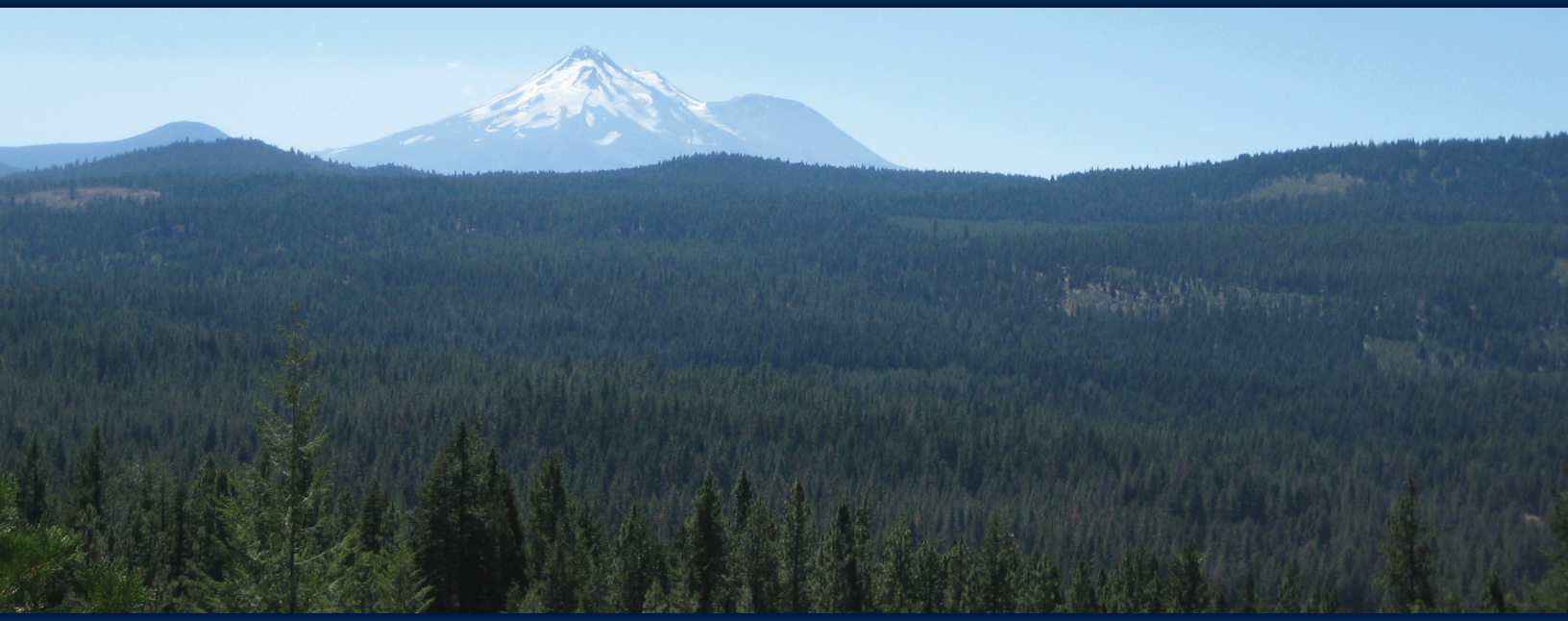
FINAL

Environmental Impact Statement for Authorization for Incidental Take and Implementation of Fruit Growers Supply Company's Multi-Species Habitat Conservation Plan



LEAD AGENCIES

NOAA National Marine Fisheries Service
United States Fish and Wildlife Service

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Lead Agencies:

NOAA National Marine Fisheries Service
United States Fish and Wildlife Service

Environmental Impact Statement for Authorization for Incidental Take and Implementation of Fruit Growers Supply Company's Multi-Species Habitat Conservation Plan

Final

June 2012

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Preface

Introduction

This Final EIS addresses the potential environmental effects that could result from implementing the Fruit Growers Supply Company (FGS) Multi-Species Habitat Conservation Plan (HCP or proposed action), and reflects any modifications to the Draft EIS based on public comments. The Final EIS has been prepared in accordance with the National Environmental Policy Act (NEPA). The National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Fish and Wildlife Service (USFWS), collectively the "Services," are the Lead Agencies under NEPA for issuance of the Incidental Take Permits (ITPs) described below.

Organization of the Final EIS

This document is organized as follows:

Preface – The preface summarizes the organization of the Final EIS, where the document is in the NEPA process, the public processes that have occurred to date, and major changes that were made to the Final EIS and HCP from the publication of the Draft EIS and HCP.

EIS – The Final EIS presents changes that were made to the text of the Draft EIS in response to public and agency comments. Volume 1 of the Final EIS contains the environmental analysis, including revisions to the Draft EIS as a result of public and agency comments. Volume 1 of the Final EIS also contains the following appendices:

- Appendix A – Regulatory Framework
- Appendix B – Summary of Scoping Comments
- Appendix C – USFWS Special-Status Species Lists
- Appendix D – Notice of Availability for the Draft EIS
- Appendix E – Fisher Spatial Analysis.

Volume 2 of the Final EIS contains the following appendix:

- Appendix F – Comments on the Draft EIS received during the public comment period and responses to comments.

Summary of Scoping and the Public Review Process

Public Scoping

The Services published a Notice of Intent (NOI) in the Federal Register on Friday, February 22, 2008, to advertise the Services' intent to prepare an EIS and to announce the public scoping meetings. The NOI provided information on the background and purpose of the proposed action and provided preliminary information about the public scoping meetings. The official comment period began with publication of the NOI and ended

April 7, 2008. The meetings also were advertised in local newspapers, as well as through mailings to members of the public who had previously expressed interest in the process.

Two public scoping meetings were held in March 2008 to inform the public and interested agencies about the planning process and to solicit meaningful input related to the scale, scope, and issues associated with the proposed action. The meetings also afforded the public an opportunity to communicate issues and concerns at the onset of the planning process to help develop alternatives. The public scoping meetings were held on March 11–12, 2008, in Yreka and Happy Camp, California. The meetings were structured as an open-house-style workshop, with a brief formal presentation by the Services to provide the public with an overview of the proposed action and the Draft EIS process. Following the presentation, the audience was provided the opportunity to ask questions and provide input to the agencies on specific issues of concern and alternatives to be considered in the EIS.

Public scoping was conducted to identify issues and concerns pertaining to issuance of the ITPs and the content of this Draft EIS. The scoping process involved solicitation of comments from the public, as well as feedback from other agencies, tribal groups, and organizations. Appendix B of this Final EIS contains a more detailed summary of scoping comments received.

Draft EIS Public Review Process

The Notice of Availability (NOA) was published in the Federal Register on November 13, 2009 (Vol. 74, No. 218). A copy of the NOA is included as Appendix D of this Final EIS. The Services issued a news release on the same day. A public meeting was held on December 2, 2009 to allow for public comments on the Draft EIS. The Draft EIS public comment period closed February 11, 2010. Comments on the Draft EIS and the FGS HCP and the Services' responses to comments are included as Appendix F of this Final EIS. Major changes to the Draft EIS and the FGS HCP in response to the comments are described below. During the comment period of the Draft EIS public review process, oral comments and comment letters were received from Federal and local agencies, environmental organizations, and the general public (Table P-1). Primary issues raised in the comments related to the Draft EIS, with some additional comments received on the HCP. Changes to the Draft EIS and HCP documents as a result of these comments are described in the following section.

TABLE P-1
Commenters on the Draft EIS

Individual or Signatory	Affiliation	Letter Dated
Frances Mangels*	Individual	12/2/2009
Kenneth Ryan*	Individual	12/2/2009
Mass E-mail 1	Individuals	01/5/2010 through 02/24/10
Jim Wells	Individual	01/5/2010
American Bird Conservancy	Steve Holmer for ABC	02/3/2010
Jim Steitz	Individual	01/8/10
Lloyd Bradshaw	Individual	01/15/10

TABLE P-1
Commenters on the Draft EIS

Individual or Signatory	Affiliation	Letter Dated
Klamath Alliance for Resources and Environment	Danielle Lindler, Executive Director of KARE	01/15/10
Tim Livingston	Individual	01/15/10
Herb Baldwin	Individual	01/18/10
Ryan Hadley	Individual	01/18/10
Bruce Haynes	Individual	01/18/10
Steve Henson	For Roseburg Resource Company	01/18/10
Howard Peterson	Individual	01/18/10
Robert Hoover	Individual	01/18/10
Richard Klug	Individual	01/19/2010
Mass E-mail 2	Individuals	01/29/10 through 02/11/2010
Steve Salzman	Individual	01/31/10
KS Wild	Representatives for KS Wild	02/03/10
CDFG	Mark Stopher, Acting Regional Manager, CDFG	02/05/10
John Denton	Individual	02/05/10
Nicholas Poister	Individual	02/05/10
Michelle Marta	Individual	02/06/10
California Geological Survey	Michael Wopat, Senior Engineering Geologist, CGS	02/10/10
Center for Biological Diversity	Justin Augustine for CBD	02/11/2010
EPA	Kathleen M. Goforth, Manager Environmental Review Office Communities and Ecosystems Division, EPA	02/11/2010
Klamath River Keeper	Erica Terence for Klamath Riverkeeper	02/11/2010
North Coast RWQCB	Maggie Robinson, representing the Review Staff, RWQCB	02/11/2010

*Oral comment at December 2, 2009 public meeting.

In reviewing these comments, the Services identified ten recurring themes, which are responded to in Appendix F. When individual comments in Appendix F can be addressed (or partially addressed) by a theme response, the Appendix F responses direct the reader to the theme responses.

The following were identified as "Themes" in the comments:

- Theme 1: Sustainable Forest Management and HCP Funding
- Theme 2: Northern Spotted Owl
- Theme 3: Biased Purpose & Need Statement and Range of Alternatives
- Theme 4: Adequacy of Analysis/Lack of Data ("Hard Look")
- Theme 5: Climate Change
- Theme 6: Permit Term and Issuance of an Incidental Take Permit/No Surprises
- Theme 7: Role of the HCP in the "Recovery" of Listed Species
- Theme 8: Role of the HCP in Meeting Water Quality Standards
- Theme 9: Benefits of the HCP to Aquatic Species
- Theme 10: Support Letters

Final EIS Public Review Process

The Final EIS will be available for a 45 day public review period.

Changes to the EIS and HCP

Table P-2 summarizes changes to the Draft EIS and Table P-3 summarizes changes to the FGS HCP. These changes do not affect the analysis of impacts presented in the Draft EIS. Not all of the changes made are listed in the tables; excluded are minor spelling, punctuation, and grammatical errors that were made to the documents. The tables describe, in general terms, changes in content, intent, or explanations of commitments contained in the documents.

TABLE P-2
Changes to the Draft EIS

Description	Location
As a result of two small land sales, acreages and other calculations have been adjusted throughout the document.	Starting in Section 1.4
As a result of two small land sales, northern spotted owl demographic information has been updated. Specifically, SK553 no longer occurs on the Plan Area.	Starting in subsection 3.3.3.1
A Changed and Unforeseen Circumstances section has been added.	Subsection 2.2.5
The applicant's decision not to cover additional species in the HCP is explained.	Subsection 2.5.3
Recovery actions for the Yreka phlox are detailed.	Subsection 3.3.3.2
Land with known occurrences of Yreka phlox on FGS lands have been sold since publication of the Draft EIS and HCP. There are soils on remaining covered lands that have the potential to support phlox, which is the reason the conservation strategy has been carried forward.	Subsection 3.3.3.2
Effects of beaver activity in riverine (and salmonid) habitat are described.	Subsection 3.3.3.3
Number of stream crossings on fish-bearing streams has been revised reflecting updated information.	Subsection 3.3.3.3
Great grey owl occurrence and survey information has been added.	Subsection 3.3.4.3
Goshawk occurrence and survey information has been added.	Subsection 3.3.4.4
Information regarding fisher prey and threats and conservation status has been added.	Subsection 3.3.4.11

TABLE P-2
Changes to the Draft EIS

Description	Location
Tailed frog habitat information has been added.	Subsection 3.3.4.12
Siskiyou Mountains salamander occurrence information has been added.	Subsection 3.3.4.14
Scott Bar salamander occurrence information has been added.	Subsection 3.3.4.15
Northern red-legged frog habitat information has been added.	Subsection 3.3.4.16
Foothill yellow-legged frog habitat information has been added.	Subsection 3.3.4.17
Pacific lamprey distribution patterns are described.	Subsection 3.3.4.18
Green sturgeon has been listed as a federally threatened species since the Draft EIS was published and information on the fish species has been added.	Subsection 3.3.4.19
Management of northern spotted owl activity centers under the Proposed Action is detailed.	Subsection 4.3.2.1
Clarifications to the fisher impact analysis were added based on the spatial analysis described in Appendix E.	Subsection 4.3.3.10
Cumulative impacts resulting from climate change is detailed.	Section 5
An analysis of impacts to fisher habitat was completed.	Appendix E

TABLE P-3
Changes to the Fruit Growers HCP

Description	Location
As a result of two small land sales, acreages and other calculations have been adjusted throughout the document.	Starting in subsection 1.2
As a result of two small land sales, northern spotted owl demographic information has been updated. Specifically, SK553 no longer occurs on the Plan Area.	Starting in subsection 4.9.1.3
Table 4-5, Number of Stream Crossings on Streams in the Plan Area has been updated.	Section 4.6.2
Land with known occurrences of Yreka phlox on FGS lands have been sold since publication of the Draft EIS and HCP. There are soils on remaining covered lands that have the potential to support phlox, which is the reason the conservation strategy has been carried forward.	Sections 3.2.2 and 4.9.2.2
Role of adaptive management for terrain-specific mass wasting prescriptions has been clarified.	Sections 5.2.4.2 and 5.2.4.3
A section on training of RPFs to address issues relating to the slope stability conservation measures has been added.	Section 5.2.4.4
A definition of “wet area” has been added to the Road Management Plan - Operations Guide.	Appendix B
Clarification on the use of fords has been added to the Road Management Plan - Operations Guide.	Appendix B
Updates to road maintenance and inspection schedules have been added to the Road Management Plan - Operations Guide.	Appendix B

Executive Summary

ES-1 Introduction to the Federal Action

The National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS), collectively the "Services," have received applications from Fruit Growers Supply Company (FGS, or applicant) for Incidental Take Permits (ITPs) in accordance with Section 10(a)(1)(B) of the federal Endangered Species Act (ESA), as amended. The applicant is seeking this authorization so that activities associated with implementing the FGS Multi-Species Habitat Conservation Plan (FGS HCP or Proposed Action) comply with the ESA, while providing protection for five species that are either listed under the ESA or could become listed during the permit term (the proposed Covered Species). The proposed Covered Species and their status appear in Table ES-1.

TABLE ES-1
Proposed Covered Species

Common Name	Scientific Name	Status	
		Federal	State
Terrestrial			
Northern spotted owl	*Strix occidentalis caurina*	Threatened	None
Yreka phlox	*Phlox hirsuta*	Endangered	Endangered
Aquatic			
Coho salmon (Southern Oregon/Northern California Coast ESU)	*Oncorhynchus kisutch*	Threatened	Threatened
Steelhead (anadromous) (Klamath Mountains Province ESU)	*Oncorhynchus mykiss*	None	None
Chinook salmon (Upper Klamath and Trinity Rivers ESU)	*Oncorhynchus tshawytscha*	None	None

Note:
ESU = evolutionarily significant unit

Because the proposed issuance of ITPs would be a federal action that may significantly affect the human environment, this issuance is subject to review under the National Environmental Policy Act (NEPA). NEPA provides an interdisciplinary framework for federal agencies to evaluate environmental consequences of programs and projects over which they have discretionary authority. NMFS and the USFWS are the co-Lead Agencies under NEPA for proposed issuance of the ITPs. This Environmental Impact Statement (EIS) evaluates the impacts of issuing the ITPs and implementing the FGS HCP.

The FGS HCP was prepared to cover the continued timber harvest and various other timber management activities within the Plan Area which lie within the geographic range of the northern spotted owl, Yreka phlox, and coho salmon. The northern spotted owl and the

Southern Oregon/Northern California Coast Coho salmon evolutionarily significant unit (ESU) are federally listed as threatened. Coho salmon are also listed as threatened by the State of California. A final recovery plan for the northern spotted owl was published in May 2008 (USFWS 2008) and a revised recovery plan was published in June 2011 (USFWS 2011). The Yreka phlox is federally and state listed as endangered; the Yreka phlox final recovery plan for the species was issued in July 2006 (USFWS 2006).

Pursuant to the ESA, USFWS regulations prohibit the take of species listed as threatened or endangered, and USFWS regards the harvest of suitable habitat in areas occupied by northern spotted owls as having the potential for take in violation of the ESA. California Board of Forestry regulations restrict timber harvest operations in suitable habitat within occupied owl territories in order to prevent the take of northern spotted owls. Similarly for listed ESUs of coho salmon, NMFS and the California Department of Fish and Game (DFG) prohibit take, and consider various forest management activities (such as harvest in riparian zones, road construction, and harvest on unstable slopes) as potentially resulting in take of coho salmon. Due to the federal listing of coho salmon, timber harvest activities in riparian areas are restricted within the historic range of coho salmon. The state listing of coho salmon further restricts activities in watersheds that support coho salmon due to the implementation of new regulations such as the "Protection Measures in Watersheds with Coho Salmon." Yreka phlox is addressed in the HCP in order to be covered by the "No Surprises" assurances in the USFWS and NMFS ESA implementing regulations.

The applicant is requesting coverage for potential incidental take of covered species for a term of 50 years. The HCP would provide measures to minimize and mitigate impacts of potential incidental take of covered species through modification of the habitats upon which they depend. The applicant is proposing specific activities for which take authorization would be provided; these are described in more detail in Section 2 of this EIS. These include activities associated with timber harvest, road construction and maintenance, silviculture, stand regeneration, harvest of minor forest products, and fire prevention. In addition to the ESA and California Endangered Species Act (CESA), activities affecting the covered species occurring in the Plan Area are subject to numerous other state and federal laws. All covered activities would be implemented in accordance with the HCP and ITPs, and other applicable federal and state regulations.

ES-2 Purpose and Need

The purpose of the proposed action is to enable the applicant to continue to operate its commercial timberlands on a long-term basis while complying with the ESA.

The need for the proposed action is to provide broad protection and conservation for listed and unlisted species, while allowing the applicant to sustainably manage its timber operations over the long term. The applicant's needs and goals are to (1) provide cost-effective measures to minimize and mitigate the incidental take of listed and unlisted species that may occur on or near its lands as a result of its timber operations, and (2) ensure long-term economically feasible timber operations. The Services' needs and goals are to conserve listed and unlisted species and their habitats during the applicant's timber management activities to ensure compliance with the ESA.

ES-3 Alternatives

This EIS analyzes a No Action Alternative, the Proposed Action, Alternative A, and Alternative B. A brief summary of each alternative is provided below. Section 2.0, Proposed Action and Alternatives, provides detailed descriptions of the four alternatives.

ES-3.1 No Action Alternative

Under the No Action Alternative, the applicant would continue to conduct timber harvesting and related operations in the Plan Area in accordance with existing state and federal regulations as well as the operational and policy management actions it currently implements. The Services would not issue ITPs and, therefore, the applicant would remain subject to the prohibition on unauthorized taking of state and federally listed species as well as the provision of the California Forest Practice Rules (CFPRs) that no timber harvesting plan (THP) may be approved that would result in the unauthorized take of a listed species. Further, the applicant would remain subject to state requirements to avoid or mitigate significant adverse impacts of timber harvesting on all wildlife, including species listed or proposed for listing under the ESA and California Endangered Species Act (CESA). In addition, the applicant would remain subject to state and federal laws, such as the Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and the prohibitions on taking of certain raptors pursuant to Sections 3503.3 and 3511 of the California Fish and Game Code. The applicable regulations that provide the framework for implementing the No Action Alternative are summarized in Section 1.5 of the EIS.

Activities that would continue to occur as part of the No Action Alternative pursuant to existing laws and regulations (where incidental take is not authorized) are described in detail as components of the No Action Alternative. These include the growing, harvesting, and transporting of timber products on and off the property; conducting ancillary activities necessary to protect the property from fire, insects, disease, and vandalism; complying with various local, state, and federal laws and regulations that assess and seek to protect environmental resources (including listed fish and wildlife species); and voluntarily conducting research on wildlife and fish species and their habitats.

The following activities are associated with the applicant's timber harvesting and forest management practices under the No Action Alternative:

- Timber harvest
- Road and landing construction, maintenance, and management
- Other management activities
- Stand regeneration and improvement
- Harvest of minor forest products
- Fire prevention and suppression
- Miscellaneous activities

No take of northern spotted owl, coho salmon, or other listed species would be authorized and the Services would not issue ITPs.

ES-3.1 Proposed Action

Under the Proposed Action, USFWS would issue an ITP with a 50-year term, covering northern spotted owl. NMFS would issue an ITP, also with a term of 50 years, for three ESUs of anadromous salmonids. Under the Proposed Action, the applicant would continue to conduct timber harvesting and related operations in accordance with existing state and federal regulations, including the CFPRs, and consistent with their operational and policy management actions currently being implemented. The applicant would also implement its proposed HCP within the Plan Area. Operations within the Plan Area would be subject to the terms and conditions of the HCP and the associated Implementing Agreement (IA). While incidental take of Yreka phlox would not be authorized under the Proposed Action, the applicant addressed this species in the HCP in order to receive assurances under the "No Surprises" in the USFWS and NMFS ESA implementing regulations.

The applicant is proposing two general habitat conservation programs (terrestrial and aquatic) and two species-specific strategies (northern spotted owl and Yreka phlox). The habitat-based components focus on maintaining and increasing the value (amount and/or quality) of aquatic and terrestrial habitats used by the covered species in the Plan Area, thus enhancing survival and reproduction of the covered species. Under the Proposed Action, a system of conservation support areas would be established around owl activity centers with high conservation values based on Critical Habitat Units. The habitat-based conservation approach is augmented by species-specific objectives designed to minimize direct effects to covered species from forest management practices, minimize threats to the covered species, and contribute to the federal conservation strategies for northern spotted owl and Yreka phlox.

ES-3.2 Alternative A

Under Alternative A, USFWS would issue the applicant an ITP with a 50-year term, covering northern spotted owl. NMFS would issue an ITP, also with a term of 50 years, for three ESUs of anadromous salmonids. Under Alternative A, the applicant would continue to conduct timber harvesting and related operations in accordance with existing state and federal regulations, including the CFPRs, and the operational and policy management actions currently being implemented by the applicant. The applicant would also implement a modified HCP within the Plan Area. Operations within the Plan Area would be subject to the terms and conditions of the modified HCP and the associated IA.

This alternative differs from the Proposed Action in the manner in which conservation support areas for northern spotted owl are selected and in the level of protection to aquatic species provided by the riparian buffers (see subsection 2.3.4). Northern spotted owl conservation areas would be based on the Northwest Forest Plan (NWFP) system of late-successional reserves (LSRs) and the aquatic strategy would be based on concepts outlined in the NWFP for the protection of aquatic habitats. Under Alternative A, management and conservation measures for Yreka phlox would be the same as under the No Action Alternative.

ES-3.3 Alternative B

Under Alternative B, USFWS would issue the applicant an ITP with a 50-year term, covering northern spotted owl. NMFS would not issue an ITP for the three species of anadromous salmonids covered under the Proposed Action.

Under Alternative B, the applicant would continue to conduct timber harvesting and related operations in accordance with existing state and federal regulations, including the CFPRs and the operational and policy management actions currently being implemented by the applicant. The applicant would also implement an HCP within the Plan Area covering the northern spotted owl. Operations within the Plan Area would be subject to the terms and conditions of the modified HCP and the associated IA.

Alternative B provides a different approach to northern spotted owl conservation by providing moderate quality foraging and dispersal habitat across the applicant's ownership as mitigation for incidental take of owls. In this manner, conservation would be achieved by landscape-level actions rather than by preserving specific owl habitat within home ranges. The terrestrial conservation program in the Alternative B modified HCP would not include conservation measures for Yreka phlox, and there would not be an aquatic species conservation program. Species protection measures for Yreka phlox and anadromous salmonids would be the same as under the No Action Alternative.

ES-4 Potential Effects of Alternatives

The potential environmental effects associated with the four alternatives are summarized in Table ES-2 and are described in detail in Section 4.0, Environmental Consequences.

TABLE ES-2
Summary of Potential Impacts

Category	No Action	Proposed Action	Alternative A	Alternative B
Geology				
Hillslope mass wasting	Slight reduction resulting from implementation of CFPRs, including "ASP Rules"	Greater reductions through implementation of slope-stability measures	Similar to No Action Alternative	Similar to No Action Alternative
Road-related sediment production	Reduction over time as roads are maintained, upgraded, and decommissioned on a THP-by-THP basis	Greater reductions through implementation of the Road Management Plan – Operations Guide	Similar to No Action Alternative	Similar to No Action Alternative
Surface erosion	Slight reduction resulting from implementation of CFPRs, including "ASP Rules"	Similar to No Action Alternative	Greater reduction due to wider, no-harvest riparian buffers	Similar to No Action Alternative
Water Resources				
Surface and groundwater hydrology	No change from existing conditions	Improvements due to reduction in clearcut acres and road management measures	Improvement due to wider, no-harvest riparian buffers	Improvements due to reduction in clearcut acres
Water temperature	Slight decreases as canopy coverage increases	Similar to No Action with greater reductions in Class A lands	Similar to No Action with greater reductions due to wider, no-harvest riparian buffers	Similar to No Action Alternative
Sediment	Slight reduction resulting from implementation of CFPRs, including "ASP Rules"	Greater reductions through implementation of slope-stability and road management measures	Greater reduction due to wider, no-harvest riparian buffers	Similar to No Action Alternative
Nutrients	Generally maintained at existing levels, possible reduction in sediment-bound nutrients	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Dissolved oxygen	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative

TABLE ES-2
Summary of Potential Impacts

Category	No Action	Proposed Action	Alternative A	Alternative B
Biological Resources – Covered Species				
Northern spotted owl	No change from existing conditions	Improved demographic support through 24 CSAs	Improved demographic support through 26 CSAs	Improved demographic support at landscape level
Yreka phlox	No change from existing conditions	Greater protection through the addition of botanical surveys to identify undiscovered phlox populations, use of certified weed-free mulch within the EEZs established around Yreka phlox occurrences, and restrictions on the felling and yarding of trees within the EEZs	Similar to No Action Alternative	Similar to No Action Alternative
Anadromous salmonids	General improvement in aquatic habitat conditions	Greater improvements in aquatic habitat conditions through reductions in sediment and increased LWD	Greater improvements in aquatic habitat conditions through reductions in sediment and increased LWD	Similar to No Action Alternative
Biological Resources – Other Species				
Bald eagle	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Western yellow-billed cuckoo	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Great gray owl	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Northern goshawk	No change from existing conditions	Increase in highly suitable habitat	Increase in highly suitable habitat	Increase in highly suitable habitat
Osprey	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Golden eagle	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Greater sandhill crane	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative

TABLE ES-2
Summary of Potential Impacts

Category	No Action	Proposed Action	Alternative A	Alternative B
American peregrine falcon	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Long-eared myotis bat	No change from existing conditions	Increase in highly suitable habitat	Increase in highly suitable habitat	Similar to No Action Alternative
Long-legged myotis bat	No change from existing conditions	Increase in foraging habitat	Increase in foraging habitat	Similar to No Action Alternative
Fisher	Maintenance of resting/denning habitat; increased foraging habitat	General improvement in habitat quality and decreased fragmentation	General improvement in habitat quality and decreased fragmentation	Increased resting/denning habitat; reduction in foraging habitat and fragmentation
Tailed frog	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Southern torrent salamander	No change from existing conditions	Marginally greater protection in riparian areas	Marginally greater protection in riparian areas	Similar to No Action Alternative
Siskiyou Mountains salamander	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Scott Bar salamander	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Northern red-legged frog	No change from existing conditions	Marginally greater protection in riparian areas	Marginally greater protection in riparian areas	Similar to No Action Alternative
Foothill yellow-legged frog	No change from existing conditions	Marginally greater protection in riparian areas	Marginally greater protection in riparian areas	Similar to No Action Alternative
Pacific lamprey	General improvement in aquatic habitat conditions	Greater improvements in aquatic habitat conditions through reductions in sediment	Greater improvements in aquatic habitat conditions through reductions in sediment	Similar to No Action Alternative

TABLE ES-2
Summary of Potential Impacts

Category	No Action	Proposed Action	Alternative A	Alternative B
Special-Status Plant Species				
Gentner's fritillary	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Siskiyou mariposa lily	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Applegate's milkvetch	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Socioeconomics and Environmental Justice				
Socioeconomic conditions	Possible future reduction in timber harvest volume	Marginal benefits compared to No Action Alternative	Similar to No Action Alternative	Marginal benefits compared to No Action Alternative
Environmental justice	No change from existing conditions	Marginal benefits compared to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Air Quality				
Air quality	No change from existing conditions	Marginal benefits compared to No Action Alternative	Similar to No Action Alternative	Marginal benefits compared to No Action Alternative
Climate change	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Cultural Resources				
Cultural resources	Increase in disturbance compared to existing conditions	Marginal benefits compared to No Action Alternative	Similar to No Action Alternative	Marginal benefits compared to No Action Alternative
Land Use				
Land use	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative

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Acronyms and Abbreviations

°F	degree(s) Fahrenheit
µg/m^3	microgram(s) per cubic meter
AB	Assembly Bill
ASP	Anadromous Salmonid Protection
APCD	Air Pollution Control District
APE	Area of Potential Effect
ARB	California Air Resources Board
BLM	Bureau of Land Management
BMP	best management practice
BOF	Board of Forestry and Fire Protection
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standard
CAL FIRE	California Department of Forestry and Fire Protection
CGS (CDGM)	California Geological Survey (previously California Department of Mines and Geology)
CDPR	California Department of Pesticide Regulation
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFPR	California Forest Practice Rule
cfs	cubic feet per second
CH_4	methane
CHU	Critical Habitat Unit
CO	carbon monoxide
CO_2	carbon dioxide
CSA	Conservation Support Area
CWHR	California Wildlife Habitat Relationships System
dbh	diameter at breast height

DFG	California Department of Fish and Game
DOF	California Department of Finance
DPM	diesel particulate matter
EDD	Employment Development Department
EEZ	equipment exclusion zone
EIS	Environmental Impact Statement
ELZ	equipment limitation zone
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionary Significant Unit
FGS	Fruit Growers Supply Company
Forest Practice Act	Z'Berg-Nejedly Forest Practice Act
GHG	Greenhouse gas
GIS	Geographic Information System
HAP	hazardous air pollutant
HCFC	hydrochlorofluorocarbon
HCP	habitat conservation plan
HFC	hydrofluorocarbon
IA	Implementing Agreement
ITP	Incidental Take Permit
KNF	Klamath National Forest
LSR	late-successional reserve
LWD	large woody debris
mi/mi^2	mile(s) per square mile
MWHZ	mass wasting hazard zone
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEIC	Northeast Information Center
NEPA	National Environmental Policy Act

NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOI	Notice of Intent
NO_x	oxides of nitrogen
NWFP	Northwest Forest Plan
O_3	ozone
PFC	perfluorocarbon
PM_{10}	particulate matter less than 10 microns in aerodynamic diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in aerodynamic diameter
ppm	part(s) per million
qmd	quadratic mean diameter
RMP	road management plan
ROD	Record of Decision
ROG	reactive organic gas
RPF	registered professional forester
RWQCB	Regional Water Quality Control Board
SCI	Stream Condition Inventory
SF_6	sulfur hexafluoride
SIP	State Implementation Plan
SMARA	Surface Mining and Reclamation Act of 1975
SO_2	sulfur dioxide
STZ	Special Treatment Zone
T&I Watershed	watershed with threatened or impaired values
TAC	toxic air contaminant
the "Services"	National Marine Fisheries Service and U.S. Fish and Wildlife Service
THP	timber harvesting plan
TMDL	Total Maximum Daily Load
TPA	California Timberland Productivity Act
TPZ	timberland production zone

USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WLPZ	Watercourse and Lake Protection Zone
WMA	Weed Management Area

CHAPTER 1

Introduction/Purpose and Need

The National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) are responding to applications by Fruit Growers Supply Company (FGS, or the applicant) for Incidental Take Permits (ITPs, or permits). This Environmental Impact Statement (EIS) addresses the potential environmental effects that may occur if NMFS and the USFWS (collectively the "Services") approve the applications. The EIS has been prepared in accordance with the National Environmental Policy Act (NEPA).

1.1 Introduction to the Federal Action

The Services received applications from FGS for ITPs pursuant to Section 10(a)(1)(B) of the federal Endangered Species Act (ESA). The ITPs would authorize incidental take of covered species on the applicant's commercial timberland in Siskiyou County, California (Figure 1-1). As part of the application process, FGS prepared a habitat conservation plan (HCP) that specifies (1) the impacts likely to result from the taking of the covered species and the measures FGS would undertake to minimize and mitigate such impacts, (2) how the HCP would be funded, and (3) alternatives to the HCP. The Services will consider the HCP, together with this EIS and public comments received, for possible issuance of ITPs. After the Services issue this EIS and each approve and sign a Record of Decision (ROD), separate permits would be issued from each agency. This process ensures that the effects of the authorized incidental take will be minimized and mitigated to the maximum extent practicable.

The applicant manages its forestlands for timber production and other purposes pursuant to California's Timberland Productivity Act, the Z'Berg-Nejedly Forest Practice Act (Forest Practice Act), the Board of Forestry and Fire Protection's (BOF) implementing rules and regulations for management of private forestlands, various other state laws, and its internal management policies and guidelines. The purpose of the habitat conservation planning process and subsequent issuance of ITPs is to authorize the incidental take of threatened or endangered species, not to authorize the underlying lawful activities that result in take. Thus, ITPs do not exempt the applicant from other regulatory review by federal, state, or local agencies on specific projects.

The ITP applications request authorization for the incidental take of two federally listed species (northern spotted owl and coho salmon) that is incidental to FGS's harvesting operations, and for two currently unlisted species (Chinook salmon and Klamath Mountains Province steelhead) should they become listed within the 50-year permit period. Incidental take of listed plant species on private lands is not prohibited under the ESA and is therefore not authorized under an ITP; however, the application to USFWS also requests that the ITP list the Yreka phlox, a federally listed plant species, as a Covered Species, in recognition of the conservation benefits provided for the species under the HCP and for purposes of extending assurances to FGS for that species under the "No Surprises" assurances rule. NMFS has management authority for the three species of salmonids, while USFWS has

management authority for northern spotted owl and Yreka phlox. Table 1-1 presents the fish and terrestrial species that would be covered under federal incidental take permits.

TABLE 1-1
Aquatic and Terrestrial Species that would be Covered under Federal Incidental Take Permits

Species Common Name (*Scientific Name*)	Listing Status Within the Plan Area	
	Federal	**State**
Terrestrial		
Northern spotted owl (*Strix occidentalis caurina*)	Threatened	None
Yreka phlox (*Phlox hirsuta*)	Endangered	Endangered
Aquatic		
Coho salmon (*Oncorhynchus kisutch*) Southern Oregon/Northern California Coast ESU	Threatened	Threatened
Steelhead (anadromous) (*Oncorhynchus mykiss*) Klamath Mountains Province ESU	None	None
Chinook salmon (*Oncorhynchus tshawytscha*) Upper Klamath and Trinity Rivers ESU	None	None

Note:
ESU = evolutionarily significant unit

The Services have determined that issuance of ITPs for affected species constitutes a major federal action that triggers the NEPA requirement for the analysis and disclosure of the potential environmental impacts that could be associated with the issuance of ITPs. Pursuant to NEPA, the environmental consequences of the proposed federal actions and alternatives are analyzed in this EIS, with USFWS and NMFS as co-lead agencies.

1.2 Purpose and Need of the Federal Action

1.2.1 Purpose

The purpose of the proposed action is to enable the applicant to continue to operate its commercial timberlands on a long-term basis while complying with the ESA.

1.2.2 Need

The need for the proposed action is to provide broad protection and conservation for listed and unlisted species, while allowing the applicant to sustainably manage its timber operations over the long term. The applicant's needs and goals are to (1) provide cost-effective measures to minimize and mitigate the incidental take of listed and unlisted species that may occur on or near its lands as a result of its timber operations, and (2) ensure long-term economically feasible timber operations. The Services' needs and goals are to conserve listed and unlisted species and their habitats during the applicant's timber management activities to ensure compliance with the ESA.

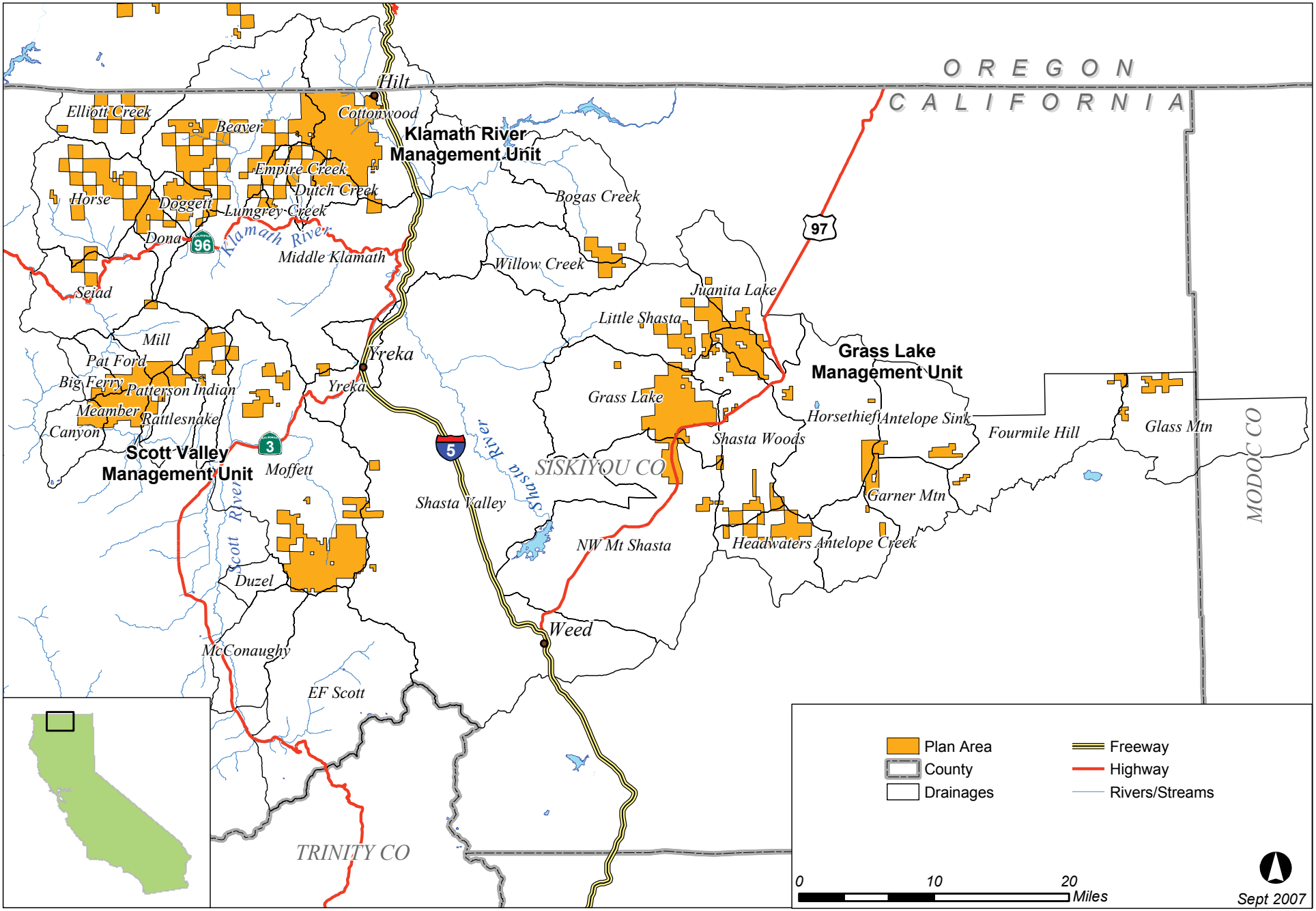


FIGURE 1-1
Plan Area Including Drainages

1.3 Decisions to Be Made

The Services must decide whether to issue, issue with conditions, or deny the ITP applications pursuant to Section 10(a)(1)(B) of the ESA. Pursuant to Section 10(a)(2)(B), the applicant is required to prepare an HCP, and in reaching its decision to issue an ITP, the Services must find that:

- The taking will be incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking.
- The applicant will ensure that adequate funding for the conservation plan will be provided.
- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and
- Other measures that the Services may require as necessary or appropriate for purposes of the conservation plan will be met and plan implementation will be assured.

1.4 Plan Area

The Plan Area includes the applicant's Hilt/Siskiyou ownership in northern California. The 152,178-acre ownership lies in Siskiyou County (Figure 1-1). The applicant manages its ownership in three management units—Klamath River (65,339 acres), Scott Valley (39,153 acres), and Grass Lake (47,686 acres). The Klamath River and Scott Valley management units are west of Interstate 5, adjacent to and intermixed with Klamath National Forest (KNF) lands. The Grass Lake management unit (also adjacent to the KNF) lies east of Interstate 5 and predominantly north of U.S. Highway 97. All lands owned by FGS in the Klamath River, Scott Valley, and Grass Lake management units are referred to as the Plan Area.

1.4.1 Plan Area Drainages

For purposes of the HCP, individual "drainages" containing the Plan Area (see Figure 1-1) were identified using CALWATER watersheds, which are standardized watershed boundaries established by the California Interagency Watershed Mapping Committee, led by NRCS and USGS partnering with state resources agencies. Typically, they are relatively small areas (2,500 to 10,000 acres) that include a major stream segment and its tributaries. Multiple CALWATER watersheds were combined into drainages that encompass the area from the stream's headwaters to the confluence with the Scott, Klamath, or Shasta rivers. For two drainages (Cottonwood Creek and Beaver Creek), the corresponding USFS watershed boundaries were used because CALWATER watershed designations do not extend into Oregon where these streams originate.

1.4.2 Modifications to the Plan Area

Minor modifications to the Plan Area could occur in order to accommodate relatively limited changes in land ownership. Throughout its corporate history, FGS has commonly purchased additional timberland, as well as sold timberlands within the Plan Area. The applicant could acquire additional property and commit to managing the new property consistent with the HCP, and incidental take coverage would be extended following modification of the ITP. Similarly, the applicant could sell property, and incidental take coverage would continue to apply if the ITPs are transferred to the new owner. Expansion of the Plan Area under this process is limited to a total of 10 percent of the existing ownership (approximately 15,000 acres) and does not require an amendment to the HCP or ITPs. The amount of land in the Plan Area that may be sold or transferred is unlimited, provided that the new owner(s) apply for and receive authorization for transfer of the Permits (see Subsection 8.4.6 of the HCP). If the new owner(s) choose not to apply for a permit transfer, then the sale or transfer of more than 10 percent of the Initial Plan Area (approximately 15,000 acres) will require FGS to apply for an amendment to the HCP and ITPs.

As described in the HCP, the extension of incidental take coverage to newly acquired property is limited to other privately owned timberlands within the general area of the applicant's existing ownership (specifically, within the same drainages). These areas—forested landscapes within the Klamath, Scott, and Shasta River watersheds—would be very similar in terms of environmental setting and characteristics to the existing FGS ownership. For this reason, the description of the Plan Area in Chapter 3 (Affected Environment), and the description of impacts in Chapter 4 (Environmental Consequences) and Chapter 5 (Cumulative Effects), is expected to be sufficiently complete to obviate the need for additional NEPA review for limited property acquisitions or sales.

1.5 Other Applicable State and Federal Laws and Regulations

Timber harvest-related activities on private lands are subject to numerous federal and state regulations and other applicable guidelines. Key relevant state regulations and guidelines applicable to management activities on the applicant's lands in northern California, and those associated with issuance of an ITP by the Services, are summarized in Table 1-2. In essence, these laws and regulations establish what are "otherwise lawful activities" pursuant to which any take that is authorized under the ITP must be incidental. In addition, laws that do not directly control these issues but are related also are included in Table 1-2. Appendix A provides more detailed descriptions of the applicable laws and regulations.

TABLE 1-2
Laws and Regulations Applicable to Timber Harvest within the Plan Area

Requirement	Applicability	How Conformance is Achieved
Federal		
Endangered Species Act, Section 9 and Section 4(d)	Section 9 prohibits take of endangered species. Section 4(d) includes a provision to extend take prohibitions to threatened species (e.g., northern spotted owl) and evolutionarily significant units (e.g., Southern Oregon/Northern California Coast coho salmon).	FGS has submitted an ITP application. See “Decisions to be Made” above.
Endangered Species Act, Section 10	Authorizes USFWS and NMFS to issue permits to non-federal entities allowing incidental take of endangered or threatened species. Incidental take authorization can be extended to unlisted species.	FGS has submitted an ITP application. See “Decisions to be Made” above.
Endangered Species Act, Section 7	Authorizes USFWS and NMFS to allow take of endangered or threatened species by federal entities, or through federal funding or permitting.	USFWS and NMFS will undergo internal Section 7 consultation on the proposed federal action to issue ITPs.
National Environmental Policy Act	Requires an EIS for “major federal actions significantly affecting the quality of the human environment.”	This EIS has been prepared to comply with NEPA for the proposed federal action of issuing ITPs.
Magnuson-Stevens Fishery Conservation and Management Act	Actions by NMFS must consider “essential fish habitat,” including rivers used by anadromous fish.	NMFS’ action to issue an ITP is subject to internal consultation regarding effects to essential fish habitat for coho and Chinook salmon.
Migratory Bird Treaty Act	In accordance with United States treaties, makes it is unlawful to pursue, hunt, capture, kill, or possess migratory birds.	An ITP also constitutes a Special Purpose Permit under the Migratory Bird Treaty Act.
Clean Water Act	Regulates the impairment of beneficial uses of waterways through individual permits or by watershed standards called Total Maximum Daily Loads.	General compliance with CFPRs. Participation in timber harvest planning by North Coast Regional Water Quality Control Board.
Clean Air Act	Section 309 authorizes the U.S. Environmental Protection Agency (EPA) to review and comment on the environmental impact of major federal actions.	This EIS was sent to EPA for review and comment.
National Historic Preservation Act	Requires federal agencies to consider the effects of a proposed undertaking on cultural resources listed or eligible for listing on the National Register of Historic Places.	The Services has consulted with the State Historic Preservation Officer (and tribal officials as necessary) prior to issuing ITPs.

TABLE 1-2
Laws and Regulations Applicable to Timber Harvest within the Plan Area

Requirement	Applicability	How Conformance is Achieved
State		
California Forest Practice Act and Forest Practice Rules	The primary regulations controlling timber operations on private lands in California. See Section 2.1, No Action Alternative.	Applicant will continue to conduct timber operations consistent with the CFPRs except where superseded by the ITP or where rules allow exemptions with an approved HCP.
California Environmental Quality Act	Requires an environmental impact report for state actions, focusing on a project's significant effects on the environment, alternatives to the project, and the manner in which significant environmental effects can be mitigated or avoided.	Timber harvest plans prepared consistent with the CFPRs are "functionally equivalent" CEQA documents.
Porter-Cologne Water Quality Control Act	Authorizes Regional Water Quality Control Boards to establish water quality objectives to protect beneficial uses of water.	Compliance with CFPRs. Participation in timber harvest planning by North Coast Regional Water Quality Control Board.
Fish and Game Code – Streambed Alteration	Activities within streambeds are subject to authorization by the California Department of Fish and Game (DFG).	Applications for streambed alteration authorization will be obtained as part of the timber harvest planning process.
California Endangered Species Act	Provides regulatory authority for DFG to protect species listed as rare, threatened, or endangered.	Compliance with CFPRs. Participation in timber harvest planning by DFG.
Native Plant Protection Act	Provides regulatory authority to DFG to designate native plants as rare or endangered.	Notify DFG at least 10 days prior to disturbance to allow for salvage of rare or endangered native plants.

1.6 Coordination with Agencies and Public Scoping

1.6.1 Public Scoping

Public scoping was conducted to identify issues and concerns pertaining to issuance of the ITPs and the content of this EIS. The scoping process involved solicitation of comments from the public, as well as feedback from other agencies, tribal groups, and organizations. Appendix B contains a more detailed summary of scoping comments received.

1.6.1.1 Dates and Times of Scoping Meetings

The Services published an NOI in the Federal Register on Friday, February 22, 2008, to advertise the Services' intent to prepare an EIS and to announce the public scoping meetings. The NOI provided information on the background and purpose of the proposed action, provided preliminary information about the public scoping meetings, and advised that public comment would be requested upon completion of the draft EIS. The official comment period began with publication of the NOI and ended April 7, 2008. The meetings also were advertised in local newspapers, as well as through mailings to members of the public who had previously expressed interest in the process.

Two public scoping meetings were held in March 2008 to inform the public and interested agencies about the planning process and to solicit meaningful input related to the scale, scope, and issues associated with the proposed action. The meetings also afforded the public an opportunity to communicate issues and concerns at the onset of the planning process to help develop alternatives. The public scoping meetings were held on March 11–12, 2008, in Yreka and Happy Camp, California. The meetings were structured as an open-house-style workshop, with a brief formal presentation by the Services to provide the public with an overview of the proposed action and the EIS process. Following the presentation, the audience was provided the opportunity to ask questions and provide input to the agencies on specific issues of concern and alternatives to be considered in the EIS.

1.6.1.2 Scoping Comments

As a result of the scoping process, approximately 140 total comments were received. The comments were compiled from seven letters, three e-mails, and two comment cards, all of which are on file with the lead agencies. The commenters are identified in Table 1-3.

TABLE 1-3
Agencies, Organizations, and Individuals Who Submitted Scoping Comments

K.S. Wild	U.S. Environmental Protection Agency	Richard Nauman
Department of Fish and Game	B. Sachau	Lani DeRose
Karuk Tribe	Oregon Wild	Quartz Valley Tribe
Klamath RiverKeeper	Timber Products Company	Francis Mangels

Comments on the EIS were grouped into nine categories as shown in Table 1-4.

TABLE 1-4
Scoping Comment Categories

Category	Number of Comments
Biological Resources	41
Hydrology and Water Quality	26
Cumulative Impacts	26
Cultural Resources	6
Suggested Alternatives	5
Vegetation	3
Purpose and Need	3
Social and Economic Effects	1
General Comments	27

The Services considered all scoping comments during the preparation of this EIS. In some cases, it was not necessary or appropriate to address the comments in the EIS. Most comments, however, influenced the scope and content of this document.

1.6.2 Issue Areas to be Analyzed

Based on the scoping process and internal coordination, the Services selected a range of environmental resources to consider in this EIS. The resources to be considered are: Geology, Water Resources, Biological Resources, Air Quality, Socioeconomics and Environmental Justice, Cultural Resources, and Land Use. The Services selected these resources based on their potential to be affected by the federal action (approval of the ITPs and FGS timber operations under the HCP) and the likely extent of the effect. Consistent with NEPA, potential impacts to these resources are described in terms of direct, indirect, and cumulative effects.

The Services considered the potential effects of the federal action on other environmental resources, and determined that the EIS does not need to discuss these other resources in detail because there would be no or very limited potential for effects. These other resources, and the reasons they are excluded from detailed analysis, are as follows.

- **Aesthetics.** Timber harvesting can result in adverse impacts to visual resources depending on the visibility of the harvest area. All alternatives would result in variations in the type and extent of harvest activities, but these variations do not change the primary use of the Plan Area as productive timberland. Because all alternatives involve continued timber harvest activities on the Plan Area, no substantial changes to the existing visual setting would occur.
- **Agricultural Resources.** The Plan Area is used primarily as commercial timberlands, and this is not expected to change under any of the alternatives. The Plan Area also contains minor land uses, including 489 acres of agricultural land and 5,231 acres of rangeland (approximately 0.3 percent and 3.4 percent of the ownership, respectively). These land uses are for purposes unrelated to commercial forest management (e.g., grazing leases). No changes in these areas are anticipated under any of the alternatives.
- **Hazardous Materials.** Commercial timber operations on the Plan Area involve the use of chemicals such as gasoline and diesel fuel, herbicides, and fertilizers. Accidents or misuse can result in the potential release of hazardous materials into the environment. All alternatives involve the continuation of timber management activities in the Plan Area in a manner similar to current conditions; therefore, no potential change in the risk of exposure to hazardous materials would occur.
- **Noise.** Timber harvesting can result in adverse noise impacts depending on the locations of sensitive noise receptors (e.g., nearby residences). Noise is generated directly by harvest activities, and indirectly by transportation of felled logs (e.g., by truck or helicopter). All alternatives would result in variations in the type and extent of harvest activities, but these variations do not change the primary use of the Plan Area as productive timberland. Because all alternatives involve continued timber harvest and related transport activities on the Plan Area, there would be no substantial changes to the existing noise setting.

- **Recreation.** The applicant allows limited use of the Plan Area for recreation (e.g., hunting and fishing) subject to written authorization, but there are no developed recreational areas. Recreation is common in the vicinity of the Plan Area, including use of developed recreation facilities (e.g., trails, campsites) on the KNF and fishing in the Klamath River and other waterways. These activities occur in the context of timber management on the Plan Area, other private timberlands, and the nearby National Forests. All alternatives would result in variations in the type and extent of harvest activities, but these variations do not change the primary use of the Plan Area as productive timberland. Because all alternatives involve continued timber harvest and related transport activities, there would be no substantial changes to the existing environment for recreation.
- **Transportation.** Timber harvesting generates traffic on local roadways, primarily from logging trucks transporting felled logs from the Plan Area to their destination. Truck traffic can result in adverse impacts to public safety (e.g., turning movements onto public roads) and to the local roads themselves (e.g., from wear-and-tear). All alternatives would result in variations in the type and extent of harvest activities, but the overall amount of truck traffic is expected to be similar because the overall volume of timber extracted would be similar under all alternatives. Because all alternatives involve continued timber harvest, and related transport activities would remain at similar levels across the Plan Area, there would be no substantial changes to the existing traffic conditions.

CHAPTER 2

Proposed Action and Alternatives

NEPA requirements for alternatives analysis (40 CFR 1502.14) direct federal agencies to consider a range of alternatives that could accomplish the agency's purpose and need and to present those alternatives in comparative form in the EIS. Four alternatives are considered in this EIS, as briefly described in Table 2-1 and compared in Section 2.6. The No Action Alternative and the two action alternatives represent a reasonable range of alternatives to the Proposed Action. Additional alternatives were considered; those eliminated from detailed evaluation are summarized in Section 2.5.

TABLE 2-1
Alternatives Analyzed in Detail in the EIS

Alternatives	Brief Description
No Action	The Services would not issue any ITPs and the HCP would not be implemented. The applicant's operations would be consistent with existing regulatory standards (for example, the CFPRs). In the 2012 CFPR's, "Protection and Restoration of the Beneficial Functions of the Riparian Zone in Watersheds with Listed Anadromous Salmonids" (CFPR 916.9, 936.9) commonly referred to as the Anadromous Salmonid Protection (ASP) Rules, would be implemented in watersheds with threatened or impaired values. Take of northern spotted owl, coho salmon, or other listed species would not be authorized.
Proposed Action	USFWS would issue an ITP for northern spotted owl; NMFS would issue an ITP for Chinook salmon, coho salmon, and steelhead. The applicant's operations and activities would be subject to the terms and conditions of the proposed HCP as well as existing regulatory standards. Northern spotted owl conservation areas would be based on Critical Habitat Units (CHUs) identified in the Proposed Revised Designation of Critical Habitat for the Northern Spotted Owl (72 FR 32450-32516). The Aquatic Species Conservation Program would be based on "Measures to Facilitate Incidental Take Authorization in Watersheds with Coho Salmon," "Protection Measures in Watersheds with Coho Salmon," and standard CFPR measures. Assurances to FGS for 50 years if in compliance with terms and conditions of the ITPs.
Alternative A	USFWS would issue an ITP for northern spotted owl; NMFS would issue an ITP for Chinook salmon, coho salmon, and steelhead. The applicant's operations and activities would be subject to the terms and conditions of the modified HCP as well as existing regulatory standards. Northern spotted owl conservation areas would be based on the Northwest Forest Plan (NWFP) system of late-successional reserves (LSRs) and the Aquatic Species Conservation Program would be based on concepts outlined in the NWFP for the protection of aquatic habitats.
Alternative B	USFWS would issue an ITP for northern spotted owl, with spotted owl conservation based on management of foraging and dispersal habitat across the Plan Area. The applicant's operations and activities would be subject to the terms and conditions of an owl HCP as well as existing regulatory standards. Salmonid conservation would be based on the CFPR requirements for watersheds with listed anadromous salmonids (14 CCR 895.1), (ASP Rules), but NMFS would not issue an ITP for Chinook salmon, coho salmon, and steelhead.

As required by NEPA, this EIS compares the Proposed Action and the other two action alternatives with the No Action Alternative. The No Action Alternative is the benchmark against which the effects of all other alternatives are measured.

2.1 No Action Alternative

This alternative has been developed to evaluate conditions as they would occur over the next 50 years if the agencies did not issue permits for incidental take of northern spotted owl, Chinook salmon, coho salmon, and steelhead and the applicant did not implement an HCP. Under this alternative, the applicant would continue to conduct timber harvesting and related operations in the Plan Area in accordance with existing state and federal regulations as well as the operational and policy management actions it currently implements. The applicant would remain subject to the prohibition on unauthorized taking of state and federally listed species as well as the provision of the CFPRs that no timber harvesting plan (THP) may be approved that would result in the unauthorized take of a listed species. Further, the applicant would remain subject to state requirements to avoid or mitigate significant adverse impacts of timber harvesting on all wildlife, including species listed or proposed for listing under the ESA and California Endangered Species Act (CESA). In addition, the applicant would remain subject to state and federal laws, such as the Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and the prohibitions on taking of certain raptors pursuant to Sections 3503.3 and 3511 of the California Fish and Game Code. The applicable regulations that provide the framework for implementing the No Action Alternative are summarized in Section 1.5.

Activities that would continue to occur as part of the No Action Alternative pursuant to existing laws and regulations (where incidental take is not authorized) are described in detail as components of the No Action Alternative. These include the growing, harvesting, and transporting of timber products on and off the property; conducting ancillary activities necessary to protect the property from fire, insects, disease, and vandalism; complying with various local, state, and federal laws and regulations that assess and seek to protect environmental resources (including listed fish and wildlife species); and voluntarily conducting research on wildlife and fish species and their habitats.

The following activities are associated with the applicant's timber harvesting and forest management practices under the No Action Alternative:

- Timber harvest
- Road and landing construction, maintenance, and management
- Other management activities:
  - Stand regeneration and improvement
  - Harvest of minor forest products
  - Fire prevention and suppression
  - Miscellaneous activities

These activities are described below, followed by a discussion of specific conservation measures for northern spotted owl, Yreka phlox, and anadromous salmonids that would be applied to avoid adverse effects to these species.

2.1.1 Timber Harvest

The applicant manages its forestlands for the primary purpose of growing and harvesting timber that is subsequently milled to produce various commercial wood products. Timber

management is the primary activity in the Plan Area, which encompasses 152,178 acres in Siskiyou County. The applicant has implemented a schedule and rate of tree harvesting that seeks to balance timber harvesting with replacement tree growth. Under the No Action Alternative, no ITPs would be issued. Under the No Action Alternative, habitat modification that results in take of northern spotted owl would not be permitted. With this restriction, the Services expect that the applicant would maintain younger forest stands and preclude development of the complex forest structure necessary for northern spotted owl nesting/roosting and foraging habitat. The take prohibitions for northern spotted owl and coho salmon would result in the applicant needing to harvest intensively across a large area in order to achieve its timber harvest goals. Widespread harvest would result in more disturbance in upland and riparian forests. This would result in both short- and long-term changes to the forest structure that could alter habitat conditions for terrestrial and aquatic species. The resulting forest landscape over time would become younger and more fragmented, yielding less sustainable volume of lower-quality products (smaller trees). Over time, it is expected that overall harvest levels would decrease as insufficient timber volume would remain on the forest landscape to maintain current harvest levels.

Timber harvest includes activities necessary for the logging and transport of timber products, including the felling, bucking, and yarding of timber, and salvage and transport of timber products. Timber felling includes cutting trees (felling) and cutting the felled tree into predetermined log lengths (bucking). Felling and bucking are generally done with chain saws by crews working in pairs. On gentle terrain, mechanical felling machines (feller-bunchers) are used to fell the trees and place them in a pile for skidding to the log landing. To move logs from where they are felled or piled to the log landing, the applicant generally uses tractor-based systems on relatively gentle terrain, cable yarders on steeper slopes, and helicopters in areas where access is otherwise prohibitive. These activities are fully described in Section 2.1 of the proposed HCP.

Dead, dying, and downed trees are periodically salvaged. Salvage is primarily related to road maintenance or fire, insect, or storm damage. Generally the economics and logistics involved in the potential harvest determine the feasibility of salvage operations. Salvage operations are feasible when damaged or weakened trees occur adjacent to ongoing logging operations, or are in heavy enough concentrations over a large enough area to justify using a salvage logger. It is typically not feasible to harvest individual occurrences of one or two trees, or trees that have been dead for more than two years. Salvage operations typically occur in isolated locations throughout the Plan Area, and consist of harvesting dead and dying conifers as individuals or in small groups.

2.1.2 Road and Landing Construction, Maintenance, and Management

Under the No Action Alternative, the applicant's activities for maintenance, improvement, construction, and closure of roads and landings would include the following:

- Construction of new roads in connection with timber management, including clearing vegetation from road rights-of-way, removing trees, grubbing (removing stumps and surface organics), grading, and compaction. New roads would be no wider than a single-lane compatible with the largest type of equipment specified for use, with adequate turnouts as required for safety.

- Extraction of rock, sand, and gravel from small borrow pits for use in road construction and maintenance.
- Drainage facility repair and/or upgrade, and erosion control.
- Construction of stream crossing (bridges, culverts, fords, and a variety of temporary crossings).
- Maintenance or reconstruction of surfaced roads, seasonal roads, culverts, bridges, fords, cuts, and fillslopes.
- Closure of roads, temporarily (abandoned) or permanently (decommissioned), and appropriate mitigation to minimize effects of erosion caused by long-term occupancy.
- Dust abatement activities, such as treating road surfaces with materials commonly used for dust abatement, including but not limited to lignin, calcium chloride, magnesium chloride, and water.
- Construction and maintenance of water holes used for water drafting (a short-duration, small-pump operation that withdraws water from streams or impoundments to fill conventional tank trucks or trailers).
- Water drafting for dust abatement, road construction, and routine maintenance.

All logging roads and landings on the ownership or under the control of the applicant within the Plan Area would be planned, located, constructed, reconstructed, used, and maintained in a manner that is consistent with long-term enhancement and maintenance of the forest resource; best accommodates appropriate yarding systems, and economic feasibility; minimizes damage to soil resources and fish and wildlife habitat; and minimizes degradation of the quality and beneficial uses of water.

To this end, the applicant would use existing roads whenever feasible, strive to minimize total mileage, minimize disturbance to natural features, avoid wet areas and unstable areas, and minimize the number of watercourse crossings. Future road construction in the Plan Area is anticipated to consist primarily of short, temporary spurs designed to locate landings on stable areas outside of Watercourse and Lake Protection Zones (WLPZs). These temporary roads would generally be used for one harvest season, and then decommissioned. New road construction is anticipated to average less than 1 mile per year. The applicant quarries rock for roads on their lands and reports to rarely use serpentine soils in road construction. When serpentine is used it is tested for asbestos content and it is not used where it exceeds standards. All new roads and landings would be constructed in accordance with practices specified in the CFPRs.

Under the existing CFPRs, the applicant may develop a road management plan (RMP) in watersheds where coho salmon are known to occur. The RMP would be submitted as part of every THP and would supplement the THP process through the provision of additional information specific to the long-term management of road systems. As part of the RMP, an inventory and assessment of the road system would be conducted. If an inventory has not been completed, the RMP would include a prioritized schedule for completion of the inventory. The inventory and assessment would include the following:

- A brief description of the method used to do the inventory and assessment.
- An inventory of permanent, seasonal and temporary roads, landings, crossings, and historic roads. The inventory would include a description of roads within each Road Management Unit, and road system maps at a scale sufficient to clearly show the classification of all roads and their location relative to the beneficial uses of water and other resources that may be affected by roads and landings.
- An assessment of the road system related to location, condition, trend, and sensitivity of beneficial uses of water and other resources that may be affected by roads and landings.
- The prioritization of any proposed maintenance, repair, improvement or abandonment of individual components of the overall road system. The road management priorities shall include clear and logical links to the stated objectives and evaluation findings.
  - Road-related sediment sources, including but not limited to road segments and specific road points, will be prioritized as "High," "Medium," and "Low." The prioritization shall take into account volume of materials that could be delivered to a watercourse or lake, proximity to a watercourse or lake (delivery hazard), and watercourse or lake classification (resource vulnerability).
- Creation of a treatment schedule for sediment source priority areas.
- Prioritization of drainage facilities and structures not currently facilitating passage for all life stages of fish.
- Creation of a schedule for modification of drainage facilities and structures not currently facilitating passage for all life stages of fish.

Under the No Action Alternative, road inventories would not be conducted in a systematic and prioritized manner, and would only cover the area identified in the individual THPs. However, it is likely that over the next 50 years, nearly all road segments would be inventoried through the THP process. Repair and upgrades of road-related sediment sources would be limited to the THP area and appurtenant roads; therefore, many large-scale repairs could go unrepaired for several years if they are not associated with a THP.

2.1.3 Other Management Activities

2.1.3.1 Stand Regeneration and Improvement

Under the No Action Alternative, the applicant would continue silvicultural practices designed to maintain and enhance the productivity of its timberlands by promoting prompt regeneration of harvested areas and rapid forest growth. The applicant's silvicultural activities are consistent with the methods defined and regulated in the CFPRs, and are more fully described in Subsection 2.3 of the proposed HCP.

The general categories of silviculture include even-aged regeneration, even-aged thinning, and uneven-aged treatments. Harvest methods include seed tree, shelterwood, and clearcutting methods. Regeneration occurs artificially through planting nursery-grown seedlings, or naturally by seed trees retained within harvest units. A number of alternative

prescriptions are commonly used by the applicant in its silvicultural management. All alternative prescriptions are analyzed and approved during the THP review process.

Under the No Action Alternative, the applicant would continue to perform timber stand regeneration and improvement activities necessary to establish, grow, and achieve the desired species composition, spacing, and rate of growth of forest stands on the ownership. Activities include site preparation, prescribed burning, and slash treatment; tree planting; vegetation management; herbicide application; and silvicultural thinning (biomass, pre-commercial, and commercial thinning).

Site preparation activities for even-aged regeneration involve the removal of logging residue and/or unwanted shrub and tree species. This is typically accomplished by using tractors to pile logging residue for burning, broadcast burning, or, less commonly, by mechanical methods. Occasionally, site preparation also requires soil scarification for planting. This treatment applies only to regeneration harvest units where it may be necessary to ensure successful regeneration.

Artificial regeneration is commonly used to ensure that sites are adequately stocked as per the stocking requirements specified in the CFPRs. The usual practice is to plant seedlings in those areas that have been either clearcut or burned by wildfire. Seedlings are grown at commercial nurseries from seed collected within the appropriate seed zones, typically by the applicant on their property, and/or purchased for the environmental conditions of each site where they would be planted.

Occasionally, sites may require one or more vegetation management treatments to reduce the impacts of unwanted competing vegetation on the growth of seedlings. Such treatments commonly involve the mechanical removal of competing brush species using tractors or hand crews. Brush is typically piled and burned, or may be chipped.

The applicant periodically applies herbicides that are approved for forestry use and are registered by the California Department of Pesticide Regulation (CDPR). EPA is responsible for regulating the sale, distribution, and use of herbicides under the Federal Insecticide, Fungicide, and Rodenticide Act.

2.1.3.2 Harvest of Minor Forest Products

Under the No Action Alternative, the applicant would continue to occasionally harvest and transport minor forest products from the Plan Area. These products include, but are not limited to, Christmas trees, mistletoe, firewood, fence posts, poles, yew bark, stumps, root wads, and mushrooms. These are all very minor components of this forest and are regulated by contract. The management of Christmas trees includes pruning and growth control in scattered locations throughout the Plan Area. The harvest of Christmas trees is small enough to be considered a minor forest product.

2.1.3.3 Fire Prevention and Suppression

Wildfire prevention involves vegetation management and the construction of fuel breaks strategically located throughout the Plan Area. The applicant would continue to follow prescriptions that typically include thinning for shaded fuel breaks along property lines or between watersheds where the applicant deems it beneficial. Because fire prevention activities generally entail vegetation management for fuels reduction, target flashy fuels,

and typically do not involve equipment, they generally would not be spatially restricted in the Plan Area.

Wildfire suppression is typically under the authority of local, state, or federal agencies. In cases of escaped prescribed burns where local, state, or federal agencies would not be involved, or for initial responses until responsible agencies have arrived, the applicant would employ emergency fire suppression activities, such as construction of fuel breaks by hand or bulldozer, lighting backfires, felling trees or snags, and water drafting for fire suppression. Under the No Action Alternative, these activities would be designed and implemented by the area forester on a local basis; therefore, these activities generally would be limited in scale and prohibited within Class I WLPZs and within 500 feet of a northern spotted owl nest site.

2.1.3.4 Miscellaneous Activities

In addition to the applicant's forest management activities, certain other activities undertaken by the applicant and third parties pursuant to their obligations (for example, easements) or authorizations (leases and licenses) would continue under the No Action Alternative. Generally, such activities could include watershed management; fish and wildlife habitat improvement; use of area roads, landings, and log decks; rock quarrying; water drafting; and various required monitoring activities.

The specific activities conducted at any particular location as part of watershed, fish, and wildlife habitat improvement would depend on site-specific needs and conditions. However, representative activities include slope stabilization, fish ladder installation, instream habitat structure installation, and fencing of fish-bearing streams.

Under the No Action Alternative, the applicant would continue to quarry rock from several rock (borrow) pit locations throughout its ownership to obtain material for road surfacing. The applicant has four primary rock quarries on the ownership, each less than 2 acres in size. These quarries are used by the applicant to provide rock products used on their ownership and in road construction and maintenance activities on roads governed by cooperative agreements with the U.S. Forest Service (USFS). Typically, up to five or more local rock sources commonly referred to as "borrow pits," are developed as needed for road upgrades associated with THPs. Each local rock source is rarely larger than 0.5 acre and is most often located in the upper portions of watersheds.

The applicant would continue to periodically draft water for dust abatement, road construction, and routine maintenance. However, the applicant currently does not divert substantial quantities of water from streams in the Plan Area, and under the No Action Alternative the rate or amount of water drafting is not expected to increase. Water drafting from within the channel zone of a natural watercourse or from a lake would conform with the water drafting guidelines contained in the CFPRs. Water drafting for a THP would comply with the following standards:

- The registered professional forester (RPF) would incorporate into the THP a description and map of proposed water drafting locations, the watercourse or lake classification, and the general drafting location use parameters.

- On Class I and Class II watercourses where the applicant has estimated that (1) bypass flows are less than 2 cubic feet per second, or (2) pool volume at the water drafting site would be reduced by 10 percent, or (3) diversion rate exceeds 350 gallons per minute, or (4) diversion rate exceeds 10 percent of the above surface flow, no water drafting would occur unless the applicant prepares a water drafting plan to be reviewed and, if necessary, a stream bed alteration agreement is issued by DFG and approved by the director of the California Department of Forestry and Fire Protection (CAL FIRE).
- Intakes would be screened in Class I and Class II watercourses, and specifications included in the THP.
- Approaches to drafting locations within a WLPZ would be surfaced with rock or other suitable material to avoid introducing sediment into the watercourse.
- Requirements of the Fish and Game Code 1600 *et seq.* Streambed Alteration Agreement.

As part of the THP process and other regulatory and management regimes, the applicant conducts a number of research and monitoring activities. These include compliance and effectiveness monitoring, wildlife surveys, environmental assessments and watershed studies. These monitoring activities would continue under the No Action Alternative. The applicant would continue to collect water temperature data in streams throughout its Klamath River and Scott Valley management units and survey for northern spotted owls around proposed THP areas.

2.1.4 Species Protection Measures

2.1.4.1 Northern Spotted Owl

The northern spotted owl is listed as threatened under the federal ESA. Under the No Action Alternative, habitat management and nest site protection measures would be implemented through CAL FIRE's THP review process. Every proposed THP located within the range of the northern spotted owl is required to follow one of the procedures required in Subsections 14 CCR 919.9 [939.9] (a)-(g) for the area within the THP boundary and also for adjacent areas as specified within the section. The submitter may choose any alternative (a)-(g) that meets the on-the-ground circumstances. The required information is used by the Director of CAL FIRE to evaluate whether or not the proposed activity would result in the "take" of an individual northern spotted owl. The objective of 14 CCR 919.9 [939.9] is to avoid take of northern spotted owls unless specifically authorized under an "incidental taking" permit or any other permit covering the northern spotted owl issued by the USFWS (see 14 CCR 919.9 [939.9] Subsection (d)). In order to make such determinations and to assure compliance with the disclosure requirements of the Z'berg-Nejedly Forest Practice Act of 1973 (Forest Practice Act) and California Environmental Quality Act (CEQA), CAL FIRE ensures that all THPs incorporate sufficient THP level information related to the occurrence of northern spotted owls, their associated habitats, and enforceable protection measures.

2.1.4.2 Yreka Phlox

The Yreka phlox is listed as endangered under the federal ESA and endangered under CESA. Currently there are no known occurrences of Yreka phlox on the applicant's lands; however, approximately 887 acres of potential habitat (i.e., soils derived from ultramafic

parent materials) are located within the areas of high and moderate likelihood for occurrence on its ownership. Appropriate soil types are also located on the applicant's lands outside of the areas identified as having a high or moderate likelihood for occurrence. Under the No Action Alternative, the applicant would incorporate site-specific measures into THPs as necessary for the purpose of avoiding significant adverse impacts to Yreka phlox.

The applicant would perform detailed pre-activity surveys for Yreka phlox prior to Covered Activities that could directly (e.g. removal, destruction) or indirectly (e.g., changes in hydrology, introduction of invasive weeds) impact Yreka phlox. Covered activities that have the potential to impact Yreka phlox include, but are not limited to activities associated with timber harvesting, road and landing construction and maintenance, silviculture, stand regeneration, harvest of minor forest products, fire prevention, construction or reconstruction of watercourse crossings, and site preparation. The applicant would conduct pre-activity surveys for Yreka phlox at the THP-level as required under the State THP review process.

The applicant would protect occurrences discovered on its ownership by establishing an equipment exclusion zone (EEZ) with a minimum width of 150 feet around each discovered occurrence to reduce external influences and allow for expansion of populations. EEZs established for plant protection would encompass the individuals or groups of plants and would be designated with appropriate flagging. There would be no heavy equipment operations within the EEZs established around Yreka phlox occurrences, except for on existing roads.

The applicant would avoid potential indirect impacts from road construction near discovered populations through placement/deposition of fill material and culverts in such a manner and in areas that will not adversely affect Yreka phlox populations. Road design and specifications will consider and avoid indirect impacts to discovered populations caused by compaction and alteration of slope drainage.

2.1.4.3 Anadromous Salmonids

Coho salmon in the Southern Oregon/Northern California Coast Evolutionary Significant Unit (ESU) are listed as threatened under the federal ESA. The Klamath Mountains Province steelhead ESU and the Upper Klamath and Trinity Rivers Chinook salmon ESU are currently unlisted. Under the No Action Alternative, NMFS would not issue a permit authorizing incidental take of these species. The applicant would remain subject to the prohibition on unauthorized taking of state and federally listed species as well as the provision of the CFPRs that no THP may be approved that would result in the unauthorized take of a listed species. The level of protection provided aquatic species under the existing CFPRs varies by watershed. Watersheds that occur within the Plan Area would be separated into three general categories for determining the protective measures to be applied: watersheds without anadromous salmonids; watersheds with listed anadromous salmonids; and watersheds with coho salmon.

- Watersheds without anadromous salmonids are watersheds that are located above long-standing barriers to anadromous fish or have no direct connection to streams supporting anadromous salmonids. The applicant's Grass Lake management unit is located in watersheds without anadromous salmonids.

- Watersheds with listed anadromous salmonids are any planning watershed where the presence of anadromous salmonids listed as threatened, endangered, or candidate under the State or Federal Endangered Species Act, has been documented or restorable habitat exists. Watersheds with coho salmon are an exception, which are included in the following classification. The geographic scope of watersheds with listed anadromous salmonids also apply to planning watersheds immediately upstream of, and contiguous to, any watershed with listed anadromous salmonids for purposes of reducing significant adverse impacts from transported fine sediment. Projects in other watersheds further upstream that flow into watersheds with listed anadromous salmonids may be subject to these provisions based on an assessment consistent with cumulative impacts assessments requirements.
- Watersheds with coho salmon are planning watersheds where coho salmon have been documented by DFG to be present during or after 1990 (DFG 2009).

The specific aquatic protection measures that would apply to each of these categories are described below.

Aquatic Protection Measures in Watersheds without Anadromous Salmonids. The CFPR's standard prescriptions include the maintenance of WLPZs as buffers around streams and lakes. The width of the zones and the activities conducted therein are determined on a THP-by-THP basis using such factors as side-stream slope and watercourse uses. The intent of these protection zones is to provide a vegetative filter strip to capture and reduce any organic and inorganic material (including sediment) carried by runoff from the sideslopes, preserve canopy cover to maintain water temperatures appropriate for wildlife and fish habitat, provide for streambed and flow modification by woody debris, and provide vegetation diversity for fish and wildlife habitat (including vertical diversity, snags, and surface cover).

In addition, to prevent the significant degradation of the quality and beneficial uses of water, the construction, use, and maintenance of logging roads, trails, and landings are strictly regulated to minimize soil disturbances that could potentially result in erosion and sedimentation impacts. Measures to minimize soil erosion from roads include the requirements to use existing roads where feasible and minimize watercourse crossings. Similarly, tractor road-crossing facilities on watercourses that support fish are designed to provide for unrestricted passage of fish and water. Logging road drainage structures on watercourses that support fish must allow for unrestricted passage.

The CFPRs also require the retention of snags for wildlife purposes and recruitment of large woody debris (LWD) for instream habitat through retention of older living trees near aquatic habitats. Specific habitat protection and harvesting prescriptions are established for wildlife species designated as "sensitive species."

Aquatic Protection Measures in Watersheds with Listed Anadromous Salmonids. In addition to the standard CFPR measures, the following CFPR measures would apply to the applicant's activities in any watershed with listed anadromous salmonids.

THP Measures

- Adverse cumulative watershed effects on the populations and habitat of coho salmon would be considered in THPs. The THP would specifically acknowledge or refute that such effects exist. Where appropriate, the THP would set forth measures to effectively reduce such effects.
- THPs would fully describe:
  - The type and location of each measure needed to fully offset sediment loading, thermal loading, and potential significant adverse watershed effects from the proposed timber operations
  - The person(s) responsible for the implementation of each measure, if other than the timber operator
- In proposing, reviewing, and approving such measures, preference would be given to the following:
  - Measures that are both on site and in-kind
  - Sites located to maximize the benefits to the impacted portion of a watercourse or lake
  - Out-of-kind measures would not be approved

For All Timber Operations or Silvicultural Prescriptions

- Within a Class I watercourse or lake protection zone (WPLZ):
  - Within 150 feet, protection, maintenance, or restoration of the beneficial uses of water or the populations and habitat of coho salmon or listed aquatic or riparian-associated species would be considered significant objectives.
  - Three zones are established within the WLPZs; the Core Zone, nearest to the water; the Inner Zone contiguous to the Core Zone and the Outer Zone, the farthest from the water and contiguous to the Middle Zone.

    Core Zone: The minimum width of the Core Zone is 30 feet measured from the watercourse transition line or lake transition line. No timber operations are permitted in this zone except those listed in 14 CCR 916.9 [936.9], subsection (e)(1)(A)-(F), or those approved pursuant to 14 CCR 916.9 [936.9]. Sanitation-Salvage is generally prohibited.

    Inner Zone: The minimum width of the Core Zone is 70 feet measured from the watercourse transition line or lake transition line. Timber operations are permitted in this zone. Harvesting prescriptions would focus on practices that use thinning from below. Silvicultural systems for harvesting are limited to the use of commercial thinning or single tree selection to meet the following requirements:

    1) When commercial thinning is used, the quadratic mean diameter (QMD) of conifer trees greater than 8 inches dbh in the preharvest project area shall be increased in the postharvest stand;
    2) Sanitation salvage is prohibited in most cases;

3) Postharvest stands shall have a minimum 70 percent overstory canopy cover. The postharvest canopy may be composed of both conifers and hardwood species and shall have at least 25 percent overstory conifer canopy.

4) Postharvest stands shall retain the 7 largest conifer trees (live or dead) on each acre of area that encompasses the Core and Inner Zones

5) Large trees retained, as stated above, that are the most conducive to recruitment to provide for the beneficial functions of riparian zones, are to be given priority to be retained as future recruitment trees.

Outer Zone: The minimum width of the Core Zone is 50 feet measured from the watercourse transition line or lake transition line. This zone is required where even-aged regeneration methods, seed tree removal, shelterwood removal, alternative prescriptions declared under 14 CFR 916.9 [936.9], subsection (e)(1)(A)-(F) or pursuant to 14 CCR 916.9 [936.9], subsection (v). Silvicultural systems for harvesting are limited to the use of commercial thinning or single tree selection modified to meet the following requirements:

1) Postharvest stands will be composed of a minimum of 50 percent overstory canopy cover. The postharvest canopy may be composed of both conifers and hardwood species and must have at least a 25 percent overstory conifer canopy.

2) Priority shall be given to retain wind firm trees.

– Preferred Management practices in the Inner and Outer zones should be considered for inclusion in the Plan by the RPF and by the Director and include preflagging or marking of any skid trails before the preharvest inspection; heavy equipment should be limited to slopes less than 35 percent with low or moderate EHR; the use of feller bunchers or hydraulic heel boom loaders which do not drag or skid logs through the zone; minimize turning of heavy equipment which would result in increased depth of ground surface depressions; and the use of mechanized harvesting equipment which delimb harvested trees on pathway over which heavy equipment would travel.

– Fore even-aged regeneration methods and rehabilitation with the same effects as a clearcut that are adjacent to a WLPZ, slopes are greater than 50 percent, and the Outer Zone is located on any north aspect, the RPF must consider the need for a special operating zone for purposes of shading the watercourse from direct low angle solar radiation from beneath the overstory canopy that is expected to have a significant adverse impact on water temperature. The special operating zone must retain understory and mid-canopy conifers and hardwoods and the trees must be protected during falling, yarding and site preparation

– Within the WLPZ, at least 85 percent overstory canopy would be retained within 75 feet of the watercourse or lake transition line, and at least 65 percent overstory canopy within the remainder of the WLPZ. The overstory canopy must be composed of at least 25 percent overstory conifer canopy post-harvest. Harvesting of hardwoods would only occur for the purpose of enabling conifer regeneration.

- Any plan involving timber operations within the WLPZ would contain (1) a description of how any disturbance or log or tree cutting and removal conforms with 14 CCR 936.2(a) and 936.9.1(a); (2) description of all existing permanent crossings and clear specification regarding fish passage; and (3) specifications for construction and operation of any new crossing to prevent direct impairment of beneficial uses of water.
- Where an inner gorge extends beyond a Class I WLPZ and slopes are greater than 55 percent, a special management zone would be established where the use of even-aged regeneration methods is prohibited, and a minimum average overstory canopy of 60 percent would be retained. This zone would extend upslope to the first major break-in-slope to less than 55 percent for a distance of 100 feet or more, or 300 feet as measured from the watercourse or lake transition line, whichever is less.
- All operations on slopes exceeding 65 percent within an inner gorge would be reviewed by a professional geologist prior to THP approval, regardless of whether they are proposed within a WLPZ or outside a WLPZ to ensure that proposed activities do not present a greater risk of sediment delivery from mass wasting.
- From October 15 to May 1, no timber operations would take place unless the approved plan incorporates a complete winter period operating plan (14 CCR 934.7(a)).

- Within a Class II watercourse or lake protection zone:
  - **Core Zone:** The minimum width of the Core Zone is 30 feet measured from the watercourse transition line or lake transition line. No timber operations are permitted in this zone except those listed in 14 CCR 916.9 [936.9], subsection (e)(1)(A)-(F), or those approved pursuant to 14 CCR 916.9 [936.9]. Sanitation-Salvage is generally prohibited.
  - **Inner Zone:** The minimum width of the Core Zone is from 35 to 90 feet measured from the watercourse transition line or lake transition line. Timber operations are permitted in this zone. Harvesting prescriptions would focus on practices that use thinning from below. Silvicultural systems for harvesting are limited to the use of commercial thinning or single tree selection to meet the following requirements:
    1) When commercial thinning is used, QMD of conifer trees greater than 8 inches dbh in the preharvest project area shall be increased in the postharvest stand;
    2) Sanitation salvage is prohibited in most cases;
    3) Postharvest stands shall have a minimum 70 percent overstory canopy cover. The postharvest canopy may be composed of both conifers and hardwood species and shall have at least 25 percent overstory conifer canopy.
    4) Postharvest stands shall retain the 13 largest conifer trees (live or dead) on each acre of area that encompasses the Core and Inner Zones

5) Large trees retained, as stated above, that are the most conducive to recruitment to provide for the beneficial functions of riparian zones, are to be given priority to be retained as future recruitment trees.

- Within 100 feet, protection, maintenance, or restoration of the beneficial uses of water or the populations and habitat of coho salmon or listed aquatic or riparian-associated species would be considered as significant objectives.
- Work may occur for those exempt actions that are directed to improve salmonid habitat with review and concurrence by DFG, actions necessary for construction, reconstruction, removal, or abandonment of approved water crossings, actions necessary for protection of public health, safety and general welfare and may include infrastructure protection such as roads, bridges, power lines, utilities, water drafting structures, home and other legal permitted structures.
- All operations on slopes exceeding 65 percent within an inner gorge would be reviewed by a professional geologist prior to THP approval, regardless of whether they are proposed within a WLPZ or outside a WLPZ to ensure that proposed activities do not present a greater risk of sediment delivery from mass wasting.

- Within a WLPZ, or within any equipment limitation zone (ELZ) or EEZ designated for watercourse or lake protection:
  - No timber operations are allowed under exemption notices or under emergency notices except for hauling on existing roads, road maintenance, operations conducted for public safety, construction or reconstruction of approved watercourse crossings, temporary crossings of dry Class III watercourses that do not require a Streambed Alteration Agreement under the Fish and Game Code, or harvesting recommended in writing by DFG or NMFS to address specifically identified forest conditions.
  - Under emergency notices, the harvest of dead or dying conifer trees can occur subject to the following conditions:
  - No salvage logging is allowed in a WLPZ without an approved plan that contains a section that sets forth objectives, goals, and measurable results for streamside salvage operations (does not apply to emergency operations under 14 CCR 1052).

Sediment Control Requirements

- Within the WLPZ, and within any ELZ or EEZ designated for watercourse or lake protection:
  - Describe in the THP treatments to stabilize soils, minimize soil erosion, and prevent the discharge of sediment in amounts deleterious to aquatic species or the quality and beneficial uses of water.

    Logging roads, landings or tractor roads will not be used when visibly turbid water from the road, landing or tractor road (skid trail) or an inside ditch associated with the logging road, landing or tractor road could produce sediment in quantities sufficient to cause a visible increase in turbidity downstream water in receiving Class I, II, III, or IV waters or violate Water Quality Requirements.

  - For areas disturbed from May 1 through October 15, sediment control treatments would be completed prior to the start of any rain that causes overland flow across or along the disturbed surface that could deliver sediment into a watercourse or lake in quantities deleterious to the beneficial uses of water; treatments would be completed prior to any day for which a chance of rain of 30 percent or greater is forecast by the National Weather Service or within 10 days, whichever is earlier.
  - Treatment for other disturbed areas may include, but need not be limited to, mulching, riprapping, grass seeding, or chemical soil stabilizers.
  - Where the undisturbed natural ground cover cannot effectively protect beneficial uses of water from timber operations, the ground would be treated by measures including, but not limited to, seeding, mulching, or replanting.

- As part of the THP, the RPF would identify, assess, and address feasible remediation for all active erosion sites in the logging area.
- The erosion-control maintenance period on permanent and seasonal roads and associated landings that are not abandoned in accordance with 14 CCR 943.8 would be three years.
- Site preparation activities would be designed to prevent soil disturbance within, and minimize soil movement into, the channels of watercourses. No broadcast burning is to occur within any WLPZ, or within any ELZ or EEZ designated for watercourse or lake protection.

In-Channel Habitat

- No timber operations would occur within the channel zone with the following exceptions:
  - Harvesting that is directed to improve coho salmon habitat
  - Harvesting necessary for approved watercourse crossings
  - Harvesting necessary for the protection of public health and safety
  - To allow for full suspension cable yarding
  - Class III watercourses where exclusion of timber operations is not needed for protection of coho salmon
- In all instances where trees are proposed to be felled within the channel zone, a base mark would be placed below the cut line of the harvest trees within the zone.

Exemptions

- Nonstandard practices (i.e., waivers, exceptions, in-lieu practices, and alternative practices) would comply with the goal set forth above as well as with the other requirements set forth in the rules.
- The director of CAL FIRE may approve alternatives that provide equal or better protection for coho salmon and achieve the goals of this section.

2.2 Proposed Action (Preferred Alternative)

Under the Proposed Action, USFWS would issue an ITP with a 50-year term, covering northern spotted owl. NMFS would issue an ITP, also with a term of 50 years, for three ESUs of anadromous salmonids. Under the Proposed Action, the applicant would continue to conduct timber harvesting and related operations in accordance with existing state and federal regulations, including the CFPRs, and consistent with their operational and policy management actions currently being implemented. The applicant would also implement its proposed HCP within the Plan Area. Operations within the Plan Area would be subject to the terms and conditions of the HCP and the associated Implementing Agreement (IA). The applicant would receive 50 years of assurances if in compliance with terms and conditions of the ITPs.

Table 2-2 lists species that would be included in the ITPs under the Proposed Action. Take of the endangered Yreka phlox is not prohibited under the ESA and is therefore not authorized under an ITP. However, the FWS ITP is expected to include the Yreka phlox as a covered species in recognition of the conservation benefits provided for the species by the HCP and to extend assurances to that species under the "No Surprises" rule. Several other species of concern may occur within the Plan Area. These species and the applicant's reasons for not requesting coverage are described in Subsection 3.3 of the proposed HCP.

TABLE 2-2
Aquatic and Terrestrial Species that would be Covered under the Proposed Action

	Listing Status within the Plan Area	
Species Common Name (*Scientific Name*)	**Federal**	**State**
Terrestrial		
Northern spotted owl (*Strix occidentalis caurina*)	Threatened (55 FR 26114)	None
Yreka phlox (*Phlox hirsuta*)	Endangered (65 FR 5268)	Endangered
Aquatic		
Coho salmon (*Oncorhynchus kisutch*) Southern Oregon/Northern California Coast ESU	Threatened (70 FR 37160)	Threatened
Steelhead (*Oncorhynchus mykiss*) Klamath Mountains Province ESU	None (66 FR 17845)	None
Chinook salmon (*Oncorhynchus tshawytscha*) Upper Klamath and Trinity Rivers ESU	None (63 FR 11482)	None

The applicant is proposing two general habitat conservation programs (terrestrial and aquatic) and two species-specific strategies (northern spotted owl and Yreka phlox). The habitat-based components focus on maintaining and increasing the value (amount and/or quality) of aquatic and terrestrial habitats used by the Covered Species in the Plan Area, thus enhancing survival and reproduction of the Covered Species. The habitat-based conservation approach is augmented by species-specific objectives designed to minimize

direct effects to Covered Species from forest management practices, and to minimize threats to the Covered Species. Specific measures contained in the CFPRs or developed pursuant to the THP process that are designed for the purpose of avoiding take of listed species and minimizing and mitigating environmental impacts to such species and their habitats would be superseded by measures prepared to meet the issuance criteria for the ITPs. The description of the Proposed Action in the following sections describes the applicant's expected operations under the Proposed Action and the proposed conservation and mitigation measures for protection of the Covered Species.

Information regarding the applicant's proposed conservation program is summarized in this section. Detailed information is provided in the HCP and in the IA. This EIS analyzes the entirety of this application—the HCP is incorporated by reference into the EIS to ensure that the project description is complete while maintaining the conciseness and readability of the document.

2.2.1 Timber Harvest

In general, the types of timber harvest and associated activities would be similar to those described for the No Action Alternative. However, the amount of timber harvest that would occur is likely to differ from the No Action Alternative, and the relative amount of land in the Plan Area subject to the different silvicultural practices would likely differ in order to meet the applicant's required harvest volume while meeting the terms and conditions of the permits. These differences are summarized below to the extent that they can be predicted under the Proposed Action.

Timber harvest would be constrained in Conservation Support Areas (CSAs), which would encumber approximately 23,000 acres where timber harvest would be limited. In drainages containing Class A and B designated lands (see Subsection 2.2.4.3 below), WLPZs established along Class I (fish-bearing) and Class II (aquatic habitat) watercourses would restrict operations on nearly 6,200 acres of the Plan Area. ELZs along Class III watercourses would restrict operations on an additional approximately 2,485 acres of Class A and Class B designated lands in the Plan Area. The applicant has indicated that these lands are some of the most productive lands on the ownership because of their proximity to water in an otherwise dry region.

Issuance of the ITPs would allow the applicant to harvest more of the currently suitable northern spotted owl habitat on its ownership. The applicant has indicated that this would reduce the amount of even-aged regeneration harvest (clearcutting) necessary to meet financial targets. A reduction in clearcutting of moderate-complexity stands (based on California Wildlife Habitat Relationships [CWHR] Class) would allow these and other stands to grow into suitable northern spotted owl habitat over the duration of the permits. Under the Proposed Action, it is anticipated that there would be about a 10 percent decrease in acres harvested each decade, including as much as a 25 percent decrease in even-age regeneration harvest (clear cuts) compared to the No Action Alternative. The amount of salvage conducted under the Proposed Action would not differ substantially from salvage under the No Action Alternative.

2.2.2 Road and Landing Construction, Maintenance, and Management

The types of road and landing construction, maintenance, and management activities would not differ substantially from those described for the No Action Alternative. Under the Proposed Action, all logging roads and landings on the ownership or under the applicant's control within the Plan Area would be planned, located, constructed, reconstructed, used, and maintained in a manner that is consistent with long-term enhancement and maintenance of the forest resource; best accommodates appropriate yarding systems and economic feasibility; minimizes damage to soil resources and fish and wildlife habitat; and minimizes degradation of the quality and beneficial uses of water.

To this end, the applicant would use existing roads whenever feasible, strive to minimize total mileage, avoid disturbance to natural features, avoid wet areas and unstable areas, and minimize the number of watercourse crossings. Future road construction in the Plan Area is anticipated to consist primarily of short, temporary spurs designed to locate landings on stable areas outside of WLPZs. These temporary roads would generally be used for one harvest season, and then decommissioned. New road construction is anticipated to average less than 1 mile per year. All new roads and landings would be constructed in accordance with practices specified in the CFPRs and the HCP.

To avoid or minimize the potential for adverse impacts to aquatic species and meet the issuance criteria for the ITP that would be issued by NMFS, the applicant would implement a number of conservation measures designed to avoid road-related impacts to anadromous salmonids caused by altered hydrology and sediment inputs. As part of the Aquatic Species Conservation Program, all roads on the ownership in the Plan Area would be subject to periodic and regular maintenance. The applicant has developed a Draft Road Management Plan – Operations Guide as part of the HCP that compiles road measures from the CFPRs, best management practices (BMPs) for stream crossings, and BMPs currently used by the applicant on its ownership. The Draft Road Management Plan – Operations Guide also includes maintenance schedules and inspection guides, and is included as Appendix B of the proposed HCP. Under the Proposed Action, the applicant would implement the following conservation measures:

- The applicant would identify road-related sediment sources in accordance with the following prioritization process:
  - Drainage level road erosion inventories of roads owned and controlled by the applicant would be conducted in all drainages within the Plan Area containing Class A designated lands. Inventories would follow a schedule produced through prioritization based on methods that use a landscape-level assessment of risk of sediment delivery to streams from road-related erosion, an assessment of resources at risk, and proposed timber management operations. The assessment classifies each drainage on a relative scale and establishes a priority for conducting detailed road erosion inventories (see Table 5-2 of the proposed HCP).
  - The road erosion inventory would map individual sites and quantify the sediment-delivery potential. Results of the inventories will be used to prioritize sites for treatment as described below.

  - All drainage-level road erosion inventories in Class A lands would be completed within 10 years of issuance of the NMFS ITP, with the top five priority drainages completed in the first 5 years. Within these priority drainages, treatment of the sites leading to stabilization of at least 50 percent of the potential sediment delivery volume identified during the inventories would be completed within 5 years of the inventory, in conjunction with other timber operations.
  - Road erosion inventories would be conducted in drainages containing Class B designated lands within 15 years of NMFS ITP issuance.

- The applicant would conduct field inventories to identify and quantify road-related sediment sources. During the field assessment, the location of each road feature that exhibits potential to deliver sediment to a stream would be identified and mapped, and the data would be stored in a Geographic Information System (GIS) database. A report that summarizes the field inventories and prioritizes treatment sites would be generated for each drainage.
- The applicant would document any potential fish passage problems, including culverts that are impeding fish passage, during the field inventory. Methods used to evaluate fish passage would include those specified in Chapter IX of the *California Salmonid Stream Habitat Restoration Manual* (DFG 1998).
- The applicant would develop reasonable and feasible erosion prevention and control prescriptions for each source of treatable erosion that is field-identified. The prescription for each site would involve temporary or permanent decommissioning, or road upgrading.
- The applicant would prioritize road-related sediment sources for treatment based on the following factors: (1) volume of future sediment delivery; (2) treatment immediacy (risk to Covered Species); and (3) treatment cost-effectiveness. Implementation would be carried out consistent with the Aquatic Protection Measures in Section 5.2.2 of the proposed HCP and to the standards and protocols set forth in the Draft Road Management Plan – Operations Guide (Appendix B of the proposed HCP).
- The applicant would follow the design and maintenance criteria as specified in the Draft Road Management Plan – Operations Guide (HCP Appendix B).

Under the Proposed Action, road inventories and treatment would be conducted in a systematic and prioritized manner and would cover the applicant's entire ownership in the drainages being inventoried. Drainages where the applicant's road-related activities have the highest potential for adverse effects on the aquatic Covered Species (Class A lands) would be prioritized for inventory and treatment within the first 10 years after issuance of the NMFS ITP, and road upgrading and decommissioning activities would be completed within 15 years following issuance of the ITP. In drainages containing Class B lands, inventories would be completed within 15 years of ITP issuance. Road inventories of the entire ownership in the Plan Area within drainages that support anadromous salmonids would be completed within 15 years, and many of the high and moderate sediment delivery potential sites would be treated within this same period. Additionally, the road inventories would be repeated on an approximately 10-year cycle to identify new treatment sites and evaluate the effectiveness of prior treatments.

2.2.3 Other Management Activities

2.2.3.1 Stand Regeneration and Improvement

Under the Proposed Action, forest stand regeneration and improvement activities would be similar to the No Action Alternative. However, these activities would be subject to the terms and conditions of the ITPs.

2.2.3.2 Harvest of Minor Forest Products

Under the Proposed Action, the harvest of minor forest products would continue as described under the No Action Alternative. However, any activities, including the harvest and transport of minor forest products, would be subject to the terms and conditions of the ITPs.

2.2.3.3 Fire Prevention and Suppression

Under the Proposed Action, all fire prevention and suppression activities would continue as described under the No Action Alternative. However, any fire prevention and suppression activities would be subject to the terms and conditions of the ITPs.

2.2.3.4 Miscellaneous Activities

In addition to forest management activities, certain other activities undertaken by the applicant and third parties pursuant to various obligations (for example, easements) or authorizations (leases and licenses) would continue under the Proposed Action. Generally, such activities could include watershed management; fish and wildlife habitat improvement; use of area roads, landings, and log decks; rock quarrying; water drafting; and various required monitoring activities.

Under the Proposed Action, the applicant would continue to quarry rock from several rock (borrow) pit locations throughout its ownership to obtain material for road surfacing. These activities would not differ substantially from rock quarrying activities conducted under the No Action Alternative, but would be subject to the terms and conditions of the ITPs.

Under the Proposed Action, the applicant would continue to periodically draft water for dust abatement, road construction, and routine maintenance. As described under the No Action Alternative, water drafting from within the channel zone of a natural watercourse or from a lake would conform with the water drafting guidelines included in the CFPRs.

As part of the THP process and other regulatory and management regimes, the applicant conducts a number of research and monitoring activities. These include compliance and effectiveness monitoring, wildlife surveys, environmental assessments, and watershed studies. These monitoring activities would continue under the Proposed Action. Additionally, the applicant would implement monitoring activities to document compliance with the terms and conditions of the ITPs and evaluate the effectiveness of the proposed conservation and mitigation measures. Monitoring protocols are described in Chapter 7 and Appendix F of the proposed HCP. The applicant would conduct the following types of monitoring activities in representative watersheds and along selected stream reaches:

- Water temperature monitoring in streams throughout its Klamath River and Scott Valley management units, and air temperature monitoring in adjacent riparian zones.

- Water temperature monitoring above and below selected harvest units prior to and following harvest activities in riparian zones
- Evaluation of potential LWD recruitment in selected riparian stands prior to and following harvest activities in riparian zones
- Repeated drainage-level road inventories in drainages with Class A and Class B lands on a 10-year interval
- Mass wasting assessment in selected drainages in years 15 and 30 following issuance of the NMFS ITP
- Monitoring of channel morphology and conditions in selected index reaches on a 5-year interval to include:
  - Habitat types (to level III as described in the *California Department of Fish and Game Salmonid Stream Habitat Restoration Manual, Third Edition* [DFG 1998])
  - Channel cross sections at two to four permanent sites
  - Pebble counts to determine particle size distribution of surface sediments in riffles at locations of permanently established cross sections
  - Assessment of streambank stability at 50 evenly spaced intervals within the index reach using visual indicators
  - Surface substrate composition in pool tail areas in Beaver, Cottonwood, Doggett, and Moffett creeks
  - Assessment of LWD distribution, type, and function within the "bankfull channel" of the index reach
- Measurements of the volume of fine sediments in pools in selected index reaches using the Rapid V* method, and including an assessment of the percent of pool tail surface area covered by fine sediments using a grid-based protocol
- Forest stand inventories to identify suitable habitat for northern spotted owls in CSAs proposed for harvest both prior to and following harvest activities
- Monitoring for the presence of northern spotted owls and barred owls in all CSAs on a 4-year cycle
- Monitoring of known and discovered Yreka phlox populations in the Plan Area. The specific elements of the monitoring plan for Yreka phlox will be developed in consultation with USFWS.

2.2.4 Species-protection Measures

2.2.4.1 Northern Spotted Owl

The northern spotted owl is listed as threatened under the federal ESA. Under the Proposed Action, USFWS would issue a permit authorizing incidental take of northern spotted owl in the applicant's Klamath River and Scott Valley management units. Under the Proposed

Action, no incidental take of northern spotted owl would be authorized in the Grass Lake management unit, and maintenance of habitat in this unit would provide mitigation for incidental take elsewhere on the ownership. To meet the issuance criteria for the ITP, the applicant developed a Terrestrial Species Conservation Program that includes specific measures to protect northern spotted owl. In addition to the conservation measures for northern spotted owl, the applicant would implement additional measures that would minimize and mitigate the impacts of any incidental take of northern spotted owls to the maximum extent practicable. The applicant designed the conservation and mitigation measures to meet the biological goals and objectives for northern spotted owl identified in Subsection 5.1.3 of the proposed HCP. The biological objectives for northern spotted owl are summarized below with a description of the conservation and mitigation measures that would be implemented to meet these objectives and allow the applicant to meet the criteria for issuance of the ITP.

Objective 1: Demographic Support. Consistent with USFWS expectations for private lands as stated in the *Revised Recovery Plan for the Northern Spotted Owl* (USFWS 2011), a biological objective is to contribute to conservation and recovery of the northern spotted owl by providing demographic support to owl populations on nearby federal lands. This objective would be accomplished through conservation of suitable habitat within 1.3 miles of selected high conservation value activity centers located near the applicant's ownership, thus providing compensatory mitigation for incidental take of owls associated with low conservation value activity centers that may occur over the term of the permit. The concept of "conservation value" and how it is calculated is provided in Subsection 6.2.1.3 of the proposed HCP.

To meet the issuance criteria for an ITP for northern spotted owl, the applicant would implement the following conservation and mitigation measures associated with the demographic support objective:

- The applicant would establish 24 CSAs on its ownership to provide demographic support to northern spotted owls associated with high conservation value activity centers located within 1.3 miles of its ownership and whose home ranges overlap with federally designated CHUs. The rationale and process for selecting activity centers to be protected by CSAs is described in Chapter 6 of the proposed HCP.
- The applicant would promote and maintain the following general conditions and habitat features on its ownership within the CSAs:
  - A multi-layered mature forest to provide a more stable and moderate microclimate
  - Areas composed of tree species associated with use by spotted owls (i.e., Douglas-fir with mistletoe infections to provide nesting platforms, hardwoods to provide food and shelter for prey)
  - Variable and increasing average tree diameter
  - A large-tree component (more than 26 inches dbh)
  - Variable tree densities

- The applicant would ensure that specific habitat standards for both nesting/roosting and foraging habitat are met within the entire CSA (which includes lands owned by others) before harvest can occur on its ownership in a CSA (see below).
- Harvest on the ownership within CSAs would be restricted, and any harvest on the ownership within the CSAs would require evaluation for compliance with the HCP provisions, and written approval by USFWS.
- The applicant would prioritize conservation efforts on lower elevation, northern-facing slopes near the nest site. The applicant would prioritize management of spotted owl habitat on its ownership within the lower third of mesic slopes near riparian zones, including designated WLPZs.
- Existing large hardwoods on the ownership within CSAs would be retained to provide nesting structures for spotted owls and food for prey species.
- Large down woody material on the ownership within CSAs would be retained to provide nesting and foraging habitat for spotted owl prey species.
- Existing snags on the ownership within CSAs would be retained. Snags that are judged to be a safety hazard may be felled and left on site.

Conditions for allowable harvest within the 500-acre core area. If there are more than 250 acres of nesting/roosting habitat and more than 150 acres of foraging habitat within the overall 500-acre core area (regardless of ownership), then harvest could occur in the core area on lands owned by the applicant. All existing substrate for spotted owl nest structures (tree deformities, mistletoe brooms, tree cavities) would be maintained within the 500-acre core area where it does not create a hazard for public safety.

Nesting/roosting habitat is defined as having the following attributes:

- ≥ 150 square feet per acre (ft^2/acre) of basal area
- ≥ 60 percent canopy closure
- ≥ 15 inches average quadratic mean diameter (qmd)
- ≥ 8 trees/acre (or ≥ 30 ft^2/acre basal area) of large conifers ≥ 26 inches dbh
- Multi-layered canopy, nesting substrates, snags, down woody material, decadent trees

Of the 250 acres of nesting/roosting habitat in the core area of the CSA (regardless of ownership), at least 100 acres must be high-quality habitat with 210 ft^2/acre or more of basal area, and at least 100 acres must be of at least moderate quality with 180 to 210 ft^2/acre of basal area for harvest to occur on lands owned by the applicant in the CSA.

Foraging habitat is defined as having the following attributes:

- 80 to 180 ft^2/acre of basal area
- ≥ 40 percent canopy closure
- ≥ 13 inches average qmd
- ≥ 5 trees per acre (≥ 20 ft^2/acre basal area) of large conifers ≥ 26 inches dbh

Of the 150 acres of foraging habitat, at least 60 acres must be high-quality foraging habitat with 150 to 180 ft^2/acre of basal area and 60 percent or greater canopy closure. At least

40 acres can be of moderate-quality, with 120 to 150 ft^2/acre of basal area and 40 percent or greater canopy closure.

Where there is currently less than 250 acres of nesting/roosting habitat and/or less than 150 acres of foraging habitat within the overall 500-acre core area, specific areas on the ownership within the CSA with the potential to develop into suitable owl habitat over the 50-year permit term were identified as part of the CSA selection process and are shown on maps included in Appendix D of the HCP. Harvest in these areas would be restricted until the habitat thresholds are met. High priority for conservation was given to areas at low elevations, and on north-facing slopes near riparian zones that are relatively contiguous with the activity center.

These harvest restrictions are based on habitat targets for the CSA as a whole (regardless of ownership), established to promote a high probability of occupancy by spotted owl nesting pairs at known activity centers with high conservation value to the federal conservation strategy. The habitat targets guide management and stand development on the applicant's land within the core area. Harvest would be restricted on the entire ownership within the CSAs because any harvest conducted within the CSAs would require evaluation and written approval by USFWS. Overall, 78 percent of the ownership in the core areas of the CSAs would be managed to provide suitable owl habitat in support of the federal conservation strategy. The remaining portion of the applicant's ownership in the core areas of the CSAs was either identified as non-habitat, could not be reasonably expected to provide habitat over the 50-year permit term, or was of low priority given the amount and quality of habitat elsewhere in the CSA. The applicant's habitat commitments associated with the core area and home range of each CSA are summarized in Table 2-3.

TABLE 2-3
Habitat Commitments in CSAs Supporting High Conservation Value Activity Centers (acres)

Activity Center ID	Suitable Spotted Owl Habitat 500-Acre Core Area	Suitable Spotted Owl Habitat Home Range (3,396 Acres)*
SK002	211	931
SK028	35	319
SK040	9	379
SK044	27	572
SK061	0	158
SK063	2	201
SK097	34	320
SK099	1	305
SK100	118	207
SK153	168	808
SK238	0	66
SK262B	152	477
SK284	130	652
SK291	11	72
SK352	58	679
SK378	33	62
SK428	16	327

TABLE 2-3
Habitat Commitments in CSAs Supporting High Conservation Value Activity Centers (acres)

Activity Center ID	Suitable Spotted Owl Habitat 500-Acre Core Area	Suitable Spotted Owl Habitat Home Range (3,396 Acres)*
SK446	48	435
SK462	110	701
SK503	38	483
SK512	16	137
SK530	28	321
SK531	108	1,055
SK548	4	277

* Acres in home range include the 500-acre core area around the activity center. The home range is the area of land within a 1.3-mile-radius around an activity center. The acreage listed in this table is the acreage present on the applicant's property only, and does not include land within the home range that is owned by others (private, federal, and state), and may include overlap with adjacent CSAs.

While silvicultural practices would be tailored to individual activity centers, the applicant would manage its lands within the CSAs to develop and maintain northern spotted owl habitat as described previously to promote heterogeneous habitat conditions within the 500-acre core area around an activity center (i.e., promote variation in basal area and canopy closure). The habitat commitments in Table 2-3 would be incorporated into the applicant's management of its land within the 500-acre core areas. As stands develop over the permit term, the actual areas of suitable habitat may shift spatially because of natural events or silvicultural activities. If an area identified for conservation as foraging habitat grows into nesting/roosting habitat, then the applicant could harvest this or other nesting/roosting habitat in the CSA down to the high-quality foraging habitat standards, provided that its commitments for nesting/roosting and foraging habitat are met and at least 250 acres of nesting/roosting habitat and 150 acres of foraging habitat would be maintained within the overall 500-acre core area.

Upon evaluation and written concurrence by USFWS, exceptions may be made on a case-by-case basis for CSAs that lack the acreage or site potential to meet this requirement. Timber harvest on the ownership in a CSA would not be allowed if such harvest would result in the applicant being unable to meet its habitat commitments post-harvest. Any harvest conducted within the CSAs by the applicant would require evaluation and written approval by USFWS for compliance with the ITP.

Conditions for Allowable Harvest within the Home Range. If more than 600 acres of nesting/roosting habitat (as defined previously for the core area) and more than 1,050 acres of foraging habitat (with at least 730 acres of high- and moderate-quality foraging habitat, as defined previously for the core area) exist within the 3,396-acre home range, then harvest could occur outside of these habitat-retention areas. By definition, the home range includes the acreage identified above for the 500-acre core area around the activity center. Where there is currently less than 600 acres of nesting/roosting habitat and/or less than 1,050 acres of foraging habitat within the entire 3,396-acre home range, specific areas on the ownership within the CSA with the potential to develop into suitable owl habitat over the term of the permits were identified as part of the CSA selection process and are shown on maps

included in Appendix D of the proposed HCP. Harvest in these areas would be restricted until the habitat thresholds are met. High priority for conservation was given to areas that provide connectivity with nesting/roosting habitat in the 500-acre core area and with other owl activity centers, and with a high likelihood of use by northern spotted owls (for example, lower third of mesic slopes near riparian zones, including designated WLPZs) to provide additional foraging opportunities for owls.

These harvest restrictions are based on habitat targets for the CSA as a whole (regardless of ownership), established to promote a high probability of occupancy by spotted owl nesting pairs at known activity centers with high conservation value to the federal conservation strategy. The habitat targets guide management and stand development on the applicant's land within the home range and any harvest conducted by the applicant within the CSAs would require evaluation and written approval by USFWS. Overall, 41 percent of the ownership in the home ranges of the CSAs would be managed to provide suitable owl habitat in support of the federal conservation strategy. The remaining portion of the applicant's ownership in the home ranges of the CSAs was either identified as non-habitat, could not be reasonably expected to provide habitat over the 50-year permit term, or was of low priority given the amount and quality of habitat elsewhere in the CSA.

While silvicultural practices would be tailored to individual activity centers, the habitat commitments would be incorporated into the management of CSAs within the 1.3-mile-radius home range around each strategic activity center. The amount and location of nesting/roosting and foraging habitat will change through time as stands age and grow. If an area in the CSA identified for conservation as foraging habitat grows into nesting/roosting habitat, then the applicant could harvest this or other nesting/roosting habitat in the CSA down to the high-quality foraging habitat standards, provided that its commitments for nesting/roosting and foraging habitat in the home range are met and at least 600 acres of nesting/roosting habitat and 1,050 acres of foraging habitat is maintained within the entire 3,396-acre home range area.

Upon evaluation and written concurrence by USFWS, exceptions may be made on a case-by-case basis for CSAs that lack the acreage or site potential to meet this requirement. Timber harvest on the ownership in a CSA would not be allowed if such harvest would result in the applicant being unable to meet its habitat commitments post-harvest. Any harvest conducted within the CSAs would require evaluation and written approval by USFWS for compliance with the ITP.

Objective 2: Riparian Management Objective. The biological objective for riparian management is to provide foraging and dispersal opportunities for the northern spotted owl across the landscape by promoting growth in riparian stands toward a more mature state with a high level of overstory canopy coverage and legacy structures, such as old large trees, snags, and downed wood. Riparian measures under the Aquatic Species Conservation Program have been developed to maintain and enhance the key riparian functions (see Section 2.2.4.3). These measures would provide foraging habitat and dispersal corridors for the northern spotted owl.

Objective 3: Dispersal Habitat Objective. The biological objective for dispersal habitat is to contribute to a general trend of increased quality and quantity of northern spotted owl dispersal habitat across the ownership over the 50-year permit term. The applicant would

promote forest management practices that develop and maintain dispersal habitat across its ownership sufficient to provide connectivity between the CSAs and nearby federal lands.

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 1992). Forsman et al. (2002) found that spotted owls could disperse through highly fragmented forest landscapes, yet the stand-level and landscape-level attributes of forests needed to facilitate successful dispersal have not been thoroughly evaluated (Buchanan 2004). Northern spotted owls disperse through a wide variety of forest conditions, including younger stands and open patches. However, northern spotted owls tend to favor foraging habitat (CWHR category 4M; average tree diameters ≥11 inches and conifer overstory trees with closed canopies of ≥40 percent canopy closure) with open space beneath the canopy to allow flight (USFWS 2011).

Objective 4: Take Minimization Objective. The biological objective for take minimization is to avoid direct take of spotted owls resulting from authorized timber-harvesting operations. This objective would be accomplished through a combination of: (1) seasonal timing restrictions; (2) pre-harvest surveys; and (3) onsite monitoring by a qualified biologist. The following measures are associated with the take minimization objective and apply to activity centers where timber harvest is allowed:

- The applicant would not conduct timber operations or create a noise disturbance in conducting covered activities within 0.25 mile of active spotted owl nest sites during the breeding season beginning February 1 and ending August 31. "Active spotted owl nest site" is defined as the nest tree of a pair of nesting spotted owls. Road use and maintenance within 0.25 mile of an active spotted owl nest site may occur during the breeding season, but would require evaluation by USFWS. Other timber operations and other covered activities on the ownership within 0.25 mile of an active spotted owl nest site may commence without restriction after August 31 for activity centers authorized for take.
- To help ensure protection of active spotted owl nest sites on the ownership and on adjacent land within 0.25 mile of the applicant's THP boundary, USFWS would require the applicant to conduct up to three protocol-level surveys each year of operation at known activity centers if necessary to determine site occupancy and reproductive status, and survey suitable habitat within 0.25 mile of covered activities planned for operations during the active breeding season. Survey results must be reviewed and approved by USFWS. For activity centers where two consecutive years of protocol-level surveys indicate the site is not currently occupied, and no spotted owls are detected within 0.25 mile of the THP boundary, covered activities may occur during the breeding season for the following two years without conducting additional surveys. Surveys are not required for covered activities occurring outside of the breeding season.
- To help ensure that all active spotted owl nest sites on the ownership and on adjacent lands within 0.25 mile of the applicant's THP boundaries are identified, USFWS would require the applicant to use the most recent information on spotted owl location from DFG, USFWS, and private timber companies with adjacent land, during the preparation of each THP. The applicant would also provide training on spotted owl identification and signs of spotted owl presence for field personnel that would be conducting THP

preparation and timber operations to increase the probability that previously unknown spotted owl sites within or adjacent to THPs are identified. All new spotted owl activity centers located through surveys or incidentally would become "known" activity centers, and would be subject to the survey and avoidance provisions above. If there is no response from an activity center during three consecutive years of protocol-level spotted owl surveys, USFWS would evaluate the habitat quality and quantity within the home range to determine its potential for occupancy.

Objective 5: Threat Management Objective. The biological objective is to manage, to the maximum extent practicable, known threats to the northern spotted owl. Significant threats to the northern spotted owl within the region include the barred owl and catastrophic wildfire. This objective would be accomplished through actions that: (1) control barred owls through management actions within the area; and (2) reduce the potential for catastrophic wildfire on the ownership that could diminish the quality and amount of spotted owl nesting/roosting, foraging, and dispersal habitat both on and off the ownership.

To meet the issuance criteria for an ITP for northern spotted owl, the applicant would implement the following conservation and mitigation measures associated with the threat management objective:

- The applicant would implement the following barred owl control measures:
  - The applicant would conduct barred owl monitoring using current USFWS-approved survey protocols every 4 years within the CSAs as long as deemed necessary by USFWS. Barred owl monitoring would be conducted in coordination with protocol-level spotted owl surveys as described in Chapter 7 of the proposed HCP. Within the 4-year interval, the applicant would conduct a barred owl survey for two consecutive years to determine if barred owls are present. Survey results would be compiled and a status report provided to USFWS every 4 years.
  - If a barred owl is detected in the Plan Area, the applicant would locate and monitor the barred owl and alert USFWS immediately.
  - As part of the ITP issuance, the applicant also would apply for a federal Depredation Permit for barred owls as needed. The applicant would help to facilitate (e.g., through providing access to and across their ownership) implementation of barred owl control measures deemed appropriate by the USFWS.
- Consistent with its fuels-management guidelines for the Plan Area, the applicant would implement the following stocking control and fuel maintenance measures within the CSAs:
  - Plantation and naturally regenerated stands would be maintained at or below stocking levels considered "normal" as defined in standard yield tables where feasible.
  - Fine fuels (slash, brush, and trees less than 3 inches in diameter) would not be allowed to accumulate to levels greater than 10 tons per acre. Thinning of suitable habitat in CSAs would require pre-approval by USFWS.

- The applicant would implement the following measure to prevent and/or control the spread of forest disease and insect outbreaks in the CSAs:
  - Salvage of trees that are weakened or killed by disease or insects, or that are damaged by wildfire or climatic events. Except where human safety is a factor, or in instances where snags have the potential to promote wildfires, salvage is not allowed in WLPZs or in designated suitable habitat within the CSAs. Salvage operations in CSAs would require pre-approval by USFWS.

2.2.4.2 Yreka Phlox

Yreka phlox is listed as endangered under the federal ESA. Incidental take of listed plant species on private lands is not prohibited under the ESA and is therefore not authorized under an ITP. However, under the Proposed Action, USFWS would include Yreka phlox on the list of covered species for the ITP authorizing incidental take of northern spotted owl in recognition of the conservation benefits provided for the species by the HCP and to extend assurances to that species under the "No Surprises" rule. To gain these assurances under the ITP, the applicant developed a Terrestrial Species Conservation Program that includes specific measures to protect Yreka phlox. The conservation measures are designed to meet the biological goals and objectives for Yreka phlox identified in Subsection 5.1.3 of the proposed HCP. The biological objectives for Yreka phlox are summarized below along with a description of the conservation measures that would be implemented to meet these objectives and allow the applicant to meet the criteria for issuance of the ITP.

Objective 1: Avoidance of Adverse Effects Objective. This biological objective is to avoid direct or indirect adverse effects to, or destruction of, known or discovered populations of Yreka phlox resulting from timber harvesting operations. This objective would be accomplished through a combination of: (1) botanical surveys in areas on the ownership with specific soil types derived from ultramafic parent material that are within the area of high to moderate likelihood of occurrence of Yreka phlox to identify undiscovered populations; (2) establishment of EEZs around discovered populations; and (3) pre-activity surveys for Yreka phlox prior to Covered Activities that could directly (e.g. removal, destruction) or indirectly (e.g. changes in hydrology, introduction of invasive weeds) impact Yreka phlox.

To meet the issuance criteria for the ITP and gain assurances under the "No Surprises" policy, the applicant would implement the conservation measures in the proposed HCP associated with the avoidance of adverse effects objective for Yreka phlox. In general, these measures are similar to and consistent with the species protection measures for Yreka phlox described in Subsection 2.1.4.2 for the No Action Alternative, with the addition of botanical surveys to identify undiscovered phlox populations, use of certified weed-free mulch within the EEZs established around Yreka phlox occurrences, and restrictions on the felling and yarding of trees within the EEZs. Detailed pre-activity surveys to avoid adverse impacts to Yreka phlox would be conducted at the THP level as under the No Action Alternative.

Objective 2: Sustainability Objective. This biological objective is to contribute to conservation and recovery of the Yreka phlox. This objective would be accomplished by development and implementation of a monitoring program for known and discovered populations of

Yreka phlox on the ownership that will provide information on species status, distribution, and threats to the populations in the area.

To meet the issuance criteria for the ITP and gain assurances under the "No Surprises" policy, the applicant would implement the following conservation measures associated with the sustainability objective for Yreka phlox:

- The applicant would monitor all discovered occurrences of Yreka phlox on its ownership for the term of the permit. The specific elements of the monitoring plan for Yreka phlox would be developed in consultation with USFWS (as described in Chapter 7 of the proposed HCP) but would include the following:
  - Current known locations of Yreka phlox on the ownership.
  - Survey protocol to be followed.
  - Qualifications for monitoring personnel, which will include, at a minimum, familiarity with the species, the ecology of ultramafic habitats, and the threats to the species.

Monitoring would focus on habitat conditions and threats within the occupied habitat and the EEZ established around each discovered occurrence. Invasive weeds such as Marlahan mustard (*Isatis tinctoria*) and yellow star-thistle (*Centaurea solstitialis*) have specifically been identified as threats to some Yreka phlox occurrences, and other weeds could be a threat. If invasive weeds with the potential to harm Yreka phlox are detected in the Yreka phlox monitoring areas, the applicant would notify USFWS within 10 days. The applicant would help to facilitate (e.g., through providing access to and across their ownership) implementation of invasive weed control measures deemed appropriate by the USFWS.

2.2.4.3 Anadromous Salmonids

Coho salmon in the Southern Oregon/Northern California Coast ESU are listed as threatened under the federal ESA. The Klamath Mountains Province steelhead ESU and the Upper Klamath and Trinity Rivers Chinook salmon ESU are currently unlisted. Under the Proposed Action, NMFS would issue a permit authorizing incidental take of these species. To meet the issuance criteria for the ITP, the applicant developed an Aquatic Species Conservation Program that includes specific measures to protect the aquatic Covered Species. The conservation measures that would be implemented to meet the biological goals and objectives and meet the criteria for issuance of the ITPs are described below.

Under the Proposed Action, the applicant would comply with specific conservation measures in the Aquatic Species Conservation Program, which include: restricting timber harvest in riparian areas; providing for better road construction, road maintenance and management; and avoiding and minimizing effects on the covered species due to harvest-related sediment input to fish-bearing water courses.

The Plan Area has been divided at the drainage level into three "Implementation Classes" based primarily on the range and distribution of anadromous salmonid populations and the proximity of the applicant's lands to known or potential habitat for coho salmon: Class A, B, and C lands. These "Implementation Classes" were developed in coordination with NMFS and DFG and indicate where various classes of conservation measures will be implemented; they are not intended to describe the current, historic, or potential distribution of coho salmon within the regional landscape. Further detail as to the location and distribution of

drainages and Implementation Classes in the Plan Area is included in Subsection 5.2.1 of the proposed HCP. Table 2-4 identifies Plan Area drainages in each Implementation Class.

TABLE 2-4
Drainages Included in Each Implementation Class

Implementation Class	Drainage Name	FGS Ownership (acres)
A	Beaver	16,902
A	Big Ferry	1,275
A	Canyon	1,965
A	Cottonwood	16,261
A	Doggett	3,974
A	Dona	2,508
A	Dutch Creek	2,972
A	Empire Creek	2,660
A	Horse	9,664
A	Indian	3,976
A	Lumgrey Creek	2,507
A	Meamber	5,038
A	Middle Klamath	1,401
A	Mill	1,419
A	Moffett	3,487
A	Pat Ford	2,153
A	Patterson	2,101
A	Rattlesnake	1,088
A	Seiad	1,438
B	Bogus Creek	1,974
B	Duzel	11
B	EF Scott	185
B	McConaughy	115
B	Moffett	16,075
B	Shasta Valley	1,207
B	Willow Creek	975
C	Antelope Creek	360
C	Antelope Sink	1,552
C	Elliott Creek	4,486
C	Fourmile Hill	751
C	Garner Mtn	1,393
C	Glass Mtn	1,976
C	Grass Lake	12,077
C	Headwaters	4,739

TABLE 2-4
Drainages Included in Each Implementation Class

Implementation Class	Drainage Name	FGS Ownership (acres)
C	Horsethief	6,620
C	Juanita Lake	2,039
C	Little Shasta	6,133
C	NW Mt Shasta	3,330
C	Shasta Valley	0
C	Shasta Woods	4,477

- Class A lands (82,783 acres) include all Plan Area lands that are located west of Interstate 5 and north of State Highway 3. These lands are located in drainages that currently (since 1990) support coho salmon or, based on the best available information, historically (prior to 1990) supported coho salmon. Class A designated lands include those portions of the Plan Area where covered activities can substantially influence habitat conditions for coho salmon based on the location of the ownership relative to the distribution of coho salmon. Class A lands generally include stream reaches that are directly tributary to the Klamath or Scott rivers that support (or historically supported) coho salmon or that are directly upstream of these coho salmon reaches. Class A lands also include the ownership in the Cottonwood drainage (32,023 acres) which currently does not support coho salmon. This drainage, at present, is blocked to anadromy as a result of agricultural diversions just upstream from its confluence with the Klamath River near the town of Hornbrook. Cottonwood Creek, however, is an important tributary to the Klamath in this region and was known historically to support anadromous salmonids upstream into the Hilt basin where the applicant has its ownership. Because of the historical importance of Cottonwood Creek as a tributary to the Klamath River and its potential to contribute to the recovery of coho salmon, the applicant's lands in the Cottonwood drainage are included in the Class A designated lands.
- Class B lands (20,542 acres) include Plan Area lands in the Bogus Creek and Willow Creek drainages, and that portion of the Moffett Creek drainage that lies south of State Highway 3. These lands are located in drainages that are within the range of anadromy and coho may be present downsteam of the ownership. However, but stream segments on the ownership in these drainages currently do not support coho salmon and have no real potential to do so in the future. There is a verified natural barrier to anadromy on Bogus Creek in the Middle Bogus drainage well downstream of the ownership. Coho have been documented in Moffett Creek only below the confluence of McAdams Creek. Class B designated lands are limited and are isolated parcels of the ownership where the potential for covered activities to influence habitat conditions for coho salmon is extremely limited and where the potential to contribute to the recovery of coho salmon is likewise limited.
- Class C lands (49,925 acres) include Plan Area lands located in the Elliott Creek drainage and those in drainages east of Interstate 5 (Grass Lake management unit), except in the Bogus Creek and Willow Creek drainages (described previously as Class B lands).

These lands are located above long-standing barriers to anadromous fish or have no direct connection to streams supporting anadromous salmonids. Consequently, there is virtually no potential for covered activities to influence habitat conditions for anadromous salmonids and no opportunity for the ownership to contribute to the recovery of coho salmon. The Grass Lake management unit (47,686 acres) is located on a high volcanic plateau east of the Shasta Valley and north of Mount Shasta. It is an arid, dry, east-side Ponderosa pine/white fir forest with few streams, none of which support anadromous salmonids. Even though this management unit is in the Klamath River Basin, all streams flow into dry sinks and are not connected to the Klamath River.

Class C lands are regulated under the current CFPRs, and thus aquatic conservation measures described in the No Action Alternative for watersheds without anadromous salmonids are already implemented by the applicant under each THP. Standards for Class C lands do not represent additional protections relative to the No Action Alternative. Accordingly, this EIS focuses instead on the additional aquatic protection measures proposed for Class A and Class B lands. Aquatic protection measures for coho salmon (based on DFG guidelines) were used as the basis for the aquatic protection measures as specified in the HCP. The aquatic protection measures in Class A and B designated lands are summarized below. A more detailed description of the aquatic protection measures is provided in Subsection 5.2.2 of the proposed HCP. These measures would allow the applicant to avoid or minimize the potential for adverse effects of their covered activities.

Aquatic Protection Measures in Class A and Class B Lands. Drainages that contain Class A and B lands as defined in the HCP are essentially the same as watersheds with listed anadromous salmonids defined in the CFPRs. As such, the conservation measures described above under the No Action Alternative for watersheds with listed anadromous salmonids would apply to these drainages under the Proposed Action. However, under the Proposed Action, additional protection would be provided to the aquatic covered species in these drainages through implementation of the road management (see Subsection 2.2.2) and slope stability measures included in the Aquatic Species Conservation Program of the proposed HCP. The slope stability measures are summarized below. Additional monitoring activities as described in Subsection 2.2.3.4 would be implemented under the Proposed Action to document compliance with the terms and conditions of the proposed HCP and evaluate the effectiveness of the proposed conservation and mitigation measures included in the proposed HCP.

Slope Stability Measures. Slope stability measures under the Proposed Action focus on project-level identification of unstable (historically active) and active slopes/landslides and the application of specific management prescriptions to those areas described as shallow or deep-seated mass wasting hazard zones (MWHZs). The purpose of the slope stability conservation measures is to: (1) minimize and mitigate sediment delivery to aquatic habitat from management-related landslides, (2) minimize the erosion potential of identified mass wasting hazard zones, and (3) minimize the potential for activation from landslide-prone terrains.

- The applicant will apply default conservation measures for "slide areas," "unstable areas," and "unstable soils" as defined in 14 CCR 895.1 (collectively termed "unstable areas") that provide protections equivalent to or greater than the current (2008) CFPRs.
- In drainages containing Class A or Class B designated lands, the applicant will apply terrain-specific conservation measures to address instability associated within explicit MWHZs. These terrain-specific default conservation measures are based on slope processes and geomorphic landforms associated with both shallow and deep-seated mass wasting hazards.

Default Conservation Measures

In all "unstable areas" that are identified at the project level, the applicant will:

- Locate and delineate known unstable areas on topographic maps at a scale sufficient to transfer to a GIS database.
- Conduct a review by a professional geologist or certified engineering geologist of all operations on unstable areas to ensure that proposed activities do not present a greater risk of sediment delivery other than optional harvest strategies (e.g. light selection harvest).
- Prohibit clearcut harvest within MWHZ boundaries.
- Limit timber operations on slides or unstable areas.
- Prohibit new road and landing construction or operation of heavy equipment within delineated MWHZ boundaries without prior field review or approval from a professional geologist or certified engineering geologist.
- Avoid loading overburden within 30 feet upslope of delineated MWHZs.
- Avoid tractor site preparation in the vicinity of MWHZs during the winter wet weather period, or during other periods when saturated soil conditions exist.
- Avoid fire break construction using heavy equipment in the vicinity of MWHZs during the winter wet weather period, or during other periods when saturated soil conditions exist.
- Conduct road construction, maintenance, and decommissioning in a manner to avoid concentrating surface runoff onto any delineated MWHZ.
- Prohibit redirecting water drainage from roads, skid trail, and landings onto any delineated MWHZs.
- Avoid operating heavy equipment on unstable areas. Where unavoidable, specific measures will be developed to minimize the effect of operations on slope instability.
- Avoid heavy equipment operations on slopes greater than 65 percent or slopes greater than 50 percent where the erosion hazard rating (EHR) is high or extreme, without approved explanation and justification prior to use.

- Prohibit heavy equipment operations on slopes steeper than 50 percent leading directly to a watercourse or lake without flattening sufficiently to dissipate water flow or trap sediment.
- Limit heavy equipment to existing tractor roads that do not require reconstruction on slopes with moderate EHR that average greater than 50 percent over 20 acres.
- Prohibit the placement of fill onto slopes greater than 65 percent.
- Minimize the placement of sidecast on slopes greater than 65 percent.
- Avoid discharge from drainage structures and drainage facilities on logging roads which could discharge on erodible fill or other erodible material unless suitable energy dissipaters are used.
- Install additional erosion control structures where necessary to control management-induced sediment delivery to area watercourses.
- Prescribe measures to minimize movement of soil and the concentrated surface runoff on any slopes 65 percent or steeper, or on slopes greater than 50 percent within 100 feet of a WLPZ boundary where roads and landings traverse more than 100 feet of linear distance.

Shallow Mass Wasting Hazards

Trained personnel (certified engineering geologist, professional geologist, or trained RPF) would examine areas with a moderate or high potential for shallow mass wasting during THP layout and identify shallow MWHZs for additional protection. The following terrain-specific conservation measures, in combination with the default measures for unstable areas, will be applied to shallow MWHZs field-verified as unstable with reasonable potential to deliver sediment directly to a watercourse.

- Prohibition of the use of even-aged regeneration methods, and a minimum average canopy of 60 percent shall be retained. All operations on active shallow landslides shall be reviewed by a professional geologist or certified engineering geologist to ensure that proposed activities do not present a greater risk of sediment delivery.
- Avoidance of new road or skid trail construction or major road reconstruction without field review and approval by a professional geologist or certified engineering geologist.
- Minimization of undercutting or removal of buttressed slide materials (i.e., slide deposits or colluvium).
- Application of bank stabilization measures in areas of management-accelerated active bank erosion to prevent altering stream channel geomorphology.
- Prohibition of heavy equipment operations in the vicinity of shallow MWHZs without field review and approval from a professional geologist or certified engineering geologist.

Deep-seated Mass Wasting Hazards

Trained personnel (i.e., certified engineering geologist, professional geologist, or trained RPF) would examine potential deep-seated mass wasting hazards (i.e., earthflows, undifferentiated slides and headwall basins, or rotational/translational slides) during

THP layout and identify deep-seated MWHZs for additional protection. The following terrain-specific conservation measures, in combination with the default measures for unstable areas, will apply to deep-seated MWHZs field-verified as unstable with reasonable potential to deliver sediment directly to a watercourse.

- Prohibition of the use of even-aged regeneration methods, and a minimum average canopy of 60 percent shall be retained. All operations on active deep seated landslides shall be reviewed by a professional geologist or certified engineering geologist to ensure that proposed activities do not present a greater risk of sediment delivery.
- Retention of an uneven-aged stand structure within slide mass and toe slopes of deep-seated MWHZ boundaries.
- Establishment of an EEZ within deep-seated MWHZ boundaries and extend the EEZ 30 feet upslope of the head scarp.
- Minimization of undercutting or removal of buttressed slide materials especially in toe slopes of any deep-seated MWHZ without field review and approval from a professional geologist or certified engineering geologist.
- Prohibition of loading slide material, slide mass margins, or toe slopes of unstable deep-seated MWHZ with excavation spoils, road fill, or surface runoff.

2.2.5 Changed and Unforeseen Circumstances

For the purposes of this EIS, changed circumstances are those changes affecting a species or geographic area covered by the HCP that can reasonably be anticipated and planned for by the applicant, NMFS, and the USFWS at the time of the HCP's preparation. In discussions with USFWS, NMFS, and DFG, the applicant identified several reasonably foreseeable circumstances under which changes could occur during the Permit Term that could result in a substantial and adverse change in the status of a Covered Species. Foreseeable conditions that could result in "changed circumstances" as defined in applicable federal regulations and policies are identified below.

- Global climate change, which over the permit term could result in increased fire risk, flooding, drought, incidence of pests or pathogens, increase in the number or density of invasive species, or restriction in the range of Covered Species at a regional or local scale. If climate change is the causative factor for these events, these issues are individually addressed in the sections below as they would pertain to changed circumstances in the Plan Area.
- Listing of species that are currently unlisted but occur within the Plan Area.
- A change in the listing status (including de-listing) of a Covered Species through a formal status review by the Services.
- Designation or revision of critical habitat for species listed after the start of the Permit Term that may be affected by a Covered Activity.

- Stand replacing fires that (alone or in combination with other events such as blowdown) affect greater than 150 feet, measured along the length of the stream, of previously standing timber within a Class I WLPZ or SMZ along streams supporting any of the aquatic Covered Species in a given year.
- Stand replacing fire that (alone or in combination with other events such as blow-down) downgrades suitable habitat within the core area or home range of an activity center supported by a CSA on the applicant's ownership to non-habitat, such that the CSA no longer provides demographic support to the federal conservation strategy or meets the biological objectives of the HCP.
- Complete blow-down that (alone or in combination with other events such as fire) affects greater than 150 feet, measured along the length of the stream, of previously standing timber within a Class I WLPZ or SMZ along streams supporting any of the aquatic Covered Species.
- Blow-down that (alone or in combination with other events such as fire) downgrades suitable habitat within the core area or home range of an activity center supported by a CSA on the applicant's ownership to non-habitat, such that the CSA no longer provides demographic support to the federal conservation strategy or meets the biological objectives of the HCP.
- Stand modification (e.g., changes in average diameter or canopy coverage) due to pests or pathogens, or their control, that (alone or in combination with other events such as fire and blow-down) downgrades suitable habitat within the core area or home range of an activity center supported by a CSA on the applicant's ownership to non-habitat, such that the CSA no longer provides demographic support to the federal conservation strategy or meets the biological objectives of the HCP.
- Landslides that deliver greater than 1,000 cubic yards of sediment to a channel.
- Introduction or invasion by exotic plant or animal species (e.g., barred owl) that affect Covered Species or their habitat.

The potential for each of these circumstances is reasonably foreseeable. As described in subsection 8.2.1 of the HCP, the applicant also considered the potential for floods and earthquakes to have effects that could constitute "changed circumstances." The applicant's strategy for addressing each of these changed circumstances is described in subsection 8.2.1 of the HCP; if changed circumstances occur, the applicant would implement the supplemental prescriptions set forth in the subsection.

All changes not described above as "changed circumstances" that would result in a substantial and adverse change in the status of a Covered Species are considered unforeseen circumstances. In case of an unforeseen event, the applicant will immediately notify the Services who will determine if an unforeseen circumstance has occurred. In determining whether such an event constitutes an unforeseen circumstance, the Services shall consider, but not be limited to, the following factors: size of the current range of the affected species; percentage of range adversely affected by the HCP; percentage of range conserved by the HCP; ecological significance of that portion of the range affected by the HCP; level of knowledge about the affected species and the degree of specificity of the species'

conservation program under the HCP; and whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

If the Service(s) determine that additional conservation and mitigation measures are necessary to respond to the unforeseen circumstances, and the HCP is being properly implemented, the additional measures required will be, to the maximum extent practicable, as close as possible to the terms of the original HCP, and must be limited to modifications within any conserved habitat area or to adjustments within lands or waters that already are set-aside in the HCP's operating conservation program. Additional conservation and mitigation measures shall not involve the commitment of additional land or financial compensation, or restrictions on the use of land or other natural resources otherwise available for development or use under the original terms of the HCP without the consent of the permit holder.

2.3 Alternative A

Under Alternative A, USFWS would issue the applicant an ITP with a 50-year term, covering northern spotted owl. NMFS would issue an ITP, also with a term of 50 years, for three ESUs of anadromous salmonids:

- Southern Oregon/Northern California Coast coho salmon ESU
- Klamath Mountains Province steelhead ESU
- Upper Klamath and Trinity Rivers Chinook salmon ESU

Under Alternative A, the applicant would continue to conduct timber harvesting and related operations in accordance with existing state and federal regulations, including the CFPRs, and the operational and policy management actions currently being implemented by the applicant. The applicant would also implement an HCP within the Plan Area. Operations within the Plan Area would be subject to the terms and conditions of the HCP and the associated IA. This alternative differs from the Proposed Action in the manner in which CSAs for northern spotted owl are selected and in the level of protection to aquatic species provided by the riparian buffers (see Subsection 2.3.4). CSAs for northern spotted owl would be based on LSRs instead of CHUs. Riparian reserves would be established around all streams and water bodies, and harvest in the reserves would be prohibited.

2.3.1 Timber Harvest

In general, the types of timber harvest and associated activities would be similar to those described for the No Action Alternative. However, the amount of timber harvest that would occur is likely to differ from the No Action Alternative, and the relative amount of land in the Plan Area subject to the different silvicultural practices would likely differ in order to meet the applicant's required harvest volume while meeting the terms and conditions of the permits. These differences are summarized below to the extent that they can be predicted under this alternative. The aquatic conservation program under Alternative A also would preclude operational activities on a large portion of the ownership contained in no-harvest riparian reserves.

As described in Subsection 2.3.4.1, timber harvest would be constrained in CSAs, which would encumber approximately 23,000 acres. This would be similar to the amount of land encumbered under the Proposed Action. Timber harvest would be prohibited in the riparian reserves, which would preclude harvest on approximately 14,000 acres of prime timberland. There may be some overlap between the riparian reserves and the CSAs, but collectively, timber harvest would be constrained on at least 30,000 acres of productive timberland under Alternative A.

By constraining harvest on at least 30,000 acres of productive (often prime) timberland in CSAs and riparian reserves, the applicant has indicated that it would harvest more intensively on its remaining timberlands. The applicant would increase the amount of even-aged regeneration harvest each year to make up for the timber volume encumbered in riparian reserves, leading to at least a 10 percent increase in the acreage subject to clearcutting compared to the No Action Alternative.

Salvage operations also would be prohibited in the riparian reserves established under Alternative A, leading to a reduction in the amount of acres available for salvage. Because salvage is a minor portion of the projected harvest volume for the applicant, the amount of salvage conducted under Alternative A would not differ substantially from salvage under the No Action Alternative.

2.3.2 Road and Landing Construction, Maintenance, and Management

The types of road and landing construction, maintenance, and management activities would not differ substantially from those described for the No Action Alternative. Under Alternative A, all logging roads and landings on the ownership or under the control of the applicant within the Plan Area would be planned, located, constructed, reconstructed, used, and maintained in a manner that is consistent with long-term enhancement and maintenance of the forest resource; best accommodates appropriate yarding systems and economic feasibility; minimizes damage to soil resources and fish and wildlife habitat; and minimizes degradation of the quality and beneficial uses of water.

To this end, the applicant would use existing roads whenever feasible, strive to minimize total mileage, minimize disturbance to natural features, avoid wet areas and unstable areas, and minimize the number of watercourse crossings. Future road construction in the Plan Area is anticipated to consist primarily of short, temporary spurs designed to locate landings at stable areas outside of riparian reserves. These temporary roads would generally be utilized for one harvest season, and then decommissioned. New road construction is anticipated to average less than 1 mile per year. All new roads and landings would be constructed in accordance with practices specified in the CFPRs.

Under Alternative A, road management and sediment control measures would be the same as implemented under the No Action Alternative. Road inventories would not be conducted in a systematic and prioritized manner and would only cover the area identified in the individual THPs. However, it is likely that over the next 50 years, nearly all road segments would be inventoried through the THP process. Repair and upgrades of road-related sediment sources would be limited to the THP area and appurtenant roads; therefore, many large-scale repairs could go unrepaired for several years if they are not associated with a THP.

2.3.3 Other Management Activities

2.3.3.1 Stand Regeneration and Improvement

Under Alternative A, all forest stand regeneration and improvement activities would be the same as summarized for the Proposed Action with the exception of the riparian reserves in which operations are prohibited.

2.3.3.2 Harvest of Minor Forest Products

Under Alternative A, the harvest of minor forest products would continue as described under the No Action Alternative.

2.3.3.3 Fire Prevention and Suppression

Under Alternative A, all fire prevention and suppression activities would continue as described under the No Action Alternative. However, any fire prevention and suppression activities would be precluded in the riparian reserves.

2.3.3.4 Miscellaneous Activities

In addition to the applicant's forest management activities, certain other activities undertaken by the applicant and third parties pursuant to their obligations (for example, easements) or authorizations (leases and licenses) would continue under Alternative A. Generally, such activities could include watershed management; fish and wildlife habitat improvement; use of area roads, landings, and log decks; rock quarrying; water drafting; and various required monitoring activities. These activities would be substantially the same as those described for the Proposed Action.

2.3.4 Species-protection Measures

2.3.4.1 Northern Spotted Owl

The conservation strategy for northern spotted owls under Alternative A would follow a similar approach as the Proposed Action, but the approach to meeting Objective 1 (Demographic Support) would change. Under Alternative A, the conservation and mitigation measures to meet the other biological objectives for northern spotted owl would be implemented in the same manner as the Proposed Action.

Under both the Proposed Action and Alternative A, demographic support would be provided by establishing a series of CSAs across the applicant's ownership. CSAs would be designated around high conservation value owl activity centers located on or within 1.3 miles of the ownership. Timber harvest consistent with the CFPRs and other conservation measures in the HCP would be allowed within 1.3 miles of owl activity centers that are not supported by designated CSAs. In contrast to the Proposed Action, CSAs would be established based on proximity of activity centers to the adjacent LSRs identified in the 1994 NWFP rather than on proximity to designated CHUs in the Proposed Revised Designation of Critical Habitat for the Northern Spotted Owl (72 FR 32450-32516).

The NWFP provided management direction for federal lands in the Pacific Northwest (including northern California), within the range of the northern spotted owl, for the sustainable production of timber and management of affected species. The NWFP

established land use allocations for 19 national forests, seven Bureau of Land Management (BLM) districts, six national parks, and other federal lands. The NWFP established a system of LSRs on federal lands that are intended to protect and enhance conditions of late-successional and old-growth forest ecosystems. LSRs provide habitat for late-successional and old-growth related species, including the northern spotted owl.

Proximity to LSRs results in a different set of activity centers supported by CSAs. Table 2-5 shows the set of activity centers with designated CSAs under Alternative A. To facilitate comparison with the CSAs designated under the Proposed Action (Table 2-3), added activity centers are shown in underline (underline) text and deleted activity centers are shown in strikethrough (~~strikethrough~~) text.

TABLE 2-5
Habitat Commitments in CSAs Supporting High Conservation Value Activity Centers (acres)

Activity Center ID	Suitable Spotted Owl Habitat 500-Acre Core Area	Suitable Spotted Owl Habitat Home Range (1.3 miles)*
SK002	211	931
SK020	21	727
SK028	35	319
SK040	9	379
SK044	27	572
SK061	0	158
SK063	2	201
SK097	34	320
SK099	1	305
~~SK100~~	~~118~~	~~207~~
SK130	122	875
SK153	168	809
SK238	0	66
SK239	126	548
SK262B	152	477
SK284	130	652
SK291	11	72
SK352	58	679
SK378	33	62
SK380	130	324
SK428	16	327
~~SK446~~	~~48~~	~~435~~
SK462	110	701

TABLE 2-5
Habitat Commitments in CSAs Supporting High Conservation Value Activity Centers (acres)

Activity Center ID	Suitable Spotted Owl Habitat 500-Acre Core Area	Suitable Spotted Owl Habitat Home Range (1.3 miles)*
SK477	41	750
SK503	38	483
SK512	16	137
SK530	28	321
SK531	108	1,055
~~SK548~~	~~4~~	~~277~~

* Acres in home range include the 500-acre core area around the activity center. The home range is the area of land within a 1.3-mile-radius around an activity center. The acreage listed in this table is the acreage present on the applicant's property only, and does not include land within the home range that is owned by others (private, federal, and state), and may include overlap with adjacent CSAs.

Within each of the designated CSAs, allowable harvest conditions for both the core area and home range would be the same as described for the Proposed Action. Specific habitat targets in the newly designated CSAs are reflected in the underlined values in Table 2-5.

2.3.4.2 Yreka Phlox

Under Alternative A, management and conservation measures for Yreka phlox would be the same as under the No Action Alternative.

2.3.4.3 Anadromous Salmonids

Under Alternative A, the conservation strategy for anadromous salmonids would be based on concepts for the protection of aquatic habitats outlined in the NWFP. The NWFP includes an aquatic conservation strategy developed to restore and maintain the ecological health of watersheds and the aquatic ecosystems contained within them on public lands. The aquatic conservation strategy protects salmon and steelhead habitat on federal lands within the range of anadromy. The aquatic conservation strategy in the NWFP employs several tactics to approach the goal of maintaining the "natural" disturbance regime and limit or exclude activities in watershed areas that are prone to instability.

The *Standards and Guidelines for Management of Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl* (Attachment A to the Record of Decision on the NWFP) outlines an aquatic strategy with four components: (1) establishment of riparian reserves, (2) designation of key watersheds, (3) watershed analysis, and (4) watershed restoration. These components are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems. Alternative A carries forward the concept of establishing riparian reserves, but does not include the other components of the aquatic conservation strategy contained in the NWFP.

Under Alternative A, riparian reserves would be established along all streams and water bodies. Riparian reserves are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply. Riparian

reserves include those portions of a watershed directly coupled to streams and rivers, that is, the portions of a watershed required for maintaining hydrologic, geomorphic, and ecologic processes that directly affect standing and flowing water bodies such as streams, lakes, ponds, and wetlands. Riparian reserves generally parallel the stream network but also include other areas necessary for maintaining hydrologic, geomorphic, and ecologic processes.

Programmed timber harvest within riparian reserves would be prohibited such that no-harvest buffers of the following widths would be established for five categories of streams or water bodies:

- Fish-bearing streams—Riparian reserves would consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest.
- Permanently flowing nonfish-bearing streams—Riparian reserves would consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150-foot slope distance (300 feet total, including both sides of the stream channel), whichever is greatest.
- Constructed ponds and reservoirs, and wetlands greater than 1 acre—Riparian reserves would consist of the body of water or wetland and the area to the outer edges of the riparian vegetation, or the extent of seasonally saturated soil, or the extent of unstable and potentially unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet of slope distance from the edge of the wetland greater than 1 acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is greatest.
- Lakes and natural ponds—Riparian reserves consist of the body of water and the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or to the extent of unstable and potentially unstable areas, or to a distance equal to the height of two site-potential trees, or 300-foot slope distance, whichever is greatest.
- Seasonally flowing or intermittent streams, wetlands less than 1 acre, and unstable and potentially unstable areas—This category applies to features with high variability in size and site-specific characteristics. At a minimum, the riparian reserves must include the extent of unstable and potentially unstable areas (including earthflows), the stream channel and to the top of the inner gorge, the stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of riparian vegetation, and extend from the edges of the stream channel to a distance equal to the height of one site-potential tree or 100-foot slope distance, whichever is greatest.

2.4 Alternative B

Under Alternative B, USFWS would issue the applicant an ITP with a 50-year term, covering northern spotted owl. NMFS would not issue an ITP for the three species of anadromous salmonids covered under the Proposed Action.

Under Alternative B, the applicant would continue to conduct timber harvesting and related operations in accordance with existing state and federal regulations, including the CFPRs and the operational and policy management actions currently being implemented by the applicant. The applicant would also implement an HCP within the Plan Area covering the northern spotted owl. Operations within the Plan Area would be subject to the terms and conditions of the modified HCP and the associated IA. Alternative B provides a different approach to northern spotted owl conservation by providing moderate quality foraging and dispersal habitat across the applicant's ownership as mitigation for incidental take of owls. In this manner, conservation would be achieved by landscape-level actions rather than by preserving specific owl habitat within home ranges (for example, the CSAs designated under the Proposed Action). The terrestrial conservation program in the Alternative B modified HCP would not include conservation measures for Yreka phlox, and there would not be an aquatic species conservation program. Species protection measures for Yreka phlox and anadromous salmonids would be the same as under the No Action Alternative.

2.4.1 Timber Harvest

In general, the types of timber harvest and associated activities would be similar to those described for the No Action Alternative. However, the amount of timber harvest that would occur is likely to differ from the No Action Alternative, and the relative amount of land in the Plan Area subject to the different silvicultural practices would likely differ in order to meet the applicant's required harvest volume while meeting permit terms and conditions. These differences are summarized below to the extent that they can be predicted under this alternative.

As described in Subsection 2.4.4.1, timber harvest would be distributed across the entire ownership because CSAs would not be established around specific activity centers as under the Proposed Action and Alternative A. The applicant would be able to maintain financial viability with less harvest than under the No Action Alternative because it would be able to harvest more of the ownership currently considered habitat for northern spotted owl. Areas of habitat generally have more and larger trees, such that they provide more timber volume per acre than non-habitat areas. The amount of even-aged regeneration harvest (clearcutting) would likely be reduced by up to 20 percent compared to the No Action Alternative.

Salvage operations also would occur over a wider area and could be increased as stands generally would be on a longer cutting cycle. However, salvage is a minor portion of the projected harvest volume for the applicant and the amount of salvage conducted under Alternative A would not differ substantially from the No Action Alternative.

2.4.2 Road and Landing Construction, Maintenance, and Management

The types of road and landing construction, maintenance, and management activities would not differ substantially from those described for the No Action Alternative. Road and landing construction, maintenance, and management activities would remain the same as under the No Action Alternative. Road inventories would not be conducted in a systematic and prioritized manner and would only cover the area identified in the individual THPs. However, it is likely that over the next 50 years, nearly all road segments would be inventoried through the THP process. Repair and upgrades of road-related sediment sources would be limited to the THP area and appurtenant roads; therefore, many large-scale repairs could go unrepaired for several years if they are not associated with a THP.

2.4.3 Other Management Activities

Other management activities would remain the same as under the No Action Alternative. The additional monitoring activities identified under the Proposed Action would not be implemented under Alternative B.

2.4.4 Species-protection Measures

2.4.4.1 Northern Spotted Owl

Under Alternative B, the applicant would implement a modified conservation program with different objectives and conservation measures for demographic support, dispersal habitat, and take minimization compared to the Proposed Action. The primary objective of the Alternative B conservation program is to provide foraging habitat at twice the existing level. This landscape-based approach is expected to increase foraging opportunities for owls nesting on adjacent ownerships, and provide for dispersal of spotted owls across the ownership. The increase in habitat is expected to result in a landscape that supports foraging by spotted owls.

Demographic Support and Dispersal Habitat. Under Alternative B, the applicant would conduct forest management activities consistent with landscape-level goals developed for each management unit. Habitat management objectives would be based on the CWHR system. CWHR habitat types 4M, 4D, 5M, 5D, and 6, which consist of stands with a mean diameter of 11 inches or greater with 40 percent or greater canopy cover, are considered to provide foraging and dispersal habitat for northern spotted owls. With the exception of 4M and 5P, these habitat types may also provide roosting and nesting habitat.

The following measures would be implemented to meet the demographic support and dispersal habitat objectives for each management unit:

- The applicant would manage its Klamath River management unit in such a manner as to allow an increase in the representation of CWHR habitat types 4M, 4D, 5P, 5M, 5D, or 6 over the term of the permit with a goal of providing these stand structures on at least 35 percent of the Klamath River management unit by the end of the permit term.
- The applicant would manage its Klamath River management unit to allow the maintenance of CWHR habitat types 4M, 4D, 5M, 5D, or 6 on at least 15 percent of the Klamath River management unit in any decade of the permit term. These habitat types

are considered to provide foraging and, with the exception of 4M, may also provide nesting/roosting habitat.

- The applicant would manage its Klamath River management unit to allow the maintenance of CWHR habitat types 3M, 3D, 4P, or 5P on at least 15 percent of the Klamath River management unit in any decade of the permit term. These habitat types are considered to provide dispersal habitat.
- The applicant would manage its Scott Valley management unit to allow an increase in the representation of CWHR habitat types 4M, 4D, 5M, 5D, or 6 over the term of the permit with a goal of providing these stand structures on at least 25 percent of the Scott Valley management unit by the end of the permit term.
- The applicant would manage its Grass Lake management unit to allow an increase in the representation of CWHR habitat types 4M, 4D, 5M, 5D, or 6 over the term of the permit with a goal of providing these stand structures on at least 20 percent of the Grass Lake management unit by the end of the permit term.

Take Minimization. In addition to the CWHR-based habitat management measures described above, Alternative B also includes take avoidance measures that would minimize disturbance to nesting and roosting owls and defer harvest in some areas. These take minimization measures are similar to those under the Proposed Action.

The following measures would be implemented to meet the take minimization objective:

- The applicant would not conduct timber operations or create a noise disturbance in conducting covered activities within 0.25 mile of active spotted owl nest sites during the breeding season beginning February 1 and ending August 31. "Active spotted owl nest site" is defined as the nest tree of a pair of nesting spotted owls. Road use and maintenance within 0.25 mile of an active spotted owl nest site may occur during the breeding season, but would require evaluation by USFWS. Covered activities on the applicant's land within 0.25 mile of an active spotted owl nest site may commence without restriction after August 31 for activity centers authorized for take.
- A 500-foot buffer would be established around active spotted owl nest sites located on CHUs. The disturbance minimization measures described in the previous bullet would apply; however, timber operations would not reduce the suitability of habitat within the 500-foot buffer area. These conditions would apply until field surveys using USFWS-approved protocols demonstrate that the site has been abandoned. If the site is determined to be abandoned, timber operations and other covered activities could occur at any time of the year within the 500-foot buffer without any restrictions.
- To help ensure protection of active spotted owl nest sites on the applicant's lands and on adjacent land within 0.25 mile of the applicant's THP boundary, USFWS would require the applicant to conduct up to three protocol-level surveys each year of operation at known activity centers if necessary to determine site occupancy and reproductive status, and survey suitable habitat within 0.25 mile of covered activities planned for operations during the active breeding season. Survey results must be reviewed and approved by USFWS. For activity centers where two consecutive years of protocol-level surveys indicate a site is not currently occupied, and no spotted owl is detected within 0.25 mile

of the THP boundary, covered activities may occur during the breeding season for the following two years without conducting additional surveys. Surveys are not required for covered activities occurring outside of the breeding season.

- To help ensure that all active spotted owl nest sites on the applicant's lands and on adjacent lands within 0.25 mile of its THP boundaries are identified, USFWS would require the applicant to use the most recent information on spotted owl location from DFG, USFS, USFWS, and private timber companies with adjacent land, during the preparation of each THP. The applicant would also provide training on spotted owl identification and signs of spotted owl presence for field personnel that would be conducting THP preparation and timber operations to increase the probability that previously unknown owl sites within or adjacent to THPs are identified. All new spotted owl activity centers located through surveys or incidentally would become "known" activity centers, and would be subject to the survey and avoidance provisions above. If there is no response from an activity center during three consecutive years of protocol-level spotted owl surveys, USFWS would evaluate the habitat quality and quantity within the home range to determine its potential for occupancy.
- Conversion of suitable habitat to low-quality foraging, dispersal, or unsuitable habitat within 1.3 miles of at least eight currently occupied activity centers located on CHUs would be deferred for up to 15 years.
- Harvest would be allowed in areas of deferred harvest before the end of the 15-year deferral period if either: (1) based on habitat typing from aerial photographs, the area within 1.3 miles of the activity center contains 40 percent or more suitable habitat, or (2) surveys have demonstrated that the activity center is abandoned.
- Conversion of suitable habitat to low-quality foraging, dispersal, or unsuitable habitat in the Grass Lake management unit within 1.3 miles of at least one activity center located on a CHU would be deferred for at least five years and up to 15 years.

2.4.4.2 Yreka Phlox

Under Alternative B, management and conservation measures for Yreka phlox would be the same as the No Action Alternative.

2.4.4.3 Anadromous Salmonids

Under Alternative B, the conservation strategy for coho salmon and other anadromous salmonids would be similar to the strategy under the No Action Alternative. The applicant would apply the measures for protection of these species identified in the No Action Alternative for watersheds with listed anadromous salmonids in all drainages in its Klamath River and Scott Valley management units. Standard CFPR aquatic protection measures identified in the No Action Alternative for watersheds without anadromous salmonids would be applied in the Grass Lake management unit.

2.5 Alternatives Considered but Dismissed from Further Consideration

During the development of this EIS, the lead agencies considered several other alternatives in addition to the alternatives that are being carried forward for detailed analysis. These other alternatives are described in this section, along with a brief discussion of why they are not being carried forward for detailed analysis. In general, these alternatives were not selected for detailed analysis because they do not meet the agencies' purpose and need or they are beyond the scope of the EIS.

2.5.1 Reduced Permit Area

Under an alternative with a reduced permit area, USFWS would issue an ITP for northern spotted owl and NMFS would issue an ITP for Chinook salmon, coho salmon, and steelhead. However, the ITPs would only apply in the applicant's Klamath River and Scott Valley management units; its Grass Lake management unit would be excluded from ITP coverage. The terms and conditions of the proposed HCP would also apply to the reduced area. No incidental take of the covered species would be authorized in the Grass Lake management unit.

An alternative with a smaller permit area could be accomplished by removing the Grass Lake management unit, located within the northern spotted owl California Cascades Province. The applicant manages 47,686 acres in this area, or approximately 4 percent of the province. Suitable northern spotted owl habitat on the applicant's ownership in this area is limited to 15 percent of the landscape. USFWS has identified the regional population in this province as directly threatened by displacement from barred owls. As part of the Proposed Action, the applicant has agreed to manage spotted owl habitat on its ownership in a manner that supports adjacent activity centers as well as assist in the management of barred owls in this province. Under the Proposed Action, no incidental take of northern spotted owls would be authorized in the Grass Lake management unit; however, this no-take provision provides mitigation for incidental take elsewhere on the applicant's ownership. For these reasons, the agencies believe that the permit area as currently defined helps support a comprehensive approach to habitat management for northern spotted owl. Therefore, this alternative is not being carried forward for additional evaluation.

2.5.2 Reduced Permit Term

Under an alternative with a reduced permit term, USFWS would issue an ITP for northern spotted owl and NMFS would issue an ITP for Chinook salmon, coho salmon, and steelhead. The terms and conditions of the proposed HCP would apply for 30 years instead of the 50 years under the proposed HCP. Incidental take of the covered species would only be authorized for a term of 30 years.

This option would be consistent with the timeframe for implementing the 2008 Final Recovery Plan for the Northern Spotted Owl. The option of a 30-year permit term was dismissed by the lead agencies because areas of the Grass Lake management unit (California Cascades Province) are used as mitigation for incidental take of northern spotted owl at activity centers in the Klamath River and Scott Valley management units (California

Klamath Province). The drier conditions and slower tree growth within the California Cascades Province favor a longer permit term in order to develop suitable habitat that would provide the benefits needed to mitigate the impacts of the taking in the California Klamath Province. Use of the Grass Lake management unit as mitigation for incidental take elsewhere necessitates the 50-year permit term to allow suitable habitat to develop.

Additionally, the HCP (and the future IA) contains several mechanisms for adjustments over the permit term, including the changed circumstances and unforeseen circumstances provisions. These mechanisms help address concerns about the long-term flexibility of the conservation program. Therefore, this alternative is not being carried forward for additional evaluation. Other large industrial timber companies (e.g., Green Diamond Resource Company) have been issued ITPs with 50-year permit terms for timber operations.

2.5.3 Additional Covered Species

Under an alternative with additional covered species, USFWS would issue an ITP for northern spotted owl, fisher (*Martes pennanti*), and several amphibian species; NMFS would issue an ITP for Chinook salmon, coho salmon, and steelhead. The terms and conditions of the proposed HCP would apply for a 50-year permit term.

This alternative would provide incidental take coverage for the species under the proposed HCP and for seven additional species:

- Fisher
- Amphibians
  - Siskiyou Mountains salamander (*Plethodon stormi*)
  - Scott Bar salamander (*Plethodon asupak*)
  - Southern torrent salamander (*Rhyacotriton variegatus*)
  - Tiger salamander (*Ambystoma tigrinum*) – Grass Lake area only
  - Shasta salamander (*Hydromantes shastae*)
  - Cascades frog (*Rana cascadae*)

During scoping, commenters recommended the inclusion of these species in the proposed HCP. The applicant decided not to include these species as Covered Species under the HCP and the Services decided it was not feasible to pursue an alternative with no chance of being implemented. The amphibian species are not listed species, and in some cases their range does not extend onto the applicant's ownership. For those species whose presence and use of the applicant's ownership is not documented, an evaluation of the effects of the covered activities and development of a conservation program for these species would not be meaningful. Therefore, this alternative is not being carried forward for additional evaluation. At any time, the applicant can apply for a major amendment to the ITP to include coverage for these species and amend the HCP to include additional conservation strategies.

Although an alternative that includes these species as additional covered species is not being considered in detail, this EIS does consider environmental consequences to several of these species. Impacts to fisher, southern torrent salamander, Siskiyou Mountains salamander, and Scott Bar salamander are described in Section 4.3.3, Other Special-Status

Species. For a complete list of species considered in the EIS, see Section 3.3.4, Other Special-Status Species.

2.5.4 No Assurances

During scoping, several commenters recommended consideration of an alternative in which no "assurances" be provided with the ITP. Assurances pursuant to the "No Surprises" rule are part of the implementing regulations of USFWS (see 50 CFR 17.22 and 17.32) and NMFS (see 50 CFR 222.307) for the Section 10(a) process. It is the policy of USFWS and NMFS to issue ITPs with assurances. "No Surprises" has been successfully defended in a recent district court ruling (see *Spirit of the Sage Council, et al. v. Dirk Kempthorne, Secretary of the Department of Interior, et al.*). The EIS does not evaluate the absence of assurances as an alternative because that would be contrary to agency policy and regulation, and the Services have no intention of changing regulations and issuing ITPs without assurances at this time.

2.5.5 Active Aquatic Conservation Strategy

Under an alternative with a an active aquatic conservation strategy, USFWS would issue an ITP for northern spotted owl and NMFS would issue an ITP for Chinook salmon, coho salmon, and steelhead. The terms and conditions of the Terrestrial Species Conservation Program would apply and incidental take of northern spotted owl would be authorized for a period of 50 years. The road management and slope stability measures from the Aquatic Species Conservation Program under the proposed HCP would be implemented; however, the riparian management measures would change from passive to active habitat manipulation and management.

The proposed HCP includes a passive aquatic conservation strategy that seeks to achieve desired instream habitat conditions through natural processes. Riparian buffers and tree retention standards would provide shading, LWD, leaf litter, and other instream benefits for habitat diversity and water quality (including temperature) improvement. These benefits would occur over time as natural processes take place. Under this alternative, the management approach would be to actively develop these habitat conditions. Actions such as placement of LWD structures, augmenting instream flows with groundwater, manually creating fish habitat by excavating a portion of the stream channel, or erecting a canvas or synthetic canopy over exposed stream reaches could produce similar benefits to habitat diversity and water quality. Active aquatic conservation strategies, as described above, are not directly tied to management of timberlands. The applicant could apply for grants to conduct these activities separate from their timber management strategies.

The lead agencies favor the passive approach contained in the proposed HCP for the following reasons:

- Although such projects may be useful in limited areas, it is not feasible to implement these types of projects across the 152,178-acre ownership.
- An active approach would require extensive disturbance by heavy equipment within riparian areas in order to produce the desired conditions. This would result in short-term adverse effects to aquatic habitat in addition to other environmental consequences (for example, erosion from new road construction and diesel particulate emissions).

- Many of these projects could be used for temperature control, but temperature has not been identified as a key limiting factor for instream habitat conditions on the applicant's ownership. However, water temperatures are of concern in stream segments downstream of the ownership, including the mainstem Klamath, Shasta, and Scott rivers.

For these reasons, an active aquatic conservation strategy is not being carried forward for additional evaluation.

2.6 Comparison of Alternatives

Table 2-6 presents the four alternatives considered in detail in a comparative format. The table summarizes the differences in key management measures under each of the alternatives. In general, the comparison is geared toward how the key management measures of each alternative are similar to or different from the provisions of the other alternatives.

A comparison of the effects of each of the alternatives is presented in the Executive Summary (Table ES-1).

TABLE 2-6
Description of Alternatives

No Action (No ITPs/No HCP)	Proposed Action (ITPs/Proposed HCP)	Alternative A (ITPs/Modified HCP)	Alternative B (ITP for spotted owls/Owl HCP)
Timber Harvest			
Maintain at current levels.	Up to 10 percent decrease in annual harvest acres, including a decline in even-age regeneration harvest.	Overall decline compared to current levels (unknown amount), but at least a 10 percent increase in even-age regeneration harvest.	Decline compared to current levels (unknown amount) including a decline in even-age regeneration harvest of up to 20 percent.
Efficiency decreases, possibly to unsustainable levels.	Efficiency increases (more board-feet per acre).	Efficiency decreases, possibly to unsustainable levels.	Efficiency increases.
Northern Spotted Owl			
Harvest restrictions, per CFPRs, in home ranges around all activity centers that intersect ownership – approximately 82 known activity centers.	Designate CSAs for 24 of the 82 activity centers based on conservation priority (including proximity to critical habitat units). Harvest restricted based on habitat targets and harvest condition requirements in HCP.	Designate CSAs for 26 of the 82 activity centers based on conservation priority (including proximity to LSRs). Harvest restricted based on habitat targets and harvest condition requirements in HCP.	Demographic support through maintenance of foraging and dispersal habitat conditions.
Harvest allowed in home ranges around activity centers, subject to CFPRs and take avoidance measures	Harvest allowed outside of CSAs and in home ranges around remaining activity centers, subject to CFPRs as modified by HCP dispersal habitat, take minimization, and threat management measures.	Same as Proposed Action.	Harvest allowed across ownership, subject to CFPRs and additional take minimization measures.
Yreka Phlox			
Pre-activity surveys at the THP-level as required under the State THP review process and protection measures for all known and discovered populations.	Botanical surveys to identify undiscovered populations within areas of moderate to high likelihood of occurrence, pre-activity surveys at the THP-level as required under the State THP review process with protection measures for and monitoring of all discovered populations.	Same as No Action.	Same as No Action.

TABLE 2-6
Description of Alternatives

No Action (No ITPs/No HCP)	Proposed Action (ITPs/Proposed HCP)	Alternative A (ITPs/Modified HCP)	Alternative B (ITP for spotted owls/Owl HCP)
Salmonids – Riparian Management			
Designate stream classes as defined in the CFPRs.	Same as No Action.	Designate stream classes as defined by the Northwest Forest Plan Aquatic Conservation Strategy.	Same as No Action.
Apply riparian management measures for "Watersheds with Listed Anadromous Salmonids" and "Watersheds with Coho Salmon" in watersheds as defined in the CFPRs for each stream class.	In "Class A" lands (based on existing and historical distribution of coho salmon) apply enhanced riparian management measures specified to mitigate incidental take of coho salmon. In "Class B" lands (within the range of anadromy that do not or have not historically supported coho salmon) apply enhanced riparian management measures for "watersheds with coho salmon." In "Class C" lands (above long-standing barriers to anadromy) apply standard riparian measures in the CFPRs.	Maintain no-harvest riparian buffers around all streams, seeps, and unstable areas as defined in the riparian reserve element of the NWFP.	Apply riparian management measures for ""Watersheds with Listed Anadromous Salmonids" defined in the CFPRs for each stream class in the Klamath River and Scott Valley management units. Otherwise, manage same as No Action.
Salmonids – Road Management			
Conduct road and landing construction, maintenance, and management consistent with the CFPRs.	Conduct road and landing construction, maintenance, and management consistent with the CFPRs and the Applicant's Road Management Plan – Operations Guide (HCP Appendix B). Systematic and prioritized drainage-level inventories on a 10-year interval.	Same as No Action.	Same as No Action.

CHAPTER 3

Affected Environment

This chapter describes the affected environment for resources potentially affected by implementing the Proposed Action and the alternatives.

3.1 Geology

The following sections provide a description of the geologic conditions within the Plan Area. The information presented is intended to provide a broad overview of how geologic characteristics, such as geologic structure, geomorphic terrain, and soil types, and anthropogenic characteristics, such as road networks, relate to sediment production and delivery in the Plan Area, thus providing a context for the impact analysis presented in Section 4.1.

The Klamath River and Scott Valley management units lie within the geologically complex Klamath Mountain physiographic province. Paleozoic and Mesozoic bedrock in the Klamath Mountain physiographic province has been folded, faulted, and chemically altered by metamorphism, volcanism, and igneous intrusion (Irwin 1966; Wright and Fahan 1988; Hacker et al. 1993; Wright and Wyld 1994; Cashman and Elder 2002). Prominent mountain ranges in the region include the Siskiyou, Salmon, Scott Bar, and Marble mountains. Within the Plan Area, elevations in the Klamath River management unit range from 1,705 feet at the confluence of Horse Creek and Klamath River to 7,120 feet at Condrey Mountain. Elevations in the Scott Valley management unit range from 1,740 feet near Scott Bar to 6,070 feet at the divide between Indian Creek and Mill Creek in the Scott Bar Mountains.

South of the Siskiyou Mountain divide, the Klamath River watershed is dominated by the Condrey Mountain schist, formed of metamorphosed marine sediments and volcanic ash. In the northeast portion, a mixture of resistant and less resistant Paleozoic ultramafic and metamorphic rocks of amphibolite, greenschist, and metasedimentary serpentinite have been intruded by granitic rocks of Jurassic age that are commonly weathered into highly erodible decomposed granitic soil mantle. Diverse lithologies also outcrop in the Cottonwood Creek subwatershed, and include limestone, marble, granite, marine sandstone, conglomerate, and shale, and a variety of Tertiary volcanic and pyroclastic rocks. The Scott River watershed is predominantly underlain by metasedimentary and metavolcanic rocks interspersed with schist and decomposed granite. Lower elevations of the Scott Valley are covered with unconsolidated Quaternary alluvium (Wagner and Saucedo 1987).

The applicant's Grass Lake management unit, located in the western portion of the California Cascade Range–Modoc Plateau physiographic province, is characterized by volcanic deposits and young shield volcanoes including the Whalebacks, Miller Mountain, Goosenest, and Ball Mountain (Norris and Webb 1976). With the exception of Mount Shasta (14,161 feet), elevations range from 2,000 feet at the Shasta River and Klamath River confluence to 8,530 feet at the Whalebacks. Lithologic units in this region are primarily

composed of resistant Quaternary andesitic and basaltic lava flows, and pyroclastic deposits of the High Cascade volcanics underlain by more weakly resistant Tertiary volcanic tuffs and breccias of the Western Cascade volcanics (Wagner and Saucedo 1987).

3.1.1 Hillslope Mass Wasting

Hillslope mass wasting refers to landslides and other processes that generate mass soil movement and contribute to sediment production and delivery. Geomorphic terrains are used to describe the existing conditions affecting hillslope mass wasting in the Plan Area.

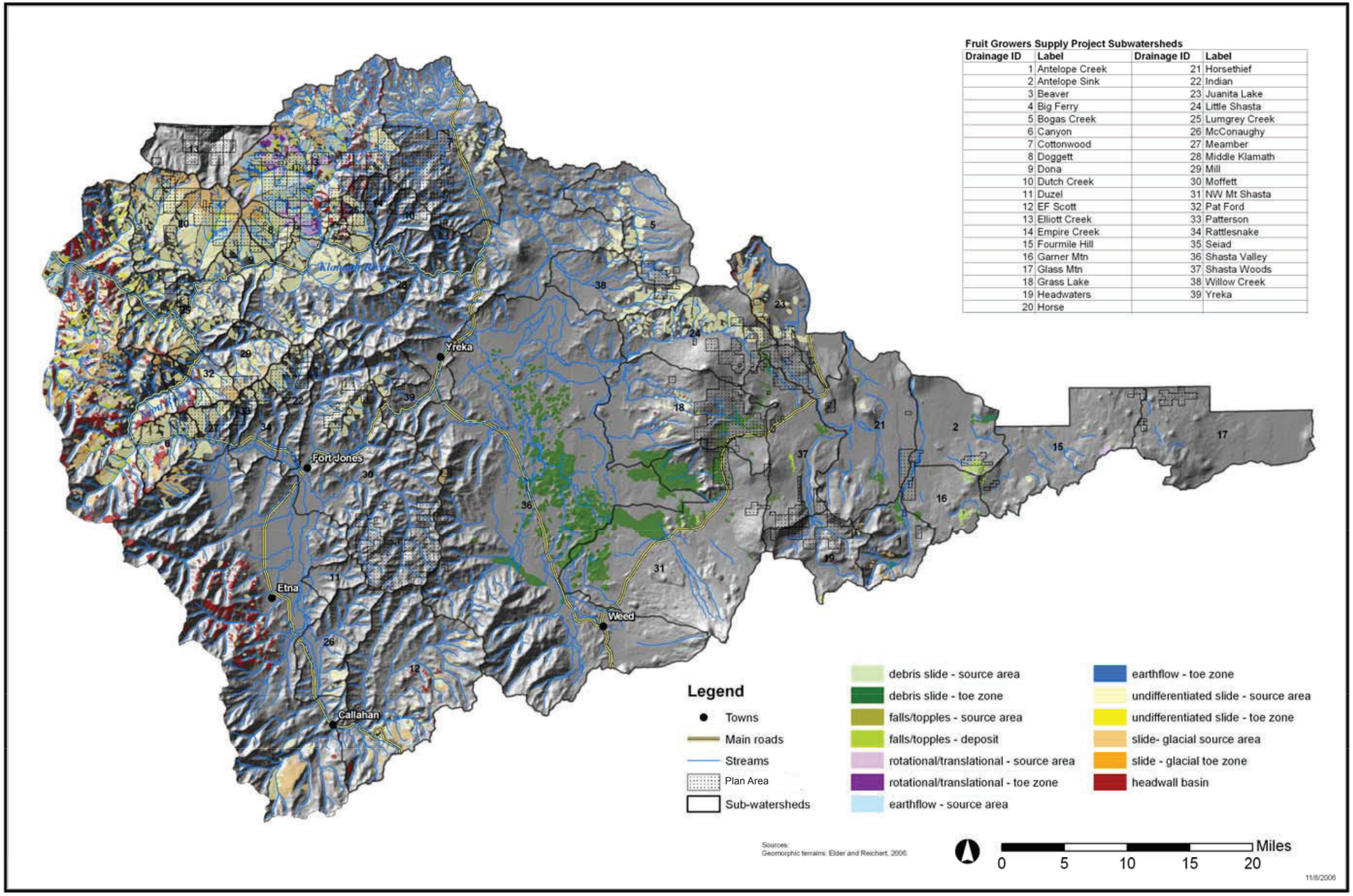
Geomorphic terrain classification is a widely used method for classifying the landscape into units with characteristic landforms and dominant erosion processes that influence sediment production and delivery (Chatwin et al. 1994; Reid and Dunne 1996; Bleier et al. 2003; North Coast RWQCB 2005; Elder and Reichert 2006; Green Diamond Resource Company 2006; Washington DNR 2006). The KNF identified landform types associated with mass wasting in the region (USFS 2003; Elder and Reichert 2006), and the applicant used these landform types to classify the Plan Area into geomorphic terrains (Figure 3.1-1). The applicant further aggregated geomorphic terrains in the Plan Area into three dominant mass wasting terrains: (1) shallow-seated landslide terrain; (2) deep-seated landslide terrain; and (3) complex landslide-prone terrain. The three dominant mass wasting terrains are described below; see Section 4.5 of the proposed HCP for a full description of all geomorphic terrains found in the Plan Area. The amount of land area in each geomorphic terrain is summarized by drainage in Table 3.1-1.

3.1.1.1 Shallow Landslide Terrain

Shallow landslides typically occur as rapid mass movements along planar or undulating zones of failure—generally greater than 65 percent in steepness and less than 5 feet deep—and incorporate the overlying unconsolidated soil mantle (soil, colluvium, and weathered bedrock). Shallow landslide terrain often is associated with steep slopes in sedimentary terrain. Shallow slope failures are commonly triggered by heavy rain or by high stream flows in unstable areas. Roads that over-steepen slopes and alter surface runoff patterns are a common cause of increased shallow landsliding. Shallow landslide terrain includes landforms mapped by the KNF as debris slides, falls and topples, and colluvial slopes.

3.1.1.2 Deep-seated Landslide Terrain

Deep-seated landslides are broad, complex mass-wasting features that persist through gradual movement of cohesive soils and/or incompetent bedrock. Deep-seated landslides are characterized by crescent-shaped major and minor scarps; flat-lying and backtilted blocks; benched topography; and lobate accumulation zones with hummocky topography, seepage lines and springs, ponding, and deflected or irregular drainage patterns. Deep-seated landslides differ from shallow landslides in that: (1) failure is typically along a concave surface or diffuse shear zone at depth, typically greater than 5 feet; (2) internal deformation occurs in incompetent, weathered, or deformed bedrock; and (3) mass movement is typically slow. Deep-seated landslides are typically larger than shallow landslides and include various movement types (for example, rotational-translational, earthflow, block slide) and states of activity (active and dormant). Deep-seated landslide terrain includes landforms mapped by the KNF as rotational-translational slides, earthflows, and block slides.



Fruit Growers Supply Project Subwatersheds

Drainage ID	Label	Drainage ID	Label
1	Antelope Creek	21	Horsethief
2	Antelope Sink	22	Indian
3	Beaver	23	Juanita Lake
4	Big Ferry	24	Little Shasta
5	Bogas Creek	25	Lumgrey Creek
6	Canyon	26	McConaughy
7	Cottonwood	27	Meamber
8	Doggett	28	Middle Klamath
9	Dona	29	Mill
10	Dutch Creek	30	Moffett
11	Duzel	31	NW Mt Shasta
12	EF Scott	32	Pat Ford
13	Elliott Creek	33	Patterson
14	Empire Creek	34	Rattlesnake
15	Fourmile Hill	35	Seiad
16	Garner Mtn	36	Shasta Valley
17	Glass Mtn	37	Shasta Woods
18	Grass Lake	38	Willow Creek
19	Headwaters	39	Yreka
20	Horse		

FIGURE 3.1-1
Geomorphic Terrains in the Plan Area

TABLE 3.1-1
Geomorphic Terrain Area in Drainages

Management Unit[a]	Drainage	Geomorphic Terrain Area in FGS Ownership (km^2)																Total FGS Ownership Area, km^2	Total Watershed Area[h], km^2	FGS ownership as % of total watershed area
		Shallow-seated Landslides					Deep-seated Landslides					Complex Landslide-Prone Terrain								
												Complex Slump – Earthflow[f]								
		Debris Slides[b]		Falls/Topples[c]		Colluvial Slopes	Rotational/ Translational Slide[d]		Earthflow[e]		Block Slide	Undifferentiated Slide		Slide – Glacial		Headwall Swale	Inner Gorge[g]			
		source area	toe zone	source area	deposit (talus)		source area	toe zone	source area	toe zone		source area	toe zone	source area	toe zone					
Grass Lake	Antelope Creek	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.08	1.5	77.8	2%
	Antelope Sink	—	—	—	0.51	—	—	—	—	—	—	—	—	—	—	—	—	6.3	114.6	5%
	Bogas Creek	—	—	—	—	—	—	—	0.22	—	—	0.06	—	—	—	—	—	8.0	139.8	6%
	Fourmile Hill	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.0	177.9	2%
	Garner Mtn.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5.6	77.5	7%
	Glass Mtn.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8.0	194.2	4%
	Grass Lake	—	5.70	—	0.13	—	—	—	—	—	—	0.02	—	—	—	—	—	48.9	223.0	22%
	Headwaters	—	—	—	—	—	—	—	—	—	—	—	—	0.00	—	—	0.00	19.2	85.2	23%
	Horsethief	—	0.31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	27.1	236.9	11%
	Juanita Lake	0.25	—	—	—	—	—	—	—	—	—	0.61	—	0.75	—	—	—	8.3	113.7	7%
	Little Shasta	—	0.25	—	0.01	—	—	—	0.17	—	—	3.08	—	—	—	—	—	24.8	159.2	16%
	NW Mt. Shasta	—	4.13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13.5	405.8	3%
	Shasta Valley	—	—	—	—	—	—	—	—	—	—	—	—	0.44	—	—	—	4.9	1125.4	0%
	Shasta Woods	—	0.14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18.1	147.6	12%
	Willow Creek	—	—	—	—	—	—	—	—	—	—	1.65	—	—	—	—	—	3.9	101.3	4%
	Grass Lake Total	**0.25**	**10.53**	**0**	**0.65**	**0**	**0**	**0**	**0.40**	**0**	**0**	**5.42**	**0**	**1.19**	**0**	**0**	**0.08**	**201.1**	**3379.8**	**6%**

TABLE 3.1-1
Geomorphic Terrain Area in Drainages

Management Unit[a]	Drainage	Geomorphic Terrain Area in FGS Ownership (km^2)																Total FGS Ownership Area, km^2	Total Watershed Area[h], km^2	FGS ownership as % of total watershed area
		Shallow-seated Landslides					Deep-seated Landslides					Complex Landslide-Prone Terrain								
												Complex Slump – Earthflow[f]								
		Debris Slides[b]		Falls/Topples[c]		Colluvial Slopes	Rotational/ Translational Slide[d]		Earthflow[e]		Block Slide	Undifferentiated Slide		Slide – Glacial		Headwall Swale	Inner Gorge[g]			
		source area	toe zone	source area	deposit (talus)		source area	toe zone	source area	toe zone		source area	toe zone	source area	toe zone					
Klamath River	Beaver	0.07	—	—	—	—	6.54	1.49	10.22	2.67	—	17.51	2.96	1.01	0.61	1.36	6.21	68.5	281.9	24%
	Cottonwood	—	—	—	—	—	—	—	—	—	—	0.13	—	—	—	—	1.01	65.9	257.1	26%
	Doggett	0.00	—	—	—	—	0.67	0.24	0.61	—	—	8.65	1.79	1.35	0.25	—	1.95	16.1	31.1	52%
	Dona	0.00	—	—	—	—	—	—	0.65	—	—	7.23	0.04	0.86	—	—	0.70	10.1	34.2	30%
	Dutch Creek	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.47	12.0	26.1	46%
	Elliott Creek	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18.2	86.2	21%
	Empire Creek	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.59	10.8	24.4	44%
	Horse	0.43	—	—	—	—	0.03	—	3.08	0.85	—	16.17	1.60	7.44	0.29	—	2.94	39.1	157.7	25%
	Lumgrey Creek	0.02	—	—	—	—	0.05	—	—	—	—	3.59	0.06	—	—	0.49	0.84	10.2	22.2	46%
	Middle Klamath	—	—	—	—	—	—	—	—	—	—	1.02	0.01	—	—	0.16	0.68	7.1	620.8	1%
	Seiad	—	—	—	—	—	—	—	—	—	—	0.85	0.02	—	—	—	0.79	5.8	136.7	4%
	Klamath River Total	**0.52**	**0**	**0**	**0**	**0**	**7.29**	**1.72**	**14.57**	**3.52**	**0**	**55.16**	**6.47**	**10.66**	**1.15**	**2.01**	**17.18**	**263.7**	**1678.5**	**16%**

TABLE 3.1-1
Geomorphic Terrain Area in Drainages

Management Unit[a]	Drainage	Geomorphic Terrain Area in FGS Ownership (km^2)																Total FGS Ownership Area, km^2	Total Watershed Area[h], km^2	FGS ownership as % of total watershed area
		Shallow-seated Landslides					Deep-seated Landslides					Complex Landslide-Prone Terrain								
												Complex Slump – Earthflow[f]								
		Debris Slides[b]		Falls/Topples[c]		Colluvial Slopes	Rotational/ Translational Slide[d]		Earthflow[e]		Block Slide	Undifferentiated Slide		Slide – Glacial		Headwall Swale	Inner Gorge[g]			
		source area	toe zone	source area	deposit (talus)		source area	toe zone	source area	toe zone		source area	toe zone	source area	toe zone					
Scott Valley	Big Ferry	—	—	—	—	—	—	—	—	—	—	2.53	0.01	0.05	—	0.58	0.14	5.2	25.4	20%
	Canyon	0.03	—	—	—	—	—	—	—	—	—	4.65	0.34	—	—	—	0.27	8.0	52.3	15%
	Duzel	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0	26.5	0%
	EF Scott	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.7	294.8	0%
	Indian	—	—	—	—	—	—	—	—	—	—	5.61	0.07	—	—	—	2.00	16.1	56.1	29%
	McConaughy	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.5	97.0	1%
	Meamber	—	—	—	—	—	—	—	—	—	—	7.80	0.05	—	—	—	0.00	20.4	33.2	61%
	Mill	—	—	—	—	—	—	—	—	—	—	0.33	0.00	1.51	0.06	—	0.44	5.8	57.8	10%
	Moffett	—	—	—	—	—	—	—	—	—	—	3.02	0.05	—	—	—	0.57	79.2	379.8	21%
	Pat Ford	—	—	—	—	—	—	—	—	—	—	2.58	—	2.37	—	—	0.07	8.7	30.9	28%
	Patterson	—	—	—	—	—	—	—	—	—	—	1.25	—	—	—	—	—	8.5	16.3	52%
	Rattlesnake	—	—	—	—	—	—	—	—	—	—	1.55	0.01	—	—	—	0.65	4.4	46.3	10%
	Scott Valley Total	**0.03**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**29.31**	**0.54**	**3.93**	**0.06**	**0.58**	**4.31**	**158.0**	**1181.8**	**13%**
Total FGS		0.80	10.53	—	0.65	—	7.29	1.72	14.97	3.52	—	89.89	7.01	15.79	1.21	2.58	21.57	**177.5**		
Total watershed		5.74	171.10	0.25	3.19	1.36	17.83	5.88	41.35	8.03	—	370.77	28.39	85.19	5.75	13.62	173.80	**932.3**		
% FGS		14%	6%	0%	20%	0%	41%	29%	36%	44%	0%	24%	25%	19%	21%	19%	12%	**19%**		

[a]Table includes subwatersheds that have FGS land ownership only.
[b]The source area and toe zone of debris slides, debris avalanches, and debris flows are included within the debris slide classification.
[c]The source area and toe zone of rockslides and rock falls are included within the falls/topples classification.
[d]The rotational/translational slide classification, within the deep-seated landslide category, includes both individual/discrete slides and complex type rotational/translational slides.
[e]The earthflow classification includes ~4.5 km^2 of slide - earthflow terrain, located within FGS's ownership in the Horse, Beaver, and Dogget Creek watersheds.
[f]Complex slump-earthflow terrain includes all mass wasting processes designated by Elder and Reichert (2006) as "undifferentiated slides" and "slide-glacial."
[g]Inner gorge area overlaps with other geomorphic terrain categories and is not used to sum total FGS or watershed areas.
[h]Total terrain area may be greater than the sum of geologic terrain data shown and suggests that the drainage may contain unmapped areas.

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3.1.1.3 Complex Landslide-prone Terrain

Complex landslide-prone terrain includes complex slump-earthflow terrain, headwall swales, and inner gorges. Complex slump-earthflow terrain includes landforms mapped as undifferentiated slides and slide-glacial (Elder and Reichert 2006), and are classified as dormant features that lack distinct source area scarps and internal benches. Debris slide activity is locally common along steeper slopes within this terrain, especially where stream erosion removes toe support. Headwall swales are characterized by headwater areas with convergent topography, where thick soils and subsurface drainage concentrate along the axis of a Class III watercourse or valley. Headwall swales may extend upslope as far as the ridgeline, and typically terminate at the point of channel initiation. These areas often have distinct to subtle concave morphology. Inner gorge slopes are defined as steep slopes (typically 65 percent and greater) extending from the stream channel up to the first break in slope. Inner gorges are commonly formed by incision into bedrock from active stream erosion.

3.1.2 Road Network

In addition to the geomorphic terrains affecting hillslope mass wasting processes, construction and use of roads for timber harvest have the potential to increase sediment production and delivery to area streams. Therefore, a description of the road network within the Plan Area, including road mileage and density, is provided in the following sections to provide a context for the analysis of road-related sediment production provided in Section 4.1.

3.1.2.1 Road Mileage

Approximately 4,500 miles of roads are located within the Plan Area and upstream and downstream of the Plan Area, of which approximately 1,350 miles of these roads are on the applicant's lands (Table 3.1-2). The remaining 3,150 miles of roads are on lands controlled by USFS, other governmental agencies, or private interests. The applicant is solely responsible for maintenance of more than 1,100 miles of road in the Plan Area. About 250 miles of roads on the applicant's lands are maintained under cooperative road agreements with USFS (co-op roads).

The co-op roads are owned and controlled by USFS, but are maintained jointly by two or more parties under a Road Right-of-Way Construction and Use Agreement. Under this agreement, construction and maintenance activities are shared between the cooperators (for example, FGS, Siskiyou County) and USFS. Because these roads are under the jurisdiction of USFS, they are constructed and maintained in accordance with USFS standards. The majority (55%) of co-op roads are found in the Beaver, Cottonwood, and Horse drainages. Co-op roads account for approximately 40 percent of the road mileage on the applicant's lands in the Beaver, Dona, and Horse drainages, and 45 percent of the small amount of road (i.e., 1.96 miles) on the applicant's lands in the Antelope Creek watershed (Grass Lake management unit).

TABLE 3.1-2
Miles of Road and Road Density in Drainages

Drainage	Miles by Owner					FGS Density (mi/mi^2)	Overall Density (mi/mi^2)
	Federal	FGS	Other Private	State	Total		
Klamath River							
Beaver	266	179	65		509	6.8	4.7
Cottonwood	55	173	97		324	6.8	3.3
Doggett	18	47	4		69	7.6	5.8
Dona	15	27	15		56	6.8	4.2
Dutch Creek	3	27	7		37	5.7	3.6
Elliott Creek	39	41	12		92	5.8	2.8
Empire Creek	11	29	1	1	42	7.0	4.5
Horse	98	100	19		217	6.6	3.6
Lumgrey Creek	12	28	2		41	7.1	4.8
Middle Klamath	188	6	166		360	2.5	1.5
Seiad	33	8	43		85	3.7	1.6
Scott Valley							
Big Ferry	2	11	0		13	5.3	1.3
Canyon	28	17	37		82	5.7	4.1
Duzel	2		9		11		1.1
EF Scott	48	0	101		149	0.1	1.3
Indian	22	41	28		91	6.6	4.2
McConaughy	9	1	32		42	6.8	1.1
Meamber	0	51	25		76	6.5	5.9
Mill	27	16	38		81	7.2	3.6
Moffett	58	145	141		344	4.7	2.3
Pat Ford	5	27	1		32	7.9	2.7
Patterson	6	18	4		28	5.4	4.4
Rattlesnake	7	10	31		48	6.0	2.7
Grass Lake							
Antelope Creek	34	2	39		75	3.5	2.5
Antelope Sink	23	12	2		37	4.8	0.8
Bogas Creek	19	19	6		45	6.3	0.8
Fourmile Hill	103	6			109	4.8	1.6
Garner Mtn	33	13	3		48	5.8	1.6
Glass Mtn	63	13	4		80	4.2	1.1
Grass Lake	35	86	74		196	4.6	2.3
Headwaters	25	36	24		85	4.8	2.6
Horsethief	107	40	28		175	3.8	1.9
Juanita Lake	32	15	11		57	4.8	1.3
Little Shasta	57	48	46		151	5.0	2.5
NW Mt Shasta	61	12	26		99	2.4	0.6
Shasta Valley	14	9	234		257	4.5	0.6
Shasta Woods	116	32	23		172	4.6	3.0
Willow Creek	1	7	37		45	4.7	1.2
TOTAL	**1,676**	**1,348**	**1,435**	**1**			

The majority (71 percent) of roads in drainages containing the applicant's lands are classified as local or secondary roads; arterial main lines account for around 16 percent of the total road mileage. County roads account for approximately 9 percent of the total road mileage, with state highways and federal highways accounting for 2.5 percent and about 1 percent of the total, respectively. Figures 3.1-2 through 3.1-4 illustrate the road network in the Plan Area showing local and mainline forest roads, county roads, and state and federal highways. The figures also show primary drafting sites (i.e., water bodies used for filling water trucks).

3.1.2.2 Road Density

The density of roads in the individual drainages ranges from 0.6 to 5.9 miles per square mile (mi/mi^2) (see Table 3.1-2). In the Plan Area, road density generally ranges from 4 to 7 mi/mi^2 depending on the watershed. The highest road densities are in the Doggett and Lumgrey Creek watersheds in the Klamath River management unit, and the Mill and Pat Ford watersheds in the Scott Valley management unit, where road densities exceed 7.0 mi/mi^2. Overall road density in the Plan Area is 5.4 mi/mi^2. In general, as the density of roads in a drainage increases, the likelihood of road-related erosion and mass movement increases. However, many factors other than road density affect the likelihood that roads will contribute sediment to streams, including surfacing, type of construction (such as cut-and-fill, full bench), proximity to streams, intensity and seasonality of use, and frequency and type of water collection facilities (Weaver and Hagans 1994).

3.1.3 Surface Erosion

Surface erosion processes are influenced primarily by soil type. This section describes soil types in the Plan Area.

Soil types are generally consistent with the underlying geologic structure and geomorphic terrains previously described; soils in the applicant's Grass Lake management unit are of volcanic origin, whereas soils in the Klamath River and Scott Valley management units are derived from metamorphic and intrusive igneous parent material (United States Department of Agriculture [USDA] Soil Conservation Service 1978).

Schist bedrock of the Condrey Mountain formation weathers to soils rich in silt and clay-size particles. These soils range from shallow and rocky on ridge tops to very deep on landslide deposits (USFS 1995). Because of the fine textures and high mica content, these soils are particularly susceptible to compaction and exhibit low shear strengths.

The metavolcanic and metasedimentary rocks found in the Plan Area weather slowly relative to other parent material. Soils formed on these parent materials tend to be shallow, and are composed of silts and clays containing variable amounts of rock fragments. The most common soils found on these parent materials are the Kindig-Nuens and Marpa-Kinkel-Boomer complexes. Soils in the Moffett Creek area formed on the Duzel and Moffett Creek formations occupy similar map units, but produce calcareous alluvium (USDA Soil Conservation Service 1978).

Soils formed on ultramafic bedrock (peridotite and serpentinite) rapidly weather to clay. Soils derived from serpentine are rich in magnesium, less productive, and often have sparse vegetation as a result of this nutrient imbalance (Buol et al. 1980). These soils range from

shallow, gravelly loams on ridge tops to deep, potentially unstable deposits in concave hollows. They are mapped as the Dubakella-Ipish complex in the Siskiyou County soil survey (USDA Soil Conservation Service 1978).

Soils derived from granitics are among the most erodible of soil types (Sommarstrom et al. 1990). Mineral reserves tend to be low in soils derived from granitics and drainage is excessive; thus, their ability to support coniferous vegetation is moderate. Granite residuum occurs in the northeast portion of the Klamath River management unit.

The arkosic sandstone and shale of the Hornbrook formation weathers to clayey soils due to the high feldspar content. These soils are high in nutrient reserves (Buol et al. 1980), and the ability to support coniferous vegetation is good.

3.2 Water Resources

This section provides descriptions of hydrologic and water quality conditions within the Plan Area. It includes a summary of regional climate, baseline surface and groundwater hydrology, and water quality, focusing on water temperature and other water quality constituents.

The Plan Area lies within the Klamath River Basin, which drains approximately 15,444 square miles in California and Oregon. All lands within the Plan Area occur within the principal drainages of the Klamath River, the Scott River, and the Shasta River.

The Klamath River Basin is characterized by a Mediterranean climate, with hot, dry summers and cool, wet winters. In the winter and spring seasons, this area receives some of the heaviest precipitation in the state. A complex surface drainage network has evolved within the steep topography and complex geology of the region, supporting a wide variety of plant and animal life including a historically productive anadromous fishery. Logging, mining, road building, and grazing over the course of the last 100 years, combined with the local existence of steep slopes, unstable geologic formations, and seasonally intense precipitation, have produced runoff and erosion concerns for portions of the Plan Area.

Enhanced runoff, erosion, sedimentation, suspended sediments, and water temperatures are the primary water quality concerns. Some stream reaches and watersheds within the Plan Area have been listed as impaired water bodies by the North Coast Regional Water Quality Control Board (RWQCB), and as such are subject to development of Total Maximum Daily Loads (TMDLs). TMDLs will provide guidance for regulating suspended sediment concentrations or loads within watersheds in the Plan Area.

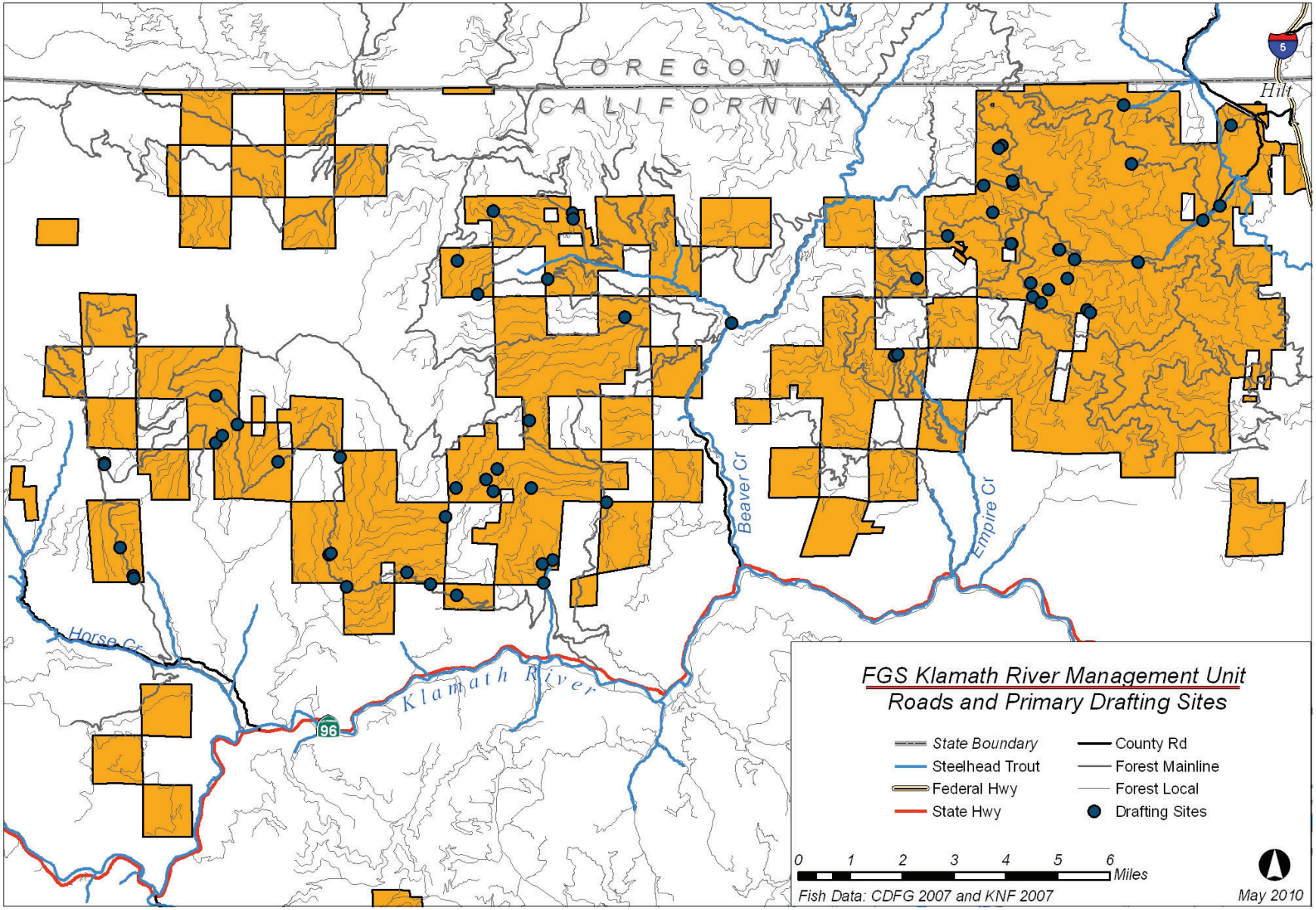

FIGURE 3.1-2
Roads and Primary Water Drafting Sites in the Klamath River Management Unit

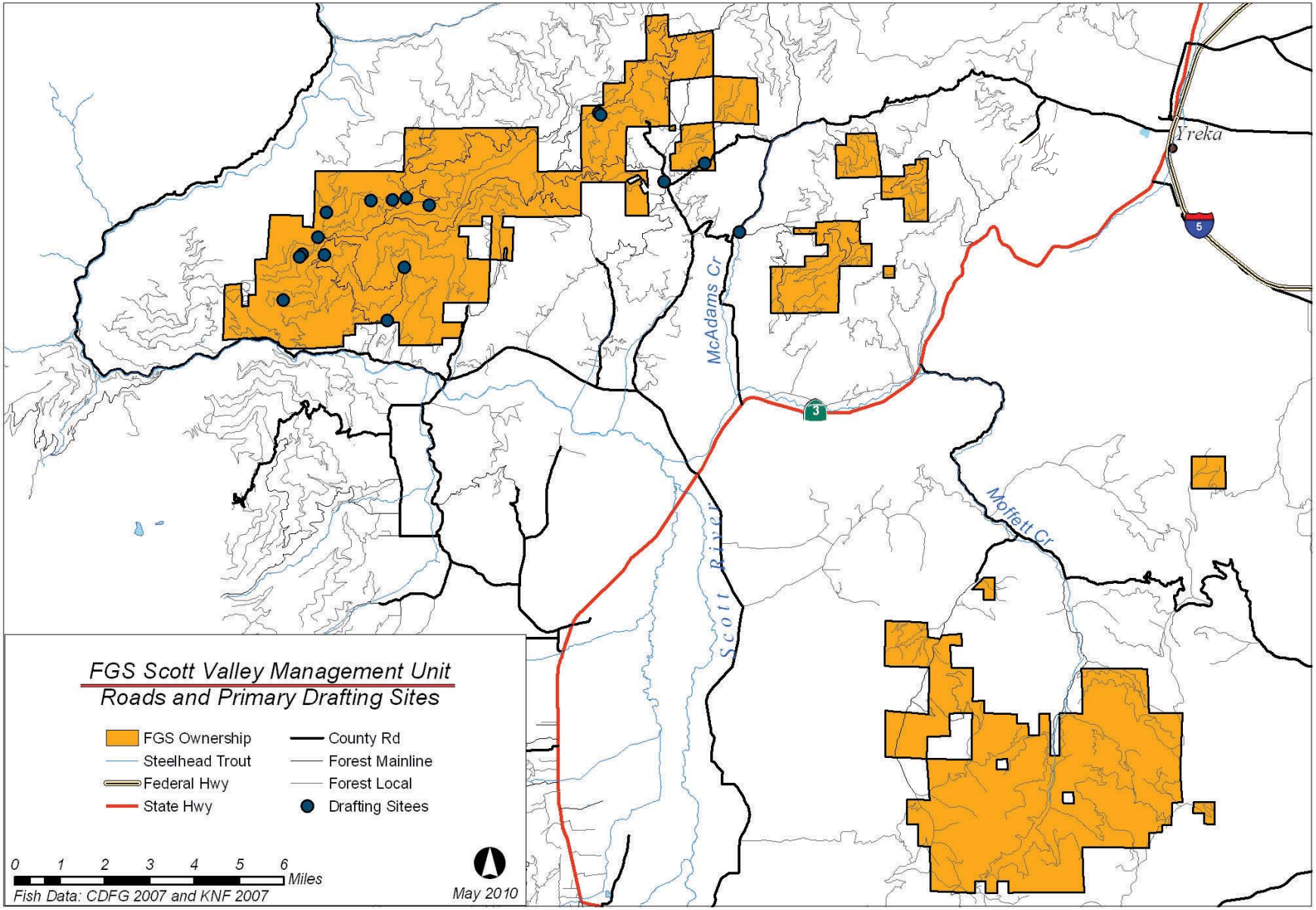

FIGURE 3.1-3
Roads and Primary Water Drafting Sites in the Scott Valley Management Unit

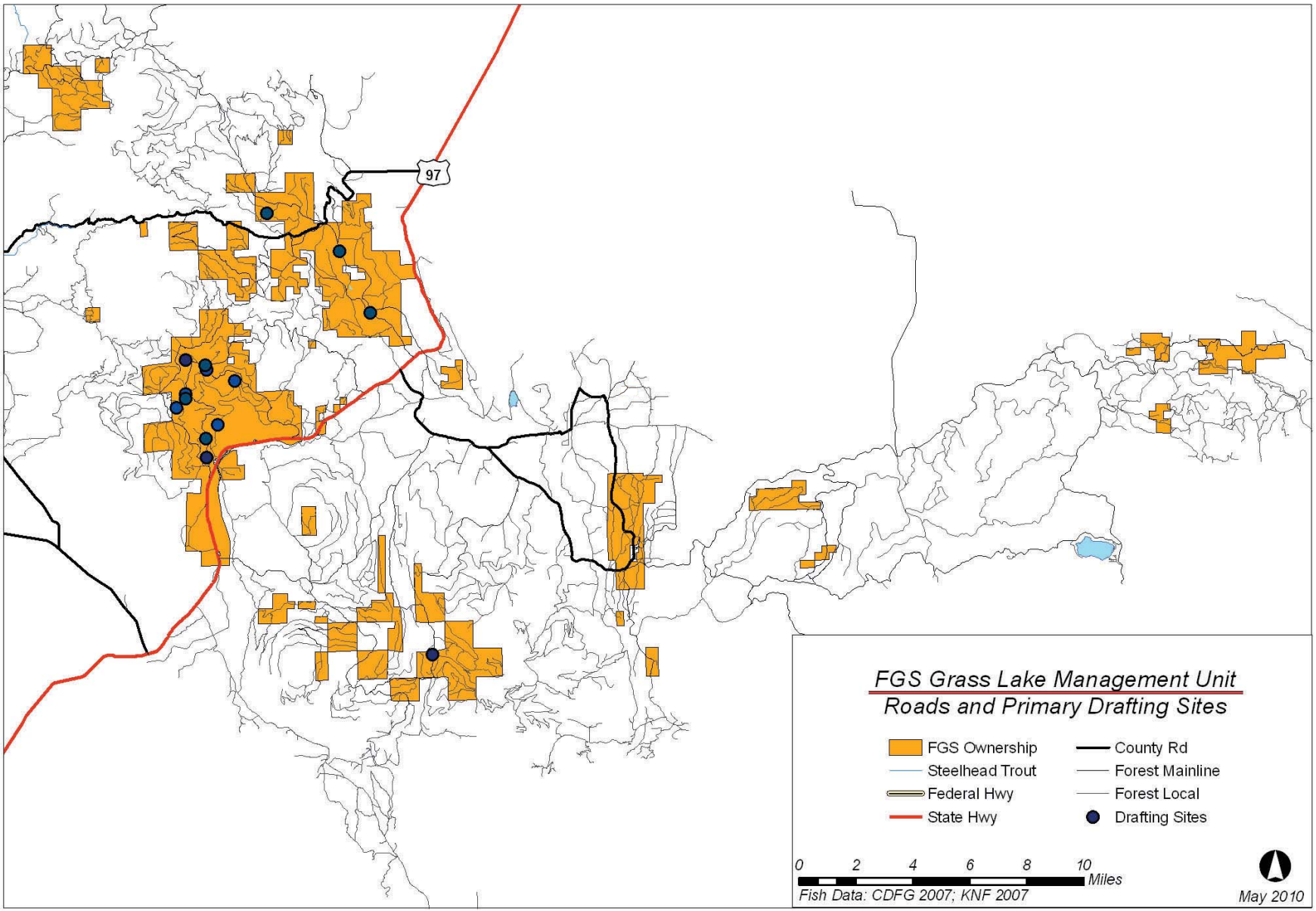

FIGURE 3.1-4
Roads and Primary Water Drafting Sites in the Grass Lake Management Unit

3.2.1 Climate

Climate in the Plan Area and surrounding region is discussed solely to provide information on the regional setting and the types of processes (for example, rain-on-snow) that can affect hydrology and water quality. It is not anticipated that the applicant's activities would substantially alter the regional climate given its limited ownership (relative to the region) and the "patchwork" nature of the ownership interspersed with federal lands and other private timberlands. The applicant's potential contribution to global climate change is discussed in Section 4.4 of this EIS.

3.2.1.1 Klamath River Management Unit

The climate in the Klamath River management unit can be characterized as temperate Mediterranean. Precipitation in the Klamath River watershed varies greatly, from around 20 inches per year in the upper watershed to as much as 100 inches per year near the coast. The Klamath River management unit lies near the middle of this range. Precipitation increases with elevation within the unit, ranging from an average of around 30 inches per year in the lower elevations near the Klamath River to about 75 inches per year at the highest elevations, with approximately 90 percent falling between October and May (USFS 1996a; 2002). Below 3,500 feet in elevation, most precipitation is rainfall; and above 4,000 feet, winter precipitation is predominately snowfall. Higher-elevation terrain in the Klamath River watershed receives large winter and spring snowpacks, and can be associated with high amounts of runoff during warm winter storms (CETFKRB 2004).

3.2.1.2 Scott Valley Management Unit

The Scott River watershed also has hot, dry summers and cool, wet winters characteristic of Mediterranean climates. Rainfall is somewhat less than along the Klamath River. Approximately 90 percent of precipitation falls between October and May; peak precipitation occurs in December and January. In the valleys, precipitation is significantly lower than in the surrounding mountains. Average annual precipitation ranges from below 20 inches at the lowest elevations along the Scott River, to more than 60 inches at the highest elevations at the western and southern extents of the watershed (North Coast RWQCB 2005). Winter precipitation is mostly rain at the lower elevations, below about 4,000 feet, with a rain-snow transition zone between about 4,000 and 5,000 feet. Snow typically accumulates in the rain-snow transition zone, but is frequently melted by midwinter rains. The higher elevations, especially above 6,000 feet, have short summers and relatively long winters with deep snowpacks.

The topographic characteristics of the basin make the Scott River watershed particularly susceptible to severe flooding caused by rain-on-snow events. A significant portion of the basin is between 4,500 and 5,500 feet in elevation, which is the range of elevation most susceptible to rain-on-snow events (North Coast RWQCB 2005). The largest floods on record (1861, 1955, 1964, 1974, and 1997) were associated with this type of event (USFS 2000).

3.2.1.3 Grass Lake Management Unit

The Grass Lake management unit receives considerably less precipitation than the Klamath River and Scott Valley management units. In the western portions of the Plan Area, annual precipitation averages about 30 to 35 inches, whereas precipitation in the eastern portions averages 20 inches or less per year (Ruffner 1978).

3.2.2 Surface Hydrology

Flows in the Klamath River are regulated by Iron Gate Dam, located upstream of the Plan Area. Below Iron Gate Dam, the Shasta, Scott, Trinity, and Salmon rivers make major contributions to flows in the Klamath River. Streams in the Klamath River management unit eventually feed into the Klamath River. In the Scott Valley management unit, streams empty into the Scott River, a major tributary to the Klamath River. Some Plan Area streams in the Grass Lake management unit eventually reach the Shasta River.

3.2.2.1 Annual Flow Patterns

Flows have been measured by USGS in the Klamath River below Iron Gate Dam since 1960 (Station 11516530), the Scott River at Fort Jones since 1941 (USGS Station 11519500), and the Shasta River since 1933 (USGS Station 11517500). All of these gaging locations are located in the mainstem of the major rivers receiving tributary inflow from Plan Area streams. No public flow gages are located on the smaller Plan Area streams; therefore, consistent and reliable hydrologic information for tributary streams in the Plan Area is scarce.

Generally, highest flow levels in area streams occur during the spring and early summer in association with snowmelt; lowest flow levels (base flows) occur during the fall before winter storms commence. Summer flows decrease to low levels in August to September, regardless of whether the winter was wet or dry, in response to a combination of hot days and low precipitation. Intensive use of water for agriculture in Scott Valley also contributes to low summer flows in the Scott River (USFS 2000). The Scott River can be virtually dry during summer months in average and dry years, but can receive very large amounts of runoff in the winter months. Flows in the Shasta River tend to be more consistent, with smaller peak flow events occurring in the winter months and more reliable, yet low base flow in the summer months (Figure 3.2-1).

Data collected in the Scott River and its tributaries (Mill, Kidder, and Shackleford creeks) from 2002 to 2005 provide a good example of a normal yearly flow pattern in the Scott Valley Management Unit (Figure 3.2-2). The yearly flow pattern in streams the Klamath River and Grass Lake management units is likely to be similar to that in streams on the Scott River management unit.

3.2.2.2 Base Flows

The applicant has measured baseflows at 13 locations in the Plan Area in the Klamath River (10 locations) and Scott Valley (3 locations) management units during the fall from 1997 to 2003 (Table 3.2-1).

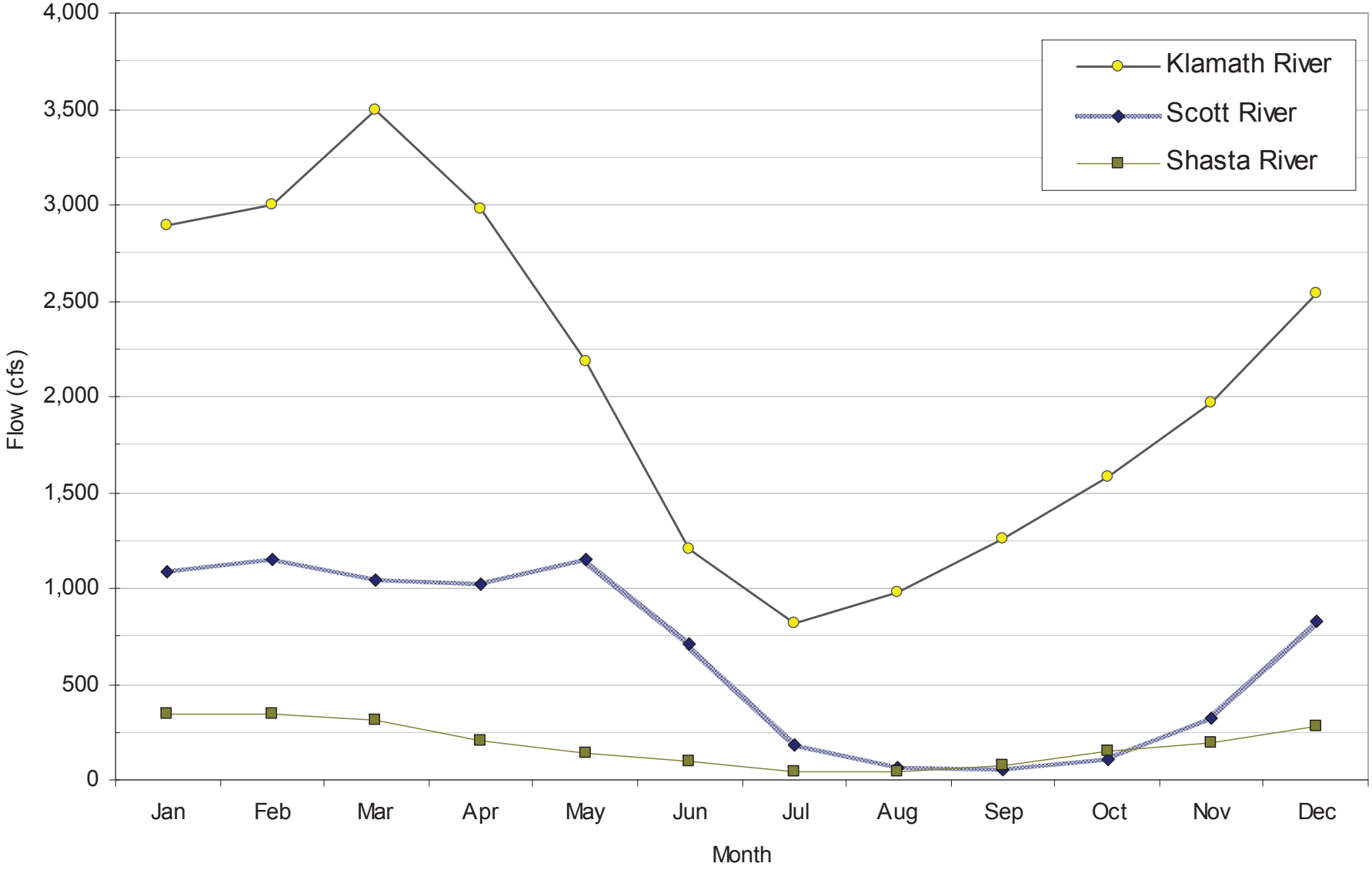

FIGURE 3.2-1
Average Monthly Flows in the Klamath River below Iron Gate (1960–2007), Scott River at Fort Jones (1941–2007), and Shasta River at Yreka (1933–2007)

Source: USGS, 2008

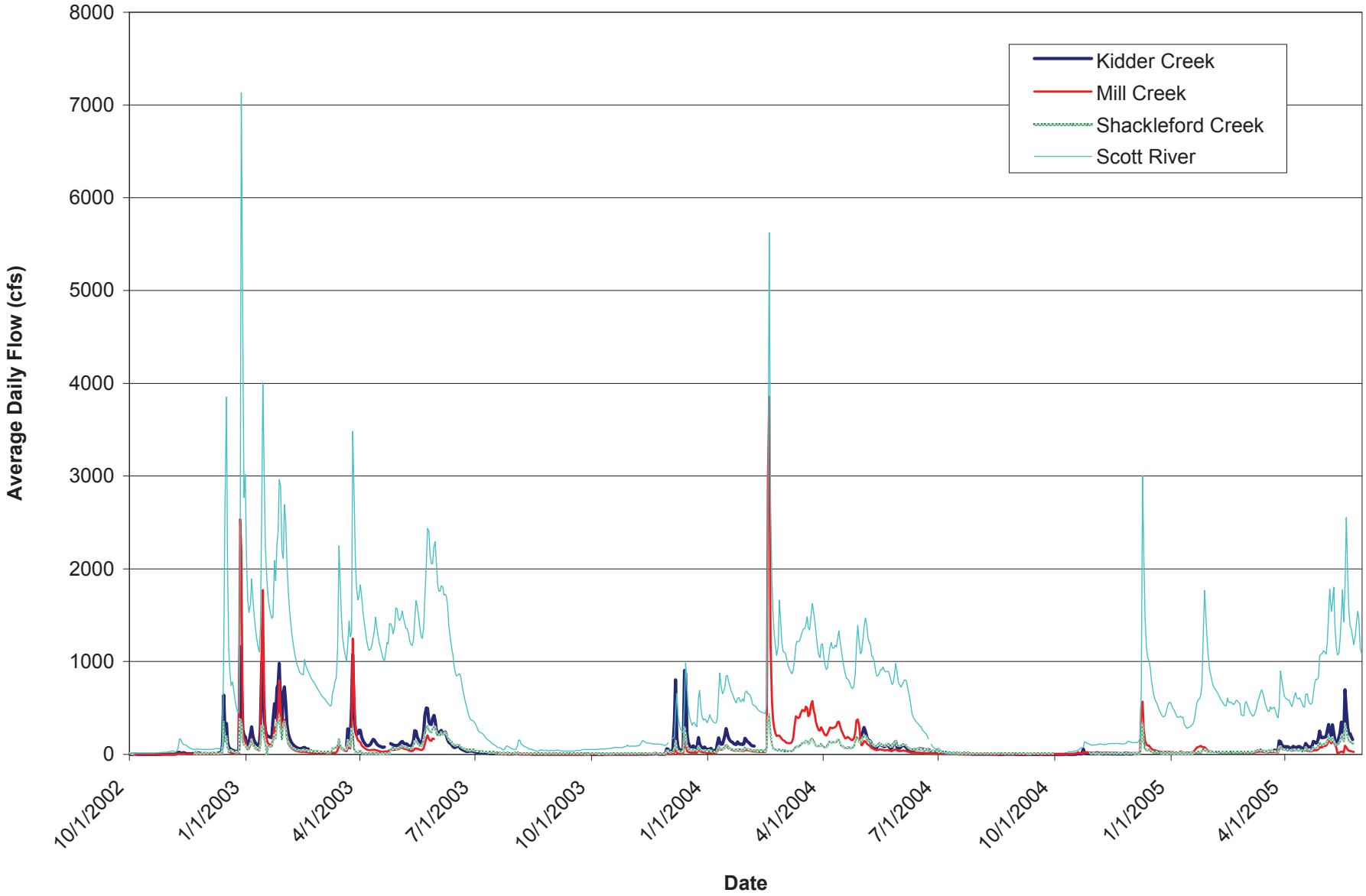

FIGURE 3.2-2
Discharge Data for October 2002 to April 2005 for Scott River (USGS) and its Tributaries Kidder Creek, Mill Creek, and Shackleford Creek (Shaw, 2005)

TABLE 3.2-1
Base Flows Measured from 1997 to 2003 in Plan Area Streams

Management Unit and Stream	Stream Class*	Baseflows (cfs)
Klamath River		
Bear Creek	II	2.0–4.6
Beaver Creek (mouth)	I	60.0–240.0
WF Beaver Creek (lower)	I	12.9–63.3
WF Beaver Creek (upper)	I	4.6–10.1
WF Cottonwood Creek	I	1.9–3.7
Doggett Creek	I	4.7–11.0
Hungry Creek	I	2.0–4.6
Kohl Creek	I	2.5–10.5
Little Soda Creek	II	0.3–0.5
Middle Horse Creek	II	4.5
Scott Valley		
Meamber Creek	II	0.4
Moffett Creek	I	0.7–1.3
Sissel Gulch	I	0.3

*Stream classes used in this EIS are those defined in the California Forest Practice Rules (CAL FIRE, 2008)

Notes:

Class I = fish-bearing
Class II = perennial, non-fish-bearing

Source: FGS unpublished data

3.2.2.3 Peak Flows

The peak flow for the period of record in the Klamath River below Iron Gate Dam (Station 11516530) was 29,400 cubic feet per second (cfs), which occurred on December 22, 1964. The peak flow for the period of record on the Scott River at Fort Jones (USGS Station 11519500) was 54,600 cfs, which also occurred on December 22, 1964. In the 1964 flood event (the largest on record for the region), residential properties in the town of Callahan along the Scott River were damaged during an extreme flooding event that also destroyed bridges, roads, and other infrastructure along the channel (Pioneer Press 2005). The 1964 flood greatly altered the morphology of stream channels in the region, scouring vegetation, moving large substrate, and rearranging channel dimension and patterns throughout the drainage network. In general, channels in the Plan Area have been more "open" (with less riparian vegetation) since the 1964 flood event.

The 1997 flood event was less severe. Damage to infrastructure was isolated to stream crossing failures and debris flows damaging or destroying roads in the area. Along some stream channels, effects included removal of all vegetation, and scour or deposition of coarse sediment throughout the inundated floodplain. At the other end of the spectrum, some area streams were little affected by the flood, with only a small amount of riparian

vegetation removed, and scour and deposition mostly limited to the bankfull channel (Harris et al. 1997).

3.2.2.4 Surface Water Diversions

Low flows are common in the mainstem Scott River and many tributaries during June through November, primarily due to water diversions for agricultural and domestic uses. Approximately 160 diversions greater than 0.1 cfs from the Scott River and its tributaries have been identified (Sommarstrom 1994). These diversions substantially reduce streamflow in the lower portions of the tributaries during the summer through the fall period, resulting in dewatering of sections of many streams (Etna, Patterson, Kidder, Moffett, Shackleford, and Mill creeks). In prolonged droughts, portions of the mainstem Scott River can be completely dry. However, surface water diversions and other human uses of surface waters are limited in the Plan Area. The applicant drafts water directly from stream channels for use in silvicultural operations or for fire suppression purposes, as detailed in the HCP. These diversions are temporary and limited in use, and the amount and timing of these withdrawals are not quantified. Typically, the applicant conducts water drafting from Class II streams with flows greater than 2 cubic feet-per-second, or more commonly, from off-channel water holes. Further downstream, diversions of surface water are more common for agricultural operations and residential uses in the Scott Valley and along the Klamath River.

3.2.3 Groundwater Hydrology

Groundwater data are not available for the Plan Area because regular groundwater monitoring does not occur as part of any ongoing program in the Plan Area or vicinity. However, groundwater–surface water interactions in some regions may be an important factor in maintaining cold water base flow patterns during the dry summer months. This has important implications for summer holding habitat for anadromous fish, and the seasonal maintenance of in-channel aquatic life in smaller tributaries. It may also influence the distribution and composition of riparian vegetation along stream channels.

In general, the western Coastal Range watersheds (including those in the Scott Valley and Klamath River management units) are dominated by older, deeply weathered, roughly layered volcanic rocks, with steep, highly dissected landscapes reflecting significant erosion. The region is typically well drained by a dense network of streams fed from surface and shallow subsurface runoff. In these watersheds, the role of groundwater in sustaining summer base flows tends to be minor because deep aquifers either do not exist or they are not connected to shallow surface drainages.

In contrast, extensive, deep volcanic-rock aquifers are located in the Modoc Plateau and the Cascade Mountains in volcanic terrains that extend into Oregon. These areas underlie much of the applicant's Grass Lake management unit. The aquifers are not distinct, readily identifiable aquifers because they contain water in fractures, volcanic pipes, tuff beds, rubble zones, and interbedded sand layers, primarily in basalts of Miocene age or younger (Planert and Williams 1995). Areas in which permeable zones are sufficiently large and interconnected to provide a good source of water to surface drainages may sustain summer base flow conditions and provide cold water habitat for aquatic organisms (PNRS 2002).

3.2.4 Water Quality

Some of the larger watersheds (such as the Klamath and Scott rivers) have significant areas of agriculture and urban development that have negatively influenced water quality conditions within those drainages. A legacy of timber operations, road building, mining, and grazing, coupled with the steep topography, unstable geology, and seasonally intense precipitation has resulted in an increase in sediment delivery, storage, and conveyance in river and stream channels, as well as increased water temperatures throughout the region. However, the Plan Area is rural in nature, and as such has not been subjected to contaminants usually associated with more urban or agricultural settings, such as elevated levels of nutrients, industrial pollutants, or constituents associated with treated and untreated sewage.

Section 303(d) of the Clean Water Act requires states to identify water bodies that are impaired, to identify the pollutant(s) or stressor(s) that are causing impairment, and to develop a plan to attain and maintain desired water quality standards. An "impaired" water body is one that is not meeting water quality standards and/or is not supporting the designated beneficial uses of the water body. The Klamath River is listed under Section 303(d) for nutrient, dissolved oxygen, water temperature, and microcystin concerns, which can be affected by altered hydrology caused by dams; the Scott River is listed for temperature and sediment concerns; and the Shasta River is listed for dissolved oxygen concerns. These water bodies were added to the 303(d) list based on water quality data specific to the water bodies, as well as information on the status of the fisheries in these watersheds. The beneficial uses of water bodies associated with fisheries tend to be the most sensitive to water quality changes. The Klamath River HU, Middle HA, Iron Gate Dam to Scott River segment includes the Beaver Creek HSA 105.35 and Hornbrook HSA 105.36. The Klamath River, from source to mouth, is listed as water quality impaired by both Oregon and California.

North Coast RWQCB staff have developed TMDLs for the Klamath Basin, including the Klamath, Shasta, and Scott rivers. The TMDL process leads to a "pollution budget" designed to restore the health of a polluted body of water, and the process is helpful in determining which water quality parameters are important for analysis. These parameters and the effects of implementing the Proposed Action and other alternatives on these parameters are described in Section 4.2.

Table 3.2-2 lists the status of TMDLs for the Klamath, Scott, and Shasta rivers as of February 2012. Available data on water temperature, sediment, nutrients, and dissolved oxygen in streams in the Plan Area is provided in the following sections.

3.2.4.1 Water Temperature

The Klamath River, Scott River, and Shasta River are listed by the North Coast RWQCB as impaired for water temperature. Elevated temperatures contribute to the non-attainment of beneficial uses associated with cold-water salmonid fisheries, both within and downstream of the Plan Area. Studies show that increases in summertime stream temperatures can adversely affect anadromous salmonids by reducing growth efficiency, increasing disease susceptibility, changing the age of smoltification, causing loss of rearing habitat, and shifting the competitive advantage to non-salmonid species. Water temperature monitoring

TABLE 3.2-2
Status of Selected TMDLs in the Klamath River Watershed

Water Body CALWATER Numbers	Impairment	Implementation Plan Completed	TMDL Established*
Klamath River, 10510000 and 10530000	Nutrients	12/28/2010 – RWQCB	12/28/2010 – RWQCB
	Temperature	12/28/2010 – RWQCB	12/28/2010 – RWQCB
	Dissolved oxygen	12/28/2010 – RWQCB	12/28/2010 – RWQCB
	Microcystin	12/28/2010 – RWQCB	12/28/2010 – RWQCB
	http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/klamath_river/		
Scott River 10540000	Sediment	09/08/2006 – RWQCB	09/08/2006 – RWQCB
	Temperature	09/08/2006 – RWQCB	09/08/2006 – RWQCB
	http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/scott_river/		
Shasta River 10550000	Dissolved oxygen	01/26/2007 – RWQCB	01/26/2007 – RWQCB
	Temperature	01/26/2007 – RWQCB	01/26/2007 – RWQCB
	http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/shasta_river/		

*TMDL established means EPA approval of the TMDL.

Source: North Coast RWQCB 2012

data for each of these major receiving water bodies is publicly available as part of the TMDL development process by the North Coast RWQCB.

The applicant has collected water temperature data in streams throughout its Klamath River and Scott Valley management units since 1997. Temperature recorders were typically installed where the stream leaves the applicant's lands. In West Fork Beaver Creek, a temperature recorder was also located where the stream enters the applicant's lands. These data provide the most complete record of water temperature conditions for streams in the Plan Area. Because of the importance of stream temperatures to anadromous salmonids and other aquatic resources, water temperature data are presented in more detail in Section 3.3 of this EIS.

Stream temperatures in the Plan Area follow the same general seasonal pattern. Temperatures are cool early and late in the summer (May and September). The warmest stream temperatures typically occur during August, corresponding with the highest air temperatures. Although water temperatures in all streams appear to follow the same general seasonal pattern, temperatures can vary considerably among streams.

3.2.4.2 Sediment

The Scott River watershed is listed as impaired for sediment by the North Coast RWQCB. Excessive sediment input can fill pools, eliminate spawning gravels, decrease channel stability, increase nutrient and contaminant loads, and modify overall channel morphology. Sediment input is important in directly affecting fish and fish spawning success but is also useful as a surrogate for changes in concentrations of sediment-associated contaminants (primarily metals and many pesticides) and nutrient input.

In the "Staff Report for the Action Plan for the Scott River Watershed," the North Coast RWQCB estimates that current sediment delivery is 167 percent of natural sediment

delivery across the entire Scott River watershed. This was determined through an inventory of present and historical sediment delivery from the following sources: road networks, landslide inputs, soil creep, and streamside sediment inputs. Natural and anthropogenic-related sources were quantified. The largest sediment sources are from streamsides and are the result of multiple interacting human activities (North Coast RWQCB 2005).

The Scott River TMDL was set at the estimated sediment delivery rate for the 1940s. Because natural salmonid populations were substantial during this period, which was assumed to be a quiescent period between the logging of old growth at the turn of the century and logging of second growth in the middle of the 20th century, EPA postulated that there could be increases above the natural amount of sediment and still maintain healthy watershed conditions. Analysis of sediment sources during this period indicates that there was about one part human-induced sediment delivery for every four parts natural sediment delivery (a 1:4 ratio, or a 25 percent increase; North Coast RWQCB 2005). The applicant contributed road inventory data to the North Coast RWQCB TMDL study, but there is no quantification of the degree of sediment input from its lands that has been determined by this or any other study.

3.2.4.3 Other Water Quality Parameters

Besides the sediment and temperature impairments described above, the North Coast RWQCB lists the Klamath River as impaired for nutrients and dissolved oxygen. The Shasta River is also listed as impaired for dissolved oxygen. The following provides a description of nutrient and dissolved oxygen impairments in these watersheds.

Nutrients. The Klamath River prior to anthropogenic impacts was likely a highly productive ecosystem, in part driven by relatively high background loading of nutrients. More recently, anthropogenic impacts have resulted in increased levels of nutrient and organic loading and altered nutrient dynamics that have amplified the risk associated with increased nutrient loading throughout the basin (North Coast RWQCB 2008b). Except in extreme cases, nutrients alone do not impair beneficial uses. Rather, they cause indirect impacts through their biostimulatory effect on algal growth, which can lead to low dissolved oxygen and extreme pH conditions, among others, that can impair beneficial uses.

Excessive nutrient loading into the Klamath River is generally attributed to irrigated agriculture return flows, internal nutrient cycling from nutrient-enriched sediments, nutrients released as a result of wetland conversion, sediments from external sources derived from land-disturbance activities, and, to much lesser extent, point sources such as urban development where wastewater treatment and sewage overflow can direct nutrient-rich wastewater into stream channels (North Coast RWQCB 2008b). In the higher elevations where the applicant's lands are located, irrigated agriculture, wetlands conversion, and urban development are relatively non-existent; the primary land ownership is private and public forestlands. Nutrient loading from these sources in the Plan Area is therefore considered to be insignificant.

Dissolved Oxygen. Adequate concentrations of dissolved oxygen are critical for the survival of salmonids. Fish have evolved very efficient physiological systems for obtaining and using oxygen in the water to oxygenate the blood and meet their metabolic demands (Deas and Orlub 1999). Reduced levels of dissolved oxygen can impact growth and development of

different life stages of salmon, including eggs, alevins, and fry, as well as the swimming, feeding and reproductive ability of juveniles and adults. Such impacts can affect fitness and survival by altering embryo incubation periods, decreasing the size of fry, increasing the likelihood of predation, and decreasing feeding activity. Under extreme conditions, low dissolved oxygen concentrations can be lethal to salmonids.

The North Coast RWQCB lists the Klamath River and the Shasta River as impaired for dissolved oxygen. The primary processes affecting dissolved oxygen concentrations in the Klamath and Shasta rivers include sediment oxygen demand, nitrification, photosynthesis, and respiration of aquatic vegetation (North Coast RWQCB 2006). Additionally, the concentration of dissolved oxygen in water is partly a function of the temperature of the water. Colder water can absorb more oxygen than warm water, all other factors being equal.

Regional water board staff identified the following five anthropogenic sources or factors affecting dissolved oxygen conditions of the Shasta River (North Coast RWQCB 2006):

- Tailwater return flow
- City of Yreka non-point and wastewater infiltration sources
- Lake Shastina and minor impoundments
- Riparian shade
- Flow

Because the Klamath River TMDL is still in development, anthropogenic sources or factors affecting dissolved oxygen conditions of the Klamath River have yet to be determined.

3.3 Biological Resources

This section provides descriptions of terrestrial wildlife species and their habitats within the Plan Area. The habitat summary includes a description of vegetation within the Plan Area using CWHR Habitat Classifications and a summary of sizes and canopy closure in forested stands within the applicant's management units. The section also includes a description of the fishery resources and habitats in the Plan Area. The description of aquatic habitats focuses on water quality and quantity, and physical habitat features. Covered species and their general habitat requirements are described in Section 3.3.3. Other special-status species are identified and a description of their general habitat requirements is provided in Section 3.3.4.

3.3.1 CWHR Habitat Classifications and Characterizations

Forests in the Plan Area have been managed for commercial timber production since the early 1900s. Vegetation within the Plan Area is described as Klamath Mixed Conifer (KMC), Douglas-fir (DFR), White Fir (WFR), Montane Hardwood (MHW), Eastside Pine (EPN), and Montane Riparian (MRI) using the vegetation classification system described in the CWHR system (Mayer and Laudenslayer 1988). Klamath Mixed Conifer and Douglas-fir have the highest commercial value, while the Montane Hardwood and Montane Riparian have little commercial value currently. The current distribution of the vegetation types is provided in Table 3.3-1.

TABLE 3.3-1
Acres of CWHR Habitat Type by Management Unit

CWHR Habitat Type	Klamath River	Scott Valley	Grass Lake	Total
Klamath Mixed Conifer	31,993	21,471	13,068	66,532
Douglas-fir	15,749	4,796	—	20,545
White Fir	3,176	617	10,216	14,010
Montane Hardwood	1,421	4,346	1,707	7,474
Eastside Pine	5,054	5,295	16,616	26,964
Montane Riparian	4,978	1,225	944	7,147
Non-forest	2,967	1,405	5,134	9,507
Total	65,338	39,154	47,686	152,178

Source: FGS, unpublished data, 2011

3.3.1.1 Klamath Mixed Conifer

The KMC habitat type is restricted to the Klamath region of northern California and southwestern Oregon. It occurs along the eastern boundaries of Del Norte and Humboldt counties at elevations from 4,500 to 7,000 feet, often on steep slopes or in narrow valleys. While similar to the mixed conifer type, it is distinguished by its higher species diversity. Douglas-fir (*Pseudotsuga menziesii*) and white fir (*Abies concolor*) are the dominant tree species, with Shasta red fir (*Abies magnifica* var. *shastensis*), lodgepole pine (*Pinus contorta*), Jeffrey pine (*Pinus jeffreyi*), mountain hemlock (*Tsuga mertensiana*), western white pine (*Pinus monticola*), Brewer spruce(*Picea breweriana*), canyon live oak (*Quercus chrysolepis*), and black oak (*Quercus kelloggii*) also included in the community. The understory is composed of a rich shrub layer including: chinquapin (*Chrysolepis chrysophylla*), Sierra laurel (*Leucothoe davisiae*), Saddler oak (*Quercus sadleriana)*, dwarf rose (*Rosa gymnocarpa*), manzanita *(Arctostaphylos* spp.), huckleberry oak (*Quercus vacciniifolia*), snowberry (*Symphoricarpos* spp.), and Oregon grape (*Berberis aquifolium*), as well as a well-developed and diverse herbaceous layer.

Following disturbance by fire and other natural events, a dense community of montane chaparral develops from seeds in the soil seed bank. If adequate seed sources are present, a dense stand of young conifers follows the shrub stage within 20 to 30 years. The successional stages are often dependent on the type and frequency of disturbance as well as site-specific environmental factors. The communities are considered to be relatively well adapted to low intensity fires; however, intense or frequent fires may result in continued dominance of the montane chaparral type.

Numerous small meadows and seeps found throughout this habitat type and the high diversity of vegetation make this an excellent habitat for wildlife, including several rare and endangered species such as spotted owl, peregrine falcon, wolverine, and Siskiyou Mountains salamander.

3.3.1.2 Douglas-fir

The DFR type is widespread throughout northwestern California, including Del Norte and Humboldt counties, at elevations ranging from 500 to 2,000 feet. Douglas-fir is the dominant species and associated species of conifers and hardwoods vary depending on soils, moisture, topography, and disturbance history. On dry, steep slopes, canyon live oak is frequently abundant, but other trees, shrubs and herbs are sparse. In moderately dry areas, tanoak (*Lithocarpus densiflorus*), Pacific madrone (*Arbutus menziesii*), sugar pine (*Pinus lambertiana*), ponderosa pine (*Pinus ponderosa*), and black oak are common components of the canopy, with Oregon grape, California blackberry (*Rubus ursinus*), dwarf rose, and poison oak (*Toxicodendron diversilobum*) occurring in the shrub layer. Forbs and grasses include Pacific trillium (*Trillium ovatum*), western swordfern (*Polystichum munitum*), redwood inside-out flower (*Vancouveria planipetala*), broadleaf starflower (*Trientalis borealis*), deer vetch *(Lotus* spp.*)*, vanilla leaf (*Achlys triphylla)*, bracken fern (*Pteridium* spp.), western fescue (*Festuca occidentalis*), common beargrass (*Xerophyllum tenax*), and whitevein shinleaf (*Pyrola picta*). On the wettest sites, Port Orford cedar (*Cupressus lawsoniana*) and Pacific yew (*Taxus brevifolia*) are present in the canopy and common shrubs include vine maple (*Acer circinatum*), California hazel (*Corylus cornuta* var. *californica*), and Pacific rhododendron (*Rhododendron macrophyllum*).

Following disturbance by logging or intense fire, resprouting tanoak typically dominates with various other shrubs and forbs. In moist areas where young Douglas-fir is present in the tanoak community, the shrubs are generally overtopped by the trees in 15 to 30 years. The shrub community may persist for 60 to 100 years on drier sites. In the absence of fire or other disturbance, western hemlock may occur as a codominant with Douglas-fir and tanoak in areas transitional to redwood forests. In the absence of disturbance, climax stands typically develop in 80 to 250 years.

The Douglas-fir community occurs within a matrix of vegetation types and supports a high diversity of wildlife species. Common bird species include western flycatcher (*Empidonax difficilis*), chestnut-backed chickadee (*Poecile rufescens*), golden-crowned kinglet (*Regulus satrapa*), Hutton's vireo (*Vireo huttoni*), solitary vireo (*Vireo solitarius*), hermit warbler (*Dendroica occidentalis*), and the varied thrush (*Ixoreus naevius*). Several rare and endangered amphibians are also found associated with this habitat type, including Pacific giant salamander (*Dicamptodon tenebrosus*), Olympic torrent salamander (*Rhyacotriton olympicus*), Del Norte salamander (*Plethodon elongatus*), black salamander *(Aneides flavipunctatus)*, clouded salamander (*Aneides ferreus*), tailed frog (*Ascaphus truei*), and northwestern garter snake (*Thamnophis ordinoides*). Mammal species typically associated with this habitat are fisher (*Martes pennanti)*, deer mouse (*Peromyscus maniculatus*), dusky-footed woodrat (*Neotoma fuscipes*), western red-backed vole (*Clethrionomys californicus*), Douglas' squirrel (*Tamiasciurus douglasii*), Trowbridge's shrew (*Sorex trowbridgii*), and shrew-mole (*Neurotrichus gibbsii*).

3.3.1.3 White Fir

The WFR type occurs in the Klamath Mountains, the Cascades, and the Sierra Nevada between mixed conifer and red fir habitats. The habitat is characterized by a nearly monotypic even-aged overstory of white fir, with overlapping crowns that cast deep shade, although open stands are common. In northern California, white fir may grow to about 230 feet high.

The understory may consist of sparsely scattered grasses, forbs, and shrubs, or white fir seedlings and saplings. However, on moist swales or drainage bottoms, herbaceous cover may approach 100 percent. Downed material usually consists of logs, branches, and needle litter. Fire influences the white fir community by creating a mosaic of even-aged stands in different successional stages. The duration of the grass/forb stage is dependent on the availability of a white fir seed source; a good seed crop every 3 to 9 years results in a duration of up to 10 years. Reforestation activities limit the duration of the grass/forb seral stage to less than 5 years. In the shrub/sapling stage, white fir seedlings and saplings can persist for 30 to 50 years under a brush overstory. The average age of the large tree stage is 250 to 300 years with trees reaching 28 to 35 inches diameter at breast height (dbh).

The white fir community provides what is probably the coolest and moistest nonriparian habitat within the lower to mid-elevations forests in northern California. As stands mature, excellent habitat is provided for snag and cavity-dependent wildlife species, particularly when tree bole breaks (usually the result of heart rot) occur between 50 to 100 feet above the ground. White fir is the preferred tree species for insect-gleaning yellow-rumped warblers (*Dendroica coronata*), and also commonly supports western tanager (*Piranga ludoviciana*), mountain chickadee (*Poecile gambelii*), chestnut-backed chickadee, golden-crowned kinglet, and black-headed grosbeak (*Pheucticus melanocephalus*).

3.3.1.4 Montane Hardwood

A typical MHW community is composed of a pronounced hardwood tree layer, with an infrequent and poorly developed shrub stratum and a sparse herbaceous layer. In the Coast Range and the Klamath Mountains, canyon live oak often forms pure stands on steep canyon slopes and rocky ridgetops. It is replaced at higher elevations by huckleberry oak and has a scattered overstory of ponderosa pine, Coulter pine (*Pinus coulteri*), California white fir, and Jeffrey pine, the latter occurring on serpentine and peridotite outcrops. Middle elevation associates are Douglas-fir, tanoak, Pacific madrone, California laurel, California black oak, and bristlecone pine (*Pinus longaeva*). Understory vegetation is mostly scattered woody shrubs, such as manzanita, mountain-mahogany *(Cercocarpus* spp.*)*, poison oak, and a few forbs.

Initial establishment of canyon live oak is by acorns, most of which do not move far from beneath tree crowns. Wider dissemination of acorns and seeds of associate species is by birds and mammals. After establishment, canyon live oak sprouts vigorously from the root crown. Most hardwood associates also sprout prolifically. In most cases, succession is slow. Seldom is canyon live oak a pioneer species, but occasionally it invades and becomes established on alluvial soils. Canyon live oak has loose, flaky bark that catches fire readily and burns intensely. Occasional fire often changes a stand of canyon live oak to live oak chaparral, but without fire for sufficient time, trees again develop. When fire is frequent, this oak becomes scarce or even drops out of the montane hardwood community. Longevity and large size help to ensure the dominance of the community by hardwoods. Seed and sprout reproductive modes assure both wide-spread and stationary reproduction, and consequently several age and size classes usually are present in most areas. Growth of most hardwoods is generally slow and depends on depth and rockiness of soil, slope, and possibly length of time for roots to reach groundwater.

Animal species characteristic of this vegetation type include disseminators of acorns (scrub-jay [*Aphelocoma californica*], Steller's jay [*Cyanocitta stelleri*], acorn woodpecker [*Melanerpes formicivorus*], and western gray squirrel [*Sciurus griseus*]) plus those that use acorns as a major food source, including wild turkey (*Meleagris gallopavo*), mountain quail (*Oreortyx pictus*), band-tailed pigeon (*Patagioenas fasciata*), California ground squirrel (*Spermophilus beecheyi*), dusky-footed woodrat, black bear (*Ursus americanus*), and mule deer (*Odocoileus hemionus*). Deer also browse on the foliage of several hardwoods. Many amphibians and reptiles are found on the forest floor of this habitat. Among them are Mount Lyell salamander (*Hydromantes platycephalus*), ensatina, relictual slender salamander (*Batrachoseps relictus*), western fence lizards (*Sceloporus occidentalis*), and sagebrush lizard (*Sceloporus graciosus*). Snakes include rubber boa (*Charina bottae*), western rattlesnake (*Crotalus viridis*), California mountain kingsnake (*Lampropeltis zonata*), and sharp-tailed snake (*Contia tenuis*).

3.3.1.5 Eastside Pine

The EPN vegetation type occurs from about 4,000 to 6,500 feet elevation, approximately east of a line drawn from Lake Tahoe to Hilt on the northern California border, and extends into Oregon. Ponderosa pine is the dominant tree with less representation by Jeffrey pine, lodgepole pine, white fir, incense cedar, Douglas-fir, California black oak, and western juniper (*Juniperus occidentalis*). This community is characterized by short to moderate height (64 to 115 feet) pine trees at maturity. Without disturbance, except for naturally occurring fire, a mosaic of even-aged patches develops, with open spaces and dense sapling stands. Oaks or junipers may form an understory, but pure stands of pine are also found. An open stand of low shrubs, less than 6.5 feet and a grassy herb layer are typical. Crowns of pines are open, allowing light, wind, and rain to penetrate. Logging, bark beetles, root diseases and fire are the major disturbances in the eastside pine type. Disturbance favors brush, particularly manzanita and ceanothus. Eastside pine is moderately slow growing and long lived. The time required for succession varies greatly depending on site characteristics, competition, and seed source. The more severe sites within the type impose problems of reproduction and competition, such that stands may not necessarily reproduce themselves after disturbance, being replaced instead by forbs, grasses, brush, or junipers.

Pine types with shrubby understories have a high degree of vertical diversity, especially when other conifers are present. Large pine branches form good nesting substrates for large raptors. Sites supporting the larger shrub species, including manzanita and ceanothus, may become so densely vegetated in the absence of fire that livestock and big game cannot use the areas. Eastside pine stands often form important migratory and winter range for deer. Higher elevation stands with grassy understories near water may be extremely important deer fawning areas and migratory holding areas. Important wildlife species in the eastside pine habitat include the bald eagle (*Haliaeetus leucocephalus*), American peregrine falcon (*Falco peregrinus anatum)*, Sierra Nevada red fox (*Vulpes vulpes necator*), and California bighorn sheep (*Ovis canadensis californiana*).

3.3.1.6 Montane Riparian

This diverse vegetation type occurs throughout the Klamath, Cascade, Coast, and Sierra Nevada mountains on seasonally flooded or saturated soils at elevations up to 8,000 feet. Deciduous broad-leaf trees dominate the canopy. The vegetation structure is variable

depending on specific site conditions, and shrubs may be common or sparse. In the northern coast range, including Humboldt and Del Norte counties, the sub-type of this habitat is dominated by red alder. Associated riparian canopy species include black cottonwood (*Populus balsamifera*), big-leaf maple (*Acer macrophyllum*), dogwood (*Cornus sericea*), Sitka spruce (*Picea sitchensis*), Hookers willow (*Salix hookeriana*), Arroyo willow (*Salix lasiolepis*), and box elder (*Acer negundo* var. *californicum*). The herbaceous layer is generally lush and frequently dominated by ferns. The transition to non-riparian vegetation is frequently abrupt. This habitat type is relatively stable but may contain a mosaic of stages depending on the flood history.

3.3.2 CWHR Size Classifications and Canopy Closure

Forests of the Plan Area have been managed for commercial timber production since the early 1900s. Consequently, forests are relatively young (less than 80 years old) with only small, isolated patches of older stands. Table 3.3-2 details the percent and acreage of forest (by CWHR classification), non-forest, and non-stocked forest lands in the Plan Area. Less than 1 percent of the forested area in the applicant's Klamath River, Scott Valley, and Grass Lake management units (19, 21, and 29 acres in each management unit, respectively) are in CWHR size class 5 (greater than 24 inches dbh) and may be considered late-seral stage. Between 82 and 93 percent (41,214, 30,659, and 32,934 acres in each management unit, respectively) of the stands are considered mid-seral, with average tree sizes of 6 to 24 inches dbh (CWHR size classes 3 and 4). Less than 1 percent (87, 58, and 0 acres in each management unit, respectively) of the forest stands is considered early-seral stage. Plantation stands typically comprising ponderosa pine, Douglas-fir, white fir, or some mix thereof, occur on approximately 13.2 percent of the Plan Area (9,161, 2,376, and 8,563 acres in each management unit respectively). These early seral coniferous forest types provide edge between mid- to late-seral stage and emergent forest types.

TABLE 3.3-2
Acreage and Percentage of WHR Size Class and Canopy Closure on FGS's Ownership (2009)

	Management Unit				
Description	**Klamath River**	**Scott Valley**	**Grass Lake**	**Total**	**Percent of Ownership**
Commercial Forest Land					
PT	2,849.2	789.3	2,113.9	5,752.5	3.8%
2D	2,357.8	1,047.9	1,760.6	5,166.3	3.4%
2M	373.3	354.3	801.6	1,529.2	1.0%
2P	112.5	44.6	89.6	246.7	0.2%
2S	0.1	-	65.8	65.9	0.0%
Acres of Size Class 2	5,693.0	2,236.1	4,831.5	12,760.6	8.4%
(% of Commercial Forest)	9%	7%	12%	9%	
3D	2,911.3	1,042.3	1,071.8	5,025.5	3.3%
3M	4,216.8	1,852.4	2,586.1	8,655.3	5.7%
3P	6,056.4	3,840.7	5,049.5	14,946.6	9.8%
3S	2,590.5	2,087.1	2,732.8	7,410.5	4.9%
Acres of Size Class 3	15,775.1	8,822.5	11,440.2	36,037.8	23.7%
(% of Commercial Forest)	26%	27%	28%	27%	

TABLE 3.3-2
Acreage and Percentage of WHR Size Class and Canopy Closure on FGS's Ownership (2009)

Description	Management Unit: Klamath River	Scott Valley	Grass Lake	Total	Percent of Ownership
4D	12,603.3	3,322.3	2,834.0	18,759.7	12.3%
4M	10,127.5	2,927.3	2,275.9	15,330.7	10.1%
4P	10,989.2	10,460.2	13,071.3	34,520.7	22.7%
4S	5,287.2	5,278.3	6,401.7	16,967.2	11.1%
Acres of Size Class 4	39,007.3	21,988.1	24,582.9	85,578.2	56.2%
(% of Commercial Forest)	64%	66%	60%	64%	
5D	23.3	-	-	23.3	0.0%
5S	48.5	21.4	-	69.8	0.0%
Acres of Size Class 5	71.8	21.4	-	93.1	0.1%
(% of Commercial Forest)	0%	0%	0%	0%	
Commercial Forest Subtotal	60,547.2	33,068.1	40,854.5	134,469.8	88.4%
Non-stocked Land (Non-commercial Forest)					
Hardwood	1,104.4	245.8	18.4	1,368.6	0.9%
Brush	667.9	4,161.0	1,567.8	6,396.8	4.2%
Juniper	-	252.5	-	252.5	0.2%
Subtotal	1,772.3	4,659.3	1,586.2	8,017.9	5.3%
Non-forest Land (Non-commercial Forest)					
Agriculture	460.1	29.6	2.2	491.9	0.3%
Bare Ground	6.7	16.3	67.5	90.5	0.1%
Borrow Pit	-	-	24.8	24.8	0.0%
Creek	65.5	-	-	65.5	0.0%
Meadow	19.9	-	-	19.9	0.0%
Range	867.8	71.5	4,223.9	5,163.2	3.4%
Rock	1,308.4	1,296.5	860.6	3,465.5	2.3%
Riparian	229.8	-	37.6	267.5	0.2%
Specific Value	32.4	-	25.8	58.1	0.0%
Wet Area	29.7	11.9	2.6	44.2	0.0%
Subtotal	3,020.2	1,425.9	5,244.9	9,691.0	6.4%
Total	**65,339.8**	**39,153.3**	**47,685.7**	**152,178.7**	**100.0%**

Size Classes:

PT: Plantation stands
2: 1 to 6 inches dbh
3: 6 to 11 inches dbh
4: 11 to 24 inches dbh
5: >24 inches dbh

Canopy Closure:

D: 60 to 100%
M: 40 to 59%
P: 25 to 39%
S: 10 to 24%

Source: FGS, unpublished data

Approximately 11.4 percent (4,357, 5,700, 6,957 acres in each management unit, respectively) of the Plan Area is not considered commercial forest land. It is made up of either non-stocked forest land (brush and non-commercial species) or non-forest land (bare ground, meadows, rock). The greatest percentage of non-commercial land is in the

Scott Valley management unit (15.5 percent, primarily non-stocked forest land) followed by the Grass Lake (14.3 percent) and the Klamath River (6.7 percent) management units.

Forested areas within the Plan Area tend to be naturally fragmented because of the diverse geology, topography, dry climatic conditions, and periodic fire events that have resulted in areas dominated by hardwoods or chaparral species. Timber harvest and fuels management have also contributed to the forest mosaic. Figures 3.3-1 through 3.3-3 illustrate the distribution of CWHR classes within each management unit.

3.3.3 Covered Species

The applicant is seeking incidental take authorization and No Surprises assurances for the following two terrestrial species under the HCP:

- Northern spotted owl (*Strix occidentalis caurina)* (federally listed as threatened)
- Yreka phlox *(Phlox hirsuta)* (federally listed as endangered)[1]

The applicant also is seeking incidental take authorization and No Surprises assurances for the following aquatic species under the HCP:

- Southern Oregon/Northern California Coast Coho salmon (*Oncorhynchus kisutch*) ESU (federally listed as threatened, 70 FR 37160)
- Klamath Mountains Province steelhead (*Oncorhynchus mykiss*) ESU (as described in the not warranted finding, 66 FR 17845)
- Upper Klamath and Trinity Rivers Chinook salmon (*Oncorhynchus tshawytscha*) ESU (as described in the not warranted finding, 63 FR 11482)

3.3.3.1 Northern Spotted Owl (Strix occidentalis caurina):

The northern spotted owl is an uncommon, permanent resident in suitable habitats. In northern California, this species is found in dense, old-growth, and multi-layered mixed conifer, redwood, and Douglas-fir habitats, from sea level up to approximately 7,600 feet. The current range of the northern spotted owl extends from southwestern British Columbia through the Cascade Mountains, coastal ranges, and intervening forested lands in Washington, Oregon, and California, as far south as Marin County (FR 55:26114–26194). A more complete description of this species habitat requirements and life history is provided in Chapter 3 of the HCP.

For the purposes of describing the environmental baseline and assessing the effects of the applicant's activities and conservation strategies for each alternative on the northern spotted owl, owl habitat and populations are characterized at the regional and local scales. The area encompassed at each of these scales is identified below and habitat conditions at the local and regional scales are described in the following sections:

- Regional Scale (termed Area of Analysis). Consists of a 20-mile radius around the applicant's ownership. It includes portions of Siskiyou, Shasta, and Trinity counties in California; and Jackson, Josephine, and Klamath counties in Oregon. The total area is

[1] Yreka phlox would not be included in the ITP because take of listed plant species is not prohibited under the ESA and therefore would not be authorized under an ITP.

approximately 3,304,840 acres, and occurs within both the California Klamath and California Cascades physiographic provinces. The applicant's Klamath River and Scott Valley management units are within the California Klamath Province, while the Grass Valley management unit is within the California Cascades Province (USDA and USDI 1994).

This Area of Analysis is used for the purposes of characterizing environmental baseline conditions and describing effects of the applicant's activities and conservation strategies under each alternative on the spotted owl. This landscape scale is reflective of the demographic connectivity for the regional spotted owl population. The 20-mile distance criterion is based on results from two field studies of natal dispersal distance (Miller et al. 1997; Forsman et al. 2002) and the review conducted by the Interagency Scientific Committee (Thomas et al. 1990). Based on these studies, a distance of 20 to 25 miles from the perimeter of the ownership incorporates the majority of dispersal from the perimeter of the applicant's lands, and an even greater proportion of dispersal from the interior of its ownership over the 50-year Permit Term. Minor adjustments were made to the Area of Analysis boundary to exclude areas on the periphery that were clearly unsuitable for spotted owl use (for example, urban lands and other non-habitat lands).

- Local Scale (termed Area of Impact). Consists of a 1.3-mile radius around the ownership, reflective of the local spotted owl population that could be directly or indirectly affected by the applicant's activities and conservation strategy. The total area within the Area of Impact is approximately 545,030 acres. This Area of Impact is used for the purposes of characterizing environmental baseline conditions and describing effects of the applicant's activities and conservation strategies under each alternative on the spotted owl. The 1.3-mile distance criterion is based on the average home range size of the northern spotted owl within the California Klamath and California Cascades provinces (USFWS 2005). The activity center typically consists of a roost or nest site, and is considered the center of a spotted owl's home range.

The following description of spotted owl population status within the Area of Analysis and Area of Impact is based on published and unpublished information, protocol-level owl surveys within the Plan Area and adjacent federal lands, and modeling results (Zabel et al. 2003) indicating the probability of spotted owl occupancy based on the amount and relative distribution of nesting/roosting and foraging habitat available within a 0.5-mile radius of an activity center.

Spotted Owl Habitat in the California Klamath Province Area of Analysis. As described above, the structure and composition of coniferous vegetation within the Area of Analysis is naturally diverse and fragmented due to variation in topography and soil type, the relatively dry climate, and stochastic events such as fire. Timber harvest and fuels management have contributed to the habitat mosaic.

Spotted owl habitat was characterized using a Geographic Information System (GIS) owl habitat layer collaboratively developed by FGS and USFWS. This baseline habitat layer represents northern spotted owl habitat in the Area of Analysis as of December 2005. A

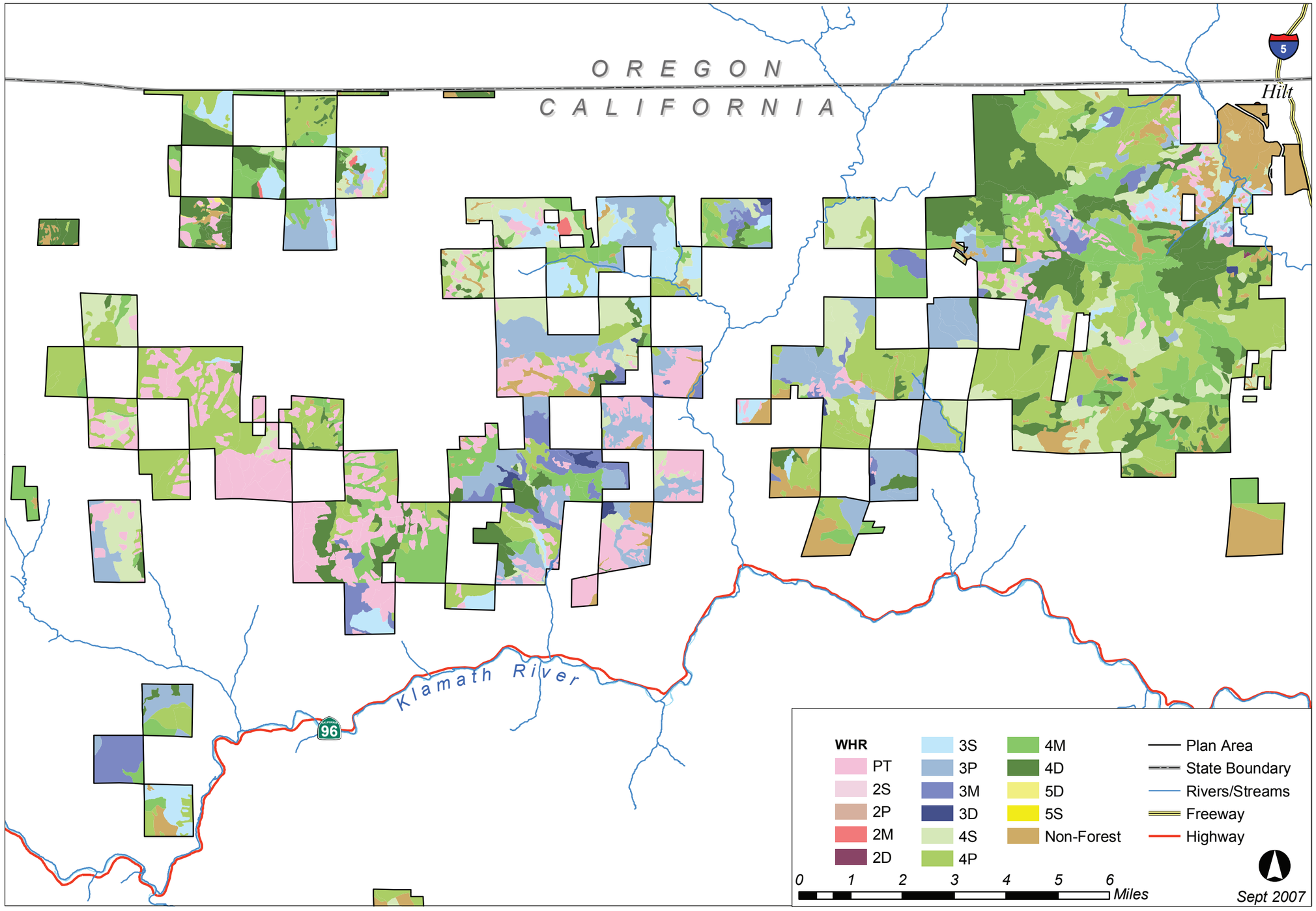

FIGURE 3.3-1
CWHR Classes in the Klamath River Management Unit

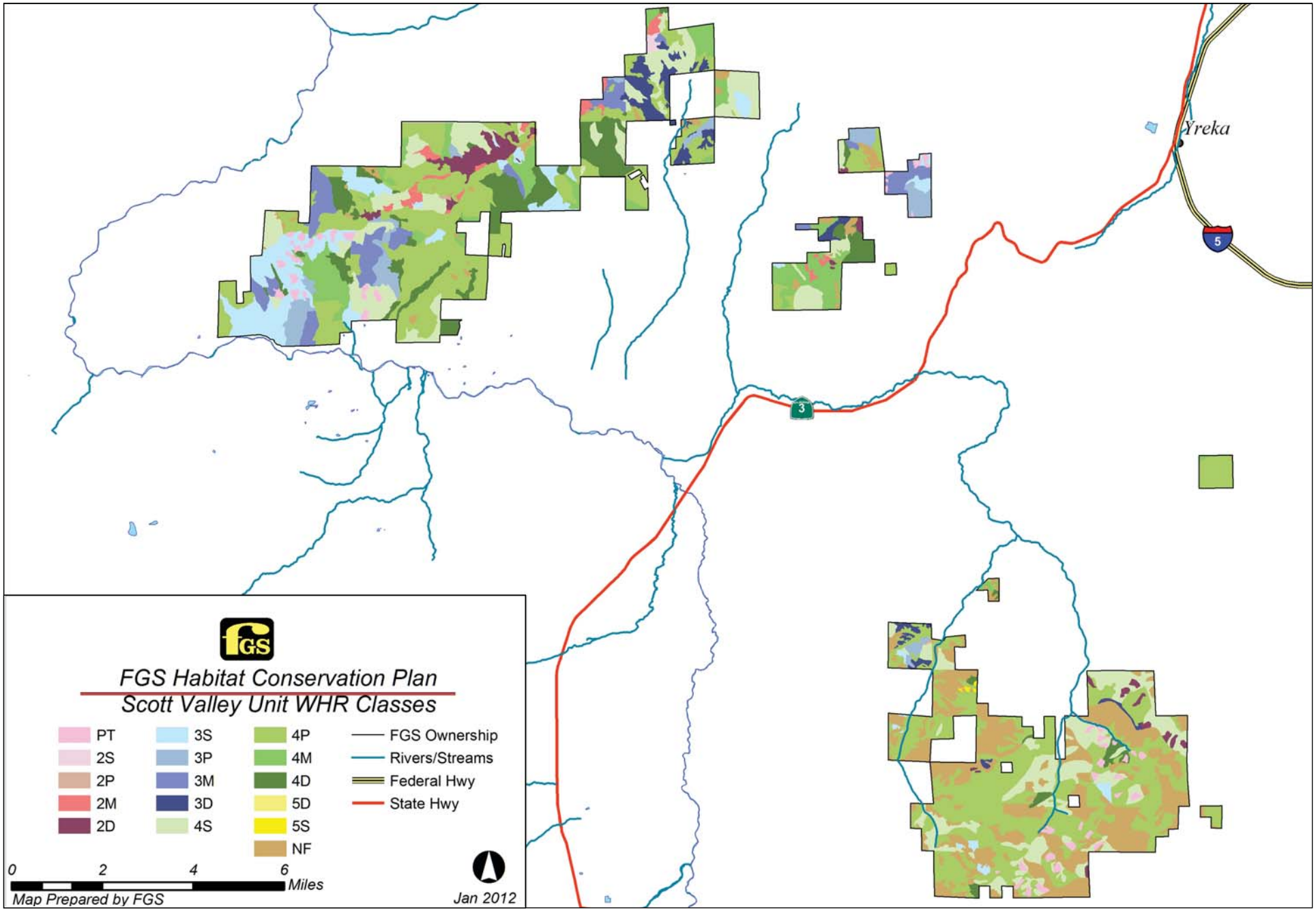

FIGURE 3.3-2
WHR Classes in the Scott Valley Management Unit

CH2MHILL.

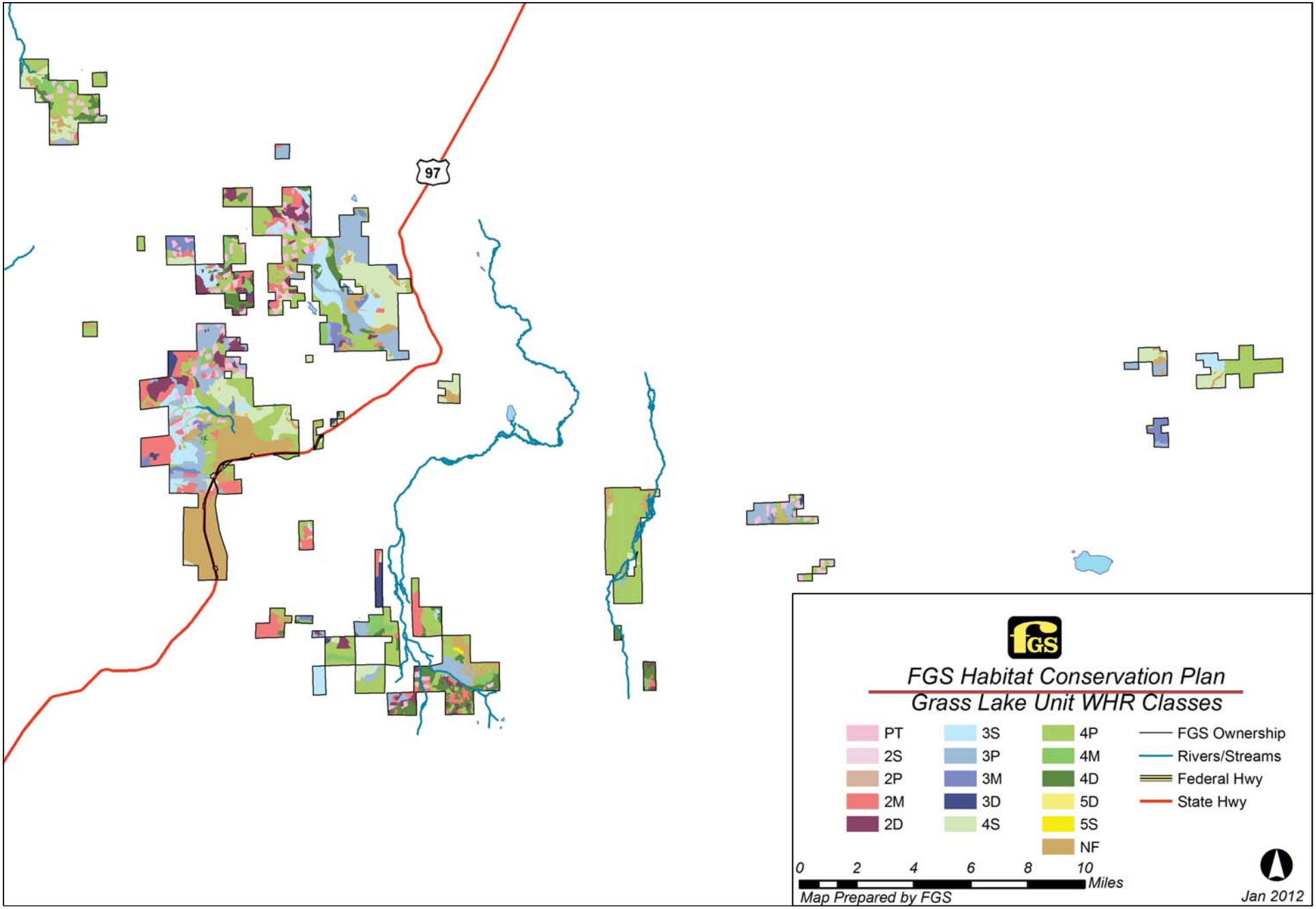

FIGURE 3.3-3
CWHR Classes in the Grass Lake Management Unit

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description of the northern spotted owl habitat layer, including data sources and methods is included in Appendix A. Table 3.3-3 presents the acreage and ownership of northern spotted owl habitat within the Area of Analysis for the California Klamath Province (containing the Scott Valley and Klamath River management units). Much of the acreage considered nesting/roosting or foraging habitat is contained in federally designated northern spotted owl Critical Habitat Units (CHUs) based on the 1992 federal designation (57 FR 1796) and refined in the final recovery plan for the northern spotted owl (USFWS 2008), or in Late-Successional Reserves (LSRs) identified in the 1994 Northwest Forest Plan (USDA and USDI 1994).

TABLE 3.3-3
Northern Spotted Owl Habitat and Land Ownership in the California Klamath Province Area of Analysis

	Acres of Habitat			
Owner	**Unsuitable**	**Foraging**	**Nesting/Roosting**	**Total**
Federal	862,569	188,241	241,589	1,292,398
Applicant	68,927	31,030	9,413	109,370
Other private	646,439	66,652	34,839	748,477
State	7,003	203	494	7,700
Total public	869,572	188,443	242,083	1,300,098
Total private	715,366	97,682	44,252	857,847

Data from 2005 northern spotted owl baseline habitat layer developed by FGS and USFWS and based on land sales in 2011.

Spotted Owl Population in the California Klamath Province Area of Analysis. The number of spotted owl pairs within the California Klamath Province Area of Analysis was estimated by modeling the probability of occupancy of an owl pair based on the proportion of nesting/roosting and foraging habitat available within a 0.5-mile radius of an activity center (Zabel et al. 2003). This approach was used to estimate the number of spotted owl pairs within the California Klamath Province Area of Analysis because the number of currently active owl sites is unknown at this scale. See Section 4.9.1 of the proposed HCP for a description of how the baseline spotted owl population was estimated using the probability of occupancy model. Results of the modeling indicated that approximately 186 activity centers (372 owls) may be supported within the California Klamath Province.

Spotted Owl Habitat in the California Klamath Province Area of Impact. Based on the 2005 owl habitat layer, there were 70,034 acres of foraging habitat, 42,045 acres of nesting habitat, and 227,464 acres of unsuitable habitat within the entire 545,030 -acre Area of Impact. Table 3.3-4 shows the acreage and ownership of spotted owl habitat within the California Klamath Province Area of Impact.

TABLE 3.3-4
Northern Spotted Owl Habitat and Land Ownership in the California Klamath Province Area of Impact

Owner	Acres of Habitat			
	Unsuitable	Foraging	Nesting/Roosting	Total
Federal	78,144	26,315	26,436	130,895
Applicant	65,535	30,548	8,410	104,493
Other private	83,281	13,128	7,199	103,608
State	504	42	0	546
Total public	78,648	26,358	26,436	131,442
Total private	148,816	43,676	15,609	208,101

Spotted Owl Population in the California Klamath Province Area of Impact. The DFG Northern Spotted Owl Database contains the most comprehensive compilation of spotted owl sightings within the Area of Impact, including results of protocol-level spotted owl surveys on the applicant's lands and adjacent private and public lands. The database contains records beginning in 1987. For this EIS, spotted owl records are used through 2007. Information on fecundity and survivorship of owls in the Plan Area is not currently available because no mark-recapture programs for spotted owls have been conducted on the applicant's ownership.

For the period from 1987 through 2007, the database contains records of 87 activity centers on or within 1.3 miles of the applicant's ownership (Area of Impact) in the California Klamath Province. Of these, 13 sites were determined by USFWS to be invalid based on lack of suitable habitat or an inadequate number of detections. Therefore, 74 valid activity centers potentially supporting a total of 143 spotted owls are presumed to occur within the California Klamath Province Area of Impact (containing the applicant's Scott Valley and Klamath River management units); 18 of these activity centers are located on the applicant's land. A quantification of spotted owls by reproductive status in the California Klamath Province Area of Impact is presented in Table 3.3-5. The 74 valid activity centers are graphically depicted in Figure 3.3-4. There is some uncertainty as to the exact number of active activity centers within the Area of Impact because the database contains detections since 1987, and some activity centers may be inactive. In addition, unsurveyed habitat may support spotted owls that have not been detected.

TABLE 3.3-5
Quantification of Spotted Owls by Reproductive Status in the California Klamath Province Area of Impact

Status (1987–2007)[a]	Sites[b]	Owls
Reproductive pair with young	50	100
Nesting pair	19	38
Territorial single	5	5
Not valid activity center	13	0
Total activity centers	87	143
Total valid activity centers	74	143

[a]Source: DFG Spotted Owl Database
[b]For the purpose of the effects analysis, each site is considered an activity center.

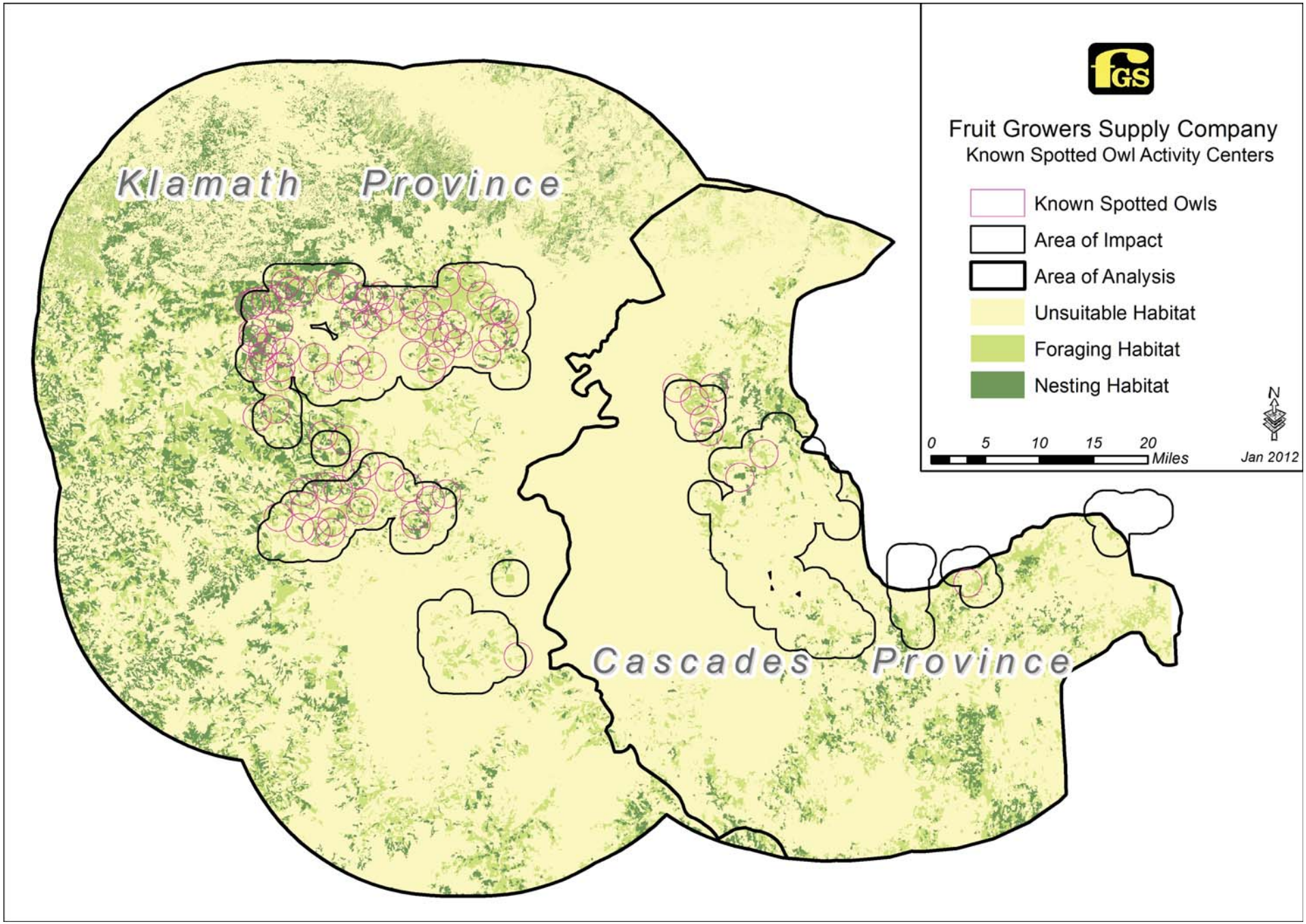

FIGURE 3.3-4
Valid Northern Spotted Owl Activity Centers
Within 1.3 Mile of the FGS Ownership

Spotted Owl Habitat in the California Cascades Province Area of Analysis. Habitat on federal and private land was quantified using the 2005 spotted owl habitat layer developed by USFWS and FGS. Table 3.3-6 presents the acreage and ownership of spotted owl habitat within the Area of Analysis for the California Cascades Province (containing the applicant's Grass Lake management unit). Much of the acreage considered nesting/roosting or foraging habitat is contained in federally designated CHUs or LSRs.

TABLE 3.3-6
Northern Spotted Owl Habitat and Land Ownership Within the California Cascades Province Area of Analysis

	Acres of Habitat			
Owner	**Unsuitable**	**Foraging**	**Nesting/Roosting**	**Total**
Federal	453,843	76,023	33,319	563,185
FGS	37,622	4,180	619	42,967
Other private	485,634	38,111	16,371	540,116
State	630	0	0	630
Total public	454,473	76,023	33,319	563,815
Total private	523,256	42,292	16,989	583,083

Data from 2005 northern spotted owl baseline habitat layer developed by FGS and USFWS and based on land sales in 2011.

Spotted Owl Population in the California Cascades Province Area of Analysis. The probability of spotted owl occupancy could not be estimated within the California Cascades Province using the Zabel et al. (2003) habitat model because owl nesting/roosting and foraging habitat in this province is not comparable to the habitat characterizations used for model development. The amount of spotted owl habitat in the California Cascades Province is limited, and protocol-level spotted owl surveys have been conducted in the last 10 years on the majority of lands within the province that could potentially support owls. USFWS considers the DFG Spotted Owl Database the best source for documenting the number of spotted owls in this province. A database query in August 2008 reported 54 activity centers within the California Cascades Area of Analysis. However, information on fecundity and survivorship of owls in the Plan Area is not currently available because no mark-recapture programs for spotted owls have been conducted on the applicant's ownership.

Spotted Owl Habitat in the California Cascades Province Area of Impact. Based on the 2005 owl habitat layer, there are 22,728 acres of foraging habitat, 7,349 acres of nesting habitat, and 154,319 acres of unsuitable habitat within the entire 524,500-acre Area of Impact. Table 3.3-7 shows the acreage and ownership of spotted owl habitat within the Area of Impact in the California Cascades Province.

Spotted Owl Population in the California Cascades Province Area of Impact. The DFG Spotted Owl Database contains records of 10 activity centers within 1.3 miles of the applicant's ownership (Area of Impact) in the California Cascades Province. Of these, two sites were determined by USFWS to be invalid based on inadequate number of detections and lack of suitable habitat. Therefore, eight valid activity centers supporting a total of 15 spotted owls are estimated to occur within the California Cascades Province Area of Impact.
A quantification of spotted owls by reproductive status in the California Cascades Province

TABLE 3.3-7
Northern Spotted Owl Habitat and Land Ownership within the California Cascades Province Area of Impact

Owner	Acres of Habitat			
	Unsuitable	Foraging	Nesting/Roosting	Total
Federal	83,092	14,220	5,737	103,050
Applicant	37,622	4,180	619	42,967
Other private	33,464	4,328	993	38,785
State	140	0	0	140
Total public	83,233	14,220	5,737	103,190
Total private	71,086	8,508	1,612	81,752

Data from 2005 northern spotted owl baseline habitat layer developed by FGS and USFWS and based on land sales in 2011.

Area of Impact is presented in Table 3.3-8. The eight valid activity centers are graphically depicted in Figure 3.3-4. There is some uncertainty as to the exact number of active activity centers within the Area of Impact because the database contains detections since 1987, and some activity centers may be inactive. In addition, unsurveyed habitat may support spotted owls that have not been detected.

TABLE 3.3-8
Quantification of Spotted Owls by Reproductive Status in the California Cascades Province Area of Impact

Status (1987–2007)[a]	Sites[b]	Owls
Reproductive pair with young	5	10
Nesting pair	2	4
Territorial single	1	1
Not valid activity center	2	0
Total activity centers	10	15
Total valid activity centers	8	15

[a]Source: DFG Spotted Owl Database
[b]For the purpose of the effects analysis, each site is considered an activity center.

3.3.3.2 Yreka Phlox (*Phlox hirsuta*)

Yreka phlox is a perennial herb that is native to California and is an endemic known only to occur in the vicinity of Yreka, California (CNPS 2008). Yreka phlox grows on serpentine soils in association with other plants tolerant of serpentine soils, particularly Jeffrey pine, incense cedar, and juniper (65 FR 65:5268-5275). As a serpentine endemic, Yreka phlox is found only on soils derived from ultramafic parent rocks, including serpentinite and peridotite. The plant occurs on lands owned and managed by industrial timber companies, other private landowners, USFS, California Department of Transportation, and the City of Yreka. It is currently known to occur at five locations, which are generally referred to as the China Hill, Soap Creek Ridge, Cracker Gulch, Greenhorn Creek, and Jackson Street occurrences. Detailed descriptions of these known locations are provided in Section 4 of the HCP.

Additionally, a single 1930 collection indicates a possible historical location near Etna or Echo Mill, near Soap Creek Ridge (USFWS 2006). However, most of the habitat in these areas does not appear suitable for Yreka phlox, and surveys near Etna and Mill Creek have failed to relocate this occurrence (Adams 1987). It has been suggested that the locality information for the collection may be incorrect (DFG 1986).

Currently there are no known occurrences of Yreka phlox on the applicant's ownership. Based on the characteristics of known and reported Yreka phlox occurrences (soils derived from ultramafic parent materials, elevations from roughly 2,500 to 4,000 feet from the Yreka area to the Etna area), areas with soil derived from ultramafic rock that occur within roughly 8 miles of any point along a line drawn from Paradise Craggy southwest through Yreka to Etna are considered to have the greatest potential to support Yreka phlox (USFWS 2006). Adams (1987) conducted a relatively extensive survey of federal lands with ultramafic soils within this area, but did not identify any occurrences other than the two known occurrences. Since the species was listed under the ESA, three new occurrences have been discovered. However, areas of potential habitat occur on private lands that have not been surveyed. Additionally, some unsurveyed areas of potential habitat exist on publicly owned and managed lands.

Yreka phlox has been recognized as being rare and endangered by CNPS since 1980, and was listed as endangered by the State of California in 1986. USFS Region 5 and the BLM Redding Field Office have recognized Yreka phlox as a Sensitive Species since at least 1979 (USFWS 2006). On April 1, 1998, USFWS published a proposed rule in the Federal Register to list Yreka phlox as endangered under the federal ESA (63 FR 15820-15825). On February 3, 2000, the final rule determining federal endangered status for this species was published (65 FR 5268-5275). The final recovery plan for the species was issued in July 2006. The recovery objectives are to recover Yreka phlox to the point where reclassification from endangered to threatened is warranted, and subsequently to the point where the species can be removed from the list of endangered and threatened species. The actions needed to meet the objective are listed below (USFWS 2006):

1. Protect and secure the four occurrences of *Phlox hirsuta* known as of January 1, 2002: China Hill, Soap Creek Ridge, Jackson Street, and Cracker Gulch occurrences. Alternatively, the China Hill and Soap Creek Ridge occurrences are protected, and substitutes representing Jackson Street and/or Cracker Gulch are protected.
2. Develop and implement a monitoring strategy for all occurrences that will identify existing and new threats over a period of at least 10 years. Implement a management plan at each protected site to ensure the long-term persistence of *Phlox hirsuta*.
3. Create and maintain a seed bank and develop propagation techniques in case of unforeseen future population losses.
4. Survey for undiscovered occurrences in unsurveyed areas likely to support *Phlox hirsuta*.
5. Conduct biological research to guide recovery and conservation efforts.
6. Enhance public awareness, understanding, and participation in *Phlox hirsuta* recovery.

3.3.3.3 Anadromous Salmonids

Southern Oregon/Northern California Coast Coho Salmon ESU. The coho salmon is one of several species of Pacific salmon found along the west coast of North America. Like all Pacific salmon, coho salmon are anadromous. Coho salmon range in freshwater drainages from Hokkaido, Japan, and eastern Russia; around the Bering Sea and Aleutian Islands to mainland Alaska; and south along the North American coast to Monterey Bay, California (Laufel et al. 1986). Within California, the historical range of coho salmon was from the Oregon-California border (including the Winchuck River and Illinois River drainages in Oregon) south to the streams of northern Monterey Bay (Snyder 1931; Fry 1973), including small tributaries to San Francisco Bay (Brown and Moyle 1991). There is some evidence that they historically ranged as far south as the Pajaro River (Anderson 1995), the Big Sur River (Hassler et al. 1991), or even the Santa Ynez River (Lucoff 1980), although evidence of spawning populations south of the Pajaro River is anecdotal (Anderson 1995). Currently, the southernmost stream that contains coho salmon is Aptos Creek in Santa Cruz County (NMFS 2001).

Like other anadromous salmonids, coho salmon are a coldwater species. High water temperatures can reduce growth, result in egg loss, block upstream or downstream migration, or result in mortality. Adult coho salmon prefer small, gravel-bottomed tributaries for spawning (Schuett-Hames and Pleus 1996), and generally do not use stream reaches with gradients greater than 3 percent (Reeves et al. 1989). They also require considerably less space for redds than other anadromous salmonids, and may spawn in streams less than 1 meter wide if suitable gravels are available. Juvenile coho salmon prefer pools all year, and commonly migrate into off-channel habitats such as side channels, sloughs, or beaver ponds during winter months (Cederholm and Scarlett 1981; Peterson 1980). Young coho salmon favor deep pools with abundant cover throughout their freshwater residence period (Sandercock 1991). Generally, abundance of juvenile coho salmon is strongly influenced by the number and quality of available pools (Carmen et al. 1984; Murphy et al. 1986). Habitat requirements of coho salmon are described in detail in Chapter 3 of the HCP.

The status and life stage distribution of coho salmon is not well known in the middle Klamath River Basin. The status of wild fish is particularly uncertain. Small wild populations may persist in a few tributaries, but many populations are influenced by hatchery operations (Weitkamp et al. 1995). Between Iron Gate Dam and Seiad Valley, coho salmon populations are known to occur in Bogus Creek, Little Bogus Creek, Shasta River, Humbug Creek, Little Humbug Creek, Empire Creek, Beaver Creek, Horse Creek, and Scott River (NMFS 2002).

As a result of declines in the population of coho salmon of the southern Oregon/northern California ESU, coho salmon within this ESU were federally listed as threatened in May 1997 (62 FR 24588). This status was reaffirmed on June 28, 2005 (70 FR 37160) and again on August 15, 2011 (76 FR 50447). The population of this ESU is considered to be very depressed, containing fewer than 10,000 naturally produced adults as compared to the 150,000 to 400,000 adults estimated to occur in the ESU in the 1940s (62 FR 24588). Critical habitat for this ESU was designated in May 1999 (64 FR 24049). The State of California formally listed coho salmon as threatened north of Punta Gorda to California's border with Oregon on March 30, 2005.

No comprehensive spawning surveys have been conducted for coho salmon in streams in the vicinity of the applicant's Klamath River management unit, and limited information is available on juvenile rearing. Juvenile coho salmon have been observed in Beaver Creek (Miller et al. 1993; FGS, unpublished data) and lower Cottonwood Creek (USFS 1993). Coho salmon are also believed to use the lower reaches of Horse Creek, Empire Creek, and West Fork Beaver Creek (USFS, unpublished data). Spawning and rearing areas have not been documented for these tributaries.

Little information is available on the distribution of coho salmon by life stage in the Scott River Basin. Coho salmon have been observed in several tributaries to the Scott River, including Canyon, Shackleford, Moffett, Mill, Kidder, French, Miners, and Sugar creeks, the East Fork and the South Fork Scott River and its tributary Boulder Creek (USFS and DFG, unpublished data). Coho salmon also utilize many other tributaries to the Scott River, such as Kelsey, Tompkins, Patterson, and Etna creeks (Hassler et al. 1991). The nature and extent of use by these tributaries' coho salmon is uncertain. In recent years, juvenile coho salmon have been reported in the mainstem Scott River (West et al. 1989) and lower reaches of French Creek (DFG 1994).

Coho salmon are known or suspected to be present in about 3.7 miles of streams in the Plan Area (USFS, unpublished data). In most drainages where coho salmon occur in streams on the applicant's ownership, the applicant owns a small proportion of the total length of stream supporting coho salmon. Only in the Empire Creek watershed does 25 percent or more of the total miles of stream supporting coho salmon occur on the applicant's lands.

Upper Klamath and Trinity Rivers Chinook Salmon ESU. Chinook salmon are known to be distributed from Central California to Kotzebue Sound, Alaska, on the North American coast; and along the Asian coast from Hokkaido, Japan, to the Anadyr River in Russia (Healey 1991). Chinook salmon also have been reported in the Mackenzie River area of northern Canada (McPhail and Lindsey 1970) and the Coppermine River in the Canadian Arctic (Hart 1973), suggesting that Chinook salmon may be distributed even farther north and east than Kotzebue Sound.

Similar to other anadromous salmonids, Chinook salmon are a coldwater species. High water temperatures can reduce growth, result in egg loss, block upstream or downstream migration, or result in mortality. Chinook salmon, the largest anadromous salmonid species in the Klamath River system, are strong swimmers and the environmental conditions preferred by Chinook salmon are most commonly found in the mainstem rivers and larger tributaries. Larger fish, such as Chinook salmon, can use larger substrate materials than can smaller fish, such as coho salmon and steelhead. Chinook fry use channel margins while dispersing downstream during high spring flows and usually do not overwinter in streams in the Klamath Basin. Habitat requirements of Chinook salmon are described in detail in Chapter 3 of the HCP.

Historically, large runs of spring-run Chinook salmon were present in the Klamath River Basin, outnumbering fall-run Chinook salmon stocks substantially (Snyder 1931). Overfishing and habitat destruction nearly extirpated this run in the early 1900s (Leidy and Leidy 1984). At the time Iron Gate Hatchery operations began in 1962, a few spring-run Chinook salmon were still returning to the upper Klamath River. Efforts to maintain this run started in 1968, but were not successful. Spring-run Chinook salmon existed in the

Scott River into the 1950s. The Salmon River and Wooley Creek (tributary to the Salmon) may support the last viable native population of spring-run Chinook salmon in the Klamath River Basin. Tributaries to the mid-Klamath River—such as Indian Creek, Elk Creek, and Clear Creek—have small, highly variable populations of spring-run Chinook salmon (KRBFTF 1991). Fall-run Chinook salmon are now the most numerous of the Chinook salmon runs in the Klamath River Basin.

A status review for spring- and fall-run Chinook salmon for the Upper Klamath and Trinity rivers ESU was completed by NMFS in March 1998. Although Klamath River spring-run Chinook salmon have been identified as being at high risk of extinction (63 FR 11493), NMFS concluded at that time that the overall ESU was not at risk of becoming extinct, nor was it likely to become endangered in the foreseeable future (63 FR 11482). Thus, listing of this ESU was not warranted.

Spring-run Chinook salmon are not supported by streams on the applicant's lands. Although individual spring-run Chinook salmon are occasionally observed in Beaver Creek (Miller et al. 1993), the stream is not known to support a spawning population of spring-run Chinook salmon. In Beaver Creek, fall-run Chinook salmon spawning is limited to the lower 7.7 miles of the mainstem (Olson and Dix 1992); most spawning occurs between the Beaver Creek Campground and the confluence with the Klamath River (USFS 1996a). In addition to Beaver Creek, other streams in the vicinity of the applicant's Klamath River management unit that support Chinook salmon are Horse Creek and possibly Cottonwood Creek, as the USFS has observed Chinook salmon fry in lower Cottonwood Creek (USFS 1993).

Most Chinook salmon spawning in the Scott River Basin appears to be in the mainstem Scott River (Olson and Dix 1992; DesLaurier 1993). During 1992 (a high-flow year), spawning occurred as far upstream as Facey Gulch, and the distribution of spawning in the mainstem was similar to that observed in 1962 (DesLaurier 1993). Chinook salmon also spawn in the lower reaches of larger tributaries (for example, Shackleford Creek and Canyon Creek) when flows are adequate (DesLaurier 1993). Spawning activity in tributaries is often limited by low flow levels in the fall that restrict access to spawning sites (Olson and Dix 1992; DesLaurier 1993). In the Shasta River Basin, Chinook salmon are known to occur in several miles of the Shasta River, Bogus Creek, and Willow Creek, primarily in the lower elevation valley sections. These areas are considerably downstream of the Plan Area.

The applicant's lands contain considerably less habitat for Chinook salmon than for steelhead and coho salmon (USFS and DFG, unpublished data). Chinook salmon are known to be present or suspected only in the Beaver drainage, where approximately 3.4 miles of the available Chinook salmon habitat is on FGS ownership.

Klamath Mountains Province Steelhead ESU. Historically, steelhead were distributed throughout the northern Pacific Ocean from the Kamchatka Peninsula in Asia to the northern Baja California Peninsula. This species probably inhabited most coastal streams in Washington, Oregon, and northern and central California, as well as many inland streams in these states, and Idaho (Busby et al. 1996). Presently, the distribution extends from the Kamchatka Peninsula along the Pacific coast of North America to at least Malibu Creek in southern California. Many populations of steelhead are believed to be extirpated, and many more are thought to be in serious decline in numerous coastal and inland streams from Washington, Oregon, Idaho, and California (Nehlsen et al. 1991).

Suitable water temperatures for spawning by steelhead are slightly lower than for Chinook salmon. In general, steelhead juveniles are able to rear in warmer temperatures than Chinook salmon and coho salmon. Steelhead prefer to spawn in tributary streams, and will use channels with gradients up to 20 percent and as little as 1 meter wide, provided sufficient space and substrate for redd construction is available. Fry initially prefer slow, shallow waters along channel margins, but move to deeper, faster water with coarse substrate and surface turbulence as they grow (Raleigh et al. 1984). Deep pools provide shelter from predators and refugia during summer low flow periods, thus benefiting juveniles. Pools also provide areas of reduced velocity that are used by juveniles for winter rearing (Bisson et al. 1988) and by adults during migration and spawning (Bjornn and Reiser 1991). Young-of-the-year steelhead are common in dammed and plunge pools; older steelhead are more common in scour pools. Habitat requirements of steelhead are described in detail in Chapter 3 of the HCP.

Steelhead populations on the west coast of the United States have experienced declines in abundance over the past several decades as a result of natural and human factors. Human activities such as forestry, agriculture, mining, and urbanization have degraded, simplified, and fragmented steelhead habitat. Water diversions for agriculture, flood control, domestic, and hydropower purposes have greatly reduced or eliminated historically accessible habitat. Sedimentation from land use activities is recognized as a primary cause of habitat degradation in the range of west coast steelhead.

The Klamath Mountains Province steelhead ESU was previously proposed for federal listing as threatened. Although populations of the summer-run life history type are severely depressed, after reviewing updated abundance and trend information for the ESU as a whole, NMFS concluded in April 2001 that the Klamath Mountains Province ESU did not warrant listing (66 FR 17845).

Weir records indicate that steelhead migrate into the larger tributaries of the Klamath River including the Salmon and Scott rivers, the Trinity River and its forks, Elk Creek, Clear Creek, Indian Creek, Bogus Creek, and the Shasta River. Winter-run steelhead are probably the most widely distributed of the salmonid runs in the basin because their return timing may allow them access to many of the smaller streams. Summer-run steelhead return to several tributaries in the Klamath River Basin, including the Salmon River, Wooley Creek, Redcap Creek, Elk Creek, Bluff Creek, Dillon Creek, Indian Creek, Clear Creek, forks of the Trinity River, and Canyon Creek.

Information on the spawning distribution of steelhead in the vicinity of the Plan Area is limited due to the difficulty in observing returning fish and redds during the winter high water periods when steelhead spawn. Steelhead have been reported to spawn in Beaver Creek (West et al. 1989), and adults have been observed holding in lower Cottonwood Creek during the summer (USFS 1993). In the mainstem Beaver Creek, most steelhead spawning has occurred relatively high in the drainage between Grouse and Soda creeks, with less spawning activity between Soda Creek and the confluence with the Klamath River (USFS 1996a).

In the Scott River, Olson and Dix (1992) noted that the lower reaches of Shackleford and Mill creeks (downstream of FGS lands) have spawning habitat for a large number of steelhead, and suggested that these creeks served as “spawning refugia” for steelhead displaced from other portions of the Scott River Basin. Kidder Creek was noted as containing excellent spawning

gravel (Scott River CRMP 1995). The Scott Valley management unit includes land in the Mill Creek drainage, but does not include lands in the Shackleford or Kidder Creek drainages.

In the Shasta River Basin, steelhead are known to occur in several miles of the Shasta River, Bogus Creek, the Little Shasta River, and Willow Creek. However, all of these areas are considerably downstream of the Plan Area, and there is no habitat accessible to steelhead within streams in the Plan Area.

Steelhead use streams in the Plan Area primarily for juvenile rearing. Fall and winter steelhead are known or suspected to be present in about 14.4 miles of streams in the Plan Area (USFS and DFG, unpublished data). No summer steelhead are found in the Plan Area. In most drainages, the applicant owns a small proportion of the total amount of habitat for steelhead. Only in the Empire Creek watershed does more than 25 percent of the steelhead habitat occur on the applicant's ownership.

Habitat Conditions for Anadromous Salmonids in the Plan Area. Some drainages within the Plan Area support naturally reproducing populations of salmon and steelhead. Although the applicant has land holdings in several of these drainages, very little of the applicant's lands are adjacent to streams containing anadromous fish populations. The Plan Area lands are typically adjacent to non-fish-bearing (Class II and III) tributaries to streams that may support anadromous fish species. There are approximately 33 miles of fish-bearing, but not necessarily anadromous, (Class I) streams within the Plan Area. Of this total, approximately 24, 4, and 5 miles of fish-bearing streams occur in the applicant's Klamath River, Scott Valley, and Grass Lake management units, respectively. Anadromous fish are found in approximately 14 miles of the 33 miles of Class I streams in the Plan Area. Approximately 13 miles of anadromous streams are within the applicant's Klamath River management unit and about 1 mile is within its Scott Valley management unit. No anadromous fish are found within the applicant's Grass Lake management unit.

Figures 3.3-5 through 3.3-7 show the current distribution of anadromous and resident fish in each of the applicant's management units.

In most cases, detailed information on aquatic habitats within the Plan Area is limited. The following subsections summarize what is known about habitat conditions in the Plan Area as they related to anadromous salmonids. For a more detailed discussion of aquatic habitat conditions in the Plan Area, see Section 4.8.5 of the proposed HCP.

Hydrology. For a detailed description of the hydrology of the Plan Area and Klamath Basin region see Section 3.2, Water Resources, above, and Section 4.4 of the proposed HCP. Generally, highest flow levels in area streams occur during the spring and early summer in association with snowmelt; lowest flow levels (base flows) occur during the fall before winter storms commence. Summer flows decrease to low levels in August to September, regardless of whether the winter was wet or dry, in response to a combination of hot days and low precipitation. Intensive use of water for agriculture in Scott Valley also contributes to low summer flows in the Scott River (USFS 2000). The Scott River can be virtually dry during summer months in average and dry years, but can receive very large amounts of runoff in the winter months. Flows in the Shasta River tend to be more consistent, with smaller peak flow events occurring in the winter months and more reliable, yet low base flow in the summer months.

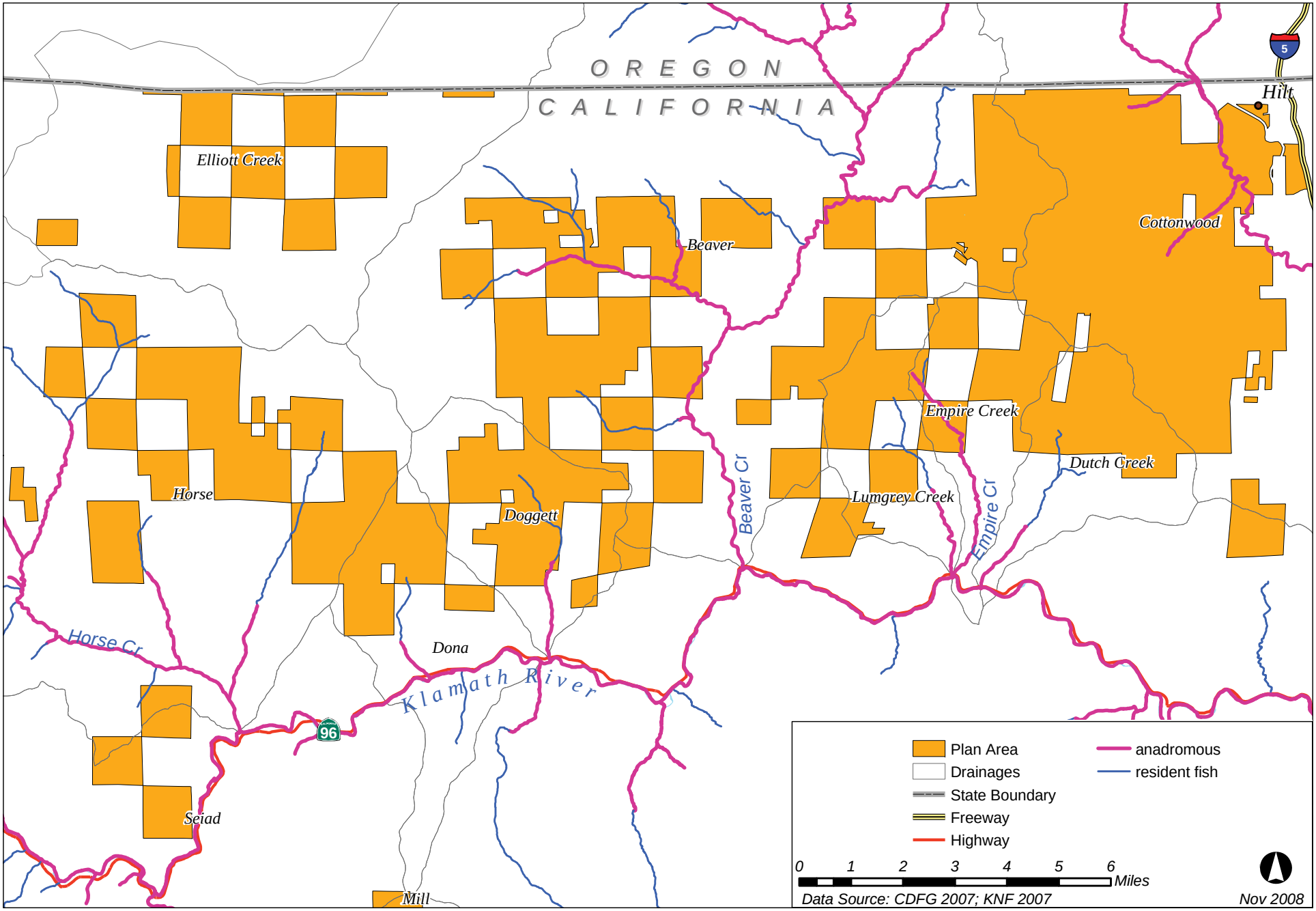

FIGURE 3.3-5
Resident and Andromous Fish in the Klamath River Management Unit

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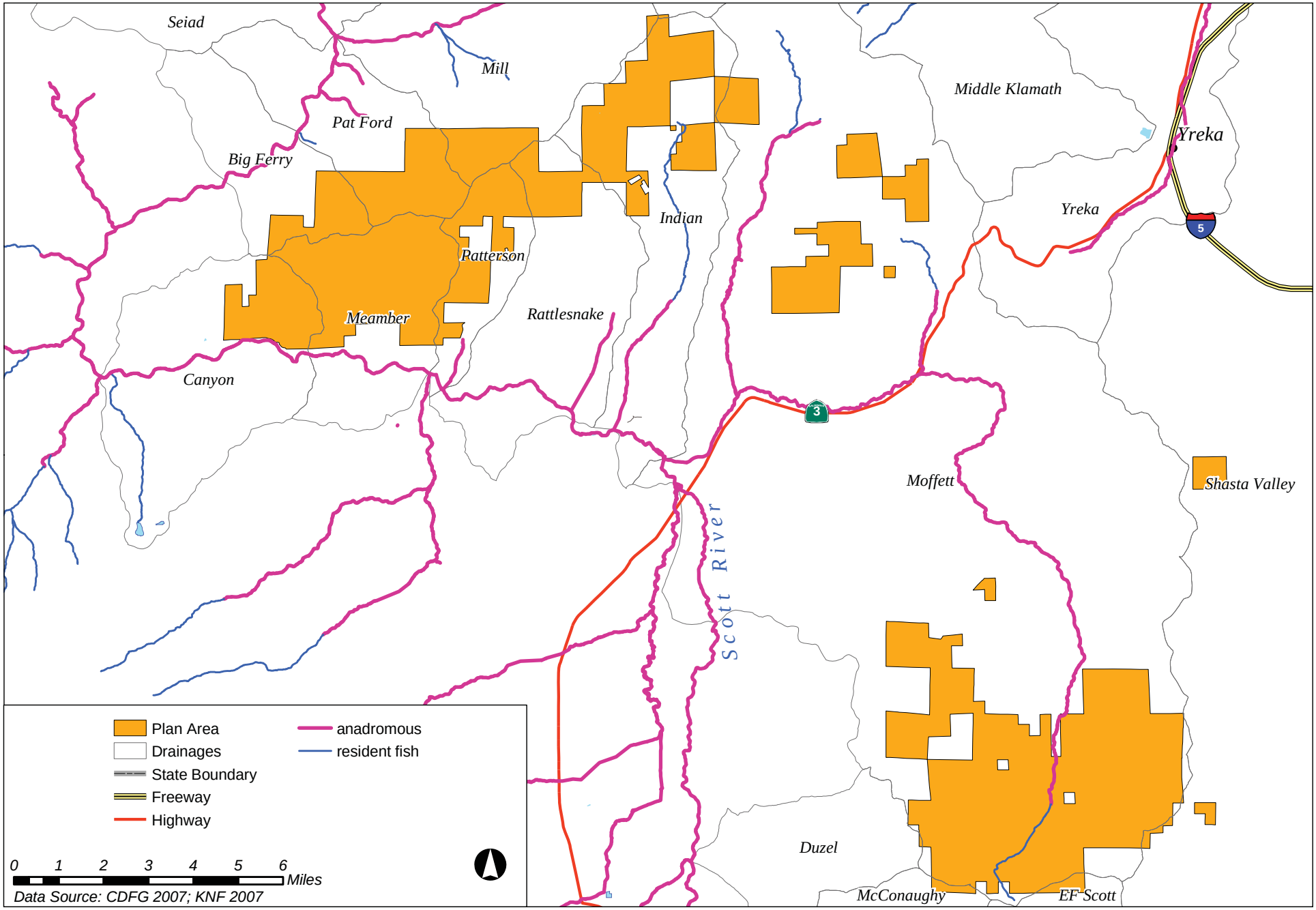

FIGURE 3.3-6
Resident and Andromous Fish in the Scott Valley Management Unit

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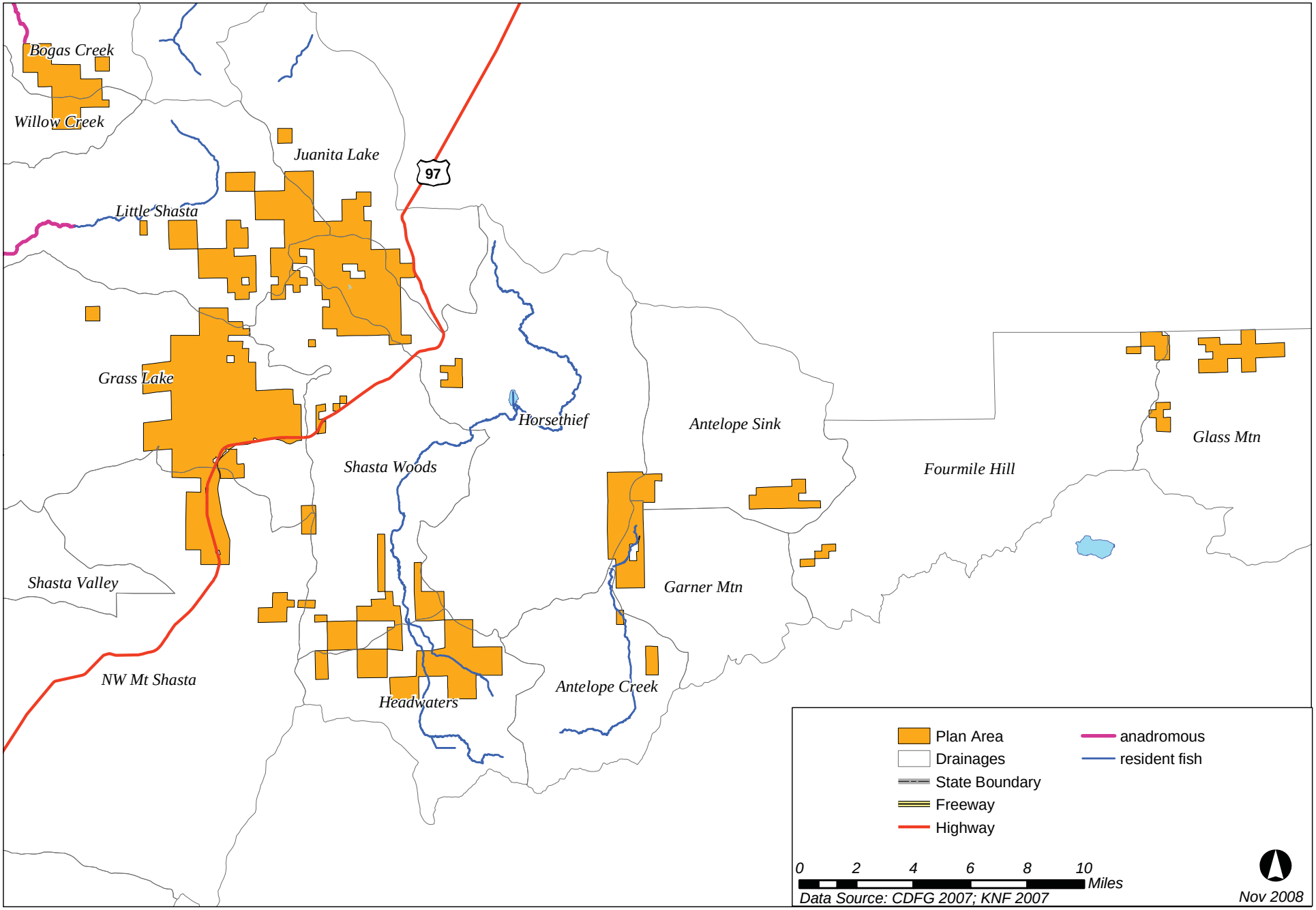

FIGURE 3.3-7
Resident and Andromous Fish in the Grass Lake Management Unit

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Water Temperature. Water temperature data in streams throughout its Klamath River and Scott Valley management units have been collected by the applicant since 1997. These data provide the most complete record of water temperature conditions for streams in the Plan Area. Water temperatures in all streams follow the same general seasonal patterns, but relative water temperatures can vary considerably among streams. Stream temperatures in the Plan Area are cool early and late in the summer (May and September). The warmest stream temperatures typically occur during August, during the highest observed air temperatures.

Both the maximum weekly average temperature (MWAT) and maximum weekly maximum temperature (MWMT) have been used for assessing the suitability of stream temperatures for juvenile coho salmon during late summer (Sullivan et al. 2000). MWAT is the mathematical mean of multiple, equally-spaced daily temperatures over a 7-day consecutive period. MWMT is the mathematical mean of multiple, daily maximum temperatures over a 7-day consecutive period. MWATs and MWMTs for streams in the Plan Area are reported in Table 3.3-9. Based on the water temperatures recorded in the Plan Area, summertime temperatures rarely, if ever, exceed lethal temperatures reported for anadromous salmonids. Likewise, average summer water temperatures (MWATs and MWMTs) in these streams are generally within the range considered suitable for juvenile rearing (see Section 3.1.4 of the HCP for a discussion of temperature requirements).

Chinook salmon and coho salmon spawning occurs in the fall or early winter, while winter steelhead spawning occurs from January through April. Temperature data are not available for winter months, but based on information for October, water temperatures are likely suitable for spawning by all species. Egg incubation also occurs during the winter months, and likewise, water temperatures appear suitable for this life stage. Although stream temperatures in the Plan Area are generally within the range utilized by coho salmon, temperatures in much of the mainstem and lowermost portions of tributaries downstream of the Plan Area in the Scott Valley are not suitable for coho salmon (North Coast RWQCB 2005).

Generally, summer water temperatures in the Plan Area rarely exceed temperatures lethal to anadromous salmonid juveniles. Water temperature data are not generally available for the winter months within the Plan Area, but based on temperature available for October, water temperatures are likely suitable for spawning and incubation by the salmonid species present within the Plan Area.

Pool Habitats. Habitat typing data collected by the Oak Knoll Ranger District from 1989 to 1992 indicated that pools generally make up less than 20 percent of the surface area in the stream segments surveyed (USFS, unpublished data). The amount of pool habitat (percent of surface area) in streams in the Oak Knoll Ranger District and on the applicant's land is generally less than that observed in streams draining unmanaged forests in northeast Oregon (Carlson et al. 1990), but similar to the amount of pool habitat reported in alluvial mountain channels in Colorado (Richmond 1994).

TABLE 3.3-9
MWAT and MWMT for Streams in the Plan Area

Stream (Drainage)	MWAT (MWMT) (°C)							
	1997	1998	1999	2000	2001	2002	2003	2004
Bear Creek (Beaver)	ND	ND	13.1 (14.6)	14.5 (16.3)	15.0 (16.4)	14.9 (16.7)	14.3 (16.2)	13.7 (15.7)
Beaver Creek, mouth (Beaver)	ND	18.0 (20.9)	16.7 (19.5)	19.0 (22.5)	20.4 (24.1)	18.8 (22.1)	19.2 (22.3)	18.6 (22.0)
Doggett Creek (Doggett)	ND	ND	14.7 (16.0)	15.8 (17.2)	17.6 (19.2)	15.7 (17.1)	ND	16.0 (17.4)
Hungry Creek (Beaver)	13.2 (15.2)	13.4 (15.1)	12.9 (15.3)	13.8 (15.8)	13.9 (16.0)	13.8 (15.9)	14.3 (16.1)	17.6 (20.6)
Kohl Creek (Dona)	14.6 (16.5)	16.3 (18.2)	13.0 (14.2)	14.7 (17.4)	ND	ND	ND	ND
Little Soda Creek (Beaver)	16.7 (18.9)	17.0 (18.9)	ND	ND	ND	ND	ND	ND
Meamber Creek (Meamber)	15.7 (17.6)	ND	ND	ND	ND	ND	ND	ND
Middle Horse Creek (Horse)	ND	ND	ND	15.3 (16.7)	16.6 (18.1)	15.3 (16.7)	ND	ND
Moffett Creek (Moffett)	16.9 (22.2)	16.8 (22.7)	15.8 (22.4)	17.6 (23.6)	17.5 (20.6)	ND	ND	ND
Sissel Gulch (Moffett)	ND	ND	16.3 (22.3)	18.6 (24.0)	16.9 (24.3)*	17.9 (22.4)	ND	ND
WF Beaver Creek, lower (Beaver)	15.5 (17.8)	15.3 (28.4)*	13.8 (15.1)	15.2 (16.8)	16.1 (17.5)	14.9 (16.7)	15.6 (17.2)	15.0 (16.8)
WF Beaver Creek, upper (Beaver)	14.3 (16.8)	13.8 (15.8)	12.7 (14.3)	13.6 (16.1)	15.7 (18.1)	14.1 (16.9)	ND	ND
WF Cottonwood Creek (Cottonwood)	17.4 (20.7)	17.1 (20.0)	15.2 (18.4)	18.8 (22.4)	ND	19.1 (27.6)*	ND	ND

*Logger may have been dewatered at some time

Notes:

ND = no data

MWAT = Maximum Weekly Average Temperature; the mathematical mean of multiple, equally-spaced daily temperatures over a 7-day consecutive period

MWMT = Maximum Weekly Maximum Temperature; the mathematical mean of multiple, daily maximum temperatures over a 7-day consecutive period

Data collected by the applicant on pool spacing in streams in the Plan Area are summarized in Table 3.3-10.

TABLE 3.3-10
Pool Frequency and Characteristics for Streams in the Applicant's Klamath River Management Unit

Stream (Drainage)	Pools per Mile	Mean Depth (m)*	Avg. Max. Depth (m)*
Klamath River Management Unit			
WF Beaver Creek (Beaver)	14.5–30.4	0.3–0.4	0.6–0.7
WF Cottonwood Creek (Cottonwood)	20.9–66.5	0.1–0.3	0.2–0.5
Doggett Creek (Doggett)	31.9–51.6	0.2–0.3	0.4
Scott Valley Management Unit			
Moffett Creek (Moffett)	82.5	0.1	0.1

*Depth measurements taken at baseflow.

Source: FGS, unpublished data, 1997 to 2000

Stream Condition Inventory (SCI) surveys conducted in 1997 on the Scott River Ranger District indicate that pool frequencies in area streams are highly variable, ranging from 11.2 to 168 pools per mile in reference streams (streams draining largely unmanaged areas) and from 19.9 to 187.9 pools in other streams (USFS and DFG, unpublished data). Primary pool (maximum depth less than 1 meter) frequency in Moffett Creek was generally lower than in the reference streams, but within the range observed for other managed streams in the Scott River Basin.

Substrate. The applicant has conducted pebble counts to determine substrate conditions in several streams in the Klamath River management unit and in Moffett Creek in the Scott Valley management unit. These pebble counts were conducted at locations corresponding to the downstream and upstream boundaries of its ownership and a mid-ownership location. Table 3.3-11 summarizes the data collected on substrate composition in streams in the Klamath River and Scott Valley management units using pebble counts.

Within the Klamath River and Scott Valley management units, the percentage of fine particles in the stream substrate is highly variable. Based on the limited surveys reported in Table 3.3-11, gravel composition in Plan Area streams appears suitable for salmonid spawning. It is important to note, however, that these results are based on pebble counts (surface conditions) from throughout a stream reach, not just from habitat units used for spawning (for example, riffles and pool tails). Using Stream Condition Inventory protocols (USFS 1996b), the applicant has also collected data on surface substrate composition in pool tail areas in Beaver, Cottonwood, Doggett, and Moffett creeks (Table 3.3-12). These data suggest that fine sediment may adversely affect spawning success of salmonids in these streams. However, little spawning by anadromous salmonids has been documented on the applicant's ownership.

TABLE 3.3-11
Summary of Substrate Conditions in Streams in the Klamath River and Scott Valley Management Units

	Percentage of Substrate Composition by Size Class				
Stream (Survey)*	**Sand < 2 mm**	**Gravels 2–64 mm**	**Cobbles 64–256 mm**	**Boulders > 256 mm**	**Bedrock**
Klamath River Management Unit					
WF Beaver (1997 SCI)	13	67	7	8	5
WF Beaver (1998 SCI)	6	25	37	22	10
WF Beaver (1998 lower)	13	30	40	14	4
WF Beaver (1998 middle)	7	40	28	14	4
WF Beaver (1998 upper)	10	56	24	8	2
WF Beaver (2000 lower)	8	45	24	18	5
WF Beaver (2000 middle)	16	36	28	15	5
WF Beaver (2000 upper)	12	49	32	7	0
WF Cottonwood (1997 SCI)	23	29	15	14	19
WF Cottonwood (1998 SCI)	27	14	36	8	15
WF Cottonwood (1998 lower)	9	30	29	3	29
WF Cottonwood (1998 middle)	20	43	32	0	5
WF Cottonwood (1998 upper)	32	50	7	5	6
WF Cottonwood (2000 lower)	16	23	20	8	33
WF Cottonwood (2000 middle)	15	46	31	8	0
WF Cottonwood (2000 upper)	28	53	7	8	4
Middle Horse (1998 middle)	12	34	28	13	13
Middle Horse (1998 upper)	6	54	26	4	10
Middle Horse (2000 lower)	25	45	18	8	4
Middle Horse (2000 middle)	17	35	14	18	16
Beaver (1998 lower)	8	26	35	27	4
Beaver (1998 upper)	4	30	51	15	0
Beaver (2000 middle)	8	32	37	14	9
Beaver (2000 upper)	18	29	36	17	0
Hungry Creek (lower)	11	15	48	26	0
Hungry Creek (middle)	22	55	11	8	4
Hungry Creek (upper)	42	53	4	1	0
Hungry Creek (2000 lower)	18	43	37	2	0
Hungry Creek (2000 middle)	18	52	21	4	5
Hungry Creek (2000 upper)	32	68	0	0	0
Scott Valley Management Unit					
Moffett Creek (lower)	3	83	11	2	1
Moffett Creek (middle)	8	73	19	0	0
Moffett Creek (upper)	17	55	24	4	0

*SCI indicates pebble counts conducted throughout a 1,000-foot reach during Stream Condition Inventory stream surveys. Lower, middle, and upper refer to additional pebble counts taken at the downstream, upstream, and middle portions of the ownership.

Notes:

WF = West Fork

Source: FGS, unpublished data, 1997 to 2000

TABLE 3.3-12
Pool Tail Substrate Composition for Streams in the Applicant's Klamath River and Scott Valley Management Units

		Percentage of Substrate Composition by Size Class					
Stream	**Embed**	**Fines < 2 mm**	**Gravel 2–64 mm**	**Cobble 65–139 mm**	**Rubble 140–254 mm**	**Boulder > 254 mm**	**Bedrock**
Klamath River Management Unit							
WF Beaver Creek	30.3	32.0–37.0	37.0–50.3	7.7–13.8	5.0–6.1	3.6–5.0	0.0–2.3
WF Cottonwood Creek	44.0	51.4–65.3	5.8–38.0	5.5–9.2	0.9–5.8	3.1–5.5	0.7–19.4
Doggett Creek	79.8	41.2–57.9	33.9–37.9	5.2–10.7	1.4–4.3	1.7–3.9	0.2–1.9
Scott Valley Management Unit							
Moffett Creek	17.8	44.2	34.5	11.3	7.1	1.3	1.6

Notes:

Embed (embeddedness) is a visual estimate of the degree to which rocks (gravel, cobble and boulders) are covered or sunken into the silt, sand or mud of the stream bottom.

Source: FGS unpublished data, 1997 to 2000

Large Woody Debris. Inventories conducted by the applicant on West Fork Beaver Creek and West Fork Cottonwood Creek in 1997 indicate that there were approximately 3.8 pieces and 5.4 pieces of LWD greater than 12 inches in diameter per 1,000 linear feet within the bankfull channel of these streams, respectively (FGS, unpublished data). These levels are below the levels of LWD observed elsewhere in the Beaver watershed. Extensive restoration efforts have been undertaken in Beaver Creek, Cow Creek, and the West Fork of Beaver Creek; more than 300 instream structures—including log and boulder weirs, boulder clusters, mini debris jams, and woody channel margin structures—have been placed (USFS 1996a).

The applicant also has characterized LWD in other streams in its Klamath River and Scott Valley management units. Results of these surveys suggest that similarly sized LWD was present in three Klamath River tributary streams (Beaver, Cottonwood, and Doggett); however, Doggett Creek contained substantially greater densities of LWD, and substantially larger pieces of LWD were present in Moffett Creek (Table 3.3-13).

TABLE 3.3-13
LWD Frequency and Characteristics on the Applicant's Ownership in the Klamath River and Scott Valley Management Units

Drainage	Instream LWD Pieces/1,000 ft (Range)*	Average Diameter Inches (Range)	Average Length Feet (Range)
Klamath River Management Unit			
Beaver	15.4 (1.8–28.9)	13.3 (8.7–25.3)	22 (16–27)
Cottonwood	17.7 (1.8–22.1)	9.6 (8.3–17.4)	18 (17–21)
Doggett	45.8 (27.4–67.8)	13.2 (11.9–15.0)	25 (22–30)
Scott Valley Management Unit			
Moffett	7.3 (3.3–11.3)	37.8 (13.0–62.8)	17 (17–18)

*LWD pieces included all wood greater than 4 inches in diameter

Source: unpublished SCI data, 1997 to 2000

These data suggest that nearly all streams (including reference streams) in the Scott River management unit have levels of LWD below those observed in streams draining unmanaged forests in other areas (Bilby and Ward 1989; Robison and Beschta 1990; Murphy and Koski 1989; summarized in Peterson et al. 1992). Stream segments on the applicant's lands generally have LWD levels less than those found in the reference streams identified in the Callahan Ecosystem Analysis (USFS 1997). However, the amount of in-channel LWD necessary to maintain suitable habitat conditions for anadromous salmonids is likely variable depending on factors such as forest type, watershed geology and topography, channel type, climate, and fish species.

Off channel Habitats. Off-channel and backwater habitat is most likely to occur in association with alluvial mainstem, alluvial valley tributary, and floodplain slough channels, all of which are rare in the Plan Area. Functional off-channel habitats are currently limited to the Big Slough/Lower Kidder Creek complex, which is on the Scott River floodplain outside of the Plan Area. This type of habitat is reported to have been widespread in the Scott River valley prior to settlement (Sommarstrom et al. 1990), but has likely never been abundant on the applicant's lands due to the absence of unconfined channel types.

Habitat Access. Low flows are common in the mainstem Scott River and many tributaries during June through November, primarily due to water diversions for agricultural and domestic uses. Approximately 160 diversions greater than 0.1 cfs from the Scott River and its tributaries have been identified (Sommarstrom 1994). These diversions substantially reduce streamflow in the lower portions of the tributaries during the summer through the fall period, resulting in dewatering of sections of many streams (Etna, Patterson, Kidder, Moffett, Shackleford, and Mill creeks). In prolonged droughts, portions of the mainstem Scott River can be completely dry. Dewatering is a persistent problem in the Scott River basin (DFG 1974; West et al. 1989; Scott River CRMP 1995; North Coast RWQCB 2005) and may strand thousands of juvenile salmon and steelhead each year (Scott River CRMP 1995). However, surface water diversions and other human uses of surface waters are limited in the Plan Area. The applicant drafts water directly from stream channels for use in silvicultural operations or for fire suppression purposes. These diversions are temporary and limited in use, and the amount and timing of these withdrawals are unquantified. The applicant does not divert substantial quantities of water from streams in the Plan Area. Typically, the applicant conducts water drafting from Class II streams with flows greater than 2 cubic feet-per-second, or more commonly, from off-channel water holes.

Beaver activity is also known to cause diversions in riverine habitat that has a positive effect in fisheries habitat. Rossell et al. 2005 provides a useful summary of ecological effects:

> In the central Oregon Coast Range, Stack & Beschta (1989) demonstrated that beaver can alter the characteristics of stream pools, as sections with beaver dams typically had larger residual pools than reaches without beaver. Thus, river corridors, which are rather narrow and well-defined elements of the landscape, become wider, geomorphologically more complex and biologically more diverse and more productive zones of the landscape in the presence of beavers (Correll et al., 2000). This alteration is well illustrated by McKinstry, Caffrey & Anderson (2001), who found that the width of the riparian zone averaged 33.9 m in streams with beaver ponds compared with 10.5 m in streams without such ponds.

Large populations of beaver in the upper Klamath likely made significant alterations to the fluvial geomorphology of small- and medium-sized watersheds in the Upper Klamath basin. Anadromous fish species were adapted to these alterations (Pollock et al. 2003), but the subsequent removal of beaver (Tappe 1942) has apparently altered this "natural" condition. Beaver is a common species in areas adjacent to the Plan Area.

The number of stream crossings on fish-bearing streams in the Plan Area is limited (Table 3.3-14). A crossings inventory conducted by the applicant reports a total of 49 crossings of fish-bearing streams in the Plan Area; 40 crossings are within the range accessible by anadromous fish. Of the crossings within the range of anadromy, 16 are bridges; there are 13 culverts, nine fords, and two crossings that have been decommissioned. Not all of the crossings are under the applicant's control; some are on roads governed by cooperative maintenance agreements with USFS (co-op roads). The DFG Passage Assessment Database (September 2006) shows a total of 27 potential barriers in the Plan Area, most of which are diversions. Further evaluation by the applicant has determined that there are five crossings that form partial barriers and four that form temporal barriers to movement of anadromous salmonids on their ownership; none are considered total barriers.

TABLE 3.3-14
Number of Stream Crossings in the Plan Area

	Stream Class		
Drainage	**1 (Fish-bearing)**	**2**	**3**
Klamath River			
Beaver	9	178	155
Cottonwood	14	74	155
Doggett	2	76	77
Dona	1	42	24
Dutch Creek	0	13	11
Elliott Creek	1	67	4
Empire Creek	3	13	13
Horse	2	159	62
Lumgrey Creek	0	7	26
Middle Klamath	0	6	6
Seiad	0	2	14
Scott Valley			
Big Ferry	0	9	34
Canyon	0	10	46
Indian	1	10	75
Meamber	0	24	96
Mill	0	3	11
Moffett	7	42	204
Pat Ford	0	5	21
Patterson	0	6	29
Rattlesnake	0	7	18

TABLE 3.3-14
Number of Stream Crossings in the Plan Area

Drainage	Stream Class		
	1 (Fish-bearing)	2	3
Grass Lake			
Antelope Creek	0	0	0
Antelope Sink	1	0	1
Bogus Creek	0	2	13
Fourmile Hill	0	0	2
Garner Mtn.	4	0	3
Glass Mtn.	0	0	13
Grass Lake	2	17	16
Headwaters	2	4	2
Horsethief	0	5	3
Juanita Lake	0	1	1
Little Shasta	0	1	9
NW Mt. Shasta	0	0	7
Shasta Valley	0	0	6
Shasta Woods	0	1	1
Willow Creek	0	3	2

3.3.4 Other Special-status Species

A list of special-status species potentially occurring on or in the vicinity of the Plan Area was compiled from the following sources: the DFG's CNDDB Special Animals list, California State and Federally Listed Endangered and Threatened Animals of California, field observations, species lists from BLM and USFS, and quadrangle and county species lists from USFWS. Sensitive species lists were generated for each of the USGS 7.5' quadrangles (a total of 35), containing the Plan Area and Siskiyou County, KNF, and BLM lands adjacent to the Plan Area (Appendix C). It is possible that species were reported to occur on the quadrangle that overlaps the Plan Area, but the actual species record locations could occur outside of the Plan Area.

In addition to the Covered Species described previously, 23 special-status wildlife species and three special-status plant species were identified as either occurring or potentially occurring within the Plan Area based on their habitat association and biological requirements. These species are identified in Table 3.3-15 and described in the following text. More detailed descriptions are provided for special-status species that are known to occur in the Plan Area and that are not Covered Species under the HCP (for example, fisher).

3.3.4.1 Bald Eagle (Haliaeetus leucocephalus)

Bald eagles occur in North America from central Alaska and Canada south to northern Mexico (USFWS 1995). They are found primarily along coasts, inland lakes, and large rivers, but may also be found along mountain ranges during migration. Although the bald eagle is greatly reduced in abundance from historical levels, the current distribution is essentially the same (USFWS 1976). Many bald eagles withdraw in winter from northern areas, migrating north again in spring and summer to breed (Terres 1980).

TABLE 3.3-15
Special-status Wildlife Species Potentially Occurring Within and Adjacent to the Plan Area

Species	USFWS or NMFS	DFG	BOF	USFS	BLM	CNPS	Habitat Associations
Birds							
Bald eagle *Haliaeetus leucocephalus*	—	CE	BFS	—	—	—	Nests in large old growth, trees near ocean shore, lakes, and rivers
Western yellow-billed cuckoo *Coccyzus americanus*	FC	CE	-	S	—	—	Riparian areas
Great gray owl *Strix nebulosa*	—	CE	BFS	—	—	—	Coniferous forest with adjacent montane meadows
Northern goshawk *Accipiter gentilis*	—	—	BFS	—	—	—	Coniferous forest
Osprey *Pandion haliaetus*	—	—	BFS	—	—	—	Near bodies of water such as lakes, rivers, marshes, mangroves, and seashores
Golden eagle *Aquila chrysaetos*	—	—	BFS	—	—	—	Rolling foothills and open mountain terrain in oak woodlands and most major forested habitats
Greater sandhill crane *Grus canadensis tabida*	—	CT		—	—	—	Wet meadow habitat
American peregrine falcon *Falco peregrinus anatum*	—	—	BFS	—	—	—	Nests on open ledges, caves, and potholes on high, vertical cliffs
Mammals							
Long-legged myotis *Myotis volans*	—	—	—	—	—	—	Roosts in hollow trees, crevices, mines, and buildings; feeds in open habitats
Long-eared myotis *Myotis evotis*	—	—	—	—	S	—	Roosts in trees, crevices, mines, caves and buildings; feeds within forest, and over water
Fisher *Martes pennanti*	FC	C	—	S	S	—	Coniferous forests and shaded riparian areas
Reptiles and Amphibians							
Tailed frog *Ascaphus truei*	—	CSC	—	—	—	—	Permanent streams in montane conifer-hardwood, redwood, Douglas-fir, and ponderosa pine forests
Southern torrent salamander *Rhyacotriton variegatus*	—	CSC	—	—	—	—	Permanent streams in coastal redwood, Douglas-fir, mixed conifer, montane hardwood, and montane riparian forests
Siskiyou Mountains salamander *Plethodon stormi*	—	CT	—	S	—	—	Mixed conifer habitat of dense trees of pole-to-mature size in Jackson County, Oregon and adjacent Siskiyou County, California

TABLE 3.3-15
Special-status Wildlife Species Potentially Occurring Within and Adjacent to the Plan Area

Species	USFWS or NMFS	DFG	BOF	USFS	BLM	CNPS	Habitat Associations
Scott Bar salamander *Plethodon asupak*	—	CT	—	—	—	—	A small area of the Siskiyou Mountains in extreme northern Siskiyou County near the confluence of the Klamath and Scott rivers, where the elevation is approximately 1,500 to 2,000 feet.
Northern red-legged frog *Rana aurora aurora*	—	CSC	—	S	—	—	Humid forests with intermixed hardwoods and grasslands, streamsides
Foothill yellow legged frog *Rana boylii*	—	CSC	—	S	—	—	Partly shaded shallow streams with rocky substrate, in a variety of habitats
Fish							
Pacific lamprey *Lampetra tridentata*	—	—	—	—	—	—	Anadromous, spawns in tributary streams
Plants							
Gentner's fritillary (Gentner's mission bells) *Fritillaria gentneri*	FE	—	—	—	—	1B.1	Species is found primarily in very small, scattered occurrences in Jackson and Josephine counties in southwestern Oregon. One small additional population was recently discovered in northern California, near the Oregon border within the Cottonwood Peak quadrangle
Siskiyou mariposa lily *Calochortus persistens*	FC	rare	—	—	—	1B.2	Species is restricted to three populations in the Klamath/Siskiyou Range near the border of California and Oregon
Applegate's milk-vetch *Astragalus applegatei*	FE	—	—	—	—	—	All of the known populations are located in Klamath County in southern Oregon, 15 miles north of the California/Oregon border

Notes:

USFWS and NWFS Federal Listing Categories
FE = Federal Endangered
FT = Federal Threatened
FC = Federal Candidate
FNW = Federal Not Warranted

DFG State Listing Categories
CE = California Endangered
CT = California Threatened
C = California Candidate
CSC = California Species of Special Concern

California Board of Forestry – CFPRs
BFS = Sensitive Species

USFS
S = Sensitive Species

BLM
S = Sensitive Species

CNPS
1B.1 = Plants Rare, Threatened, or Endangered in California and Elsewhere
1B.2 = Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere

Bald eagles are associated with aquatic ecosystems, including large rivers, major lakes, reservoirs, estuaries, and seacoasts. They require open water habitats that support an adequate food base. Bald eagles forage on fish and waterfowl from perch sites adjacent to foraging areas. Thus, perch sites near open water or marshes are an essential habitat feature. Bald eagles acquire food in a variety of ways. They catch live prey, steal prey from other predators, and find carrion. Fish, small mammals, and waterfowl make up the majority of the eagles' diet (Terres 1980).

In the Klamath Province, bald eagles typically nest in very large, emergent trees that may or may not be associated with dense older stands. Nest sites are usually associated with rivers, but may be located on steep mountainsides or drainages over a mile from aquatic habitats used for foraging. During winter, bald eagles often congregate near productive foraging areas (e.g., Klamath Basin, Klamath River) and use communal roost sites. Roost sites are typically located in dense stands of very large trees, often in topographically sheltered locations. Nearly all foraging occurs in or adjacent to open habitats, typically riparian, aquatic, or grassland habitat.

Bald eagles are known to nest and overwinter along the Klamath River in areas adjacent to the applicant's ownership. The Plan Area itself contains primarily low-order drainages with ephemeral and intermittent streams, and does not support the large aquatic features bald eagles typically use. There is an active bald eagle nest in the Plan Area adjacent to Grass Lake, and other bald eagles may use the Plan Area on a transient basis.

3.3.4.2 Western Yellow-billed Cuckoo (*Coccyzus americanus*)

Historically, the western yellow-billed cuckoo was a fairly common breeding species throughout the river bottoms of the western U.S. and southern British Columbia (Gaines and Laymon 1984). Because of the loss of riparian woodland habitat, particularly cottonwood-willow habitat, the cuckoo has become an uncommon to rare summer resident in scattered locations throughout its former range. In California, remnant populations breed along sections of seven rivers, including the Colorado River in the southern part of the state.

The yellow-billed cuckoo arrives on its breeding grounds in mid- to late June and departs by the end of August, spending only about one-quarter of its annual cycle on its breeding territory. As a midsummer breeder, the yellow-billed cuckoo faces extremely high temperatures that could easily kill eggs not protected by behavioral or physiological cooling mechanisms. To counter these midsummer temperatures, the yellow-billed cuckoo is a nest site specialist, choosing stands of mature cottonwoods that have a subcanopy layer of willows that provide thermal refuge for the nest. Gaines (1974) found very few yellow-billed cuckoos where suitable habitat was less than 330 feet wide and patch size was less than 25 acres. Galli et al. (1976) found yellow-billed cuckoos were rarely present in patches of suitable habitat less than 60 acres.

In riparian forests, yellow-billed cuckoos can feed in a variety of forest stands, but moderate to dense canopy cover are more suitable for this species. For cover and reproduction, larger CWHR size classes (size class 3 to 6) provide higher habitat suitability values, especially the moderate to dense canopy cover classes. The most suitable forest stands for this species are those with large trees and moderate to dense canopy cover (CWHR classes 4M, 4D, 5M, 5D, and 6). This species has not been observed in the Plan Area, but surveys have not been

conducted for this species. Large patches of intact riparian areas with hardwoods, cottonwoods, and willows are limited in the Plan Area but could provide habitat for this species.

3.3.4.3 Great Grey Owl (*Strix nebulosa*)

The great grey owl is the largest North American owl and one of the rarest owls in California. Recent studies suggest a population decline; there may be fewer than 50 pairs remaining in California (Grinnell and Miller 1944; Winter 1980, 1982). This species is a rarely seen resident found from 4,500 to 7,500 feet elevation in the Sierra Nevada from the vicinity of Quincy in Plumas County south to the Yosemite region. Most recent records are from the Merced and Tuolumne river drainages of Yosemite National Park. This species is occasionally reported in northwestern California during winter and in the Warner Mountains during summer (McCaskie et al. 1988). This species breeds in old-growth red fir, mixed conifer, or lodgepole pine forests, usually in the vicinity of meadows or pastures. The great grey owl nests in large, broken-topped snags, usually greater than 24 inches dbh (Winter 1980). A survey of six nests located in California (Winter 1980, 1982) showed that nests were within 861 feet of a meadow, with nest height ranging from 25 to 72 feet above the ground.

In Sierran Mixed Conifer forests, the great grey owl uses stands with large trees and dense canopy cover. While CWHR classes 4M and 4D provide suitable foraging and cover conditions for this species, larger size classes are more suitable for reproduction. The most suitable forest stands for this species are late seral stands with large trees and moderate to dense canopy cover (CWHR classes 5M, 5D, and 6). This species has not been observed in the Plan Area, but surveys have not been conducted for this species. The closest known great gray owl nest site is in the Applegate River watershed northwest of the Plan Area. There have also been incidental sightings on the Siskiyou Crest and Goosenest Ranger District (USFS pers. comm. 2010). Dense forests near meadows could provide habitat for this species, but are limited in the Plan Area. Pursuant to CAL FIRE and CDFG, THP protocol surveys for the great gray owl are required for any proposed ground-disturbing activities. During timber operations, nest trees, designated perch trees, screening trees, and replacement trees are to be left standing and unharmed, and timber operations are required to be planned and operated to start as far as possible from occupied nest trees unless a reason is given and justified otherwise.

3.3.4.4 Northern Goshawk (*Accipiter gentilis*)

The northern goshawk breeds in the north coastal range through the Sierra Nevada, Klamath, Cascade, and Warner mountains; Mount Pinos and Mount San Jacinto; and in the San Bernardino and White mountains. This species may remain in breeding areas as an uncommon resident. Goshawks prefer middle and higher elevations. Dense, mature conifer and deciduous forest, interspersed with meadows, other openings, and riparian areas are required. This species usually nests on north slopes, near water, in the densest parts of stands, but close to openings. Goshawks hunt in wooded areas, using snags and dead-topped trees for observation and prey-plucking perches.

Northern goshawks forage in nearly all forested landscapes, but tend to utilize larger, denser stands for cover and reproduction. Habitat suitability is maximized for foraging,

cover, and reproduction in stands with large trees and moderate to dense canopy cover (CWHR classes 4M, 4D, 5M, 5D and 6) in the Klamath Mixed Conifer and similar forest types. However, stands with sparse or open canopy cover (CWHR cover classes S and P) are not suitable for reproduction. Northern goshawks are known to use forests on the applicant's ownership. Goshawks have been observed on or adjacent to the applicant's ownership in six locations in the Klamath River Management Unit, seven locations in the Scott Valley Management Unit (six sightings north of Highway 3), and eighteen locations in the Grass Lake Management Unit (USFS 2010). The applicant performs stand searches for nesting activity and dawn acoustic surveys for the northern goshawk when conducting protocol surveys.

3.3.4.5 Osprey (*Pandion haliaetus*)

The osprey is a cosmopolitan species, found on every continent except Antarctica (Terres 1980). In North America, ospreys breed from northwest Alaska and Canada south to Baja California, Mexico, and Florida (Johnsgard 1990). In the U.S., they occur close to coastal waters on the east and west coasts and inhabit inland areas around the Great Lakes, Utah, Arizona, and Nevada. Ospreys winter on the Gulf Coast and southern California south into Central and South America (Terres 1980). This species breeds in northern California from Cascade Ranges south to Lake Tahoe, and along the coast south to Marin County. Regular breeding sites include Shasta Lake, Eagle Lake, Lake Almanor, and other inland lakes and reservoirs (DFG 2005).

Ospreys are found only in association with lakes, reservoirs, coastal bays, or large rivers. They feed predominantly on fish, although some mammals, birds, reptiles, and amphibians are also eaten. Ospreys require open, clear water for foraging, and swoop down while in flight or from a perch to catch fish at the water's surface. Large trees and snags near the water are used for roosting and nesting. This species nests on a platform of sticks at the top of large snags, dead-topped trees, on cliffs, or on human-made structures. Nests may be as much as 250 feet above ground. During the breeding season, ospreys generally restrict their movements to activities in and around the nest site, and between the nest and foraging sites.

Ospreys can forage along streams in nearly all forested landscapes, but larger, denser stands are more suitable for foraging. Habitat suitability for cover and reproduction is maximized in stands with large trees (CWHR size classes 4, 5 and 6) in the Klamath Mixed Conifer and similar forest types regardless of canopy density. However, stands with slightly smaller trees (CWHR size class 3) provide at least moderate suitability for cover and reproduction of this species. Ospreys are known to use riparian forests on the applicant's ownership.

3.3.4.6 Golden Eagle (*Aquila chrysaetos*)

The golden eagle is found throughout the U.S. and Canada, ranging from southern Alaska to central Mexico. It is a widely distributed resident throughout western North America, except for the recent extirpation in the Central Valley of California (Harlow and Bloom 1989). This species may be more common in southern California than in the north and is found from sea level up to 11,500 feet (Grinnell and Miller 1944).

Golden eagles occupy primarily mountain, desert, and canyon habitats, usually avoiding dense forested areas where hunting is difficult due to their large wingspan (Johnsgard 1990). Golden eagles construct their nests on cliff ledges and high rocky outcrops, in large

trees, on top of telephone poles, and on the ground (Bruce et al. 1982; Knight et al. 1982). Golden eagles hunt over open country for hares, marmots, rodents, snakes, birds, and sometimes newborn ungulates and carrion. In California, golden eagles also forage on wintering waterfowl. Grassland, oak savannah, alpine tundra, meadows, open woodland, chaparral, and wetland habitats provide foraging habitat.

Golden eagles can forage in nearly all CWHR forested landscapes, but open stands (CWHR cover classes S and P) are more suitable, and dense stands (CWHR cover class D) have low suitability for foraging by this species. Habitat suitability for cover and reproduction is high in all CWHR size and canopy cover classes. This species has not been observed in the Plan Area, but given its widespread distribution and ability to utilize a variety of forested and non-forested landscapes, it is likely that golden eagles could occur in the Plan Area.

3.3.4.7 Greater Sandhill Crane (*Grus canadensis tabida*)

Both greater and lesser sandhill cranes occur in California. Historically, greater sandhill cranes were a fairly common breeder on northeastern plateau (Grinnell and Miller 1944); now it breeds only in Siskiyou, Modoc, Lassen, Plumas, and Sierra counties (James 1977; Remsen 1978; McCaskie et al. 1988). Greater sandhill cranes breed in open, isolated wetlands surrounded by shrubs or forestland. Diverse structural and compositional vegetation, including species such as bulrush, cattails, and bur-reed, are used for nesting sites (Tacha et al. 1992). Habitats such as meadows, irrigated pastures and fields, bogs, fens, and marshes are used as foraging areas. Wintering populations roost in shallow open water, marshes, rivers, and lakes where they flock together at night for safety (Eckert and Karalus 1981). Wintering populations feed primarily in irrigated croplands and pastures. Moist sites are commonly used, but this species also feeds on dry plains far from water. Food items include crops such as wheat, sorghum, barley, oats, corn, and rice as well as insects, snails, reptiles, small mammals, seeds, and berries (Tacha et al. 1992).

Forested landscapes generally provide only low-suitability habitat for this species, which tends to breed in wetlands and feeds in open agricultural areas. In the Valley Foothill Riparian forest type, sparse and open (CWHR canopy classes S and P) forest stands have low suitability for foraging. Valley Foothill Riparian forests with large trees (CWHR size classes 5 and 6) and moderate to dense canopy cover (CWHR canopy classes M and D) are considered unsuitable for this species. This species is known to occur in the Grass Lake Management Unit.

3.3.4.8 American Peregrine Falcon (*Falco peregrinus anatum)*

Peregrine falcons are very uncommon breeding residents in California, and uncommon migrants. Active nest sites are known along the coast north of Santa Barbara, in the Sierra Nevada, and in other mountains of northern California. In the winter, this species is found inland throughout the Central Valley, and occasionally on the Channel Islands. Migrants occur along the coast and in the western Sierra Nevada during the spring and fall.

Peregrine falcons occur in a wide range of open country and forested habitats, from desert mountains to sea coasts (Kaufman 1996). The presence of tall cliffs is the most characteristic feature of the peregrine's habitat and is considered a limiting factor for this species. Cliffs provide the peregrine with both nesting and perching sites and an unobstructed view of the

surrounding area. Where cliffs are lacking, manmade structures, such as tall buildings and bridges, can be used as substitutes.

Nearby water bodies or wetlands that support abundant prey of small- to medium-sized birds, particularly waterfowl, are another common feature of peregrine falcon habitat that influences their distribution and abundance (Johnsgard 1990); however, in the Klamath Mountains many territories are located on steep forested mountainsides away from water. Birds such as pigeons, woodpeckers, songbirds, shorebirds, and waterfowl are the peregrine falcon's primary prey. River canyons and steep, rocky mountainsides that offer a large number of potential nest sites, abundant prey, and ideal hunting conditions are frequently inhabited by this species (Skaggs et al. 1988).

In the Klamath Mixed Conifer and similar forest types, the peregrine falcon shows little preference for particular stand conditions with all CWHR size/canopy cover classes providing high suitability for reproduction and cover and moderate suitability for foraging. This species has not been observed in the Plan Area, as stated by the applicant and supported by USDA Forest Service data, but surveys have not been conducted for this species. Several peregrine falcon nest sites occur on federal lands adjacent to the Plan Area, and it is likely that this species occupies any suitable cliff habitats in the Plan Area.

3.3.4.9 Long-legged myotis (*Myotis volans*)

The long-legged myotis bat is common in California, occurring in the coastal ranges from Oregon to Mexico, the Cascade/Sierra Nevada ranges to southern California, most of the Great Basin region, and in several Mojave Desert mountain ranges. It is absent only from the Central Valley, the Colorado and Mojave deserts (except in mountain ranges), and from eastern Lassen and Modoc counties. This species is most common in woodland and forest habitats above 4,000 feet in elevation. The long-legged myotis forages near water in chaparral, coastal scrub, Great Basin shrub habitats, and in early successional stages of woodlands and forests. The long-legged myotis roosts in rock crevices, buildings, under tree bark, in large-diameter conifer snags or live trees, mines, and caves. Separate day and night roosts may be used. Large-diameter trees in higher elevation, multi-aged stands with an abundance of snags probably are the most important day roosts. Caves and mines are used only as night roosts. There are a few records of hibernation in caves. The long-legged myotis forages in nearly all forested landscapes. Sparse and open stands (CWHR canopy classes S and P) are highly suitable for foraging, while more dense stands (classes M and D) have moderate to low suitability for foraging by this species. Habitat suitability for cover and reproduction is high in stands with larger trees (CWHR size classes 3, 4, 5, and 6) regardless of canopy cover. This species has been recorded to fly considerable distances from its roosting to foraging sites; roosting sites being in higher-elevated conifer forested landscapes and foraging sites being in lower-elevation downstream drainages. This species has not been observed in the Plan Area, but surveys have not been conducted for this species.

3.3.4.10 Long-eared myotis (*Myotis evotis*)

The long-eared myotis bat is widespread in California, but generally is uncommon throughout most of its range. This species is found along the entire coast and in the Sierra Nevada, Cascades, and Great Basin from the Oregon border south through the Tehachapi Mountains. It avoids the arid Central Valley and hot deserts. This species has been found in

nearly all brush, woodland, and forest habitats, from sea level to at least 9,000 feet, but coniferous woodlands and forests seem to be preferred. This species roosts in buildings, rock crevices at ground level, spaces under bark, snags, and large-diameter trees. The largest-diameter trees in multi-aged stands, particularly with an abundance of snags are primarily used as day roosts. Caves are used primarily as night roosts. The long-eared myotis roosts singly or is found in fairly small groups.

The long-eared myotis forages in nearly all forested landscapes, but stands with larger trees and dense canopy cover are highly suitable for foraging by this species. This species forages relatively close to their roost sites. Habitat suitability is high in CWHR size classes 4M, 4D, and size class 5 and 6 regardless of canopy cover; however, all CWHR classes provide at least moderately suitable habitat for this species. This species has not been observed in the Plan Area, but surveys have not been conducted for this species.

3.3.4.11 Fisher (*Martes pennanti*)

Fishers are distributed throughout coniferous and mixed forests of Canada and northern portions of the United States. In California, the fisher's current range is divided into two populations separated by about 260 miles (Zielinski et al. 1997). One population is in northwestern California in portions of Del Norte, Siskiyou, Humboldt, Trinity, Shasta, Lake, and northern Mendocino counties (Zielinski et al. 1995, Slauson and Zielinski 2007), and across into Oregon in Curry, Josephine, and Jackson counties. The other is in the southern Sierra Nevada in portions of Mariposa, Madera, Fresno, Tulare, Kern, Mono, and Inyo counties. The southern Sierra Nevada population appears isolated from the northern population (Zielinski et al. 1997). Fishers are known to occur on the applicant's ownership, although their abundance and distribution is poorly understood. During surveys for fishers in the Upper and West Fork Beaver Creek watersheds, fishers were detected at two locations on the applicant's ownership (Farber and Cross 2006). Fishers have also been detected on the applicant's ownership in the Scott Valley management unit (Farber et al. 2008).

Fishers have been described as generalist predators (Powell 1981, Zielinski et al. 1999, Bowman et al. 2006), yet they have also been specifically associated with snowshoe hare (*Lepus americanus*; Bulmer 1975, Powell 1981, Kuehn 1989) and porcupine (*Erethizon dorsatum*) as prey (Schoonmaker 1938, Powell 1981, Arthur et al. 1989). Bowman et al. (2006) reported a positive numerical response of fisher populations to these two prey items, but noted that alternative prey may have been important in years when hare populations were reduced.

Although some studies show the importance of porcupine as fisher prey, other fisher studies are less conclusive. Porcupine coincide with fisher in northern California. Contrary to expectation, no porcupine remains were detected in an analysis of 382 fisher scats from four disparate locations in the Klamath region of northern California (Ingles 1965). Across the range of fishers, porcupine frequency in the diet has ranged from very low (Giuliano et al. 1989) to 12-34 percent (deVos 1952, Powell 1981, Rego 1984). Absence of porcupine in the scats was reflective of very little predation on porcupine in the Klamath region.

In 2003, the USFWS announced a 90-day finding (68 Fed. Reg. 41169-41174) on a petition to list a segment of the fisher population in the west coast range as an endangered species and to designate critical habitat for the species based on threats that put the population at risk.

Threats identified in the petition included "a combination of continued habitat destruction caused by logging and development, poaching, predation, small population size and population isolation." The USFWS concluded that "… present and expected future timber harvests, various types of development, and recreational pressure may result in the destruction, modification, or curtailment of the fisher's habitat and range." The USFWS found that the petition presented substantial information indicating the West Coast population of the fisher may be a distinct population segment for which listing may be warranted and initiated a 12-month status review of the species. After review of all available scientific and commercial information, the USFWS published a 12-month Finding for a Petition to List the West Coast Distinct Population Segment of the Fisher (*Martes pennanti*) (69 Fed. Reg. 18770-18792). The USFWS found that the petitioned action was warranted, but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Therefore the fisher was added to the candidate species list and the USFWS will develop a proposed rule to list this population pursuant to their Listing Priority System. In Candidate Notices of Review published in the FR from 2005 to 2010, the Service has continued to evaluate the species and concluded that there has been no change in listing priority.

Habitat Types. At the landscape scale, fishers are associated with mixed conifer, Douglas-fir, and true fir forests throughout their western range. In the North Coast population, they are more closely associated with Douglas-fir forests, while in the Sierra population they are associated with mixed conifer (Schemph and White 1977; Zielinski et al. 2004a). Hardwoods often are a component of their habitat (Powell and Zielinski 1994). Self and Kerns (2001), in a study in Northern California near Castle Crags State Park, found that fishers selectively used Klamath mixed-conifer and montane-hardwood, and selected for dense, older forests, but showed equal selection for other forest types. Klug (1997) found that on the North Coast region, fisher detection ratios were higher at higher elevations, and in Douglas-fir forests with greater amounts of hardwood. They were less common in redwoods.

Although fishers are restricted to conifer and mixed conifer cover types, within these cover types the physical structure and complexity of the forest may be more important in determining use by fishers than forest type (Buskirk and Powell 1994). Important physical structures of habitat types for fishers are discussed below.

Home Range Size. Fishers have large home ranges, with those of males considerably larger than those of females. Mean estimates of fisher home ranges from seven study areas in California ranged from 1.7 to 23.5 km^2 for females and 7.4 to 58.1 km^2 for males (Buck et al. 1983, Self and Kerns 2001, Mazzoni 2002, Zielinski et al. 2004a, Yaeger 2005). Aubry and Raley (2006) reported an average home range size for females of 25 km^2 and an average home range size for males of 62 km^2 and 147 km^2 during the non-breeding and breeding seasons, respectively, in their southern Oregon (Rogue River) study area. Truex et al. (1998) found that home range sizes were largest in their eastern Klamath study area in northern California where habitat quality was generally considered poor. Zielinski et al. (2004a) found that females had home ranges that were almost three times larger in their northern California study area in the Coast Ranges than in their southern Sierra Nevada study area. Both studies concluded that home range size is influenced by habitat quality and prey availability. Yaeger (2005) found that home range size for females in the Hoopa study area (1.68 km^2) were smaller than in the Shasta-Trinity area (23.47 km^2) or any reported for

western fisher, and concluded that this may be indicative of better habitat conditions in the Hoopa area.

Home Range Composition In defining landscape-level (home range or regional scale) habitat selection by fishers, researchers have taken different approaches. Some have identified home ranges, and characterized conditions of home ranges (Mazzoni 2002; Zielinski et al. 2004a). Others have centered variously sized circles (or blocks, moving GIS windows, etc.) on sampling stations, and characterized conditions within the circles (Rosenburg and Raphael 1986; Dark 1997; Carroll et al. 1999; Campbell 2004).

Mazzoni (2002) identified home ranges of fishers in the southern Sierra region, and characterized forest classes within home ranges compared to random areas. She found that female home ranges had a significantly higher proportion of habitat classified as CWHR class 1 (definition is not consistent with standard CWHR definitions, but appears to be tree cover of 60 to 100 percent by trees greater than 28 cm dbh), and a lower proportion of CWHR class 4 (defined as tree cover of 10 to 24 percent with trees greater than 28 cm dbh), compared to random areas.

Zielinski et al. (2004b) also characterized home ranges of fishers, and provided comparisons in findings between the North Coast and Southern Sierra areas. Stand composition in the Coastal study area included: mid-seral Douglas-fir (24.5 percent; range 14.6 to 34.3), mid-seral true fir (18.3 percent; range 8.7 to 27.9), late-seral Douglas-fir (14.0 percent; range 0.4 to 27.6); late-seral true fir (13.97 percent); other conifer types/seral stages (16.8 percent); and mixed oak-pine type of all seral stages (5.7 percent). Composition in the Sierra study area included: Sierran mixed conifer type (40.4 percent), ponderosa pine type (32.9 percent), and montane hardwood (12.3 percent). It was rare for sites to have less than 15 percent Sierran mixed conifer, less than 5 percent CWHR size class 5, or less than 53 percent dense (D) stands.

Dark (1997) evaluated a 1-km radius circle around sample stations in the Eastern Klamath region, resulting in a consistent 3.14 km^2 analysis block. Fisher were detected in areas where more habitat was classified as Douglas-fir (km^2), with 50 to 75 percent canopy cover (km^2), less barren area, and greater density of low use roads (m).

Carroll et al. (1999) evaluated a "moving-average" function that evaluated habitat parameters at 1, 10, 20, 30, 50, and 100 km^2 scales for a study in the Klamath region of northern California and southern Oregon, and adjacent areas along the coast. Data from track plates and cameras were used to develop the models, as well as provide model validation. The models at scales of 10 to 50 km^2 had the best predictive power; the 10 km^2 model was selected as the final model because model performance generally leveled off above 10 km^2. The moving-average variables selected for the final best fit model included tree canopy closure (positive effect), tree size class (negative, but complex effect), percent conifer (stronger correlation with hardwood or mixed forests), and some interactive terms that are more difficult to interpret: tree canopy closure by percent conifer (canopy closure has a more positive effect in mixed forests than purely conifer forests), and tree class by precipitation.

Campbell (2004) conducted both plot- and landscape-level analyses in the southern Sierra, evaluating habitat parameters at scales of 2, 5, 10, and 30 km^2 around sample stations, and

evaluating plot data in the immediate vicinity of sample stations. In univariate analysis, fishers were associated with drier areas, hardwoods, dense stands of medium-sized trees, shrub cover, and steeper slopes. While the best model for fishers was at the plot scale, statistically significant variables at coarser scales included mean annual precipitation (negative); percent area in trees 15 to 60 cm with less than 40 percent canopy closure (negative), percent area in trees 15 to 60 cm with greater than 40 percent canopy closure (positive); percent area in trees less than 15 cm and greater than 40 percent cover (positive); area within riparian buffer area (negative); percent of analysis area in hardwood types (positive); and percent of analysis area in shrub types (positive).

Several studies have reported fishers to disproportionately use riparian areas (Buck et al. 1983; Rosenberg and Raphael 1986; Aubry and Houston 1992; Jones and Garton 1994; Zielinski et al. 2004a). The reasons for this association are unclear. Fishers may show a preference for riparian areas because these areas typically contain a greater abundance of the structural features and attributes that fisher appear to require or prefer (for example, large trees, higher volumes of downed woody debris, dense canopy) as a result of the more mesic conditions and/or because of greater timber harvesting restriction in riparian zones relative to upslope areas. These areas may also support more abundant and accessible prey species than adjacent upslope areas.

Resting Habitat. The characteristics of sites used for resting and denning are the best-known elements of habitat selection by fisher. Rest sites have structures that provide protection from unfavorable weather and predators. Numerous studies have documented that for resting habitat, fishers in the western United States select stands with large trees and snags, coarse woody-debris, dense canopy closure and multiple-canopy layers, large diameter hardwoods, on steep slopes near water (Dark 1997; Truex et al. 1998; Self and Kerns 2001; Mazzoni 2002; Zielinski et al. 2004b).

Rest site structures used by fishers include: cavities in live trees, snags, hollow logs, fallen trees, canopies of live trees, platforms formed by mistletoe ("witches brooms") or large or deformed branches, and to a lesser extent stick nests, rocks, ground cavities, and slash and brush piles (Heinemeyer and Jones 1994; Self and Kerns 1995; Aubry et al. 2002; Mazzoni 2002; Higley et al. 1998 cited in USFWS 2004; Zielinski et al. 2004b). Natal and maternal dens are almost always in cavities in live or dead trees. Resting and denning structures are typically large diameter, and often atypical within a patch (Weir and Harestad 2003), with a larger diameter at breast height (dbh) than the mean of forest conditions surrounding them.

In the Klamath area, fishers used live conifers with a mean diameter of 110.1 cm and live hardwoods with a mean diameter of 74.6 cm for rest sites (Higley et al. 1998). Diameter of trees and snags containing rest structures averaged 76 cm and 107 cm, respectively, on industrial timberlands in western Shasta County, California (Self and Kerns 2001). Mazzoni (2002) found the mean diameter of rest sites in the southern Sierra were 95 cm for live trees, and 116 cm for snags.

Fishers most frequently used live hardwood trees for resting (57.1 percent) followed by live conifer trees (26.3 percent), snags and logs (14.9 percent hardwoods and conifers combined) and the ground (1.7 percent) in the western Klamath (Hoopa) area (Higley et al. 1998). Douglas-fir was the most frequently used species of tree (37.9 percent), followed by black oak (26.4 percent) and tanoak (26.4 percent) (Higley et al. 1998). These results are similar to

those reported by Yaeger (2005) for the Hoopa area. On managed industrial timberlands in northwestern California, fisher resting sites (N=35) were predominantly located on dwarf mistletoe in western hemlocks, large lateral branches and mammal nests in Douglas-firs, and cavities in cedars (Ewald, pers. comm. 2003 cited in USFWS 2004). Of 34 rest sites described by Self and Kerns (2001), the majority were located in mistletoe brooms in live Douglas-firs, whereas only 20 percent were in snags or hardwoods.

Canopy coverage appears to strongly influence rest site selection (Powell and Zielinski 1994). Self and Kerns (2001) frequently found resting sites in areas with a high canopy closure (greater than 60 percent). In her study of fishers in the southern Sierra Nevada range, Mazzoni (2002) found canopy coverage at rest sites averaged 73 percent while at random sites it averaged 56 percent. Aubry and Raley (2006) found that the mean canopy cover at denning and resting sites in Oregon was 80 percent or greater. Dark (1997) quantified habitat characteristics at fisher rest sites within a 28.3 hectare circular buffer and found that fisher rest site buffers had greater amounts of 50 percent to 75 percent canopy cover and a greater amount of Douglas-fir than stations where fisher were not detected. There were no significant differences between fisher rest sites and where fishers were detected using track plates. Fishers used and rested in areas with less habitat fragmentation and less human activity (Dark 1997).

Denning Habitat. Fisher rest sites are relatively more numerous and more easily located than are natal and maternal den sites. Limited information is available on natal and maternal den site characteristics. Although rest sites can be in live trees, snags, logs, and other structures, dens are almost all found in large, live trees or snags (Powell and Zielinski 1994). The trees must be large enough for cavities that can be used for natal dens, where kits are born, and maternal dens, where kits are raised.

Aubry and Raley (2006) found that for natal dens, adult female fishers typically used live trees (n = 7) or snags (n = 6) with openings that accessed hollows created by heartwood decay. Most of the openings used appeared to have been excavated by pileated woodpeckers (n = 8); natural openings included small knot holes and narrow cracks in the bole. Self and Callas (2006) also documented 2 natal dens (where parturition occurred) and 7 maternal dens (where the females moved their young). All the dens were in cavities in standing live or dead trees, primarily in black oak (*Quercus kelloggii*) (n=6). Other tree species used for denning by the study animals were live oak (*Q. chrysolepis*) (n=2) and Douglas-fir (*Pseudotsuga menziesii*) (n=1). All but the Douglas-fir were live trees. Dens used by fishers during the study were primarily in cavities formed by decay, where limbs were broken at the trunk of trees, or in cavities apparently excavated by woodpeckers (Self and Callas 2006).

Natal den trees need to be fairly large to accommodate a cavity large enough for an adult female and kits. The average dbh and height of live trees used for natal dens was 92 cm (range = 62 to 138 cm) and 40 m (range = 25 to 54 m), respectively. The average dbh and height of snags was 89 cm (range = 61 to 136 cm) and 26 m (range = 10 to 52 m), respectively (Aubry and Raley 2006). In the North Coast region, Higley and Matthews (2006) found fisher dens in Douglas-fir trees with a mean dbh of 137 cm. However, 75 percent of the dens were in hardwoods, and were in smaller trees.

Of nine presumed natal and maternal dens located in California, the average estimated dbh was 101.6 cm ranging from 53.3 to 147.3 cm (Zielinski and Barrett 1995; Zielinski 1995). Truex et al. (1998) documented 19 tree dens across three study areas in California. The average diameter of trees with dens was 115 cm for conifers and 63 cm for hardwoods. Of 16 maternal and natal dens located on managed timberlands in northwestern California, nine were in cavities in hardwoods and seven were in conifer snags (Ewald, pers. comm. 2003 cited in USFWS 2004) with diameters of den trees ranging from 62.5 to 295 cm (116 in).

Height of the cavity-opening may also be important for protection from potential predators. According to Lewis and Stinson (1998), natal dens are most commonly found in tree cavities at heights of greater than 6 m, while maternal dens may be in cavities closer to the ground so active kits can avoid injury in the event of a fall from the den. In Oregon, mean height of den trees was 16 m (Aubry et al. 2002). Aubry and Raley (2006) reported that the average height of cavity-openings was 16.2 m (range = 4-47 m; n = 10). The most commonly used tree species were incense cedar, true fir, and western white pine.

Foraging Habitat. Foraging habitat for fisher has been more difficult to determine than resting habitat. Foraging habitat characteristics for fisher has been inferred from telemetry locations during non-resting periods and from presence-absence data obtained from sooted track plates. Several authors have suggested that fisher selection of resting habitat was more specific than selection of habitats for foraging and traveling (Arthur et al. 1989, Jones 1991, Jones and Garton 1994, Powell 1994), however, Dark (1997) found no difference in resting and foraging/travel habitat.

Buck et al. (1994) and Buck (1983) reported that fisher generally showed a preference for mature, closed-conifer forest. Jones and Garton (1994) also reported that fisher preferred old-growth and mature forest stands in summer and used late-successional stands in winter but not preferentially relative to their occurrence. In winter, young forest stands were preferred for foraging. In their use of younger forests, fishers in Idaho appeared to select localities with a higher availability of large diameter trees, snags, and logs than randomly located plots in the home range (Jones 1991, cited in USFWS 2004). The results of this study suggest that fishers use a broader range of successional stages for hunting than for resting. During foraging, fishers are believed to be sensitive to canopy closure, and to avoid open areas or areas with low canopy closure (Jones and Garton 1994; Weir and Harestad 1997; Self and Kerns 2001).

In Jones and Garton's (1994) study in Idaho, fisher avoided areas with less than 40 percent canopy closure. However, use of open stands while traveling and foraging has been reported, principally in areas with a dense, brushy understory during the summer (Powell and Zielinski 1994; Self and Kerns 2001). In a radiotelemetry study in northern California, Self and Kerns (2001) found fishers to use CWHR size classes 3, 4, 5, and 6 with a preference for open and dense canopies within these size classes. Stands with sparse canopy closure (<25 percent) were avoided. These results agree with previous observations that fishers avoid open areas, but suggest that fishers may be able to use a broad range of canopy closures depending on site-specific conditions.

Fishers often are detected at sites with higher amounts of downed logs than at random sites (Klug 1997), and at sites with high volumes of coarse woody debris and structural complexity near the forest floor (Weir and Harestad 2003). The vulnerability of prey species

to capture may be affected by structural complexity near the ground (Buskirk and Powell 1994). Shrubs also provide food for prey and for fishers in the form of fruits and berries. In northwestern California, a matrix of shrubby early-successional habitats and second-growth redwood stands provide habitat for dusky-footed woodrats, potential prey for fishers detected in adjacent forest habitat (Klug 1997). However, fishers may avoid areas with too much low shrub cover. Weir and Harestad (2003) found that fishers avoided stands with greater than 80 percent coverage by low shrubs, suggesting that an overly complex forest floor may impair movement or be less favorable to the hunting success of fishers.

3.3.4.12 Tailed Frog (*Ascaphus truei*)

The tailed frog is found only in Del Norte, Siskiyou, Humboldt, Trinity, Shasta, Tehama, and Mendocino counties (Bury 1968; Jennings and Hayes 1994). This species has been found from near sea level to 6,500 feet elevation (Jennings and Hayes 1994). Although considered uncommon, it has been found to be quite common in suitable habitats. Tailed frogs are found in permanent streams with low temperatures in conifer-dominated forests including redwood, Douglas-fir, Klamath Mixed Conifer, and ponderosa pine forests. It also occurs in montane hardwood-conifer habitats. Tailed frogs are found more frequently in mature or late-successional stands than in younger stands (Bury 1983; Bury and Corn 1988; Welsh 1990; Jennings and Hayes 1994). Most California populations occur in areas that receive more that 40 inches of rainfall annually (Bury 1968). Permanent water is critical because the aquatic larvae require 2 to 3 years to transform. Intermittent streams are unsuitable. Egg embryos tolerate water temperature between 5 and 18 degrees Celsius (°C) (41 to 64 degrees Fahrenheit [°F]). Tadpoles actively avoid water temperatures above 22°C (72°F) and die at temperatures exceeding 30°C (86°F), while water temperatures greater than 23 to 24°C (73 to 75°F) appear lethal to adults (Jennings and Hayes 1994). Tailed frogs are known to occur in the French Creek watershed and are suspected in other drainages throughout the Plan Area in high gradient streams and wet meadow habitats (USFS pers. comm. 2010).

3.3.4.13 Southern Torrent Salamander (*Rhyacotriton variegates*)

The southern torrent salamander is found in the coastal forests of northwestern California south to Point Arena in Mendocino County (Jennings and Hayes 1994) and is common in high quality habitat. This species is found from near sea level to about 3,940 feet (Jennings and Hayes 1994). It inhabits cold, well-shaded permanent streams and spring seepages (Behler and King 1979) in redwood, Douglas-fir, mixed conifer, montane riparian, and montane hardwood-conifer habitats (Stebbins 1951; Anderson 1968). Permanent cold streams and seeps are required throughout the year. It is unknown whether southern torrent salamanders inhabit the Plan Area because surveys designed to locate this species have not been conducted. The current range extends east to Grider Creek, which is just east of the Plan Area (USFS pers. comm. 2010). Therefore, the Plan Area is outside of the known range for this species.

3.3.4.14 Siskiyou Mountains Salamander (*Plethodon stormi*)

The Siskiyou Mountains salamander (*Plethodon stormi*) is a member of the Del Norte salamander (*Plethodon elongatus*) species complex in the lungless salamander family (Plethodontidae; DFG 2005a). In general, plethedontid salamanders require high relative humidity for surface activity, where the majority of feeding and mating is believed to occur

(DFG 2005a). Thus, these salamanders tend to be nocturnal and more active during rainy periods. The Siskiyou Mountains salamander is a rare species found in Jackson County, Oregon and adjacent Siskiyou County, California. The Siskiyou Mountains salamander is considered a talus or rock substrate obligate (DFG 2005a), but is occasionally found under logs, leaf litter, and other cover near talus. Heavily wooded, north-facing slopes with rock talus were originally thought to provide habitat for the major populations (Nussbaum et al. 1983, cited in Amphibia Web). Later studies demonstrated that the distribution and habitat types are substantially larger than early reports. The Siskiyou Mountains salamander can be found on all slope aspects and occupies a variety of forest types with a range of overstory canopy species (DFG 2005a). Habitat suitability is high for CWHR classes 3D, 4D, 5D and 6 and moderate in CWHR classes 3M, 4M, and 5M.

The Siskiyou Mountains salamander was considered rare in 1971 and listed as threatened under CESA in 1985. The species was petitioned for emergency listing under the ESA in 2004, at which time petitioners requested that the Scott Bar salamander also be considered for listing if the Siskiyou Mountains and Scott Bar salamanders were later determined to be separate species. Following the petition, Mead et al. (2005) recognized the Scott Bar salamander (*Plethodon asupak*) as a species separate from the Siskiyou Mountains salamander. After a thorough review of all available scientific and commercial information, USFWS found that listing the Siskiyou Mountains and Scott Bar salamanders was not warranted (73 FR 4379; January 24, 2008). DFG petitioned for delisting of the species in 2005 due to recent studies showing that the range and abundance of the salamander is greater than previously known (DFG 2006). This species is known to occur in the Klamath River Management Unit near Horse Creek and Elliot Creek (USFS 2010).

3.3.4.15 Scott Bar Salamander (*Plethodon asupak*)

The Scott Bar salamander is a new species described by Mead et al. (2005). This species, once considered a subspecies of the Siskiyou Mountains salamander, is now considered morphologically and genetically distinct enough from closely occurring *P. elongatus* and *P. stormi* to be given full species status (Mead et al. 2005). The Scott Bar salamander is known to occur in a very small area of the Siskiyou Mountains in extreme northern Siskiyou County (mostly south and southeast of the range of *P. stormi*) near the confluence of the Klamath and Scott rivers at an elevation of approximately 1,500 to 2,000 feet above mean sea level. The species is associated with rocky forested areas, particularly thick, moss-covered talus. Habitat suitability is high for CWHR classes 3D, 4D, 5D and 6 and moderate in CWHR classes 3M, 4M, and 5M. This species is known to occur in the Scott Valley Management Unit and on adjacent National Forest lands, and in the Klamath River Management Unit and adjacent National Forest lands south of Horse Creek (USFS 2010).

3.3.4.16 Northern Red-legged Frog (*Rana aurora aurora*)

The northern red-legged frog occurs along the Coast Ranges from Del Norte County to Mendocino County, usually below 4,000 feet. Sierra Nevada and Cascades populations and populations in the Coast Ranges south of a narrow zone of overlap in southern Mendocino County are now considered to be a new species, the California red-legged frog *(Rana draytonii)* (Shaffer et al. 2004). The northern red-legged frog is highly aquatic and is found in the vicinity of quiet, permanent pools of streams, marshes, and occasionally ponds. It prefers shorelines with extensive vegetation. Permanent or nearly permanent pools are

required for larval development, such that intermittent streams must retain surface water in pools year-round for frog survival (Jennings et al. 1993). Individuals have been found considerable distances from breeding sites on rainy nights. Northern red-legged frogs have not been reported on the applicant's ownership, but the proximity of known locations of these frogs to the Hilt/Siskiyou forest suggests that they could occur on the ownership in perennial streams and wet meadow habitats.

3.3.4.17 Foothill Yellow-legged Frog *(Rana boylii*)

The foothill yellow-legged frog is found in the Coast Ranges from the Oregon border south to the Transverse Mountains in Los Angeles County, in most of northern California west of the Cascade crest, and along the western flank of the Sierra Nevada south to Kern County. Its elevation range extends from near sea level to 6,370 feet in the Sierra Nevada (Jennings and Hayes 1994). The foothill yellow-legged frog is found in or near rocky streams in a variety of habitats, including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadow types. Unlike most other ranid frogs in California, this species is rarely encountered (even on rainy nights) far from permanent water. Tadpoles require water for at least three or four months while completing their aquatic development. Frogs may be active all year in warmer areas, but may become inactive or hibernate in colder areas. Foothill yellow-legged frogs have not been reported in the Plan Area, but the proximity of known locations of these frogs to the Hilt/Siskiyou forest suggests that they could occur in the Plan Area in low gradient streams and wet meadow habitats.

3.3.4.18 Pacific Lamprey (*Lampetra tridentata*)

Pacific lampreys are the most widely distributed lamprey species on the west coast of the United States. They have been found in streams from Japan, and around the Pacific Rim to Baja California, Mexico. Their distribution includes major river systems such as the Fraser, Columbia, Klamath-Trinity, Eel, Sacramento, and San Joaquin rivers. The lampreys of the upper Klamath basin are all derived from anadromous Pacific lampreys that became land-locked, perhaps multiple times over millions of years. Their evolution and ecology are poorly understood. Four species are recognized (Docker et al. 1999, Lorion et al. 2000, Moyle 2002), but additional species may be uncovered as genetic studies proceed. The distribution of Pacific lamprey within the Klamath Province is not well known because most collections are of ammocoetes, which are difficult to identify in the field (National Research Council 2004). Pacific lamprey distribution patterns are similar to that of anadromous salmonids.

Pacific lamprey adults are parasitic, feeding on anadromous and marine fish including Pacific salmon, flatfish, rockfish, and pollock in the ocean. Adults spend 1 to 3 years in the ocean and then migrate to freshwater. In freshwater, adults are believed to remain over the winter months and up to approximately one year before spawning. Larval stages (ammocoetes) disburse into downstream areas with low water velocity and fine substrates. These larvae then burrow into the substrate, where they live and grow as filter feeders for 3 to 7 years. Ammocoete metamorphosis into *macropthalmia* (juvenile phase) occurs slowly over several months. Development typically begins in summer and is completed by the following winter. During this juvenile metamorphosis, body form changes occur, including the appearance of eyes and teeth. Juveniles disperse downstream and emigrate to the estuary where they mature into adults and enter the ocean.

Adult Pacific lampreys spawn in habitats similar to those used by salmon and steelhead at the upstream end of riffle habitat. Spawning occurs in areas that also contain suitable ammocoete habitat in the vicinity. The degree of homing is unknown, but adult lampreys cue in on areas supporting ammocoetes, which release pheromones that are thought to aid adults in locating spawning areas. After the eggs are deposited and fertilized, the adults typically die within days after spawning. It is likely that Pacific lamprey would be found in the Plan Area in approximately the same areas as the anadromous salmonids described previously.

3.3.4.19 Gentner's Fritillary (*Fritillaria gentneri*)

Gentner's fritillary, also known as Gentner's mission-bell, is a rare, red-flowered member of the lily family that blooms from April to May and occurs in chaparral and cismontane woodland habitats, between the elevations of 306 and 15 meters (1,004 and to 506 feet) (USFWS 2003; CNPS 2009). This perennial herb arises from a fleshy bulb and nonflowering individuals vastly outnumber flowering plants in natural populations. Nonflowering plants are recognizable only by their single basal leaves. This species is found primarily in very small, scattered occurrences in Jackson and Josephine counties in southwestern Oregon. One small additional population was recently discovered in northern California, near the Oregon border within the Cottonwood Peak quadrangle. The location data for this population is not specific, thus it is uncertain whether this population is on or adjacent to the applicant's ownership. This population represents the southernmost extent of this species' range. No data exists for this species in adjacent KNF lands (USFS pers. comm. 2010).

Gentner's fritillary is often found in grassland and chaparral habitats within, or on the edge of dry, open woodlands. Individual plants are often associated with shrubs where they may be somewhat protected from the effects of wind and sun. Although it often occupies ridge-line ecotones, Gentner's fritillary is not found on fully exposed sites or extremely dry sites (64 Federal Register 69195-69203). The overstory habitat for this species is open oak, mixed conifer woodland, forest edges, associated with white-leaved manzanita (*Ceanothus cuneatus*) in the shrub layer and Pacific madrone (*Arbutus menziesii*), incense cedar (*Calocedrus decurrens*), Oregon white oak (*Quercus garryana*), California black oak (*Q. kelloggii*), Ponderosa pine (*Pinus ponderosa*), and Douglas-fir (*Pseudotsuga menziesii*) in the tree layer. Gentner's fritillary blooms from April to June.

Gentner's fritillary was listed as a federally endangered species on December 10, 1999 (64 Federal Register 69195-69203) and is listed by the State of Oregon as endangered. CNPS (2009) considers this species seriously endangered in California. Gentner's fritillary is threatened by a variety of factors including habitat loss associated with rapidly expanding residential and agricultural development, alteration of habitat by invasive weeds and successional encroachment by trees and shrubs, habitat disturbance from timber harvest and recreational activities, and vulnerability associated with extremely small population sizes. Other potential threats to Gentner's fritillary include bulb collecting for gardens and herbivory by deer and livestock.

USFWS issued the Recovery Plan for *Fritillaria gentneri* (Gentner's Fritillary) in August of 2003. Recovery of Gentner's fritillary will be based on conservation of the species through protected populations ("Fritillaria management areas") distributed in natural densities across the historical range of the species in four designated recovery units. Recovery units are geographic or otherwise identifiable subunits that are considered individually necessary

to the long-term viability of the species through the preservation of factors such as genetic or demographic robustness that are essential to the species' survival and recovery. The overall objective of this recovery plan is to reduce the threats to Gentner's fritillary to the point where reclassification from endangered to threatened is warranted (downlisted), and subsequently to the point where the species can be removed from the list of endangered and threatened species (delisted) (USFWS 2003).

3.3.4.20 Siskiyou Mariposa Lily (*Calochortus persistens*)

The Siskiyou mariposa lily is a bulbiferous herb that blooms in June and July. It occurs in lower montane coniferous and north coast coniferous forests at elevations between 131 to 1,847 meters. The plants are almost entirely restricted to the rockiest portions of the ridgetops and ridge shoulders, and do not extend very far down the associated slopes. It appears to occur in greater numbers on north-facing slopes. The species is restricted to three occurrences in the Klamath/Siskiyou Range near the border of California and Oregon. All three occurrences are found on open ridgeline rock outcrops and shallow talus soils, where soils are shallow, dry, rocky, and acidic (KNF 1987; Klamath-Siskiyou Wildlands Center et al. 2001, USFWS 2008). These soils are well drained and dry early in the season after snowmelt. Siskiyou mariposa lilies were discovered on the applicant's lands in the Cottonwood Creek drainage within the Klamath River management unit along the California/Oregon border during botanical surveys conducted in 2006 for a proposed timber harvest plan.

Siskiyou mariposa lily is designated as a candidate species by USFWS, a sensitive species by USFS Region 5, a rare species by the State of California, and a critically imperiled species by the State of Oregon. As a result of information gained during the 2003 field season, namely the observation of juvenile plants across the California range, USFWS downgraded the candidate status from listing priority 2 to priority 5 (70 FR 24869). Major threats to the species include the introduction of exotic weeds and grasses; fire suppression resulting in increased fuel loading and shading and competition by native and non-native species; fragmentation by roads, fire breaks, tree plantations, and radio-tower facilities; maintenance and construction around radio towers and a telephone relay station located on Gunsight Peak and Mahogany Point; and soil disturbance and exotic species introduction as a result of heavy recreational use and fire break construction. Dyer's woad, an invasive, non-native plant that may prevent germination of Siskiyou mariposa lily seedlings, is now found throughout the southernmost California occurrence, affecting 75 percent of the known lily habitat on Gunsight-Humbug Ridge. The combination of restricted range, extremely low numbers (five plants) in one of three disjunct occurrences, poor competitive ability, short seed dispersal distance, slow growth rates, low seed production, apparently poor survival rates in some years, herbivory, and competition from exotic plants threaten the continued existence of this species.

3.3.4.21 Applegate's Milk-vetch (*Astragalus applegatei*)

Applegate's milk-vetch (*Astragalus applegatei*) is a taprooted, herbaceous, perennial flowering plant in the legume family. This species is endemic to the Lower Klamath Basin, in Klamath County, Oregon, about 15 miles north of the Oregon-California border (USFWS 1998). Applegate's milk-vetch grows on seasonally moist areas with sparse native bunch grasses and bare, strongly alkaline soil. Based on the species' affinity for alkaline

soils, floodplain habitat, and its current and documented historical distribution, it is probable that Applegate's milk-vetch once occurred along the fringes of the marshes and floodplain of Upper Klamath Lake and Ewauna Lake, and very likely other areas throughout the pre-settlement Lower Klamath Basin.

Believed to be extinct until its rediscovery in 1983, Applegate's milk-vetch is currently known from only six sites, all of which are found at approximately 4,100 feet above sea level. The type locality is two miles east of the town of Keno, Oregon, which is located about 10 miles southwest of Klamath Falls. Efforts to relocate Applegate's milk-vetch in the Keno area have proven unsuccessful. Widespread habitat conversion to fields and pastures has likely displaced the species in this portion of its historical range.

Applegate's milk-vetch appears on the USFWS special-status species list for the Macdoel quadrangle, this quadrangle contains a portion of the applicant's ownership, although no occurrences have been reported on the applicant's lands.

Applegate's milk-vetch is listed as a federally endangered species on July 28, 1993 (58 FR 40547-40551). Intensive agricultural and urban development of the Klamath River floodplain has resulted in severe depletion and fragmentation of the species' habitat. Virtually all remaining potential (undeveloped) habitat for the species has been seriously modified by the proliferation of weeds, suppression of floods and fires, and land reclamation projects involving extensive construction of drainage ditches and water retention dikes. Because of habitat modification, Applegate's milk-vetch may be limited by competition from exotic weeds. Threats to this plant are intensified by the small number and limited distribution of remaining populations, which increases the milk-vetch's vulnerability to extirpation due to random mortality events. Finally, this species may be threatened by caterpillar predation, low seed production, seed loss to pre-dispersal predation by adult and larval beetles, and cattle grazing.

Applegate's milk-vetch may be considered for downlisting to threatened status when at least six natural and/or introduced self-sustaining populations (defined as having a minimum of 1,500 reproductive plants) are preserved in habitat permanently secured and managed for the benefit of the species (USFWS 1998).

3.4 Socioeconomics/Environmental Justice

Timber management activities within the 152,178-acre Plan Area can influence local social and economic conditions. This section addresses the existing socioeconomic resources within Siskiyou County, specifically social characteristics such as population, race/ethnicity, and employment.

3.4.1 Population and Ethnicity

According to data from the California Department of Finance (DOF), Siskiyou County experienced population decreases during the latter half of the 1990s. However, the county's population recovered from these population decreases, and since 2001 it has increased on average by about 0.5 percent per year. During this same period, the state of California has been experiencing population increases equivalent, on average, to about 1.5 percent annually. Table 3.4-1 shows the population for Siskiyou County and California from 1998 to 2010.

TABLE 3.4-1
Siskiyou County Population, January 1998 to January 2010

Year	Siskiyou	State of California
1998	44,675	32,657,877
1999	44,352	33,140,771
2000	44,301	33,873,086
2001	44,490	35,063,959
2002	44,597	35,063,959
2003	44,835	35,652,700
2004	45,141	36,199,342
2005	45,459	36,675,346
2006	45,615	37,114,598
2007	45,667	37,559,440
2008	45,971	38,049,462
2009	44,634	36,961,664
2010	44,900	37,253,956

Source: DOF 2012.

Table 3.4-2 shows the Census 2010 racial/ethnic percentage of Siskiyou County compared to that of the state. Racial minority population accounts for 13 percent of the population of Siskiyou County. Individuals who identified themselves as Hispanics (although Hispanic is not a race per Census definition, but an ethnic definition) account for 7.2 percent of the population.

TABLE 3.4-2
2010 Census Racial/Ethnic Population Distribution

		Racial/Ethnic Percentage							
Area	Total Population	White	African American	Alaskan/ Native American	Asian	Native Hawaiian/ Other Pacific Islander	Some Other Race	Two or more Races	Hispanic*
Siskiyou County	44,900	84.7	1.3	4.0	1.2	0.2	3.3	5.3	10.3
State of California	37,253,956	57.6	6.2	1.0	13.0	0.4	17.0	4.9	37.6

*Hispanics or Latinos are those people who classified themselves in one of the specific Spanish, Hispanic, or Latino categories listed on the Census 2000 questionnaire—"Mexican, Mexican Am., Chicano," "Puerto Rican," or "Cuban"—as well as those who indicate that they are "other Spanish/Hispanic/Latino." People who identify their origin as "other Spanish/Hispanic/Latino" may be of any race. Thus, the percent Hispanic should not be added to percentages for racial (minority) categories.

Source: 2010 U.S. Census.

Table 3.4-3 shows the percentage distribution of low-income population from the 2010 Census data for Siskiyou County and the state. Low-income population accounts for 14.0 percent of the population of Siskiyou County compared to 10.6 percent for the state.

TABLE 3.4-3
2010 Census Racial/Ethnic Population Distribution

Area	Total Population[a]	Low-income Population[b]	Percent Low Income (%)
Siskiyou County	44,900	6,286	14.0
State of California	37,253,956	3,948,919	10.6

[a]Population numbers are only those for whom poverty was determined and exclude full-time college students.
[b]Population below the poverty line as defined by the US Department of Health and Human Services.

Source: 2010 U.S. Census.

3.4.2 Employment

According to the California Employment Development Department (EDD), Siskiyou County had a total annual civilian labor force estimated at 18,780, with an annual unemployment rate of 17.5 percent in 2008 (EDD 2012). As shown in Table 3.4-4, the civilian labor force in the county has remained at about 19,000 over the past decade while the unemployment rate has remained consistently higher than that at the state level. As such, Siskiyou County typically experiences higher unemployment rates than the state as a whole.

TABLE 3.4-4
Historical County and State Labor Force and Unemployment, 1997 to 2011

Year	Siskiyou County – Labor Force	Siskiyou County Unemployment Rate (%)	State of California – Labor Force	State of California Unemployment Rate (%)
1997	18,540	12.2	14,780,800	6.4
1998	18,330	12.6	15,203,700	6
1999	17,590	10.4	15,566,900	5.3
2000	19,100	7.5	16,024,300	4.9
2001	18,900	8.1	16,220,000	5.4
2002	19,100	9	16,180,800	6.7
2003	19,300	9.5	16,200,100	6.8
2004	19,100	9.5	16,413,400	6.2
2005	18,800	9.1	16,742,300	5.4
2006	18,900	8	17,029,900	4.9
2007	19,200	8.6	17,208,900	5.4
2008	19,470	10.2	18,391,800	7.2
2009	19,650	14.6	18,148,900	12.2
2010	19,970	17.6	18,150,800	12.5
2011	18,780	17.5	18,218,800	11.1

Source: EDD 2012

Table 3.4-5 shows annual employment by industry data for Siskiyou County in 2011. Most of the jobs in the county are in government, services, or retail. Jobs in these three sectors account for two out of three jobs. Of the three sectors, the services sector leads with 57 percent of all jobs.

TABLE 3.4-5
Siskiyou Employment by Industry, 2010

Industry	Siskiyou County	
	Jobs	Percent (%)
Agriculture	530	3.08
Natural Resources and Mining	100	0.58
Construction	310	1.80
Manufacturing	710	4.13
Wholesale Trade	300	1.74
Retail Trade	1,500	8.72
Transportation, Warehousing and Utilities	200	1.16
Information	190	1.10
Financial Activities	370	2.15
Services	9,730	56.57
Federal Government	690	4.01
State and Local Government	2570	14.94
Total Employment	17,200	

Source: EDD 2011

Timber management jobs (e.g. RPFs, biologists, administrators) are included in the Natural Resources and Mining sector while jobs in the logging, timber harvesting, timber transporting, and any jobs in establishments/businesses that provide services are included in the Services sector shown in Table 3.4-5. The actual split between natural resources and mining is currently unavailable from EDD due to data confidentiality associated with mining. According to EDD, the number of establishments involved in non-recreational mining in Siskiyou County is too few for EDD to publish their employment numbers. Furthermore, most of these mines operate on an intermittent basis and are usually operated by one person (Hickel 2008). As such, it can be assumed that most of the 100 jobs listed under the Natural Resources and Mining sector are those related to timber management. Many timber jobs in Siskiyou County are supported by the national forests in the region.

The EDD publishes industry employment projections for its Northern Mountains Region (comprising Lassen, Modoc, Nevada, Plumas, Sierra, Siskiyou, and Trinity counties), but does not publish separate employment projections for Siskiyou County. In the Northern Mountains Region, it is not expected that employment in the Natural Resources and Mining sector or the Services sector will change during the projected period of 2004–2014.

Forest management activities carried out by the applicant influence the local economy in a number of ways. FGS employs approximately 30 full-time employees whose functions include secretarial, bookkeeping and accounting, forestry, engineering, biology, tree felling and bucking, road construction, yarding and loading, and mechanical and repair. All of these activities are conducted over the entire year; consequently, the 30 jobs are year-round jobs. Most employees are based in Hilt. Employee wages have an indirect effect on the purchase of goods and services from local businesses. Overall, the economic benefit to the community is expected to be roughly double the benefit from direct employment (economic multiplier of two). Additionally, yield taxes on timber purchases are distributed to Siskiyou County.

In addition to work conducted by FGS employees, many of the forest management activities (for example, tree planting, pre-commercial thinning, logging, and fertilizer application) are contracted directly to other firms. Timber harvested from the Plan Area is supplied to 30 to 40 mills as far north as Port Angeles, Washington and as far south as Lincoln, California. These mills contribute to employment and income in their local areas.

3.5 Air Quality

The project is located in Siskiyou County, in the Northeast Plateau Air Basin (Basin). The Basin is in the northeast corner of California and contains Siskiyou County, Lassen County, and Modoc County. The northern part of the Basin has volcanic peaks, and the south and west are dominated by forested mountains (California Air Resources Board [ARB] 2008a).

Federal air quality policies are regulated through the federal Clean Air Act (CAA). Pursuant to this act, EPA has established National Ambient Air Quality Standards (NAAQS) for air pollutants (called "criteria" pollutants). The NAAQS criteria pollutants most relevant to the project area are ozone (O_3), particulate matter (PM_{10}), and fine particulate matter (defined as particulate matter less than 2.5 microns in aerodynamic diameter [$PM_{2.5}$]). Other NAAQS criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead. The ambient air quality standards represent levels established to avoid specific adverse health and welfare effects associated with each pollutant. Table 3.5-1 summarizes the relevant ambient air quality standards.

EPA has designated counties in California as either attainment or non-attainment for each NAAQS. Air basins that have not received sufficient analysis for certain criteria pollutants are designated as "unclassified" for those particular pollutants; this is the case for Siskiyou County, which is designated unclassified/attainment for all the criteria pollutants (ARB 2008a).

In the 1990 CAA amendments, EPA included provisions requiring federal agencies to ensure that actions undertaken in nonattainment or maintenance areas are consistent with applicable State Implementation Plans (SIPs). The process of determining whether a federal action is consistent with applicable SIPs is called conformity. Because the project is located in Siskiyou County, which is designated unclassified/attainment for all the NAAQS, a conformity determination would not be required.

ARB oversees California air quality policies. California established the California Ambient Air Quality Standards (CAAQS) in 1969. These standards are generally more stringent and include more pollutants than the NAAQS (Table 3.5-1). Similar to EPA, ARB designates counties in California as attainment or non-attainment for the CAAQS. Siskiyou County is designated non-attainment for the state 8-hour ozone standard and unclassified/attainment for all other criteria pollutants.

TABLE 3.5-1
Ambient Air Quality Standards

Pollutant	Averaging Time	CAAQS[a]	NAAQS[b] Primary[c]	NAAQS[b] Secondary[d]
Ozone	8 hours	0.07 ppm	0.075 ppm	0.08 ppm
	1 hour	0.09 ppm	—	—
Respirable particulate matter (PM_{10})	Annual arithmetic mean	20 µg/m^3	—	—
	24 hours	50 µg/m^3	150 µg/m^3	150 µg/m^3
Fine particulate matter ($PM_{2.5}$)	Annual arithmetic mean	12 µg/m^3	15 µg/m^3	15 µg/m^3
	24 hours	—	35 µg/m^3	35 µg/m^3
Carbon monoxide	8 hours	9.0 ppm	9 ppm	—
	1 hour	20 ppm	35 ppm	—
Nitrogen dioxide[e]	Annual arithmetic mean	0.03 ppm	0.053 ppm	0.053 ppm
	1 hour	0.18 ppm	—	—
Sulfur dioxide	Annual arithmetic mean	—	0.03 ppm	—
	24 hours	0.04 ppm	0.14 ppm	—
	3 hours	—	—	0.5 ppm
	1 hour	0.25 ppm	—	—
Lead[f]	Calendar quarter	—	1.5 µg/m^3	1.5 µg/m^3
	30-day average	1.5 µg/m^3	—	—
Visibility-reducing particles	8 hours	[g]	—	—
Sulfates	24 hours	25 µg/m^3	—	—
Hydrogen sulfide	1 hour	0.03 ppm	—	—
Vinyl chloride[f]	24 hours	0.01 ppm	—	—

[a]California standards for ozone carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, and suspended particulate matter (PM_{10}, $PM_{2.5}$, and visibility-reducing particles) are values that are not to be exceeded. All others are not to be equaled or exceeded.

[b]National standards other than ozone, particulate matter, and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, is equal to or less than the standard.

[c]National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[d]National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[e]The nitrogen dioxide ambient air quality standard was amended on February 22, 2007, to lower the 1-hour standard and to establish a new annual standard of 0.03 ppm. The new standards became effective on March 20, 2008.

[f]ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold level of exposure for adverse health effects determined. ARB made this determination following the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[g]Insufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.

Notes:

NAAQS criteria pollutants (unshaded); additional CAAQS criteria pollutants (shaded)

µg/m^3 = micrograms per cubic meter
ppm = parts per million (by volume)

Source: ARB 2008b

The Siskiyou County Air Pollution Control District (APCD) is the local agency charged with preparing, adopting, and implementing mobile, stationary, and area air-emission control measures and standards. Three air-monitoring stations (Lava Beds, Mt. Shasta, and Yreka) operate in Siskiyou County. Concentrations of CO, NO_2, and SO_2 are not monitored at the stations in Siskiyou County. The primary air pollutant of concern in Siskiyou County is O_3 (smog) because this is the only pollutant for which measured concentrations exceed the state ambient air quality standards. The measured concentrations of PM_{10} and $PM_{2.5}$ in Siskiyou County have not exceeded the federal or state standards in the past 5 years (ARB 2008c).

In addition to the criteria pollutants, concern about non-criteria pollutants, termed hazardous air pollutants (HAPs) and toxic air contaminants (TACs), has increased in recent years. HAPs are air contaminants identified in the CAA, Section 112(b), and TACs are air contaminants identified by ARB under Sections 93000 and 93001 of Title 13 of the California Code of Regulations. HAPs and TACs include airborne inorganic and organic compounds that can have both short-term (acute) and long-term (carcinogenic, chronic, and mutagenic) effects on human health. Exposure to these pollutants may cause or contribute to cancer, birth defects, genetic damage, and other adverse health effects. In 1988, ARB identified particulate emissions from diesel-fueled engines (diesel particulate matter [DPM]) as a toxic air contaminant, based on its potential to cause cancer and other health problems (ARB 2008d). DPM emissions are responsible for the majority of the state's known cancer risk from outdoor pollutants (ARB 2008d).

The criteria pollutants of greatest relevance to the project are ozone and particulate matter. In the Basin, the primary sources of O_3 precursor pollutants (oxides of nitrogen [NO_x] and reactive organic gas [ROG]) are mobile sources, such as diesel trucks and construction equipment. Activities associated with forest management practices include timber felling, extraction, and hauling; site preparation; road maintenance and construction; and prescribed burning. The trucks and equipment used to conduct these activities would generate exhaust emissions of ozone precursors and DPM.

3.5.1 Climate Change

Greenhouse gases (GHGs) are defined as any gases that absorb infrared radiation in the atmosphere (ARB 2008e). GHGs include, but are not limited to, water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrochlorofluorocarbons (HCFCs), O_3, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) (ARB 2008e). Ongoing research contends that accelerated climate change is occurring and that anthropomorphic (human-induced) GHG emissions, primarily CO_2, are the main cause of accelerated climate change (IPCC 2007).

Photosynthesis is a biological process that converts CO_2 from the air into carbohydrates, which releases oxygen into the atmosphere as a waste product. The consumption of CO_2 and the release of oxygen directly affects earth's climate by helping to control the composition of our atmosphere. As photosynthesis consumes CO_2 and releases oxygen, it counteracts the release of carbon dioxide, which occurs as a result of combustion of fossil fuels. Forests and forest management practices can sequester carbon and influence emissions of CO_2 (Smith and Heath 2004).

In 2006, California adopted the Global Warming Solutions Act (Assembly Bill [AB] 32), which finds that global warming poses a serious threat to the environment of California and mandates significant reductions in GHGs. Two requirements of the ARB pursuant to AB 32—establishing the GHG emission inventory and preparing the Scoping Plan—apply to the forestry sector. ARB developed a 1990–2004 GHG emission inventory and estimated that the California forest sector contributed to net sequestration of carbon (ARB 2007). In June 2008, ARB released the Draft Scoping Plan, which included a target to reduce GHG emissions through sustainable forest management practices (ARB 2008f). As of March 2009, ARB continues to revise the California Climate Action Registry's forest project protocol for reporting carbon gains and losses.

On average, California forests store about 92 tons of carbon per acre, distributed among trees (31 percent), soil (48 percent), forest floor (21 percent), and understory biomass (1 percent) (Birdsey and Lewis 2002). Less than half of the carbon stored by trees is above ground (Christensen et al. 2007). The applicant's forestland stores more than the state average because forests in the Plan Area are more productive than average (Birdsey and Lewis 2002). Forests can reduce GHG concentrations by sequestering atmospheric carbon in biomass and soil, and the carbon can remain stored in wood products from harvested trees (Malmsheimer et al. 2008). Forests are better at storing carbon than any other land cover (Helms 2007a). In addition, forests and forest products can prevent GHG emissions by substituting wood and woody biomass for fossil fuel, using harvest residues for electrical power generation, controlling wildfires, and as an alternative to land uses with diminished ability to capture and store carbon, such as urbanized landscapes (Malmsheimer et al. 2008). Major carbon storage loss follows converting forest land to other uses (Helms 2007b).

Emissions of CO_2 to the atmosphere occur as a result of a variety of land use activities associated with forest management. Management activities that release CO_2 might involve fossil fuel combustion or prescribed burning. The biggest non-biological contributors to GHG emissions are harvesting, followed by site preparation (32 percent), and fertilization (15 percent) (Sonne 2006). However, GHG emissions from forestry operations represent only a fraction of carbon sequestered by tree growth. Sonne (2006) found that average GHG emissions from forest operations, over a 50-year period, represent approximately 4.5 percent of the value of onsite average carbon storage, and increase to 9.4 percent of average carbon storage if transportation of harvested materials is included. Typical CO_2 emission factors for timber harvesting equipment (mobile combustion sources) ranges from 2,360 gCO_2/liter for gas powered vehicles to 2,730 gCO_2/liter for diesel powered vehicles (Environment Canada 2009). Sonne (2006) found that fuel consumption by harvesting equipment emits 8.3 kilograms CO_2e[2] per square meter of harvested wood. Total emissions per 100 cubic meters averaged 1.6 Mg CO_2e ha^{-1} over a suite of management regimes, with direct onsite emissions accounting for about 84 percent of total GHG emissions and indirect emissions accounting for about 16 percent (Sonne 2006).

Prescribed burning is conducted in accordance with the CFPRs and Siskiyou County APCD regulations. The total particulate emission factor for prescribed burning in California mixed

[2] The various greenhouse gases have different capacities to trap heat in the atmosphere, with some more effective at trapping heat than others. For providing a standard basis for emissions calculations, greenhouse gases are typically indexed to the heat-trapping capability of carbon dioxide (carbon dioxide equivalents or CO_2e), which allows comparison of the global warming influence of different greenhouse gases relative to carbon dioxide.

conifer forests averages about 0.017 lb/lb of fuel consumption, but can vary by as much as 50 percent with fuel and fire conditions (EPA 1995).

Overall, while the net effects of the forest products industry's activities cannot be precisely calculated, there is no reason to suspect that these activities are responsible for significant net losses or gains in forest ecosystem carbon (Skog et al. 2008). For private timberland under sustainable forest management, it is reasonable to assume that the net change in forest carbon stocks on land affected by industrial forestry activities is zero (Skog et al. 2008). Therefore, carbon removal by California forests is about one-and-one-half to two times greater than carbon emissions; that is, forest land uses function as net sinks, rather than sources, for carbon (ARB 2008h).

3.6 Cultural Resources

This section describes the cultural resource setting of the Plan Area, including applicable cultural resource regulations. The Plan Area is located entirely within Siskiyou County in northern California. The 152,178-acre Plan Area is separated into three management units: Klamath River, Scott Valley, and Grass Lake (Figure 1-1). For the purposes of cultural resources consultation, the Area of Potential Effect (APE) is defined as the Plan Area.

3.6.1 Cultural Resource Setting

The Plan Area has been subject to commercial timber harvest activities since approximately 1907, and contains very little old-growth forest (about 252 acres) or other undisturbed forest areas. As a result of recent requirements for cultural resources surveys as part of timber harvest planning, approximately half of the Plan Area has been inventoried for cultural resources (Figure 3.6-1). Additional areas have been surveyed for other purposes (for example, roads and transmission lines) by other entities. Information on these prior surveys is archived at the Northeast Information Center (NEIC) at California State University, Chico, a division of the State Historic Resources Information System. A review of all NEIC information was conducted for this EIS.

Because of the varied environmental setting of the Plan Area, cultural resources within the area vary and consist of historic and Native American archaeological resources as well as resources of the historic built environment. Most of the Plan Area is composed of upland, moderately to heavily timbered forest areas in moderate to steep terrain with few nearby permanent water resources. Inventoried cultural resources in these areas consist mainly of historic resources: cabins, trails, roads, railroads, and debris scatters. Portions of the Plan Area in less steep terrain, closer to permanent water resources, and in more open areas contain Native American archaeological sites as well as a wider variety of historic sites.

Cultural resources possibly occurring within the Plan Area include Native American open campsites, rock shelter or cave sites, trails, butcher and kill sites, hunting stations, toolstone quarries, tool manufacture sites and lithic scatters, petroglyph and pictograph sites, botanical resource collection and processing sites, food storage sites, cairns and other vision questing sites, and possibly habitation sites. Historic resources within the Plan Area may include: trails, roads, cabins and other settlement-era sites; dendroglyphs and sites affiliated with livestock range management; historic logging or other historic resource procurement sites; debris scatters; permanent, seasonal, or temporary habitation sites;

temporary or permanent resource use and processing sites; sites related to government-regulated agriculture and ranching; recreation sites; historic forest management sites (e.g., fire lookout towers); linear transportation sites (e.g., railroads, roads, trails); utilities sites (e.g., hydro-electric facilities, irrigation facilities, transmission or telephone lines); and portions of existing or abandoned town sites. There are no sites listed on the National Register of Historic Places.

3.6.2 Cultural Resource Regulatory Context

Section 1.5 and Appendix A summarize the regulatory framework for cultural resource management, including the requirement for the Services' action to be consistent with the National Historic Preservation Act.

3.7 Land Use

This section describes the land use setting of the Plan Area, including applicable land use regulations. The Plan Area is located entirely within Siskiyou County in northern California. The Plan Area is separated into three management units: Klamath River, Scott Valley, and Grass Lake (Figure 1-1).

3.7.1 Land Use Setting

The Plan Area is entirely privately owned; however, most of the forest abuts or is adjacent to national forest lands, which are under the jurisdiction of USFS. The Plan Area is intermixed with federal and other private lands (Figure 3.7-1). The majority of the surrounding forest lands are part of the KNF. Minor amounts of surrounding forest lands are part of other National Forests, including the Shasta-Trinity National Forest south of the Grass Lake management unit and the Rogue River-Siskiyou National Forest north of the Klamath River management unit. The KNF accounts for the largest proportion of adjacent federal land, although a small portion of the Plan Area is bordered by lands managed by BLM. The Siskiyou County General Plan designates most of the Plan Area as suitable for timber production. The majority of the Plan Area is designated as a timberland production zone (TPZ) in the Siskiyou County Zoning Ordinance.

3.7.1.1 Klamath River Management Unit

The Klamath River management unit is west of Interstate 5, adjacent to and intermixed with KNF lands. The Klamath River management unit is the northernmost holding within the Plan Area and is north of the Scott Valley management unit near the California-Oregon border. The Klamath River management unit covers 65,339 acres. Much of the Klamath River management unit is in "checkerboard" land—land in alternating sections typical of lands granted to the railroad in the nineteenth century—with USFS lands and other private landowners.

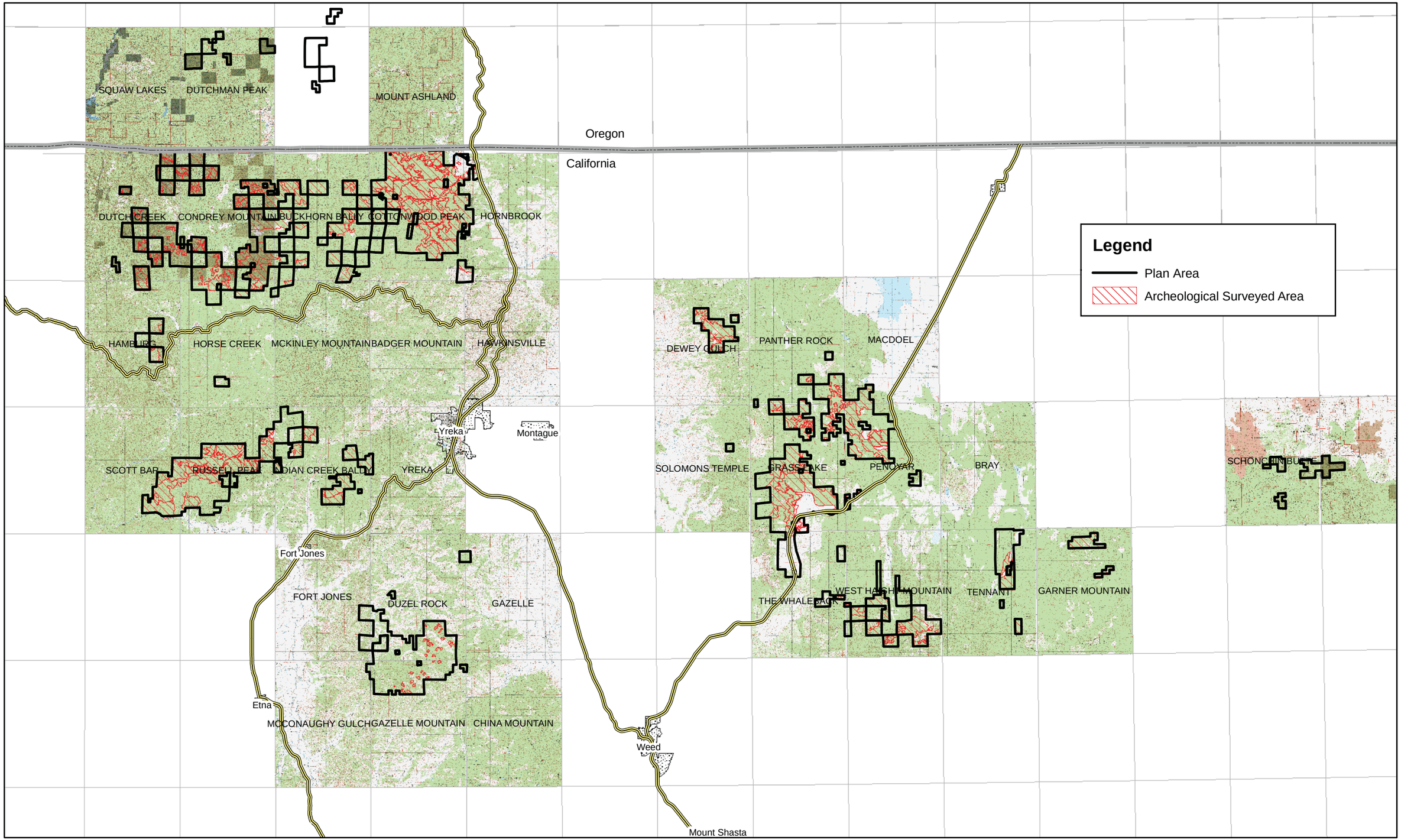

FIGURE 3.6-1
Cultural Resources Surveys

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3.7.1.2 Scott Valley Management Unit

The Scott Valley management unit is west of Interstate 5, adjacent to and intermixed with KNF lands. The Scott Valley management unit covers 39,153 acres and is south of the Klamath River management unit. The Scott Valley management unit, east of the Scott River, also is adjacent to lands under BLM's jurisdiction. These BLM lands are not considered to be of important management concern, and are proposed for sale or other divestment in the BLM's Redding Resource Management Plan (BLM 1993). The Scott Valley management unit generally consists of larger, more contiguous blocks surrounded by USFS lands or private landowners. Adjoining privately owned lands are managed for commercial timber harvest in a manner similar to the Plan Area or are agricultural lands with rural residential use.

3.7.1.3 Grass Lake Management Unit

The Grass Lake management unit is adjacent to KNF lands, east of Interstate 5, and predominantly north of State Highway 97. The Grass Valley management unit covers 47,686 acres. The Grass Lake management unit generally consists of larger, more contiguous blocks surrounded by USFS lands or private landowners. Adjoining privately owned lands are managed for commercial timber harvest in a manner similar to the Plan Area or are agricultural lands with rural residential use.

3.7.2 Land Use Regulations

In addition to the regulations summarized in Section 1.5 and described in Appendix A, the following regulations specifically apply to the analysis of land use impacts.

3.7.2.1 State

California Timberland Productivity Act of 1982. The California Timberland Productivity Act (TPA) protects properly conducted timber operations from being prohibited or restricted due to conflict or apparent conflict with surrounding land uses. The TPA reinforces the prior Forest Taxation Reform Act of 1976, which directs counties to designate and zone lands for the primary use of timber production. Counties designate parcels used for the growing and harvesting of timber as TPZ. Within the TPZ district, land uses are limited to the growing and harvesting of timber and compatible uses. The TPA states that "timber operations conducted [on TPZ land pursuant to the CFPRs]…shall not constitute a nuisance, public or private."

The TPZ designation gives landowners tax incentives to keep their land in timber production, consistent with the legislative intent to "maintain the optimum amount of the limited supply of timberland to ensure its current and continued availability for the growing and harvesting of timber and compatible uses."

The Right to Farm Act (California Civil Code, Section 3482.5). This Act generally establishes that no agricultural activity, including timber harvesting, conducted or maintained for commercial purposes in a manner consistent with proper and accepted standards, and as established and followed by similar agricultural operations in the same locality, shall be or become a nuisance, private or public, due to any changed condition, after it has been in operation for more than three years if it was not a nuisance at the time it began.

3.7.2.2 Local

Siskiyou County General Plan. Specific land use designations are not applied to individual parcels by the Siskiyou County General Plan; rather, general land use suitability classifications are given. The Siskiyou County General Plan designates most of the Plan Area as suitable for timber production.

Siskiyou County Zoning Ordinance. The majority of the Plan Area is designated as TPZ in the Siskiyou County Zoning Ordinance. This zoning district was established by Siskiyou County in accordance with the TPA. Land use in the TPZ district is restricted to growing and harvesting timber and compatible uses, and establishes a presumption that timber harvesting is expected to and will occur on such lands.

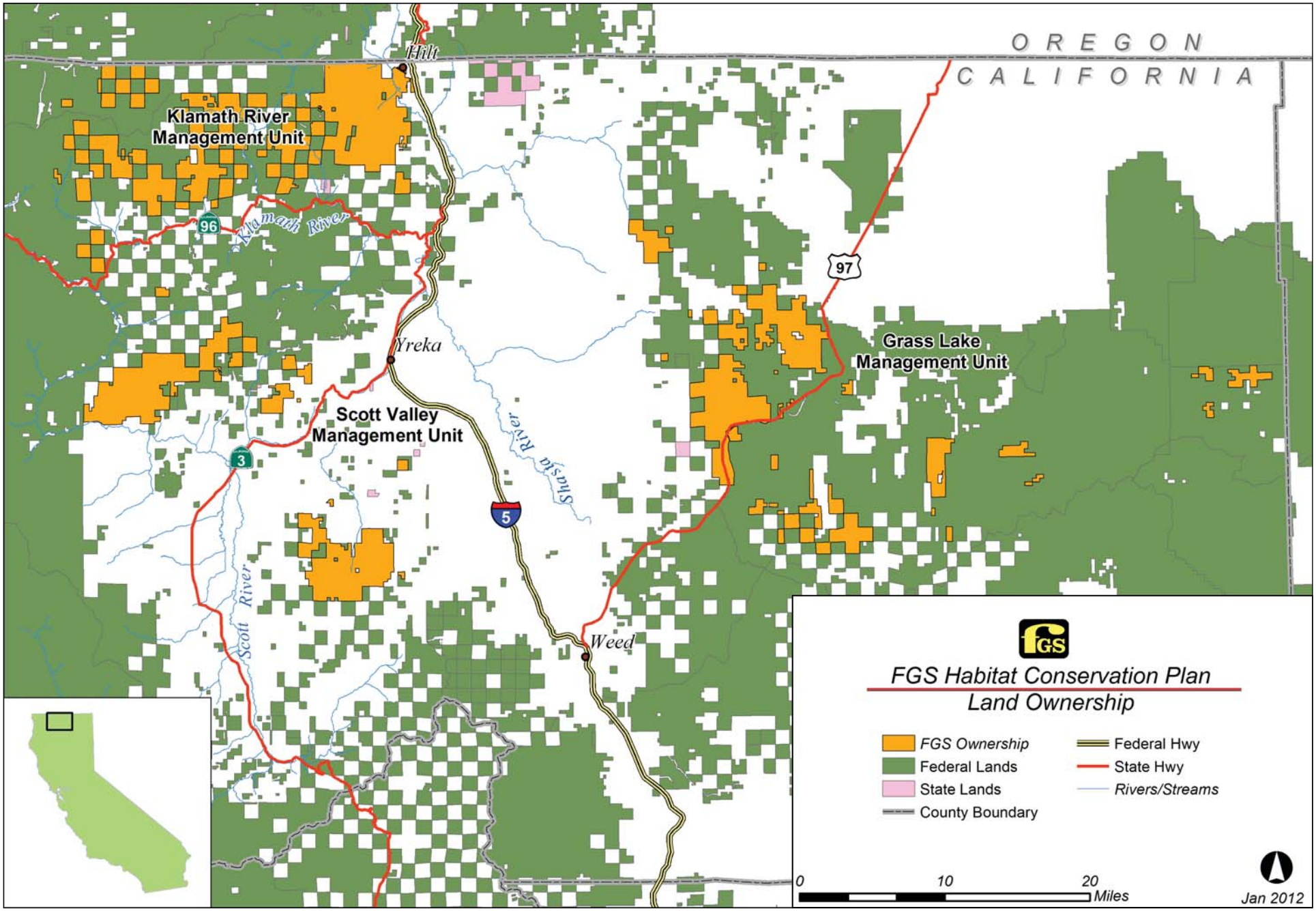

FIGURE 3.7-1
Land Ownership in the Plan Area and Vicinity

CHAPTER 4

Environmental Consequences

This chapter describes the anticipated consequences to environmental resources potentially affected by implementing the Proposed Action and the alternatives.

4.1 Geology

Section 3.1 provided a broad overview of how geologic characteristics, such as geomorphic terrains, and anthropogenic characteristics, such as road networks, relate to sediment production and delivery in the Plan Area. This section evaluates the potential impacts to sediment production and delivery processes (i.e., hillslope mass wasting, road-related sediment production, and soil erosion) resulting from implementing the alternatives.

Potential adverse impacts include acute or chronic changes in geomorphic and hydrologic processes that affect sediment production and delivery to streams in the Plan Area. Potential effects could be localized or dispersed over a wide area. Primarily, these effects are related to movement of surface materials, including sediment and soils, through hillslope mass wasting and surface erosion. When delivered to streams, these materials can affect water quality and fish habitat. Secondary impacts to water quality and fish habitat are described in Sections 4.2 and 4.3, respectively.

Excessive sediment inputs, both coarse and fine, can result in adverse effects to watercourses in the Plan Area. The Scott River watershed has been listed as impaired under the Clean Water Act Section 303(d) relative to sediment. Any future management-related sediment delivery to this impaired stream above existing levels could prolong or increase the level of impairment. Although not all Plan Area streams are listed as impaired for sediment, the following assessment of the alternatives assumes that all streams may currently be adversely affected by sediment, and that additional sediment delivery in excess of background levels would have negative effects on aquatic habitats.

Timber harvest activities (felling and yarding) not directly associated with roads can increase direct sediment input to streams through mass wasting and surface erosion. The occurrence of mass soil movement may also increase after timber harvesting, depending in part on the type and intensity of harvest methods (Rood 1984; Swanson et al. 1987). With respect to shallow landslide processes and slope stability, harvesting trees reduces effective soil cohesion by disrupting networks of interlocking roots from living trees, and increases soil moisture by reducing interception of precipitation and evapotranspiration of soil water. Deep-seated landslides may also be affected by the hydrologic changes associated with reduced evapotranspiration and reduced canopy interception during rainstorms (CGS 1999). Timber harvest may increase the amount of bare soil exposed to rainfall and runoff, leading to increased surface erosion.

In addition, construction and use of roads for timber harvesting can result in increased erosion rates within a watershed, especially at stream crossing locations because sediment has a relatively short transport distance to watercourses. Through creation of cut and fill

slopes too steep to be stable, deposition of sidecast material (spoils) that overburdens and/or oversteepens slopes, and diversion and/or concentration of both surface and subsurface runoff, road construction can lead to increases in the incidence of shallow mass soil movement. Deep-seated landslides (earthflows and rockslides) may be destabilized by undercutting of the landslide toe (e.g., by streambank erosion or excavation of road cuts), by adding significant mass to the landslide body (e.g., disposing of spoils from grading or excavation projects), or by significantly altering the groundwater conditions in a landslide (e.g., diversion of road drainage into head scarps or lateral scarps) (Transportation Research Board 1996).

4.1.1 No Action Alternative

Under the No Action Alternative, the level of harvest, silvicultural methods used, and drainage area affected by harvest would not change substantially from current operations. Therefore, forest stand conditions that can affect mass wasting processes would not substantially change from existing conditions, and the potential for increased sediment delivery due to these processes would be minimal.

In addition to other riparian management measures, general WLPZ conservation measures such as the limitations on equipment use, seeding and mulching of areas of ground disturbance larger than 100 square feet in WLPZs, and limitations on site preparation in WLPZs and ELZs would contribute to minimizing the effects of timber harvest on hillslope mass wasting adjacent to watercourses. Specific Class I WLPZ conservation measures, such as retention of the ten largest trees likely to contribute to in-stream LWD and restrictions on salvage logging, may also contribute to mitigating the effects of management-related increased sediment loads on the aquatic covered species.

Sediment production from hillslope mass wasting is greatest in steep streamside slopes, headwall swales, and historically active deep-seated landslides. Implementation of the measures for aquatic protection measures in watersheds with listed anadromous salmonids under the No Action Alternative would result in these sensitive areas receiving additional protection by establishing Special Management Zones (SMZs) for inner gorges along Class I watercourses and geologic review of all planned operations on slopes exceeding 65 percent within an inner gorge along Class I and II watercourses. Additionally, tree retention standards in the WLPZs are expected to maintain a network of live roots that would provide soil cohesion and contribute to bank stability in these areas. These conservation measures would minimize the potential for harvest-related mass wasting within harvest units adjacent to watercourses.

Under the No Action Alternative, the applicant would continue to use the existing road network. Future road construction in the Plan Area would consist primarily of short temporary spurs designed to locate landings at stable areas outside the wider WLPZs. These temporary roads would generally be utilized for one harvest season, and then will be decommissioned. New road construction is anticipated to average less than 1 mile per year. At the same time, the applicant anticipates decommissioning many of their seasonal roads such that there would be a gradual reduction in active road mileage over the next 50 years. Therefore the road density in the Plan Area would decrease slightly in the future compared to existing conditions.

Although the applicant would continue to build new roads to gain access to and manage its lands, new road building would be minimal and all new roads and landings would be constructed in accordance with practices specified in the CFPRs. Limitations on road construction and reconstruction on unstable slopes and in WLPZs would likely result in avoiding or reducing the undercutting and overburdening of sensitive hill slopes, helping to avoid unnatural concentration of storm runoff on these slopes. The implementation of SMZs for inner gorges along Class I watercourses would reduce the potential for road-related sediment delivery to streams in the Plan Area. It is expected that sediment delivery due to the applicant's road-building activities would be reduced slightly over time under the No Action Alternative as roads are maintained, upgraded, and decommissioned. It is also anticipated, therefore, that suspended sediment levels, turbidity, and nutrient and contaminant loading would also be reduced somewhat under the No Action Alternative relative to existing conditions.

Under the No Action Alternative, road inventories would not be conducted in a systematic and prioritized manner and would only cover the area identified in the individual THPs. Repairs and upgrades that address road-related sediment sources identified during the inventories would be limited to the THP area and appurtenant roads; therefore, many large-scale repairs could go unrepaired for several years if they are not associated with a THP. However, it is likely that over the next 50 years, nearly all road segments would be inventoried through the THP process.

Under the No Action Alternative, the level of harvest, silvicultural methods used, and drainage area affected by harvest would not change substantially from current operations. Therefore, forest stand conditions that can affect surface erosion would not substantially change from existing conditions, and the potential for increased sediment delivery due to these processes would be minimal.

Under the No Action Alternative, riparian management prescriptions specified in the CFPRs include measures designed to impede sediment delivery in areas where sediment would have relatively short transport distances to watercourses. These measures include high levels of overstory canopy retention standards within WLPZs, limitations on equipment use, retention of trees likely to recruit as LWD, and retention of trees that contribute to maintaining bank stability. Implementation of the WLPZ management measures is expected to result in almost no loss in total forest canopy in the inner zone of WLPZs along Class I watercourses, and is anticipated to increase overstory canopy along Class II watercourses relative to existing conditions. An increase in overstory canopy would impede surface erosion as a result of direct rainfall impact during precipitation events in these critical areas.

Under the No Action Alternative, conservation measures in the CFPRs addressing harvest-related ground disturbance focus on minimizing ground disturbance and exposure of bare mineral soil within harvest units. These measures include: (1) site-specific treatments to stabilize soils, minimize soil erosion, and prevent the discharge of sediment (includes mulching, rip-rapping, grass seeding, or chemical soil stabilizers); (2) identification, assessment, and development of feasible remediation actions for all active erosion sites in the logging area; (3) limiting use of ground-based yarding; and (4) use of cable or aerial yarding systems on steeper slopes. All of these conservation measures would minimize the potential for harvest-related soil erosion within harvest units.

4.1.2 Proposed Action

Sediment production from hillslope mass wasting within the Plan Area is greatest in steep streamside slopes, headwall swales, and historically active deep-seated landslides. Implementation of the HCP under the Proposed Action would result in these sensitive areas receiving additional protection by (1) requiring review by a professional geologist where harvesting is proposed on a connected headwall swale to ensure that proposed activities do not present a greater risk of sediment delivery from mass wasting, and (2) establishing Special Management Zones (SMZs) for inner gorges along Class I, II, and III watercourses. Additionally, tree retention standards in the WLPZs and areas of recognized instability are expected to maintain a network of live roots that would provide soil cohesion and contribute to slope stability in these areas. These conservation measures would minimize the potential for management-related mass wasting within harvest units and adjacent to watercourses and are anticipated to result in a reduction in sediment delivery from these areas compared to under the No Action Alternative.

As under the No Action Alternative, the applicant would continue to use the existing road network under the Proposed Action. The applicant would use existing roads whenever feasible; strive to minimize total mileage; minimize disturbance to natural features; avoid wet areas and unstable areas; and minimize the number of watercourse crossings. New road construction is anticipated to average less than 1 mile per year. At the same time, the applicant anticipates decommissioning many of their seasonal roads such that there will be a gradual reduction in active road mileage over the Permit Term.

As under the No Action Alternative, limitations on road construction and reconstruction on unstable slopes and in WLPZs would likely result in avoiding or reducing the undercutting and overburdening of sensitive hill slopes, helping to avoid unnatural concentration of storm runoff on these slopes. The implementation of SMZs would reduce potential for sediment delivery to streams in the Plan Area.

Road-related erosion is known to be a substantial contributor to the sediment budget in most managed watersheds. Under the Proposed Action, road inventories and treatment of sites exhibiting sediment delivery would be conducted in a systematic and prioritized manner and would cover the applicant's entire ownership in the drainages being inventoried. Implementation of the HCP under the Proposed Action provides an accelerated time frame for inventory and repair of high- and moderate-risk sediment delivery sites on roads in the Plan Area compared to the No Action Alternative, under which road inventories would occur over a longer period of time on a THP by THP basis.

Road inventories within drainages that support anadromous salmonids would be completed within 15 years and many of the high and moderate sediment delivery potential sites would be treated, leading to a 50 percent reduction in sediment delivery from these sites within this same period. The road inventories would be repeated on an approximately 10-year cycle to identify new treatment sites and evaluate the effectiveness of prior treatments. The applicant's Draft Road Management Plan – Operations Guide and associated conservation measures under the Proposed Action (Section 2.2.2) would reduce road-related sediment production and delivery to Plan Area watercourses relative to measures under the No Action Alternative.

Similar to the No Action Alternative, riparian management prescriptions in the HCP that would be implemented under the Proposed Action include conservation measures designed to impede sediment delivery from surface erosion in areas where sediment would have relatively short transport distances to watercourses. Like the No Action Alternative, implementation of the WLPZ management measures is expected to result in almost no loss in total forest canopy in the inner zone of WLPZs along Class I watercourses, and is anticipated to increase overstory canopy along Class II watercourses relative to existing conditions. Increased overstory canopy would impede surface erosion as a result of direct rainfall impact in these critical areas, where sediment would have relatively short transport distances to watercourses. Conservation measures addressing harvest-related ground disturbance focus on minimizing ground disturbance and exposure of bare mineral soil within harvest units. Implementation of the riparian and ground disturbance conservation measures are anticipated to result in reductions in sediment delivery from surface erosion similar to the No Action Alternative.

4.1.3 Alternative A

Under Alternative A, the applicant would continue to conduct timber harvesting on its property in accordance with existing regulations and management practices, supplemented by a conservation strategy specific to this alternative. This strategy would include riparian reserves, within which no management or timber harvesting would occur, adjacent to all streams and lakes. These conservation measures would minimize the potential for management-related mass wasting within harvest units and adjacent to watercourses and are anticipated to result in a reduction in sediment delivery from these areas compared to under the No Action Alternative.

As under the No Action Alternative, the applicant would continue to use the existing road network under Alternative A. The applicant would use existing roads whenever feasible; strive to minimize total mileage; minimize disturbance to natural features; avoid wet areas and unstable areas; and minimize the number of watercourse crossings. New road construction is anticipated to average less than 1 mile per year. At the same time, the applicant anticipates decommissioning many of their seasonal roads such that there would be a gradual reduction in active road mileage over the Permit Term, similar to that anticipated under the No Action Alternative.

Under Alternative A, the applicant would not implement the comprehensive, ownership-wide Road Management Plan, or additional slope stability measures contained in the Proposed Action, therefore, Alternative A would provide a degree of protection against road-related sediment delivery and hillslope mass wasting in the Plan Area similar to the No Action Alternative.

Overall, implementation of Alternative A would result in improved erosion and sediment control compared to existing conditions or to conditions anticipated to occur under the No Action Alternative, although the improvements would not be as great as those that would occur under the Proposed Action. The wider riparian reserves established under this alternative would not be harvested. Thus, under Alternative A, there would be no loss in total forest canopy along Plan Area watercourses and increased overstory canopy in the riparian reserves would impede surface erosion as a result of direct rainfall impact in these critical areas. On this basis, the riparian measures associated with Alternative A are

anticipated to result in reductions in sediment delivery from surface erosion greater than the reductions expected to occur under the No Action Alternative.

4.1.4 Alternative B

Similar to the No Action Alternative, the level of harvest, silvicultural methods used, and drainage area affected by harvest under Alternative B would not change substantially from current operations. Therefore, forest stand conditions that can affect mass wasting processes and would not substantially change from existing conditions, and the potential for increased sediment delivery due to these processes would be minimal.

Under Alternative B, the applicant would adopt conservation measures for aquatic species that would be similar to the No Action Alternative, with application of the measures for protection of coho salmon and other salmonid species in selected watersheds with listed anadromous salmonids in all Class A and B designated lands. Watersheds with listed anadromous salmonids are defined as any planning watershed where the presence of anadromous salmonids listed as threatened, endangered, or candidate under the State or Federal Endangered Species Act, has been documented or restorable habitat exists. The ASP Rules applied in watersheds with listed anadromous salmonids are described in detail in Section 2.1, No Action Alternative. Similar to the No Action Alternative, the ASP Rules would also be implemented under Alternative B on a THP-by THP basis where and when incidental take of coho salmon could occur.

Under Alternative B, road and landing construction, maintenance, and management activities, and other management activities would remain the same as under the No Action Alternative. Under Alternative B, the road management and sediment control measures in the HCP that would be implemented under the Proposed Action would not be implemented, thus road management and slope stability measures under this action alternative would be the same as under the No Action Alternative.

As under the No Action Alternative, the applicant would continue to use the existing road network under Alternative B. The applicant would use existing roads whenever feasible; strive to minimize total mileage; minimize disturbance to natural features; avoid wet areas and unstable areas; and minimize the number of watercourse crossings. New road construction is anticipated to average less than 1 mile per year. At the same time, the applicant anticipates decommissioning many of their seasonal roads such that there would be a gradual reduction in active road mileage over the Permit Term, similar to that anticipated under the No Action Alternative.

Similar to the No Action Alternative, conservation measures in the CFPRs addressing harvest-related ground disturbance focus on minimizing ground disturbance and exposure of bare mineral soil within harvest units. These conservation measures would minimize the potential for harvest-related soil erosion within harvest units. Riparian management prescriptions specified in the CFPRs include measures designed to impede sediment delivery in areas where sediment would have relatively short transport distances to watercourses. These measures include high levels of overstory canopy retention standards within WLPZs, limitations on equipment use, retention of trees likely to recruit as LWD, and retention of trees that contribute to maintaining bank stability. Implementation of the WLPZ management measures is expected to result in almost no loss in total forest canopy in

the inner zone of WLPZs along Class I watercourses, and is anticipated to increase overstory canopy along Class II watercourses relative to existing conditions. An increase in overstory canopy would impede surface erosion as a result of direct rainfall impact during precipitation events in these critical areas. Impacts under Alternative B would be similar to those that would occur under the No Action Alternative.

4.1.5 Summary of Effects

Table 4.1-1 summarizes the effects of the alternatives on geology. Effects of the No Action Alternative are relative to existing conditions. Effects of the Proposed Action, Alternative A, and Alternative B are relative to the No Action Alternative.

TABLE 4.1-1
Alternatives Comparison Table—Geology

Subcategory	No Action	Proposed Action	Alternative A	Alternative B
Hillslope Mass Wasting	Slight reduction resulting from implementation of CFPRs, including ASP Rules	Greater reductions through implementation of slope-stability measures	Similar to No Action Alternative	Similar to No Action Alternative
Road-related Sediment Production	Reduction over time as roads are maintained, upgraded, and decommissioned on a THP-basis	Greater reductions through implementation of the Road Management Plan – Operations Guide	Similar to No Action Alternative	Similar to No Action Alternative
Surface Erosion	Slight reduction resulting from implementation of CFPRs, including ASP Rules	Similar to No Action Alternative	Greater reduction due to wider, no-harvest riparian buffers	Similar to No Action Alternative

4.2 Water Resources

This section evaluates the potential impacts to hydrology and water quality as a result of implementing the alternatives. For hydrology, the evaluation focuses on activities and changes in forest stands that alter hydrologic processes and could potentially impact covered species in Plan Area streams; this includes potential changes in the timing and magnitude of flow events. Impacts to water quality are analyzed based on anticipated changes in harvest, riparian management, and other activities that can affect water temperatures, sediment input, and other water quality parameters (nutrients and dissolved oxygen).

The following is a general discussion of how the applicant's activities can affect hydrologic processes and water quality through alteration of stream flows, water temperatures, sediment input rates, and nutrient inputs. For a more detailed discussion of the effects of forest management on these watershed processes and products see Chapter 6 of the proposed HCP. The general discussion is followed by an assessment of the impacts that would occur to hydrology and water quality under each of the four alternatives. This

evaluation focuses on the potential impacts to watersheds through changes in flow, water temperature, nutrients, and dissolved oxygen. Potential impacts due to alteration of watershed processes that affect sediment input were described in Section 4.1, Geology, and are summarized below. It is not anticipated that the applicant's activities would substantially alter the regional climate given its limited ownership (relative to the region) and the "patchwork" nature of the ownership interspersed with federal lands and other private timberlands. The applicant's potential contribution to global climate change is discussed in Section 4.5 of this EIS.

4.2.1 Surface and Groundwater Hydrology

Forest management activities can affect hydrologic processes that determine stream flows (surface hydrology) and groundwater recharge. Alteration of snow pack, enhancement of runoff throughout timber harvest units or along roads, interception of groundwater flows by roads, and alteration of evapotranspiration through changes in forest structure all have the potential to affect hydrology in the Plan Area (Beschta et al. 1995; Ziemer 1998). The primary effects of timber management activities on hydrology pertain to peak flows, low (base) flows, water yield, and runoff timing (Spence et al. 1996). In rain-dominated systems in the Coast Range, increases in peak flows, water yield, and summer flows have been observed following timber harvesting activities.

Removal of vegetation (e.g., timber harvest) reduces evapotranspiration, which increases the amount of water that infiltrates the soil and ultimately reaches the stream. Increases in soil moisture can contribute to an increased risk of mass wasting (Sidle et al. 1985; Schmidt et al. 2001). The effect of any reduction in evapotranspiration is typically short lived (3 to 5 years), because regrowth of vegetation may consume more water than pre-timber harvest amounts (Harr 1977). Streams draining recently logged areas may see increased summer flows (Keppeler 1998). Many paired watershed studies have found increases in summer base flow and total water yield (Bosch and Hewlett 1982).

Forest management activities, such as yarding, burning, or road and skid trail construction, may alter both surface and subsurface (groundwater) pathways that transport water to streams (Thomas et al. 1993; Murphy 1995; Keppeler and Brown 1998). Soil compaction caused by heavy equipment can decrease infiltration capabilities, increasing surface runoff. Ditches associated with roads collect runoff and intercept subsurface flows, and route them to streams more quickly. Timber harvest and road construction alter runoff by accelerating surface flows from hillsides to stream channels (Chamberlin et al. 1991; McIntosh et al. 1994). These accelerated flows can increase peak flows during rainstorms (Ziemer 1998).

4.2.1.1 No Action Alternative

Under the No Action Alternative, the applicant would continue to implement a schedule and rate of tree harvesting that seeks to balance timber harvesting with replacement tree growth. The take prohibitions for northern spotted owl and coho salmon would result in the applicant needing to harvest intensively across a large area in order to achieve its timber harvest goals. The level of harvest, silvicultural methods used, and drainage area affected by harvest would not change substantially from current operations. Therefore, forest stand conditions that can affect surface and groundwater hydrology would not substantially

change from current conditions, and the potential for altered hydrology due to timber harvest would be minimal.

Under the No Action Alternative, WLPZs, ELZs, and EEZs would be established along Plan Area streams, and other protective measures in the CFPRs would minimize the potential for soil compaction from use of heavy equipment in these areas. Additionally, for those areas where heavy equipment would be used, site preparation measures (including seasonal operating limitations) would minimize the potential for ground compaction related to timber harvest activities. These harvest-related ground disturbance prevention measures are expected to contribute to reducing the potential for adverse impacts of operations-related alterations in surface and subsurface hydrology by minimizing soil compaction that can increase the magnitude of peak flows and affect groundwater recharge.

Under the No Action Alternative, the applicant would continue to implement current road management practices as specified in individual THPs and detailed in Section 2.1.2. This would include road upgrading, maintenance, and decommissioning, as well as the construction of new roads in connection with timber management. The maintenance, improvement, construction, and closure of roads and landings under the No Action Alternative would not substantially change hydrologic conditions from those that currently exist.

Water drafting for road construction and maintenance, as well as for local fire suppression activities, would continue under the No Action Alternative. However, the applicant currently does not divert substantial quantities of water from streams in the Plan Area, and under the No Action Alternative the rate or amount of water drafting is not expected to increase. Water drafting from within the channel zone of a natural watercourse or from a lake would conform to the water drafting guidelines contained in the CFPRs. The water drafting guidelines would help ensure that flows in Plan Area streams would not change substantially compared to existing conditions.

4.2.1.2 Proposed Action

Under the Proposed Action, issuance of the ITPs would allow the applicant to harvest more of the currently suitable northern spotted owl habitat in the Plan Area, reducing the amount of even-aged regeneration harvest (clearcutting) necessary to meet its financial targets. Under the Proposed Action, it is anticipated that there would be about a 10 percent decrease in acres harvested each decade, including as much as a 25 percent decrease in even-age regeneration harvest (clearcuts), compared to the No Action Alternative. A reduction in clearcutting would contribute to maintenance or improvement of existing hydrologic conditions.

Under the Proposed Action, the WLPZs, ELZs, and EEZs that would be established along Plan Area streams would be similar to those established under the No Action Alternative. Similar to the No Action Alternative, other protective measures in these areas would contribute to reducing the potential for operations-related changes in surface and subsurface hydrology by minimizing soil compaction that can increase the magnitude of peak flows. The road management measures implemented under the Proposed Action would have greater influence on area hydrology through the hydrologic disconnection of the existing road network from area streams. It is anticipated that approximately 10 to 20 percent of

hydrologically connected roads over which the applicant has jurisdiction will be disconnected within the first five years. This would have the combined effect of decreasing peak flows in affected stream channels, reducing the amount of sediment delivered to those channels, and reducing the potential for the geomorphic destabilization of the associated stream network, all of which contribute to net positive impacts on hydrology in the Plan Area.

Through the use of decreased cross-drain and rolling dip spacing, and outsloping, as specified in the applicant's Road Management Plan – Operations Guide (see Appendix B of the proposed HCP), the amount of concentrated surface runoff at any point will decrease. Ditch water will be dispersed onto the forest floor where it can infiltrate and reduce the effects of increased peak flow caused by the road network. The reduction in concentrated runoff will contribute to improved hydrologic conditions anticipated over the permit term.

Water drafting for road construction and maintenance, as well as for local fire suppression activities, would continue under the Proposed Action. However, water drafting from within the channel zone of a natural watercourse or from a lake would conform to the water drafting guidelines identified for the No Action Alternative. The water drafting guidelines would help ensure that any alteration of hydrologic conditions due to water drafting would be the same as under the No Action Alternative.

A more intact overstory canopy and greater retention of trees required by the conservation measures in the HCP that would be implemented under the Proposed Action will improve the recharge of shallow water and deep water aquifers by providing increased interception, reducing surface runoff velocities and increasing soil porosity, and allowing more precipitation to infiltrate into the soils as opposed to rapidly running off the land to a downslope area.

4.2.1.3 Alternative A

Under Alternative A, harvest would be constrained in CSAs established for protection of northern spotted owls and in riparian reserves. By constraining harvest on at least 30,000 acres of productive (often prime) timberland in CSAs and riparian reserves, the applicant has indicated that it would harvest more intensively on its remaining timberlands. The applicant would increase the amount of even-aged regeneration harvest each year to make up for the timber volume encumbered in riparian reserves, leading to at least a 10 percent increase in the acreage subject to clearcutting compared to the No Action Alternative. This increase in clearcutting has the potential to result in increases in peak flow events where clearcutting affects a high percentage of the drainage area. This impact would be temporary in nature and offset by the unharvested area in riparian reserves.

Although increased levels of clearcutting may affect groundwater recharge, it is unlikely that upslope clearcutting would affect groundwater levels in the near-stream environment, or affect hyporheic exchange within the stream channel. This is because steep valley slopes induce high rates of surface runoff in the upslope areas, and in the Scott and Klamath watersheds, the bedrock geology is largely impermeable, and not conducive to groundwater infiltration. Thus, clearcutting in the upslope environments would likely influence higher rates of surface runoff, but not necessarily affect groundwater processes. While it is likely

that upslope clearcutting would influence soil surface drying in the summer months, this would not affect aquatic conditions or the riparian environment.

Under Alternative A, riparian reserves would be established along the stream network within the Plan Area consistent with the aquatic conservation strategy of the NWFP. Programmed timber harvest within these riparian reserves would be prohibited such that no-harvest buffers would be established for five categories of streams or water bodies. Compared to the No Action Alternative and other action alternatives (including the Proposed Action), the riparian reserves proposed in Alternative A would provide a greater amount of riparian protection around Plan Area streams, both in terms of the width of the buffer as well as more limitations on potentially impacting activities within the buffers (such as absolute restrictions on timber harvest). Overall, the wide, no-harvest riparian reserves would provide a greater degree of protection for the hydrologic processes affected by timber harvest and management activities in the riparian zone than the No Action Alternative. Specifically, the proposed riparian conservation measures would:

- Increase the density and composition of vegetation in the riparian zone, thus decreasing the quantity and rate of surface runoff through direct interception and infiltration. A dense vegetative root mass would serve to increase the rate of surface water infiltration through the presence of added organic "roughness" to surface flow paths, as well as facilitate biological activity along the riparian forest floor and in the subsurface, supported by the continual input of organic detritus. Some organisms actively burrow and forage in the soil layer, maintaining a high degree of porosity and thus facilitating high rates of infiltration.
- Reduce the amount of soil compaction in the riparian zone, thus increasing the rate of surface runoff infiltration, and increasing the rate and amount of shallow and deep groundwater recharge.
- Increase the overall geomorphic stability of streams in the Plan Area, by reducing the rate of water delivery to the channel network during runoff events, and increasing the amount of in-channel roughness to reduce in-stream velocities.

Due to the designation of a substantially wider buffer and prohibition of timber harvesting within the buffer, it is anticipated that greater amounts of vegetation would exist within the riparian zone and floodplain terraces. This could improve the recharge of shallow water and deep water aquifers by providing increased interception, reducing surface runoff velocities and increasing soil porosity, and allowing more precipitation to infiltrate into the soils as opposed to rapidly running off the land to a downslope area (Welsch 1991). In certain areas, this would allow a greater amount of cold groundwater recharge into stream channels during the warmer summer months, moderating surface water temperatures.

Under Alternative A, the road management and sediment control measures in the HCP that would be implemented under the Proposed Action would not be implemented, thus road management and slope stability measures under this action alternative would be the same as under the No Action Alternative. Road inventories would not be conducted in a systematic and prioritized manner and would only cover the area identified in the individual THPs. Road upgrades, including the hydrologic disconnection of roads from area streams, would occur in association with THP implementation rather than in a systematic,

prioritized manner as under the Proposed Action. The effects of road maintenance, construction, upgrading, and decommissioning activities on surface and groundwater hydrology would be similar to the No Action Alternative.

4.2.1.4 Alternative B

Under Alternative B, the application of the ASP Rules in all Class A and B designated lands would be in the same asunder the No Action Alternative. The ASP Rules described in the No Action Alternative would also be implemented under Alternative B where and when incidental take of coho salmon could occur. Under Alternative B, road and landing construction, maintenance, and management activities, and other management activities would remain the same as under the No Action Alternative. Because timber harvesting and forest management activities, as well as road management and riparian conservation measures, under Alternative B would be substantially the same as under the No Action Alternative, potential effects on hydrologic conditions from these activities within the Plan Area would be the same as described for the No Action Alternative.

However, timber harvest would be distributed across the entire ownership because CSAs would not be established around specific activity centers as under the Proposed Action and Alternative A. The applicant would be able to maintain financial viability with less harvest than under the No Action Alternative because it would be able to harvest more of the ownership currently considered habitat for northern spotted owl. Areas of habitat generally have more and larger trees, such that they provide more timber volume per acre than non-habitat areas. The amount of even-aged regeneration harvest (clearcutting) would likely be reduced by up to 20 percent compared to the No Action Alternative. A reduction in clearcutting would contribute to maintenance or improvement of existing hydrologic conditions over the Permit Term.

4.2.2 Water Temperature

Removal of the riparian canopy can result in elevated summer water temperatures, often in direct proportion to the increase in incident solar radiation that reaches the water surface (Chamberlin et al. 1991). High levels of canopy coverage are believed to contribute to stream shading and maintenance of cool stream temperatures (Welsch 1991). The influence of shading provided by riparian vegetation on stream temperature differs depending on a variety of factors, including stream size, position in the watershed, drainage orientation, and local climatic influences. Exposed channels will also radiate heat more rapidly at night. Sediment input, particularly increases in fine sediment, can affect stream temperatures through changes in channel morphology such as reduced pool volume and increased channel width (Rhodes et al. 1994; Lewis 1998), potentially leading to elevated water temperatures. Temperature data within the Plan Area indicate that water temperatures are generally favorable for the covered aquatic species throughout the Plan Area.

4.2.2.1 No Action Alternative

Under the No Action Alternative, the applicant would remain subject to the provisions of the CFPRs, including the THP provisions for riparian management that require retention of high levels of canopy coverage along Class I and II watercourses. These requirements will ensure that a high number of trees that contribute to stream shading are retained. The canopy coverage and tree retention standards would help to maintain high levels of canopy

cover in the critical "inner zone" where stream shading and microclimate effects are anticipated to have the greatest potential to affect water temperatures. Overstory canopy closure would likely increase relative to existing conditions in stands as they regenerate following timber harvesting. The overall increase in overstory canopy closure is anticipated to result in minor decreases in water temperatures in Plan Area streams. In general, decreases in stream temperatures are considered beneficial to anadromous salmonids and other aquatic species. Controls on sediment delivery to streams as a result of slope stability and sediment management provisions in the CFPRs will be enacted as part of the THPs. Any adverse change in water temperature as a result of sedimentation is likely to be spatially limited and temporary in nature and would be offset by the decrease in stream temperatures as a result of increased canopy coverage over the long term.

4.2.2.2 Proposed Action

Implementation of riparian conservation measures under the Proposed Action would help to maintain high levels of canopy cover in the critical "inner zone" where stream shading and microclimate effects are anticipated to have the greatest potential to affect water temperatures. Like the No Action Alternative, overstory canopy closure is likely to increase relative to current conditions in all stands as they regenerate following timber harvesting. In drainages with Class A lands, harvest of trees that provide direct shading to pools in Class I streams would be prohibited, leading to an increase in stream shading relative to the No Action Alternative. The overall increase in overstory canopy closure is anticipated to result in minor decreases in water temperatures in Plan Area streams over the permit term, comparable to the No Action Alternative. In general, decreases in stream temperatures are considered beneficial to anadromous salmonids and other aquatic species. Any adverse change in water temperature as a result of sedimentation is likely to be spatially limited and temporary in nature and would be offset by the decrease in stream temperatures as a result of increased canopy coverage over the long term.

Implementation of the road management and slope stability measures in the proposed HCP are anticipated to reduce the level of sediment delivery to Plan Area streams relative to the No Action Alternative. Reduced sediment delivery to streams under the Proposed Action could indirectly contribute to minor decreases in water temperature. Given that water temperatures are generally favorable for the covered aquatic species throughout the Plan Area even with past and current levels of sediment delivery, reduced sediment delivery under the Proposed Action would reduce the likelihood that aggradation of channels would occur and contribute to elevated water temperatures

4.2.2.3 Alternative A

Under Alternative A, timber harvesting activities would be prohibited within the riparian reserves, and wider, more vegetated buffers would be provided than under the No Action Alternative or other action alternatives. Establishment of wide, no-harvest buffers would result in a greater amount of canopy closure in riparian areas compared to the No Action Alternative and other action alternatives. Increased canopy closure in riparian areas is anticipated to result in minor decreases in water temperatures in Plan Area streams over the permit term, greater than under the No Action Alternative and the other action alternatives.

In the long term, the riparian reserves established under Alternative A will provide a greater amount of hydrologic and geomorphic stability to the stream channel network, ultimately reducing the amount of sedimentation occurring in the channel network due to localized channel instability (manifested by eroding channel bed and banks). Given that water temperatures are generally favorable for the covered aquatic species throughout the Plan Area even with past sediment inputs, reduced sedimentation under Alternative A would reduce the likelihood that aggradation of channels would result in elevated water temperatures.

4.2.2.4 Alternative B

Functionally, Alternative B and the No Action Alternative would have similar effects on the riparian processes that affect stream temperatures. Because timber harvesting and forest management activities, as well as road management and riparian conservation measures, under Alternative B would be substantially the same as under the No Action Alternative, potential effects on stream temperatures within the Plan Area would be the same as described for the No Action Alternative.

4.2.3 Sediment

Sediment impacts are described in Section 4.1, Geology.

4.2.4 Nutrients

Timber harvest in riparian areas can affect nutrient inputs and stream productivity in several ways. Removal of trees directly adjacent to the stream can lead to a reduction in nutrient inputs through decreased leaf and litter fall. Removal of canopy cover also increases the amount of sunlight reaching the stream and can increase algal production (unless it is limited by nitrogen), which may increase the abundance of invertebrates and fish. Studies indicate that nutrients increase in the first few years following logging (Hicks et al. 1991).

4.2.4.1 No Action Alternative

As described previously for stream temperatures, riparian management measures under the No Action Alternative are expected to maintain or enhance existing levels of stream shading and LWD recruitment as compared to the way timber has been managed in the past. These same measures will ensure that nutrient inputs from the adjacent stand are maintained over the long term. Additionally, it is anticipated that sediment delivery due to the applicant's activities would be reduced slightly over time under the No Action Alternative. Some of the nutrient constituents are closely linked to sediment; therefore, sediment-bound nutrient loading may also be somewhat reduced over time relative to existing conditions under the No Action Alternative.

4.2.4.2 Proposed Action

As described for stream temperatures, riparian management measures under the Proposed Action are expected to maintain or enhance existing levels of stream shading and LWD recruitment. These same measures will ensure that nutrient inputs from the adjacent stand are maintained over the long term. Additionally, it is anticipated that sediment delivery due to the applicant's activities under the Proposed Action would be reduced over time

compared to the No Action Alternative. Sediment-bound nutrient loading could also be reduced over time relative to existing conditions and the No Action Alternative.

4.2.4.3 Alternative A

As described for stream temperatures, riparian management measures under Alternative A are expected to enhance existing levels of stream shading and LWD recruitment. These same measures will ensure that nutrient inputs from the adjacent stand are maintained or increased over the long term. Additionally, it is anticipated that sediment delivery due to the applicant's activities would be reduced slightly over time under Alternative A. Sediment-bound nutrient loading may also be somewhat reduced over time, similar to what is anticipated to occur under the No Action Alternative.

4.2.4.4 Alternative B

Functionally, Alternative B and the No Action Alternative would have similar effects on the processes that affect nutrient input to Plan Area streams. Because timber harvesting and forest management activities, as well as road management and riparian conservation measures, under Alternative B would be substantially the same as under the No Action Alternative, potential effects on nutrient inputs to Plan Area streams would be the same as described for the No Action Alternative.

4.2.5 Dissolved Oxygen

The applicant's influence on dissolved oxygen concentrations within the stream network in the Plan Area (and downstream of the Plan Area) is limited to indirect effects due to altered water temperature, sediment input, and flow. It is assumed that any increase in water temperatures and sediment input, as well as any hydrologic alterations as a result of management actions, would negatively affect dissolved oxygen concentrations within the stream network.

As described previously, the applicant's activities and conservation measures under the No Action Alternative, the Proposed Action, and other action alternatives are expected to maintain or improve existing water temperatures and nutrient inputs, decrease sediment inputs, and result in flows comparable to existing conditions. Conservation measures that could affect these processes would have similar effects on dissolved oxygen levels under all of the alternatives. Therefore, it is not anticipated that dissolved oxygen levels in Plan Area streams would change over time relative to existing conditions under the No Action Alternative, Proposed Action, or other action alternatives.

4.2.6 Summary of Effects

Table 4.2-1 summarizes the effects of the alternatives on water resources. Effects of the No Action Alternative are relative to existing conditions. Effects of the Proposed Action, Alternative A, and Alternative B are relative to the No Action Alternative.

TABLE 4.2-1
Alternatives Comparison Table—Water Resources

Subcategory	No Action	Proposed Action	Alternative A	Alternative B
Surface and Groundwater Hydrology	No change from existing conditions	Improvements due to reduction in clearcut acres and road management measures	Improvement due to wider, no-harvest riparian buffers	Improvements due to reduction in clearcut acres
Water Temperature	Slight decreases as canopy coverage increases	Similar to No Action with greater reductions in Class A lands	Similar to No Action with greater reductions due to wider, no-harvest riparian buffers	Similar to No Action Alternative
Sediment	Slight reduction resulting from implementation of CFPRs, including ASP Rules	Greater reductions through implementation of slope-stability and road management measures	Greater reduction due to wider, no-harvest riparian buffers	Similar to No Action Alternative
Nutrients	Generally maintained at existing levels, possible reduction in sediment-bound nutrients	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Dissolved Oxygen	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative

4.3 Biological Resources

This section evaluates the potential impacts to terrestrial and aquatic species of concern as a result of implementing the Proposed Action (issuance of 50-year ITPs for the covered species and implementing the proposed HCP) and the alternatives, including the No Action Alternative. For terrestrial species, the evaluation of project impacts focuses on changes in forest stands and the forest structure that determine the suitability of habitat for these species. Impacts to aquatic species are analyzed based on anticipated changes in watershed processes including: hydrology, LWD recruitment, water temperature, nutrient and sediment inputs, and passage.

4.3.1 CWHR Size Classifications and Canopy Closure

As described in Subsection 3.3 of this EIS, forests in the Plan Area have been managed for commercial timber production since the early 1900s, resulting in a mosaic of forest habitat types. None of the alternatives would alter the forested landscape to the extent that the mosaic of forest types (CWHR classification [e.g., KMC, DFR]) would change. However, the applicant's activities would alter the forest landscape through changes in the size (diameter and height) and canopy coverage of trees in the forested stands. This section provides a description of how the applicant's activities would alter the forest landscape through harvest, protection of selected areas (e.g., WLPZs, CSAs), and retention of various habitat features. Similar to the description of the Affected Environment (Chapter 3), the forest landscape and

changes to the forest landscape are described in terms of CWHR size classifications and canopy closure that would result from implementation of the alternatives. Impacts of the changes in the forested landscape on biological resources are described in Subsections 4.3.2 and 4.3.3 below.

4.3.1.1 No Action Alternative

Activities that would continue to occur as part of the No Action Alternative include the growing, harvesting, and transporting of timber products on and off the property; conducting ancillary activities necessary to protect the property from fire, insects, disease, and vandalism; complying with various local, state, and federal laws and regulations that assess and seek to protect environmental resources (including listed fish and wildlife species); and voluntarily conducting research on wildlife and fish species and their habitats. The applicant would follow the specific conservation measures for Yreka phlox as described in Section 2.1.4.2.

Under the No Action Alternative, the take prohibitions for northern spotted owl and coho salmon would result in the applicant needing to harvest intensively across a large area in order to achieve their timber harvest goals. This would require a substantial amount of clearcutting in the first three decades. Widespread harvest would result in substantial disturbance in upland forests and riparian forests, except in WLPZs and other special management areas. This would result in both short- and long-term changes to the forest structure that could alter habitat conditions for terrestrial and aquatic species over both the short- and long-term.

Under the No Action Alternative, riparian management prescriptions include conservation measures that would retain high levels of overstory canopy retention within WLPZs. Implementation of the WLPZ management measures is expected to result in almost no loss in total forest canopy in the inner zone of WLPZs along Class I watercourses, and is anticipated to increase overstory canopy along Class II watercourses relative to existing conditions. The CFPRs would continue to restrict salvage operations in the WLPZs under the No Action Alternative, but salvage could occur across the ownership outside of the WLPZs. Because salvage is a minor portion of the projected harvest volume for the applicant, the amount of salvage conducted under the No Action Alternative would not differ substantially from the amount of salvage currently conducted.

Table 4.3-1 presents projections at the midpoint of each decade, starting from the year 2007 for the No Action Alternative. Decade 1 represents five years in the future (2012) from the starting point with succeeding decades representing projections at 10-year intervals (i.e., at the midpoint of each decade). Under the No Action Alternative, the acreage of stands with small trees and high canopy cover (CWHR classes 2M and 2D) is anticipated to nearly triple over the first decade and then be maintained until the last two decades when the acreage of small trees is anticipated to decline. The acreage of mid-seral stands with low canopy coverage (CWHR classes 3S and 3P) is anticipated to decline over time to zero as these stands grow and increase in canopy coverage, thus increasing the acreage of stands in CWHR classes 3M and 3D in the Plan Area over time to levels 50 percent higher than existing conditions. A substantial portion of the Plan Area is currently composed of mid-to late-seral stands with low canopy coverage (CWHR classes 4S and 4P) and the acreage of these stand types is anticipated to decrease by approximately 25 percent during the first

decade and then increase over time to levels 43 percent higher than existing conditions. To maintain harvest volumes that would allow it to remain profitable, the applicant would be forced to harvest mid- to late-seral stands in a manner that precludes development of additional canopy coverage (i.e., CWHR classes 4M and 4D), thus the acreage of these stand types is anticipated to remain similar to existing conditions.

TABLE 4.3-1
Projected Acres in each CWHR Size/Canopy Cover Class Under the No Action Alternative

CWHR Class	2007	Decade				
		1	2	3	4	5
2S	0	0	0	0	0	0
2P	0	0	0	0	0	0
2M	221	4,188	3,132	2,782	0	3,145
2D	4,899	10,866	11,868	12,218	12,515	8,370
3S	7,619	2,917	0	0	0	0
3P	28,634	21,820	7140	220	27	0
3M	11,986	14,783	12,903	8,772	5,108	5,240
3D	11,844	20,315	25,737	29,053	28,011	32,021
4S	1,385	1,011	839	300	0	0
4P	36,257	26,928	40,956	49,499	57,184	54,068
4M	10,612	10,612	10,612	10,612	10,612	10,612
4D	16,318	16,318	16,318	16,318	16,318	16,318
5S	0	0	0	0	0	0
5P	0	0	269	0	0	0
5M	0	0	0	0	0	0
5D	0	16	0	0	0	0
Total	**129,774**	**129,774**	**129,774**	**129,774**	**129,774**	**129,774**

Note:

The “Plantation” (PT) category in the forest inventory presented in Table 3.3-1 is incorporated into the CWHR classes here based on age.

4.3.1.2 Proposed Action

Under the Proposed Action, the types of timber harvest and associated activities would be similar to those described for the No Action Alternative. Timber harvest would be constrained in CSAs, which would encumber approximately 23,000 acres where timber harvest would be limited and, in drainages containing Class A and B designated lands, WLPZs established along Class I (fish-bearing) and Class II (aquatic habitat) watercourses would restrict operations on nearly 6,200 acres of the Plan Area. ELZs along Class III watercourses would restrict operations on an additional approximately 2,485 acres of Class A and Class B designated lands in the Plan Area.

Under the Proposed Action, it is expected that a similar volume of timber would be harvested each decade compared to current levels. Over time, the volume extracted per acre would increase by approximately 6 percent, such that harvest would occur on a smaller area. In addition, there would be changes in structure of riparian stands from the application of riparian conservation measures under the Aquatic Species Conservation Program. Similar to the No Action Alternative, the acreage protected by riparian buffers would increase relative to existing conditions, as would the number and size of trees retained post-harvest, resulting in increased riparian stand densities, tree volumes, stream shading, and potential LWD recruitment, particularly in Class A designated lands. Salvage operations would be restricted in the WLPZs and CSAs established under the Proposed Action, leading to a reduction in the amount of acres available for salvage. Because salvage is a minor portion of the projected harvest volume for the applicant, the amount of salvage conducted under the Proposed Action would not differ substantially from the amount of salvage under the No Action Alternative.

Similar to the No Action Alternative, there would be no change in forest types or species mix under the Proposed Action; however, harvest would result in both short- and long-term changes to the forest structure (Table 4.3-2) that could alter habitat conditions for terrestrial and aquatic species over both the short- and long-term. Impacts of the changes in the forested landscape on biological resources are described in Subsections 4.3.2 and 4.3.3 below.

Under the Proposed Action, the amount of early- and mid-seral forest with high canopy coverage (CWHR classes 2M, 2D, 3M, and 3D) would decrease by up to 20 percent during the first 3 decades relative to the No Action Alternative but is anticipated to be the same as under the No Action Alternative by the end of the Permit Term. Under the Proposed Action, the acreage of mid-to late-seral stands with low canopy coverage (CWHR classes 4S and 4P) would decrease over the Permit Term to levels less than 10 percent of the acreage in these stand types under the No Action Alternative as these stands are allowed to grow and increase in canopy coverage. Thus, the acreage in mid- to late-seral stands with high canopy coverage (CWHR classes 4M and 4D) would be nearly twice as high as under the No Action Alternative by the end of the Permit Term. Similar to the No Action Alternative, the amount of late-seral forest in size class 5 would remain essentially the same as currently exists (near zero) until the last two decades when there is likely to be a small increase (400 acres).

TABLE 4.3-2
Projected Acres in each CWHR Size/Canopy Cover Class Under the Proposed Action

CWHR Class	2007	Decade 1	2	3	4	5
2S	0	0	0	0	0	0
2P	0	0	0	0	0	0
2M	221	1,688	1,132	782	0	3,145
2D	4,899	8,366	9,868	10,218	12,515	8,370
3S	7,619	2917	0	0	0	0
3P	28,634	21,820	7,140	220	27	0
3M	11,986	14,783	10,903	6,272	5,108	5,240
3D	11,844	20,315	21,737	24,053	28,011	32,021
4S	1,385	1,011	839	300	0	0
4P	36,257	16,886	31,611	16,861	14,767	4,768
4M	10,612	29,463	24,732	43,586	34,364	37,707
4D	16,318	12,508	21,542	26,982	34,575	38,115
5S	0	0	0	0	0	0
5P	0	0	269	0	0	0
5M	0	0	0	0	0	0
5D	0	16	0	0	407	407
Total	**129,774**	**129,774**	**129,774**	**129,774**	**129,774**	**129,774**

Note:

The "Plantation" (PT) category in the forest inventory presented in Table 3.3-1 is incorporated into the CWHR classes here based on age.

4.3.1.3 Alternative A

Under Alternative A, like the Proposed Action Alternative, FGS's forest management would not result in changes in forest types or species mix and a similar amount of land (approximately 23,000 acres) would be encumbered in CSAs for northern spotted owl. However, timber harvest would be prohibited in the riparian reserves, which would preclude harvest on approximately 14,000 acres of prime timberland. There may be some overlap between the riparian reserves and the CSAs, but collectively, timber harvest would be constrained on at least 30,000 acres of productive timberland under Alternative A.

By constraining harvest on at least 30,000 acres of productive (often prime) timberland in CSAs and riparian reserves, implementation of Alternative A would require the applicant to harvest more intensively on their remaining timberlands. The applicant would increase the amount of even-aged regeneration harvest each year to make up for the timber volume encumbered in riparian reserves, leading to at least a 10 percent increase in the acreage subject to clearcutting compared to the No Action Alternative. The acreage protected by

riparian buffers would increase, and these stands would remain unharvested, resulting in increased riparian stand densities, tree volumes, stream shading, and potential LWD recruitment over time.

Salvage operations also would be prohibited in the riparian reserves established under Alternative A, leading to a reduction in the amount of acres available for salvage. Because salvage is a minor portion of the projected harvest volume for the applicant, the amount of salvage conducted under Alternative A would not differ substantially from the amount of salvage under the No Action Alternative.

Similar to the No Action Alternative, there would be no change in forest types or species mix under Alternative A; however, harvest would result in both short- and long-term changes to the forest structure (Table 4.3-3) that could alter habitat conditions for terrestrial and aquatic species over both the short- and long-term. Impacts of the changes in the forested landscape on biological resources are described in Subsections 4.3.2 and 4.3.3 below.

TABLE 4.3-3
Projected Acres in each CWHR Size/Canopy Cover Class Under Alternative A

CWHR Class	2007	Decade 1	2	3	4	5
2S	0	0	0	0	0	0
2P	0	0	0	0	0	0
2M	221	7,688	7,132	782	0	3,145
2D	4,899	10,366	11,868	10,218	12,515	8,370
3S	7,619	2,917	0	0	0	0
3P	28,634	21,820	7,140	220	27	0
3M	11,986	12,783	8,903	11,272	5,108	5,240
3D	11,844	18,315	19,737	29,053	28,011	32,021
4S	1,385	1,011	839	300	0	0
4P	36,257	16,886	27,611	16,861	14,767	4,768
4M	10,612	24,347	23,125	38,607	33,605	37,707
4D	16,318	11,746	18,892	16,865	30,242	33,022
5S	0	0	0	0	0	0
5P	0	0	269	0	0	0
5M	0	1,409	3,193	3,924	4,363	0
5D	0	485	1,062	1,172	1,138	5,500
Total	**129,774**	**129,774**	**129,774**	**129,774**	**129,774**	**129,774**

Note:

The "Plantation" (PT) category in the forest inventory presented in Table 3.3-1 is incorporated into the CWHR classes here based on age.

Under Alternative A, the acreage of early- and mid-seral forest with high canopy coverage (CWHR classes 2M, 2D, 3M, and 3D) would decrease by up to 11 percent during the first

three decades relative to the No Action Alternative but is anticipated to be the same as under the No Action Alternative by the end of the Permit Term. Similar to the Proposed Action, which also utilizes CSAs for northern spotted owl, the acreage of mid-to late-seral stands with low canopy coverage (CWHR classes 4S and 4P) would decrease over the Permit Term to levels less than 10 percent of the acreage in these stand types under the No Action Alternative as these stands are allowed to grow and increase in canopy coverage. Thus, the acreage in mid- to late-seral stands with high canopy coverage (CWHR classes 4M and 4D) would be nearly twice as high as under the No Action Alternative by the end of the Permit Term. The amount of late-seral forest in size class 5 would increase from near zero under the No Action Alternative to over 5,000 acres under Alternative A.

4.3.1.4 Alternative B

Under Alternative B, there would be no change in forest types or species mix, similar to the No Action Alternative. Implementation would consist of continued timber harvest operations and associated activities and would be similar to those described for the No Action Alternative, although the amount of timber harvest that would occur would differ from the No Action Alternative, both spatially and temporally.

Timber harvest would be distributed across the entire ownership because CSAs would not be established around specific activity centers as under the Proposed Action and Alternative A. The applicant would be able to meet its financial obligations with less harvest than under the No Action Alternative because it would be able to harvest more of the ownership currently considered habitat for northern spotted owl. Areas of habitat generally have more and larger trees, such that they provide more timber volume per acre than non-habitat areas. The amount of even-aged regeneration harvest (clearcutting) would likely be reduced by up to 20 percent compared to the No Action Alternative.

Salvage operations would also occur over a wider area and could be increased because stands generally would be on a longer cutting cycle. However, salvage is a minor portion of the projected harvest volume for the applicant, and the amount of salvage conducted under Alternative B would not differ substantially from the No Action Alternative.

Similar to the No Action Alternative, there would be no change in forest types or species mix under the Proposed Action; however, harvest would result in both short- and long-term changes to the forest structure (Table 4.3-4) that could alter habitat conditions for terrestrial and aquatic species over both the short- and long-term. Impacts of the changes in the forested landscape on biological resources are described in Subsections 4.3.2 and 4.3.3 below.

Under Alternative B, the amount of early- and mid-seral forest with high canopy coverage (CWHR classes 2M, 2D, 3M, and 3D) would decrease by up to 20 percent during the first three decades relative to the No Action Alternative but is anticipated to be the same as under the No Action Alternative by the end of the Permit Term. Similar to the Proposed Action and Alternative A, the acreage of mid-to late-seral stands with low canopy coverage (CWHR classes 4S and 4P) would decrease over the Permit Term to levels less than 10 percent of the acreage in these stand types under the No Action Alternative as these stands are allowed to grow and increase in canopy coverage. Thus, the acreage in mid- to

TABLE 4.3-4
Projected Acres in each CWHR Size/Canopy Cover Class Under Alternative B

CWHR Class	2007	Decade 1	2	3	4	5
2S	0	0	0	0	0	0
2P	0	0	0	0	0	0
2M	221	1,688	1,132	282	0	3,145
2D	4,899	8,366	8,868	9,718	12,515	8,370
3S	7,619	2,917	0	0	0	0
3P	28,634	21,820	7,140	220	27	0
3M	11,986	14,783	10,403	6,272	5,108	5,240
3D	11,844	20,315	23,237	25,553	28,011	32,021
4S	1,385	1,011	839	300	0	0
4P	36,257	16,886	31,611	16,861	14,767	4,768
4M	10,612	31,907	25,189	44,809	34,586	37,929
4D	16,318	10,064	21,086	25,759	34,761	38,301
5S	0	0	0	0	0	0
5P	0	0	269	0	0	0
5M	0	0	0	0	0	0
5D	0	16	0	0	0	0
Total	**129,774**	**129,774**	**129,774**	**129,774**	**129,774**	**129,774**

Note:

The "Plantation" (PT) category in the forest inventory presented in Table 3.3-1 is incorporated into the CWHR classes here based on age.

late-seral stands with high canopy coverage (CWHR classes 4M and 4D) would be nearly twice as high as under the No Action Alternative by the end of the Permit Term. Similar to the No Action Alternative, the amount of late-seral forest in size class 5 would remain essentially the same as currently exists (near zero).

4.3.2 Covered Species

4.3.2.1 Northern Spotted Owl

No Action Alternative. Under the No Action Alternative, the applicant would continue to manage the Plan Area in accordance with the CFPRs, which contain provisions for avoiding take of northern spotted owls. Where a nest site or activity center is located within a THP boundary or within 1.3 miles of that boundary, timber harvesting would be planned and implemented to: (1) protect spotted owl nest sites during the nesting and fledging season; (2) maintain suitable foraging, roosting, and nesting habitat on the applicant's property; and (3) accelerate the development of replacement habitat following harvesting.

Specifically, take avoidance measures for northern spotted owls under 14 CCR 919.9 [939.9] (g) consist of establishing a 500 foot buffer around known activity centers within which functional nesting and roosting habitat must be retained and within which timber restrictions are seasonally restricted to avoid disturbance during the breeding season. In addition to these measures, 500 acres of suitable owl habitat must be retained within 0.7 mile of an activity center and 1,336 acres of suitable habitat must be retained within 1.3 miles of an activity center. With these restrictions, timber management operations would be limited within owl territories, and the applicant would concentrate most timber harvest in areas not affected by the habitat-retention requirements. Therefore, adverse effects on northern spotted owl from habitat modification and disturbance would be avoided under the No Action Alternative. In addition, based on the projections of forest stands (see Table 4.3-1 above), suitable habitat for northern spotted owl would increase over time in the Plan Area (Figure 4.3-1).

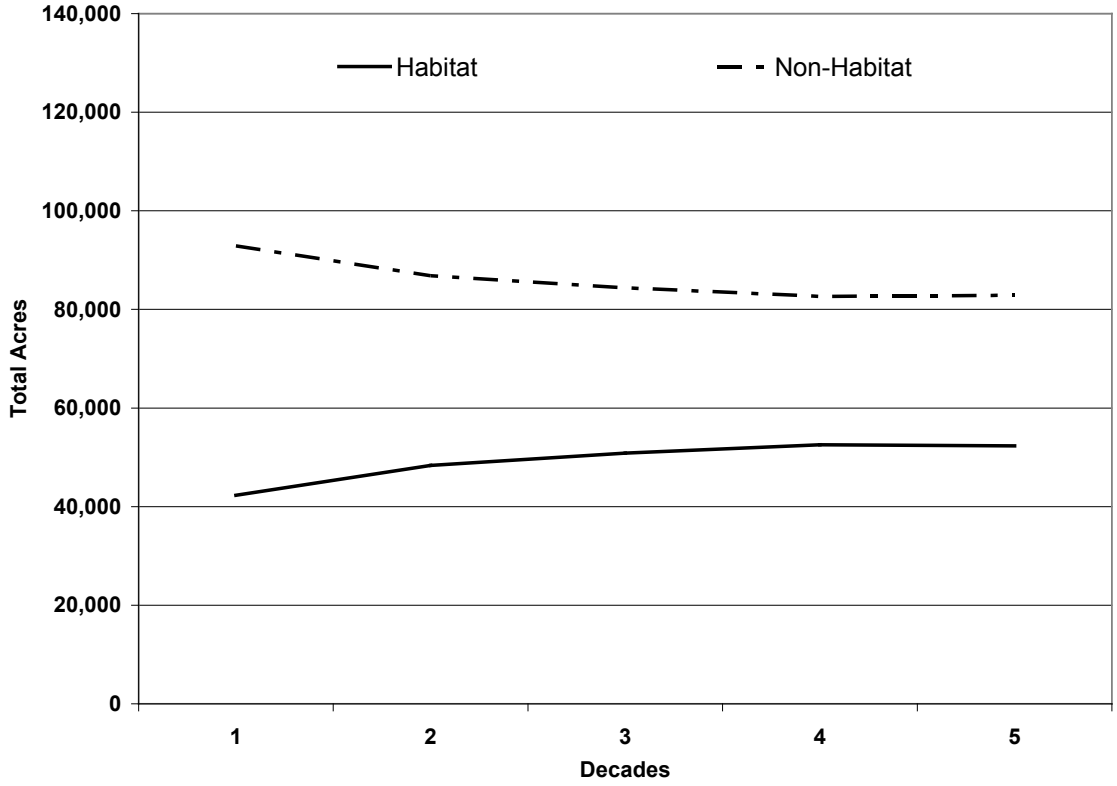

FIGURE 4.3-1
Projected Acreage of Suitable Northern Spotted Owl Habitat and Non-habitat in the Plan Area under the No Action Alternative

Proposed Action. Under the Proposed Action, demographic support for the federal conservation strategy would be provided by establishing a number of CSAs across the Plan Area. CSAs would be designated around strategic owl activity centers located on or within 1.3 miles of the Plan Area based on proximity to federal CHUs. Within each of the designated CSAs, there would be specific habitat targets and allowable harvest conditions for both the core area and home range of the activity center supported by the CSA. These targets and harvest restrictions would result in the development and protection of suitable habitat for northern spotted owls. As a result, the amount of suitable habitat for northern spotted owl in the Plan Area would increase over time (Figure 4.3-2).

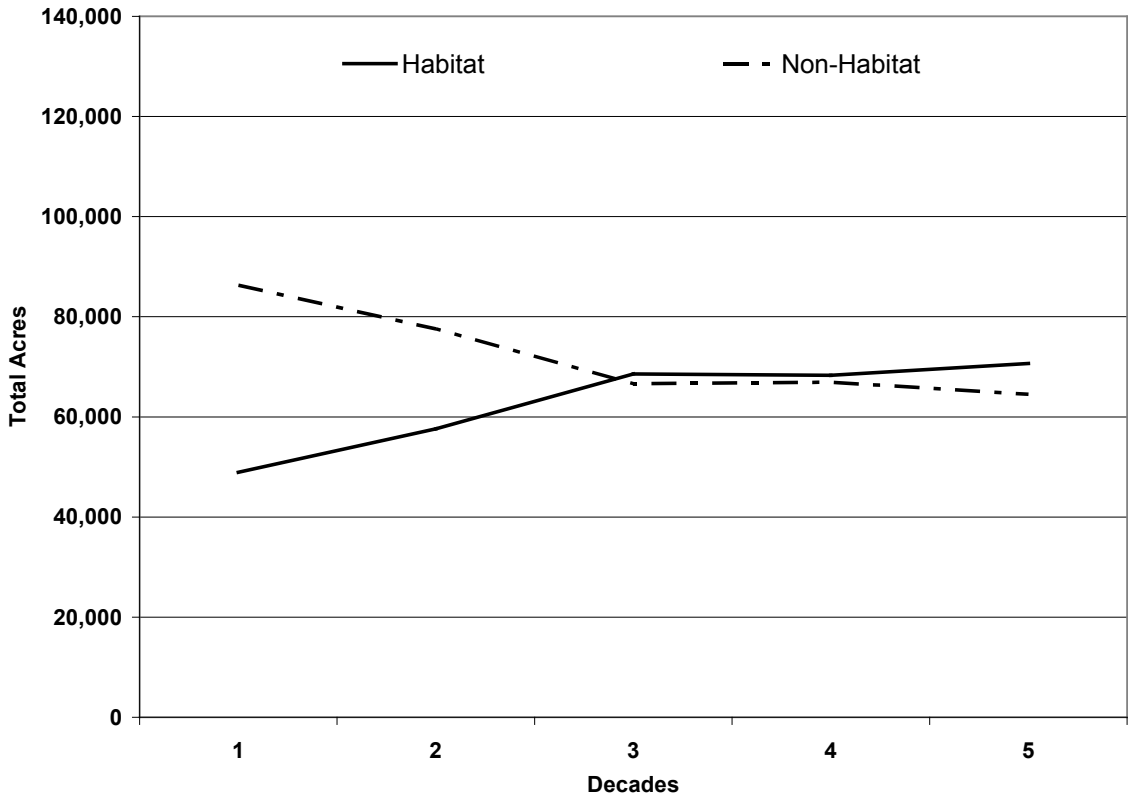

FIGURE 4.3-2
Projected Acreage of Suitable Northern Spotted Owl Habitat and Non-habitat in the Plan Area under the Proposed Action

As described in Chapter 6 of the HCP, the conservation value of each activity center within 1.3 miles of the applicant's ownership was assessed using an evaluation matrix developed by the applicant and USFWS. The sum of the conservation values for all activity centers within this area is 2,922. The conservation value of individual activity centers ranges from 0 to 111. Higher numbers represent higher conservation value within the context of the local population.

Under the Proposed Action, the applicant's covered activities would likely result in incidental take of northern spotted owls at 43 activity centers with a corresponding reduction of 18 percent of the total conservation value of activity centers in the Area of Impact. Under the HCP, the applicant would establish CSAs that provide demographic support to 24 strategic owl activity centers with high conservation value. The CSA designation contributes to the federal conservation strategy by maintaining approximately 55 percent of the total conservation value of activity centers within 1.3 miles of the applicant's ownership. Incidental take of spotted owls associated with activity centers supported by the CSAs would not be authorized. Activity centers in which incidental take of northern spotted owls is unlikely because of low overlap with the applicant's ownership account for an additional 27 percent of the total conservation value of activity centers within 1.3 miles of the ownership. Overall, 82 percent of the total conservation value of activity centers within 1.3 miles of the applicant's ownership would be retained and conserved by the HCP's conservation, mitigation, and take avoidance measures.

Implementation of the Proposed Action would result in impacts to the regional spotted owl population in the California Klamath province, but the impacts would not be substantial because of the large amount of suitable owl habitat available on nearby federal lands. The impacts of the taking in the California Klamath province are mitigated by demographic support of high conservation value activity centers provided through establishment of CSAs in this province and in the California Cascades province.

Timber harvest consistent with the CFPRs and other conservation measures in the Proposed Action would be allowed within 1.3 miles of owl activity centers that are not supported by designated CSAs.

Alternative A. Under Alternative A, like the Proposed Action, demographic support for the federal conservation strategy would be provided by establishing a number of CSAs across the Plan Area. CSAs would be designated around strategic owl activity centers located on or within 1.3 miles of the Plan Area based on proximity to federal LSRs. Within each of the designated CSAs, there would be specific habitat targets and allowable harvest conditions for both the core area and home range of the activity center supported by the CSA. These targets and harvest restrictions would result in the development and protection of suitable habitat for northern spotted owls. As a result, the amount of suitable habitat for northern spotted owl in the Plan Area would increase over time (Figure 4.3-3).

As described above for the Proposed Action, the conservation value of each activity center within 1.3 miles of the applicant's ownership was assessed using an evaluation matrix developed by the applicant and USFWS. The sum of the conservation values for all activity centers within this area is 2,922. The conservation value of individual activity centers ranges from 0 to 111. Higher numbers represent higher conservation value within the context of the local population.

Under Alternative A, the applicant's covered activities could result in incidental take of northern spotted owls at 41 activity centers with a corresponding reduction of 16 percent of the total conservation value of activity centers in the Area of Impact. Under the HCP, the applicant would establish CSAs that provide demographic support to 26 strategic owl activity centers with high conservation value. The CSA designation contributes to the federal conservation strategy by maintaining approximately 58 percent of the total conservation value of activity centers within 1.3 miles of the applicant's ownership. Incidental take of spotted owls associated with activity centers supported by the CSAs would not be authorized. Activity centers in which incidental take of northern spotted owls is unlikely because of low overlap with the applicant's ownership account for an additional 26 percent of the total conservation value of activity centers within 1.3 miles of the ownership. Overall, 84 percent of the total conservation value of activity centers within 1.3 miles of the applicant's ownership would be retained and conserved by the HCP's conservation, mitigation, and take avoidance measures.

Timber harvest consistent with the CFPRs and other conservation measures would be allowed within 1.3 miles of owl activity centers that are not supported by designated CSAs.

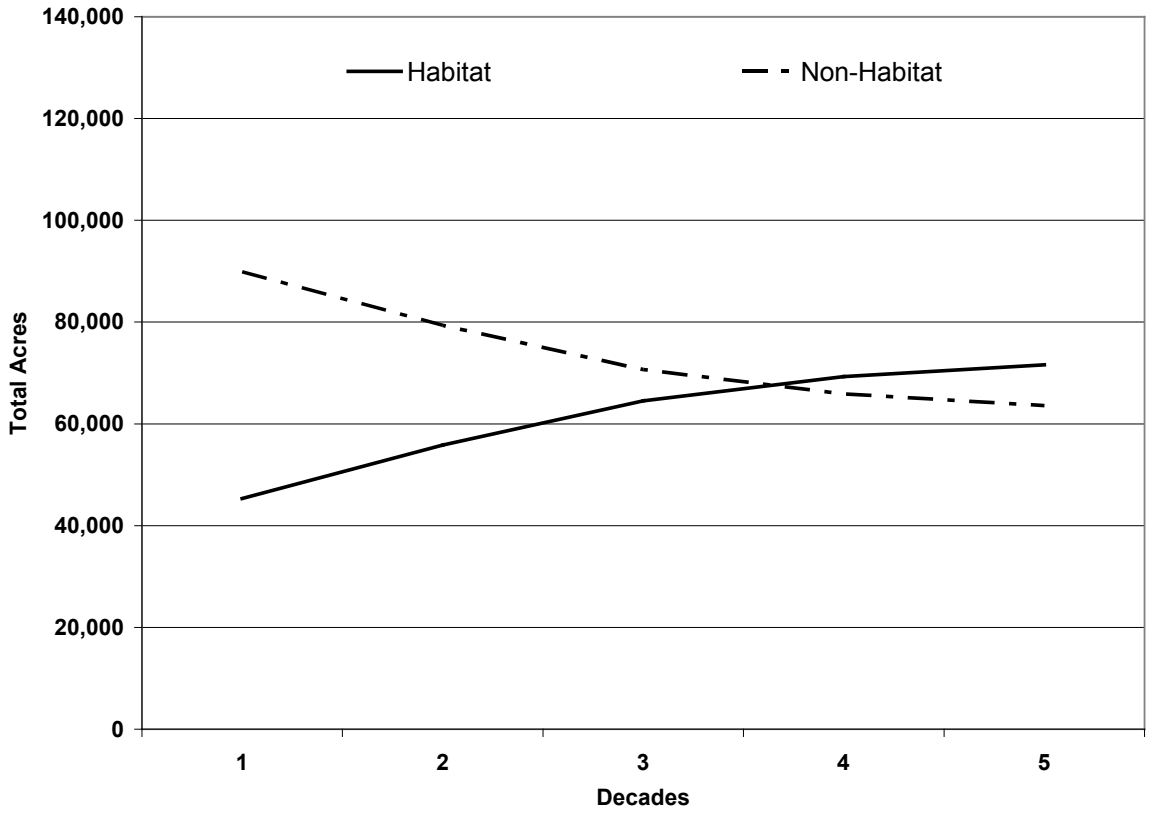

FIGURE 4.3-3
Projected Acreage of Suitable Northern Spotted Owl Habitat and Non-habitat in the Plan Area under Alternative A

Alternative B. The primary objective of the terrestrial conservation program under Alternative B is to increase the total amount of foraging habitat across the Plan Area to twice the existing level over the permit term. This landscape-based approach is expected to increase foraging opportunities for owls nesting on adjacent ownerships, and provide for dispersal of spotted owls across the ownership. Overall, suitable habitat for northern spotted owl in the Plan Area is anticipated to increase over time (Figure 4.3-4).

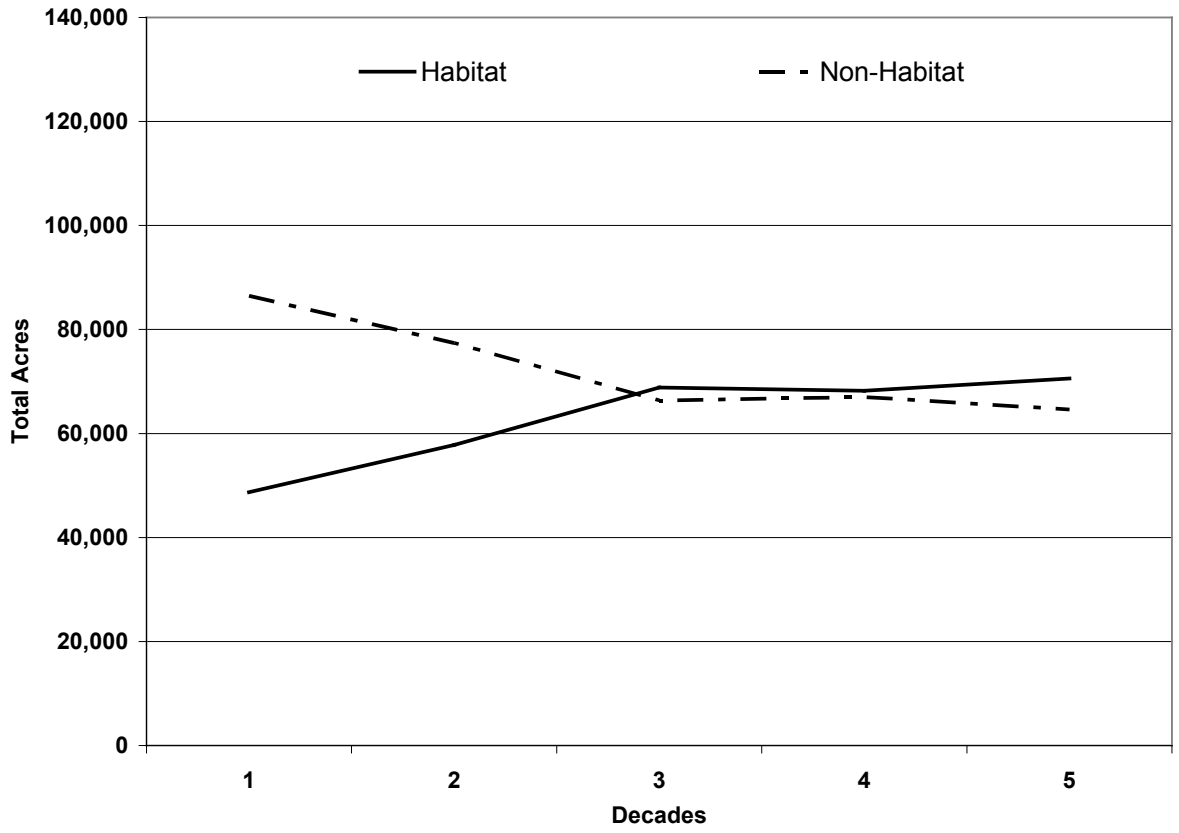

FIGURE 4.3-4
Projected Acreage of Suitable Northern Spotted Owl Habitat and Non-habitat in the Plan Area under Alternative B

The increase in foraging habitat relative to the No Action Alternative is expected to result in a landscape that supports additional foraging opportunities for spotted owls and will contribute to support and dispersal of owls nesting on adjacent federal lands. However, specific areas with suitable nesting and roosting habitat for northern spotted owl would not be identified and maintained in CSAs as under the Proposed Action and Alternative A. Harvest of existing nesting habitat for northern spotted owl would occur and the level of incidental take under Alternative B would likely be greater than under the Proposed Action or Alternative A.

4.3.2.2 Yreka Phlox

The primary activities that could result in adverse effects to Yreka phlox are new road, landing, and skid trail construction, and introduction of invasive weeds through seed transport and soil disturbance associated with timber harvest and other silvicultural activities. The potential for adverse impacts is low, however, because the serpentine soils where Yreka phlox is found are generally not suited for timber production, with few opportunities to introduce invasive weeds.

No Action Alternative. Under the No Action Alternative, the applicant would incorporate measures designed to avoid adverse impacts to Yreka phlox. The applicant would perform detailed pre-activity surveys for Yreka phlox prior to Covered Activities that could directly (e.g. removal, destruction) or indirectly (e.g. changes in hydrology, introduction of invasive

weeds) impact Yreka phlox. Covered activities that have the potential to impact Yreka phlox include, but are not limited to activities associated with timber harvesting, road and landing construction and maintenance, silviculture, stand regeneration, harvest of minor forest products, fire prevention, construction or reconstruction of watercourse crossings, and site preparation. FGS would conduct pre-activity surveys for Yreka phlox at the THP-level as required under the State THP review process. The applicant would protect occurrences discovered on its ownership by establishing an EEZ with a minimum width of 150 feet around each known or discovered occurrence to reduce external influences and allow for expansion of populations. EEZs established for plant protection would encompass the individuals or groups of plants and would be designated with appropriate flagging. There would be no heavy equipment operations within the EEZs established around Yreka phlox occurrences except on existing roads.

The applicant would avoid potential indirect impacts from road construction near discovered populations through placement/deposition of fill material and culverts in such a manner and in areas that will not adversely affect Yreka phlox populations. Road design and specifications will consider and avoid indirect impacts to known and discovered populations caused by compaction and alteration of slope drainage. With continued conservation activities around known occurrences of the Yreka phlox, few adverse impacts are likely to occur to this species under the No Action Alternative.

Proposed Action. Under the Proposed Action, the applicant would implement the conservation measures in the proposed HCP associated with the avoidance of adverse effects objective for Yreka phlox. In general, these measures are similar to and consistent with the species protection measures for Yreka phlox described in Subsection 2.1.4.2 above for the No Action Alternative with the following additional protective measures:

- The applicant would perform botanical surveys for undiscovered populations of Yreka phlox that may exist in the Plan Area. Botanical surveys will be conducted on any Plan Area lands with specific soil types derived from ultramafic parent material that are within the area of high to moderate likelihood of occurrence of Yreka phlox (i.e., within 8 miles of any point along a line drawn between Paradise Craggy, southwest through Yreka, to Etna) (see Figure 4-36 in Chapter 4 of the HCP).
- Any mulch applied within or immediately adjacent to the EEZ around discovered populations will be certified weed free.
- Trees to be removed from within EEZs would be cut with a feller buncher and removed fully suspended above the ground or would be cut to lead away from protected plants within the buffer. Trees to be harvested near EEZs established to protect Yreka phlox would be directionally felled away from the EEZ.

However, under the Proposed Action, the surveys for Yreka phlox would likely be implemented in a systematic manner rather than as activities are scheduled under individual THPs. In addition, the applicant would develop and implement a monitoring program for populations of Yreka phlox discovered on the ownership that would provide information on species status, distribution, and threats to the populations in the area. Monitoring would focus on habitat conditions and threats within the occupied habitat and the EEZ established around each discovered occurrence. If invasive weeds with the

potential to harm Yreka phlox are detected in the Yreka phlox monitoring areas, the applicant would notify the USFWS within 10 days. The applicant would help to facilitate (e.g., through providing access to and across their ownership) implementation of invasive weed control measures deemed appropriate by the USFWS at the time of detection. With continued conservation measures around known occurrences of Yreka phlox and continued monitoring in locations it could potentially populate, few adverse impacts are likely to occur to this species under the No Action Alternative or any of the action alternatives.

Alternative A. Under Alternative A, the applicant would exercise the precautions necessary to comply with the prohibitions on adverse impacts to listed plants described above for the No Action Alternative. As described for the No Action Alternative, the applicant would continue to comply with the CFPRs and measures identified during the THP preparation and review process. Therefore, similar to the No Action Alternative, few adverse impacts are likely to occur to Yreka phlox under Alternative A.

Alternative B. Under Alternative B, the applicant would exercise the precautions necessary to comply with the prohibitions on adverse impacts to listed plants described above for the No Action Alternative. As described for the No Action Alternative, the applicant would continue to comply with the CFPRs and measures identified during the THP preparation and review process. Therefore, similar to the No Action Alternative, few adverse impacts are likely to occur to Yreka phlox under Alternative B.

4.3.2.3 Anadromous Salmonids

The fish species covered in this evaluation are Chinook salmon, coho salmon, and steelhead, all of which are members of the broad group of fishes referred to commonly as "Pacific salmon" or salmonids. In recent years, the decline and extinction of Pacific salmon populations has been linked, in part, to habitat loss and degradation in their spawning and rearing streams (Nehlsen et al., 1991). Many of the applicant's activities have the potential to alter watershed processes and adversely affect aquatic habitat. Thus, the assessment of the effects from implementing the alternatives is primarily habitat based.

As discussed in Section 4.2 (Water Resources), changes in hydrology from timber harvest and management activities can directly affect physical habitat conditions for the covered species. Specifically, stream flow timing and magnitude can affect aquatic habitat quantity and quality, LWD recruitment, and fish passage. For example, as discussed in Section 4.2.2, changes in water quality as a result of timber harvest and management activities can negatively affect water temperature. Changes in runoff magnitude and duration can increase erosion processes resulting in excessive sediment input and deposition into aquatic habitats. Ultimately, these processes can result in increased stream temperatures which in turn adversely affect covered species by reducing growth efficiency, increasing disease susceptibility, changing the age of smoltification, causing loss of rearing habitat, and shifting the competitive advantage of salmonids over non-salmonid species. Similarly, excessive sediment inputs can result in sediment deposition in pools, a decrease in spawning gravel quantity and quality, decreased channel stability, increased nutrient and contaminant loads, and modification of channel morphology. Timber harvest and management activities affect riparian buffers, which in turn affect levels of streamside shade and can affect water temperatures and LWD recruitment rates.

Timber harvest and related activities will occur over the applicant's entire ownership. Because specific locations where timber harvest will occur on the applicant's ownership cannot be projected, it is assumed that all areas may be subject to timber harvest including limited harvest activities in designated habitat management areas such as northern spotted owl Conservation Support Areas (Proposed Action and Alternative A) at some point in the future. Because the biological requirements of the aquatic covered species are similar (see Chapter 3 of the HCP) and the applicant's activities will affect watershed process and products that affect aquatic habitats for all the aquatic covered species, the effects are described for these species as a group, rather than individually.

No Action Alternative. Under the No Action Alternative, major activities would include the following:

- Timber harvest
- Road and landing construction, maintenance, and management
- Other management activities including stand regeneration and improvement, harvesting of minor forest products, fire suppression, and water drafting

These activities would have both direct and indirect effects on fish species and their habitats. These effects are described below.

Activities with the potential to directly impact individual fish or small groups of fish include the operation of heavy equipment in streams, such as for the construction of watercourse crossings or stream enhancement work (potentially injuring or killing adults, juveniles, larvae, and/or eggs of the species). Other activities such as drafting of water from streams for dust abatement (potentially injuring or killing individuals suctioned up with the water and/or potentially damaging or destroying the incubating eggs of such species) have the potential to impact larger groups of individuals. The use of petroleum products as fuel and lubricants in machinery and equipment (potentially injuring or killing individuals and incubating eggs in the event of spill or leaks) could also impact large groups of individuals within small areas to entire stream segments.

In general, the direct effects to fish species under the No Action Alternative are expected to be comparable to the existing conditions throughout the Plan Area. As described in Chapter 2, the applicant is currently operating under regulations governing the activities that may result in direct impacts to aquatic species such as water drafting. The applicant's operations and activities under the No Action Alternative would continue to be regulated under the THP process and, therefore, the No Action Alternative would not change the current level of direct effects on fish in Plan Area streams.

Indirect effects include activities that do not result in immediate death or injury to individual fish or groups of fish but may result in longer-term changes to fish populations or their habitats through alteration of watershed processes. Generally, only some of the applicant's activities are expected to affect watershed processes. Therefore, only the effects of specific activities are discussed below. The following discussion of indirect effects is organized by category of environmental effect on aquatic species and their habitats and includes the effects of changes in hydrology, stream temperatures, LWD recruitment, nutrient inputs, sediment inputs, and fish passage.

- **Hydrology:** As described in Section 4.2.1, the activities that would affect hydrologic and water quality conditions under the No Action Alternative are generally expected to be similar to existing conditions throughout the Plan Area. Currently, the applicant is operating under regulations that govern their activities that can influence hydrology and water quality conditions within the Plan Area. Under the No Action Alternative, the applicant would continue to be regulated under these regulations; therefore, implementation of the No Action Alternative would not result in substantial changes in habitat conditions for anadromous salmonids due to alteration of hydrologic and water quality conditions in the future.
- **Stream Temperature.** As described in Section 4.2.2, stream shading under the No Action Alternative is expected to increase slowly from existing conditions as riparian stands age and grow. Regulations under the No Action Alternative contain provisions for riparian management that retain high levels of canopy coverage near Class I and II streams in the Plan Area. The canopy closure requirements and other tree retention standards are expected to help maintain stream shading in the critical "inner zone" where microclimate effects have the greatest potential to affect water temperatures. Overstory canopy closure is likely to increase relative to current conditions in all stands as they regenerate following timber harvesting. The overall increase in overstory canopy closure is anticipated to result in minor decreases in water temperatures, which may be beneficial to aquatic resources in Plan Area streams. Controls on sediment delivery to streams as a result of slope stability and sediment management provisions in the CFPRs would continue to be enacted as part of the THPs. Any adverse change in water temperature due to sedimentation is likely to be spatially limited and temporary in nature and would be offset by the decrease in stream temperatures resulting from increased canopy coverage over the long-term. In general, decreases in stream temperatures are considered beneficial to anadromous salmonids and other aquatic species.
- **Large Woody Debris Recruitment.** LWD recruitment potential under the No Action Alternative is expected to increase slowly from existing conditions as riparian stands age and grow. Regulations under the No Action Alternative contain provisions for riparian management that retain high levels of canopy coverage near Class I and II streams in the Plan Area. The canopy closure requirements and other tree retention standards are expected to help maintain LWD recruitment from the critical "inner zone" where the majority of LWD may recruit from adjacent stands. Therefore, implementation of the No Action Alternative would result in minor increases in LWD recruitment relative to existing conditions. In general, increased LWD recruitment in Plan Area streams would benefit anadromous salmonids through improvement in aquatic habitat conditions.
- **Nutrient Inputs.** As described previously for stream temperatures, riparian management measures under the No Action Alternative are expected to maintain or enhance existing levels of stream shading and LWD recruitment. These same measures would help ensure that nutrient inputs from the adjacent stands are maintained over the long term. In addition, it is anticipated that sediment delivery resulting from the applicant's activities would be reduced slightly over time under the No Action Alternative. Some of the nutrient constituents are closely linked to sediment; therefore, sediment-bound nutrient loading would also be reduced slightly over time relative to

existing conditions under the No Action Alternative. The slight decrease in nutrient inputs under the No Action Alternative is not anticipated to adversely affect anadromous salmonids in Plan Area stream and would be at least partially offset by the improvement in aquatic habitat conditions through reduced sedimentation, decreased water temperatures, and increased LWD recruitment relative to existing conditions.

- **Sediment Input.** As described in Section 4.1, Geology, it is expected that sediment delivery resulting from the applicant's activities would be reduced slightly over time under the No Action Alternative as roads are maintained, upgraded, and decommissioned. It is also anticipated, therefore, that suspended sediment levels, turbidity, and nutrient and contaminant loading would also be reduced slightly under the No Action Alternative relative to existing conditions in Plan Area streams. The reductions in sediment delivery, turbidity, and contaminant loading would provide minor beneficial effects to anadromous salmonids and other aquatic resources in Plan Area streams.
- **Fish Passage.** As described previously, hydrologic and water quality conditions under the No Action Alternative are not expected to substantially change relative to existing conditions, but may improve slightly throughout the Plan Area. Under the No Action Alternative, the applicant would continue to implement current road management and stream crossing practices specified in individual THPs. Culverts that restrict fish passage would be replaced over time as they are identified at the THP level. Therefore, the maintenance, improvement, construction, and closure of roads and landings under the No Action Alternative would improve fish passage conditions over time relative to existing conditions.

Proposed Action. Direct losses and injuries to individuals through operation of heavy machinery in streams under the Proposed Action are expected to be minimal. Equipment would be operated in the wetted channel only at approved and designated crossings. Furthermore, skid crossings would not be located on Class I (fish-bearing) streams. Road construction and maintenance activities may also require in-channel work. The Road Management Plan and Operations Guide (see Appendix B of the HCP) includes road design and maintenance specifications for stream crossings, work windows, and erosion control methods, including BMPs for road construction and maintenance of stream crossings. These BMPs would be included in the long-term streambed alteration permit being developed with DFG.

Like the No Action Alternative, water drafting under the Proposed Action would be conducted under strict guidelines, ensuring that no aquatic species are accidentally captured with the water drafted or harmed by dewatering of the stream. EEZs around Class I, II, and III watercourses as specified in the HCP, would minimize the potential for hazardous materials from incidental leaks or drips from heavy equipment from reaching streams. Preventative measures are incorporated into the HCP Road Management Plan and Operations Guide and long-term streambed alteration permit to preclude possible degradation of water quality from accidental spillage of hazardous materials.

With implementation of the conservation and preventative measures, direct impacts to aquatic species, including the special-status fish species, within the Plan Area are expected

to be less for the Proposed Action than for the No Action Alternative. This would provide a benefit to fish and aquatic species within the Plan Area.

As previously described for the No Action Alternative, timber harvest and forest management activities have the potential to affect fish and aquatic life by altering watershed processes. Generally, only some of the covered activities under the Proposed Action are expected to affect watershed processes. Therefore, only the effects of specific activities covered in the proposed HCP and its conservation measures are discussed below.

- **Hydrology.** As described in Section 4.2.1, the conservation measures under the Proposed Action would minimize the potential impacts that could otherwise result from altered hydrology in the Plan Area. They would reduce the impacts of forest management on surface runoff and peak flows, reduce soil compaction and disturbance, increase slope stability, and maintain or enhance in-channel LWD. Any adverse impacts to anadromous salmonids due to altered hydrology and water quality would be minimized and mitigated by the improved riparian conditions resulting from riparian management and decreased sediment production and delivery. The Proposed Action would maintain or improve hydrologic processes in the Plan Area compared to the No Action Alternative and would likely contribute to maintenance and stability of aquatic habitat conditions in local channels. This would provide a beneficial effect to fish and aquatic life relative to the No Action Alternative.

- **Stream Temperatures.** As described in Section 4.2.2, implementation of riparian conservation measures under the Proposed Action would help to maintain stream shading in the critical "inner zone" where microclimate effects are anticipated to have the greatest potential to affect water temperatures. Overstory canopy closure is likely to increase relative to current conditions in all stands as they regenerate following timber harvesting. The overall increase in overstory canopy closure is anticipated to result in minor decreases in water temperatures, which may be beneficial to aquatic resources, in Plan Area streams.

  Implementation of the Road Management and Slope Stability measures in the proposed HCP are anticipated to reduce the level of sediment delivery to Plan Area streams relative to the No Action Alternative. Reduced sediment delivery to streams under the Proposed Action could indirectly contribute to minor decreases in water temperature. In general, decreases in stream temperatures are considered beneficial to anadromous salmonids and other aquatic species. Given that water temperatures are generally favorable for the covered aquatic species throughout the Plan Area even with past and current levels of sediment delivery, reduced sediment delivery under the Proposed Action would reduce the likelihood that aggradation of channels would occur and contribute to elevated water temperatures and provide additional benefits to anadromous salmonids relative to the No Action Alternative.

- **Large Woody Debris Recruitment.** Management activities that influence the supply of woody debris to streams include: riparian management in watercourse and lake protection zones (WLPZs), harvest activities within WLPZs, harvest on inner gorges and headwall swales, and road construction and maintenance action. Specific conservation measures in the HCP that would be implemented under the Proposed Action were developed to minimize the potential for these activities to adversely affect LWD

recruitment. These riparian conservation measures were designed to increase LWD recruitment in designated Class I (fish-bearing) and Class II (non-fish-bearing) watercourses, particularly in Class A and Class B lands that support anadromous salmonids. Over time, these riparian conservation measures are anticipated to increase the amount of LWD in streams relative to the No Action Alternative, which would result in improved habitat conditions and benefits to overwintering coho and steelhead juveniles, as well as improved habitat conditions for other fish species.

- **Nutrient Inputs.** The riparian management measures in the proposed HCP establish WLPZs that are expected to influence nutrient inputs. As described previously for stream temperatures, Class I and II WLPZs under the Proposed Action would maintain or increase the level of shading to streams within the Plan Area. This would result in no measurable increases in the sunlight reaching the streams and primary productivity would remain unchanged. Riparian conifers may replace hardwoods over time, resulting in minor reductions in nutrient inputs from leaf litter into the stream. The slight decrease in nutrient inputs under the Proposed Action is not anticipated to adversely affect anadromous salmonids in Plan Area stream and would be at least partially offset by the improvement in aquatic habitat conditions through reduced sedimentation, decreased water temperatures, and increased LWD recruitment relative to existing conditions.
- **Sediment Inputs.** As described in Chapter 2 of this EIS, the HCP that would be implemented under the Proposed Action provides additional conservation measures for management of riparian areas and roads, and slope stability measures that would minimize and reduce sediment inputs into watercourses within the Plan Area. Sediment production and delivery that could result in increased sediment loading, sedimentation, and turbidity levels would be reduced under the Proposed Action, compared to conditions anticipated to occur over time under the No Action Alternative. The reduction in sediment delivery to watercourses would benefit aquatic species through improvements in habitat conditions for anadromous salmonids and other fish species in the Plan Area.
- **Fish Passage.** As described in Chapter 2 of this EIS, potential fish passage problems at existing watercourse crossings would be documented using methods specified in the California Salmonid Stream Habitat Restoration Manual (DFG, 1998). During the road inventory process, culverts that are documented as impeding fish passage would be prioritized for replacement with a fish-passable solution. Under the Proposed Action, impacts caused by the blockage of fish passage would be avoided or minimized by proper culvert installation at all stream crossings or replacement with fish-friendly structures. As such, fish passage problems at watercourse crossings would be eliminated over time, most within the first 15 to 20 years following issuance of the ITPs. These actions would benefit fishery and aquatic resources compared to the No Action Alternative.

Alternative A. Compared to the No Action Alternative, and other action alternatives (including the Proposed Action), the riparian reserves proposed in Alternative A would provide a greater amount of riparian protection around Plan Areas streams, both in terms of the width of the buffer as well as more restrictions on timber operations in the buffer.

Overall, this will provide a greater degree of protection for the hydrologic, geomorphic, and ecologic processes that affect aquatic habitat quality within the Plan Area.

Under Alternative A, general timber harvesting activities outside of the riparian reserves, road and landing construction, maintenance, and management activities, and other management activities would remain the same as under the No Action Alternative. Under Alternative A, the road management and sediment control measures in the Proposed Action would not be implemented, thus road management and slope stability measures under this action alternative would be the same as under the No Action Alternative. Road inventories would not be conducted in a systematic and prioritized manner and would only cover the area identified in individual THPs. However, it is likely that over the next 50 years, nearly all road segments would be inventoried through the THP process. Repair and upgrades to road-related sediment sources would be limited to the THP area and appurtenant roads; therefore, many large-scale repairs could go unrepaired for several years if they are not associated with a THP.

Direct and indirect effects on fish species and their habitats that would result from implementation of the HCP are described below.

Direct losses and injuries to individuals through operation of heavy machinery in streams under Alternative A are expected to be minimal. Like the No Action Alternative, water drafting would be conducted under strict guidelines, ensuring that no aquatic species are accidentally captured with the water drafted or harmed by dewatering of the stream. Equipment exclusions within the riparian reserves established around all streams and water bodies would minimize the potential for hazardous materials from incidental leaks or drips from heavy equipment from reaching streams. Direct impacts to the special-status fish species within the Plan Area are expected to be less than under the No Action Alternative. This would provide a benefit to fish and aquatic species within the Plan Area.

As previously described for the No Action Alternative, timber harvest and forest management activities have the potential to affect the fish and aquatic life by altering watershed processes. Under Alternative A, timber harvest activities outside riparian reserves would occur similar to the No Action alternative. Roads and landings would be constructed, roads would be maintained, and harvest would occur on unstable ground. These activities have the potential to indirectly impact aquatic species and their habitats as road-related and harvest-related sediment, and harvesting of trees large enough to serve as habitat improving LWD would occur. The established riparian reserves may help to buffer against these impacts, but nonetheless, Alternative A establishing riparian reserves would not be a guarantee against impacts to aquatic habitats supporting covered species. An exception to this would be the processes directly influenced by riparian management as described below.

- **Hydrology.** As described in Section 4.2.1, conservation measures proposed under Alternative A would minimize the potential impacts that could otherwise result from altered hydrology in the Plan Area. They would reduce the impacts of forest management on surface runoff and peak flows, reduce soil compaction and disturbance, increase slope stability, and maintain or enhance in-channel LWD. Any adverse impacts to anadromous salmonids due to altered hydrology and water quality would be minimized and mitigated by the improved riparian conditions resulting from wider

riparian buffers and decreased sediment production and delivery. Alternative A would maintain or improve hydrologic processes in the Plan Area compared to the No Action Alternative and would likely contribute to maintenance and stability of aquatic habitat conditions in local channels. This would provide a beneficial effect to fish and aquatic life relative to the No Action Alternative.

- **Stream Temperatures.** As described in Section 4.2.2, Alternative A includes wider riparian buffers where harvest is prohibited, and would lead to a greater degree of canopy closure in riparian areas compared to the No Action Alternative. This could serve to decrease surface water temperatures through direct shading and regulation of riparian microclimate air temperatures, and result in reduced maximum summer water temperatures in Plan Area streams. Controls on sediment delivery to streams as a result of slope stability and sediment management provisions in the CFPRs would be enacted as part of the THPs. It is expected that sediment delivery resulting from the applicant's activities would be reduced slightly over time under the No Action Alternative as roads are maintained, upgraded, and decommissioned. In general, decreases in stream temperatures are considered beneficial to anadromous salmonids and other aquatic species. Given that water temperatures are generally favorable for the covered aquatic species throughout the Plan Area even with past sediment inputs, reduced sediment input under Alternative A would reduce the likelihood that aggradation of channels would result in elevated water temperatures and provide additional benefits to anadromous salmonids relative to the No Action Alternative.

- **Large Woody Debris Recruitment.** When combined with the general timber harvesting and road and landing management measures in the proposed HCP, the riparian conservation measures proposed in Alternative A would increase the amount of LWD recruitment to the channel network by maintaining an undisturbed, unharvested riparian buffer of sufficient width to allow the recruitment of LWD into the channel to occur in an ecologically functional manner. This would provide in-stream channel complexity and increase the quality and availability of aquatic habitat, reduce in-channel velocities, induce sediment deposition in the channel, and influence floodplain inundation during higher flow events. Over time, these riparian conservation measures are anticipated to increase the amount of LWD in streams relative to the No Action Alternative, which would result in improved habitat conditions and benefits to overwintering coho and steelhead juveniles, as well as improved habitat conditions for other fish species.

- **Nutrient Inputs.** Alternative A includes prohibitions on timber harvesting activities within the riparian reserves, along with conservation measures that provide a wider, more vegetated buffer. Because of the restrictions on timber harvesting within the buffer and the designation of a significantly wider buffer, it is anticipated that greater amounts of vegetation would exist within the riparian zone and floodplain terraces. This should result in an increased rate of litterfall and nutrient input to Plan Area streams. It is possible that conifers may replace hardwoods in riparian areas over time, resulting in minor reductions in nutrient inputs from leaf litter into the stream. The slight decrease in nutrient inputs under Alternative A is not anticipated to adversely affect anadromous salmonids in Plan Area stream and would be at least partially offset by the improvement

in aquatic habitat conditions through reduced sedimentation, decreased water temperatures, and increased LWD recruitment relative to existing conditions.

- **Sediment Inputs.** As described in Chapter 2 of this EIS, Alternative A would include the general timber harvesting activities outside of the riparian reserves; road and landing construction, maintenance, and management activities; and other management activities described in the Proposed Action. The riparian reserves proposed in Alternative A prohibit timber harvesting activities within established reserves and provide a wider, more heavily vegetated buffer. Compared to the No Action Alternative, the wider riparian buffer and inclusion of unstable inner gorges within the no-harvest riparian reserves would reduce the amount of sediment delivered to the channel from colluvial or aeolian sources. In the long term, this would likely provide a greater amount of hydrologic and geomorphic stability to the stream channel network relative to the No Action Alternative, ultimately reducing the amount of sedimentation occurring in the channel network due to localized channel instability. Increased channel stability and reduced sedimentation would benefit the aquatic covered species through improvements in habitat conditions.
- **Fish Passage.** Under Alternative A, the applicant would continue to implement current road management and stream crossing practices specified in individual THPs as described above for the No Action Alternative. Culverts that restrict fish passage would be replaced over time as they are identified at the THP level. As described for the No Action Alternative, the maintenance, improvement, construction, and closure of roads and landings under the Alternative A would improve fish passage conditions over time relative to existing conditions.

Alternative B. Under Alternative B, the applicant would adopt conservation measures for aquatic species that would be similar to the No Action Alternative, with application of the measures for protection of coho salmon and other salmonid species in selected watersheds with listed anadromous salmonids in all Class A and B designated lands. Watersheds with Listed Anadromous Salmonids are defined as any planning watershed where the presence of anadromous salmonids listed as threatened, endangered, or candidate under the State or Federal ESA has been documented or restorable habitat exists. The ASP Rules are described in detail for the No Action Alternative.

Within the Plan Area, the application of the ASP rules in all Class A and B designated lands would be similar in effect to the timber harvesting or silvicultural conservation measures proposed in the No Action Alternative. Both Alternative B and the No Action Alternative include conservation measures in WLPZs adjacent to Class I and Class II watercourses that are similar. In addition, the ASP Rules described in the No Action Alternative would also be implemented under Alternative B where and when incidental take of coho salmon could occur as determined through the THP review process. Under Alternative B, road and landing construction, maintenance, and management activities, and other management activities would remain the same as under the No Action Alternative.

Functionally, Alternative B and the No Action Alternative would have similar effects on the watershed processes that affect aquatic habitat quality. Because timber harvesting and forest management activities, as well as road management and riparian conservation measures, under Alternative B would be substantially the same as under the No Action Alternative,

potential direct and indirect effects on aquatic species and their habitats within the Plan Area would be the same as described for the No Action Alternative.

4.3.3 Other Special-status Species

Pursuant to NEPA, other listed species that could be impacted by the Proposed Action and the other alternatives including the No Action Alternative that are not covered by issuance of the ITP and implementation of the HCP must also be evaluated and are therefore addressed below.

4.3.3.1 Bald Eagle

The Plan Area contains only low-order drainages such as ephemeral and intermittent streams, and does not support the large aquatic features bald eagles typically use. Bald eagles may use the Plan Area on a transient basis, but are unlikely residents. Bald eagles require large bodies of water, such as lakes and large rivers (such as the Klamath), for nesting and wintering. Under all of the alternatives, the applicant would continue to operate in accordance with the CFPRs and other state regulations. Under the CFPRs, the bald eagle is considered a "sensitive species" and protective measures to avoid disturbance of nesting bald eagles would be implemented under each of the alternatives. The CFPRs also include provisions for review of THPs by CALFIRE such that if additional protective measures are needed, a mechanism exists for their incorporation on a site-specific basis. One active bald eagle nesting site is located on the Plan Area west of Grass Lake. In a May 19, 2004 consultation letter, DFG (2004) identified several protection measures for the nesting site. None of the alternatives would affect the application of these protective measures for bald eagle. Given that bald eagles may use the Plan Area on a transient basis, the level of use is likely to persist at existing levels under all of the alternatives. The level of protection is comparable under all of the alternatives and no adverse impacts to the bald eagle are anticipated under any of the alternatives.

4.3.3.2 Western Yellow-billed Cuckoo

This species favors riparian areas dominated by hardwoods, particularly cottonwoods and willows, a habitat that is uncommon in the Plan Area and adjacent areas. However, some suitable habitat for the western yellow-billed cuckoo does occur within the Plan Area. Although surveys designed to locate this species have not been conducted, there is the possibility that this species could occur in the Plan Area. Under all alternatives, the applicant would continue to operate in accordance with the CFPRs and other state regulations, unless superseded by the HCP provisions under the Proposed Action or Alternative A, which would provide for more stringent riparian measures than exist in the CFPRs. The CFPRs do not contain specific measures for the protection of cuckoos; however the species is listed as Endangered in the State of California, and as such, is protected under CESA. During the THP review process, which includes CDFG participation, potential impacts to this species that could result from site-specific timber operations would be addressed and appropriate measures implemented to minimize potential adverse effects. The level of protection is comparable under all of the alternatives and no adverse impacts to the western yellow-billed cuckoo are anticipated under any of the alternatives.

4.3.3.3 Great Grey Owl

The Plan Area contains few wet meadow areas that support pocket gophers and voles upon which this species feeds. However, some suitable habitat for the great grey owl does occur within the Plan Area. Although surveys designed to locate this species have not been conducted, it is possible that this species could occur in the Plan Area. Under all alternatives, the applicant would continue to operate in accordance with the CFPRs and other state regulations, unless superseded by the provisions of an HCP that provides for more stringent riparian measures than exist in the CFPRs. The CFPRs do not contain specific measures for the protection of great grey owls; however, the species is listed as Endangered in the State of California and as such, is protected under CESA. During the THP review process, which includes DFG participation, potential impacts to this species that could result from site-specific timber operations would be addressed, and appropriate measures implemented to minimize potential adverse effects. None of the alternatives would affect the application of these protective measures for great grey owls. The level of protection is comparable under all of the alternatives and no adverse impacts to the great gray owl are anticipated under any of the alternatives.

4.3.3.4 Northern Goshawk

Under all of the alternatives, the applicant would continue to operate in accordance with the CFPRs and other state regulations. Under the CFPRs, the northern goshawk is considered a "sensitive species" and protective measures to avoid disturbance of nesting goshawks would be implemented under each of the alternatives. The CFPRs also include provisions for review of THPs by CALFIRE such that if additional protective measures are needed, a mechanism exists for their incorporation on a site-specific basis. None of the measures would affect the application of these protective measures for northern goshawks; therefore, the following discussion focuses on the effects of the alternatives on the overall availability of suitable habitat for the northern goshawk.

No Action Alternative. Northern goshawk forage in nearly all forested landscapes, but tend to utilize stands with larger trees (CWHR size class 4 and above) for cover and reproduction. Nesting generally occurs in stands with larger trees and dense canopy (CWHR classes 4M, 4D, 5M, 5D and 6). The change in the amount of early to mid-seral stage forests anticipated under the No Action Alternative would not affect foraging by northern goshawk and the increase in CWHR class 4P stands would provide additional moderate quality foraging habitat for this species. The amount of forest stands with large trees and dense canopy cover (CWHR classes 4M, 4D, 5 and 6) would not change from existing conditions, thus the amount of highly suitable foraging, resting, and nesting habitat for northern goshawk in the Plan Area would remain the same as existing conditions.

Snags provide an important resource for primary prey species of the northern goshawk and also are used for observation and prey-plucking perches. Snag retention under the No Action Alternative would continue at current levels, thus maintaining the current availability of snags that may be suitable for use by goshawks. Live trees that are of sufficient size would most likely develop in stands managed with uneven-aged silviculture, which would comprise a large portion of the Plan Area under the No Action Alternative. These trees could contribute to the availability of snags in the future. Overall snags would

generally persist at current levels for the foreseeable future; therefore, adverse effects on the northern goshawk population in and adjacent to the Plan Area are not expected to occur.

Proposed Action. Under the Proposed Action, issuance of the ITPs and implementation of the HCP will encourage the development and persistence of mature stands in the CSAs and across the Plan Area to promote use by northern spotted owls. This development of mature stands will also promote use by the northern goshawk as they tend to utilize stands with larger trees (CWHR size class 4 and above) for cover and reproduction. Over the permit term, the amount of forest in the Plan Area in CWHR classes 4M and 4D is anticipated to more than double; and the amount of early- to mid-seral stage forest is expected to decline to levels below what is anticipated under the No Action Alternative. The decrease in CWHR classes 2M, 2D, 3M, and 3D could result in a decrease in moderate quality foraging habitat for northern goshawk relative to the No Action Alternative. However, the loss in moderate quality foraging habitat is expected to be offset by the increase in 4M and 4D stands that would provide additional highly suitable habitat for northern goshawk, compared to the No Action Alternative. Similar to what would occur under the No Action Alternative, the amount of late seral stage forest (CWHR classes 5 and 6) in the Plan Area would remain nearly the same as existing conditions and the forested landscape in the Plan Area would continue to provide only a small amount of highly suitable habitat for northern goshawk.

Snags provide an important resource for primary prey species of the northern goshawk and also are used for observation and prey-plucking perches. Because large trees and snags are important structures influencing nesting, roosting, and foraging of spotted owls, snag and large tree features will be an integral component of the CSAs established under the Terrestrial Species Conservation Program of the HCP. Snag retention in portions of the Plan Area will also be increased under the Aquatic Species Conservation Program because of the higher tree retention standards in riparian areas in drainages with coho salmon. Under the Proposed Action, the number of potential goshawk nesting and perching sites will be maintained or increased over the Permit Term through implementation of the terrestrial and aquatic conservation programs. Any increase in the number of potential nesting and perching sites would have beneficial effects on northern goshawks in and adjacent to the Plan Area relative to the No Action Alternative.

Alternative A. Under Alternative A, the determination of which owl activity centers would be supported by CSAs would be based on their proximity to adjacent LSRs established under the NWFP. Like the Proposed Action, the amount of forest in the Plan Area in CWHR classes 4M and 4D is anticipated to increase substantially, and the amount of early- to mid-seral stage forest is expected to decline to levels below what is anticipated under the No Action Alternative. This development of mature stands will also promote use by the northern goshawk as they tend to utilize stands with larger trees (CWHR size class 4 and above) for cover and reproduction. The decrease in CWHR classes 2M, 2D, 3M, and 3D could result in a decrease in moderate quality foraging habitat for northern goshawks relative to the No Action Alternative. However, similar to the Proposed Action, the loss in moderate quality foraging habitat is expected to be offset by the increase in 4M and 4D stands that would provide additional highly suitable habitat for northern goshawks, compared to the No Action Alternative. Because the amount of late seral stage forest (CWHR classes 5 and 6) in the Plan Area would increase over time, the forested landscape

in the Plan Area would provide additional highly suitable habitat for northern goshawk compared to the No Action Alternative.

Snag and large tree features would be an integral component of the CSAs established under the Terrestrial Species Conservation Program of the HCP. Snag retention would also be increased under the Aquatic Species Conservation Program because of the establishment of wide, no-harvest riparian reserves along all streams. Under Alternative A, the number of snags and large trees would be maintained or increased over the Permit Term through implementation of the terrestrial and aquatic conservation programs. Any increase in the number of snags and large trees would have beneficial effects to northern goshawks in and adjacent to the Plan Area relative to the No Action Alternative.

Alternative B. Under Alternative B, the applicant would conduct forest management activities consistent with the landscape-level goals developed for each management unit. Habitat objectives would be based on vegetation characteristics, and the applicant would manage for stands that would provide foraging habitat for northern spotted owls at twice the existing level. Like the Proposed Action, the amount of forest in the Plan Area in CWHR classes 4M and 4D is anticipated to increase substantially, and the amount of early- to mid-seral stage forest is expected to decline to levels below those anticipated under the No Action Alternative. The increase in 4M and 4D stands would provide additional high quality foraging and resting habitat for northern goshawk compared to the No Action Alternative and offset the loss of moderate quality foraging habitat in early seral stands. However, the amount of nesting and roosting habitat for northern goshawk is anticipated to decline. Thus, the reduction in the amount of suitable nesting habitat for northern goshawk under Alternative B could result in adverse effects on the northern goshawk population in and adjacent to the Plan Area. These negative effects would be greater than under the No Action Alternative.

4.3.3.5 Osprey

This species is associated strictly with large, fish-bearing waters (such as the Klamath); the Plan Area contains primarily low-order drainages with ephemeral and intermittent streams, and does not support the large open water features typically used by osprey. However, a few ospreys may inhabit the Plan Area, foraging in the larger fish-bearing streams and nesting and roosting in large trees and snags that are near water. Implementation of the No Action Alternative and the Action Alternatives (including the Proposed Action) would not result in substantial changes in area hydrology, water quality, riparian function, and sediment delivery that would have adverse effects on habitat for fish resources in the Plan Area (see Section 4.3.2.3, Anadromous Salmonids, above) and, therefore, would not adversely affect the prey base for osprey.

Under all of the alternatives, the applicant would continue to operate in accordance with the CFPRs and other state regulations. Under the CFPRs, ospreys are considered a “sensitive species” and protective measures to avoid disturbance of nesting ospreys would be implemented under each of the alternatives. The CFPRs also include provisions for review of THPs by CALFIRE such that if additional protective measures are needed, a mechanism exists for their incorporation on a site-specific basis. None of the measures would affect the application of these protective measures for osprey. The level of protection is comparable

under all of the alternatives and no adverse impacts to osprey are anticipated under any of the alternatives.

4.3.3.6 Golden Eagle

The Plan Area contains primarily forest lands, managed to support commercial timber production, and does not support large open areas typically used by golden eagles for foraging. However, a few golden eagles may inhabit the Plan Area, foraging in the larger meadows and non-forested habitats. The potential for disturbance of nesting pairs would be low under all alternatives because the applicant would continue to operate in accordance with the CFPRs, which include specific protection measures for this species. The CFPRs also include provisions for review of THPs by CALFIRE such that if additional protective measures are needed, a mechanism exists for their incorporation on a site-specific basis. None of the alternatives would affect the application of these protective measures for golden eagle; therefore, adverse effects on golden eagle populations in or adjacent to the Plan Area are not expected to occur under any of the alternatives.

4.3.3.7 Greater Sandhill Crane

The Plan Area contains primarily forest lands, managed to support commercial timber production, and does not support a substantial amount of wet meadows, bogs, fens, marshes, and pastures to be used by sandhill cranes for foraging. However, sandhill cranes have been reported in the vicinity of the applicant's Grass Lake management unit, foraging in the larger meadows and non-forested habitats and breeding in the few wetlands and marshes that exist in the region. Under all alternatives, the applicant would continue to operate in accordance with the CFPRs and other state regulations, unless superseded by the HCP provisions under the Proposed Action or Alternative A, which would provide for more stringent riparian measures than exist in the CFPRs. The CFPRs do not contain specific measures for the protection of sandhill cranes; however, the species is listed as threatened in the State of California, and as such, is protected under CESA. During the THP review process, which includes CDFG participation, potential impacts to this species that could result from site-specific timber operations would be addressed and appropriate measures implemented to minimize potential adverse effects. The level of protection is comparable under all of the alternatives and no adverse impacts to the greater sandhill crane are anticipated under any of the alternatives.

4.3.3.8 American Peregrine Falcon

It is unknown whether peregrine falcons inhabit the Plan Area, although surveys designed to locate this species have not been conducted. However, peregrine falcons are known to occupy large cliffs in surrounding Federal lands and would be likely to occur on suitable cliffs within the Plan Area. Assuming, for the sake of argument, that peregrine falcons do exist in the Plan Area, the applicant would continue to operate in accordance with the CFPRs and other state regulations. The potential for disturbance of peregrine falcons would be low under all alternatives because the CFPRs include specific protection measures for peregrine falcon. The CFPRs also include provisions for review of THPs by CALFIRE such that if additional protective measures are needed, a mechanism exists for their incorporation on a site-specific basis. None of the measures would affect the application of these protective

measures for peregrine falcons; therefore, adverse effects on peregrine falcon populations in or adjacent to the Plan Area are not expected to occur under any of the alternatives.

4.3.3.9 Bats

The following two bat species have the potential to occur in the Plan Area:

- Long-legged myotis
- Long-eared myotis

These two species are treated together in the following evaluation of the effects of the alternatives with reference to species-specific traits as necessary. Although each species has its own unique set of habitat requirements and sensitivities, there is considerable overlap, and in the Plan Area these species would use similar resources and, in general, be expected to respond similarly to changes in forest structure that could occur under the alternatives.

The long-eared myotis and long-legged myotis both use forested landscapes for foraging, cover, and reproduction. More open forest stands are highly suitable for foraging by the long-legged myotis, while the long-eared myotis prefers stands with larger trees and greater canopy coverage. Both the long-eared and long-legged myotis find stands with larger trees and high canopy cover highly suitable for cover and reproduction, probably due to the greater abundance of crevices that develop in the branches and bark of older, large trees.

These species use caves, mines, crevices, and human-made structures as roost sites. These types of roosts would not be affected by the applicant's timber operations under any of the alternatives, although the suitability of mines and caves, if they exist, could be affected by timber harvest activities if the microclimates near the mouth of caves or mines were altered. Timber operations could also result in disturbance of roost sites if activities occurred while the bats were present. The probability of disturbance or alteration of microclimates around roost sites is very low, as only one potentially suitable feature (a mine) is known in the Plan Area, and it is not known whether either of these bat species uses the mine for roosting. These bats may also use large diameter conifer snags or live trees with lightning scars as roost sites. The development of large trees and snags is directly related to timber management and, therefore, could be affected by timber operations. The following discussion focuses on the effects of the alternatives on the overall availability of suitable habitat for these species.

No Action Alternative. Although the amount of area with more open stands (CWHR classes 3S, 3P, and 4S) is anticipated to decline over time under the No Action Alternative, the amount of mid-seral stands in CWHR classes 3D and 4P is anticipated to increase. This change in forest structure would not have adverse effects on the long-legged myotis or long-eared myotis because all of these stand types provide moderate to highly suitable habitat for these species. Because the amount of mid- to late-seral stage forest (CWHR classes 4M, 4D, 5 and 6) in the Plan Area would remain nearly the same as existing conditions, the forested landscape in the Plan Area would continue to provide only a small amount of highly suitable habitat for these bats.

Snags and large live trees may provide suitable roosting sites for the long-eared and long-legged myotis. Snag retention under the No Action Alternative would not change, thus maintaining the current availability of snags that may be suitable for roosting by these

species. Live trees that are of sufficient size would most likely develop in stands managed with uneven-aged silviculture, which would comprise a large amount of the Plan Area under the No Action Alternative. Overall, suitable foraging and roosting conditions for these bats would generally persist at current levels for the foreseeable future. Therefore, the level of use is likely to persist at existing levels and adverse effects on populations of long-legged and long-eared myotis in and adjacent to the Plan Area are not expected to occur.

Proposed Action. Under the Proposed Action, issuance of the ITPs and subsequent implementation of the HCP would encourage the development and persistence of mature stands in the CSAs and across the Plan Area to promote use by northern spotted owls. Over the permit term, the amount of forest in the Plan Area in CWHR classes 4M and 4D is anticipated to more than double, and the amount of early seral stage forest is expected to decline to levels below what is anticipated under the No Action Alternative. However, the increase in mid-seral stands would replace smaller and less dense early-seral stands that are equally suitable for long-legged myotis such that the overall availability of suitable habitat for this species would remain similar to that under the No Action Alternative. The increase in 4M and 4D stands would benefit the long-eared myotis by providing more high quality roosting habitat for this species. Because the long-eared myotis usually forages close to roosting habitat, the increase in 4M and 4D in the CSAs would also benefit this species by increasing the amount of foraging habitat compared to the No Action Alternative.

Snags and large trees would be an integral component of the CSAs established under the Terrestrial Species Conservation Program of the proposed HCP. Snag retention in portions of the Plan Area would also be increased under the Aquatic Species Conservation Program because of higher tree retention standards in riparian areas in drainages with coho salmon (Class A lands). Under the Proposed Action, snag roosting sites would be retained or increased through implementation of the terrestrial and aquatic conservation programs. This alternative would have beneficial effects to both the long-eared and the long-legged bat, and would additionally benefit the long-legged myotis (due to its tendency to forage in riparian areas), relative to the No Action Alternative.

Alternative A. Under Alternative A, the determination of which owl activity centers would be supported by CSAs would be based on their proximity to adjacent LSRs established under the NWFP. Implementation of Alternative A based on LSRs results in the establishment of two more CSAs on the applicant's ownership relative to the Proposed Action. Like the Proposed Action, the amount of forest in the Plan Area in CWHR classes 4M and 4D is anticipated to increase substantially, and the amount of early seral stage forest is expected to decline to levels below what is anticipated under the No Action Alternative. However, the increase in mid-seral stands would replace smaller and less dense early-seral stands that are equally suitable for long-legged myotis such that the overall availability of suitable habitat for this species would remain similar to that under the No Action Alternative. The increase in 4M and 4D stands would benefit the long-eared myotis by providing more high quality roosting habitat for this species. Because the long-eared myotis usually forages close to roosting habitat, the increase in 4M and 4D would also benefit this species by increasing the amount of foraging habitat, similar to the Proposed Action.

Snag and large tree features would be an integral component of the CSAs established under the Terrestrial Species Conservation Program of the HCP. Snag retention would also be increased under the Aquatic Species Conservation Program because of the establishment of wide, no-harvest riparian reserves along all streams. Under Alternative A, snag-roosting sites would be retained or increased through implementation of the terrestrial and aquatic conservation programs, which would have beneficial effects to both the long eared and the long legged myotis relative to the No Action Alternative. In addition, the aquatic conservation program would benefit the long-legged myotis (due to its tendency to forage in riparian areas), by providing additional riparian protection relative to the No Action Alternative.

Alternative B. Under Alternative B, the applicant would conduct forest management activities consistent with the landscape-level goals developed for each management unit. Habitat objectives would be based on vegetation characteristics, and the applicant would manage for stands that would provide foraging habitat for northern spotted owls at twice the existing level. These stands would continue to provide moderate to highly suitable habitat for long-legged and long-eared myotis. Timber harvest could remove some trees and snags that provide suitable roosting sites for these species; however, harvesting of suitable roosting trees and snags could also occur under the No Action Alternative. As such, Alternative B would not fundamentally change the availability of these features on the landscape. In addition, with the uneven-aged management that the applicant would practice on the majority of the ownership, large trees would develop and continue to be available throughout the permit term. Overall, habitat conditions for long-legged and long-eared myotis would generally be similar to the No Action Alternative for the foreseeable future. Therefore, impacts to populations of these species in and adjacent to the Plan Area would be similar to the No Action Alternative.

4.3.3.10 Fisher

Under all alternatives, the applicant would continue to operate in accordance with the CFPRs and other state regulations, unless superseded by the HCP provisions under the Proposed Action or the other Action Alternatives. The CFPRs do not contain specific measures for the protection of fishers. Although fishers use terrestrial habitats at different (larger) scales than northern spotted owls, the action alternatives contain conservation measures for the northern spotted owl (and for the HCP-covered fish species) that could provide localized increases in habitat quality for fishers. The evaluation of potential effects of each alternative on fishers focuses on the availability of resting, denning, and foraging habitat and specific habitat elements such as snags and downed woody debris under each alternative.

No Action Alternative. Under the No Action Alternative, the representation of medium tree stands with closed canopy (CWHR classes 3M and 3D) would increase substantially over the next 50 years as smaller stands age and grow. The representation of pole tree stands with closed canopy (CWHR classes 2M and 2D) would also substantially increase during this period from initial levels. The increase in acreage of these stand types is expected to generally improve foraging and dispersal conditions across the forest landscape for fishers relative to existing conditions. However, under this alternative, the forest landscape would consist of more edge habitat than under existing conditions due to fragmentation resulting from increased use of even-aged regeneration (clearcutting). Because fishers are believed to

be sensitive to forest fragmentation (Powell and Zielinski 1994), the potential increase in edge habitat could result in a less favorable landscape for fishers.

Fishers use large trees (> 24 inches dbh) with cavities, deformities, and damage from mistletoe in areas of high canopy closure for resting and denning. Resting and denning often occurs in hardwood trees, which in the Plan Area are typically found in riparian areas. Under the No Action Alternative, harvest activities in riparian areas (WLPZs) along Class I and Class II streams would be restricted, a high level of canopy coverage would be retained in the inner zone of WLPZs, and few, if any, hardwoods would be harvested. These restrictions would ensure that stand structures with the potential for use by fishers for resting and denning would continue to develop across the Plan Area in the future.

Under the No Action Alternative, the representation of stands with large trees and dense canopy closure (CWHR classes 4M, 4D, 5M, 5D) would stay relatively constant over the next 50 years (see Table 4.3-1). Live trees that are of sufficient size to provide resting opportunities for fishers would most likely occur in stands where uneven-aged silvicultural methods are employed, and in riparian areas where WLPZ harvest restrictions would result in an increase in canopy coverage and the number of large trees as riparian stands age and grow.

Overall, this alternative would at least maintain existing resting and denning habitat for fishers and could slightly improve habitat quality relative to existing conditions because of an increase in the number (and acres) of forest stands suitable for traveling and foraging by fishers. Therefore, this alternative would have minor beneficial effects on the fisher population in and adjacent to the Plan Area relative to existing conditions.

Proposed Action. Under the Proposed Action, timber harvest consistent with the CFPRs and other HCP conservation measures would be allowed within 1.3 miles of owl activity centers that are not supported by designated CSAs. This would result in an adverse effect on fishers resting or denning within 1.3 miles of an owl activity center not designated as a CSA, or whose home ranges overlap with these areas.

Under the Proposed Action, implementation of the HCP would encourage the development and persistence of mature stands in the CSAs and riparian areas (WLPZs) to promote use by northern spotted owls. Because the amount of woody debris and the number of large snags are important structures influencing nesting, roosting, and foraging of spotted owls, snags and large (≥ 26 inches dbh) trees would be an integral component of the habitat surrounding activity centers supported by CSAs. Snag and downed woody debris retention would also be increased under the Aquatic Species Conservation Program because of the increased canopy coverage and tree retention standards in WLPZs. Under the Proposed Action, it is anticipated that there would be about a 10 percent decrease in acres harvested each year, including as much as a 25 percent decrease in even-age regeneration harvest (clearcuts) during the first decade, compared to the No Action Alternative.

Numerous studies have documented that fishers in the western United States select stands with large trees and snags, high levels of downed woody debris, dense canopy closure with multiple canopy layers and large diameter hardwoods, on steep slopes near water as resting habitat (Dark 1997; Truex et al. 1998; Self and Kerns 2001; Mazzoni 2002; Zielinski et al. 2004b). In their examination of regional variation in home-range-scale habitat models,

Zielinski et al. (2004b) found that large trees had a prominent influence on resting site selection in all of the top models, such that management can have direct effects on the resting habitat of fishers by favoring retention and recruitment of trees that achieve the largest sizes possible.

The changes in forest management anticipated under the Proposed Action would likely result in an increase in mid- to late-seral forest stands with dense canopy cover (CWHR classes 4M, and 4D) over the Permit Term relative to the No Action Alternative. Similar to the No Action Alternative, the amount of CWHR classes 3M and 3D is anticipated to increase over the Permit Term. The increase in acreage of these stand types is expected to generally improve foraging and dispersal conditions across the forest landscape for fishers and promote the development of resting and denning structures relative to existing conditions and the No Action Alternative.

Suitable habitat for spotted owls, which includes large trees, dense canopy closure, multiple canopy layers, and development of snags and coarse woody debris, also provides suitable habitat for fishers. By restricting harvest in CSAs until high levels of suitable habitat for northern spotted owls has developed, the Proposed Action would encourage the development and maintenance of suitable resting and denning habitat for fishers in the CSAs. In addition, the riparian management measures under the Aquatic Conservation Strategy would promote the retention of large trees, canopy coverage, snags, and downed woody material in WLPZs along Class I and Class II watercourses, particularly in Class A designated lands. These restrictions would ensure that stand structures with the potential for use by fishers for resting and denning would continue to develop across the Plan Area in the future.

Canopy coverage also appears to strongly influence rest site selection (Powell and Zielinski 1994). Self and Kerns (2001) frequently found resting sites in areas with a high canopy closure (i.e., greater than 60 percent). In her study of fishers in the southern Sierra Nevada range, Mazzoni (2002) found canopy coverage at rest sites averaged 73 percent while at random sites it averaged 56 percent. Dark (1997) found that fishers used and rested in areas with less habitat fragmentation and less human activity. The high canopy coverage (greater than 85 percent along Class I streams and greater than 65 percent along Class II streams) and tree retention standards in WLPZs in Class A and Class B lands would develop and maintain suitable resting habitat for fishers over the Permit Term. The decreased reliance on even-aged regeneration harvest under the Proposed Action would result in less fragmentation of the forest landscape.

General forest management and other covered activities have the potential to benefit fishers and other species through maintaining forest productivity and promoting the development of a heterogeneous forest structure consisting of a full range of forest habitats, including mature forest stands. Silvicultural treatments can reduce the potential for fire, especially large, stand-replacing events that can significantly affect habitat for fishers and other covered species.

A spatial analysis was conducted using a landscape-scale habitat suitability model based on Zielinski et al. (2010), as described in Appendix E. The purpose of this analysis was to evaluate potential effects of the Proposed Action on fisher habitat and hypothetical fisher populations at the local and regional scales within the California Klamath Province. The

regional fisher analysis for the California Klamath Area of Analysis (20-mile radius around the applicant's ownership) estimated a 4.05 percent net increase in the amount of modeled suitable fisher habitat by the end of the 50-year permit term under the Proposed Action. Results of the modeling indicated that habitat may support approximately 109 hypothetical female home ranges within the California Klamath Area of Analysis. Under the Proposed Action, the number of hypothetical female fisher home ranges increased incrementally at each time step until decade five, which estimated approximately 115 home ranges. The analysis for the California Klamath Area of Impact (1.6-mile radius around the applicant's ownership) estimated a net increase of 6.73 percent modeled suitable fisher habitat at the end of the 50-year permit term under the Proposed Action.

Results of the modeling indicated that current conditions may support approximately 25 hypothetical female home ranges within the California Klamath Area of Impact. Under the Proposed Action, the number of hypothetical female fisher home ranges increased incrementally at each time step until decade five, which estimated approximately 31 home ranges. Based on this analysis, the Proposed Action is expected to result in an increase in habitat and hypothetical fisher populations within the California Klamath Area of Analysis and Area of Impact. However, at a finer scale, timber harvest activities at northern spotted owl take sites are anticipated to reduce habitat suitability, forest complexity, and the availability of structures that are essential to fishers for resting and denning at these locations.

The Proposed Action would have adverse and beneficial effects on the fisher population in and adjacent to the Plan Area relative to existing conditions and the No Action Alternative. Adverse impacts would result from timber harvest at proposed northern spotted owl take sites and within 1.3 miles of activity centers not supported by CSAs. Beneficial effects include localized increases in habitat from the northern spotted owl and aquatic conservation measures, and increases in habitat over the ownership with the reduction of even-aged management practices. Overall, effects are expected to be less than significant.

Alternative A. Under Alternative A, the determination of which owl activity centers would be supported by CSAs would be based on their proximity to adjacent LSRs established under the NWFP. Implementation of Alternative A based on LSRs results in the establishment of two more CSAs on the applicant’s ownership relative to the Proposed Action. In addition, the riparian reserves established under this alternative would provide more undisturbed acreage along Plan Area watercourses. Under Alternative A, the changes in forest structure would be similar to those under the Proposed Action and the adverse and beneficial effects described above for the Proposed Action would occur. Overall, this alternative would not significantly affect the fisher population in and adjacent to the Plan Area relative to existing conditions and the No Action Alternative.

Alternative B. Under Alternative B, timber harvest consistent with the CFPRs and Alternative B conservation measures would be allowed within 1.3 miles of owl activity centers. This would result in an adverse effect on fishers resting or denning in these areas. Over the permit term, the forest landscape management measures of Alternative B would likely result in an increase in the amount of pole tree and medium tree stands with closed canopy (CWHR classes 2M, 2D and 3M, 3D) over the Permit Term, but at levels less than under the No Action Alternative. This would be expected to decrease the amount of

foraging and dispersal habitat for fishers relative to the No Action Alternative. This loss of foraging and dispersal habitat would be offset by a substantial increase in the amount of large tree stands with closed canopy (CWHR classes 4M and 4D) across the ownership, more than is expected to occur under the No Action Alternative. The increase in stands with large trees and dense canopy cover would also provide additional resting and denning habitat for fishers. Similar to the No Action Alternative, harvest activities in riparian areas (WLPZs) along Class I and Class II streams would be restricted under this alternative, a high level of canopy coverage would be retained in the inner zone of WLPZs, and few, if any, hardwoods would be harvested. These restrictions would ensure that stand structures with the potential for use by fishers for resting and denning would continue to develop across the Plan Area in the future. In addition, the amount of edge habitat and forest fragmentation would be less under this alternative than under the No Action Alternative, providing a better forest landscape for fishers.

Alternative B would have adverse and beneficial effects on the fisher population in and adjacent to the Plan Area relative to existing conditions and the No Action Alternative. Overall, effects are expected to be neutral and less than significant.

4.3.3.11 Tailed Frog

Tailed frogs are known to occur in the French Creek watershed and are suspected in other drainages throughout the Plan Area. Under each alternative, the applicant would continue to conduct timber operations throughout the Plan Area, consequently, the likelihood of tailed frogs being directly impacted during timber management operations would persist under all alternatives. Under all alternatives, the applicant would continue to operate in accordance with the CFPRs and other state regulations. In addition, as described in Section 4.2, Water Resources, no substantial changes in water quality are anticipated under any of the alternatives; thus, habitat quality for tailed frogs would not change. Because habitat quality would not change under any of the alternatives, no indirect effects on tailed frogs are likely to occur.

4.3.3.12 Southern Torrent Salamander

It is unknown whether southern torrent salamanders inhabit the Plan Area because surveys designed to locate this species have not been conducted. It is likely that headwater streams and seeps in the Plan Area could provide habitat for this species, but the Plan Area is inland from the known coastal range of this species. Direct impacts to this species could include activities such as excessive canopy removal leading to elevated water temperature, operating heavy equipment in streams, or destabilizing soil leading to excessive sediment deposition in streams.

Under all alternatives, the applicant would continue to operate in accordance with the CFPRs and other state regulations. The increased canopy cover requirements or buffer widths under the action alternatives would provide additional protection against elevated water temperatures; however, water temperatures in seeps are not likely to be substantially influenced by overhead canopy coverage. The streams and seeps potentially inhabited by southern torrent salamanders are afforded substantial protection under the existing CFPRs, and the more stringent riparian measures in the Proposed Action and Alternative A would

provide marginally greater protection than under the No Action Alternative or Alternative B.

4.3.3.13 Siskiyou Mountains Salamander

Siskiyou Mountains salamanders are known from the Elliot Creek and Horse Creek drainages of the applicant's Klamath River Management Unit. Under all alternatives, the applicant would continue to operate in accordance with the CFPRs and other state regulations. The CFPRs do not contain specific measures for the protection of the Siskiyou Mountains salamanders; however, the species is listed as threatened in the State of California and, as such, is protected under CESA. During the THP review process, which includes DFG participation, potential impacts to this species that could result from site-specific timber operations would be addressed and appropriate measures implemented to minimize potential adverse effects. Protective measures are commonly implemented to avoid directly impacting Siskiyou Mountains salamanders and avoid adverse habitat modification. The level of protection is common to all alternatives, and because of these measures, none of the alternatives would be expected to directly or indirectly affect Siskiyou Mountains salamanders.

4.3.3.14 Scott Bar Salamander

The Scott Bar salamander occurs in a very small area of the Siskiyou Mountains in extreme northern Siskiyou County (mostly south and southeast of the range of *P. stormi*) near the confluence of the Klamath and Scott rivers. Portions of the applicant's ownership along Little Ferry Creek overlap with the known range of the Scott Bar salamander. Under all alternatives, the applicant would continue to operate in accordance with the CFPRs and other state regulations. The CFPRs do not contain specific measures for the protection of the Scott Bar salamander; however, the species is listed as threatened in the State of California and, as such, is protected under CESA. During the THP review process, which includes DFG participation, potential impacts to the species that could result from site-specific timber operations would be addressed and appropriate measures implemented to minimize potential adverse effects. Protective measures are commonly implemented to avoid directly impacting salamanders and avoid adverse habitat modification. The level of protection is common to all alternatives, and because of these measures, none of the alternatives would be expected to directly or indirectly affect Scott Bar salamanders.

4.3.3.15 Northern Red-legged Frog

Northern red-legged frogs have not been reported on the applicant's ownership, but the proximity of known locations of these frogs to the Hilt/Siskiyou forest suggests that they could occur on the ownership. This species is associated with permanent water bodies and is a highly aquatic species with little movement away from streamside habitats. Individuals are occasionally found on roads at night during winter and spring rains where they could be struck by vehicles or equipment operating at night. Operations in streamside areas are restricted under all of the alternatives (e.g., in WLPZs) and night operations are unusual in the Plan Area, such that the likelihood of red-legged frogs to be directly impacted by the applicant's operations is low. In addition, no substantial changes in water quality are anticipated under any of the alternatives. The more stringent riparian measures in the

Proposed Action and Alternative A would provide marginally greater protection for this species than under the No Action Alternative or Alternative B.

4.3.3.16 Foothill Yellow-legged Frog

Foothill yellow-legged frogs have not been reported in the Plan Area, but the proximity of known locations of these frogs to the Hilt/Siskiyou forest suggests that they could occur in the Plan Area. These frogs are known to spend most of their time in or near streams at all seasons. Unlike most other ranid frogs in California, this species is rarely encountered (even on rainy nights) far from permanent water. Operations in streamside areas are restricted under all of the alternatives (e.g., in WLPZs), such that the likelihood of yellow-legged frogs to be directly impacted by the applicant's operations is low. In addition, no changes in water quality are anticipated under any of the alternatives. The more stringent riparian measures in the Proposed Action and Alternative A would provide marginally greater protection for this species than under the No Action Alternative or Alternative B.

4.3.3.17 Pacific Lamprey

The types of activities that could affect Pacific lamprey and potential impacts to this species would not differ substantially from those described for anadromous salmonids (see subsection 4.3.2.3). None of the alternatives would implement specific conservation measures for Pacific lamprey, but the conservation measures implemented under the Proposed Action would provide greater benefit to the lamprey than the measures under the No Action and other action alternatives. Of particular benefit would be the Road Management and Slope Stability measures that would reduce sediment production and delivery to Plan Area streams. A reduction in sediment delivery would benefit lamprey by improving spawning conditions in riffle habitats. The riparian measures would also benefit lamprey through maintenance or improvement of water temperatures in Plan Area streams.

4.3.3.18 Special-Status Plant Species

In addition to Yreka phlox, three plant species listed as federal or state endangered could potentially occur within the Plan Area:

- Gentner's fritillary
- Siskiyou mariposa lily
- Applegate's milkvetch

Potential impacts to these species from the applicant's activities are similar and described below for each alternative. Where specific differences in effect or conservation measures exist, they are noted below.

No Action Alternative. Under the No Action Alternative, no ITPs would be issued and the applicant would continue to exercise the precautions necessary to comply with the prohibitions on adverse impacts to listed plants. The applicant would continue to avoid or minimize potential adverse impacts to listed plants, including continuing to adhere to measures contained in the CFPRs (special protections afforded to meadows and wetlands), and measures identified during the THP preparation and review process. Existing state regulations require that THPs include measures to avoid potential adverse impacts to

federal and state listed plant species and other species of concern (if they occur) to a level of insignificance.

The applicant would continue to operate under individual THPs that would provide for protection of special-status plant species including the Siskiyou mariposa lily. The existing state regulations help ensure that few adverse impacts would occur to the Siskiyou mariposa lily under the No Action Alternative.

Proposed Action. Under the Proposed Action, the Services would issue ITPs for northern spotted owl, Yreka phlox, Chinook and coho salmon, and steelhead covering a period of 50 years. The applicant would implement the proposed HCP and exercise the precautions necessary to comply with the prohibitions on adverse impacts to listed plants described above for the No Action Alternative. The applicant would continue to avoid or minimize potential adverse impacts to listed plants, including continuing to adhere to measures contained in the CFPRs (special protections afforded to meadows and wetlands), and measures identified during the THP preparation and review process. Existing regulations require that THPs include measures to avoid or minimize potential adverse impacts to federal and state listed plant species and other species of concern to a level of insignificance. Therefore, similar to the No Action Alternative, few adverse impacts are likely to occur to special-status plants under the Proposed Action.

Alternative A. Under Alternative A, the Services would issue ITPs for northern spotted owl, Yreka phlox, Chinook and coho salmon, and steelhead covering a period of 50 years. The applicant would implement an HCP and exercise the precautions necessary to comply with the prohibitions on adverse impacts to listed plants described above for the No Action Alternative. As described for the No Action Alternative, the applicant would continue to avoid or minimize potential adverse impacts to listed plants in compliance with the CFPRs and measures identified during the THP preparation and review process. Therefore, similar to the No Action Alternative, few adverse impacts are likely to occur to special-status plants under Alternative A.

Alternative B. Under Alternative B, USFWS would issue an ITP for northern spotted owl but NMFS would not issue ITPs for Chinook salmon, coho salmon, and steelhead. The applicant would implement an HCP for northern spotted owl and continue to exercise the precautions necessary to comply with the prohibitions on adverse impacts to listed plants described for the No Action Alternative. The applicant would continue to avoid or minimize potential adverse impacts to listed plants, including continuing to adhere to measures contained in the CFPRs and measures identified during the THP preparation and review process. Existing conservation agreements for the eradication of invasive species would continue. Therefore, similar to the No Action Alternative, few adverse impacts are likely to occur to special-status plants under Alternative B.

4.3.4 Summary of Effects

Table 4.3-5 summarizes the effects of the alternatives on biological resources. Effects of the No Action Alternative are relative to existing conditions. Effects of the Proposed Action, Alternative A, and Alternative B are relative to the No Action Alternative.

TABLE 4.3-5
Alternatives Comparison Table—Biological Resources

Subcategory	No Action	Proposed Action	Alternative A	Alternative B
CWHR Size Classifications and Canopy Closure				
CWHR size/ canopy cover	Various changes over time see Table 4.3-1	Various changes over time see Table 4.3-2	Various changes over time see Table 4.3-3	Various changes over time see Table 4.3-4
Riparian	Same canopy closure in Class I watercourses. Increase canopy closure in Class II watercourses	Increase in acreage protected by riparian buffers	Increase in acreage protected by riparian buffers	Similar to No Action Alternative
Covered Species				
Northern spotted owl	No change from existing conditions	Improved demographic support through 24 CSAs	Improved demographic support through 26 CSAs	Improved demographic support at landscape level
Yreka phlox	No change from existing conditions	Greater protection through the addition of botanical surveys to identify undiscovered phlox populations, use of certified weed-free mulch within the EEZs established around Yreka phlox occurrences, and restrictions on the felling and yarding of trees within the EEZs	Similar to No Action Alternative	Similar to No Action Alternative
Anadromous salmonids	General improvement in aquatic habitat conditions	Greater improvements in aquatic habitat conditions through reductions in sediment and increased LWD	Greater improvements in aquatic habitat conditions through reductions in sediment and increased LWD	Similar to No Action Alternative
Other Special Status Species				
Bald eagle	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Western yellow-billed cuckoo	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Great gray owl	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Northern goshawk	No change from existing conditions	Increase in highly suitable habitat	Increase in highly suitable habitat	Increase in highly suitable habitat
Osprey	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Golden eagle	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Greater sandhill crane	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative

TABLE 4.3-5
Alternatives Comparison Table—Biological Resources

Subcategory	No Action	Proposed Action	Alternative A	Alternative B
American peregrine falcon	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Bats (long eared myotis and long-legged myotis)	No change from existing conditions	Increase in highly suitable habitat for long-eared myotis and an increase in foraging habitat for the long-legged myotis	Increase in highly suitable habitat for long-eared myotis and an increase in foraging habitat for the long-legged myotis	Similar to No Action Alternative
Fishers	Maintenance of resting/denning habitat; increased foraging habitat	Adverse effects outside CSAs; beneficial effects in CSAs	Adverse effects outside CSAs; beneficial effects in CSAs	Adverse effects offset by some habitat increases
Tailed frog	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Southern torrent salamander	No change from existing conditions	Marginally greater protection in riparian areas	Marginally greater protection in riparian areas	Similar to No Action Alternative
Siskiyou Mountains salamander	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Scott Bar salamander	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Northern red-legged Frog	No change from existing conditions	Marginally greater protection in riparian areas	Marginally greater protection in riparian areas	Similar to No Action Alternative
Foothill yellow-legged Frog	No change from existing conditions	Marginally greater protection in riparian areas	Marginally greater protection in riparian areas	Similar to No Action Alternative
Pacific lamprey	General improvement in aquatic habitat conditions	Greater improvements in aquatic habitat conditions through reductions in sediment	Greater improvements in aquatic habitat conditions through reductions in sediment	Similar to No Action Alternative
Special-Status Plant Species				
Gentner's fritillary	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Siskiyou mariposa lily	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative
Applegate's milkvetch	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative

4.4 Socioeconomics/Environmental Justice

Over the permit term, key socioeconomic indicators (e.g., FGS employment) would likely be affected by several internal influences (e.g., implementation of the proposed HCP) and external influences (e.g., market forces in the lumber and wood products sector). This analysis assesses the potential for socioeconomic impacts to occur under the Proposed Action and the alternatives. Additionally, environmental justice impacts are assessed in accordance with Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994).

4.4.1 No Action Alternative

Under the No Action Alternative, key socioeconomic indicators would likely be affected by several internal and external influences. Regulatory requirements would continue to affect management activities in the Plan Area and have the potential to affect timber harvesting and socioeconomic conditions in the absence of an approved HCP. Under the No Action Alternative, timber harvest would continue to be greatly restricted within existing spotted owl home ranges, thereby concentrating timber harvest outside of these areas. The overall harvest volume is expected to remain similar to current levels as long as the current levels could be sustained outside of the existing spotted owl home ranges.

Assuming market demand and prices remain fairly constant over the 50-year analysis period, it is possible that harvest levels would decrease across the ownership as forest conditions would no longer allow for sustainable harvest at current levels. In this case, direct and indirect employment in the regional timber industry and tax revenue would decline toward zero. This possible future reduction in timber harvest volume under the No Action Alternative would have social and economic consequences on Siskiyou County. Declining timber harvest levels would require a reduction in the applicant's workforce, resulting in both direct and indirect economic effects. For example, declining timber harvest levels would affect the amount of work contracted to specialty service providers and the amount of timber taxes and other forest products revenue received by Siskiyou County. However, because timber management jobs represent approximately 1 percent of Siskiyou County employment (see Section 3.4), this reduction is unlikely to be a significant social or economic impact.

4.4.1.1 Environmental Justice

Under the No Action Alternative, overall harvest volume is expected to remain similar to existing conditions as long as the current levels could be sustained outside of the existing spotted owl home ranges. Therefore, the applicant's workforce and other local employment would remain similar to current conditions, and the potential for increased unemployment, including disproportionate job losses affecting minority populations, is not expected to occur as a result of the No Action Alternative.

4.4.2 Proposed Action

4.4.2.1 Timber Harvest

Under the Proposed Action, it is expected that a similar volume of timber would be harvested compared to the No Action Alternative. Timber harvesting would be more

efficient (about 10 percent reduction in acres harvested compared to the No Action Alternative), requiring a smaller area to extract the required volume. The increase in harvest efficiency is expected to help support the long-term, sustainable harvest of timber products (unlike the No Action Alternative). In addition, the implementation of measures contained in the proposed HCP (e.g., road management) that augment existing practices could generate additional employment. The applicant's employment levels are expected to increase slightly (by about two workers) with implementation of the HCP compared to current levels. Relative to the No Action Alternative, the maintenance of existing jobs and potential for additional job creation would have beneficial social and economic impacts.

4.4.2.2 Environmental Justice

Under the Proposed Action, timber-harvesting levels are expected to remain similar to the No Action Alternative. However, the applicant's employment levels are expected to increase slightly (by about two workers) with implementation of the HCP compared to current levels. Therefore, it is possible that the maintenance of existing jobs and the potential for additional job creation would have a beneficial impact affecting minority populations compared to the No Action Alternative.

4.4.3 Alternative A

4.4.3.1 Timber Harvest

Under Alternative A, it is expected that a similar volume of timber would be harvested compared to the No Action Alternative. Compared to the No Action Alternative, however, harvest intensity would be greater because of restrictions on timber harvest within riparian buffers, which limits the amount of land available to harvest. Over the 50-year analysis period, it is possible that harvest levels would decrease across the ownership as forest conditions would no longer allow for sustainable harvest. In this case, direct and indirect employment and tax revenue would decline toward zero. This possible future reduction in timber harvest volume under Alternative A would have adverse social and economic consequences on Siskiyou County in a similar manner as under the No Action Alternative.

4.4.3.2 Environmental Justice

Under Alternative A, timber-harvesting levels are expected to remain similar to the No Action Alternative. Therefore, the applicant's workforce and other local employment would remain similar to the No Action Alternative, and the potential for increased unemployment, including disproportionate job losses affecting minority populations, is not expected to occur as a result of implementing Alternative A.

4.4.4 Alternative B

4.4.4.1 Timber Harvest

Under Alternative B, it is expected that a similar volume of timber would be harvested compared to the No Action Alternative. Timber harvesting would be more efficient (about 10 percent reduction in acres harvested compared to the No Action Alternative), requiring a smaller area to extract the required volume.

Under Alternative B, the applicant would continue to harvest timber in a long-term, sustainable manner similar to the Proposed Action. Although the applicant would have greater flexibility to harvest timber under Alternative B (due to access to existing owl home ranges), it is not expected that timber harvest would increase substantially compared to existing conditions because of state requirements to maintain sustained yield of timber products. Therefore, Alternative B is expected to result in similar levels of social and economic conditions compared to the Proposed Action, and fewer adverse social and economic effects relative to the No Action Alternative.

4.4.4.2 Environmental Justice

Under Alternative B, timber-harvesting levels are expected to remain similar to the No Action Alternative. Therefore, the applicant's workforce and other local employment would remain similar to the No Action Alternative, and the potential for increased unemployment, including disproportionate job losses affecting minority populations, is not expected to occur as a result of implementing Alternative B.

4.4.5 Summary of Effects

Table 4.4-1 summarizes the effects of the alternatives on socioeconomic conditions and environmental justice. Effects of the No Action Alternative are relative to existing conditions. Effects of the Proposed Action, Alternative A, and Alternative B are relative to the No Action Alternative.

TABLE 4.4-1
Alternatives Comparison Table—Socioeconomic Conditions and Environmental Justice

Subcategory	No Action	Proposed Action	Alternative A	Alternative B
Socioeconomic Conditions	Possible future reduction in timber harvest volume	Marginal benefits compared to No Action Alternative	Similar to No Action Alternative	Marginal benefits compared to No Action Alternative
Environmental Justice	No change from existing conditions	Marginal benefits compared to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative

4.5 Air Quality

The analysis in this section focuses on whether the action alternatives would degrade or improve air quality, or affect climate when compared to the No Action Alternative.

4.5.1 No Action Alternative

4.5.1.1 Air Quality

Under the No Action Alternative, the levels of emissions from forest management activities would vary over time as the amount of forest management activity varies and forest practices regulations evolve. Meaningful fuel usage projections cannot be made because of uncertain harvest levels, site-specific forest engineering requirements, location of harvest units, distance to markets, timberland maintenance, and other practices. The Services

expect, however, that increases in harvest area would result in greater emissions from forest management activity.

Changes in forest practice regulations are expected to contribute to decreased emissions. ARB has adopted new rules that will require the phased overhaul of off-road diesel vehicle fleets, and has drafted legislation requiring on-road trucks to install filters or upgrade their engines to reduce smog-forming and particulate pollution (ARB 2008g). Also, EPA promulgated a rule to greatly reduce emission standards for 2007 and subsequent model year heavy-duty diesel engines (66 FR 5002, January 18, 2001). Increasing use of retrofitted and replacement on- and off-road vehicles and equipment with lower emissions should counterbalance any trends associated with increasing forest management activity under the No Action Alternative. No emissions data are available for forest road maintenance and construction, but practices would follow CFPRs and forestry best management practices, which include dust abatement activities to minimize particulate emissions from re-entrained road dust.

Another source of air quality impacts associated with the No Action Alternative would be the continued practice of prescribed burning, which results in PM_{10} emissions. Emissions from wildfires are less predictable because they are influenced by natural events and external land management practices. The estimated average total particulate emission factor for a California forest wildfire is 306 pounds per acre (EPA 1995). Current CFPRs do not mandate forest fuels reduction; however, the applicant would likely continue to reduce forest fuel hazards—mechanically or by prescribed burning—and implement suppression activities to minimize timber and carbon emissions (Battye and Battye 2002).

In summary, the applicant's management activities under the No Action Alternative would continue to generate levels of NO_x, ROG, DPM, and PM_{10} emissions over the next 50 years that are too variable to quantify because of uncertain harvest levels, site-specific forest engineering requirements, location of harvest units, distance to markets, timberland maintenance, and other practices. However, the applicant would continue to comply with the CFPRs and Siskiyou County APCD burning restrictions, as amended, which would continue to protect ambient air quality. Therefore, forest management activities under the No Action Alternative are not expected to affect air quality in a manner substantially different than under existing conditions.

4.5.1.2 Climate Change

Timber harvest and forest management activities, pursuant to federal and state regulations, would occur as continuation of current practices, unless forest operations become economically infeasible. Greenhouse gases would be released into the atmosphere naturally through decomposition or episodic wildfire. Non-biological GHG emissions derived from stationary engines and off- and on-road vehicles would result from fossil fuel combustion. Prescribed burning would generate GHG emissions through combustion of understory biomass.

The forests would continue to sequester carbon as they grow. The Services expect that the applicant's management activities would be similar to current practices, with the take prohibitions for northern spotted owl and coho salmon resulting in more even-aged harvest across a larger area compared to current conditions. The No Action Alternative may

eventually result in a reduction in extracted timber volume if current harvest levels are not sustainable over time. Silvicultural prescriptions that improve growing conditions, control stand density, increase tree vigor, and adjust rotation lengths would affect the stocks and flows of carbon in the forest, and rates of removal from and release to the atmosphere. Harvest of forest products would result in carbon storage in long-lived wood products, whereas forest residues and wood waste used as energy substitutes would return carbon to the atmosphere (Skog and Nicholson 2000; Penman et al. 2003; Lippke et al. 2004; Perez-Garcia et al. 2004; Johnson et al. 2005; NCASI 2006). Under the No Action Alternative, forest fuel hazards would continue to be managed to reduce wildfire risks.

Carbon also is stored in harvested forest products, which would continue to be marketed, transported, and manufactured under more or less similar scenarios as present. However, the ultimate disposition of harvested forest products and residues is beyond the applicant's control, and the carbon stored as wood-in-use and rates of emissions from long-lived wood products cannot be reliably predicted.

Rates of carbon removal and release are influenced by forest management practices. However, for private timberland under sustainable forest management, it is reasonable to assume that the net change in forest carbon stocks on land affected by industrial forestry activities is zero (Skog et al. 2008). Therefore, the No Action Alternative is not expected to affect climate change caused by GHGs in a manner substantially different than under existing conditions and the Plan Area would continue to be a net sink for atmospheric carbon.

4.5.2 Proposed Action

4.5.2.1 Air Quality

Under the Proposed Action, the applicant would continue to conduct timber harvesting and related operations in accordance with state and federal regulations, including the CFPRs and Siskiyou County APCD burning restrictions, as amended. Also, the applicant would conduct timber harvesting and related operations in accordance with its proposed HCP. Similar to the No Action Alternative, another source of air quality impacts associated with the Proposed Action would be the continued practice of prescribed burning, which results in PM_{10} emissions.

The applicant has indicated that the harvest area would likely decrease by approximately 10 percent compared to the No Action Alternative as a result of increased harvest efficiency. Increased harvest efficiency under the Proposed Action, together with the phased introduction of retrofitted engines and replacement engines with lower emissions, should reduce emissions for the next 50 years compared to the No Action Alternative. Conservation measures (e.g., restrictions on areas in which timber can be harvested, heavy equipment exclusion zones) could reduce the applicant's contributions to PM_{10} over time by improving road conditions, but the improvements would not differ significantly from the No Action Alternative. Therefore, the impacts to air quality under the Proposed Action would be similar to, and slightly less than, those anticipated under the No Action Alternative. The magnitudes of the differences would vary over time and uncertainty of actual harvest area and volume makes emissions quantification difficult. Similar to the No Action Alternative, the Proposed Action would not substantially affect air quality.

Although current CFPRs do not mandate forest fuels reduction, the applicant would continue to manage forest fuel hazards to reduce wildfire risks. Timber operations in CSAs would occur on a case-by-case basis for habitat restoration and fuel hazard reduction purposes. Therefore, it is likely that forest management activities within CSAs would reduce fuel hazards and the risks of uncontrolled wildfire emissions in CSAs and adjacent lands. Consequently, the Proposed Action would reduce the risk of adverse wildfire emissions on air quality compared to the No Action Alternative.

4.5.2.2 Climate Change

Under the Proposed Action, the Plan Area would continue to serve as a sink for atmospheric carbon, similar to the No Action Alternative. Forest practices, including timber harvest, would vary in extent, intensity, and frequency compared to the No Action Alternative; however, the Proposed Action would not mandate a specific or predictable management regime, nor specify rates of carbon sequestration or release. It is conceivable that the Proposed Action, through silvicultural options, could influence carbon stocks and flows of forests and forest products. However, it is unlikely that the Proposed Action would affect climate change caused by GHGs in a substantial manner.

4.5.3 Alternative A

4.5.3.1 Air Quality

Under Alternative A, the applicant would continue to conduct timber harvesting in the Plan Area in accordance with CFPRs and other applicable regulations. Harvest activities would be more intensive because of the amount of land set aside in no-harvest riparian areas. This increase in harvest intensity would result in greater emissions from forest management activity compared to the No Action Alternative. As described above, increasing use of retrofitted and replacement on- and off-road vehicles and equipment with lower emissions over time should counterbalance trends associated with increasing forest management activity. Similar to the No Action Alternative, Alternative A is not expected to substantially affect air quality.

4.5.3.2 Climate Change

Forests in the Plan Area would sequester carbon and influence carbon stocks and flows in a manner similar to the No Action Alternative because harvest volumes and the range of silvicultural options would be similar. By providing a greater level of protection for riparian areas by prohibiting harvest in designated riparian reserves, forest management would shift such that the timber harvest regime would become less efficient. However, no appreciable change to climate would occur under Alternative A compared with what would occur under the No Action Alternative.

4.5.4 Alternative B

4.5.4.1 Air Quality

Under Alternative B, the applicant would continue to conduct timber harvesting in the Plan Area in accordance with CFPRs and other applicable regulations. Harvest area would decrease because the applicant would have greater access to high-volume stands where harvest is currently restricted. This decrease in harvest area would result in fewer emissions

from forest management activity compared to the No Action Alternative. As described above, increasing use of retrofitted and replacement on- and off-road vehicles and equipment with lower emissions should contribute to reduced air emissions. Similar to the No Action Alternative, Alternative A is not expected to substantially affect air quality.

4.5.4.2 Climate Change

Forests in the Plan Area would sequester carbon and influence carbon stocks and flows in a similar manner as under the No Action Alternative because harvest volumes and the range of silvicultural options are expected to be similar or slightly greater. The applicant would have more management flexibility with timber harvest over a greater area in the Plan Area. Overall timber operations would be comparable to those described for the No Action Alternative. Therefore, no appreciable change to climate would occur under Alternative B compared with what would occur under the No Action Alternative.

4.5.5 Summary of Effects

Table 4.5-1 summarizes the effects of the alternatives on air quality. Effects of the No Action Alternative are relative to existing conditions. Effects of the Proposed Action, Alternative A, and Alternative B are relative to the No Action Alternative.

TABLE 4.5-1
Alternatives Comparison Table—Air Quality

Subcategory	No Action	Proposed Action	Alternative A	Alternative B
Air Quality	No change from existing conditions	Marginal benefits compared to No Action Alternative	Similar to No Action Alternative	Marginal benefits compared to No Action Alternative
Climate Change	No change from existing conditions	Similar to No Action Alternative	Similar to No Action Alternative	Similar to No Action Alternative

4.6 Cultural Resources

Adverse impacts to cultural resources are defined as any changes to the site, its boundaries, or contents that detract from its historical integrity or eligibility for listing on the National Register of Historic Places. Federal agencies have a duty to consider potential impacts to cultural resources for actions that are determined to be "undertakings." The Proposed Action and alternatives are undertakings. Timber harvesting and other management operations can result in impacts to individual cultural resources, resource networks (e.g., archaeological or historic districts), and linear resources (e.g., trails and railroad systems).

Impacts to cultural resources can result from noncompliance with existing regulations intended to protect cultural resources. Cultural resource impacts fall under two categories: direct effects and indirect effects. Direct effects to historic properties include physical destruction of the property and damage, alteration, or removal of a portion of the historic property. Examples of activities resulting in direct effects to cultural resources include felling of trees and clearing of land for and construction of roads and logging platforms.

Indirect effects to cultural resources include longer-term loss of historic integrity from alterations, modifications, destruction, or removal of cultural resources. Such indirect effects may result from risk of fires caused by heavy equipment access, human destruction caused by increased access, ongoing degradation of subsurface deposits caused over time by unstable or shifting soils, and reforestation efforts. Potential impacts to cultural resources under all alternatives are viewed within this framework.

4.6.1 No Action Alternative

Under the No Action Alternative, the Services expect that the continuing prohibition on take of northern spotted owl and coho salmon would require the applicant to harvest intensively across a large area to achieve its timber harvest goals. More widespread harvest would result in more disturbance to upland and riparian forests, with increased potential to disturb cultural resources compared to existing conditions. The applicant would, however, continue to conduct timber harvesting and related operations in the Plan Area in accordance with existing state and federal regulations that assess and seek to protect cultural resources. Pursuant to the CFPRs, the following steps must be taken in preparation of THPs:

- Conduct an archaeological record search at the Northeast Information Center.
- Contact local Native Americans identified by the Native American Heritage Commission and allow for their participation, particularly in regard to sacred site areas.
- Provide a professional archaeologist or a person with archaeological training (in accordance with the CFPRs) to conduct a field survey for archaeological and historical sites in the area covered by the THP (previous archaeological surveys within the site survey area may also be used to partially or entirely satisfy this requirement).
- Prepare a confidential addendum to the THP, including a survey coverage map showing the locations of identified cultural resources. The addendum should describe record search and survey methods, results of contact with Native Americans, qualifications of the surveyor, a description of identified archaeological and historical sites, and a description of specific enforceable protection measures to be implemented both within the site boundaries and within 100 feet of the site.
- If a known archaeological or historical site could not be avoided during timber harvesting, then a preliminary determination of significance would be necessary. CAL FIRE would determine if a substantial adverse change to the resource would occur, and protection measures would be developed to reduce the severity of the impact.
- Submit completed site records for each site determined to be a “significant” archaeological or historical site in a manner consistent with the recording standards identified in the State Office of Historic Preservation’s Instruction for Recording Historical Resources.

Where needed, site-specific measures may be used to achieve a finding of "no substantial adverse change" from CAL FIRE. Such measures include, but are not limited to:

- No timber operations within a cultural resource's site boundaries or within a cultural resource's Special Treatment Zone (STZ). The STZ is defined as a 100-foot buffer zone around a cultural resource's site boundary.
- Allowance of limited timber operations within cultural site boundaries and STZ or limiting operations within the STZ only. These limits are designed to avoid or reduce impacts to a cultural resource's historical integrity. Such limited operations may include, but are not restricted to:
  - Directional felling of timber from within a cultural resource's boundary toward its edge, and into the STZ or beyond, contingent upon the ability to yard the material with minimal ground disturbance (i.e., through helicopter or high lead cable yarding) and without ground-based equipment entering the site, except on previously existing and treated roads, landings, or skid trails. Foresters must mark trees in advance and if trees cannot be directionally felled for reasons of safety, they may not be cut without submission and approval of alternative approaches that would achieve the same outcome.
  - Required extensive archaeological surveys (i.e., subsurface testing) and onsite cultural resource monitoring to ensure that road construction or reconstruction within a site or STZ avoids impacts to the historical integrity of cultural resources.
  - Roads and landings within a site or STZ that are proposed for use and maintenance would be covered with geotextile fabric and capped with culturally sterile material sufficient to conduct use and maintenance without scarring preexisting road material. These roads and landings are also drained to avoid deflection of water onto site areas.
  - Skid trails within a cultural resource site boundary or STZ that are proposed for use and maintenance may be required to be covered with slash or other debris prior to use depending on the size of timber to be skidded and distance to haul roads.

If an archaeological or historical site that was not identified in a THP is discovered during timber operations, the licensed timber operator would immediately stop operations within 100 feet of the discovery site and would notify CAL FIRE. Resource protection measures would then be implemented. In the event of discovery or recognition of any human remains, no further disturbance of the site or any nearby area would occur until the Siskiyou County coroner determined that no investigation of the cause of death is required. If the remains are found to be of Native American origin, then the descendants of the deceased must make a recommendation to the landowner or the person responsible for the excavation work for means of appropriate treatment or dignified disposal of the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98. Further work could occur if the Native American Heritage Commission was unable to identify a descendant or the descendant failed to make a recommendation within 24 hours after being notified by the Commission.

4.6.2 Proposed Action

Under the Proposed Action, the applicant would continue to implement ownership-wide mitigation, management, and monitoring measures in accordance with the requirements of the CFPRs, except as modified by issuance of the ITPs, and would continue to comply with the cultural resources protections described for the No Action Alternative. However, under the Proposed Action, the Services expect that the applicant would increase the number of timber stands allowed to grow into mature forest, which would result in an increase in the acreage of older stands over the permit term and up to a 25 percent decrease in clearcutting. Over the permit term, the volume extracted per acre of harvest is expected to increase such that harvest would occur on a smaller area. As a result of the smaller harvest footprint over the duration of the proposed 50-year limit, effects to cultural and historic properties are expected to be less than the No Action Alternative.

The Services have concluded the required consultation activities pursuant to the National Historic Preservation Act. Compliance with Section 106 has been accomplished.

4.6.3 Alternative A

Under Alternative A, the applicant would continue to implement ownership-wide mitigation, management, and monitoring measures in accordance with the requirements of the CFPRs, except as modified by issuance of the ITPs, and would continue to comply with the cultural resources protections described for the No Action Alternative. Unlike the No Action Alternative, however, under Alternative A, timber harvest would be constrained on approximately 14,000 acres of timberland as a result of establishing wide riparian buffers. Because of this constraint, the Services expect that the applicant would increase the amount of even-aged regeneration harvest to compensate for the timber volume encumbered in riparian reserves. Compared to the No Action Alternative, the Services expect that clearcutting would increase by 10 percent or more. The larger harvest footprint would result in greater potential effects to cultural and historic properties compared to the No Action Alternative. This increase, however, would be offset by the additional harvest restrictions in the wide riparian buffers established under Alternative A.

4.6.4 Alternative B

Under Alternative B, the applicant would continue to implement ownership-wide mitigation, management, and monitoring measures in accordance with the requirements of the CFPRs, except as modified by issuance of the ITP, and would continue to comply with the cultural resources protections described for the No Action Alternative. Unlike the No Action Alternative, however, under Alternative B, harvest would be allowed in areas currently considered habitat for the northern spotted owl. Because of the increased access to older forest areas with more timber volume per acre, the Services expect that the amount of even-aged regeneration harvest (clearcutting) would likely be reduced by up to 20 percent compared to the No Action Alternative. The smaller harvest footprint would result in fewer potential effects to cultural and historic properties compared to the No Action Alternative.

4.6.5 Summary of Effects

Table 4.6-1 summarizes the effects of the alternatives on cultural resources. Effects of the No Action Alternative are relative to existing conditions. Effects of the Proposed Action, Alternative A, and Alternative B are relative to the No Action Alternative.

TABLE 4.6-1
Alternatives Comparison Table—Cultural Resources

Subcategory	No Action	Proposed Action	Alternative A	Alternative B
Cultural Resources	Increase in disturbance compared to existing conditions	Marginal benefits compared to No Action Alternative	Similar to No Action Alternative	Marginal benefits compared to No Action Alternative

4.7 Land Use

This section evaluates the potential for impacts to land use from implementing the alternatives. Land use impacts are typically described as inconsistencies with applicable land use plans and policies. Conflicts with adjacent land uses (e.g., incompatibilities with the type or intensity of existing or planned surrounding uses) can also be a type of land use impact. Therefore, this impact analysis evaluates compatibility with surrounding land uses and consistency with land use regulations.

4.7.1 No Action Alternative

Activities that would continue to occur as part of the No Action Alternative pursuant to existing laws and regulations include growing, harvesting, and transporting of timber products on and off the property; conducting ancillary activities necessary to protect the property from fire, insects, disease, and vandalism; complying with various local, state, and federal laws and regulations that assess and seek to protect environmental resources (including listed fish and wildlife species); and voluntarily conducting research on wildlife and fish species and their habitats. These activities are the same as current practices.

Under the No Action Alternative, timber harvest activities in the Plan Area would remain compatible with adjacent federal lands of the KNF and other nearby National Forests in the same manner as existing conditions. These federal forest lands are managed for multiple beneficial uses, and include land use categories that permit timber harvest and habitat conservation. Timber production activities also occur on many adjacent privately owned properties and BLM lands. Adjacent non-timberlands are used primarily for grazing or other agricultural use and, therefore, are compatible with timber operations. Additionally, timber harvest activities under the No Action Alternative would remain compatible with the TPA.

Specific land use designations are not applied to individual parcels by the Siskiyou County General Plan; rather, general land use suitability classifications are given. The Siskiyou County General Plan designates most of the Plan Area as suitable for timber production. This designation is consistent with past and intended future use of the forest. The No Action

Alternative would continue essentially the same type of management activity (i.e., timber production) as under current conditions, which would be consistent with the Siskiyou County General Plan.

The majority of the Plan Area is designated as TPZ in the Siskiyou County Zoning Ordinance. This zoning district was established by Siskiyou County in accordance with the TPA. Land use in the TPZ district is restricted to growing and harvesting timber and compatible uses, and establishes a presumption that timber harvesting is expected to and will occur on such lands. Because the No Action Alternative involves the continued production of timber in the Plan Area, it would remain consistent with the intent of the TPZ district, and therefore consistent with the Siskiyou County Zoning Ordinance.

4.7.2 Proposed Action

Under the Proposed Action, the Services would issue ITPs and the applicant would implement the HCP. The applicant would continue to conduct timber harvesting and related operations in accordance with existing state and federal regulations, including the CFPRs, and the operational and policy management actions currently being implemented, as described for the No Action Alternative.

Operations in the Plan Area would be subject to the provisions of the ITPs. Specific measures contained in the CFPRs or developed pursuant to the THP process that are designed for the purpose of avoiding take of listed species and minimizing and mitigating environmental impacts to such species and their habitats would be superseded by measures described in the proposed HCP, but implementation of these measures would not result in any new types of land use inconsistency or incompatibility with land use regulations. For the reasons described under the No Action Alternative, timber harvest activities would remain compatible with adjacent federal lands of the KNF and other nearby National Forests. In addition, timber harvest activities would remain consistent with the Siskiyou County General Plan and the Siskiyou County Zoning Ordinance.

4.7.3 Alternative A

Under Alternative A, the Services would issue ITPs and the applicant would implement a modified HCP. The applicant would continue to conduct timber harvesting and related operations in accordance with existing state and federal regulations, including the CFPRs, and the operational and policy management actions currently being implemented, as described for the No Action Alternative.

Operations in the Plan Area would be subject to the provisions of ITPs. Under Alternative A, spotted owl activity centers supported by establishment of CSAs would be based on their proximity to adjacent LSRs rather than on proximity to designated CHUs. For the reasons described under the No Action Alternative, timber harvest activities would remain compatible with adjacent federal lands of the KNF and other nearby National Forests. In addition, timber harvest activities would remain consistent with the Siskiyou County General Plan and the Siskiyou County Zoning Ordinance.

4.7.4 Alternative B

Under Alternative B, USFWS would issue an ITP and the applicant would implement a modified HCP (no ITP would be issued by NMFS). The applicant would continue to conduct timber harvesting and related operations in accordance with existing state and federal regulations, including the CFPRs, and the operational and policy management actions currently being implemented, as described for the No Action Alternative.

Operations in the Plan Area would be subject to the provisions of the ITP. Under Alternative B, conservation would be achieved by landscape-level actions rather than by preserving owl habitat within home ranges (i.e., the CSAs designated under the Proposed Action). For the reasons described under the No Action Alternative, timber harvest activities would remain compatible with adjacent federal lands of the KNF and other nearby National Forests. In addition, timber harvest activities would remain consistent with the Siskiyou County General Plan and the Siskiyou County Zoning Ordinance.

4.7.5 Summary of Effects

Table 4.7-1 summarizes the effects of the alternatives on land use. Effects of the No Action Alternative are relative to existing conditions. Effects of the Proposed Action, Alternative A, and Alternative B are relative to the No Action Alternative.

TABLE 4.7-1
Alternatives Comparison Table—Land Use

Subcategory	No Action	Proposed Action	Alternative A	Alternative B
Land Use	No change from existing conditions	Similar to the No Action Alternative	Similar to the No Action Alternative	Similar to the No Action Alternative

CHAPTER 5

Cumulative Effects

This section presents an analysis of the cumulative effects (beneficial or adverse) on the environment of the Proposed Action and alternatives evaluated in this EIS. The cumulative effects are considered in the context of other local, state, and federal management activities and projects.

5.1 Actions Included in the Cumulative Impacts Analysis

Based on the description of NEPA requirements for cumulative impacts analysis, this section describes the other actions that are considered. The other actions are presented as general categories of activities that can affect the same resources that are potentially affected by the alternatives considered in Chapter 4, Environmental Consequences. These general categories are as follows.

- Climate Change
- Timber Operations
- Road Maintenance and Management
- Agriculture
- Land Development
- Mining
- Dams and Diversions
- Fishing

Each of these general categories has affected regional environmental conditions as summarized in the sections below. Regulations and programs that minimize and mitigate the ongoing impacts of these activities also are described.

5.1.1 Climate Change

The potential effects of increasing atmospheric concentrations of carbon dioxide and other "greenhouse gases," and the observed increase in the average temperature of the Earth's atmosphere and oceans, have been the subject of considerable technical analysis and political debate. There is growing consensus that climate change is occurring and additional change is predicted with great accuracy, particularly at local scales. However, there is considerable uncertainty associated with projecting future climate changes. This uncertainty is partly due to uncertainties about future emissions of greenhouse gases and to differences among climate models and simulations (Stainforth et al., 2005; Duffy et al., 2006). There are no known specific climate change simulations for the Klamath-Siskiyou region, but the results of numerous climate change simulations for California and the Pacific Northwest have been published. Together, these simulations describe a range of plausible outcomes from increased emissions of greenhouse gases.

The general projected effects of climate change on local and regional temperatures and precipitation are described below. Much of the following discussion was taken from the

12-Month Finding on a Petition to List the Siskiyou Mountains Salamander (*Plethodon stormi*) and Scott Bar Salamander (*Plethodon asupak*) as Threatened or Endangered (73 FR 4380; January 24, 2008). The 12-month finding on this petition is particularly relevant because the range of both of these species overlaps the Plan Area and because this analysis represents the best available information on the effects of global climate change in the Plan Area.

All of the studies reviewed predicted continued increases in average surface temperatures in California and the Pacific Northwest in response to increased emissions of greenhouse gases (Leung and Ghan, 1999; Snyder et al., 2002; Electric Power Research Institute [EPRI], 2003; Hayhoe et al., 2004; Cayan et al., 2006; Duffy et al., 2006; Maurer, 2007; Salathé et al., 2008). The magnitude of projected increases in annual average temperature varied widely among studies, depending on the models and emissions scenarios used, from 3 to 10.4°F (1.5 to 5.8°C), by the year 2100 (EPRI, 2003; Hayhoe et al., 2004; Cayan et al., 2006; Maurer, 2007). Simulations consistently project more pronounced temperature increases in California during the summer months than during other times of the year (Hayhoe et al., 2004; Cayan et al., 2006; Maurer, 2007). Some simulations projected more rapid temperature increases at higher elevations than at lower ones (Leung and Ghan, 1999; Salathé et al., 2008).

Reviews of a large number and variety of climate change simulations found that projected changes to precipitation in California were highly variable but clustered around no change or a slight increase in annual precipitation (Cayan et al., 2006; Maurer, 2007). In regards to annual precipitation within the Plan Area, rainfall patterns are predicted to trend downward over the next century (California Natural Resources Agency 2009). Warming temperatures are consistently projected to increase the proportion of precipitation that falls as rain rather than as snow in California and the Pacific Northwest (Leung and Ghan, 1999; Snyder et al., 2002; Hayhoe et al., 2004; Cayan et al., 2006; Maurer, 2007). Snowpack in upper elevations of the Klamath Basin are modeled to decrease with long-term changes in temperature and precipitation patterns (California Natural Resources Agency 2009). Earlier and more rapid snowmelt and decreases in the proportion of precipitation that falls as snow are expected to cause declines in spring snowpacks (Hayhoe et al., 2004; Cayan et al., 2006; Maurer, 2007). Declines in spring snowpacks have already occurred in some areas and are correlated with global warming trends (Mote, 2003).

5.1.2 Timber Operations

Forests of the Plan Area have been managed for commercial timber production since the early 1900s. Early logging operations used “steam donkeys” (steam-powered hoists), log chutes, horses, and oxen to transport logs. Steam donkeys were eventually replaced with steam engines and railroad track, allowing logs to be transported longer distances. By the late 1930s and 1940s, railroad logging declined and railroad grades were converted to road systems for logging trucks. Extensive new road development and reconstruction of existing roads began in the late 1950s and continued to the mid-1980s by private timber companies and the USFS, primarily for timber harvest. Through 1971, timber harvest concentrated on old-growth stands resulting in a degradation of the forest environment and old-growth dependent species. Since passage of the State of California Forest Practice Act in 1973, timber management has focused on younger, more productive forests and mandatory protective measures for natural resources have been implemented, including designated

stream protection zones, canopy retention standards, stream crossing standards, and other protective best management practices.

The fire regime prior to Anglo-American settlement (1850) within the Klamath area can be described as having mostly low- to moderate-intensity fires, with only small areas burning at high intensity. Fire frequency and intensity have changed since the fire-suppression era (1950 to present) (Fry and Stephens 2006). Fires occurring in the fire-suppression era are less frequent and have greater intensity, resulting in a more homogeneous effect on the habitat by damaging and removing all vegetation (Fry and Stephens 2006).

Prior to Anglo-American settlement, much of the region was maintained in an open mixed conifer forest. True fir was found on colder sites above 5,000 feet elevation, and the mixed conifer forest blended into hardwoods on drier sites below 3,000 feet (USFS 1996a, 2002). Under the historical fire regime, brush fields within the region were periodically replaced, but fire suppression has resulted in much denser and larger vegetation. The fire-suppression era, beginning at about the same time as the first commercial harvest activities, has allowed dense conifer stands to develop, and more litter and downed woody material to accumulate (USFS 1996a, 2002). The lack of fire favors regeneration of Douglas fir and white fir over pine species. Currently, dense stands of Douglas fir and white fir are found in some areas that were historically open, pine dominated stands.

Timber harvest operations and fire suppression activities continue to occur today and will continue into the future. Timber harvest occurs in the Plan Area and on adjacent lands, both public and private. These activities are regulated by plans and policies as described below.

5.1.2.1 Z'berg-Nejedly Forest Practice Act

Commercial timber harvest occurs on private land adjacent to the Plan Area, and is governed by the Z'berg-Nejedly Forest Practice Act. The intent of the Forest Practice Act is to assure that: (1) where feasible, the productivity of timberlands is restored, enhanced, and maintained; and (2) the goal of maximum sustained production of high-quality timber products is achieved while giving consideration to values relating to recreation, watershed, wildlife, range and forage, fisheries, regional economic vitality, employment, and aesthetic enjoyment. The Forest Practice Act is described in more detail in Appendix A.

5.1.2.2 Northwest Forest Plan

The NWFP protects large blocks of late-successional forest from commercial timber harvest and provides habitat for species that depend on these forests, including the northern spotted owl. Late-successional reserves (LSRs) were designated to contain significant amounts of the "best" late-successional forests. Management of the LSRs emphasizes retention of the existing late-successional forests and uses silvicultural approaches to speed development of beneficial structural conditions for younger forest stands. The NWFP contains extensive provisions for the restriction of timber operations in forested environments for the protection of terrestrial habitats and species (including the northern spotted owl). In 2008, the USFWS redesignated critical habitat units (CHUs) for the spotted owl to encompass a total of nearly 5.3 million acres. CHUs total approximately 1.2 million acres in California (USFWS 2011).

Additionally, the NWFP restricts timber operations for the protection of aquatic resources on federal forest lands. The NWFP outlines an Aquatic Conservation Strategy that contains four components: riparian reserves, key watersheds, watershed analysis, and watershed restoration. Each component is expected to play an important part in improving the health of the region's aquatic ecosystems. The four components are described as follows:

- **Riparian Reserves:** Riparian reserves provide an area along all streams, wetlands, ponds, lakes, and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis. Initial boundary widths for riparian reserves are identified in the NWFP. The NWFP describes standards and guidelines for riparian reserves, which generally prohibit or regulate activities within the reserves that retard or prevent attainment with the objectives of the Aquatic Conservation Strategy. Timber harvest is generally prohibited in riparian reserves unless it is consistent with or necessary to achieve the Aquatic Conservation Strategy objectives set forth in the NWFP.
- **Key Watersheds:** The NWFP also designates "key watersheds" in two categories: Tier 1 and Tier 2. Tier 1 key watersheds are those managed for at-risk fish species. Tier 2 key watersheds are those where high water quality is important.
- **Watershed Analysis:** Watershed analysis was selected as a systematic procedure to characterize the aquatic, riparian, and terrestrial features within a watershed. Managers are to use information gathered during the watershed analysis to refine riparian reserve boundaries and prescribe land management activities, including timber harvest.
- **Watershed Restoration:** Watershed restoration is designed to restore currently degraded habitat. Important components are control and restoration of road-related runoff and sediment production, restoration of riparian vegetation, and restoration of instream habitat complexity.

The NWFP establishes land use objectives for federal lands in the Pacific Northwest under the jurisdiction of USFS and BLM (USFS 1994). As such, the NWFP adds to the existing management direction of existing adopted USFS Land and Resource Management Plans (LRMPs) and BLM Resource Management Plans (RMPs), and supersedes management direction contained in existing plans where it differs for specific resources or areas. The LRMPs and RMP specific to this analysis are described in more detail below.

Klamath National Forest Land and Resource Management Plan. The majority of the Plan Area is adjacent to the KNF. The KNF is managed for multiple uses including recreation, fish and wildlife habitat, timber harvest, and visual resources (USFS 1994). Under the KNF LRMP, USFS will manage about 22 percent of the forest as LSRs (USFS 1994). About 35 percent of the forest is considered "matrix" lands that are managed for multiple-use purposes, including timber harvest (USFS 1994). Timber harvest is prohibited on the remaining 43 percent of the forest, which consists of other congressionally designated areas and administratively withdrawn areas (USFS 1994). Riparian reserves designated under the NWFP encompass an estimated 458,000 acres (27 percent) of the KNF (USFS 1994).

Shasta-Trinity National Forest LRMP. Minor amounts of the Plan Area in the Grass Lake management unit are adjacent to the Shasta-Trinity National Forest. The primary goals of the Shasta-Trinity LRMP are to integrate a mix of management activities that allow use and protection of forest resources and to meet the needs of guiding legislation (USFS 1995).

Under the Shasta-Trinity LRMP, USFS will manage about 25 percent of the Shasta-Trinity National Forest as LSRs (USFS 1995). About 23 percent of the Shasta-Trinity National Forest is considered "matrix" lands that are managed for multiple-use purposes, including timber harvest (USFS 1995). Timber harvest is prohibited on the remaining 52 percent of the Shasta-Trinity National Forest, which consists of other congressionally designated areas and administratively withdrawn areas (USFS 1995). Riparian reserves designated under the NWFP encompass an estimated 274,308 acres (13 percent) of Shasta-Trinity National Forest (USFS 1995).

Rogue River-Siskiyou National Forest LRMP. Minor amounts of the Plan Area in the Klamath River management unit are adjacent to the Rogue River-Siskiyou National Forest. The Rogue River-Siskiyou National Forest LRMP guides all natural resource management activities and establishes management standards and guidelines for the Rogue River-Siskiyou National Forest consistent with the NWFP. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management.

BLM Redding District RMP. BLM land management activities are required to comply with NWFP requirements and are managed according to the BLM Redding RMP. The Redding RMP addresses several planning issues, including forest management. BLM uses several designations to identify areas that require special management to protect resources. These designations include Areas of Critical Environmental Concern (ACEC), which are areas—designated and administered by a federal land management agency—that require special measures to (1) prevent irreparable damage to important archaeological/historic or other cultural sites, protect scenic values, fish and wildlife resources or other natural systems or processes; or (2) to preserve human life from natural hazards (BLM 1993). Under the Redding RMP, any fire occurring on public land is required to be suppressed. Public land designated as a sensitive category, such as ACEC, requires modified suppression techniques to protect environmental resources. The Scott Valley management unit, east of the Scott River, is adjacent to lands under BLM's jurisdiction. These BLM lands are not considered to be of important management concern, and are proposed for sale or other divestment in the BLM's Redding Resource Management Plan (BLM 1993).

5.1.2.3 Revised Recovery Plan for the Northern Spotted Owl

In 1990, the northern spotted owl was listed under the ESA as threatened because of widespread loss of suitable habitat across the northern spotted owl's range and the inadequacy of existing regulatory mechanisms to conserve the spotted owl. The Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011) acknowledges the important role that State, private, and Tribal lands can play toward recovering the northern spotted owl. Contributions from non-Federal lands are recognized as important to the range-wide goal of achieving conservation and recovery of the spotted owl. While the plan recommends retention of all occupied sites and unoccupied, high quality northern spotted owl habitat on all lands to the greatest extent feasible, the Service recognized that this goal will be especially difficult to meet on non-Federal lands. Relevant recovery actions are as follows.

- Recovery Action 10: *Conserve spotted owl sites and high value habitat to provide additional demographic support to the spotted owl population*. The Recovery Plan suggests that spotted owl recovery will require conservation of occupied and high quality owl habitat to

ameliorate impacts from barred owls and buffer potential declines in habitat due to climate change. This recovery action focuses on retention of high quality habitat and long-term occupancy and reproduction at spotted owl sites in order to bolster demographic rates in the larger landscape.

- Recovery Action 14: *Encourage applicants to develop Habitat Conservation Plans that are consistent with the recovery objectives.* HCPs are important tools that non-Federal landowners can voluntarily use to assist in the recovery of the spotted owl.
- Recovery Action 30: *Manage to reduce the negative effects of barred owls on spotted owls*; Recovery Action 31: *Develop mechanisms for landowners and land managers to support barred owl management*; and Recovery Acton 32: *Land managers should maintain and restore well distributed, older, and more structurally complex multi-layered conifer forests*. These actions are intended to reduce negative impacts of barred owls and other stressors on spotted owls by maintaining and restoring high-quality habitat that can serve as refugia where such habitat is limited.

5.1.2.4 Recovery Plan for the Southern Oregon/Northern California Coast Coho Salmon ESU

In 1997, the Southern Oregon/Northern California Coast (SONCC) coho salmon ESU was listed as threatened under the ESA, and this status was reaffirmed in 2005. In June 2006, the SONCC Technical Recovery Team released its historical population structure report for the SONCC coho salmon ESU (NMFS 2008). Numerous conservation actions were conducted between 2004 and 2006 for the SONCC coho salmon ESU recovery such as developing guidelines for maintaining instream flows below water diversions, guidelines for salmonid passage at stream crossings, and fish screening criteria for anadromous salmonids. A draft Recovery Plan was released for public review and comment in January 2012.

5.1.2.5 Magnuson-Stevens Reauthorization Act Klamath River Coho Salmon Recovery Plan

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the primary law governing marine fisheries management in United States federal waters. The Klamath River Coho Salmon Recovery Plan was completed in accordance with the 2007 amendments to the MSA. NMFS relied on the foundation of data currently in existence for Klamath River Basin coho salmon to complete the recovery plan (NMFS 2007). The Recovery Plan for the Klamath River Coho Salmon draws heavily from existing recovery and restoration plans developed with substantial stakeholder participation, including the NWFP and the Recovery Strategy for California Coho Salmon (DFG 2004). The Klamath River Coho Salmon Recovery Plan presents long-range guidance for various agencies, organizations and individuals to use as they consider taking actions or pursuing projects that may affect Klamath River coho salmon (NMFS 2007).

5.1.2.6 Recovery Strategy for California Coho Salmon

DFG prepared a recovery strategy for California coho salmon within the California Central Coast coho salmon ESU and the SONCC coho salmon ESU. The primary objective of the recovery strategy is to return coho salmon to a level of sustained viability, while protecting the genetic integrity of both ESUs. DFG defines sustained viability as a future condition when naturally producing coho salmon are adequately abundant and occupy a sufficient range and distribution to ensure against extinction due to environmental fluctuations and human impacts. The five main goals of the recovery strategy are to (1) maintain and

improve the number of key populations and increase the number of populations and cohorts of coho salmon; (2) maintain and increase the number of spawning adults; (3) maintain the range, and maintain and increase distribution of coho salmon; (4) maintain existing habitat essential for coho salmon; and (5) enhance and restore habitat within the range of coho salmon. Implementation includes hundreds of potential short-term and long-term actions intended to contribute to achieving a level of sustained viability.

5.1.2.7 Clean Water Act

Section 303(d) of the CWA requires that states make a list of waters that are not in attainment of water quality standards. For waters on this list, the states are to develop TMDLs. The TMDL is the maximum amount of a pollutant that a body of water can contain and still achieve water quality standards (North Coast RWQCB 2007). Federal regulations require that the TMDL must account for all sources of the pollutants that caused the water to be listed, including contributions from point sources (federally permitted discharges) and contributions from nonpoint sources. An impaired water body does not meet water quality standards and/or does not support the designated beneficial uses of the water body. In California, the SWRCB has interpreted state law (Porter-Cologne Water Quality Control Act, California Water Code Section 13000 et. seq.) to require that implementation be addressed when TMDLs are incorporated into Basin Plans. The Porter-Cologne Act requires each RWQCB to formulate and adopt Basin Plans for all areas within its region.

Klamath River TMDLs. The Klamath River is listed under Section 303(d) as impaired for nutrients, dissolved oxygen, temperature, and microcystin (North Coast RWQCB 2011). Impaired beneficial uses in the Klamath River Basin include contact and non-contact water recreation; commercial and sport fishing; cold freshwater habitat; rare, threatened, and endangered species; migration of aquatic organisms; spawning, reproduction, and/or early development of fish; and Native American culture (North Coast RWQCB 2007). The North Coast RWQCB has developed TMDLs (North Coast RWQCB 2010) for the Klamath River. The TMDLs include specific implementation actions that regulate timber operations on both private and public lands.

Scott River TMDLs. The Scott River is listed as impaired for temperature and sediment (North Coast RWQCB 2007). The Scott River and its tributaries are degraded by excessive sediment loads and elevated water temperatures, which impair designated beneficial uses including contact and non-contact water recreation; commercial and sport fishing; cold freshwater habitat; rare, threatened, and endangered species; migration of aquatic organisms; and spawning, reproduction, and/or early development of fish (North Coast RWQCB 2007). The Action Plan for the Scott River Sediment and Temperature TMDLs was completed in 2006 and includes sediment and temperature TMDLs, as well as the implementation actions necessary to achieve the TMDLs and attain water quality standards (North Coast RWQCB 2007). Specific implementation actions are included that regulate timber operations on both private and public lands.

Shasta River TMDLs. The Shasta River is listed as impaired for temperature and dissolved oxygen (North Coast RWQCB 2007). The Shasta River and its tributaries have low dissolved oxygen concentrations and elevated water temperatures that have degraded water quality and impaired designated beneficial uses, including cold freshwater habitat; rare, threatened, and endangered species; migration of aquatic organisms; and spawning, reproduction,

and/or early development of fish (North Coast RWQCB 2007). The Action Plan for the Shasta River Temperature and Dissolved Oxygen TMDLs was completed in 2007 and includes temperature and dissolved oxygen TMDLs, as well as implementation actions necessary to achieve the TMDLs and attain water quality standards (North Coast RWQCB 2007). Specific implementation actions are included that regulate timber operations on both private and public lands.

5.1.3 Road Maintenance and Management

Numerous roads exist throughout the region, including about 1,500 miles of roads in the Plan Area. Many of the roads in the Plan Area are maintained under cooperative road agreements with the USFS. The co-op roads are owned and controlled by the USFS, but are maintained jointly by two or more parties under a Road Right-of-Way Construction and Use Agreement. As these roads are under the jurisdiction of the USFS, they are constructed and maintained in accordance with USFS standards. Many more miles of road are on lands controlled by the USFS, other governmental agencies, or private interests.

5.1.3.1 Northwest Forest Plan

The NWFP's Aquatic Conservation Strategy for Key Watersheds includes provisions that preclude new roads from being built in roadless areas in Key Watersheds and that reduce existing system and nonsystem road mileage outside roadless areas. Roads cause runoff and sediment production. Road construction in LSRs for silvicultural, salvage, and other activities generally is not recommended unless potential benefits exceed the costs of habitat impairment.

5.1.3.2 Five Counties Road Maintenance Program

Siskiyou County participates in the Five Counties Road Maintenance Program under Limit Number 10 of the ESA Section 4(d) rule, which pertains to take of threatened salmon and steelhead arising from routine road maintenance on county maintained roads. To qualify their road programs under Limit 10, Humboldt, Del Norte, Trinity, Siskiyou and Mendocino Counties (Five Counties) collaboratively developed the "Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California 19 Watersheds" (Five Counties Salmon Conservation Program 2002), which includes design and construction guidelines and best management practices that minimize erosion and rectify fish passage problems.

5.1.4 Agriculture

Domestic livestock were brought to northern California more than 150 years ago. As the region became settled and ranches were established, cattle and sheep were moved into the adjacent mountains to forage. In the early 1900s, grazing was largely unregulated, and livestock numbers were much higher than present day numbers. In the past, a longer grazing season of February through December (compared to the present April to October grazing season) allowed animals to graze plants in the more sensitive times of spring and early winter. However, the continued high use of the mountain rangelands created degraded conditions in some areas, and forage production was reduced. Today, the implementation of a shorter, more restrictive grazing season in combination with the related actions described below has helped reduce the negative environmental effects of grazing. In addition to grazing, other agricultural activities in the region include cultivation of crops such as alfalfa and grains. Grazing by cattle degrades riparian function by simplifying the

composition of riparian species and weakening streambank structure. Removing grazing cattle helps improve streambank stability and minimize erosion.

Agricultural activities such as grazing continue to occur today and will continue into the future. Grazing occurs in the Plan Area and on adjacent lands, both public and private. These activities are regulated by plans and policies as described in the following subsections.

5.1.4.1 Northwest Forest Plan

The NWFP contains standards and guidelines for protection of sites from grazing throughout all land allocations. Grazing practices within Riparian Reserves must be consistent with the objectives of the Aquatic Conservation Strategy or else grazing must be eliminated. Range-related management in LSRs that does not adversely affect habitat is developed in coordination with wildlife and fisheries biologists. Relocation of livestock management and/or handling facilities is required in LSRs if reserve objectives cannot be met due to grazing practices.

5.1.4.2 TMDLs

As described previously, the Scott and Shasta rivers are impaired for temperature and sediment and for temperature and dissolved oxygen, respectively. The Action Plan for the Scott River Sediment and Temperature TMDLs was completed in 2006 and includes sediment and temperature TMDLs, as well as the implementation actions necessary to achieve the TMDLs and attain water quality standards (North Coast RWQCB 2007). Specific implementation actions are included for grazing activities on both private and public lands. The Action Plan for the Shasta River Temperature and Dissolved Oxygen TMDLs was completed in 2007 and includes temperature and dissolved oxygen TMDLs, as well as implementation actions necessary to achieve the TMDLs and attain water quality standards (North Coast RWQCB 2007). Specific implementation actions are included for grazing activities on both private and public lands. The Klamath River is listed under Section 303(d) as impaired for nutrients, dissolved oxygen, temperature, and microcystin (North Coast RWQCB 2010). The TMDLs also include specific implementation actions that regulate grazing on both private and public lands.

5.1.4.3 Invasive Weed Control Programs in Siskiyou County

The Siskiyou County Weed Management Area (SCWMA) coordinates and prioritizes activities necessary for the prevention, exclusion, control, and eradication of noxious and invasive weeds in the county (SCWMA 2000). Projects include integrated weed management of invasive species, surveys and mapping, and monitoring. In addition to the SCWMA, the KNF implements a noxious and invasive weed program including elements of prevention, education, eradication, and control. These programs and projects are ongoing and will continue to be implemented in the future.

5.1.5 Land Development

Land development projects often conflict with natural resources and result in adverse effects on the environment. Projects can affect wildlife habitat, cultural resources, wetlands and water bodies, and water and air quality. Siskiyou County is still relatively undeveloped; however, as population pressure increases, agricultural and forestry land at the fringe of

urban areas, such as Yreka in Siskiyou County, is most likely to experience land development pressure. Many small land development projects are proposed, but at this time no major land development projects are under consideration in Siskiyou County.

5.1.6 Mining

Gold mining within the region was the primary resource extraction from the mid-1850s through the 1930s. Historically, hydraulic mining operations occurred in the region and were often concurrent with hard rock and dredge mining. Hydraulic mining used a large volume of water to dislodge rock material and move sediment. The displaced material was washed through a sluice box in order to separate the gold from the rock material and sediment. A sluice box is a metal, wood, or plastic channel that has riffles in it to catch gold and separate it from the lighter material. Hydraulic mining caused sedimentation of rivers and streams from the combination of water, rock, and gravel runoff it produced.

Dredge mining removes gravel and sediment from rivers and stream bottoms. This material is run through a sluice box and then returned to the water. Large scale dredge mining continued until the 1950s and small-scale dredge mining persists today along the Klamath River. Historical mining activities caused extensive changes to the watersheds in the region. Mining is very destructive to fish habitat; sluicing and hydraulic mining operations increased turbidity and siltation, smothered salmon redds, destroyed riparian areas, and filled pools with sediment. Elemental mercury, which was used to extract gold, was released into the environment and continues to be found in the environment. Siskiyou County is one of the larger mining counties in California and produces sand and gravel, rocks, cinders, bituminous rock, pumice, dimension stone, and gold (placer and lode). There are approximately 43 mines within the jurisdiction of Siskiyou County, of which 34 are currently active, 4 are closed with no intent to resume, 2 are newly permitted, and 3 are noted as idle (California State Mining and Geology Board 2009).

Mining activities on private land are regulated by the Office of Mine Reclamation (OMR), which was created in 1991 to administer the Surface Mining and Reclamation Act of 1975 (SMARA). For all mining activities on BLM-managed land causing surface disturbance on five acres or less, operators must submit a Notice of Intent and receive approval. On USFS land, which is subject to the provisions of an LRMP and the NWFP, mineral management guidelines require a reclamation plan, approved operation plan, and reclamation bond for all mineral operations that would occur in Riparian Reserves, as well as requiring structures, support facilities, and roads to be located outside of Riparian Reserves whenever possible. When a road in a Riparian Reserve is no longer required for mineral or land management activities, it will be closed, decommissioned, and stabilized.

5.1.7 Dams and Diversions

Many large and small dams were built in the Klamath River system to divert water for mining, agriculture, and domestic use (Figure 5.1-1). These dams blocked salmon and steelhead from spawning and rearing habitat along the Klamath River and its tributaries. Additionally, unscreened or poorly screened water diversions and ditches resulted in a significant loss of juvenile fish. Early diversions often were unscreened and many more recently screened diversions are in need of repair. The state began efforts to screen the diversions in the region as early as the 1930s. A permanent program was initiated in the

1970s with the establishment of an improved DFG Stream Improvement Headquarters established in Yreka. Other activities affecting dams and diversions in the region are described below.

5.1.7.1 Activities Conducted by the Siskiyou Resource Conservation District

Siskiyou Resource Conservation District (RCD) projects focus on stream bank protection and erosion control, as well as the protection and enhancement of fish and wildlife habitat. Between 1992 and 2002, the Siskiyou RCD implemented approximately 100 projects on private lands in the Scott River watershed including 62 fish screens (Siskiyou RCD 2008). However, an estimated 13 active diversions remain unscreened in the uppermost portions in the watershed. Projects planned for 2008 and beyond range from species surveys, agricultural diversion improvements, fish screen maintenance and improvement, implementation of watershed-wide permitting programs, flow enhancements, fish passage, and stream bank enhancement and stabilization (Siskiyou RCD 2008).

5.1.7.2 Shasta and Scott River Watershed-wide Permitting Program for Streambed Alteration

A Shasta and Scott River Watershed-wide Permitting Program (DFG 1600 Incidental Take Permit for Scott and Shasta Valley Agricultural Lands) is being developed by DFG in consultation with the Siskiyou RCD, Shasta Valley RCD, and agricultural operators within the Scott and Shasta river watersheds. By establishing a streamlined process for the issuance of ITPs and Streambed Alteration Agreements, the permitting program would implement key coho salmon recovery tasks while facilitating compliance with California ESA and Fish and Game Code section 1602, respectively (NMFS 2007). Compliance with these laws is necessary because both agricultural water diversions and agricultural land practices may adversely affect coho salmon and its habitat (NMFS 2007).

5.1.7.3 Proposed Dam Removal Projects on the Klamath River

PacifiCorp operates a hydroelectric project with dams on the Klamath River that are used for power generation. Among other things, the project operations result in altered shape and flow characteristics of the river downstream, increased water temperatures, and lowered dissolved oxygen levels in the Klamath River. In February 2010, PacifiCorp entered into the Klamath Hydroelectric Settlement Agreement (KHSA) with a range of government agencies, Tribes, and stakeholders, which, among other things, established a process for a determination by the Secretary of the Interior regarding whether the removal of four project dams on the Klamath River (1) will advance restoration of the salmonid fisheries of the Klamath Basin, and (2) is in the public interest. The Department of the Interior has issued a Draft Environmental Impact Statement/Environmental Impact Report on the Secretary of the Interior's determination regarding dam removal pursuant to the KHSA (76 Fed. Reg. 58833; September 22, 2011), and has recently released Klamath Dam Removal Overview Report for the Secretary of the Interior: An Assessment of Scientific and Technical Information. If the Secretary's determination under the KHSA is affirmative, the target for dam removal under the KHSA is by the end of 2020, and dam removal is expected to open up more than 300 miles of habitat for salmon and steelhead and reduce water quality problems that result from operation of the dams.

In addition, as provided under the KHSA, PacifiCorp has developed HCPs and filed separate applications with NMFS and FWS for incidental take permits under Endangered

Species Act Section 10(a)(1)(B) authorizing the incidental take of Southern Oregon/ Northern California Coast (SONCC) Evolutionarily Significant Unit (ESU) coho salmon, and Lost River and shortnose suckers, for a ten-year period until either dam removal is expected to happen under the KHSA or, if the KHSA is not fully implemented for some reason, volitional fish passage facilities are expected to be implemented in Federal Energy Regulatory Commission proceedings to relicense the hydroelectric project. The PacifiCorp HCPs include a series of conservation measures to minimize and mitigate the effects of potential incidental take of listed species resulting from operation of the Project during this interim period. NMFS recently issued an incidental take permit to PacifiCorp for incidental take of SONCC ESU coho salmon resulting from interim operations of its hydroelectric project and implementation of its HCP (77 Fed. Reg. 14734; March 13, 2012).

Fishing

The Pacific salmon fishery is regulated by the Pacific Fishery Management Council (PFMC). Primary species in PFMC-managed waters are Chinook and coho salmon. PFMC's Salmon Fishery Management Plan (PFMC 1999) establishes goals and methods for salmon management, including tools such as season length and quotas. Every year, PMFC develops recommendations for management of the fishery and the recommendations are implemented by NMFS (PMFC 2008). Management depends on fishery conditions and salmon are affected by both natural and human-caused factors, including changes in ocean conditions and weather, effects of fishing gear, removal of salmon prey by other fisheries, and the effect of salmon fishing on reducing nutrients in streams due to fewer salmon carcasses in the spawning grounds (PFMC 1999). In 2006 and 2007, salmon fishing was severely limited off the California and Oregon coasts in order to protect the depleted Klamath stocks. In 2008, the salmon fishing season was closed off of the California coast due to depressed Sacramento River stocks although Klamath River stocks were within management targets. And as a result of the previous fishing restrictions, years 2010 and 2011 resulted in better returns of Chinook salmon and less restrictive commercial and recreational opportunities. Several different groups are involved in the salmon fishery including recreational, commercial, and tribal (ceremonial and subsistence).

5.2 Cumulative Impact Analysis

5.2.1 Geology

This section describes how the applicant's activities, in conjunction with the actions described previously for inclusion in the cumulative impacts analysis, can affect geologic conditions in the Plan Area and surrounding area. Geologic conditions can be affected in several ways. Primarily, the effects are related to movement of surface materials, including soils, weathered rock, and sediment through surface erosion and hillslope mass wasting. When delivered to streams, these materials can affect water quality and aquatic habitat. Secondary impacts to water quality and aquatic habitat are described in Sections 5.2.2 and 5.2.3, respectively. These natural processes are exacerbated by timber operations, mining, land development, and other activities that have occurred in the past and would continue to occur under all alternatives.

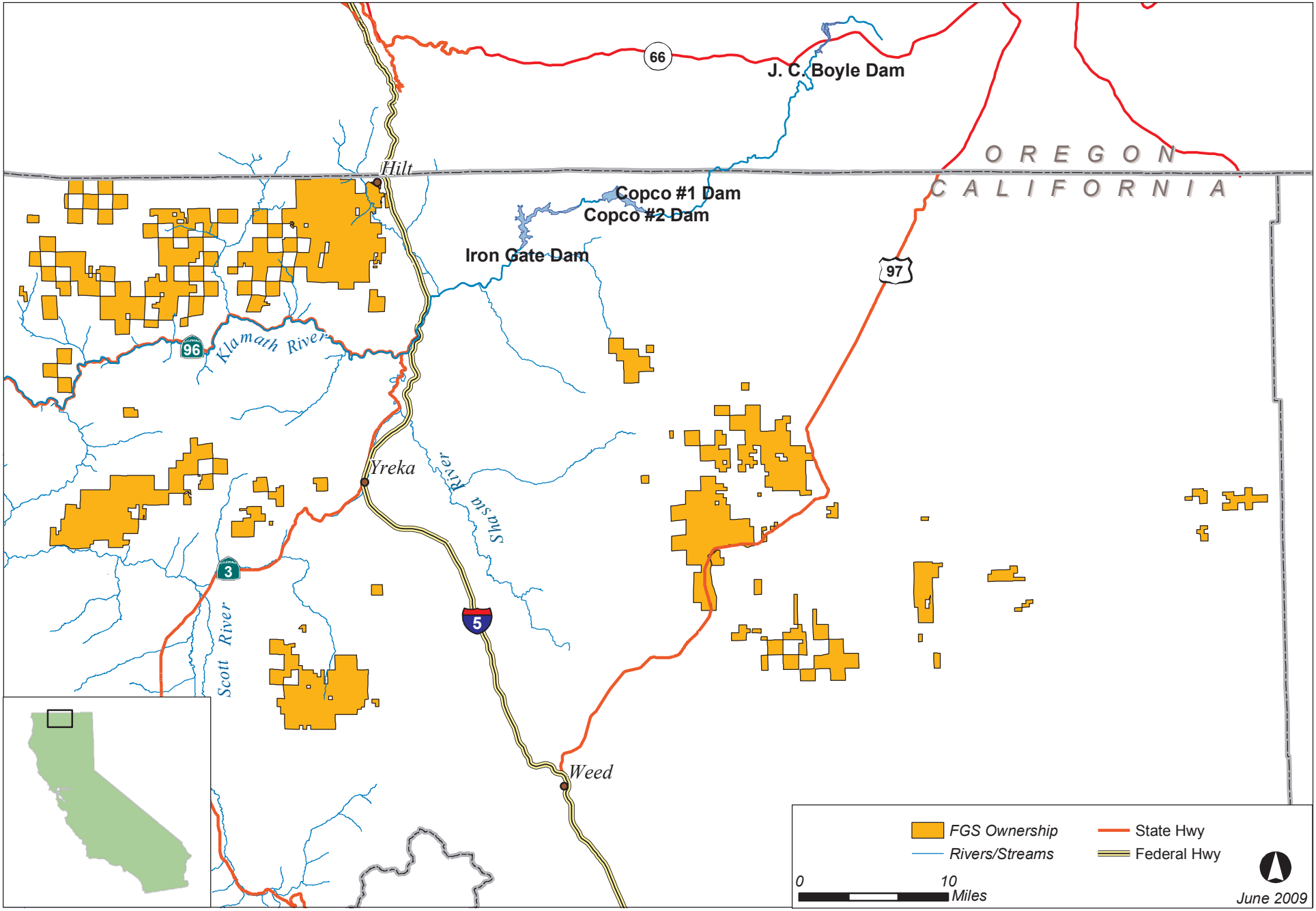

FIGURE 5.1-1
Dam Location Map

The assessment area for cumulative impacts on geology consists of the planning watersheds (drainages) that contain Plan Area lands owned by the applicant and covered in the proposed HCP, as well as other lands within the planning watersheds. These other lands are predominantly either privately owned or administered by a federal resource management agency.

Under all alternatives, timber operations and other activities on privately owned commercial timber lands would continue to be governed by the CFPRs which contain measures governing riparian management, silviculture, road maintenance, ground disturbance, and other factors that can affect geology and sediment delivery through mass wasting, surface erosion, and other geologic processes. Timber operations, road maintenance and management, and grazing on other public and private lands would also be subject to regulation under the Klamath, Scott, and Shasta river TMDLs administered by the North Coast RWQCB. The guidelines and actions under the various coho salmon recovery planning efforts may affect activities on other private lands that impact geologic processes in the analysis area for cumulative impacts. Design and construction guidelines and best management practices outlined in the "Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California 19 Watersheds" (Five Counties Salmon Conservation Program 2002) would be implemented on county roads, including those managed or maintained under cooperative agreements between private landowners and Siskiyou County. The existing regulations that govern timber operations and road maintenance and management on other private timberlands are anticipated to continue in the future.

Federal lands adjacent to and around the Plan Area are managed by the USFS and/or BLM. The resource management strategies on lands administered by the USFS and BLM include the continued implementation of guidelines contained in the NWFP for federal lands through the various LRMPs and Redding RMP as described previously. The guidelines and actions under the various coho salmon recovery planning efforts will affect activities on public lands administered by federal agencies that have the potential to impact geologic processes. Guidelines and implementation actions in the NWFP, LRMPs, and RMP governing timber operations, road maintenance and management activities, grazing, and mining in those areas where federal agencies are the predominant land managers are expected to continue into the future.

5.2.1.1 No Action Alternative

Under the No Action Alternative, riparian management prescriptions specified in the CFPRs are anticipated to impede sediment delivery from WLPZs and other riparian areas (e.g., inner gorges) within the Plan Area and on other privately owned timberlands in the planning watersheds. The CFPRs will also result in retention of high levels of overstory canopy within WLPZs, retention of trees likely to recruit as LWD, and retention of trees that contribute to maintaining bank stability. In addition to other riparian management measures, general WLPZ conservation measures such as the limitations on equipment use and limitations on site preparation in WLPZs and ELZs would contribute to minimizing the effects of timber operations on erosion processes on hillslopes that are adjacent to watercourses. Under the No Action Alternative, conservation measures in the CFPRs regulating timber harvest would continue to minimize the potential for soil compaction and management-related surface erosion within harvest units. Compared to historical timber harvest practices, these regulations would reduce environmental effects from mass wasting,

surface erosion, and sediment delivery to area streams on private lands in the planning watersheds.

The resource management strategies on lands administered by the USFS and BLM include the continued implementation of guidelines contained in the NWFP for timber operations and other activities on federal lands. These guidelines are expected to provide environmental benefits through a reduction in delivery of sediment within drainages where the USFS/BLM administers public lands. Current protections in those drainages where federal agencies are the predominant land managers would be expected to continue into the future and contribute to an improving trend in erosion and sediment control.

Implementation actions associated with TMDLs and various recovery planning efforts for coho salmon would continue under the No Action Alternative and are anticipated to provide environmental benefits through a reduction in mass wasting potential, surface erosion, hydrologic connectivity, and sediment delivery to area streams from private lands in the analysis area. Delivery of sediment to watercourses supporting the covered aquatic species is expected to continue to some degree but is expected to be in much less quantities than has been delivered in the past.

5.2.1.2 Proposed Action

Compared to the No Action Alternative, the Proposed Action is expected to result in relative reductions in mass wasting, surface erosion and sediment delivery within the Plan Area. This is described in Section 4.1, Geology and Soils. Specific improvements are expected to result from the following:

- Enhanced riparian management prescriptions that would impede sediment delivery in areas where sediment would have relatively short transport distances to watercourses.
- Implementation of conservation measures that would minimize the potential for soil compaction and management-related surface erosion during timber operations.
- Increased management attention to sensitive and unstable areas that would reduce the potential for hillslope mass wasting caused by timber management activities.
- Implementation of the Draft Road Management Plan – Operations Guide and associated conservation measures that would reduce road-related sediment production and delivery.

Overall, the cumulative effect of implementing the conservation measures for erosion and sediment control under the Proposed Action would be a reduction in sediment production and delivery compared with both existing conditions and conditions anticipated to occur over time under the No Action Alternative. Implementation of the Road Management Plan and the accelerated time period for road inventories and repair of road-related sediment sites under the Proposed Action are anticipated to provide for a substantial reduction in sediment delivery early on and improvements would continue over the period of analysis. For these reasons, the agencies anticipate that the measures associated with the Proposed Action, in conjunction with ongoing activities on other private and public lands (as regulated by the plans and policies identified above and for the No Action Alternative) would result in reductions in sediment delivery greater than the reductions expected to

occur under the No Action Alternative. Thus, the Proposed Action is expected generate beneficial cumulative effects over the 50-year permit term. The environmental benefits associated with the reduction in sediment delivery are described in Section 5.3.3, Biological Resources.

5.2.1.3 Alternative A

As described in Section 4.1, Geology and Soils, implementation of Alternative A would result in improved erosion and sediment control compared to conditions anticipated to occur under the No Action Alternative because the wider riparian reserves established under this alternative would not be harvested. However, the improvements would not be as great as those that would occur under the Proposed Action because the applicant would not implement the comprehensive, ownership-wide Road Management Plan, or additional slope stability measures contained in the Proposed Action. For this reason, the agencies anticipate that the measures associated with Alternative A, in conjunction with ongoing activities on other private and public lands, would result in reductions in sediment delivery greater than the reductions expected to occur under the No Action Alternative, but less than under the Proposed Action. This would be a beneficial cumulative effect, but not as beneficial as the effects under the Proposed Action.

5.2.1.4 Alternative B

Functionally, Alternative B and the No Action Alternative would have similar effects on the watershed processes that affect geology and soils. Because timber harvesting and forest management activities, as well as road management and riparian conservation measures, under Alternative B would be substantially the same as under the No Action Alternative, potential effects on geologic conditions within the Plan Area would be the same as described for the No Action Alternative. For this reason, the agencies anticipate that the measures associated with Alternative B, in conjunction with ongoing activities on other private and public lands, would result in reductions in sediment delivery similar to the reductions expected to occur under the No Action Alternative. Cumulative impacts would be the same as the No Action Alternative.

5.2.2 Water Resources

This section describes how the applicant's activities, in conjunction with the actions described previously for inclusion in the cumulative impacts analysis (including climate change), can affect water resources in the Plan Area and surrounding area. Water resources in the Plan Area can be affected in several ways. Primarily, the effects are related to changes in surface and groundwater hydrology, water temperature, sediment, nutrients, and dissolved oxygen. Changes in these factors can affect water quality and aquatic habitat. The impacts on water quality are described below. Secondary impacts to aquatic habitat are described in Section 5.2.3.

Past timber management and other actions within the watersheds that contain the Plan Area have affected peak flows, water temperatures, and sedimentation of streams. As described above, climate change is anticipated to result in changes in temperature, precipitation and snowpack in the future that can alter runoff timing and magnitude as well as water temperatures in area streams. Changes in peak flows (timing and intensities) have resulted from additional water runoff in timber harvest units or along roads, the interception of

groundwater flows by roads, and alteration of evapotranspiration through changes in forest structure. The normal hydrologic cycles in some watersheds have also been dramatically modified by dams, water diversions, development, and agriculture. Large-scale water management activities have resulted in adverse environmental conditions in some locations, including insufficient summer stream flows, increases in summer/fall stream temperatures, stranding or entrainment of juvenile salmonids, and alteration of aquatic habitat. As a result of improved timber management (i.e. under the NWFP) in riparian zones, as well as the removal of dams and water diversions over time, existing adverse conditions related to the changes in hydrology and water quality are expected to improve under the No Action Alternative.

5.2.2.1 Surface and Groundwater Hydrology

Forest management activities can affect hydrologic processes that determine stream flows (surface hydrology) and groundwater recharge. Alteration of snow pack, enhancement of runoff throughout timber harvest units or along roads, interception of groundwater flows by roads, and alteration of evapotranspiration through changes in forest structure all have the potential to affect surface and groundwater hydrology. Future changes in surface and groundwater hydrology are possible, even likely, given current projections for climate change.

No Action Alternative. Under the No Action Alternative, WLPZs, ELZs, and EEZs would be established along area streams, and other protective measures in the CFPRs would reduce the potential for soil compaction from the use of heavy equipment in these areas. Additionally, for those areas where heavy equipment would be used, site preparation measures (including seasonal operating limitations) would reduce the potential for ground compaction related to timber harvest activities. These harvest-related ground disturbance prevention measures are expected to contribute to reducing the potential for adverse impacts of operations-related alterations in surface and subsurface hydrology by reducing soil compaction that can increase the magnitude of peak flows and affect groundwater recharge.

Water drafting for road construction and maintenance, as well as for local fire suppression activities, would continue under the No Action Alternative both on the applicant's ownership and on other privately owned lands. Water drafting from within the channel zone of a natural watercourse or from a lake would follow the water drafting guidelines contained in the CFPRs. The water drafting guidelines would help ensure that flows in area streams would not change substantially compared to existing conditions.

The resource management strategies on lands administered by the USFS and BLM include the continued implementation of guidelines contained in the NWFP for timber operations and other activities on federal lands. These guidelines are expected to provide environmental benefits through an increase in the density and composition of vegetation in the riparian zone, thus decreasing the quantity and rate of surface runoff through direct interception and infiltration. In addition, it is anticipated that there would be a reduction in the amount of soil compaction in the riparian zone, thus increasing the rate of surface runoff infiltration, and increasing the rate and amount of shallow and deep groundwater recharge. Current protections in those drainages where federal agencies are the predominant land

managers would be expected to continue into the future and contribute to minimizing the effects of timber operations and other activities on surface flows and groundwater recharge.

Proposed Action. Compared to the No Action Alternative, the Proposed Action is expected to result in improved hydrologic conditions within the Plan Area, as described in Section 4.2, Water Resources. Specific improvements are expected to result from the following:

- A reduction in the amount of even-aged regeneration harvest (clear-cutting) necessary to meet the applicant's financial targets.
- Enhanced riparian management prescriptions that would require a more intact overstory canopy and greater retention of trees in riparian zones.
- Drainage-level road inventories that would result in a greater degree of hydrologic disconnection of the existing road network from area streams.
- Implementation of the Draft Road Management Plan – Operations Guide and associated conservation measures that specify the use of decreased cross-drain and rolling dip spacing, and outsloping.

Overall, the cumulative effect of implementing the riparian management measures and Road Management Plan under the Proposed Action would be an improvement in hydrologic conditions greater than anticipated to occur over time under the No Action Alternative. Under the Proposed Action, it is anticipated that there would be about a 10 percent decrease in acres harvested each decade, including as much as a 25 percent decrease in even-age regeneration harvest (clear-cuts), compared to the No Action Alternative. A reduction in clear-cutting would contribute to maintenance of existing hydrologic conditions. Implementation of the Road Management Plan and the accelerated time period for road inventories and repair of road-related sediment sites under the Proposed Action would result in hydrologically disconnecting approximately 10 to 20 percent of hydrologically connected roads over which the applicant has jurisdiction within the first five years. For these reasons, the agencies anticipate that the measures associated with the Proposed Action, in conjunction with ongoing activities on other private and public lands (as regulated by the plans and policies identified above and for the No Action Alternative) would result in improved hydrologic conditions greater than the improvement expected to occur under the No Action Alternative. This would be a beneficial cumulative effect and help to offset potential adverse effects due to climate change. The environmental benefits associated with improved hydrologic conditions are described in Section 5.2.3, Biological Resources.

Alternative A. As described in Section 4.2, Water Resources, implementation of Alternative A would provide a greater degree of protection for the hydrologic processes affected by timber harvest and management activities in the riparian zone than the No Action Alternative, but overall, would provide less protection against altered hydrology than under the Proposed Action. This is because the applicant would establish wider riparian reserves than under the No Action Alternative but would not implement the comprehensive, ownership-wide Road Management Plan contained in the Proposed Action. For this reason, the agencies anticipate that the measures associated with Alternative A, in conjunction with ongoing activities on other private and public lands, would result in an improvement in

hydrologic conditions greater than expected to occur under the No Action Alternative, but less than under the Proposed Action. This would be a beneficial cumulative effect and help to offset potential adverse effects due to climate change. However, beneficial effects under Alternative A would be less than the effects under the Proposed Action.

Alternative B. Functionally, Alternative B and the No Action Alternative would have similar effects on the watershed processes that affect surface and groundwater hydrology. Because timber operations, as well as road management and riparian conservation measures, under Alternative B would be substantially the same as under the No Action Alternative, potential effects on hydrologic conditions within the Plan Area would be the same as described for the No Action Alternative. For this reason, the agencies anticipate that the measures associated with Alternative B, in conjunction with ongoing activities on other private and public lands, would result in a level of improvement in hydrologic conditions similar to what is expected to occur under the No Action Alternative. Cumulative impacts would be the same as the No Action Alternative.

5.2.2.2 Water Temperature

Removal of the riparian canopy can result in elevated summer water temperatures; high levels of canopy coverage are believed to contribute to stream shading and maintenance of cool stream temperatures (Welsch 1991). The influence of shading provided by riparian vegetation on stream temperature differs depending on a variety of factors, including stream size, position in the watershed, drainage orientation, and local climatic influences. Exposed channels will also radiate heat more rapidly at night. Sediment input, particularly increases in fine sediment, can affect stream temperatures through changes in channel morphology such as reduced pool volume and increased channel width leaving greater surface area subject to solar heating (Rhodes et al. 1994; Lewis 1998). As described in Subsection 3.3 of this EIS, summertime temperatures rarely, if ever, exceed lethal temperatures reported for anadromous salmonids and average summer water temperatures in these streams are generally within the range considered suitable for juvenile rearing. Temperature data are not available for winter months, but based on information for October, water temperatures are likely suitable for spawning by anadromous salmonids.

No Action Alternative. Under the No Action Alternative, private timberlands would remain subject to the provisions of the CFPRs, including the THP provisions for riparian management that require retention of high levels of canopy coverage along Class I and II watercourses. The canopy coverage and tree retention standards would help to maintain high levels of canopy cover in the critical "inner zone" where stream shading and microclimate effects are anticipated to have the greatest potential to affect water temperatures. Overstory canopy closure would likely increase relative to existing conditions in stands as they regenerate following timber harvesting. The increase in canopy closure under the No Action alternative is particularly important given anticipated increases in air temperature due to climate change. The overall increase in overstory canopy closure is anticipated to result in minor decreases in water temperatures in Plan Area streams. The potential for decreased water temperatures offered by the No Action Alternative may mitigate some of the adverse effects of climate, however the beneficial effects would be minor. The resource management strategies on lands administered by the USFS and BLM include the continued implementation of guidelines contained in the NWFP for timber

operations and other activities on federal lands. These guidelines are expected to provide environmental benefits through an increase in the density and composition of vegetation in the riparian zone, thus contributing to moderation of surface water temperatures through direct shading and regulation of riparian microclimate air temperatures. Current protections in those drainages where federal agencies are the predominant land managers would be expected to continue into the future and contribute to minimizing the effects of timber operations and other activities on water temperatures.

Proposed Action. The Proposed Action is expected to result in water temperature conditions in the Plan Area that are comparable to those that would occur under the No Action Alternative, as described in Section 4.2, Water Resources. Like the No Action Alternative, overstory canopy closure is likely to increase relative to current conditions in all stands as they regenerate following timber harvesting. In drainages with Class A lands, harvest of trees that provide direct shading to pools in Class I streams would be prohibited, leading to an increase in stream shading relative to the No Action Alternative. However, any decrease in water temperature due to shading of pools under the Proposed Action would be minor relative to the No Action Alternative. For these reasons, the agencies anticipate that the measures associated with the Proposed Action, in conjunction with ongoing activities on other private and public lands (as regulated by the plans and policies identified above and for the No Action Alternative), would result in minor reductions in water temperatures, similar to what are expected to occur under the No Action Alternative. The potential for decreased water temperatures offered by the Proposed Action may mitigate some of the adverse effects of climate change, however the beneficial effects would be minor. The environmental benefits associated with reductions in water temperatures are described in Section 5.2.3, Biological Resources.

Alternative A. As described in Section 4.2, Water Resources, implementation of Alternative A would result in a greater amount of canopy closure in riparian areas compared to the No Action Alternative. Increased canopy closure in riparian areas would contribute to moderation of surface water temperatures through direct shading and regulation of riparian microclimate air temperatures. However, because of the measures specifically addressing canopy coverage and shading in WLPZs that would be implemented under the No Action Alternative, the increment of water temperature improvement created by the expanded riparian buffers under Alternative A would be minor. For this reason, the agencies anticipate that the measures associated with Alternative A, in conjunction with ongoing activities on other private and public lands, would result in minor reductions in water temperatures, similar to those expected to occur under the No Action Alternative. The potential for decreased water temperatures offered by Alternative A may mitigate some of the adverse effects of climate change, however, the effects would be minor.

Alternative B. Functionally, Alternative B and the No Action Alternative would have similar effects on the riparian processes that affect stream temperatures. Because timber harvesting and forest management activities, as well as road management and riparian conservation measures, under Alternative B would be substantially the same as under the No Action Alternative, potential effects on stream temperatures within the Plan Area would be the same as described for the No Action Alternative. For this reason, the agencies anticipate that the measures associated with Alternative B, in conjunction with ongoing activities on other private and public lands, would result in minor reductions in water temperatures, similar to

those expected to occur under the No Action Alternative. The potential for decreased water temperatures offered by Alternative B may mitigate some of the adverse effects of climate change, however the effects would be minor.

5.2.2.3 Sediment

Sediment impacts are described in Section 5.2.1, Geology.

5.2.2.4 Nutrients

Timber harvest in riparian areas can affect nutrient inputs and stream productivity in several ways. Removal of trees directly adjacent to the stream can lead to a reduction in nutrient inputs through decreased leaf and litter fall. Removal of canopy cover also increases the amount of sunlight reaching the stream and can increase algal production, which can lead to low dissolved oxygen and extreme pH conditions.

No Action Alternative. Under the No Action Alternative, private timberlands would remain subject to the provisions of the CFPRs, including the THP provisions for riparian management that require retention of high levels of canopy coverage along Class I and II watercourses. The canopy coverage and tree retention standards would help to maintain high levels of canopy cover in the critical "inner zone" where the majority of nutrients contributed by the riparian stand originate. Overstory canopy closure would likely increase relative to existing conditions in stands as they regenerate following timber harvesting. The overall increase in overstory canopy closure is anticipated to maintain existing levels of nutrient input to Plan Area streams. Additionally, as described above, it is anticipated that sediment delivery would be reduced slightly over time under the No Action Alternative. Some of the nutrient constituents are closely linked to sediment; therefore, sediment-bound nutrient loading may also be somewhat reduced over time relative to existing conditions under the No Action Alternative.

The resource management strategies on lands administered by the USFS and BLM include continued implementation of guidelines contained in the NWFP for timber operations and other activities on federal lands. These guidelines are expected to provide environmental benefits through an increase in the density and composition of vegetation in the riparian zone, ensuring that nutrient inputs from the adjacent stand are maintained or increased over the long term. Current protections in those drainages where federal agencies are the predominant land managers would be expected to continue into the future and contribute to minimizing the effects of timber operations and other activities on nutrient inputs.

Proposed Action. As described for stream temperatures, riparian management measures under the Proposed Action are expected to maintain or enhance existing levels of stream shading and LWD recruitment. These same measures would help ensure that nutrient inputs from the adjacent stand are maintained over the long term. Additionally, it is anticipated that sediment delivery due to the applicant's activities under the Proposed Action would be reduced over time compared to the No Action Alternative. Sediment-bound nutrient loading could also be reduced over time relative to existing conditions and the No Action Alternative. For these reasons, the agencies anticipate that the measures associated with the Proposed Action, in conjunction with ongoing activities on other private and public lands (as regulated by the plans and policies identified above and for the No Action Alternative), would result in maintenance of or increased nutrient inputs

over the long term, similar to what is expected to occur under the No Action Alternative. In general, increased nutrient input would have a beneficial effect through increased stream productivity.

Alternative A. As described in Section 4.2, Water Resources, implementation of Alternative A would result in a greater amount of canopy closure in riparian areas compared to the No Action Alternative. Increased canopy closure in riparian areas would contribute to maintenance of or increased nutrient inputs over the long term. For this reason, the agencies anticipate that the measures associated with Alternative A, in conjunction with ongoing activities on other private and public lands, would result in maintenance of or an increase in nutrient inputs, similar to what is expected to occur under the No Action Alternative. In general, increased nutrient input from the riparian areas would have a beneficial effect through increased stream productivity.

Alternative B. Functionally, Alternative B and the No Action Alternative would have similar effects on the riparian processes that affect nutrient input. Because timber harvesting and forest management activities, as well as road management and riparian conservation measures, under Alternative B would be substantially the same as under the No Action Alternative, potential effects on nutrients within the Plan Area would be the same as described for the No Action Alternative. For this reason, the agencies anticipate that the measures associated with Alternative B, in conjunction with ongoing activities on other private and public lands, would result in maintenance of nutrient inputs, similar to what is expected to occur under the No Action Alternative.

5.2.2.5 Dissolved Oxygen

The ability of a single landowner to influence dissolved oxygen concentrations within the stream network is limited to indirect effects due to altered water temperature, sediment input, and flow. It is assumed that any increase in water temperatures and sediment input, as well as any hydrologic alterations as a result of management actions, would negatively affect dissolved oxygen concentrations within the stream network.

As described previously, the applicant's activities and conservation measures under all of the alternatives, in conjunction with ongoing activities on other private and public lands, are expected to maintain or improve existing water temperatures and nutrient inputs, decrease sediment inputs, and result in flows comparable to existing conditions. Conservation measures that could affect these processes would have similar effects on dissolved oxygen levels under all of the alternatives. Therefore, it is not anticipated that dissolved oxygen levels in Plan Area streams would change over time relative to existing conditions under any of the alternatives.

5.2.3 Biological Resources

This section describes how the applicant's activities, in conjunction with the actions described previously for inclusion in the cumulative impacts analysis (including climate change), can affect biological resources in the Plan Area and surrounding area. Biological resources in the Plan Area can be affected in several ways. For terrestrial species, the evaluation of cumulative impacts focuses on expected changes in forest stands and the forest structure that determine the suitability of habitat for these species. Cumulative impacts to aquatic species are analyzed based on anticipated changes in watershed

processes including: hydrology, LWD recruitment, water temperature, nutrient and sediment inputs, and fish passage. Cumulative impacts due to changes in hydrology, water temperature, and nutrients are described in Section 5.2.2, while sediment impacts are described in Section 5.2.1. The secondary impacts of these changes on aquatic habitats are described below in the subsection on anadromous salmonids.

Past timber management and other actions within the planning watersheds have affected the forested landscape on and adjacent to the Plan Area. Forests within the Plan Area have been managed for commercial timber production since the early 1900s. Consequently, forests are relatively young (less than 80 years old) with only small, isolated patches of older stands. Forested areas within the Plan Area tend to be naturally fragmented because of the diverse geology, topography, dry climatic conditions, and periodic fire events that have resulted in areas dominated by hardwoods or chaparral species. Timber harvest and fuels management have also contributed to the forest mosaic.

5.2.3.1 Covered Species

Northern Spotted Owl. Timber operations have the potential to alter forest characteristics and influence the availability and quality of habitat for northern spotted owls. The modification of forest stand conditions through timber harvest has the greatest potential to affect (adversely or beneficially) northern spotted owls because of the immediate and long-term effects it has on habitat conditions and prey availability. While even-aged management can have direct negative impacts by removing suitable owl habitat, other silvicultural treatments such as thinning may benefit northern spotted owls by accelerating the development of owl habitat and dense prey populations, and reducing the risk of catastrophic wildfire. Other activities related to timber harvesting such as road construction, maintenance, and use can result in varying levels of habitat modification and disturbance.

Past management practices have greatly modified Pacific Northwest forests compared to historic conditions, and climate change is rapidly altering forest ecosystems within the range of the spotted owl with some unpredictable outcomes. Many of the current climate projections for the Pacific Northwest suggest the spotted owl and its habitat probably will be affected by climate change through several pathways, including but not limited to changes in fire regime; patterns of rain and snowfall; wildlife diseases; and abundance and distribution of native and nonnative species of fish, wildlife, and plants (USFWS 2011).

Wildfire size and severity have been increasing in the dry, fire prone forests of the western U.S. as a result of changing climatic conditions and past management activities (Heyerdahl et al. 2008, Reinhardt et al. 2008, Wiedinmyer and Hurteau 2010, Spies et al. 2010). Climate change is affecting insect outbreaks and intensity, which in turn affect fire and other forest processes (Kurz et al. 2008; Littell et al. 2009a, 2010; Latta et al. 2010; Spies et al. 2010), all of which change forest structure and composition and have profound implications for spotted owls. Although potential consequences of global climate change on Pacific Northwest forests remain unclear, most models predict warmer, wetter winters and hotter, drier summers for the Pacific Northwest in the first half of the 21st century (Mote et al. 2008). Based on patterns observed during 1990-2005, Glenn et al. (in press) suggest that increased occurrence of drought conditions during the summer has the potential to negatively affect annual survival, recruitment, and population growth rates of northern spotted owls across much of their range. As climate changes, the abundance and distribution of species

(including northern spotted owl) are expected to change, although the extent of the potential effects of climate change on spotted owl habitat and population dynamics is largely uncertain.

The Recovery Plan (USFWS 2011) suggests that spotted owl recovery will require conservation of as much occupied and high quality owl habitat as possible to ameliorate impacts from barred owls and buffer potential declines in habitat due to climate change. The Recovery Plan further recommends building on the LSR network from the NWFP, including increased conservation of high quality habitat on some Federal "Matrix" lands and the evaluation of contributions from non-Federal lands. It is anticipated that modifications to the northern spotted owl recovery strategy will likely be needed as new and updated information on the effects of climate change becomes available.

The NWFP has succeeded in slowing down the loss of late successional forests due to timber harvest (Healy et al. 2008), but recent research shows continued loss due to fire, especially in drier portions of the range (Spies et al. 2006, Ager et al. 2007, Healy et al. 2008, Kennedy and Wimberly 2009). Future losses of late successional forest to disease, insects, drought, and fire seem likely given predictions of climate change (Hessburg et al. 2005; Kennedy and Wimberly 2009; Littell et al. 2008, 2009a, 2009b, 2010).

The Recovery Plan (USFWS 2011) also recommends that land managers develop landscape-level adaptive management strategies that include active management of forest habitat to address climate change (Wright and Agee 2004, Lee and Irwin 2005, Carey et al. 2007, Keeton et al. 2007, Littell et al. 2008). Silvicultural treatments, such as thinning, can reduce the potential for fire, especially large, stand-replacing events that can significantly affect habitat for spotted owls and other species. In areas where past management practices have decreased age class diversity and altered forest patch structure, targeted timber harvest could create appropriate fuel breaks and increase canopy and age class diversity (Franklin et al. 2002, 2006; Wimberly et al. 2004; Littell et al. 2010). Some management actions, such as promoting spatial heterogeneity within stands, may degrade spotted owl habitat in the short-term (Franklin et al. 2006; Spies et al. 2006, 2010), but may be beneficial to spotted owls in the long-term by reducing the risk of habitat loss or improving overall forest ecosystem resilience to climate change (Roloff et al. 2005, Ager et al. 2007, Spies et al. 2009).

No Action Alternative. Under the No Action Alternative, private timberlands on and around the Plan Area would be managed in accordance with the CFPRs, which contain provisions for avoiding take of northern spotted owls. Timber harvesting would be planned and implemented to: (1) protect spotted owl nest sites during the nesting and fledging season; (2) maintain suitable foraging, roosting, and nesting habitat on the applicant's property; and (3) accelerate the development of replacement habitat following harvesting.

The resource management strategies on lands administered by the USFS and BLM include the continued implementation of guidelines contained in the NWFP for timber operations and other activities on federal lands. These guidelines are expected to benefit northern spotted owls through establishment of LSRs specifically for northern spotted owls and other species that are associated with late-seral forests. The establishment of LSRs under the No Action alternative is particularly important given anticipated loss of late successional forest due to climate change. Additionally, the NWFP and LRMPs guide timber operations on federal lands and contain provisions, similar to those in the CFPRs, to protect spotted owl

nest sites during the nesting and fledging season. The riparian reserves established under the NWFP and LRMPs are anticipated to provide additional suitable habitat for northern spotted owl and enhance dispersal of the species by maintaining connectivity between areas of suitable spotted owl habitat. Current protections in those drainages where federal agencies are the predominant land managers would be expected to continue into the future and provide protection for nesting and fledging owls and contribute to an increasing trend in the quantity and quality of habitat for northern spotted owls.

Proposed Action. Under the Proposed Action, demographic support for the federal conservation strategy would be provided by establishing a number of CSAs across the Plan Area. CSAs would be designated around strategic owl activity centers located on or within 1.3 miles of the Plan Area based on proximity to federal CHUs. Within each of the designated CSAs, there would be specific habitat targets and allowable harvest conditions for both the core area and home range of the activity center supported by the CSA. These targets and harvest restrictions would result in the development and protection of suitable habitat for northern spotted owls. The establishment of CSAs to maintain and develop high quality owl habitat under the Proposed Action Alternative is consistent with the long-term recovery goals in the Recovery Plan and may mitigate loss of habitat due to climate change; however the beneficial cumulative effects would be minor. Under the Proposed Action, it is anticipated that there would be about a 10 percent decrease in acres harvested each decade, including as much as a 25 percent decrease in even-age regeneration harvest, compared to the No Action Alternative. As a result, the amount of suitable habitat for northern spotted owl in the Plan Area would increase over time at a rate higher than under the No Action Alternative, and reach levels that exceed those anticipated under the No Action Alternative. The shift in harvest practices from even-aged to more uneven-aged management under the Proposed Action Alternative may offset some of the anticipated large-scale loss of habitat due to climate change, however the beneficial effects would be minor. Not only would the amount of suitable habitat increase, much of the suitable habitat would be located in areas that provide the highest levels of demographic support to the federal conservation strategy (i.e., the CSAs). For these reasons, the agencies anticipate that the measures associated with the Proposed Action, in conjunction with ongoing activities on other private and public lands, would result in substantial benefits to the northern spotted owl, compared to the No Action Alternative. This would be a beneficial cumulative effect.

Alternative A. As described in Section 4.3.2, Covered Species, implementation of Alternative A would result in substantial benefits to northern spotted owls through establishment of CSAs around strategic owl activity centers located on or within 1.3 miles of the Plan Area based on proximity to federal LSRs. Like the Proposed Action, there would be specific habitat targets and allowable harvest conditions for both the core area and home range of the activity center supported by the CSA. These targets and harvest restrictions would be the same as under the Proposed Action and would result in the development and protection of suitable habitat for northern spotted owls. The establishment of CSAs to maintain and develop high quality owl habitat under Alternative A is consistent with the long-term recovery goals in the Recovery Plan and may mitigate loss of habitat due to climate change; however the beneficial cumulative effects would be minor. The riparian reserves established under Alternative A are anticipated to provide additional suitable habitat for northern spotted owl and enhance dispersal of the species by maintaining connectivity between areas of suitable spotted owl habitat.

The amount of suitable habitat in the Plan Area is anticipated to increase and much of the suitable habitat would be located in areas that provide the highest levels of demographic support to the federal conservation strategy (i.e., the CSAs). The increase in suitable habitat under Alternative A is particularly important given anticipated loss of late successional forest due to climate change. Because the applicant would establish wider riparian reserves than under the No Action Alternative (and other action alternatives), Alternative A would provide a greater level of dispersal habitat and connectivity for dispersing northern spotted owls in the Plan Area than the other alternatives. For these reasons, the agencies anticipate that the measures associated with Alternative A, in conjunction with ongoing activities on other private and public lands, would result in the highest level of benefits to the northern spotted owl, compared to the No Action Alternative. This would be a beneficial cumulative effect.

Alternative B. The primary objective of the terrestrial conservation program under Alternative B is to increase the total amount of foraging habitat across the Plan Area to twice the existing level over the period of analysis. This landscape-based approach would provide foraging opportunities for owls nesting on adjacent ownerships and dispersal of spotted owls across the ownership. Overall, suitable habitat for northern spotted owl in the Plan Area is anticipated to increase over time (see Section 4.3.2, Covered Species). The increase in foraging habitat relative to the No Action Alternative is expected to result in a landscape that supports additional foraging opportunities for spotted owls and contribute to support and dispersal of owls found on adjacent federal lands. However, specific areas with suitable nesting and roosting habitat for northern spotted owl would not be identified and maintained in CSAs as under the Proposed Action and Alternative A, and harvest of all existing nesting/roosting habitat for northern spotted owl on the applicant's ownership is expected to occur. Although the measures associated with Alternative B would result in greater foraging opportunities for northern spotted owl in the Plan Area, the cumulative effect would not necessarily be beneficial because of the loss of nesting/roosting habitat. Additionally, the foraging habitat is not expected to be as high quality as the Proposed Action and Alternative A, and may not be used by northern spotted owl if not in close proximity to an activity center.

Yreka Phlox. The primary activities that could result in adverse effects to Yreka phlox are new road, landing, and skid trail construction and the introduction of invasive weeds through seed transport and soil disturbance associated with timber harvest and other silvicultural activities. The potential for adverse impacts is low because the serpentine soils where Yreka phlox is found are generally not suited for timber production, with few opportunities to introduce invasive weeds.

Under the No Action Alternative, Alternative A, and Alternative B, the applicant would incorporate measures designed to avoid adverse impacts to Yreka phlox. These measures include:

- Detailed pre-activity surveys for Yreka phlox prior to Covered Activities that could directly (e.g. removal, destruction) or indirectly (e.g. changes in hydrology, introduction of invasive weeds) impact Yreka phlox. Covered activities that have the potential to impact Yreka phlox include, but are not limited to activities associated with timber harvesting, road and landing construction and maintenance, silviculture, stand

regeneration, harvest of minor forest products, fire prevention, construction or reconstruction of watercourse crossings, and site preparation. The applicant would conduct pre-activity surveys for Yreka phlox at the THP-level as required under the State THP review process.

- Protection of occurrences discovered in the Plan Area by establishing an EEZ with a minimum width of 150 feet around each discovered occurrence to reduce external influences and allow for expansion of populations.

Similar protective measures are expected to be implemented on adjacent federal and private lands. These protective measures would be expected to continue into the future, resulting in continued avoidance of adverse effects to Yreka phlox. Because no change from existing conditions is expected, there would be no cumulative impact.

Under the Proposed Action, the applicant would implement the conservation measures in the proposed HCP associated with the avoidance of adverse effects objective for Yreka phlox. In general, these measures are similar to and consistent with the species protection measures for Yreka phlox described for the other alternatives, with the addition of botanical surveys to identify undiscovered phlox populations, use of certified weed-free mulch within the EEZs established around Yreka phlox occurrences, and restrictions on the felling and yarding of trees within the EEZs. Detailed pre-activity surveys to avoid adverse impacts to Yreka phlox would be conducted at the THP level as under the No Action Alternative. Additionally, the applicant would develop and implement a monitoring program for known and discovered populations of Yreka phlox on the ownership that would provide information on species status, distribution, and threats to the populations in the area. For these reasons, the agencies anticipate that the level of protection afforded Yreka phlox in the Plan Area under the Proposed Action would be incrementally greater than under the other alternatives and would constitute a cumulative benefit.

Anadromous Salmonids. Past timber management and other actions within the planning watersheds have affected watershed processes and products that determine the suitability of aquatic habitat for anadromous salmonids and other aquatic species. Changes in sediment inputs, hydrology, water temperature, nutrient input, and dissolved oxygen are described in the preceding subsections. The secondary impacts of these changes on aquatic habitats are described below. The normal hydrologic cycles in some watersheds have also been modified by dams, water diversions, development, and agriculture. These activities have resulted in adverse environmental conditions, such as insufficient summer stream flows, for the aquatic Covered Species in some locations, and instances of increases in stream temperatures, stranding or entrainment of juvenile salmonids, and alterations to aquatic habitat.

Warming as a result of climate change is likely to affect salmon species negatively, particularly those species and populations that rely extensively on freshwater habitats for juvenile rearing (Fleming and Jensen 2002). They are likely to face altered water temperatures and precipitation related changes in flow regimes. Anticipated changes in temperature and precipitation are described in Section 5.1.1 and the indirect effects of these changes on water temperatures and flow regimes are described in Section 5.2.2.

Under all alternatives, timber operations and other activities on privately owned commercial timber lands would continue to be governed by the CFPRs which contain

measures governing riparian management, silviculture, road maintenance, ground disturbance, and other activities that can affect anadromous salmonids. Timber operations, road maintenance and management, and grazing on other public and private lands would also be subject to regulation under the Klamath, Scott, and Shasta river TMDLs administered by the North Coast RWQCB. The guidelines and actions under the various coho salmon recovery planning efforts will affect activities on other private lands that impact watershed processes. Design and construction guidelines and best management practices outlined in the "Five Counties Salmon Conservation Program" would be implemented on county roads, including those managed or maintained under cooperative agreements between private landowners and Siskiyou County. The existing regulations that govern timber operations and road maintenance and management on other private timberlands are anticipated to continue in the future.

Federal lands adjacent to and around the Plan Area are managed by the USFS and/or BLM. The resource management strategies on lands administered by the USFS and BLM include the continued implementation of guidelines contained in the NWFP for federal lands through the various LRMPs and Redding RMP as described previously. The guidelines and actions under the various coho salmon recovery planning efforts will affect activities on public lands administered by federal agencies that have the potential to impact watershed processes that determine the quantity and quality of aquatic habitats. Guidelines and implementation actions in the NWFP, LRMPs, and RMP governing timber operations, road maintenance and management activities, grazing, and mining in those areas where federal agencies are the predominant land managers are expected to continue into the future.

No Action Alternative. In general, the direct effects to anadromous fish species under the No Action Alternative are expected to be similar to the existing conditions throughout the Plan Area. As described in Chapter 2, Alternatives, the applicant is currently operating under regulations governing the activities that may result in direct impacts to aquatic species such as water drafting. The applicant's operations and activities under the No Action Alternative would continue to be regulated under the THP process; therefore, the No Action Alternative would not change the current level of direct effects on anadromous fish in Plan Area streams.

Indirect effects include activities that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include longer-term changes to fish populations or their habitats through alteration of watershed processes. As described in Section 4.2.1, the applicant is currently operating under regulations that govern its activities that can influence hydrology and water quality conditions within the Plan Area. NMFS does not believe that the existing CFPRs, broadly applied on California's private timberlands, adequately protect SONCC coho salmon or provide for properly functioning habitat conditions. Under the No Action Alternative, the applicant would continue to be regulated under these regulations; therefore, implementation of the No Action Alternative would not result in substantial changes in hydrologic and water quality conditions in the future and would result in continued inadequate conservation of SONCC coho salmon within the Plan Area.

Under the No Action Alternative, the applicant would continue to implement current road management and stream crossing practices specified in individual THPs. Culverts that restrict fish passage would be replaced over time as they are identified at the THP level.

Therefore, the maintenance, improvement, construction, and closure of roads and landings under the No Action Alternative would improve fish passage conditions over time relative to existing conditions.

Proposed Action. Under the Proposed Action, direct losses and injuries to individuals through operation of heavy machinery in streams under the Proposed Action are expected to be minimal. The Road Management Plan and Operations Guide (see Appendix B of the HCP) includes road design and maintenance specifications for stream crossings, work windows, and erosion control methods, including BMPs for road construction and maintenance of stream crossings. Like the No Action Alternative, water drafting under the Proposed Action would be conducted under strict guidelines, minimizing the potential for the accidental entrainment of aquatic species or harm resulting from dewatering of the stream. EEZs around Class I, II, and III watercourses as specified in the HCP, would minimize the potential for hazardous materials from incidental leaks or drips from heavy equipment from reaching streams.

As described in Section 4.1, Geology and Soils and 4.2 Water Resources, the Proposed Action, compared to the No Action Alternative, is anticipated to have the following effects on aquatic habitat for anadromous salmonids in the Plan Area.

- Adverse impacts to hydrology and water quality would be minimized and mitigated by the improved riparian conditions resulting from riparian management and decreased sediment production and delivery.
- Increased overstory canopy closure would result in slight decreases in water temperatures, which may be beneficial to aquatic resources.
- Increased amounts of instream LWD would result in improved habitat conditions and benefits to overwintering coho and steelhead juveniles, as well as improved habitat conditions for other fish species.
- Reduced sediment delivery to watercourses would benefit aquatic species through improvements in habitat conditions for anadromous salmonids and other fish species in the Plan Area.
- Increased channel stability and reduced sediment input would result in improved substrate conditions for spawning and juvenile rearing.
- Proper culvert installation at all stream crossings or replacement with fish-friendly structures would avoid or minimize impacts caused by the blockage of fish passage.

For these reasons, the agencies anticipate that the measures associated with the Proposed Action, in conjunction with ongoing activities on other private and public lands, would result in improvements in aquatic habitat conditions greater than the level of improvement expected to occur under the No Action Alternative. This increase in habitat quality for anadromous salmonids and other fish species would supplement the substantial benefits that would occur if the Klamath River dams were removed or altered to provide fish passage. Overall, implementation of the Proposed Action would result in a beneficial cumulative effect.

Alternative A. Compared to the No Action Alternative and other action alternatives (including the Proposed Action), the riparian reserves proposed in Alternative A would provide a greater amount of riparian protection around Plan Areas streams, both in terms of the width of the buffer as well as more restrictions on timber operations in the buffer. Overall, this would provide a greater degree of protection for the hydrologic, geomorphic, and ecologic processes that affect aquatic habitat quality within the Plan Area.

Direct impacts to the special-status fish species within the Plan Area are expected to be less than under the No Action Alternative due to the wider buffer widths and equipment exclusions within the riparian reserves established around all streams and water bodies. These restrictions would minimize the potential for hazardous materials from incidental leaks or drips from heavy equipment from reaching streams. Like the No Action Alternative, water drafting under Alternative A would be conducted under strict guidelines, ensuring that no aquatic species are accidentally entrained with the water drafted or harmed by dewatering of the stream.

For these reasons, the agencies anticipate that the measures associated with Alternative A, in conjunction with ongoing activities on other private and public lands, would result in improvements in aquatic habitat conditions greater than the level of improvement expected to occur under the No Action and the Proposed Action Alternative. This would be a beneficial cumulative effect.

Alternative B. Functionally, Alternative B and the No Action Alternative would have similar effects on the watershed processes that affect aquatic habitat quality. Because timber harvesting and forest management activities, as well as road management and riparian conservation measures, under Alternative B would be substantially the same as under the No Action Alternative, potential direct and indirect effects on aquatic species and their habitats within the Plan Area would be the same as described for the No Action Alternative.

5.2.3.2 Other Special-status Species

The other special-status species included in this EIS are separated into the following categories for the purposes of the cumulative impacts analysis based on the similarity of effects of the actions described above:

- California Listed Species
- California Board of Forestry Sensitive Species
- Bats
- Fisher
- Amphibians
- Pacific Lamprey
- Special-status Plant Species

California Listed Species. The following species are listed as threatened (T) or endangered (E) by the State of California, and as such, are protected under CESA: western yellow-billed cuckoo (E), great gray owl (E), greater sandhill crane (T), Siskiyou Mountains salamander (T), and Scott Bar salamander (T). Under all alternatives, private timberlands on and around the Plan Area would be managed in accordance with the CFPRs and other state regulations, unless superseded by the provisions of an HCP that provides for more stringent riparian

measures than exist in the CFPRs. During the THP review process, which includes DFG participation, potential impacts to these species that could result from site-specific timber operations would be addressed, and appropriate measures implemented to minimize potential adverse effects. None of the alternatives would affect the application of these protective measures for these species. The level of protection is similar under all of the alternatives and no adverse impacts to these species are anticipated under any of the alternatives. Because no adverse impacts to these species are anticipated under any of the alternatives, there would be no substantial cumulative impacts on any of these species as a result of implementation of any alternative in conjunction with ongoing activities on other private and public lands.

California Board of Forestry Sensitive Species. Under the CFPRs, the following species are considered "sensitive species" and protective measures would be implemented under each of the alternatives: bald eagle, northern goshawk, osprey, golden eagle, and American peregrine falcon. Under all alternatives, private timberlands on and around the Plan Area would be managed in accordance with the CFPRs and other state regulations, unless superseded by the provisions of an HCP that provides for more stringent riparian measures than exist in the CFPRs. The CFPRs include provisions for review of THPs by CAL FIRE such that if additional protective measures are needed, a mechanism exists for their incorporation on a site-specific basis. The level of protection is similar under all of the alternatives and no adverse impacts to these species are anticipated under any of the alternatives. Because no adverse impacts to these species are anticipated under any of the alternatives, there would be no substantial cumulative impacts on any of these species as a result of implementation of any alternative in conjunction with ongoing activities on other private and public lands.

Bats. The bat species considered in this EIS are the long-legged myotis and long-eared myotis. These two bat species use large-diameter conifer snags or live trees, spaces under bark, rock crevices, mines, caves, and buildings as roost sites. Timber harvest activities could affect overall suitability of habitat and some roost sites (e.g., conifer snags, live trees, and spaces under bark). In addition, timber harvest activities could alter the microclimates near the mouths of caves or mines, making them less suitable roosting sites. However, the probability of this occurring is very low because only one mine is known in the Plan Area, and it is not known whether either of these bat species uses the mine for roosting. Features, such as buildings, are unrelated to timber management and, therefore, would not be affected by any of the alternatives. The following discussion focuses on the cumulative effects of the alternatives on the overall availability of suitable habitat for these species, including specific habitat elements (i.e., snags) that may be used for roosting.

No Action Alternative. Although the amount of area with smaller, more open stands is anticipated to decline after the first decade under the No Action Alternative, the amount of mid-seral stands with larger trees is anticipated to increase (see Section 4.3.1). This change in the amount of early- to mid-seral stage forests would not have adverse effects on the long-legged myotis or long-eared myotis because all of these stand types provide moderate to highly suitable habitat for these species.

Snags and large live trees may provide suitable roosting sites for the long-eared and long-legged myotis. Snag retention under the No Action Alternative would not change,

thus maintaining the current availability of snags that may be suitable for roosting by these species. Overall, suitable foraging and roosting conditions for these bats would generally persist at current levels for the foreseeable future. Therefore, adverse effects on populations of long-legged and long-eared myotis in and adjacent to the Plan Area are not expected to occur. Because no adverse impacts to these species are anticipated under any of the alternatives, there would be no substantial cumulative impacts to either of the bat species as a result of implementation of any alternative in conjunction with ongoing activities on other private and public lands.

Proposed Action. Under the Proposed Action, the amount of mid- to late-seral forest in the Plan Area is anticipated to more than double over the period of analysis, and the amount of early seral stage forest is expected to decline to levels below what is anticipated under the No Action Alternative (see Section 4.3.1). The increase in mid- to late-seral stands would benefit the long-eared myotis by providing more high quality habitat for this species, but would have little effect on long-legged myotis.

Snags and large trees would be an integral component of the CSAs established under the Terrestrial Species Conservation Program of the proposed HCP. Snag retention in portions of the Plan Area would also be increased under the Aquatic Species Conservation Program because of higher tree retention standards in riparian areas in drainages with coho salmon. Under the Proposed Action, snag roosting sites would be retained or increased through implementation of the terrestrial and aquatic conservation programs, which would have beneficial effects to snag-roosting bats in the Plan Area relative to the No Action Alternative.

For these reasons, the agencies anticipate that the measures associated with the Proposed Action, in conjunction with ongoing activities on other private and public lands, would result in improvements in habitat conditions for the long-eared myotis greater than the level of improvement expected to occur under the No Action Alternative. This would have a beneficial cumulative effect on this species. Habitat conditions for long-legged myotis would be maintained at current levels and there would be no adverse cumulative impacts on these species.

Alternative A. Under Alternative A, the amount of mid- to late-seral forest in the Plan Area is anticipated to more than double over the period of analysis, and the amount of early seral stage forest is expected to decline to levels below what is anticipated under the No Action Alternative (see Section 4.3.1). The increase in mid- to late-seral stands would benefit the long-eared myotis by providing more high quality habitat for this species, but would have little effect on long-legged myotis.

Snags and large trees would be an integral component of the CSAs established under the Terrestrial Species Conservation Program of the proposed HCP. Snag retention would also be increased under the Aquatic Species Conservation Program because of the establishment of wide, no-harvest riparian reserves along all streams. Under Alternative A, snag-roosting sites would be retained or increased through implementation of the terrestrial and aquatic conservation programs, which would have beneficial effects to snag-roosting bats in the Plan Area relative to the No Action Alternative.

For these reasons, the agencies anticipate that the measures associated with Alternative A, in conjunction with ongoing activities on other private and public lands, would result in

improvements in habitat conditions for the long-eared myotis greater than the level of improvement expected to occur under the No Action Alternative. This would have a beneficial cumulative effect on this species. Habitat conditions for long-legged myotis would be maintained at current levels and there would be no adverse cumulative impacts on these species.

Alternative B. Under Alternative B, the applicant would conduct forest management activities consistent with the landscape-level goals developed for each management unit. These stands would continue to provide moderate to highly suitable habitat for long-legged and long-eared myotis. Timber harvest could remove some trees and snags that provide suitable roosting sites for these species; however, harvesting of suitable roosting trees and snags could also occur under the No Action Alternative. As such, Alternative B would not fundamentally change the availability of these features on the landscape. Additionally, with the uneven-aged management that the applicant would practice on the majority of the ownership, large trees would develop and continue to be available throughout the period of analysis. Overall, habitat conditions for long-legged and long-eared myotis would generally be similar to the No Action Alternative for the foreseeable future. Therefore, the agencies anticipate that there would be no adverse cumulative impacts on these species.

Fisher. Timber operations have the potential to alter forest characteristics, and influence the availability and quality of habitat for fisher. The modification of forest stand conditions through timber harvest has the greatest potential to affect (adversely or beneficially) fisher because of the immediate and long-term effects it has on habitat conditions and prey availability. Silvicultural treatments such as thinning may benefit fisher by accelerating the development of suitable habitat conditions and dense prey populations, and by reducing the risk of catastrophic wildfire. Other activities related to timber harvesting, such as road construction, maintenance, and use, can result in varying levels of habitat modification and disturbance.

No Action Alternative. Under the No Action Alternative, private timberlands on and around the Plan Area would be managed in accordance with the CFPRs and other state regulations. The CFPRs do not contain specific measures for the protection of fishers.

The resource management strategies on lands administered by the USFS and BLM include the continued implementation of guidelines contained in the NWFP for timber operations and other activities on federal lands. These guidelines are expected to benefit fisher through establishment of late-successional reserves (LSRs) for species that are associated with late-seral forests. The riparian reserves established under the NWFP and LRMPs are anticipated to provide additional suitable habitat for fisher and enhance dispersal of the species by maintaining connectivity between areas of suitable habitat. Current protections in those drainages where federal agencies are the predominant land managers would be expected to continue into the future and contribute to an increasing trend in the quantity and quality of habitat for fisher.

Proposed Action. Adverse effects would occur to fishers resting or denning within 1.3 miles of an owl activity center not designated as a CSA because additional timber harvesting would occur in these areas under the Proposed Action. These adverse effects would be partially offset by restricting harvest in CSAs until high levels of suitable habitat for northern spotted owls has developed, which would encourage the development and

maintenance of suitable resting and denning habitat for fisher in the CSAs. Under the Proposed Action, it is anticipated that there would be about a 10 percent decrease in acres harvested each decade, including as much as a 25 percent decrease in even-age regeneration harvest (clear-cuts), compared to the No Action Alternative. Additionally, the riparian management measures under the Aquatic Conservation Strategy would promote the retention of large trees, canopy coverage, snags, and downed woody material in WLPZs along Class I and Class II watercourses, particularly in Class A designated lands. These enhanced riparian areas would contribute to an increasing amount and quality of habitat for fisher over the period of analysis.

Overall, the positive and negative impacts associated with the Proposed Action, in conjunction with ongoing activities on other private and public lands, would not result in a significant adverse or beneficial cumulative impact.

Alternative A. Under Alternative A, the determination of which owl activity centers would be supported by CSAs would be based on their proximity to adjacent LSRs established under the NWFP. Implementation of Alternative A based on LSRs results in the establishment of one more CSA on the applicant's ownership relative to the Proposed Action. Under Alternative A, the same adverse and beneficial effects described for the Proposed Action would occur. For this reason, the agencies anticipate that the measures associated with Alternative A, in conjunction with ongoing activities on other private and public lands, would not result in a significant adverse or beneficial cumulative impact.

Alternative B. Over the period of analysis, the forest landscape management measures of Alternative B would substantially increase the amount of medium tree stands with closed canopy throughout the ownership, which would exceed the amount expected under the No Action Alternative. This would be expected to increase the amount of suitable habitat for the fisher relative to the No Action Alternative. Additionally, the amount of edge habitat and forest fragmentation would be less under this alternative than under the No Action Alternative, therefore, providing a better forest landscape for fisher. The Alternative B conservation measures, in conjunction with ongoing activities on other private and public lands, would not result in a significant adverse or beneficial cumulative impact.

Amphibians. The amphibian species considered in this EIS are the tailed frog, southern torrent salamander, northern red-legged frog, and foothill yellow-legged frog, Siskiyou Mountains salamander, and Scott Bar salamander. Impacts to the Siskiyou Mountains and Scott Bar salamander are described under "California Listed Species." The amphibian species addressed in this section are associated with water, and as such, are typically found in riparian areas along perennial streams, springs, seeps, and marshes. Therefore, timber operations and other management activities in riparian areas are the actions with the greatest potential for impacts to these species. Impacts to these species could result from activities such as canopy removal leading to elevated water temperature, operation of heavy equipment in streams, or destabilization of soil leading to excessive sediment deposition in streams.

Under all alternatives, private timberlands on and around the Plan Area would be managed in accordance with the CFPRs and other state regulations, unless superseded by the provisions of an HCP that provides for more stringent riparian measures than exist in the CFPRs. The increased canopy cover requirements or buffer widths under the action

alternatives would provide additional protection against elevated water temperatures in the Plan Area; however, as described in Section 4.2 (Water Resources) minor beneficial effects on water temperatures are anticipated in Plan Area streams. The aquatic habitats potentially inhabited by these species are afforded protection under the existing CFPRs, and the more stringent riparian measures in the Proposed Action and Alternative A would provide marginally greater protection than under the No Action Alternative or Alternative B. No substantial changes in water quality are anticipated under any of the alternatives.

For these reasons, the agencies anticipate that the measures associated with the action alternatives, in conjunction with ongoing activities on other private and public lands, would result in an incremental increase in the level of protection afforded amphibian species, compared to the No Action Alternative. This would be a minor beneficial cumulative effect.

Pacific Lamprey. The types of activities that could potentially affect Pacific lamprey would not differ substantially from those described for anadromous salmonids. None of the alternatives would implement specific conservation measures for Pacific lamprey, but the conservation measures implemented under the Proposed Action would provide greater benefit to the lamprey than the measures under the No Action and other action alternatives. Of particular benefit would be the Road Management and Slope Stability measures that would reduce sediment production and delivery to Plan Area streams. A reduction in sediment delivery would benefit lamprey by improving spawning conditions in riffle habitats. The riparian measures would also benefit lamprey through maintenance or improvement of water temperatures in Plan Area streams.

For these reasons, the agencies anticipate that the measures associated with the Proposed Action and other action alternatives, in conjunction with ongoing activities on other private and public lands, would result in improvements in aquatic habitat conditions greater than under the No Action Alternative. This increase in aquatic habitat quality would supplement the substantial benefits that would occur if the Klamath River dams were removed or altered to provide fish passage. Overall, implementation of the Proposed Action and other action alternatives would result in a beneficial cumulative effect.

Special-status Plant Species. In addition to Yreka phlox, three plant species listed as federal or state endangered could potentially occur within the Plan Area: Gentner's fritillary, Siskiyou mariposa lily, and Applegate's milkvetch. The primary activities that could result in adverse effects to these species are new road, landing, and skid trail construction, which can result in introduction of invasive weeds through seed transport and soil disturbance.

Under all of the alternatives, the applicant would continue to exercise the precautions necessary to comply with the prohibitions on adverse impacts to listed plants. The applicant would continue to avoid or minimize potential adverse impacts to listed plants, including continuing to adhere to measures contained in the CFPRs (special protections afforded to meadows and wetlands), and measures identified during the THP preparation and review process. Existing state regulations require that THPs include measures to avoid potential adverse impacts to federal and state listed plant species and other special-status species of concern (if they occur) to a level of insignificance. Similar protective measures would be implemented on adjacent federal and private lands. These protective measures would be expected to continue into the future, resulting in continued avoidance of adverse effects to

these special-status plant species. Because no change from existing conditions is expected, there would be no cumulative impact.

5.2.4 Air Quality

5.2.4.1 Criteria Pollutants

Past actions in the Northeast Plateau Air Basin have contributed to the generation of air pollution. Land development has increased the local population, leading to an increase in criteria pollutants such as ozone (e.g., from vehicles) and particulate matter (e.g., from wood burning). Management of public and private forests has influenced natural fire regimes. Fire suppression may have contributed to the outbreak of severe wildfires, which are an important contributor to particulate levels. Current trends of using prescribed burning to control fuel levels are expected to reduce severe wildfires. Other elements of forest management (e.g., timber harvest) contribute to criteria pollutants through engine exhaust and entrainment of particulates into the atmosphere. Similar impacts occur as a result of agriculture, mining, and other activities in the air basin. The federal Clean Air Act and other laws and regulations intended to curb air pollution have made a positive contribution to the mitigation of cumulative air quality impacts (e.g., the use of catalytic converters and clean-burning diesel engines). Even with these mitigating factors, however, criteria pollutants will continue to be generated by activities in the air basin under the No Action Alternative.

The Proposed Action, Alternative A, and Alternative B are not expected to contribute in a considerable manner to cumulative air pollution effects compared to the No Action Alternative. The changes in harvest efficiency may have minor positive (decreased disturbance area under the Proposed Action and Alternative B) and negative (increased disturbance area under Alternative A) effects on the generation of criteria pollutants, but these effects are unlikely to change the overall air quality conditions in the air basin when considered together with the overall cumulative effects described previously.

5.2.4.2 Climate Change

Past actions in the region have contributed to the accumulation of greenhouse gases in the atmosphere. The mechanisms of greenhouse gas generation (e.g., release of carbon through fuel combustion) are similar to the mechanisms described previously for criteria pollutants. Public and private timberlands in the region, however, contribute to the sequestration of carbon through the mechanisms described in Section 3.5.1, Climate Change. Because the forestry sector sequesters more carbon than it generates, maintenance of the forestry sector is an important mitigation measure for the cumulative impact of global climate change. Under the No Action Alternative, the forestry sector is expected to be maintained through the continued management of timberlands for sustained yield of forest products and the continued restriction of TPZ forestland conversions. In addition, other efforts to mitigate greenhouse gas generation (e.g., use of forests as carbon offset mitigation banks) may further bolster the long-term sustainability of the forestry sector.

The maintenance of the forest landscape under the Proposed Action, Alternative A, and Alternative B is expected to positively contribute to overall trends in sustaining the forest landscape for carbon sequestration. This would be a beneficial cumulative effect.

5.2.5 Socioeconomics/Environmental Justice

Siskiyou County was established around resource extraction, starting with gold mining and expanding to include timber and agriculture. Over time, the economy in the area has diversified to include other industries, and in 2010, the majority of employment in the county was in government, services, or retail (see Table 3.4-5 in Section 3.4). Forest management activities influence the local economy in a number of ways. For example, forest management can employ year-round, full-time employment such as secretarial, bookkeeping and accounting, forestry, engineering, biology, tree felling and bucking, road construction, yarding and loading, and mechanical and repair.

USFS LRMPs and BLM RMPs are guided by the NWFP, which establishes land use objectives for federal lands under the jurisdiction of USFS and BLM. The NWFP protects large blocks of late-successional forest from commercial timber harvest and provides habitat for species that depend on these forests, including the northern spotted owl. In 2008, USFWS redesignated critical habitat for the spotted owl to encompass a total of approximately 1.2 million acres in California (USFWS 2011). Timber harvest regulations contained in the CFPRs place similar restrictions on private timberland. The CFPRs were amended in 1990 to require surveys for northern spotted owls in suitable habitat and to provide protection around activity centers. Under the CFPRs, no THP can be approved if it is likely to result in incidental take of federally listed species, unless the take is authorized by a federal HCP. Over the period of analysis, regulatory restrictions will continue to reduce the amount of timber harvest conducted on both private and federal land in the area. As a result, employment in forest management and forestry-related services is expected to decline. These regulatory actions are ongoing and are expected to continue throughout the period of analysis and into the future.

Under the No Action Alternative, timber harvest would remain similar to current levels as long as the current levels can be sustained outside of areas restricted by regulations protecting species (e.g., northern spotted owl). However, it is possible that harvest levels under the No Action Alternative could decrease as forest conditions no longer allow for sustainable harvest at current levels. This reduction in timber harvest volume that could occur under the No Action Alternative would have social and economic consequences on Siskiyou County (i.e. reduction in the workforce). Similarly, under Alternative A, the current declining trend would continue over the period of analysis, which could potentially lead to an increase in unemployment. Given that direct timber management jobs represent approximately 1 percent of Siskiyou County employment (Section 3.4), this reduction is unlikely to be a significant social or economic impact. Therefore, actions occurring under the No Action Alternative and Alternative A would not be expected to contribute in a considerable manner to cumulative socioeconomic and environmental justice effects.

In contrast, under the Proposed Action and Alternative B, the long-term sustainability of timber harvest operations is expected to be preserved. This long-term sustainability would have a modest benefit on local socioeconomic conditions, which could result in a positive contribution to cumulative socioeconomic and environmental justice effects.

5.2.6 Cultural Resources

Past actions have caused disturbance to cultural resources. For example, land development, forestry, and mining likely have destroyed or degraded historic properties. Some recordation of the effects of recent activities on historic resources, particularly timber operations on private land, has occurred. Similarly, dams on the Klamath River, in addition to forestry, agriculture, and other activities that generate sediment, have contributed to a decline in fish populations, which in turn has affected the availability of resources for traditional cultural practices such as salmon fishing. Most of these past actions are ongoing and are expected to continue throughout the period of analysis and into the future. Currently, there are strict requirements that protect cultural resources from these activities, such as surveys, preservation, data collection (curation), and recordation.

Under the No Action Alternative, these activities and protective requirements would be expected to continue in a manner similar to current conditions. For example, the continuing prohibition on take of northern spotted owl and coho salmon would require the applicant to harvest intensively across a large area, resulting in disturbance to upland and riparian forests, with the potential to disturb cultural resources. However, harvest and related actions would occur in accordance with existing state and federal regulations that protect cultural resources (e.g. CFPRs). Therefore, impacts to cultural resources under the No Action Alternative would not be expected to contribute in a considerable manner to cumulative cultural effects. A similar assessment of the cumulative conditions would be expected for implementation of the Proposed Action, Alternative A, and Alternative B because the existing state and federal regulations protecting cultural resources would apply to actions under each of the alternatives in addition to other activities with the potential to affect cultural resources, such as land development, forestry, and mining.

5.2.7 Land Use

Past and present land use includes forestry, agriculture, and land development, as well as activities associated with compliance with various local, state, and federal laws and regulations that assess and seek to protect environmental resources. These actions are ongoing and are expected to continue throughout the period of analysis and into the future. As described in Section 4.7, no impacts to land use would be expected to occur as a result of implementation of the Proposed Action or the alternatives. Therefore, actions occurring under each of the alternatives would not be expected to contribute in a considerable manner to cumulative land use effects. For example, under each of the alternatives, timber harvest activities would be compatible with adjacent federal lands of the KNF and other nearby National Forests, which are managed for multiple beneficial uses such as timber harvest and habitat conservation. Future actions that could change the compatibility of land uses (e.g., modifications to recovery planning placing a higher burden of recovery on private timberlands, conversion of land for development) when considered in combination with actions occurring under each of the alternatives have the potential to contribute in a considerable manner to cumulative land use effects; however, such actions are unknown at this time.

CHAPTER 6

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CHAPTER 7

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Federal

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Senator Barbara Boxer
Honorable Mike Thompson, 1st Congressional District of California
Honorable Wally Herger, 2nd Congressional District of California

State

Governor Jerry Brown
Senator Doug La Malfa, Senate District 4
Assemblyman Jim Nielsen, Assembly District 2
Brett Brownscombe, Natural Resources Adviser, Oregon Governor's Natural Resources Office

Local

Jim Cook, Siskiyou County Board of Supervisors, District 1
Ed Valenzuela, Siskiyou County Board of Supervisors, District 2
Michael Kobseff, Siskiyou County Board of Supervisors, District 3
Grace Bennett, Siskiyou County Board of Supervisors, District 4
Marcia Armstrong, Siskiyou County Board of Supervisors, District 5

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Frank Fryman, Area Archaeologist, Bureau of Indian Affairs
Gary D. Cooper, Acting District Manager, Bureau of Land Management
James Patterson, District Conservationist, Natural Resources Conservation Service
Patricia Grantham, Forest Supervisor, Klamath National Forest
Scott Conroy, Forest Supervisor, Rogue River-Siskiyou National Forest
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Harold Bennett, Quartz Valley Indian Reservation
Rick Dowd, Resighini Rancheria
Leonard Masten, Hoopa Valley Indian Tribe
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Maria Trip, Yurok Tribe
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Ric Costales, Natural Resource Policy Specialist, Siskiyou County
Patrick Griffin, Agricultural Commissioner, Siskiyou County Department of Agriculture
Thomas P. Guarino, County Counsel, Siskiyou County

Libraries

Siskiyou County Library
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- Happy Camp Branch
- Etna Branch
- Mt. Shasta Branch

Humboldt County Library
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CHAPTER 8

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CHAPTER 9

Glossary

Active spotted owl nest site	The nest tree of a pair of nesting spotted owls.
Activity centers	An area of concentrated activity of either a pair of spotted owls or a territorial single owl.
Age class	One of the intervals into which the age range of trees is divided for classification or use in management. Management classification using the age of a stand of trees.
Basal area	The cross-sectional area of a single stem, including the bark, measured at breast height (4.5 feet above the ground).
Bucking	Use of a saw to remove log lengths from a tree after it has been felled.
Cable logging/yarding	Taking logs from the stump area to a landing using an overhead system of winch-driven cables to which logs are attached with chokers.
California Forest Practice Rules (CFPRs)	Rules promulgated by the California Board of Forestry and administered by the California Department of Forestry and Fire Protection governing the conduct of commercial timber operations on state and private land in California.
Class I watercourse	All current or historical fish-bearing watercourses or domestic water supplies, including springs, that are on site or within 100 feet downstream of an operations area.
Class II watercourse	Defined by the California Forest Practice Rules as watercourses in which fish are always or seasonally present offsite within 1,000 feet downstream, or that provide aquatic habitat for non-fish aquatic species. This designation excludes Class III waters that are tributary to Class I waters. Seeps or springs that support or provide habitat for aquatic vertebrates are also considered Class II watercourses with respect to the conservation measures.
Class III watercourse	Defined by the California Forest Practice Rules as watercourses in which no aquatic life is present. The watercourse shows evidence of being capable of sediment transport to Class I and II waters under normal high water flow conditions after completion of timber operations.

Clearcutting	Even-aged regeneration method where all the merchantable trees in the stand are removed in one harvest. Regeneration is accomplished by natural or artificial means.
Coho Designated Watersheds	Watersheds in which the presence of coho salmon has been documented by DFG since 1990. A list of these watersheds is maintained by DFG and updated as the distribution of coho salmon is further documented.
Commercial harvest	Removal of merchantable trees from a stand.
Conservation Support Area (CSA)	Area intended to support the spotted owls residing in adjacent CHUs while assisting in achieving the recovery criteria. CSAs are existing land-use allocations that benefit spotted owls and are found on private, State and Federal lands. CSAs may function to provide demographic support to core spotted owl populations in the CHU or habitat networks, facilitate dispersal of juvenile spotted owls among CHUs or habitat networks, or serve both of these functions.
Core Area	The core area is the area of land within a 0.5-mile radius around an activity center
Covered Activities	Certain activities carried out by the applicant in the Plan Area that may result in incidental take of covered species and all those activities necessary to carry out the commitments reflected in the HCP.
Critical Habitat Unit (CHU)	Intended to identify a network of habitats that provide the functions considered important to maintaining stable, self-sustaining, and interconnected populations over the range of the spotted owl, with each CHU having a local, provincial, and range-wide role in spotted owl conservation.
Cumulative effect	As defined by NEPA, the change in environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.
Decommissioning (Roads)	Road Decommissioning means the temporary or permanent abandonment of a road prism and associated landings resulting in maintenance-free drainage and erosion control. This includes removal or stabilization of drainage structures and fills, as well as unstable road and landing fills, hydrologic disconnection of the road prism, stabilization of exposed excavated areas or material, and application of measures to prevent and control erosion.

Diameter at breast height (dbh)	The diameter of a tree 4.5 feet above the ground on the uphill side of the tree.
Distinct Population Segment (DPS)	A discrete population (or group of populations) that is markedly separated from other population units of the same species and is significant to the taxon.
Downed woody debris	Logs, rootwads, and large branches on the forest floor.
Drainage	An area (basin) mostly bounded by ridges or other similar topographic features, encompassing part, most, or all of a watershed.
Early-seral	The biotic community that develops immediately following the removal or destruction of the vegetation in an area. The stage in forest development that includes seedling, sapling, and pole-sized trees.
Edge	The place where different plant communities meet or where different successional stages or vegetative conditions within plant communities come together.
Element	A biotic or abiotic feature that is a component of a habitat patch, but which occurs somewhat independent of overall patch conditions.
Endangered	A plant or animal that is in danger of extinction throughout all or a significant portion of its range.
Even-aged	A forest stand composed of trees with less than a 20-year age difference.
Even-aged management	The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.
Evolutionarily Significant Unit (ESU)	A population (or group of populations) that is substantially reproductively isolated from other population units of the same species, and represents an important component in the evolutionary legacy of the species.
Feasible	Capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, operational, and technological factors, and considering what is allowable under law.
Feller-buncher	A mechanical felling machine used to fell the trees and place them in a pile for skidding to the log landing
FGS's ownership	Commercial timberlands that the applicant owns in fee.

Forest fragmentation	Isolating or breaking up large tracts of forest as a result of natural events (such as wildfire) or by the implementation of timber management or other human activities.
Forest management	Activities undertaken for the purpose of harvesting, traversing, transporting, protecting, changing, replenishing, or otherwise using forest resources.
Ground-based yarding	Movement of logs to a landing by use of tractors, either tracked or rubber tired (rubber tired skidders) or shovels (hydraulic boom log loaders).
Habitat	The place, natural or otherwise, (including climate, food, cover, and water) where an animal, plant, or population naturally or normally lives and develops.
Habitat Conservation Plan (HCP)	As defined in the Services' HCP Handbook, a planning document that is a mandatory component of an application for an Incidental Take Permit under ESA Section 10(a)(1)(B). The document that, among other things, identifies the operating conservation program that will be implemented to minimize, mitigate, and monitor the effects of incidental take on the species covered by a Section 10(a)(1)(B) permit.
Harass	A form of take under the federal Endangered Species Act; defined in federal regulations as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, spawning, rearing, migrating, breeding, feeding, or sheltering (50 CFR 17.3). The Department of Commerce/NOAA Fisheries has not defined "harass" by regulation.
Harm	A form of take under the Federal Endangered Species Act; defined in Federal regulations as an act that actually kills or injures wildlife. Such acts may include significant habitat modification or degradation when it actually kills wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding or sheltering.
Harvesting	All activities necessary to cut, remove, and transport timber products from the Plan Area. Also see Timber Harvesting.
Harvesting rights	Rights to conduct timber operations on lands owned in fee by another. Short-term harvesting rights generally expire upon the conclusion of timber operations, upon a date certain, or a combination of the two. Perpetual harvesting rights pertain to existing and subsequent crops of timber and continue without expiration.

Home Range	A spotted owl home range within the Klamath Province is defined as the area within 1.3 miles of an activity center
Implementation Agreement (IA)	An agreement between the Service(s) and the incidental take permittee(s) that identifies the obligations of the parties, identifies remedies if parties fail to meet their obligations, provides assurances to the Service(s) that the conservation plan will be implemented, and provides assurances to the permittee(s) that implementation of the plan satisfies ESA requirements for the species and activities covered by the plan and permit.
Implementation classes	The division of the Plan Area at the drainage level into three "Implementation Classes" based primarily on the range and distribution of anadromous salmonid populations: Class A, B, and C lands.
Incidental take	Take of any federally listed or state-listed wildlife species that is incidental to, but not the purpose of, otherwise lawful activities.
Incidental Take Permit (ITP)	Permit issued by the USFWS or NMFS pursuant to Section 10(a)(1)(B) of the ESA to a non-Federal entity (State, tribe, private landowner) that authorizes incidental take of a threatened or endangered species named on the permit. The permit also requires the permittee to develop, fund, and implement a conservation plan that minimizes and mitigates the impacts of incidental take.
Issuance criteria	The criteria specified in the ESA and federal regulations for issuance of an ITP.
ITP species	The covered species for which the applicant is seeking an ITP.
Landings	The areas where harvested trees are gathered (through skidding or yarding) for subsequent transport out of the forest.
Landscape	An area composed of interacting ecosystems that are variously repeated in response to geology, landform, soils, climate, biota, and human influences throughout the area.
Large woody debris (LWD)	Larger pieces of wood in stream channels or on the ground, including logs, root wads, and large chunks of wood, that provide important biological and physical functions.
Late seral	The stage in forest development that includes mature and old-growth forest.
Late-successional	See "late-seral."
late-successional reserves (LSRs)	LSRs provide habitat for late-successional and old-growth related species including the northern spotted owl

Listed species	Species, including subspecies and distinct populations, of fish, wildlife, or plants listed as either endangered or threatened under Section 4 of the federal Endangered Species Act or under the California Endangered Species Act.
LRMP	Land and Resource Management Plan
Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (MSRA)	The Magnuson-Stevens Fishery Conservation and Management Act (MSA) is the primary law governing marine fisheries management in United States federal waters. The Act's reauthorization (2006) mandates the use of annual catch limits and accountability measures to end overfishing, provides for widespread market-based fishery management through limited access programs, and calls for increased international cooperation.
Managed Owl Conservation Areas (MOCA)	Managed large blocks of habitat in designated conservation areas throughout the range of the spotted owl that could support self-sustaining populations of 15 to 20 pairs of spotted owls and spacing the blocks and managing the areas between them to permit movement of spotted owls between and among the blocks.
Maximum extent practicable	Phrase used in the ESA and federal regulations to describe the level of impact minimization and mitigation required for incidental take of a listed species to be authorized under ESA Section 10(a)(1)(B).
Maximum sustained timber production	Harvest levels planned under CFPRs to balance forest growth and timber harvest over a 100-year period and to achieve maximum sustained production of high quality timber products while protecting resource values such as water quality and wildlife.
Mid-seral	The period in the life of a forest stand from crown closure to first merchantability, usually at 8 inches dbh. Brush, grass, or herbs rapidly decrease in the stand because of stand density.
Minor forest products	Secondary forest materials including tree burls, stump products, boughs and greenery for wreaths and floral arrangements or similar purposes.
National Marine Fisheries Service (NMFS)	A federal agency of the Department of Commerce that is responsible for the authorization of incidental take of marine resources and anadromous fish listed under the Endangered Species Act.

Northwest Forest Plan (NWFP)	The NWFP provided management direction for federal lands in the Pacific Northwest (including Northern California), within the range of the northern spotted owl, for the sustainable production of timber and management of affected species. The NWFP established land use allocations for 19 national forests, seven Bureau of Land Management districts, six national parks, and other federal lands. The NWFP established a system of LSRs on federal lands that are intended to protect and enhance conditions of late-successional and old-growth forest ecosystems.
Old-growth	A forest stand with moderate-to-high canopy closure; a multilayered canopy dominated by large overstory trees; a high incidence of large trees with large, broken tops, and other indications of decadence; numerous large snags; and heavy accumulations of logs and other woody debris on the ground.
Outsloping	Describes a road where the inner edges of the road surface are higher than the outer edges of the road. Consequently, runoff is directed onto the sideslope downhill of the road.
Overstory	That portion of trees in a forest that forms the uppermost layer of foliage.
Permit	An Incidental Take Permit (ITP) issued by USFWS and NOAA pursuant to ESA Section 10(a)(1)(B).
Plan Area	The Plan Area includes FGS's Hilt/Siskiyou ownership in Northern California. The 152,178-acre ownership lies in Siskiyou County. The ownership consists of three management units—Klamath River, Scott Valley, and Grass Lake—covering 65,339, 39,153, and 47,686 acres, respectively.
Population	A collection of individuals that share a common gene pool.
Practicable	Defined in Section 404 Clean Water Act regulations as "capable of being done (or capable of achieving the project purpose and need), taking into account costs, existing technology, and logistics (40 C.F.R. § 230.10(a)(2))." "Practicable" is not specifically defined in the Endangered Species Act.
Prescribed burning	Introduction of fire under controlled conditions to remove unwanted brush, logging slash, or woody debris.
Rare	A State of California classification for a plant species that is not presently threatened with extinction, but the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens.

Recovery	The process by which the decline of an endangered or threatened species is arrested or reversed, or threats to its survival are neutralized so that the species' long-term survival in nature can be ensured. For the federal ESA recovery means the species has recovered to a point where the protections afforded under the ESA are no longer needed.
Regeneration	The renewal of tree cover by natural or artificial means. Also the young tree crop (seedlings and saplings).
Registered Geologist	A person who holds a valid California license as a professional geologist pursuant to California's Department of Consumer Affairs Geologist and Geophysicist Act.
Registered Professional Forester (RPF)	A person who holds a valid license as a professional forester pursuant to Article 3, Section 2, Division 1 of the California Public Resources Code.
Riparian reserves	Riparian reserves are portions of watersheds where riparian-dependent resources receive primary emphasis and where special standards and guidelines apply. Riparian reserves include those portions of a watershed directly coupled to streams and rivers, that is, the portions of a watershed required for maintaining hydrologic, geomorphic, and ecologic processes that directly affect standing and flowing water bodies such as streams, lakes and ponds, and wetlands. Riparian reserves generally parallel the stream network but also include other areas necessary for maintaining hydrologic, geomorphic, and ecologic processes.
Salvage operations	The removal of dead trees or trees damaged or dying because of injurious agents other than competition, to recover economic value that would otherwise be lost.
Selection harvest	The removal or trees, individually or in small groups, from the forest.
Sensitive species	A species designated by the California Board of Forestry pursuant to 14 CCR 898.2(d). Currently, these species are bald eagle, golden eagle, great blue heron, great egret, northern goshawk, osprey, peregrine falcon, California condor, great gray owl, northern spotted owl, and marbled murrelet.
Seral stage	One of several successional stages of plant community development, beginning with an early seral stage, following a major disturbance, and ending with a late-seral stage near or at climax stage.
Services	NMFS and USFWS

Shovel Logging One of a number of methods that may be used to move logs from forest to road. Rather than driving out to the log and dragging it back to the landing, the loader moves slowly across the harvest area, grabbing logs/trees within reach, and swinging them around to drop them closer to the road. Logs further from the road can be "shoveled" to the landing in a few passes back and forth.

Silviculture The specific methods by which a forest stand or area is harvested and regenerated over time to achieve the desired management objectives.

Size class The categorization of trees into one of the following four dbh classes: seedling (<1 inch), sapling (1 to 4.9 inches), pole (5 to 11.9 inches), sawtimber (12 inches and larger).

Skidder A skidder is any type of heavy vehicle used in a logging operation for pulling cut trees out of a forest in a process called "skidding."

Skidding Process in which the logs are transported from the cutting site to a landing.

Skid trail An access cut through the woods for skidding logs with ground-based equipment. It is not a high enough standard for use by highway vehicles, such as a log truck, and is therefore not a road.

Slash Woody residue left on the ground after trees are felled, or accumulated there as a result of a storm, fire, or silvicultural treatment.

Snag A standing dead tree.

Special-status species A species listed as threatened or endangered by the Federal or State government; classified as a California Species of Special Concern, a Federal Species of Concern, Rare, or a Board of Forestry Sensitive species; or designated a Fully Protected Species under the California Fish and Game Code.

Species As defined in ESA Section 3(16), "the term 'species' includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife, which interbreeds when mature." Also, a population of individuals that are more or less alike and that are able to breed and produce fertile offspring under natural conditions.

Species of concern An informal means of referring to species listed as threatened or endangered under the federal or State of California endangered species acts, classified as a federal "species of concern" or State of California "species of special concern," or classified as a "sensitive species" by the California Board of Forestry.

Stand A group of trees that possesses sufficient uniformity in composition, structure, age, spatial arrangement, or condition to distinguish it from adjacent groups.

Status The classification of a species regarding its position in the listing process under the state or federal endangered species acts.

Stream A natural watercourse with a well-defined channel and distinguishable bed and bank showing evidence of having contained flowing water indicated by deposit of rock, sand, gravel, or soil.

Sustained yield The yield of commercial wood that an area can produce continuously at a given intensity of management. These yields are professionally planned to achieve over time a balance between growth and removal over time.

Take Defined under Section 3(19) of the federal Endangered Species Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Take of endangered species is prohibited under Section 9 of the federal ESA. Take of threatened species is prohibited pursuant to regulations promulgated under section 4(d) of the federal ESA. Defined under Section 86 of the California Fish and Game Code, take for solely State-listed species means "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, capture, or kill."

Thinning A treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality.

Threatened The classification given to a plant or animal species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Timber felling Physically cutting a tree from its stump including cutting of the felled tree into predetermined log lengths.

Timber Harvesting All activities necessary to cut, remove, and transport timber products from the Plan Area. Also see Harvesting.

Timber Harvesting Plan (THP)	A plan, which is administered and approved by CAL FIRE, describing a proposed timber harvesting operation pursuant to 14 CCR Section 4582.
Tractor logging	Use of a tractor to carry logs from the harvest site to a landing.
Understory	Vegetation (trees or shrubs) growing under the canopy formed by larger trees.
Uneven-aged	A stand with trees of three or more distinct age classes, either intimately mixed or in small groups.
Uneven-aged management	The application of a combination of actions needed to simultaneously maintain continuous forest cover, recurring regeneration of desirable species, and orderly growth and development of trees through the range of diameter or age classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.
Unlisted species	Fish, wildlife, or plant species not currently listed as threatened or endangered under the federal or state Endangered Species Acts.
U.S. Fish and Wildlife Service (USFWS)	A federal agency of the Department of Interior that is responsible for the authorization of incidental take of terrestrial resources listed under the Endangered Species Act.
Watercourse and Lake Protection Zone (WLPZ)	A strip of land, along both sides of a watercourse or around the circumference of a lake or spring, where additional management practices may be required for erosion control and for protection of the quality and beneficial uses of water, fish, and riparian wildlife habitat. (14 CCR 895.1)
Watershed	The catchment area of land draining into a river, river system, or body of water; the drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a stream or lake.
Watersheds with Listed Anadromous Salmonids	Any planning watershed where the presence of anadromous salmonids listed as threatened, endangered, or candidate under the State or Federal Endangered Species Act has been documented or restorable habitat exists.
Yarding	A method of bringing logs to a roadside area or landing for truck transport.

CHAPTER 10

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Appendix A
Regulatory Framework

APPENDIX A

Regulatory Framework

1.0 Federal Regulatory Provisions Relating to Approval of Incidental Take Permits

1.1 Endangered Species Act

The federal Endangered Species Act (ESA) is administered by the Secretaries of the Interior and Commerce through the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). The following sections of the ESA pertain to approval of Incidental Take Permits (ITPs). Species listed as endangered or threatened under the ESA are provided protection as described herein.

1.1.1 Section 9/Section 4(d)

Section 9 of the ESA prohibits the take of fish and wildlife species listed as endangered. Pursuant to Section 4(d) of the ESA, the Services may, by regulation, extend the prohibition of take to species listed as threatened. NMFS has extended the prohibition of take to the listed species covered in the HCP pursuant to 50 Code of Federal Regulations (CFR) 223.203. As defined in the ESA, take includes harm or harassment as well as more directed activities such as hunting, capturing, collecting, or killing [16 USC 1532(19)]. By regulation, USFWS and NMFS have defined harm as an act that actually kills or injures fish or wildlife, and may include significant habitat alteration that significantly impairs essential behavioral patterns, such as migrating, rearing, spawning, feeding, breeding, or sheltering (50 CFR 17.3, 50 CFR 222.102).

1.1.2 Section 10

Section 10(a)(1)(A) of the ESA authorizes USFWS and NMFS to authorize take of individual members of endangered and threatened species for scientific purposes or to enhance the propagation and survival of the species.

In recognition that take cannot always be avoided, Section 10(a)(1)(B) of the ESA allows USFWS and NMFS to authorize taking of endangered and threatened species by non-federal entities that is incidental to, but not the purpose of, otherwise lawful activities. Similar provisions are found in Section 7 for actions by federal agencies. Under Section 10(a)(1)(B), such authorizations are granted through the issuance of ITPs. The Section 10 process for obtaining an incidental take permit has three primary phases: (1) the Habitat Conservation Plan (HCP) development phase, (2) the formal permit processing phase, and (3) the post-issuance phase.

During the HCP development phase, the project applicant prepares a plan that integrates the proposed project or activity with the protection of listed species. An HCP submitted in support of an incidental take permit application must include the following information:

- Impacts likely to result from the proposed taking of the species for which permit coverage is requested;
- Measures that will be implemented to monitor, minimize, and mitigate impacts;
- Funding that will be made available to undertake such measures;
- Alternative actions considered; and
- Additional measures that the Services may require as necessary or appropriate for purposes of the plan.

The HCP development phase concludes and the permit processing phase begins when a complete application package is submitted to the appropriate permit-issuing office. A complete application package consists of (1) an HCP, (2) an IA, (3) a permit application, and (4) remittance of the application fee from the applicant. The Services must publish a Notice of Availability of the HCP package in the Federal Register to allow for public comment. The Services also prepare an Intra-Service Section 7 Biological Opinion and prepare a Set of Findings, which evaluates the Section 10(a)(1)(B) permit application in the context of permit issuance criteria (provided in the following list). An Environmental Assessment (EA) or Environmental Impact Statement (EIS) document that has undergone a 60-day to 90-day public comment period serves as the Services' record of compliance with NEPA. A Section 10 incidental take permit is issued upon a determination by the Services that all permit requirements have been met. Statutory criteria for issuance of the permit specify the following:

- The taking will be incidental.
- The impacts of incidental take will be minimized and mitigated to the maximum extent practicable.
- Adequate funding for the HCP will be provided.
- The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild.
- The applicant will provide additional measures that the Services require as being necessary or appropriate.
- The Services have received assurances, as may be required, that the HCP will be implemented.

During the post-issuance phase, the Permittee and other responsible entities implement the HCP, and the Services monitor the Permittee's compliance with the HCP, as well as the long-term progress and success of the HCP. The public is notified of permit issuance through notification in the Federal Register.

The Services can also approve HCPs and issue ITPs that cover unlisted species. If an ITP and HCP treat an unlisted species as if listed, additional mitigation would not be required within the area covered by the ITP and HCP upon listing the species. The 'No Surprises' regulation adopted by USFWS and NMFS [63 Federal Register (FR) 8859 (February 23, 1998), codified at 50 CFR 17.22 and 17.32 for USFWS and 50 CFR 222.307(g) for NMFS] also provides that as long as the HCP is being properly implemented, the Services will not require additional conservation and mitigation measures beyond those specified in the plan in the event of changed circumstances not addressed in the plan. In the event of unforeseen circumstances, the Services may require additional measures limited to modifications within the conserved habitat area or the plan's operating conservation program, but the Services will not require the commitment of additional land, water, or money, or impose additional restrictions on the use of land, water, or natural resources beyond the level otherwise agreed upon without the consent of the permittee. However, in the unlikely event that the permitted activity no longer meets the issuance criteria that the "activity will not appreciably reduce the likelihood of survival and recovery of the species in the wild", and the Services are not able to take steps to prevent that reduction, the Services will, as a last resort, revoke the permit [69 FR 71723 (December 10, 2004)].

1.1.3 Section 7

Section 7 of the ESA requires all federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any species listed under the ESA, or to result in the destruction or adverse modification of its designated critical habitat. Because issuance of a permit is a federal action, the Services must conduct an internal Section 7 consultation on the proposed issuance of the ITPs. The internal consultation is conducted after an HCP is developed by the project applicant (a nonfederal entity), and is submitted as part of an application for an incidental take permit for formal processing and review.

Provisions of Sections 7 and 10 of the ESA are similar, but Section 7 requires consideration of several factors not explicitly required by Section 10. Specifically, Section 7 requires consideration of the effects on all federally listed species that may be affected by the activities covered under the ITP, whether or not such species are identified as covered species under the ITP. Section 7 also requires consideration of effects on designated critical habitat for any federally listed species, whether or not such species is identified as a covered species under the ITP. The internal consultation results in a Biological Opinion prepared by the Services that analyzes whether issuance of the ITP is likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of the critical habitat of any listed species.

1.2 National Environmental Policy Act

The National Environmental Policy Act (NEPA) applies to all federal agencies and most of the activities they manage, regulate, or fund that affect the environment. It establishes environmental policies for the nation, provides an interdisciplinary framework for federal agencies to assess environmental impacts, and contains "action-forcing" procedures to ensure that federal agency decision makers take environmental factors into account.

NEPA requires the analysis and full public disclosure of the potential environmental impacts of a proposed major federal action. The issuance of ITPs by USFWS and NMFS are major federal actions that trigger the NEPA requirement for the analysis and disclosure of the potential environmental impacts of the actions.

NEPA compliance is obtained through one of three actions: (1) preparation of an EIS (generally prepared for high-effect HCPs); (2) preparation of an EA (generally prepared for moderate-effect HCPs); or (3) a categorical exclusion (allowed for low-effect HCPs). The NEPA process helps federal agencies make informed decisions with respect to the environmental consequences of their actions, and ensures that measures to protect, restore, and enhance the environment are identified as a component of their actions.

1.3 Magnuson-Stevens Fishery Conservation and Management Act

The 1996 Sustainable Fisheries Act amended the Magnuson-Stevens Fishery Conservation and Management Act (the Magnuson Act) to add provisions requiring NMFS and the various fishery management councils to identify and protect essential fish habitat (EFH) for fish species managed under the Magnuson Act. EFH can include coastal areas and oceans, and it can also include rivers used by anadromous fish. The amendments require that whenever federal or state approval is required for any activity, including a non-fishing-related activity that could adversely affect EFH, a consultation similar to the consultation required under the ESA must be conducted. If it is determined that the activity would adversely affect EFH, recommendations would be made on measures that the agency can take to conserve the habitat. The Magnuson Act did not, however, place mandatory requirements on agencies for compliance with conservation measures recommended by NMFS.

1.4 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) makes it unlawful to pursue, hunt, capture, kill, or possess or attempt to do the same to any migratory bird or part, nest, or egg of such bird listed in four separate wildlife protection treaties concluded between the United States and each of the following countries: Great Britain, Mexico, Japan, and Russia. As with the federal ESA, the MBTA also authorizes the Secretary of the Interior to issue permits for take. The procedures for securing such permits are found in 50 CFR 21, together with a list of the migratory birds covered by the act. The USFWS has recently determined that an ITP issued under Section 10 of the ESA also constitutes a Special Purpose Permit under 50 CFR 21.27 and thus complies with the MBTA.

2.0 Related Federal Laws

2.1 Clean Water Act

The Clean Water Act (CWA) is the principal federal legislation designed to protect the quality of the nation's waters. The purposes of the CWA include "the protection and propagation of fish, shellfish, and wildlife." The U.S. Environmental Protection Agency (EPA) is charged with implementing most of the CWA, including Section 303, which contains provisions for establishing and meeting water quality standards. The CWA provides for establishment of total maximum daily loads (TMDLs) where water bodies are

not meeting established water quality standards. The CWA includes provisions for states to assume much of the implementation responsibility, which is largely the case in California. The State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs) implement the federal CWA in California under the oversight of the EPA, Region IX. The California Porter-Cologne Water Quality Control Act authorized the RWQCBs to establish water quality objectives necessary for the reasonable protection of "beneficial uses," which include preservation and enhancement of fish, wildlife, and other aquatic resources or preserves (see subsequent discussion on the Porter-Cologne Water Quality Control Act).

Section 303(d) of the CWA requires states to identify water bodies that are impaired, to identify the pollutant(s) or stressor(s) that are causing impairment, and to develop a plan to attain and maintain desired water quality standards. An "impaired" water body is one that is not meeting water quality standards and/or not supporting the designated beneficial uses of the water body.

The TMDL process leads to a "pollution budget" designed to restore the health of a polluted body of water. The TMDL process provides a quantitative assessment of water quality problems, contributing sources of pollution, and the pollutant load reductions or control actions needed to restore and protect the beneficial uses of an individual water body impaired from loading of a particular pollutant. More specifically, a TMDL is defined as the sum of the individual waste load allocations for point sources, load allocations for non-point sources, and natural background such that the capacity of the water body to assimilate pollutant loading (the loading capacity) is not exceeded (40 CFR 130.2). The TMDL process involves development of a technical TMDL and technical support document (TSD), implementation of the TMDL, and monitoring.

Technical TMDL and TSD

A technical TMDL presents background and analysis to support calculations of the loading capacity and load allocations for an impaired water body. A technical TMDL does not include implementation or monitoring plans. A TSD is a report developed by Regional Water Board staff that meets all federal requirements for a TMDL, but with no implementation or monitoring plan and no action on the part of the RWQCB or SWRCB. Upon completion by the RWQCB, the TSD is forwarded to the U.S. Environmental Protection Agency (EPA), which then develops the TMDL based upon the information contained in the TSD.

Implementation and Monitoring

Upon completion of the technical TMDL and/or TSD, the state is charged with ensuring the necessary actions are taken so that the loading of the pollutant of concern does not exceed the TMDL and associated load allocations. Several mechanisms are available to implement the actions necessary to meet a TMDL. These mechanisms include:

- Regulatory action(s) of the RWQCB, such as a permit, waiver, or enforcement order.
- Regulatory action(s) of another state, federal, or local agency. A Memorandum of Understanding may be appropriate to describe the specific regulatory actions to be taken.

- Non-regulatory action(s), such as third party agreements and self-determined pollutant control.
- Amendments of the Basin Plan in the form of an Action Plan, which describes the steps necessary to meet the TMDL. A Basin Plan amendment is necessary when rule making is required to address the pollutant(s) and meet the TMDL. Additionally, TMDLs shall be incorporated into the state's continuing planning process, of which the Basin Plan is the primary venue, in accordance with Sections 303(d)(2) and 303(e)(3) of the federal CWA.

Monitoring is necessary to ensure information is available to assess progress toward attainment of the desired water quality conditions. A monitoring plan is a vital component of any implementation strategy.

2.2 National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, as amended, requires federal agencies to take into account the effects of a proposed undertaking on cultural resources listed or eligible for listing on the National Register of Historic Places (NRHP). The purpose of Section 106 is to ensure that federal agencies consult with state and local groups before non-renewable cultural resources, such as archaeological sites and historic structures, are affected. Section 106 requires federal agencies to take into account the effects of their actions on properties that may be eligible for listing or that are listed in the NRHP for projects that they finance, permit, or own.

3.0 State Regulation of Timber Harvesting and Related Activities

3.1 California Forest Practice Act and Forest Practice Rules

In general, commercial timber operations on state and private land in California are governed by the Z'berg-Nejedly Forest Practice Act of 1973 (Forest Practice Act) as implemented through Forest Practice Rules (Title 14 of the California Code of Regulations [14 CCR]) promulgated by the Board of Forestry and Fire Protection (BOF) and administered by the California Department of Forestry and Fire Protection (CAL FIRE). Pertinent examples of California Forest Practice Rules (CFPRs) relevant to fish and wildlife habitat management under an HCP include: (1) the environmental review process undertaken by CAL FIRE, with input from other agencies, that applies to review and approval of proposed commercial timber operations; (2) watercourse and lake protection zone rules; (3) special rules to protect wildlife and sensitive species; (4) rules specific to watersheds with Coho salmon; (5) rules specific to the requirement for maximum sustained production of high quality timber products; and (6) a methodology for assessing cumulative environmental effects. The CFPRs also incorporate significant requirements contained in other state laws, such as the Porter-Cologne Water Quality Control Act, the California Environmental Quality Act (CEQA), and the California Endangered Species Act (CESA).

3.1.1 Environmental Review Process

The CFPRs impose a two-tiered environmental review process on timber harvesting operations in California. The review process is a certified regulatory program that produces

the functional equivalent of an Environmental Impact Report (EIR) process and documentation required under CEQA for discretionary permitting decisions by state agencies. As a certified program, it is exempt from CEQA requirements regarding preparation of initial studies, negative declarations, and EIRs. Other provisions of CEQA, however, apply to BOF decisions, such as the policy of avoiding significant adverse effects on the environment (where feasible) and the requirement to consult with responsible agencies.

The first tier of the review process entails the programmatic consideration by BOF and CAL FIRE of environmental impacts common to timber operations and the adoption of rules (the CFPRs) to control those impacts. The second tier of review occurs when the rules are applied to individual timber operations through the preparation, review, and approval of Timber Harvesting Plans (THPs).

A THP is a three-year plan for the harvesting of commercial tree species on private and state-owned forestlands. The primary purpose of the THP is to identify the scope of the proposed timber operations, assess potential site-specific and area-specific individual and cumulative effects on the environment, and discuss all feasible mitigation measures and alternatives that will reduce or avoid potentially significant impacts. Each plan is filed with CAL FIRE and reviewed by an interdisciplinary team that, if necessary, also inspects the plan site. No harvesting can occur until the THP for the site is approved. Approval of a THP requires a determination by the director of CAL FIRE that all significant adverse impacts, including cumulative effects, have been avoided or mitigated to a level of insignificance.

3.1.2 Watercourse and Lake Protection Rules

The California Watercourse and Lake Protection Zone (WLPZ) rules require buffers of specified widths along streams and other bodies of water. They also require maintenance of specified percentages of overstory canopy and understory vegetation in the buffers. These buffers are intended to: (1) provide a vegetative filter strip that will capture and reduce sediment carried by runoff from sideslopes; (2) preserve canopy cover to maintain water temperatures; and (3) provide for filtration of organic and inorganic material and vegetation, as well as streambed and flow modification by instream woody debris. In addition, the construction, use, and maintenance of logging roads, skid trails, and landings are regulated to minimize erosion and sedimentation impacts to watercourses and to remove or prevent in-stream obstructions to unrestricted fish passage.

3.1.3 Special Rules for Wildlife and Sensitive Species

The CFPRs also require the retention of snags, intended for wildlife purposes and for the recruitment of large woody debris (LWD) for instream habitat through retention of larger living trees near aquatic habitats. Specific habitat protection and harvesting prescriptions are established for wildlife species designated as sensitive species. In addition, wildlife needs must be considered in the cumulative effects assessment, discussed subsequently.

If substantial evidence exists that timber operations within a planning watershed will create a reasonable potential to cause or contribute to ongoing, significant cumulative effects on resources within the watershed, the BOF may classify the planning watershed as sensitive. Subsequent to classification, the BOF may further define watershed-specific performance standards for timber operations that will avoid or mitigate new or continuing significant

cumulative effects. Further, the CFPRs stipulate that no THP can be approved if it would result in an unauthorized taking of species listed under either the federal or state ESAs.

3.1.4 Rules Specific to Watersheds with Coho Salmon

BOF "Protection Measures in Watersheds with Coho Salmon" [14 CCR 936.9.1] apply to forest management activities in watersheds where Coho salmon have been documented by DFG to be present during or after 1990. These special requirements apply in addition to all other district CFPRs within qualifying planning watershed. The measures include the following protective measures:

- Establishment of wider WLPZs along Class I (fish-bearing) and Class II (non fish-bearing aquatic habitats) watercourses
- Overstory canopy coverage retention standards within WLPZs
- Tree retention standards for recruitment of LWD in WLPZs along Class I watercourses
- Establishment of Special Management Zones where inner gorges extend beyond the WLPZ boundaries along Class I and Class II watercourses

Additional measures ("Measures to Facilitate Incidental Take Authorization in Watersheds with Coho Salmon" [14 CCR 936.9.2]) have also been adopted that provide additional protection for Coho salmon. These measures are intended to facilitate the process of obtaining ITPs for state-listed Coho salmon from DFG for timber operations under CESA. In addition to the "Protection Measures in Watersheds with Coho Salmon" summarized above, the following measures are included to facilitate incidental take authorization:

- Maintenance of pre-harvest levels of direct shading to pools along Class I watercourses
- Retention of additional trees for recruitment of LWD within WLPZs along Class I watercourses
- Higher canopy retention standards in WLPZs along Class II watercourses
- Establishment of equipment exclusion zones (EEZs) along Class III (intermittent) watercourses
- Geologic review of proposed harvest activities in hydrologically connected headwall swales
- Inner gorge protection measures along Class III watercourses

DFG and NMFS participated in this rule-making process and have indicated that on a case-by-case basis the rules may be used to meet federal species protection programs and goals.

3.1.5 Maximum Sustained Production of High Quality Timber Products

Pursuant to the Forest Practice Act, the BOF adopted regulations designed to achieve the goal of maximum sustained production (MSP) of high-quality timber products, while giving consideration to various other forest benefits and amenities. Each proposed timber harvest operation must demonstrate that it will contribute toward achievement of MSP. Pursuant to Section 913.11(a) (also known as "Option [a]") of the CFPRs, MSP will be achieved by:

- Producing a yield of timber products specified by the landowner, which takes into account biological and economic factors, as well as consideration of other forest values
- Balancing growth and harvest over time
- Realizing growth potential as measured by adequate site occupancy by the tree species to be managed and maintained given silvicultural methods selected by the landowner
- Maintaining good stand vigor
- Providing for adequate regeneration, as defined in the CFPRs

3.2 California Environmental Quality Act

Similar to NEPA, CEQA requires state agencies with discretionary permitting authority to evaluate the environmental effects of a proposed project. CEQA processes closely parallel those for NEPA, with the Initial Study (IS) and Environmental Impact Report (EIR) serving as the CEQA equivalents of the EA and EIS, respectively. If one or more significant impacts are identified, a detailed EIR must be prepared. If no significant impacts are determined or if all of the significant impacts can be mitigated to less-than-significant levels, a negative declaration is prepared. CEQA also requires that a negative declaration or Draft EIR be prepared if a project has statewide, regional, or area-wide significance, including projects that would substantially affect sensitive habitats.

The CEQA Guidelines exempt certain public agency programs from the requirement to prepare environmental documents under CEQA. Such "functional equivalent" programs include the regulation of timber harvesting operations under the California Forest Practices Act (CEQA Guidelines Section 15251). As described above, preparation of a THP is considered a functional equivalent process.

3.3 Porter-Cologne Water Quality Control Act

As previously noted (see previous CWA discussion), the SWRCB and RWQCBs implement the CWA in California under the oversight of EPA, Region IX. Direction for implementation of the CWA is provided by CFR Title 40 and by a variety of EPA guidance documents on specific subjects. The SWRCB and the North Coast RWQCB have the authority and responsibility to ensure compliance with the provisions of the CWA in the north coast region of California, which includes the Action Area.

The Porter-Cologne Water Quality Control Act of 1969 authorizes RWQCBs to establish water quality objectives necessary for the reasonable protection of beneficial uses, including preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. The objectives are stated in basin plans. The North Coast Basin Plan, which encompasses the Action Area, includes water quality objectives for several pollutants associated with non-point source discharges from timber operations. These include the suspended sediment load and suspended sediment discharge rate of surface waters, turbidity, and the natural receiving water temperatures of intrastate waters (see previous CWA discussion for the full list of Section 303(d) impairments within the Action Area). The North Coast Basin Plan regulates certain practices relating to logging and related activities pursuant to the North Coast RWQCB's authority to regulate discharges of pollutants that may affect water quality.

RWQCBs participate in the review of THPs. However, pursuant to RWQCB basin plans, which implement the water quality objectives, there exists an entirely separate, additional layer of state protection for fish and wildlife dependent on watercourses for habitat. In general, these basin plans provide for the permitting of waste discharges and prohibit any waste discharges caused by land use activities (such as timber operations) in quantities considered deleterious to fish, wildlife, and other beneficial uses.

RWQCBs in timber harvesting areas have adopted strongly conditioned waivers of the requirement for timber operators to obtain waste discharge permits. The conditions generally provide that timber harvesting is exempt from waste discharge permits to the extent that the discharger is operating under an approved THP, complies with the basin plan, and that the timber operations do not violate applicable requirements of the basin plan. This requirement to protect beneficial uses of water is incorporated in the CFPRs. The RWQCBs may require timber operators to obtain waste discharge permits where those conditions are not met. Under the CFPRs, no THP may be approved if it would result in the violation of an applicable Basin Plan provision.

3.4 California Endangered Species Act

The CESA is part of the California Fish and Game Code. As a guide to state agencies, Section 2053 states that, "it is the policy of the State that State agencies should not approve projects as proposed which would jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives consistent with conserving the species or its habitat which would prevent jeopardy."

The CESA prohibits the take of species listed as threatened or endangered by the California Fish and Game Commission. Under CESA, take is defined more narrowly than under the federal ESA; CESA defines take as, "to hunt, pursue, capture, or kill, or to attempt the same." Take of state listed species may be authorized under Sections 2080 and 2081 of the California Fish and Game Code.

Section 2080

Under Section 2080.1, any person who obtains from the Secretary of the Interior or the Secretary of Commerce an incidental take statement pursuant to Section 1536 of Title 16 of the United States Code, or an incidental take permit pursuant to Section 1539 authorizing the take of an endangered or threatened species, can take the species if the following measures are followed:

1. Notify the director in writing that the person has received an incidental take statement or an incidental take permit issued pursuant to the federal ESA of 1973 (16 U.S.C.A. Sec. 1531 et seq.); and
2. Include in the notice to the director a copy of the incidental take statement or incidental take permit.

Within 30 days after the director has received the notice that an incidental take statement or an incidental take permit has been issued pursuant to the federal ESA, the director shall

determine whether the incidental take statement or incidental take permit is consistent with Chapter 1.5 (Endangered Species) of the California Fish and Game Code. If the director determines within the 30-day period, based upon substantial evidence, that the incidental take statement or incidental take permit is not consistent with this chapter, then the taking of that species may only be authorized pursuant to Section 2081.

Section 2081

Section 2081 allows DFG to authorize, by permit, the take of endangered species, threatened species, and candidate species if all of the following conditions are met:

1. The take is incidental to an otherwise lawful activity.
2. The impacts of the authorized take shall be minimized and fully mitigated. The measures required to meet this obligation shall be roughly proportional to the level of impact of the authorized taking on the species. Where various measures are available to meet this obligation, the measures required shall maintain the applicant's objectives to the greatest extent possible. All required measures shall be capable of successful implementation. For purposes of this section only, impacts of taking include all impacts on the species that result from any act that would cause the proposed taking.
3. The applicant shall ensure adequate funding to implement the measures required by paragraph (2), and for monitoring compliance with, and effectiveness of, those measures.

No permit may be issued if issuance of the permit would jeopardize the species' continued existence. DFG shall make this determination based on the best scientific information, as well as other information that is reasonably available. DFG also shall include consideration of the species' capability to survive and reproduce, and any adverse impacts of the taking on those abilities in light of known population trends, known threats to the species, and reasonably foreseeable impacts on the species from other related projects and activities.

4.0 Related State Laws

4.1 Streambed Alteration Agreements

Pursuant to California Fish and Game Code sections 1600-1603, DFG regulates the alteration of streambeds through streambed alteration agreements. Under these provisions, DFG specifies conditions that must be followed to protect fish and wildlife resources that could be impacted by the construction of stream crossings and related activities associated with stream crossings.

4.2 Timberland Productivity Act

The California Timberland Productivity Act of 1982 (TPA) affirms the State of California's interest in providing a favorable climate for long-term investment in forest resources through establishment of "timberland production zones" (TPZs). The use of lands designated as TPZ is limited to the growing and harvesting of timber and uses compatible with those activities.

4.3 Native Plant Protection Act

The California State Legislature formally recognized the status of rare and endangered plants in 1977 with the passage of the Native Plant Protection Act (NPPA). The NPPA directs DFG (California Fish and Game Code, Sections 1900–1913) to carry out the Legislature's intent to "preserve, protect and enhance rare and endangered plants in this State." The NPPA gives the California Fish and Game Commission the power to designate native plants as "endangered" or "rare," and to require permits for collecting, transporting, or selling such plants. Timber operations conducted pursuant to the CFPRs are not subject to restriction under the NPPA provided that timberland owners notify DFG at least 10 days prior to disturbance to allow for salvage of rare or endangered native plants.

Appendix B
Summary of Scoping Comments

APPENDIX B

Summary of Scoping Comments

Commenter	Comment
KS Wild	Opposed to 50-year HCP with “No Surprises” assurances. Says No Surprises policy is illegal.
	Wants one of the alternatives to analyze an HCP without “No Surprises” assurances.
	Believes the legal standard for HCPs provides for recovery of listed species (particularly concerned with owls). Cites case law supporting position.
	Believes FGS violates state law via THPs and therefore should not be eligible for an ITP.
	Wants the HCP to have high level of oversight and monitoring.
	Raised concerns about the 50-year financial stability of FGS considering current decline in timber prices. Wants a sizeable bond to be put up.
	Cautions against deciding on HCP actions until NEPA analysis complete. NEPA analysis should include no action, no-ITP, and ITP with no “No Surprises” clause as alternatives.
	Continuous and thorough species surveys should persist over the life of the HCP.
	Must have in-depth review of the impact of private timber harvest on water quality (roads and landslides).
	Must look at other private timberland harvest in northern California and southern Oregon.
	Believes years of species surveys are needed to establish appropriate baseline to evaluate alternatives.
	Cumulative impacts analysis should include the diminished range of the NSO, including the causes and effects.
	Believes a jeopardy determination is appropriate if the HCP doesn’t result in a net benefit for the NSO.
	Despite regulatory oversight, FGS’ practice of logging overlapping THPs has resulted in “take” of NSO under the ESA by eroding NSO habitat on their land.
	Identifies the following potential threats to NSO: timber operations, barred owl, West Nile virus, sudden oak death, wildfire, effects from climate change (increased fire and tree mortality, altered vegetation patterns, uncertainty whether suitable habitat can be regrown, increase in inclement weather during nesting season), and fuels reduction treatments that degrade NSO habitat.
	Cites the *Gifford Pinchot Task Force v. USFWS* ruling that merely avoiding jeopardy is insufficient; rather, critical habitat is intended for recovery. Gifford Pinchot invalidated the FWS’s regulatory definition of Adverse Modification of Critical Habitat and found that FWS’s application of the erroneous standard in the relevant Biological Opinions was not harmless error. It also held that FWS could not rely on the presence of suitable owl habitat in the LSR network to find that the loss of critical habitat was not “destruction or adverse modification.”
	Questions how the HCP can avoid jeopardy, result in a net-benefit, and achieve the recovery standard when it allows removal of nesting/roosting habitat, which is a dwindling limiting resource for NSO.

Commenter	Comment
KS Wild (continued)	Believes there is insufficient survey information on owls to determine level of take and that the NSO population baseline overestimates the number of NSO on FGS land. Concerned that so much of the Yreka phlox's range exists within FGS holdings that allowing take inherently jeopardizes the continued viability of the species. Concerned about the effects of erosion, sedimentation, and herbicides on Yreka phlox.
CA DFG	DFG can use EIS for 1600 process if EIS incorporates the following: discussion of mitigation measures proposed to minimize potential significant impacts, discussion of growth inducing impacts, significant impact to sensitive plant species, and significant impacts to wildlife species that may be present in the HCP area which meet CEQA criteria as endangered, threatened, or under CEQA Guidelines Section 15380. This analysis needs to be clearly identified in the EIS for impacts associated with 1600 activities.
Karuk Tribe	Opposed to No Surprises. HCP should provide for net benefit/recovery to species. Believes HCP cannot result in negative impact to other beneficial uses in affected watersheds. Thinks road decommissioning and limits on harvest are necessary to meet beneficial uses. Believes the HCP should be put on hold and work with the Water Board in the development of TMDLs. Need to conduct baseline water quality monitoring for sediment and turbidity to demonstrate not violating CWA. Role of logging and fire severity in Beaver Creek. Impacts associated with mechanical thinning (sediment, habitat, tree mortality). Believe beneficial uses in the Klamath have been affected by sediment. Believe road decommissioning and limits on THPs are needed in the HCP to meet beneficial uses. Believe FGS is not financially stable enough for a 50-year HCP and wants to see sizeable bond. No ITP for fall Chinook and steelhead as they are critical tribal trust fish species. Make sure there is adequate mitigation for Chinook and steelhead should they become listed in the future. Believes mitigation would be different than for Coho due to different habitat requirements. Believe there must be a reduction in logging, roads, and mining to deal with cumulative effects on salmon populations. Want legacy issues dealt with. How will FGS deal with road impacts in Beaver Creek (cold water refugia for Coho, Chinook, and steelhead). How will FGS work with the Forest Service to address these road impacts? Plan for rocking, decommissioning riparian, and outsloping roads in Beaver Creek. HCP should detail funding sources and timeline for this work. Fish distribution maps presented at public scoping meeting are inaccurate. Cottonwood Creek and Yreka Creek are Coho streams, check with Forest Service and Cal Fish databases. What are the effects of the 1997 flood on Beaver Creek? What role would ground-based yarding have on peak flows? Believes Coho spawning grounds are filling with sediment. Believes roads are causing most sediment damage to fish habitat.

Commenter	Comment
Karuk Tribe (continued)	Want extra protection in Beaver Creek (roads).
	Believe that many culverts in Beaver Creek are undersized.
	Believe PFC's are not being met in 5th field watersheds of Beaver Creek due to sediment and peak flow impacts.
	Hungry Creek and Bumblebee/Deer sub-watersheds have high rates of sediment delivery from high road densities.
	Horse Creek supports Chinook and has similar problems as that of Beaver Creek (roads, rain on snow, peak flows, etc.).
	Thorough examination of how Scott and Shasta ITPs will be included in cumulative effects analysis. Also, what about documented and undocumented take that has occurred on private lands?
	Make sure you consider the effects from the upcoming dam decisions on the Klamath.
	How will climate change be addressed in cumulative effects analysis?
	Cumulative effects analysis should consider other timber harvest plans in proximity to FGS lands.
	NMFS past criticism of using BMPs to address cumulative impacts (incremental small additions to a system already in trouble).
	Believes the Basin Plan prevents a 20 percent increase in turbidity unless there is a permit or waiver from the Regional Board.
	Concerned about the lack funding in the Forest Service to address road problems.
	Believes BMPs don't fully address cumulative effects.
	Believes road construction and extensive timber harvest has an adverse affect on hydrology and peak flow during rain on snow events.
	Suggest the EIS map toe zones and unstable areas in the Scott River. Concerned roads will affect Middle Creek.
	Evaluate the relationship between roads and landslides.
	Believe recovery of species is a criteria for ITP.
	Many similar legal comments to KS Wild.
	Mechanical thinning, which opens forest canopies and eliminates multilayered internal forest structure, is generally not compatible with conservation of critical habitat for spotted owl or other sensitive species known to exist in the analysis area including Pacific fisher, pileated woodpecker and northern goshawk.
	SOME OF THE SAME NSO COMMENTS AS KS WILD.
	Commenter provided Coho, Chinook, and steelhead data for Beaver creek and Tom Martin Creek.
Klamath Riverkeeper	Will not support an HCP with a No Surprises policy attached to it.
	Believes the HCP should contribute to the recovery of listed species.
	Believes the HCP should establish the following regarding take: number of species, impact, age, and sex if known.

Commenter	Comment
Klamath Riverkeeper (continued)	Wants it clear how minimization, monitoring, and mitigation measures will be funded and what procedures will be used to deal with unforeseen circumstances.
	Believe there needs to be a complete and accurate baseline, recent survey data, and amount of take needs to be specified.
	Want strict enforcement and monitoring in the HCP.
	Make sure many alternatives are analyzed in NEPA.
	Will not support new road building in watersheds that already have 2 to 5 miles of road per mile. SEE KARUK COMMENTS REGARDING SPECIFIC WATERSHEDS (road densities, turbidity, hydrology effects, use of BMP's and CE's, clear cutting and roads and peak flows, baseline water quality monitoring, elevated risk of fire from management styles, effects from mechanical thinning and ground based yarding, effects from 1997 flood, Beaver Creek road densities (want no take allowed here), Horse Creek landslides and roads, rain on snow and effects on peak flow, Cottonwood Creek, Scott River and road impacts.
	How will HCP work to ensure the "floor" number of fish produced in the Klamath is met? Numbers are set by the PFMC.
	Concerned with high level of impact to fisheries (Coho) occurring in the Scott River. How will the HCP deal with the Scott as a high impact area? Only want to see road decommissioning covered as they believe cumulative effects to fish is very high.
	Cumulative Effects analysis should address issues of fish health in the Klamath (algae, disease, etc.).
	What is the link between a No Surprises policy and declines in fish populations from cumulative effects?
	Will the HCP impact Spring Chinook?
	Include Green Diamond HCP in CE analysis.
	Link between fishing treaty rights and HCP.
	Will HCP affect fish populations in a way that PFMC floor cannot be met?
	The HCP should address recovery of Coho.
	The HCP should be put on hold until the recovery plan for Coho in the SONCC is finished.
	Horse Creek important for all three species and has sediment impacts
	How will the HCP address water quality impacts and meet CWA requirements?
	Make sure EIS analyzes of other timber sales in the area. (cites case law).
	Many of the same comments as Karuk Tribe on rain on snow effects from different silvicultural and road strategies.
	Need to include the effects from the Scott/Shasta ITPs as well as unregulated take. Also consider effects from upcoming Klamath Project and BO.
	Address global warming.
	Evaluate grazing impacts.
	SAME MECHANICAL THINNNING COMMENTS AS KARUK TRIBE.
	SOME OF THE SAME NSO COMMENTS AS KS WILD.

Commenter	Comment
EPA	Need a clear purpose and need statement and the intended objectives that will be achieved by the actions. Be clear what proposed actions will be thoroughly assessed in the HCP NEPA, and what actions might be assessed in other NEPA actions (e.g. Corps permits or Forest Service actions related to FGS). Be clear how lands bought will be addressed in the HCP and adequate conservation measures provided. Explain need and benefit of 50-year permit. Explain reliability of the HCP with potential climate change during the permit period. Explain how adaptive management will ensure adequate protection of covered species. EIS should look at alternatives that include different covered activities, species, land coverage and permit terms. Want to see clear, obtainable and effective mitigation measures that prevent negative environmental impacts in the affected area. Supports permanent conservation of high quality habitat and restoration of degraded habitat in order to preserve and recover covered species. Recommend robust species surveys to ensure that monitoring accurately tracks effects to species populations and ensures a net benefit. Encourages early coordination with local tribes. Wants two copies of DEIS to San Francisco office as well as DC.
B. Sachau	Toxic pesticides. Public $ going to FGS. Any connection between FGS and APHIS.
Oregon Wild	Interaction between No Surprises and Climate Change. Thinks climate change should allow for a reopening of the HCP. What role does FGS forest play in climate change and the risk to the species? Relationship of FGS lands to Forest Service Roadless area values, carbon storage and climate change, weeds, soil. Do not place too much reliance on the habitat heterogeneity hypothesis for NSO where they rely primarily on woodrats. Avoid using “habitat fitness potential” as used in the Draft Recovery Plan because it is “deeply flawed.” Carbon losses from logging will exacerbate climate change and further “jeopardize” the NSO by increasing fire threat. HCP should not rely too much on providing dispersal habitat because “Dispersal habitat is where spotted owls go to die,” according to a federal biologist. Carbon losses from logging will exacerbate climate change and further “jeopardize” the Yreka phlox via risks from uncharacteristic disturbance and migration bottlenecks.
Timber Products Co	Will adjacent forest landowners be required to maintain sufficient amounts of suitable habitat for NSO that are authorized for take? If yes, then how? If harvesting of previously retained suitable habitats is deemed an “incidental take” of owls, discuss what remaining protection measures are necessary for a NSO activity center where “incidental take” has been granted. If harvesting of historic or currently known owl nest sites is deemed an “incidental take” of owls, discuss what remaining protection measures, if any, are necessary for that NSO activity center.

Commenter	Comment
Richard Nauman	The EIS should consider the following species if they are in the HCP Area: *Plethodon stormi*, *P. asupak*, *Rhyacotriton variegates*, *Ambystoma tirgrinum* (Grass Lake area), *Hydromantes shastae*, *Rana cascadae*.
Lani DeRose	Concerned that 50-year No Surprises clause is not realistic given rate of endangered species listings, and climate change. Concerned with level of clearcutting on FGS land, roads, erosion and impact on fish population in the Klamath.
Quartz Valley Tribe	Opposed to No Surprises policy. FGS should not be given an ITP for fall Chinook or steelhead (critical tribal trust fish species). Ensure that HCP applies good protection measures for Chinook and steelhead even though not currently listed. Want alternatives to evaluate no action, no ITP, and ITP without No Surprises. HCP should address beneficial uses of Klamath watershed and prevent negative impact to beneficial uses (e.g., subsistence fishing, cultural uses, etc.). HCP should be put on hold until TMDLs for Scott and Klamath are finished. SAME LEGAL COMMENTS AS KS WILD. Wants government-to-government consultation. Particularly concerned with effects on HCP on fish populations in the Scott and Shasta Rivers. HCP should lead to recovery of fish populations. Believe it is important to reduce or eliminate logging, mining, and roads to meet recovery. Effects from legacy operations need to be addressed. Beaver Creek— see Karuk comments (sediment impairment, roads, cold water refugia, etc.). Believes no new roads should be built in Beaver Creek watershed, and old roads fixed to prevent sediment discharges. HCP should detail funding sources and a timeline for road work. Fish distribution maps presented at scoping meeting are not accurate. Coho found in Cottonwood Creek, and Yreka Creek. Evaluate impacts in cumulative effects analysis of Scott and Shasta ITPs and unregulated take. BMPs should not be used to explain away cumulative effects. Cumulative effects analysis should also include analysis of Klamath Project and pending BO and global warming. SEE KARUK COMMENTS ON WATERSHED SPECIFIC CE ISSUES (road densities, 1997 flood effects, ground based yarding impacts, integrating Basin Plan through monitoring, clearcuts, roads, and peak flow, turbidity, conduct baseline water quality monitoring, fire risk from logging practices in Beaver Creek, mechanical thinning, roads and landslides, rain on snow and increase in peak flow, etc. SAME MECHANICAL THINNNING COMMENTS AS KARUK TRIBE SOME OF THE SAME NSO COMMENTS AS KS WILD.

Commenter	Comment
Francis Mangels	How will HCP ensure tribal fishing, hunting, subsistence rights as guaranteed by treaties are not adversely affected - Environmental Justice?
	The Pope has declared environmental degradation is a sin and therefore take of endangered species is immoral.
	How will HCP affect wild, not hatchery, populations of fish in the Klamath?
	Evaluate the impacts of water rights and use in the Klamath on fish populations.
	What is the economic role of healthy fish populations in the Klamath in comparison to economic role of timber production?
	NSO is essential to fast growth of fir trees and helpful to other trees. NSO is the only owl capable of spreading spores and inoculating trees. Cites three scientific journals where this is documented.
	NSO on the east side are “occasional occupants” and usually not viable territories. The most likely to survive are the west side NSO.
	Yreka phlox is not generally associated with old growth forest, but roads could be routed to avoid populations. The main threat is cow grazing and development.

Appendix C
USFWS Special-status Species List

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Listed/Proposed Threatened and Endangered Species for the BRAY Quad (Candidates Included)

February 15, 2012

Document number: 577613907-173236

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y

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Listed/Proposed Threatened and Endangered Species for the BUCKHORN BALLY Quad (Candidates Included)

February 15, 2012

Document number: 577613907-173449

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Invertebrates					
		Branchinecta lynchi	vernal pool fairy shrimp	T	Y
		Polites mardon	mardon skipper	C	N
Fish					
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds					
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y
Mammals					
		Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the CHINA MTN. Quad (Candidates Included)

February 15, 2012

Document number: 577613907-173527

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Invertebrates					
		Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish					
	*	*Acipenser medirostris*	green sturgeon	T	Y
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds					
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y
Mammals					
		Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the CONDREY MTN. Quad (Candidates Included)

February 16, 2012

Document number: 699865518-10104

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
Mammals				
	Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the COTTONWOOD PEAK Quad (Candidates Included)

February 16, 2012

Document number: 699865518-10112

==========

KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Plants					
		Fritillaria gentneri	Gentner's fritillary	E	N
Fish					
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds					
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y
Mammals					
		Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the DEWEY GULCH Quad (Candidates Included)

February 16, 2012

Document number: 700850125-101143

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish				
	Chasmistes brevirostris	shortnose sucker	E	P
	Deltistes luxatus	Lost River sucker	E	P
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y

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Listed/Proposed Threatened and Endangered Species for the DUTCH CREEK Quad (Candidates Included)

February 16, 2012

Document number: 700850125-101248

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Invertebrates					
		Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish					
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds					
		Brachyramphus marmoratus	marbled murrelet	T	Y
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y
Mammals					
		Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the DUZEL ROCK Quad (Candidates Included)

February 16, 2012

Document number: 700850125-101334

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
Mammals				
	Martes pennanti	fisher, West Coast DPS	C	N

==========

Listed/Proposed Threatened and Endangered Species for the FORT JONES Quad (Candidates Included)

February 16, 2012

Document number: 700850125-101422

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Fish					
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds					
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y
Mammals					
		Martes pennanti	fisher, West Coast DPS	C	N

==========

Listed/Proposed Threatened and Endangered Species for the GARNER MTN. Quad (Candidates Included)

February 16, 2012

Document number: 700850125-10156

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Fish				
	Chasmistes brevirostris	shortnose sucker	E	P
	Deltistes luxatus	Lost River sucker	E	P
	Hypomesus transpacificus	delta smelt	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y

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Listed/Proposed Threatened and Endangered Species for the GAZELLE MTN. Quad (Candidates Included)

February 16, 2012

Document number: 700850125-101727

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
Mammals				
	Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the GRASS LAKE Quad (Candidates Included)

February 16, 2012

Document number: 700850125-101815

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y

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Listed/Proposed Threatened and Endangered Species for the HAMBURG Quad (Candidates Included)

February 16, 2012

Document number: 700850125-10193

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Fish					
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds					
		Brachyramphus marmoratus	marbled murrelet	T	Y
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y
Mammals					
		Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the HAWKINSVILLE Quad (Candidates Included)

February 16, 2012

Document number: 700850125-101943

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Invertebrates					
		Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish					
		Chasmistes brevirostris	shortnose sucker	E	P
		Deltistes luxatus	Lost River sucker	E	P
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds					
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y
Mammals					
		Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the HORNBROOK Quad (Candidates Included)

February 16, 2012

Document number: 700850125-102022

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Plants					
		Fritillaria gentneri	Gentner's fritillary	E	N
Invertebrates					
		Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish					
		Chasmistes brevirostris	shortnose sucker	E	P
		Deltistes luxatus	Lost River sucker	E	P
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds					
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y
Mammals					
		Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the HORSE CREEK Quad (Candidates Included)

February 16, 2012

Document number: 700850125-102056

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
Mammals				
	Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the INDIAN CREEK BALDY Quad (Candidates Included)

February 16, 2012

Document number: 702052168-102130

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Plants				
	Calochortus persistens	Siskiyou mariposa lily	C	N
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
Mammals				
	Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the Klamath National Forest (KLAMATH) Administrative Unit (Candidates Included)

February 16, 2012

Document number: 704222422-104458

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Plants					
		Arabis macdonaldiana	McDonald's rock-cress	E	N
		Astragalus applegatei	Applegate's milk-vetch	E	N
		Calochortus persistens	Siskiyou mariposa lily	C	N
		Fritillaria gentneri	Gentner's fritillary	E	N
		Phlox hirsuta	Yreka phlox	E	N
Invertebrates					
		Branchinecta lynchi	vernal pool fairy shrimp	T	Y
		Polites mardon	mardon skipper	C	N
Fish					
	*	*Acipenser medirostris*	green sturgeon	T	Y
		Chasmistes brevirostris	shortnose sucker	E	P
		Deltistes luxatus	Lost River sucker	E	P
		Eucyclogobius newberryi	tidewater goby	E	Y
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds					
		Brachyramphus marmoratus	marbled murrelet	T	Y
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y
Mammals					
		Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the MACDOEL Quad (Candidates Included)

February 16, 2012

Document number: 702052168-102213

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Plants				
	Astragalus applegatei	Applegate's milk-vetch	E	N
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y

==========

Listed/Proposed Threatened and Endangered Species for the MCCONAUGHY GULCH Quad (Candidates Included)

February 16, 2012

Document number: 702052168-102627

==========

KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
Mammals				
	Martes pennanti	fisher, West Coast DPS	C	N

==========

Listed/Proposed Threatened and Endangered Species for the MCKINLEY MTN. Quad (Candidates Included)

February 16, 2012

Document number: 702052168-102715

==========

KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Plants				
	Calochortus persistens	Siskiyou mariposa lily	C	N
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
Mammals				
	Martes pennanti	fisher, West Coast DPS	C	N

==========

Listed/Proposed Threatened and Endangered Species for the PANTHER ROCK Quad (Candidates Included)

February 16, 2012

Document number: 702052168-10281

==========

KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish				
	Chasmistes brevirostris	shortnose sucker	E	P
	Deltistes luxatus	Lost River sucker	E	P
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y

==========

Listed/Proposed Threatened and Endangered Species for the PENOYAR Quad (Candidates Included)

February 16, 2012

Document number: 702052168-10294

==========

KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y

==========

Listed/Proposed Threatened and Endangered Species for the RUSSELL PEAK Quad (Candidates Included)

February 16, 2012

Document number: 703118822-103011

==========

KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish				
*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y
Mammals				
	Martes pennanti	fisher, West Coast DPS	C	N

==========

Listed/Proposed Threatened and Endangered Species for the SCHONCHIN BUTTE Quad (Candidates Included)

February 16, 2012

Document number: 703118822-10311

==========

KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Fish				
	Chasmistes brevirostris	shortnose sucker	E	P
	Deltistes luxatus	Lost River sucker	E	P
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y

==========

Listed/Proposed Threatened and Endangered Species for the SCOTT BAR Quad (Candidates Included)

February 16, 2012

Document number: 703118822-103150

==========

KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Fish					
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds					
		Brachyramphus marmoratus	marbled murrelet	T	Y
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y
Mammals					
		Martes pennanti	fisher, West Coast DPS	C	N

==========

Listed/Proposed Threatened and Endangered Species for Siskiyou County (Candidates Included)

February 16, 2012

Document number: 704222422-104721

==========

KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Plants					
		Arabis macdonaldiana	McDonald's rock-cress	E	N
		Astragalus applegatei	Applegate's milk-vetch	E	N
		Calochortus persistens	Siskiyou mariposa lily	C	N
		Fritillaria gentneri	Gentner's fritillary	E	N
		Orcuttia tenuis	slender Orcutt grass	T	P
		Phlox hirsuta	Yreka phlox	E	N
Invertebrates					
		Branchinecta lynchi	vernal pool fairy shrimp	T	Y
		Pacifastacus fortis	Shasta crayfish	E	N
		Polites mardon	mardon skipper	C	N
Fish					
	*	*Acipenser medirostris*	green sturgeon	T	Y
		Chasmistes brevirostris	shortnose sucker	E	P
		Deltistes luxatus	Lost River sucker	E	P
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
	*	*Oncorhynchus mykiss*	Central Valley steelhead	T	Y
	*	*Oncorhynchus tshawytscha*	Central Valley fall/late-fall chinook salmon	C	N
	*	*Oncorhynchus tshawytscha*	Central Valley spring-run chinook salmon	T	Y
	*	*Oncorhynchus tshawytscha*	winter-run chinook salmon	E	Y
Amphibians					
		Rana draytonii	California red-legged frog	T	Y
		Rana pretiosa	Oregon spotted frog	C	N
Birds					
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y
Mammals					
		Martes pennanti	fisher, West Coast DPS	C	N

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Listed/Proposed Threatened and Endangered Species for the Siskiyou National Forest - California Portion (SISKIYOU) Administrative Unit (Candidates Included)

February 16, 2012

Document number: 704222422-104548

==========

KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Invertebrates					
		Polites mardon	mardon skipper	C	N
Fish					
	*	*Acipenser medirostris*	green sturgeon	T	Y
		Eucyclogobius newberryi	tidewater goby	E	Y
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds					
		Brachyramphus marmoratus	marbled murrelet	T	Y
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y
Mammals					
		Martes pennanti	fisher, West Coast DPS	C	N

==========

Listed/Proposed Threatened and Endangered Species for the SOLOMONS TEMPLE Quad (Candidates Included)

February 16, 2012

Document number: 703118822-103229

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type		Scientific Name	Common Name	Category	Critical Habitat
Invertebrates					
		Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Fish					
	*	*Oncorhynchus kisutch*	S. OR/N. CA coho salmon	T	Y
Birds					
		Coccyzus americanus	Western yellow-billed cuckoo	C	N
		Strix occidentalis caurina	northern spotted owl	T	Y

==========

Listed/Proposed Threatened and Endangered Species for the TENNANT Quad (Candidates Included)

February 16, 2012

Document number: 703118822-103315

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y

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Listed/Proposed Threatened and Endangered Species for the THE WHALEBACK Quad (Candidates Included)

February 16, 2012

Document number: 703118822-103411

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y

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Listed/Proposed Threatened and Endangered Species for the WEST HAIGHT MTN. Quad (Candidates Included)

February 16, 2012

Document number: 703118822-103450

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KEY:
(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species Habitat Y = Designated, P = Proposed, N = None Designated
* Denotes a species Listed by the National Marine Fisheries Service

Type	Scientific Name	Common Name	Category	Critical Habitat
Invertebrates				
	Branchinecta lynchi	vernal pool fairy shrimp	T	Y
Birds				
	Coccyzus americanus	Western yellow-billed cuckoo	C	N
	Strix occidentalis caurina	northern spotted owl	T	Y

Appendix D
Notice of Availability

Lois Avenue, Suite 1100, Tampa, FL 33607.

FOR FURTHER INFORMATION CONTACT: Dr. Carrie Simmons, Fishery Biologist; Gulf of Mexico Fishery Management Council; telephone: (813) 348–1630.

SUPPLEMENTARY INFORMATION: On the first day of the meeting, the Standing and Special Reef Fish Scientific and Statistical Committees and the Red Snapper Advisory Panel will meet jointly to hear a presentation on the update stock assessment for red snapper. Following the presentation, Special Reef Fish Scientific and Statistical Committees and the Red Snapper Advisory Panel will reconvene separately to continue any discussion of the update stock assessment and make any management recommendations. Other issues on the agenda include: red snapper season openings and closings, settlements for recreational fishing violations, and potential donation of seized catches. There will also be election of a chair and vice-chair. The comments and recommendations made by the Red Snapper Advisory Panel will be presented to the Council at its February 1 - 4, 2010 meeting in Mobile, AL.

Copies of the agenda and other related materials can be obtained by calling (813) 348–1630 or can be downloaded from the Council's ftp site, *ftp.gulfcouncil.org*.

Although other non-emergency issues not on the agenda may come before the Advisory Panel for discussion, in accordance with the Magnuson-Stevens Fishery Conservation and Management Act, those issues may not be the subject of formal action during this meeting. Actions of the Advisory Panel will be restricted to those issues specifically identified in the agenda and any issues arising after publication of this notice that require emergency action under Section 305(c) of the Magnuson-Stevens Fishery Conservation and Management Act, provided the public has been notified of the Council's intent to take action to address the emergency.

Special Accommodations

These meetings are physically accessible to people with disabilities. Requests for sign language interpretation or other auxiliary aids should be directed to Tina O'Hern at the Council (see **ADDRESSES**) at least 5 working days prior to the meeting.

Dated: November 9, 2009.

Tracey L. Thompson,

Acting Director, Office of Sustainable Fisheries, National Marine Fisheries Service.

[FR Doc. E9–27267 Filed 11–12–09; 8:45 am]

BILLING CODE 3510–22–S

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

RIN 0648–XS76

Multi-species Habitat Conservation Plan

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce; Fish and Wildlife Service, Interior.

ACTION: Notice of availability of draft environmental impact statement, multi-species habitat conservation plan, and receipt of application; notice of public meeting.

SUMMARY: This notice announces the availability of a Draft Environmental Impact Statement (DEIS), proposed Multi-Species Habitat Conservation Plan (HCP), and associated Implementation Agreement (IA), for public review and comment. Fruit Growers Supply Company has submitted separate applications to the National Marine Fisheries Service (NMFS) and to the U.S. Fish and Wildlife Service (FWS) for 50–year incidental take permits under section 10 of the Endangered Species Act (ESA) of 1973, as amended.

DATES: Written comments on the proposed HCP, IA, and DEIS must be received by 5 p.m. Pacific Time on February 11, 2010.

ADDRESSES: Address all comments concerning the proposed HCP and DEIS to Lisa Roberts, and send by any one of the following methods, U.S. Mail: National Marine Fisheries Service, Arcata Area Office, 1655 Heindon Rd, Arcata, CA 95521; Fax: (707) 825–4840; E-mail: *FGSHCP.SWR@noaa.gov*. In the subject line of the e-mail, include the document identifier: FGS HCP.

A public meeting will be held on December 2, 2009, 6–8 p.m. at the Best Western Miners Inn Convention Center, 122 East Miner Street, Yreka, CA 96097.

FOR FURTHER INFORMATION CONTACT: For further information, or to receive a copy of the documents, please contact Lisa Roberts, Fisheries Biologist, National Marine Fisheries Service, (707) 825–5178. The HCP and DEIS are also available electronically for review on the NMFS Southwest Region website at: *http://swr.nmfs.noaa.gov*, or the FWS Yreka office website at: *www.fws.gov/yreka/*.

SUPPLEMENTARY INFORMATION: The documents being made available include (1) the proposed HCP, (2) the IA, and (3) the DEIS. This notice is provided pursuant to the ESA and the National Environmental Policy Act (NEPA) as amended. NMFS and FWS are furnishing this notice to allow other agencies and the public an opportunity to review and comment on these documents. All comments received will become part of the public record for this action. Hard bound copies of the HCP, IA, and DEIS are available for viewing, or for partial or complete duplication, at the following locations:

1. Siskiyou County Library, 719 4th St., Yreka, CA 96097.
2. Humboldt County Library, 1313 3rd St., Eureka, CA 95501.
3. Del Norte County Library, 190 Price Mall, Crescent City, CA 95531.
4. National Marine Fisheries Service, 1655 Heindon Rd., Arcata, CA 95521.
5. Yreka Fish and Wildlife Office, 1829 South Oregon St., Yreka, CA 96097.

Background

Section 9 of the ESA prohibits the ''take'' of wildlife species listed as endangered or threatened by either the FWS or NMFS (16 USC 1538). The ESA defines the term ''take'' as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect listed species, or attempt to engage in such conduct. ''Harm'' is defined to include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, spawning, migrating, rearing, and sheltering (64 FR 60727). Pursuant to section 10(a)(1)(B) of the ESA, FWS and NMFS may issue ITPs authorizing the take of listed species if, among other things, such taking is incidental to, and not the purpose of, otherwise lawful activities.

Take of listed plant species is not prohibited under the ESA, and cannot be authorized under a section 10 permit. However, the applicant proposes to include Yreka phlox (Phlox hirsuta) in the HCP to extend the plan's conservation benefits to this species. The applicant would receive assurances under the ''No Surprises'' regulations found in 50 CFR 17.22(b)(5), 17.32(b)(5), and 222.307(g) for all proposed covered species in the ITP.

To receive an ITP under the ESA, an applicant must prepare an HCP that specifies the following: (1) the impact of the taking; (2) steps the applicant will take to minimize and mitigate the impact; (3) funding available to implement the steps; (4) what

alternative actions to the taking the applicant considered and the reasons why these actions were not taken; and (5) any other measures NMFS or FWS may require as being necessary or appropriate for the purpose of the plan (16 USC 1539(a)(2)(A)). To issue a permit, NMFS and FWS must find that: (1) the taking will be incidental; (2) the applicant will minimize and mitigate impacts of the take to the maximum extent practicable; (3) the applicant will ensure adequate funding for the HCP; (4) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and (5) the applicant will meet other measures required by FWS and NMFS. Regulations governing issuance of FWS permits for endangered and threatened species are at 50 CFR 17.22 and 17.32, and for NMFS-issued permits at 50 CFR 222.301 through 307.

The applicant has prepared a multi-species HCP and has applied for ITPs under the ESA. The HCP applies to 152,163 acres of commercial timberland owned by Fruit Growers Supply Company in Siskiyou County, California. The ownership consists of three management units: Klamath River (64,867 acres), Scott Valley (38,814 acres), and Grass Lake (48,482 acres). The Klamath River and Scott Valley management units are located west of Interstate 5, adjacent to and intermixed with Klamath National Forest (KNF) lands. The Grass Lake management unit (also adjacent to the KNF) lies east of Interstate 5 and predominantly north of State Highway 97. These lands are referred to as the Plan Area.

The applicant has requested coverage from FWS for northern spotted owl (*Strix occidentalis caurina*) and Yreka phlox (*Phlox hirsuta*), and from NMFS for the Southern Oregon/Northern California Coasts coho salmon (*Oncorhynchus kisutch*) Evolutionarily Significant Unit (ESU). The applicant also has requested coverage under the ITP for the unlisted Klamath and Trinity Rivers Chinook salmon (*O. tshawytscha*) ESU and the Klamath Mountains Province steelhead (*O. mykiss*) ESU. Should these unlisted covered species become listed under the ESA during the term of the permit, take authorization for those species would become effective upon listing. The HCP describes the habitat-based conservation approach, with species-specific objectives. This includes an Aquatic Species Conservation Program for salmonids and Terrestrial Species Conservation Program for the northern spotted owl and Yreka phlox.

Activities proposed for ITPs coverage include mechanized timber harvest; forest product transportation; road and landing construction, use, maintenance, and abandonment; site preparation; tree planting; certain types of vegetation management; silvicultural thinning and other silvicultural activities; fire suppression; rock quarry and borrow pit operations; aquatic habitat restoration; minor forest management activities such as forest product collecting; and monitoring activities and scientific work in the Plan Area.

The proposed duration of the ITPs and HCP is 50 years, though many aspects of the plan's conservation strategy are intended to benefit the covered species long into the future. The goals of this HCP are to: (1) protect and improve habitats required by species covered by the HCP and (2) establish appropriate guidelines for continuing timber harvests and other forest management activities.

National Environmental Policy Act Compliance

NMFS and FWS formally initiated an environmental review of the project through publication of a Notice of Intent to prepare an Environmental Impact Statement in the **Federal Register** on February 22, 2008 (73 FR 9776). That document also announced a public scoping period during which interested parties were invited to provide written comments expressing their issues or concerns relating to the proposal and attend one of two public scoping meetings held in Yreka and Happy Camp, California.

NMFS and FWS have jointly prepared a DEIS to analyze the effects of alternatives on the human environment. Proposed issuance of the associated ITPs from both NMFS and FWS for covered species and applicant implementation of the HCP make up the Proposed Alternative in the DEIS. The other alternatives analyzed in the DEIS include: (1) the No Action Alternative (ITPs would not be issued and there would not be an HCP); (2) Alternative A (ITPs would be issued by both agencies, and northern spotted owl conservation areas would be based on the Northwest Forest Plan (NWFP) system of late-successional reserves (LSRs), and the Aquatic Species Conservation Program would be based on concepts outlined in the NWFP for the protection of aquatic habitats); and (3) Alternative B (FWS would issue an ITP for northern spotted owl, with spotted owl conservation based on management of foraging and dispersal habitat across the Plan Area).

Public Comments

If you wish to comment on the permit application, the HCP, IA, or DEIS, you may submit your comments to the address listed in the **ADDRESSES** section of this document. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment including your personal identifying information may be made publicly available at any time. While you may ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Special Accommodations

The public meeting is physically accessible to people with disabilities. Requests for sign language interpretation or other auxiliary aids should be directed to Lisa Roberts, National Marine Fisheries Service (707) 825–5178, at least 5 working days prior to the meeting date.

Next Steps

NMFS and FWS will evaluate the applications, associated documents, and comments submitted to them to prepare a final EIS. A permit decision will be made no sooner than 30 days after the publication of the final EIS and completion of the Record of Decision.

Dated: November 5, 2009.

Alexandra Pitts,

Acting Deputy Regional Director, Pacific Southwest Region, U.S. Fish and Wildlife Service.

Dated: November 9, 2009.

Angela Somma,

Chief, Endangered Species Division, Office of Protected Resources, National Marine Fisheries Service.

[FR Doc. E9–27318 Filed 11–12–09; 8:45 am]

BILLING CODE 3510–22–S

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[Docket No. 0911041393–91393–01]

New NOAA Cooperative Institutes (CIs): (1) A CI to Support NOAA Research Facilities in the Pacific Northwest; (2) A CI for Southwestern U.S. Marine Ecosystems, Climate, and Ocean Studies; and (3) A Southeastern Regional CI for Atmospheric and Marine Studies.

AGENCY: Oceanic and Atmospheric Research (OAR), National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric

Appendix E
Fisher Spatial Analysis

Effects on Fishers (*Martes pennanti*) from the Proposed Fruit Growers Supply Company Multi-Species Habitat Conservation Plan

Prepared by:

Yreka Fish and Wildlife Office

1829 South Oregon Street

Yreka, CA 96097

1 April 2011

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INTRODUCTION

The U.S. Fish and Wildlife Service and National Marine Fisheries Service received comments during the 90-day public comment period pertaining to fishers (*Martes pennanti*) on the October 2009 Draft Environmental Impact Statement (EIS) for the Fruit Growers Supply Company (FGS) Multi-Species Habitat Conservation Plan (HCP). Commenters expressed a concern that the analysis regarding fishers made an erroneous assumption that fishers would benefit from increased northern spotted owl (*Strix occidentalis caurina*) habitat, and failed to support this assumption by analyzing, disclosing, or quantifying the impacts of the proposed plan. The fisher analysis in the Draft EIS relied on evaluating potential effects to fisher habitat under all of the alternatives. The Draft EIS took into consideration localized increases in habitat from the northern spotted owl and aquatic conservation measures, increases in habitat throughout the ownership with the reduction of even-aged management practices under several alternatives, and adverse impacts to habitat from removal of northern spotted owl habitat at proposed take sites. This analysis was not spatially explicit or quantitative, and relied on descriptions of general habitat trends.

Zielinski et al. (2010) published a landscape-scale habitat suitability model for fishers in an area that encompasses a large portion of the FGS California Klamath Province Area of Analysis. The availability of this model allowed us (the Fish and Wildlife Service) to conduct a more rigorous evaluation of potential effects by modeling fisher habitat, estimate fisher populations via an index, and evaluate changes in the population index over the 50-year permit term at both the regional and local scales within the Klamath Province.

OBJECTIVES

The main objective of this document is to compare the potential effects of the Proposed Action as described in the Draft EIS for the FGS HCP on fisher habitat and fisher populations relative to current conditions. The Draft EIS was prepared to evaluate potential effects of alternatives from timber harvest and other covered activities, including road construction and maintenance, silviculture, stand regeneration, harvest of minor forest products, and fire prevention and suppression. The HCP's covered activities have the potential to affect fishers by:

1) changing the amount and quality of habitat, which could alter the ability of fishers to breed, feed, or shelter; 2) disturbing pregnant or nursing female fishers during the early denning season; 3) causing mortality by cutting down a den tree containing a late-term pregnant fisher or fisher kits; and 4) causing mortality by vehicle collision associated with traffic from otherwise lawful activities. In general, the types of timber harvest and associated forestry management activities would be similar under all Alternatives. Effects from covered activities 2, 3, and 4 above are not expected to differ in Alternatives thus are not addressed further in this document.

This analysis focuses on potential changes in the amount and spatial arrangement of modeled fisher habitat resulting from covered activities under the Proposed Action relative to current conditions over the 50-year permit term. To achieve this objective we: 1) quantify and assess potential effects to modeled habitat conditions resulting from the Proposed Action at two spatial scales, and 2) assess potential effects to fisher populations.

METHODS

SCALES OF ANALYSIS

We characterized fisher habitat at the regional and local scales, and fisher populations at the range-wide, population, regional, and local scales. We conducted regional and local analyses separately for the ownership occurring in the California Klamath (hereafter Klamath) and California Cascades (hereafter Cascades) Provinces (Figure 1), as was done for the regional analyses of impacts to northern spotted owl (see section 6.2.1.3 of the HCP). Separate results and discussions were warranted because the availability of information pertaining to fisher habitat occupancy are distinctly different between the two provinces.

REGIONAL HABITAT SCALE (AREA OF ANALYSIS)

The Area of Analysis consists of a 20-mile (mi) [32.1-kilometer (km)] buffer around FGS ownership in the Klamath and Cascades Provinces (Figure 1). We used the Area of Analysis to characterize current conditions and describe potential effects of the Proposed Action on modeled fisher habitat within each region. The 20-mi buffer was based on field studies documenting juvenile dispersal distances (Lofroth et al. 2010) and selected as a reasonable distance to

encompass a majority of natal dispersal (and therefore demographic connectivity) of fishers associated with the FGS ownership.

The Klamath Area of Analysis includes portions of Siskiyou and Trinity Counties in California (Figure 2). The Area of Analysis buffer includes portions of Jackson, Josephine, and Klamath Counties in Oregon; however, the modeling described below (see Analytical Approach for Habitat Evaluation) does not extend into Oregon. The total area is approximately 1,583,000 ac (640,600 ha), and occurs in both the Eastern Klamath and California Cascades Physiographic Provinces. Lands that were clearly unsuitable for fishers (e.g., urban and agricultural lands, grasslands, alpine areas, and other non-habitat lands) are included in the area calculation.

The Cascades Area of Analysis includes portions of Siskiyou and Modoc Counties in California, and Jackson and Klamath Counties in Oregon (Figure 3). The total area is approximately 2,485,500 ac (1,005,850 ha), and occurs in both the Eastern Klamath and California Cascades Physiographic Provinces. Similar to the Klamath Area of Analysis, it includes areas unsuitable for fishers.

LOCAL HABITAT SCALE (AREA OF IMPACT)

The Area of Impact consists of a 1.6-mi (2.5-km) buffer around the FGS ownership to encompass the local fisher population that could be directly or indirectly affected by the Proposed Action. The total area within the Klamath Area of Impact (Figure 2) is approximately 350,800 acres (ac) [142,000 hectares (ha)] and includes FGS's Klamath River and Scott Valley Management Units. The total area within the Cascades Area of Impact (Figure 3) is approximately 255,100 ac (103,200 ha) and includes FGS's Grass Valley Management Unit.

The 1.6-mi (2.5-km) distance criterion is the radius for a circular home range for female fishers conservatively estimated to be (7.7 mi2 [20 km2]). No completed telemetry studies occur in either the Klamath or Cascade Areas of Impact to derive site-specific home range estimates. However, sources of information within the Klamath Province allowed us to make an informed estimate of female home range size and were applied to both provinces (Table 1).

Table 1. Information sources and values used to derive a home range estimate for female fishers in the eastern Klamath Province.

Source	Study Area	*n*	Mean km^2 (mi^2)	Weighted Mean km^2 (mi^2)
C. Thompson Pers. Comm. 2010[a]	Rogue Siskiyou NF[b]	1	12.2	12.2
S. Self Pers. Comm. 2007[c]	Shasta-Trinity NF	9	11.7	105.0
Yaeger 2005[d]	Shasta-Trinity NF	7	23.5	164.3
		17		281.5
	Mean		15.8	
	Weighted Mean		16.6	

[a] – Minimum Convex Polygon estimate from a 2-month telemetry study in vicinity of Mt. Ashland, OR. Monitoring was for a short period; therefore, this estimate may be small.
[b] – NF = National Forest.
[c] – Minimum Convex Polygon estimate from a 2-year telemetry study near Hayfork, CA.
[d] – Minimum Convex Polygon estimate from a 3-year telemetry study near Clair Engle Reservoir, CA.

ANALYTICAL APPROACH FOR HABITAT EVALUATION

FISHER HABITAT IN THE CALIFORNIA KLAMATH PROVINCE

Zielinski et al. (2010) developed a landscape-scale habitat suitability model (hereafter Zielinski model) for fishers in the California Klamath Region using standard non-parametric logistic regression approaches. These statistical approaches enable biologists to model species responses to a wide range of environmental data types and are a commonly used technique to understand ecological requirements and assist in conservation planning (Guisan and Zimmerman 2000, Guisan and Thuiller 2005, Kearney 2006, Pearce and Boyce 2006, Zielinski et al. 2006). Statistical landscape-scale habitat models have been built for the fishers in northwestern California (Carroll et al. 1999, Davis et al. 2007), portions of the Sierra Nevada (Campbell 2004, Davis et al. 2007, Spencer et al. 2011) and statewide (Davis et al. 2007). The Zielinski model encompasses a majority of the FGS Klamath Province Area of Analysis and provides a means to

evaluate potential changes to modeled habitat under different management scenarios. The Zielinski model does not extend into the Cascades Area of Analysis or into Oregon, so it will not be used to analyze data in those regions.

Based on variables in the Zielinski model, the U.S. Fish and Wildlife Service, FGS, and a third party Geographic Information System consultant (Natural Resource Geospatial, Yreka, California) worked cooperatively to produce a new habitat suitability surface (hereafter FGS fisher model) to represent current conditions and each 10-year time step of the Proposed Action.

DATA SOURCES

Zielinski model

The original paper details model development and contains descriptions of variables. Below we describe a few key aspects of the model because they influence interpretation of the FGS fisher model. The Zielinski model predictor variables are represented at a 2.47-ac (1.0-ha) pixel size and assessed within a 1.93-mi^2 (5.0-km^2) circular moving window centered on each pixel. EVEG vegetation data (see description below) were used to derive the values of the biotic variables included in the final habitat suitability model. Of the final model's seven variables, three were abiotic (and static) while four were biotic and can be influenced by changes in vegetation species composition (type), tree diameter size class (size), and canopy closure class (density). California Wildlife Habitat Relationship (CWHR; Mayer and Laudenslayer 1988) type, size and density were used to score each variable.

FGS data layer

The Geographic Information System data layers for the FGS ownership were derived from FGS inventory data and are represented as CWHR categories. Based on FGS forest inventory data and modeled projections of future condition, the data layers report average CWHR attributes (type, size, and density) derived from forest stand characteristics, such as tree species, basal area, and quadratic mean diameter for current conditions and each 10-year time step of the 50-year permit term.

EVEG

The U.S. Department of Agriculture Forest Service Existing Vegetation (EVEG) data [http://www.fs.fed.us/r5/rsl/clearinghouse/cite.shtml] was used to characterize habitat outside of the FGS ownership on public and other private lands. Unlike the FGS data layers, EVEG layers do not project growth and harvest of forest stands for other ownerships (public and other private) surrounding FGS ownership into the future.

The EVEG classification system is a California-wide system developed by the U.S. Department of Agriculture Forest Service, Region 5, to serve as a standard for existing vegetation maps. This data source is a seamless vegetation layer encompassing all ownerships within the entire landscape but is restricted to California. The layer includes species, size, and density information that was used to model fisher habitat for the original Zielinski model and for non-FGS ownership for this analysis.

DATA PROCESSING

The general approach was to use EVEG data on non-FGS ownership and the FGS data layer on FGS ownership to develop the FGS fisher model. Some restructuring of the FGS data layer was necessary to make it compatible with the Zielinski modeling approach. This included converting vegetation data from a polygon to grid format and deriving a few data values not regularly collected by FGS. The company manages its inventory data as polygons that are classified according to vegetation type, average size, and density attributes. To match the format of the EVEG layer we converted polygons to a grid format by re-sampling polygons down to 120-yard^2 (100-m^2) pixels. Each pixel carried forth the CWHR attributes (i.e., type, size, and density) of its parent polygon. FGS does not conduct or maintain inventory data for some non-merchantable timber type CWHR categories. For two CWHR forest types used in the Zielinski model (Montane Hardwood and Montane Riparian), this resulted in blank data cells for size and density, the values of which are required to model fisher habitat suitability. To populate these cells, we derived size and density values by calculating the median value for that forest type across FGS ownership from the underlying EVEG layer.

MODELING FISHER PROBABILITY OF DETECTION AND HABITAT SUITABILITY

The Zielinski model predicts probability of detection of fishers across the landscape, and assumes that areas with a higher probability of detection fulfill a greater number of, or higher quality of, life-requisite needs for fishers (e.g., food, shelter). The probability of detecting fishers may be used as an index of relative habitat suitability for fishers. The Zielinski model used the probability of detection in each pixel to estimate the abundance and distribution of predicted habitat suitability (Boyce et al. 2002, Hirzel et al. 2006). As a measure of strength of habitat selection, Zielinski et al. (2010) generated a ratio of predicted to expected values (Hirzel et al. 2006). In Figure 5 of Zielinski et al. (2010), the fitted regression line of strength of selection indicates negative values (avoidance) for the lower predicted range (i.e., 0–0.40) and positive values (preference) for the range of higher predicted probabilities (greater than 0.40). We selected probability of detection values greater than or equal to 0.41 as a threshold to represent potential habitat using the FGS fisher model. To quantify current conditions and changes of modeled habitat over time, we compared the amount of modeled habitat at time step zero, or current conditions, to each 10-year time step under the Proposed Action.

We excluded from some calculations isolated patches of modeled habitat smaller than 7.7 mi^2 (20 km^2). We selected this size to be a minimum area for supporting a hypothetical female home range. We chose this approach to provide a spatially explicit method for analyzing how changes in the amount and spatial configuration of modeled habitat may impact fishers under the Proposed Action. Excluding smaller patches of modeled habitat from calculations does not mean fishers will not use patches of habitat smaller than 7.7 mi^2 (20 km^2), or that females require their home ranges to be completely composed of a single patch of higher-suitability habitat, or that fishers will not cross areas of lower-suitability habitat, but is a conservative approach to quantifying areas that have a greater likelihood of providing sufficient habitat for the species to meet its life history needs.

FISHER HABITAT IN THE CALIFORNIA CASCADES PROVINCE

Zielinski et al. (2010) developed their model specifically for the California Klamath Province and used independent survey data from this region to evaluate its performance. We chose not to extrapolate the Zielinski model beyond its developmental boundaries to the

California Cascades Province because the lack of fisher detections in this region would not allow for evaluation of model performance. Therefore, we were unable to conduct a quantitative analysis to compare time steps of the Proposed Action in the Cascades Area of Analysis or Area of Impact.

Davis et al. (2007) developed a landscape-scale fisher suitability model specific to this region, which allowed us to make a qualitative landscape scale assessment. In addition, we used relative amounts of available foraging and nesting/roosting northern spotted owl habitat (hereafter northern spotted owl habitat) from Table 4-24 and Table 4-27 of the HCP to make some generalized inferences and conclusions. The HCP summarized the amount of northern spotted owl habitat on private and federal lands using the 2005 spotted owl habitat layer developed by U.S. Fish and Wildlife Service and FGS.

POPULATION ASSESSMENT

We used various sources of information to describe the current distribution of fishers in the regional Area of Analysis. The U.S. Department of Agriculture Forest Service *Forest Carnivore Surveys in the Pacific States* website [http://maps.fs.fed.us/carnivore/ /Modules/application/home.html] provides a permanent archive and retrieval system for data from standardized forest carnivore surveys conducted in the Pacific states, regardless of their success or failure to detect target species. This database contains the most comprehensive, publicly available compilation of verified detections. It is still a relatively new effort, however, and regular use has not become widespread amongst both private and public land managers conducting forest carnivore surveys. Consequently, we supplemented the records in this database with published and unpublished literature and records when we knew additional information existed.

FISHER POPULATION IN THE CALIFORNIA KLAMATH PROVINCE

The number of fishers currently occupying the Klamath Area of Analysis and Area of Impact is unknown; therefore, we derived an index representing the number of hypothetical female fishers in the area as a baseline to assess potential effects of the Proposed Action. The fisher population index is based on the number of hypothetical female fisher home ranges

(7.7 mi^2 [20 km^2]) available within modeled habitat polygons larger than 7.7 mi^2 (20 km^2) at each time step. The index does not give an actual population estimate, but allows us a spatially explicit means of projecting modeled habitat changes at large scales to compare the relative change in the hypothetical population based on modeled habitat values at each time step compared to current conditions.

FISHER POPULATION IN THE CALIFORNIA CASCADES PROVINCE

For the reasons described in the *Fisher Habitat in the Cascades Province* section, we could not apply the FGS fisher model to the Cascades Province. Information for the Cascades fisher population is limited to information sources described earlier in this section.

RESULTS

HABITAT EVALUATION

FISHER HABITAT IN THE CALIFORNIA KLAMATH PROVINCE AREA OF ANALYSIS

The FGS fisher model identified a heterogeneous distribution of modeled habitat within the Klamath Area of Analysis (Figure 4). Larger concentrations of modeled habitat occur in the western and northern portions of the Area of Analysis. Modeled habitat East of Highway 3 occurs in relatively small isolated patches.

Table 2 provides the acres of modeled habitat and percent change for current conditions and at each decadal time step under the Proposed Action. At the end of the permit term, the model estimated a 4.05% net increase (22,951 ac; 9,287 ha) in amounts of modeled fisher habitat compared to current conditions.

Table 2. Acres of modeled habitat (greater than or equal to 0.41 probability of detection) within the California Klamath Province Area of Analysis for current conditions and each time step under the Proposed Action.

	Acres in Area of Analysis			
TIMESTEP	Total	Po[a] < 0.41	Po ≥0.41	% change Po ≥0.41
Current	1,582,994	1,016,960	566,034	–
Decade 1	1,582,994	1,012,917	570,077	0.71%
Decade 2	1,582,994	996,371	586,623	2.90%
Decade 3	1,582,994	993,980	589,015	0.41%
Decade 4	1,582,994	987,291	595,704	1.14%
Decade 5	1,582,994	994,009	588,985	-1.13%

[a] – Po = Probability of detection derived from the FGS fisher model.

The amount of modeled habitat in patches larger than 20 km^2 in size increased in 4 of the 5 time steps (Table 3). At decade 5, the model estimated a 4.85% net increase (26,215 ac; 10,608 ha) in amounts of modeled fisher habitat in patches larger than 20 km^2 compared to current conditions. Most (95%) modeled habitat at the current condition time step was in a network of patches substantially larger than 20 km^2 (Figure 5). Based on these results, we would expect female home ranges to be widely dispersed across the landscape, with clusters of home ranges occurring in the larger patches.

FISHER HABITAT IN THE CALIFORNIA KLAMATH PROVINCE AREA OF IMPACT

Results from the FGS fisher model identified a heterogeneous distribution of modeled habitat throughout the Klamath Area of Impact (Figures 6 – 11). A visual inspection of each time step (Figures 6 – 11) suggests modeled habitat does change its location on the landscape, and generally increases in size and connectivity. Table 4 provides the acres of modeled habitat and percent change for current conditions and at each decadal time step under the Proposed Action. At decade 5, the model estimated a 16.73% net increase (22,951 ac; 9,287 ha) in amounts of modeled fisher habitat compared to current conditions. Throughout the permit term, there are

both increases and decreases in the amount of modeled fisher habitat relative to the prior decade, but the amount remains greater than current conditions at each time step.

Table 3. Acres of modeled habitat (greater than or equal to 0.41 probability of detection) in patches larger than 20 km2 in size within the California Klamath Province Area of Analysis for current conditions and each time step under the Proposed Action.

	Acres in Area of Analysis		
TIMESTEP	Po[a] ≥0.41 in Patches >20 km^2	% change Patches >20 km^2	Fisher Population Index
Current	540,687	–	109.4
Decade 1	541,119	0.08%	109.5
Decade 2	558,683	3.25%	113.0
Decade 3	565,449	1.21%	114.4
Decade 4	567,196	0.31%	114.8
Decade 5	566,902	-0.05%	114.7

[a] – Po = Probability of detection derived from the FGS fisher model.

Table 4. Acres of modeled habitat (greater than or equal to 0.41 probability of detection) within the California Klamath Province Area of Impact for current conditions and each time step under the Proposed Action.

	Acres in Area of Impact			
TIMESTEP	Total	Po[a] < 0.41	Po ≥0.41	% change Po ≥0.41
Current	350,800	213,638	137,163	–
Decade 1	350,800	209,595	141,205	2.95%
Decade 2	350,800	193,049	157,751	11.72%
Decade 3	350,800	190,657	160,143	1.52%
Decade 4	350,800	183,968	166,832	4.18%
Decade 5	350,800	190,687	160,113	-4.03%

[a] – Po = Probability of detection derived from the FGS fisher model.

On average, over current conditions and the five time steps, 92% (range 90% – 95%) of modeled habitat occurred in a network of patches larger than 20 km^2 (Table 5). The amount of modeled habitat in patches larger than 20 km^2 in size shows an increasing trend over time (Figure 12), with positive increases in 4 of the 5 time steps (Table 5). At decade 5, the model estimated a 20.8% net increase (26,215 ac; 10,608 ha) in amounts of modeled fisher habitat patches larger than 20 km^2 compared to current conditions.

Table 5. Acres of modeled habitat (greater than or equal to 0.41 probability of detection) in patches larger than 20 km^2 in size within the California Klamath Province Area of Impact for current conditions and at each time step under the Proposed Action

	Acres in Area of Impact		
TIMESTEP	Po[a] ≥0.41 in Patches >20 km^2	% change Patches >20 km^2	Fisher Population Index
Current	126,036	–	25.5
Decade 1	126,468	0.34%	25.6
Decade 2	144,032	13.89%	29.1
Decade 3	150,798	4.70%	30.5
Decade 4	152,545	1.16%	30.9
Decade 5	152,251	-0.19%	30.8

[a] – Po = Probability of detection derived from the FGS fisher model.

For current conditions, the percent of area by ownership within the Klamath Area of Impact indicates federal lands contribute more modeled habitat relative to their availability than private lands (Table 6). Approximately 31% of FGS ownership contains modeled habitat in patches larger than 20 km^2, but accounts for only 9.2% of the modeled habitat in patches larger than 20 km^2 within the Area of Impact. Private ownership (e.g., FGS, other private industrial timberland owners, some non-capable agriculture and urban land) represents almost 62% of the Area of Impact and accounts for more than 18% of modeled fisher habitat in patches greater than 20 km^2. Public lands represent approximately 38% of the Area of Impact and accounts for more than 17% of modeled fisher habitat in patches greater than 20 km^2.

Table 6. Percent of modeled habitat (greater than or equal to 0.41 probability of detection) within the California Klamath Province Area of Impact for current conditions by land ownership.

	Percent of Area of Impact				% Ownership
OWNER	% Total	<0.41 Po	≥0.41 Po	≥0.41 Po Patches >20 km^2	% ≥0.41 Po Patches >20 km^2
Federal	37.7%	19.4%	18.3%	17.4%	46.2%
FGS	29.3%	19.2%	10.1%	9.2%	31.3%
Other private	32.7%	22.0%	10.7%	9.3%	28.5%
State	0.4%	0.3%	0.0%	0.0%	5.2%
Total public	38.1%	19.7%	18.3%	17.4%	45.8%
Total private	61.9%	41.2%	20.8%	18.5%	29.8%

[a] – Po = Probability of detection derived from the FGS fisher model.

FISHER HABITAT IN THE CALIFORNIA CASCADES PROVINCE AREA OF ANALYSIS AND AREA OF IMPACT

We were unable to conduct a quantitative analysis comparing time steps of the Proposed Action in the Cascades Area of Analysis or Area of Impact (see above section *Fisher Habitat in the California Cascade Province*). The amounts of northern spotted owl habitat reported for the Klamath Area of Analysis and Klamath Area of Analysis (HCP Tables 4-24 and 4-27), however, allow for some generalized inferences. Whereas 26.5% of the total area of the Klamath Area of Analysis was reported to be in northern spotted owl habitat, these habitat types comprise only 14.7% of the total area of the Cascades Area of Analysis. Public land accounts for a majority (Table 7) of the 168,623 ac (68,239 ha) of the northern spotted owl habitat reported in the Cascades Area of Analysis (HCP Tables 4-27). The applicant's ownership accounts for a relatively small amount of all northern spotted owl habitat in the Cascades Area of Analysis, while within the Area of Impact, the applicant's ownership accounts for almost half of northern spotted owl habitat in private ownership (HCP Table 4-29). Neither the HCP nor the EIS report how the amounts of northern spotted owl habitat will change over time within only the Cascades Area of Analysis or Area of Impact under the Proposed Action precluding our ability to track the change in habitat over time for these areas.

Table 7. Percent of northern spotted owl habitat (foraging and nesting/roosting) by land ownership within the California Cascades Area of Analysis and Area of Impact.

	Area of Analysis	Area of Impact
Federal	64.8%	66.4%
FGS	2.8%	16.0%
Other private	32.3%	17.7%
State	0.0%	0.0%
Total public	64.8%	66.4%
Total private	35.2%	33.6%

FISHER POPULATION ASSESSEMENT

POPULATION IN THE CALIFORNIA KLAMATH AREA OF ANALYSIS

The FGS fisher model indicates that current conditions could support approximately 109 hypothetical female home ranges within the Klamath Area of Analysis (Table 3). The amounts of modeled habitat increased in all but one time step, resulting in an increase of the fisher population index by five to 114 by decade 5 under the Proposed Action (Table 3).

The USFS database query conducted on January 24, 2011 (Figure 13) reported verified fisher detections throughout much of the Klamath Area of Analysis. Although reported survey efforts are not consistent through this region, fisher detections are clustered in the northern and southwestern portions of the Area of Analysis within and adjacent to FGS lands.

POPULATION IN THE CALIFORNIA KLAMATH AREA OF IMPACT

Results of the modeling indicated that current conditions could support approximately 25 hypothetical female home ranges within the Klamath Area of Impact (Table 5). The amounts of modeled habitat increased in all but one time step, resulting in an increase of the fisher population index by five by decade 5 under the Proposed Action (Table 5).

The USFS database query conducted on January 24, 2011 (Figure 13) reported verified fisher detections throughout much of the northern and central portions of the Klamath Area of Impact. No fishers were detected at any of the relatively few survey locations in the southernmost portion of the Klamath Area of Impact.

POPULATION IN THE CALIFORNIA CASCADES AREA OF ANALYSIS AND AREA OF IMPACT

As described previously, we could not use the Zielinski model to estimate the probability of fisher occupancy or to compare population indices based on changes in amounts of modeled habitat by decade. A query of the USFS Forest Carnivore Surveys in the Pacific States website on January 24, 2011 reported verified fisher records along the approximate boundary of the Cascades Area of Analysis, but none within the Cascades Area of Impact (Figure 13). One verified detection of a fisher south of Mount Shasta within the Cascades Area of Analysis is known to have occurred in 2003 (Lindstrand 2008) approximately 9 mi (15 km) south-southwest of the Cascades Area of Impact.

DISCUSSION

The Draft EIS for the FGS HCP did not contain a quantitative analysis of potential effects to fishers under the alternatives. The Draft EIS fisher analysis determined that fishers would benefit from increases in habitat at northern spotted owl Conservation Support Areas, from the aquatic conservation measures, and the reduction of even-aged management practices under several of the alternatives. The analysis recognized some likely adverse impacts to fishers resulting from management activities under the alternatives, but did not attempt to quantify potential impacts of the Proposed Action. This analysis was conducted to improve our understanding of the likely potential effects to fishers under the Proposed Action.

FISHER HABITAT

KLAMATH PROVINCE HABITAT MODELING

The structure and composition of coniferous forests within the Klamath Province are naturally diverse due to variation in topography and soil type, the relatively dry climate, and stochastic events such as fire. Timber harvest and fuels management have contributed to the habitat mosaic. The removal of large structural elements or fragmentation of fisher habitat through various forest vegetation management practices, such as timber harvest and fuels-reduction treatments, have been identified as threats to fishers (69 FR 18770; April 8, 2004). The concern about anticipated changes to fisher habitat resulting from covered activities prompted us

to conduct a spatial analysis to evaluate potential impacts of the Proposed Action on fishers at the local and regional scales.

The FGS model allowed us to conduct a quantitative analysis of changes in modeled fisher habitat under the Proposed Action over portions of the Plan Area. The model used the best available science and was more rigorous than any other decision-support tool currently available for the Klamath Province providing the best estimate of potential effects to fishers at the landscape scale. The analysis conducted for the FGS HCP is not an analysis of the overall threat of habitat loss and fragmentation of forested habitat that is suitable for fishers, but an analysis of how, or if, any relative changes in modeled habitat may affect fisher populations in the region.

The decadal results of the FGS habitat model indicated that the Proposed Action had a positive effect on the overall amounts of modeled habitat within the Klamath Area of Analysis. Even though FGS owns and manages a relatively small portion of the Area of Analysis (< 7%) modeled habitat increases by more than 4%. By decade five, the model projected that more than 26,000 additional acres of modeled fisher habitat in areas greater than 20 km^2 of ≥0.41 probability of detection would be available compared to current conditions. This increase in modeled habitat is more pronounced at the Area of Impact scale because the higher proportion of FGS ownership.

The Zielinski model did not apply to the northern and northeastern portions of the Klamath Area of Analysis (Figure 4), because these areas were outside the model developmental boundaries. Fishers are present west of Interstate 5 in the northern portion of the Klamath Area of Analysis (in Oregon), but the vegetation layers used in our modeling did not cover this area. An ongoing USDA Forest Service research study is quantifying fisher use of these forests and investigating the effects of vegetation management on fisher behavior (C. Thompson pers. comm.). The northeastern and eastern portions of the Klamath Area of Analysis include a presumed barrier created by Interstate 5 and large unforested areas (e.g., grassland valleys, shrub fields) that are not considered fisher capable habitat. These areas of unsuitable or non-capable habitat reduce connectivity with potential habitat to the east, and more specifically for this analysis, with the Cascades Area of Analysis.

Although the Zielinski model enabled us to conduct a robust analysis, it is unclear how some differences between the underlying EVEG vegetation layer and the FGS forest inventory layer may have affected model results. For example, the FGS forest inventory polygons used to

build the FGS habitat model were large compared to the EVEG polygons (18.2 ha FGS; 1.8 ha EVEG) and had a single mean value for type, size, and density derived from the company's inventory data. A single value over such a large area could affect the moving window analysis by skewing the results towards the more spatially dominant FGS polygon, than if the landscape were represented at a finer level of resolution. Put another way, if we were working with discrete harvest units and associated changes to CWHR typing over time, we could possibly better understand the effects of management at a finer scale.

The Zielinski and FGS fisher models do not have the ability to project the current or future availability of fine-scale habitat attributes important to fishers such as resting and denning structures or forest complexity. We could not quantify change in habitat elements at this fine-scale using the FGS model because the data used to develop and run the models are at a much larger scale and do not represent fine-scale forest complexity or specific structures.

In an attempt to understand how forest complexity or specific structures might change for fishers, we reviewed the projected change in amounts of CWHR size and canopy cover classes presented in Table 4.3-2 of the Draft EIS under the Proposed Action. By the end of the reporting period, size class 4 increases by more than 16,000 ac (6,474 ha) relative to current condition. Because size class four spans a large range of tree diameters (i.e., 11 to 24 inches; 28 to 61 cm) and is an averaged statistic, it is difficult to determine if it contains the larger trees used by denning and resting fishers. That is, stands averaging 11 inch trees are less likely to provide the conditions suitable for resting or denning than are stands averaging 24 inch trees, unless previous timber harvest left some residual component. Without a more detailed description of the range of diameter classes that were averaged to make size class 4 stands it is impossible to determine if the "critical" (Lofroth et al. 2010, pg. 121) legacy structures in younger forests following timber harvest will be available.

CASCADES PROVINCE HABITAT MODELING

As described in the *Fisher Habitat in the California Cascades Province* section, the Zielinski model is not applicable to the Southern Cascades Province because the model was developed specifically for the Klamath Province. Without a model to conduct a quantitative analysis in this region, we attempted to understand potential impacts of the Proposed Action by reviewing the summaries of foraging and nesting/roosting habitat for northern spotted owls.

Northern spotted owl habitat, however, is not a perfect surrogate for spatial analysis of fisher habitat. Northern spotted owl and fisher habitat share many of the same characteristics (e.g., large diameter trees, dense canopy cover, vegetation diversity), but how each species uses the landscape differs spatially. Northern spotted owls require perches to hunt from and understories that allow for flight and capture of prey, while fishers forage on the move and benefit from understory cover for hunting and screening from predators. Northern spotted owls in the Klamath province do not solely rely on cavities in trees or snags for nesting structures, while fishers rely exclusively on cavities in large (36 in; 92 cm) trees and snags for denning (Lofroth et al. 2010). Northern spotted owls form pair bonds for mating and provisioning young, while male fishers may mate with more than one female during the breeding season and female fishers raise their young alone. We still have a great deal to learn about how fishers use landscapes and, more importantly, how habitat conditions influence individual fitness and population performance.

We do know that some of the strongest habitat associations for fishers are with moderate to dense forest canopy and elements of late-successional forests, and rest and den structures are larger, typically deformed or deteriorating trees that are relatively rare in forested landscapes (Lofroth et al. 2010). Furthermore, throughout their Pacific coastal range, fishers exhibit strong consistent patterns indicative of preference for greater volume of logs and a higher prevalence of large diameter conifers and hardwoods and high basal area of conifers, hardwood, and snags (Buskirk et al. 2010).

Relatively little information exists for fisher habitat relationships in the California Cascades Province compared to the Klamath Area of Analysis. Davis et al. (2007) reported their "Klamath/Shasta" probability of detection model performed "relatively well" for an area that includes the Cascades Area of Analysis. Figure 5c of Davis et al. (2007) shows only small amounts of isolated patches of higher probability habitat within the Cascades Area of Analysis, while projecting greater amounts and a pattern of higher probability habitat similar to the FGS fisher modeling results in the Klamath Area of Analysis. Likewise, the Cascades Area of Impact appears to have lower amounts of suitable habitat than the Klamath Area of Impact when visually comparing Figure 5c of Davis et al. (2007) to the FGS fisher model.

Like the Davis et al. (2007) model, lower amounts of northern spotted owl habitat are reported to occur in the Cascades Area of Analysis and Area of Impact than in the Klamath Area of Analysis (HCP Tables 4-24 and 4-27). Assuming the amount and spatial distribution of potential fisher habitat and northern spotted owl habitat in these two areas follows a similar pattern, we inferred the reported amounts of owl habitat occurring across ownership types could provide a means of understanding possible impacts of the Proposed Action to potential fisher habitat in the region. Potential fisher habitat in the Cascades Area of Analysis is more likely to be present on public lands than on private lands. The applicant's ownership accounts for 2.8% of all northern spotted owl habitat in the Cascades Area of Analysis and thus, only has the ability to affect a small percentage of existing habitat in the Area. Within the Area of Impact, the applicant's ownership accounts for 16.0% of northern spotted owl habitat in the Cascades (HCP Table 4-29). Therefore, FGS has the ability to affect a higher percentage of the Area of Impact than of the Area of Analysis.

The HCP incidental take permit will not authorize incidental take of northern spotted owls in the Cascades Area of Analysis, therefore we assume maintenance of potential fisher habitat within 1.3 mi (2.1 km) of currently known owl activity centers. Per the Proposed Action, harvest in these areas will be restricted and subject to USFWS approval, while harvest outside of the 1.3 mi (2.1 km) of currently known owl activity centers will be consistent with the California Forest Practice Rules.

FISHER POPULATION

RANGE-WIDE POPULATION

Fishers occur in the northern coniferous and mixed forests of Canada and the northern United States, from the mountainous areas in the southern Yukon and Labrador Provinces in Canada southward to central California and Wyoming, the Great Lakes and Appalachian regions, and New England (Proulx et al. 2004). West of the Rocky Mountains, fishers appears to be extirpated or reduced to scattered individuals from the lower mainland of British Columbia and in three disjunct populations in southern Oregon and California (Proulx et al. 2004, Lofroth et al. 2010).

The reduction in range and distribution of fishers in the late 1800s and early 1900s resulted in a retraction in all Provinces except the Yukon in Canada (Gibilisco 1994) and

remnant populations in the United States occurring in Maine, Minnesota, New Hampshire, New York, and in the Pacific States (Powell and Zielinski 1994). Since the 1950s, fishers have recovered in some of the central (Minnesota, Wisconsin) and eastern (New England) portions of their historical range in the United States as a result of trapping closures, habitat regrowth, and reintroductions (Brander and Books 1973, Powell 1993, Gibilisco 1994, Lewis and Stinson 1998, Proulx et al. 2004). Fishers have not returned to the areas south of West Virginia in the Appalachian Mountains (Proulx et al. 2004).

Although some central and eastern United States fisher populations are showing some promising recovery into portions of their historical range, much of the fisher's historical range in the Pacific States remains unoccupied, prompting a finding of warranted for listing under the Endangered Species Act for the West Coast distinct population segment (DPS) (69 FR 18770; April 8, 2004). In its western range, fishers occupy much of their historical range in British Columbia. However, the population status is uncertain in the southern portion of the province and may no longer be contiguous with extant populations in Idaho, Montana (75 FR 19925; April 16, 2010), or the Pacific States (Lofroth et al. 2010). In the Pacific States, standardized survey efforts have documented three isolated populations (Figure 14). Descendants of a fisher reintroduction effort occur in the southern Oregon Cascades, while native extant populations of fisher are isolated in the Southern Sierra Nevada and Northern California-Southwestern Oregon populations (Lofroth et al. 2010).

POPULATION SCALE

The Northern California-Southwestern Oregon fisher population is separated from Sierra Nevada population by approximately 430 km (267 mi) (Zielinski et al. 2005) and as close as 12 mi (30 km) from the Southern Oregon Cascades population in Oregon (USDI 2010). No genetic exchange has been documented (Drew et al. 2003, Aubry et al. 2004, Wisely et al. 2004, Farber et al. 2010) between the reintroduced Southern Oregon Cascades population and the native Northern California- Southwestern Oregon population even throughout these populations are relatively close (verified locations of fishers occur within 12 mi (30 km) of one another [Farber and Criss 2006, Stephens 2006, Clayton 2010]).

The regional Area of Analyses overlaps extensively with the native Northern California-Southwestern Oregon population. The geographic extent of the Northern California-Southwestern Oregon population is the largest of the three extant populations in the West Coast DPS (Lofroth et al. 2010). Lofroth et al. (2010) describe this population as a patchy distribution of fishers occurring from south of the Snow Mountain Wilderness on the Mendocino National Forest, north into the Siskiyou Mountains and southernmost portion of the Rogue River watershed in southwestern Oregon, east of Interstate 5 in the Pit River watershed, and west through the Klamath Mountains and Coast Ranges. There is no evidence that this population extends east of Interstate 5 in southwestern Oregon.

A rigorous monitoring program is lacking for the Northern California- Southwestern Oregon and Southern Oregon Cascades populations, making estimates of fisher abundance and population trends for these two populations difficult. The monitoring program for the southern Sierra Nevada population has provided preliminary estimates that indicate no decline in the index of abundance within the monitored portion of the population (Truex 2009). The extant fisher populations are either small (e.g., southern Sierra Nevada and Southern Oregon Cascades populations), isolated from one another, or both.

Estimates of fisher numbers in native populations of the West Coast DPS vary widely. Estimates of fisher abundance and vital rates (e.g., survival, reproduction) are difficult to obtain (Douglas and Strickland 1987) and vary widely because of habitat composition and prey availability (York 1996). In addition, the assumptions of many methods for estimating populations based on trapping success may not be valid for fishers (Powell and Zielinski 1994). Consequently, there are only a few estimates of fisher population densities from specific study areas in the Pacific States and British Columbia.

Population density estimates are available for individual study areas (Zielinski et al. 2004, Thompson 2008, Matthews et al. 2010) within the Northern California- Southwestern Oregon population. Individual study area density estimates range widely for this population. In their north coast study area (Six Rivers and Shasta-Trinity National Forests of southeastern Humboldt and southwestern Trinity Counties, California) Zielinski et al. (2004) estimated five female fishers per 38.6 mi^2 (100 km^2). On the Hoopa Valley Indian Reservation in the Klamath Mountain Range (eastern Humboldt County, California) Matthews et al. (2010) estimated 52 (43–64) fishers per 38.6 mi^2 (100 km^2).

POPULATION IN THE KLAMATH AREA OF ANALYSIS

Fishers within the Klamath Area of Analysis are part of the native Northern California-Southwestern Oregon population. Fishers within the Area of Analysis are part of a series of interconnected populations that extend west to the Pacific Ocean, south to Lake County, and north into Oregon (USDI FWS 2010). Interconnected populations are important for the conservation and recovery of fishers, and form the basis for the federal conservation strategy for this species (Interagency Fisher Conservation Strategy, in prep).

The FGS fisher model indicates that approximately 109 hypothetical female home ranges could occur under current conditions in the Klamath Area of Analysis. Increases in modeled habitat allowed the fisher population index to increase by five to 114 under the Proposed Action. Because we kept growth and harvest of forest stands static for other lands surrounding FGS ownership at each time step (see Data Processing section), any changes observed in the fisher population index at the Area of Analysis scale would be a result of changes in the Area of Impact.

These results do not suggest that an actual population increase will occur, but rather demonstrate a relative trend in the amount of and changes to modeled habitat. Whether all of these blocks of modeled habitat can be accessed by fishers on the ground is unknown, making it impossible with this model to predict actual population increases.

POPULATION IN THE KLAMATH AREA OF IMPACT

Fishers have been detected in or near the Area of Impact over at least the past decade. The U.S. Department of Agriculture Forest Service describes "…two fishers detected in the West Fork of Beaver Creek and one fisher in the Applegate watershed west of the [Mt. Ashland Late-Successional Reserve (#RO-248)]" in the mid-1990s (Mastrofini et al. 1996). Farber and Criss (2006) report fisher detections at six of 21 sample units surveyed between October 2005 and May 2006 in the upper and west of the Beaver Creek watershed. Current studies continue to detect fishers regularly in the area.

In 2006, a fisher monitoring study started in the eastern Siskiyou Mountains of California, and the northern half of this 200 mi^2 (500 km^2) study area occurs within the Area of Impact overlapping the Beaver Creek drainage of FGS's Klamath River Management Unit. The

study is monitoring the fisher population by extracting DNA from hair follicles collected at survey stations. The DNA samples allow for unique identification of individual fishers and establishes data suitable for use in standard population estimation programs such as MARK (White and Burnham 1990). Using microsatellite analysis, DNA collected in the field is used to identify individuals of a target species and "mark" individuals. Subsequent collection from that individual are considered a "recapture." This methodology allows for the derivation of population sizes and demographic structure for each year, as well as ingress and egress between years. Using these techniques, Swiers and Powell (2010) provide preliminary population estimates for the entire study area for 2007 to 2009 of 25, 53, and 47, respectively. Confidence intervals, however, were not included to determine if this is an actual increase in the number of fishers in 2008 or sampling error. The number of individual fishers detected each year (Table 8) suggests a continuing persistence of fishers in the area with some variability in the number of individuals.

Table 8. The number of individual male and female fishers captured in the northern portion of the Eastern Klamath Study Area located within the California Klamath Province Area of Impact.

	2006	2007	2008	2009	Total
Female	5	6	7	4	22
Male	4	3	12	11	30
Total	9	9	19	15	52

The FGS fisher model indicates that almost 31 hypothetical female home ranges could occur in the Klamath Area of Impact under the Proposed Action, increasing the population index by five when compared to current conditions. As stated previously, the model results demonstrate a relative trend in the amount of and changes to modeled habitat and cannot be used to predict actual population increases.

POPULATIONS IN THE CASCADES AREA OF ANALYSIS AND AREA OF IMPACT

Survey effort in the Cascades Area of Analysis is low when compared to the Klamath Area of Analysis. Except for the verified location along the southern border of the Area of Analysis, fishers appear to be either not present or sufficiently low in numbers that they have avoided detection. Negative results from standardized detection surveys provide useful information on species' absence. Unsurveyed habitats may support fishers because the closest detection to FGS ownership is easily within the distance a fisher can travel (Aubry and Raley 2006).

SUMMARY

Fishers occur in and around the Klamath Area of Analysis and Area of Impact in unknown numbers. The Proposed Action has the ability to affect the amount, quality, and location of fisher habitat in these areas. We modeled fisher habitat within the Klamath Province to establish current conditions and evaluate how the Proposed Action may impact habitat and the local and regional fisher populations over the 50-year permit term. The FGS fisher model provides a current description of potential fisher habitat and offers the best estimate of potential changes to habitat in the Klamath Area of Analysis and Klamath Area of Impact under the Proposed Action. That is, this approach provides better prediction and understanding than any other decision-support tool currently available.

The model indicates an approximate 4% increase in large-scale forest conditions associated with fisher occupancy in the Klamath Area of Analysis. Projected increases in modeled habitat suggest that the landscape could support more fishers in the future. Although impracticable to quantify realized population change with this technique, the positive trend for modeled habitat suggests that the Proposed Action may have a positive effect on the fisher population. However, this analysis is unable to detect potential effects of the Proposed Action on fine-scale habitat attributes, including denning and resting sites and structures.

It is unknown if fishers currently occupy the Cascades Area of Impact, though they have been detected along the southern boundary of the Area of Analysis. We were unable to quantify changes to potential fisher habitat in the Cascades Area of Analysis, but qualitatively determined

there was likely to be smaller amounts of suitable habitat when compared to the Klamath Area of Analysis. Using northern spotted owl habitat to make interferences about potential impacts to possible fisher habitat, we conclude relatively small amounts of potential fisher habitat occur on the applicant's ownership minimizing their ability to negatively affect the regional amounts of habitat available for fishers.

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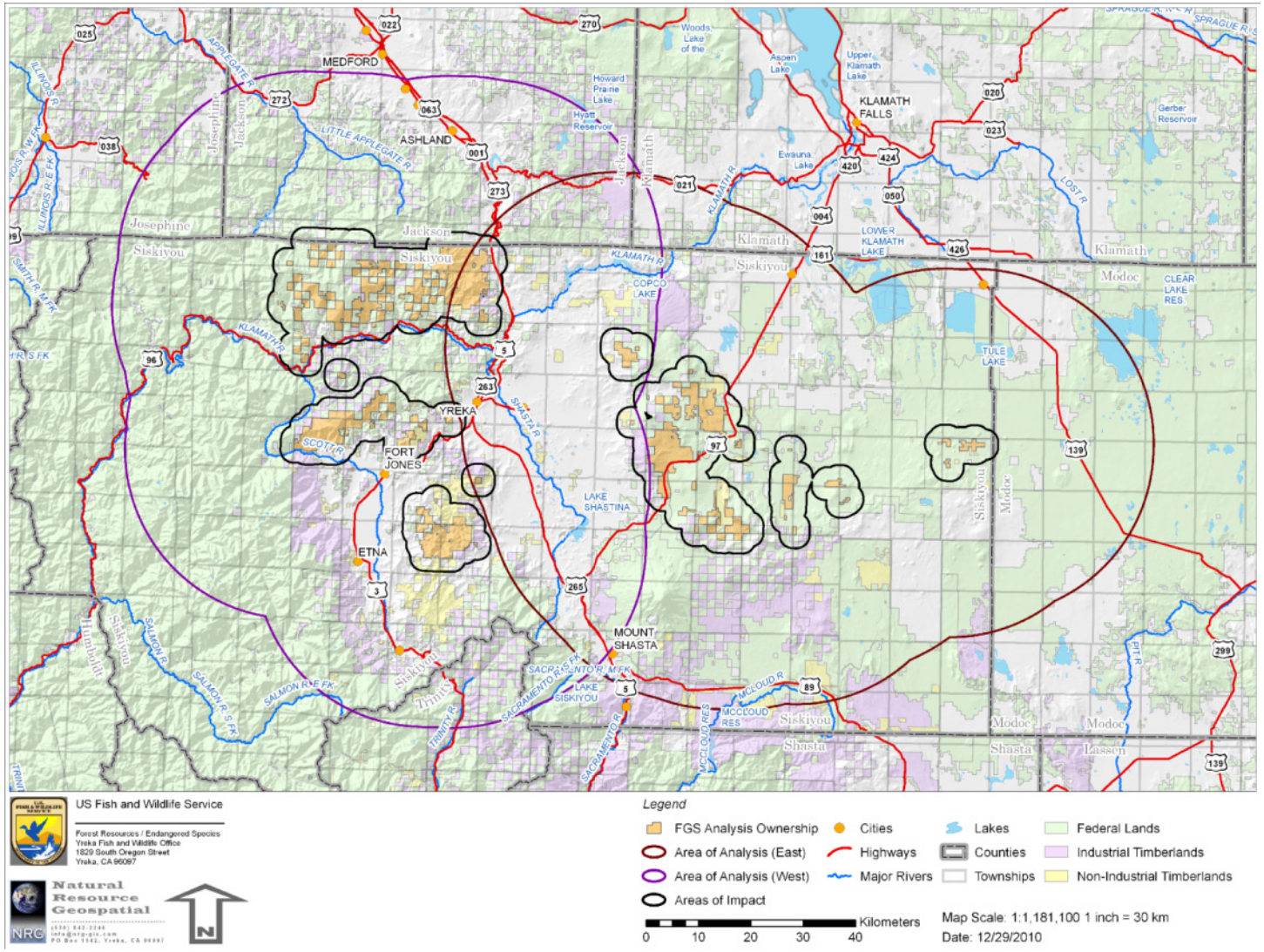

Figure 1. California Klamath and California Cascades regional "Area of Analysis" and local "Area of Impact" within a 20-mile and 1.6-mile radius, respectively, of Fruit Growers Supply Company's ownership.

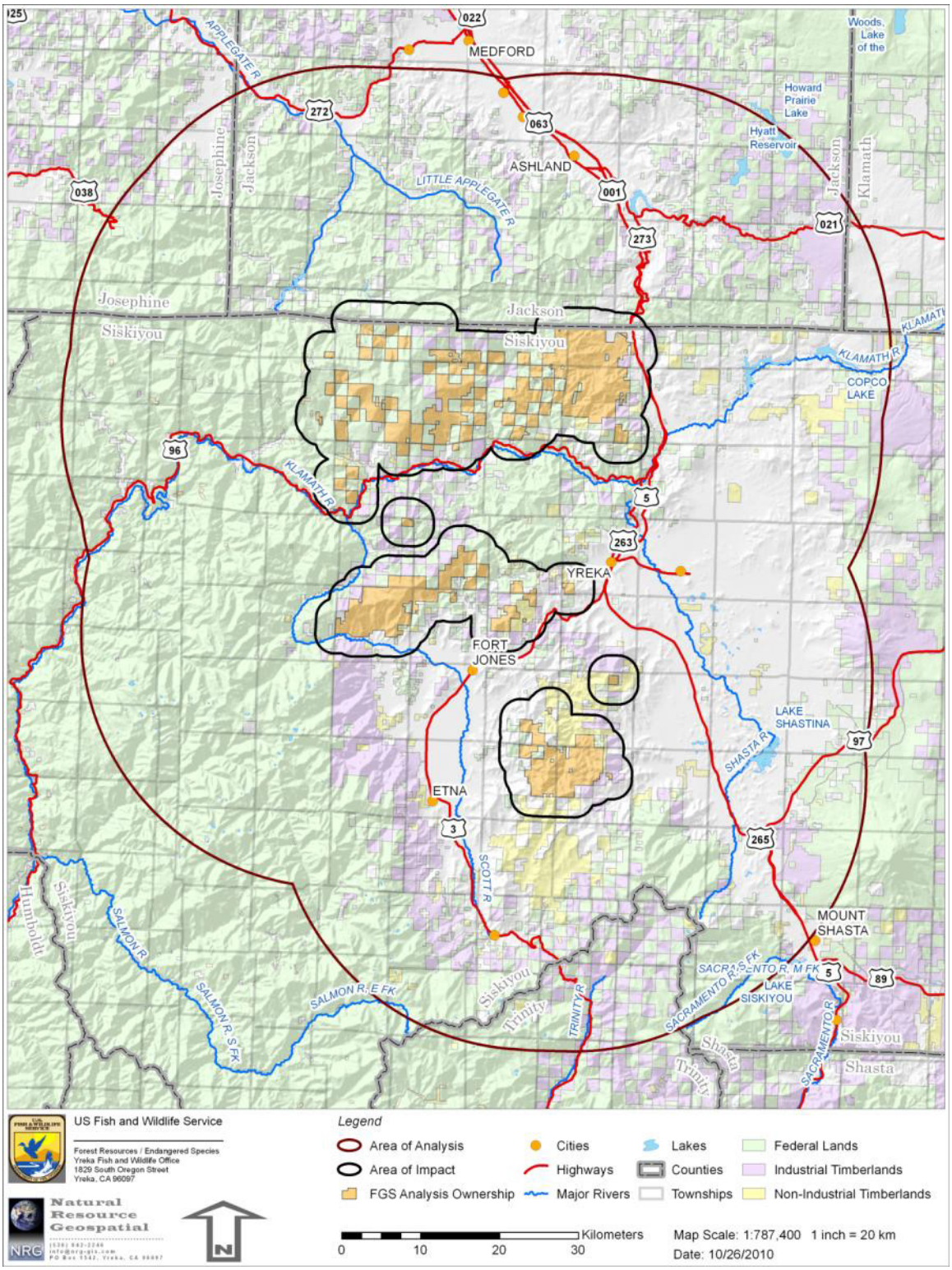

Figure 2. The California Klamath Province Area of Analysis (20-mile radius) and Area of Impact (1.6-mile radius) for the Fruit Growers Supply Company Multi-Species Habitat Conservation Plan fisher analysis.

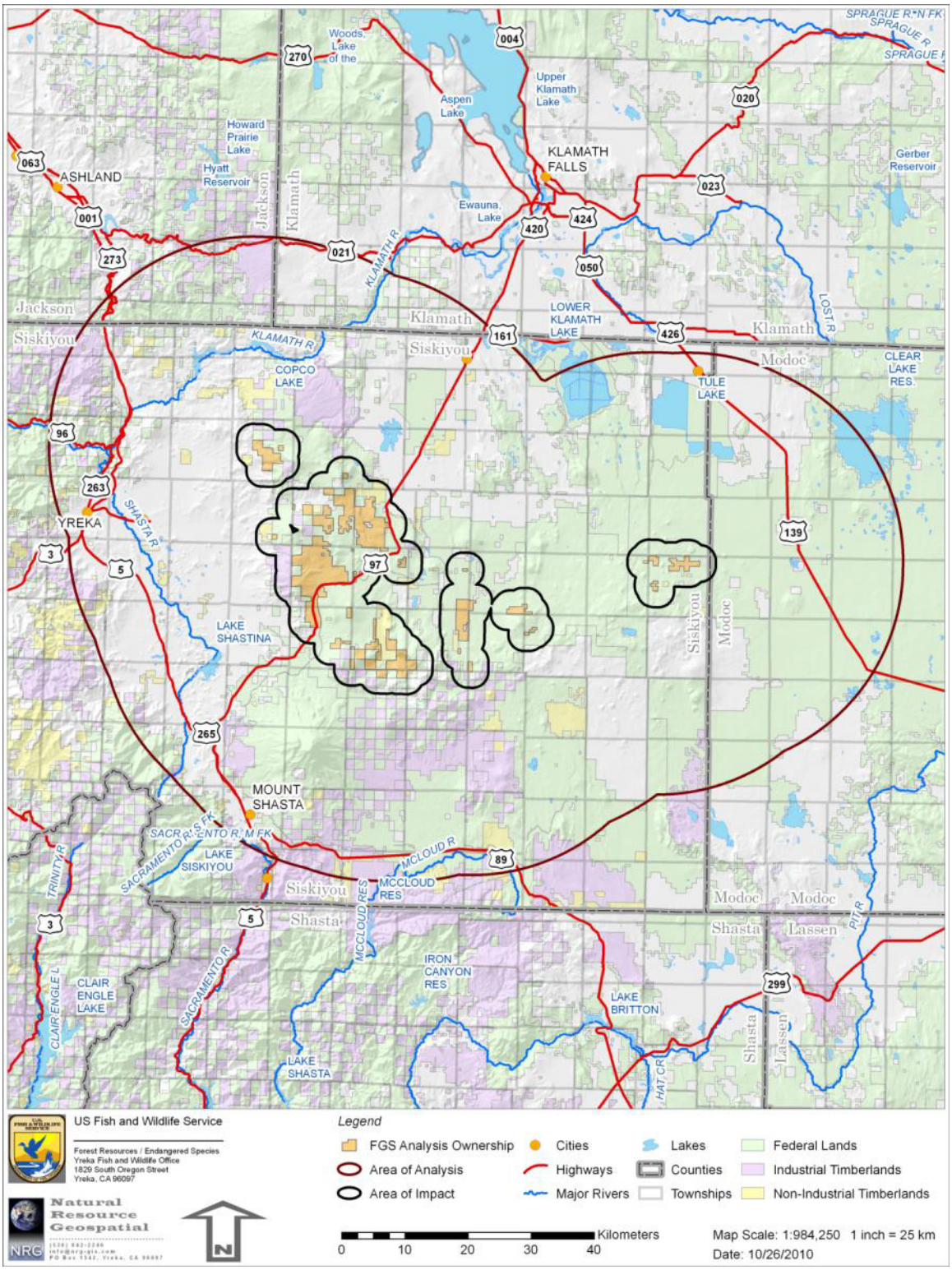

Figure 3. The California Cascades Province Area of Analyses (20-mile radius) and Area of Impact (1.6-mile radius) for the Fruit Growers Supply Company Multi-Species Habitat Conservation Plan fisher analysis.

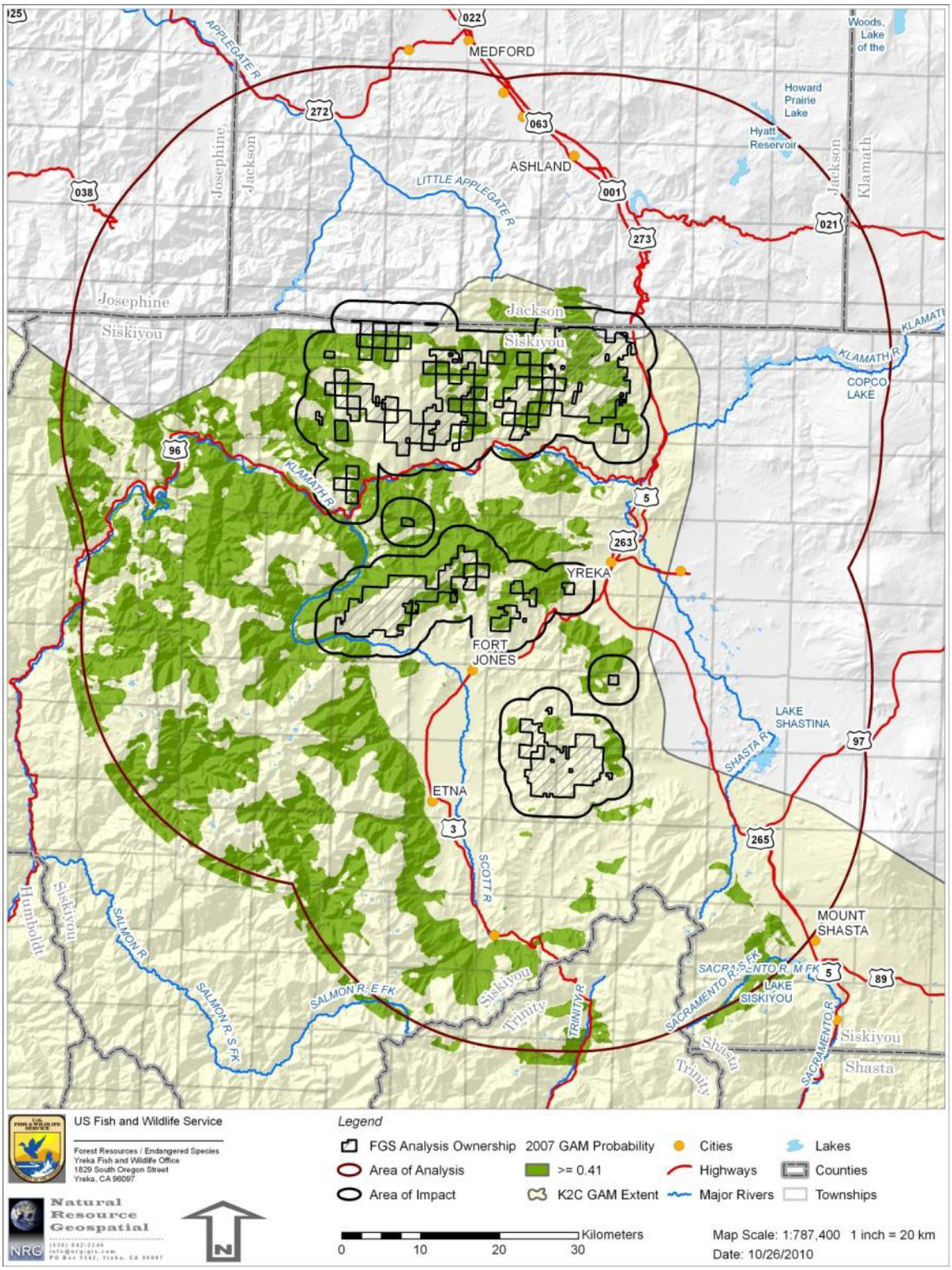

Figure 4. Modeled fisher habitat in the California Klamath Province Area of Analysis (20-mile radius) at current conditions. Modeled habitat defined as those pixels greater than or equal to 0.41 probability of occupancy per the FGS fisher model probability surface.

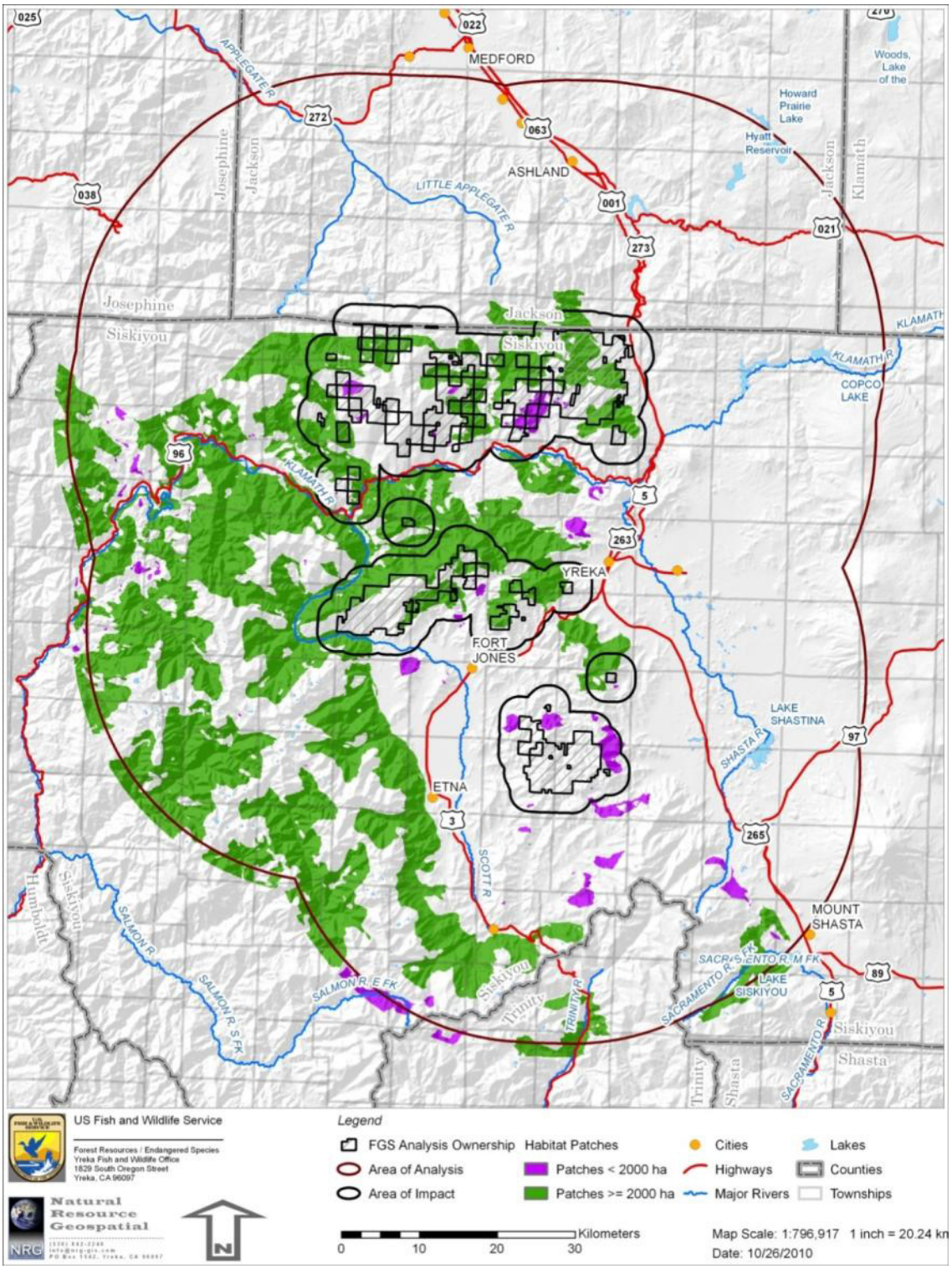

Figure 5. Modeled fisher habitat within the California Klamath Province Area of Analysis (20-mile radius) for current conditions. Example of isolated patches smaller than 7.7 mi2 (20 km2) (in purple) that were excluded from some calculations as a conservative means of including only those areas that have a greater likelihood of providing sufficient habitat for a hypothetical female home range.

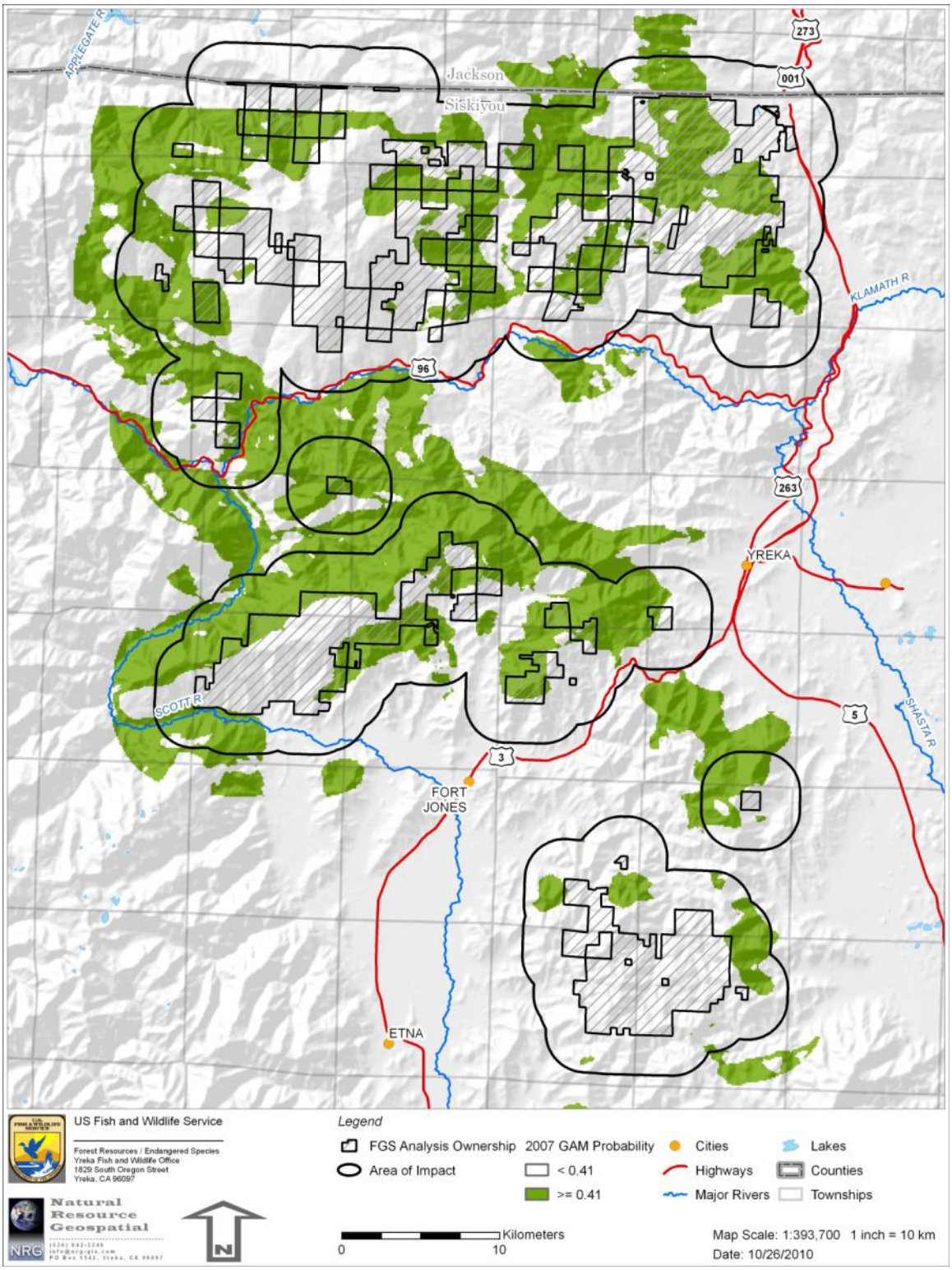

Figure 6. Modeled fisher habitat in the California Klamath Province Area of Impact (1.6-mile radius) at current conditions. Habitat defined as those pixels greater than or equal to 0.41 probability of occupancy per the FGS fisher model probability surface.

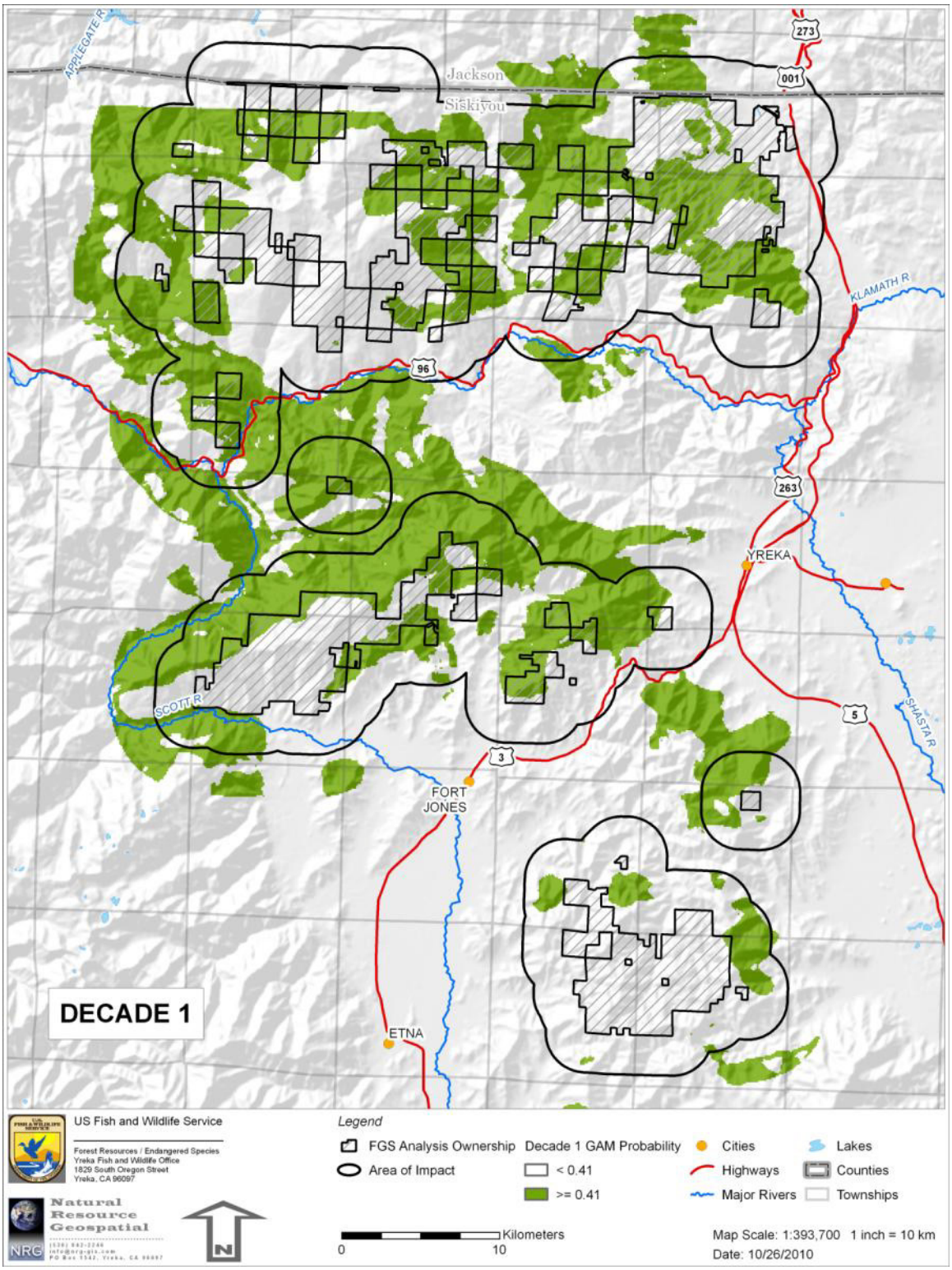

Figure 7. Modeled fisher habitat in the California Klamath Province Area of Impact (1.6-mile radius) at decade 1. Habitat defined as those pixels greater than or equal to 0.41 probability of occupancy per the FGS fisher model probability surface.

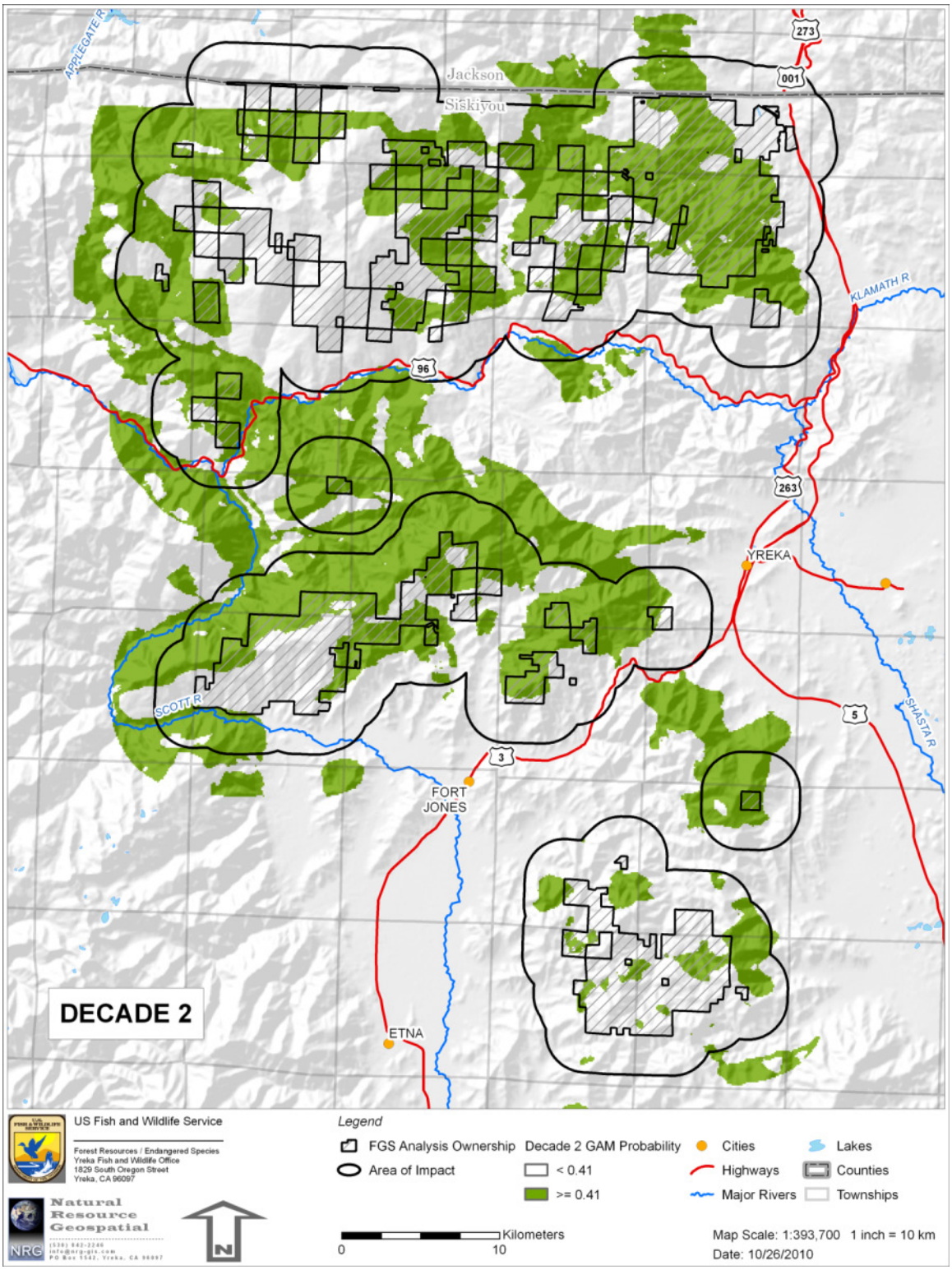

Figure 8. Modeled fisher habitat in the California Klamath Province Area of Impact (1.6-mile radius) at decade 2. Habitat defined as those pixels greater than or equal to 0.41 probability of occupancy per the FGS fisher model probability surface.

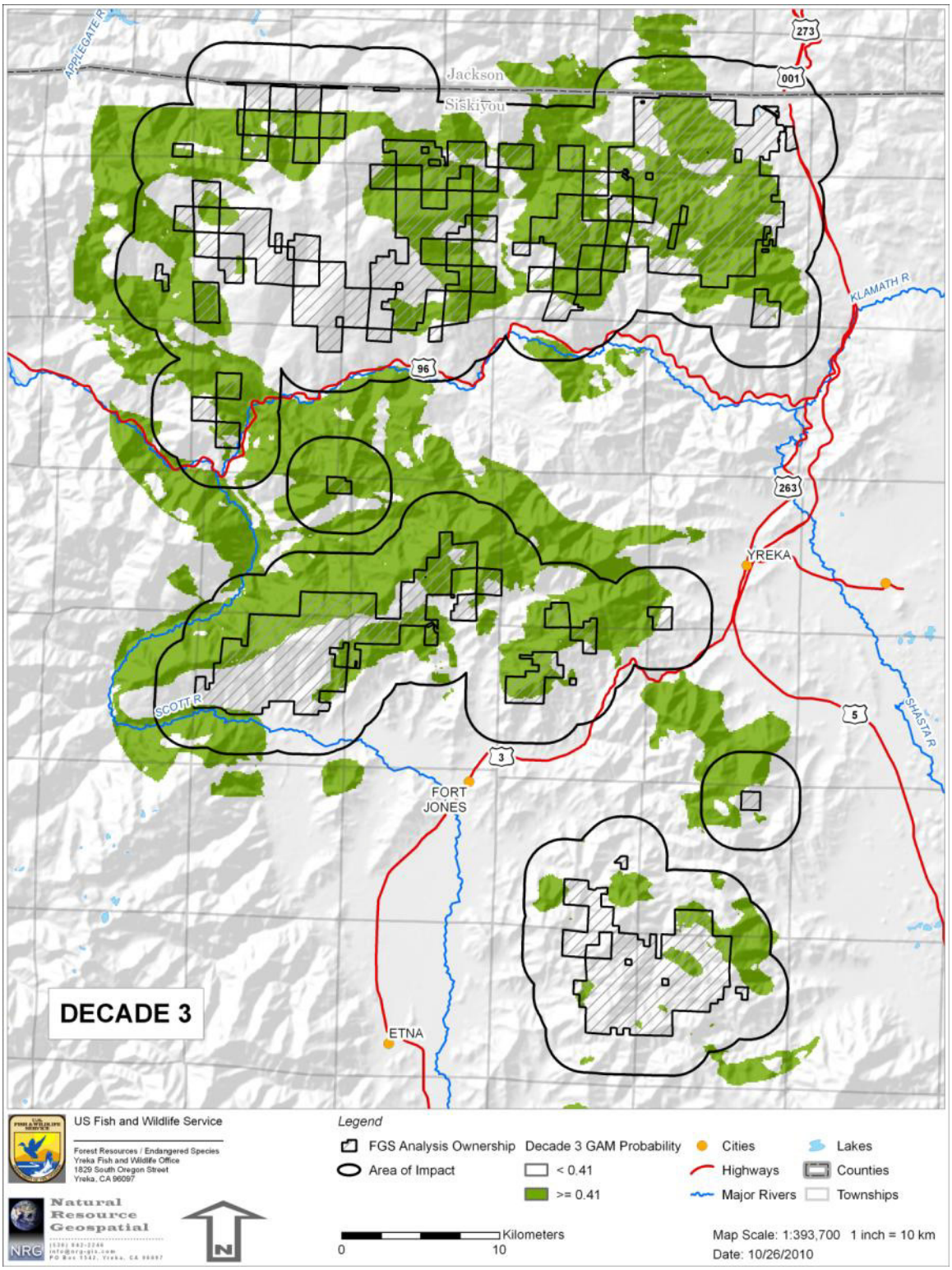

Figure 9. Modeled fisher habitat in the California Klamath Province Area of Impact (1.6-mile radius) at decade 3. Habitat defined as those pixels greater than or equal to 0.41 probability of occupancy per the FGS fisher model probability surface.

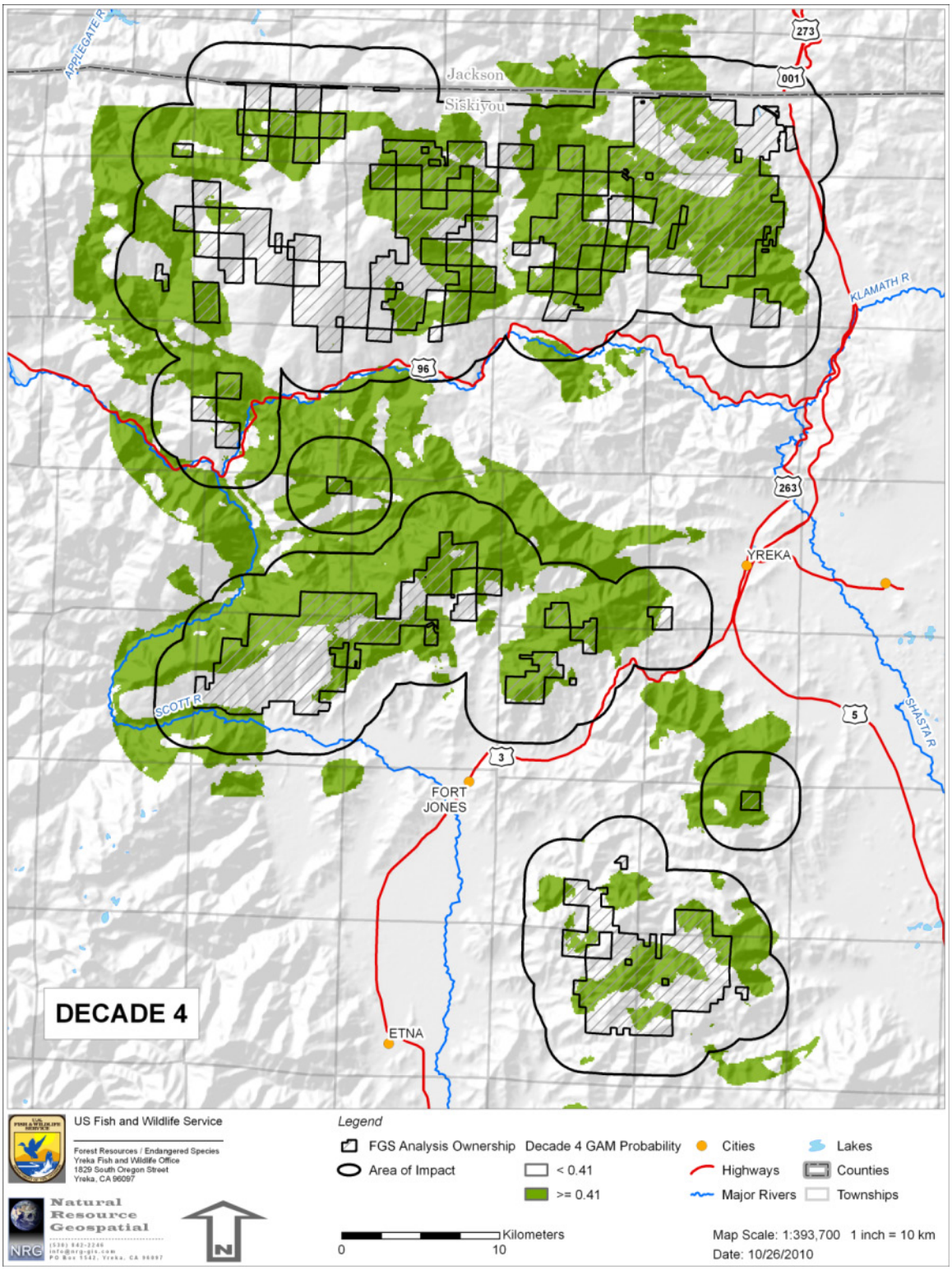

Figure 10. Modeled fisher habitat in the California Klamath Province Area of Impact (1.6-mile radius) at decade 4. Habitat defined as those pixels greater than or equal to 0.41 probability of occupancy per the FGS fisher model probability surface.

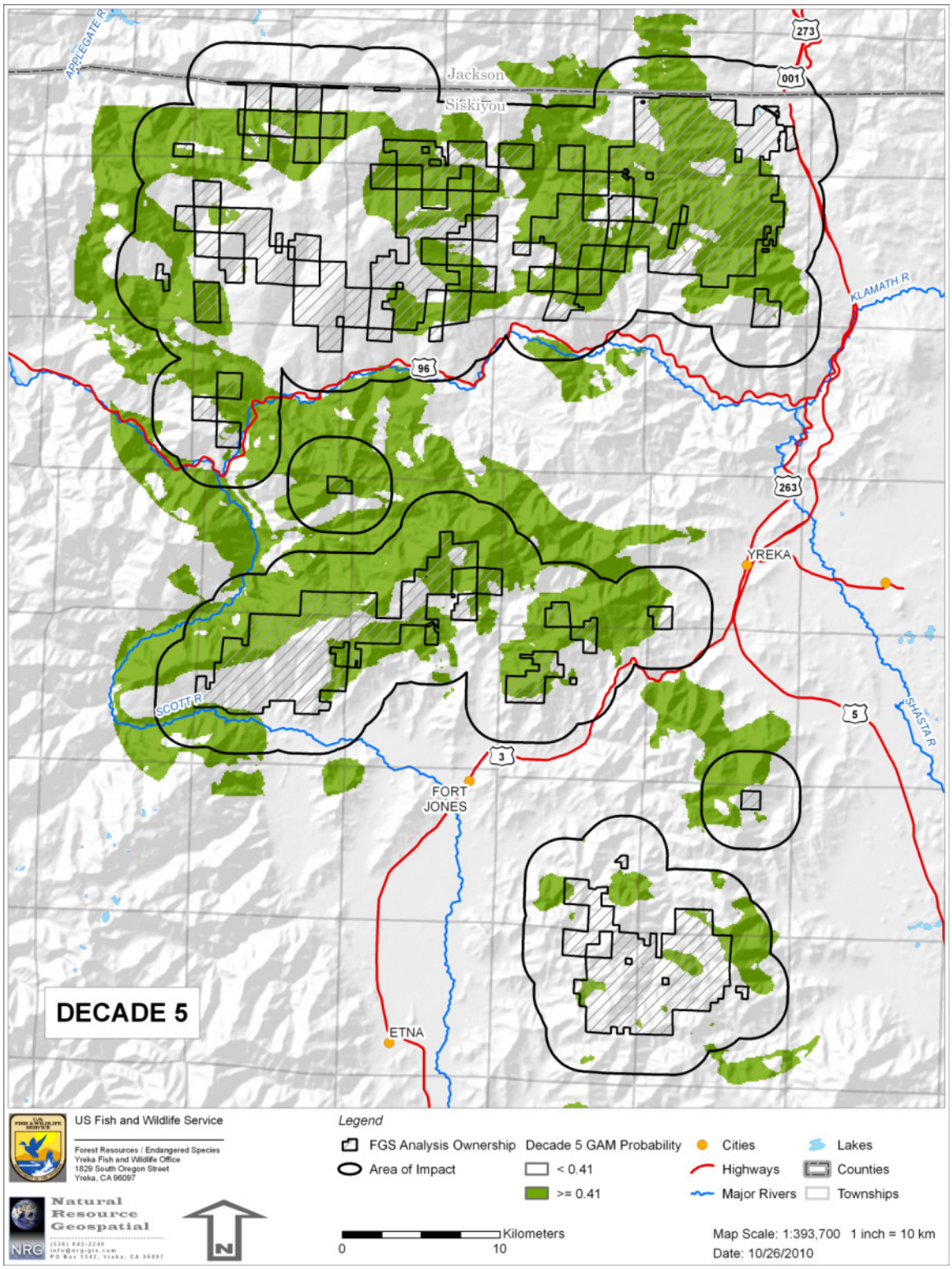

Figure 11. Modeled fisher habitat in the California Klamath Province Area of Impact (1.6-mile radius) at decade 5. Habitat defined as those pixels greater than or equal to 0.41 probability of occupancy per the FGS fisher model probability surface.

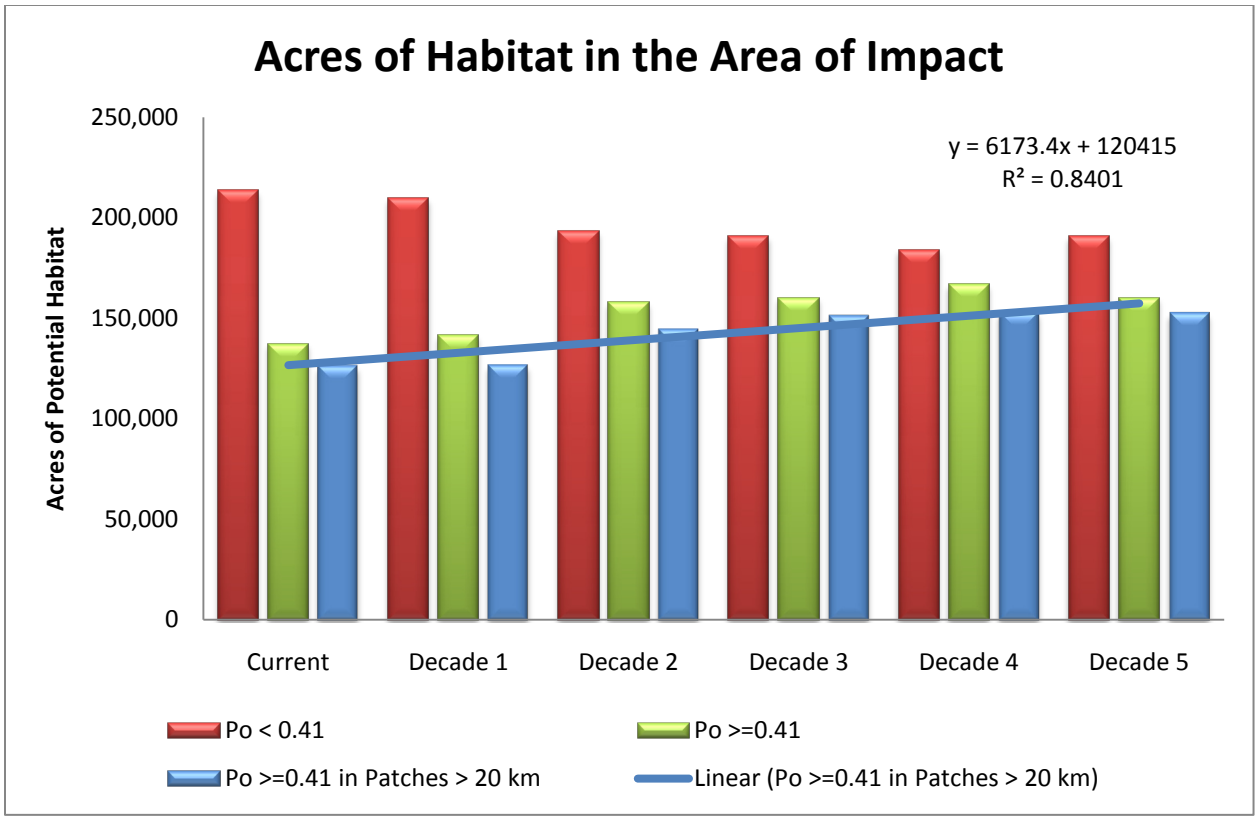

Figure 12. Graphical representation of the acres of modeled fisher habitat greater than or equal to 0.41 probability of occupancy (Po) within the California Klamath Province Area of Impact (1.6-mile radius) for the current conditions and each of five decadal time steps.

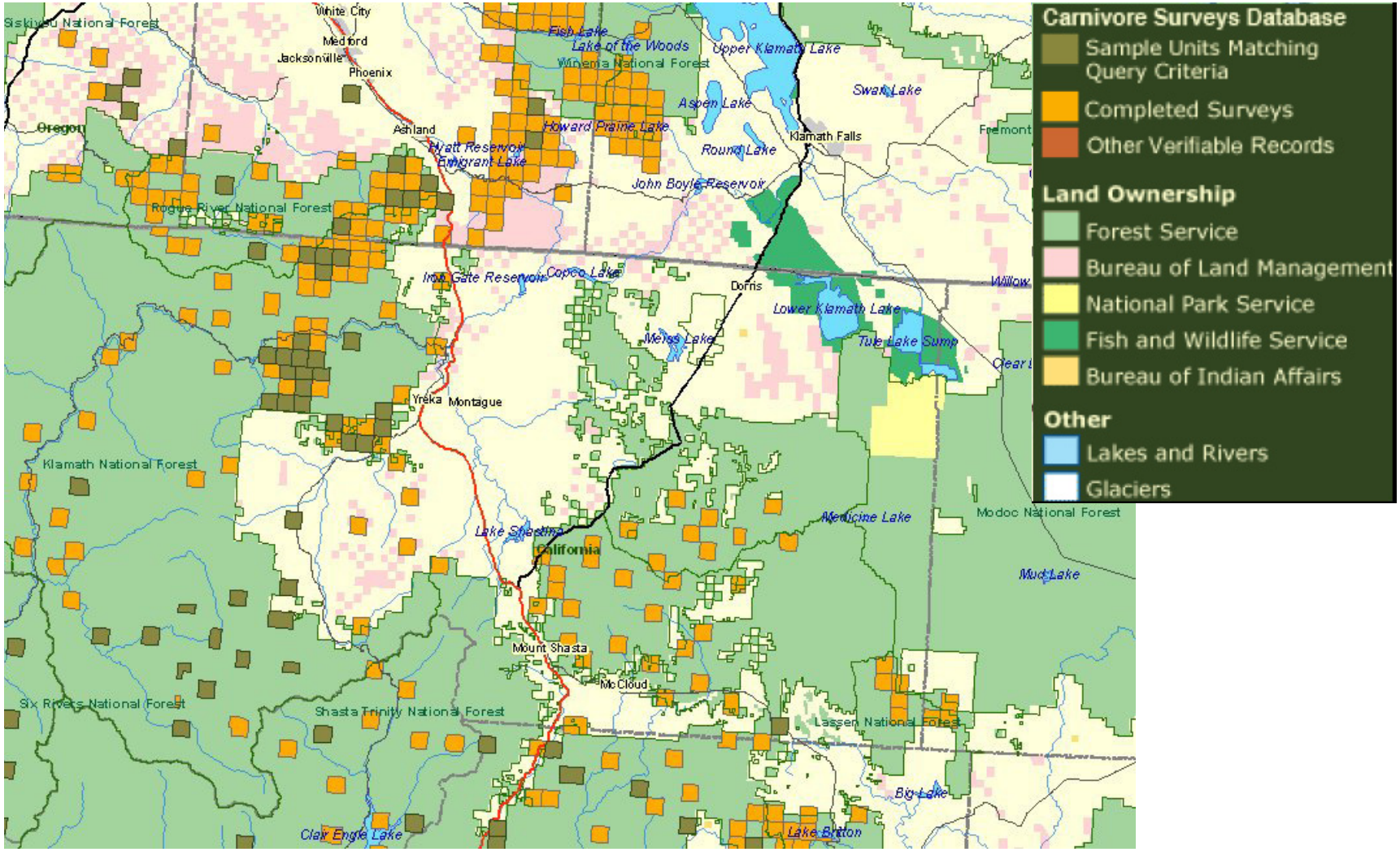

Figure 13. Graphical results of January 24, 2011 query of the USFS Forest Carnivore Surveys in the Pacific States website [http://maps.fs.fed.us/carnivore//Modules/application/home.html]. Orange squares [ ] represent completed surveys within 4-mi2 sample units based on the Public Land Survey System. Dark green squares [ ] match query parameters that included: Carnivores: "Fisher", Range of Years from: "1995" to "2010", and detection Sources: "All Sources".

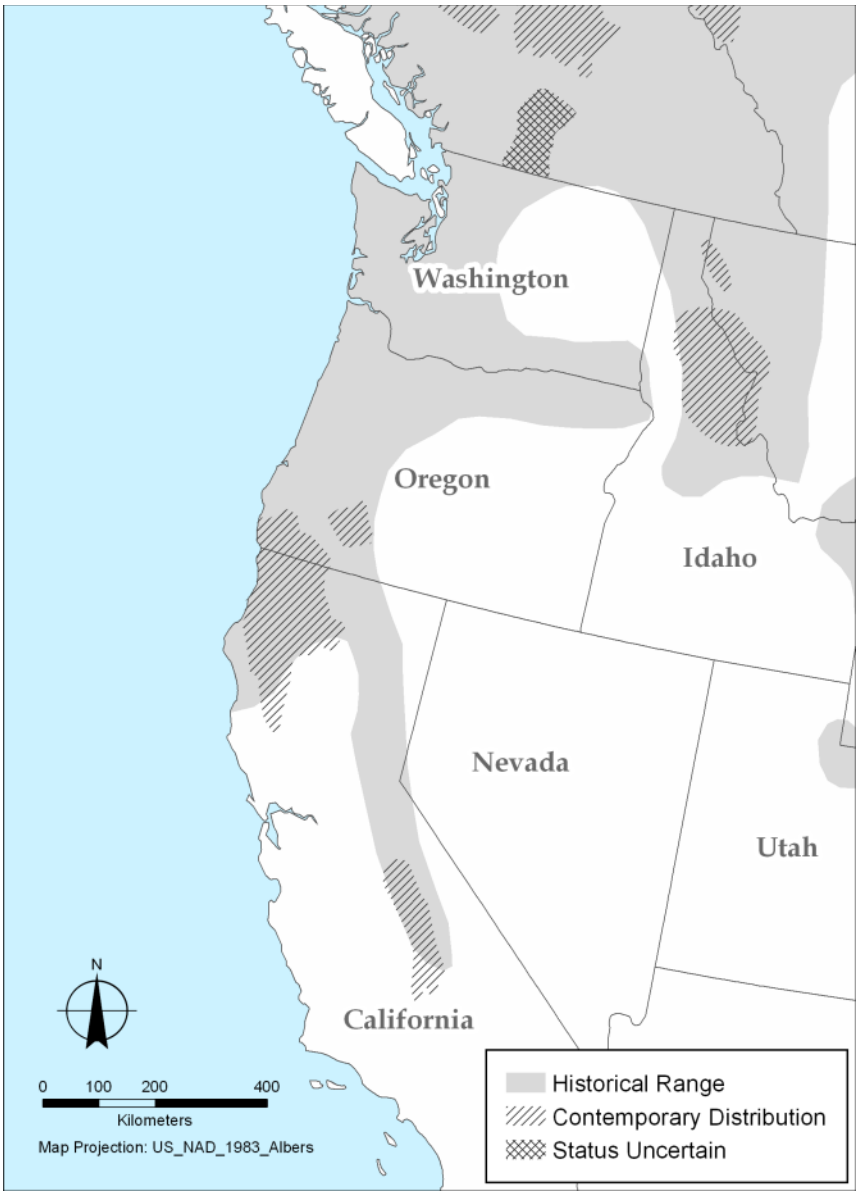

Figure 14. Contemporary distribution of fisher in the western United States and southern British Columbia compared to the historical distribution as depicted by Gibilisco (1994). Figure adapted from Lofroth et al. (2010).