

Final Environmental Assessment

Green Diamond Resource Company, California Timberlands

Amendments to the Northern Spotted Owl Habitat Conservation Plan

Prepared by

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Cover Sheet

Title of Proposed Action: Issuance of an Amended Federal Incidental Take Permit In Association with Amendments to Green Diamond Resource Company's Habitat Conservation Plan for the Northern Spotted Owl for Green Diamond Resource Company Lands in Northern California

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Legal Authority: Endangered Species Act of 1973, as amended, Section 10(a)

Location of Proposed Action: Portions of lands owned by Green Diamond Resource Company Humboldt, Del Norte, Mendocino and Trinity Counties, California

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Abstract

The U.S. Fish and Wildlife Service (USFWS) is responding to an application from Green Diamond (previously Simpson Timber Company [Simpson]) to amend the Incidental Take Permit (ITP) issued to Simpson in 1992 in association with its Northern Spotted Owl Habitat Conservation Plan on its California Timberlands (NSO HCP). In April 1992, Simpson submitted an NSO HCP and ITP application for the take of northern spotted owls, in conjunction with otherwise lawful timber harvesting on the firm's properties in Del Norte, Humboldt, Mendocino, and Trinity counties, California. The effects of the NSO HCP were analyzed and described in an Environmental Assessment (EA) prepared and issued by USFWS (Notice of Availability in the *Federal Register* on May 27, 1992). On September 17, 1992, USFWS issued an ITP to Simpson authorizing take of northern spotted owls (NSO) in accordance with conditions set forth in an Implementation Agreement (IA) between USFWS and Simpson, and pursuant to Section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (ESA). The level of incidental take authorized by the ITP, 50 owl pairs, was the amount of incidental take estimated to occur under the HCP during the first 10 years of the permit's 30-year term.

Green Diamond is requesting an amendment to the 1992 ITP. The requested amendment would allow the incidental take of up to eight additional owl pairs on Green Diamond's ownership on the west slopes of the Klamath Mountains and the Coast Range of California in Humboldt and Del Norte counties. These incidental takes would be above and beyond the 50 owl pair incidental takes authorized by the existing ITP. These additional incidental takes would be authorized during the existing permit term expiring in 2022 and would provide Green Diamond operational flexibility while USFWS and Green Diamond further consider and evaluate the findings of a comprehensive review of Green Diamond's NSO HCP. Green Diamond also proposes to amend its NSO HCP to (1) provide for initiation of new research on the habitat overlap and interaction between the barred owl (*Strix varia*) and the northern spotted owl, (2) reinstate until 2012 or later its monitoring and management obligations, as described in the IA, for a special management area consisting of those 20,310 acres of the original special management area that are still owned by Green Diamond, (3) provide an HCP review in 2012, and (4) provide a revised NSO survey and response protocol for when barred owls are present and may interfere with the detection of NSO.

In this document, the environmental effects of implementing Green Diamond's proposed amendments to the 1992 NSO HCP and associated ITP are compared to the effects of managing without the amendments. One other alternative is considered.

The proposed amendments to the 1992 NSO HCP and ITP would not have any significant adverse environmental effects when compared to the No Action Alternative. While the proposed action would allow harvest of suitable owl habitat around eight NSO nest sites, additional areas of suitable NSO habitat will continue to develop in the future through 2022. These new habitat areas are expected to benefit the Green Diamond NSO population, as well as other terrestrial wildlife and aquatic species that are associated with mid- to late-seral forest habitats. Proposed research regarding competition and niche overlap

between the spotted owl and barred owl will also provide additional useful information in identifying reasons for changes in spotted owl population numbers across the region.

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Acronyms and Abbreviations

AHCP	Aquatic Habitat Conservation Plan
AQMB	Air Quality Management Board
ASL	above mean sea level
ATV	all-terrain vehicle
BLM	Bureau of Land Management
BMP	best management practices
BOF	Board of Forestry
CCAA	Candidate Conservation Agreement with Assurances
CCR	California Code of Regulations
CDC	California Department of Conservation
CDF	California Department of Forestry and Fire Protection
CDFG	California Department of Fish and Game
CDMG	California Division of Mines and Geology
CDPR	California Department of Pesticide Regulation
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFPR	California Forest Practice Rules
CFR	Code of Federal Regulations
CFS	cubic feet per second
CMZ	Channel Migration Zone
CNDD	California Natural Diversity Database
CSC	Coastal Scrub
CWA	Clean Water Act
CWHR	California Wildlife Habitat Relationships System
dbh	diameter at breast height

DEIS	Draft Environmental Impact Statement
DFR	Douglas-fir
DPS	Distinct Population Segment
EEZ	Equipment Exclusion Zone
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ELZ	Equipment Limitation Zone
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESP	Enhancement of Survival Permit
ESU	Evolutionarily Significant Unit
FR	Federal Register
HCP	Habitat Conservation Plan
HPA	Hydrographic Planning Area
IA	Implementation Agreement
ITP	Incidental Take Permit
km	kilometers
KMC	Klamath Mixed Conifer
LAC	Lacustrine
LWD	large woody debris
MHC	Montane hardwood conifer
MHW	Montane hardwood
MSP	maximum sustained production
MWAT	Maximum Weekly Average Temperature
NEPA	National Environmental Protection Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NSO HCP	Northern Spotted Owl Habitat Conservation Plan

NWFP	Northwest Forest Plan
PALCO	Pacific Lumber Company
PFA	Post Fledging Area
PGS	perennial grassland
PM ₁₀	particulate matter less than 10 microns in diameter
RDW	Redwood
RIV	Riverine
RM	river mile
RNP	Redwood National Park
RPF	Registered Professional Forester
RWQCB	Regional Water Quality Control Board
SMRA	Surface Mining and Reclamation Act
SR	State Route
SWRCB	State Water Resources Control Board
SYP	Sustained Yield Plan
THP	Timber Harvesting Plan
TMDL	total maximum daily load
TPZ	Timberland Production Zone
TSS	total suspended solids
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WLPZ	Watercourse and Lake Protection Zone
WTM	wet meadow

Executive Summary

This Environmental Assessment (EA) addresses the potential environmental effects that could result from implementing proposed amendments to Green Diamond Resource Company's (Green Diamond) 1992 Northern Spotted Owl Habitat Conservation Plan and Incidental Take Permit (NSO HCP and ITP). The EA has been prepared in accordance with the National Environmental Policy Act (NEPA).

Introduction

The U.S. Fish and Wildlife Service (USFWS) is responding to an application from Green Diamond (previously Simpson Timber Company [Simpson]) to amend the ITP issued in 1992 in association with its NSO HCP. In April 1992, Simpson submitted an NSO HCP and ITP application for the incidental take of the northern spotted owl (*Strix occidentalis caurina*), in conjunction with otherwise lawful timber harvesting on the firm's properties in Del Norte, Humboldt, Mendocino, and Trinity counties, California. The effects of the NSO HCP were analyzed and described in an EA prepared and issued by USFWS (Notice of Availability in the *Federal Register* on May 27, 1992). On September 17, 1992, USFWS issued an ITP to Simpson authorizing incidental take of northern spotted owls in accordance with conditions set forth in an Implementation Agreement (IA) between USFWS and Simpson, and pursuant to Section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (ESA). The level of incidental take authorized by the ITP, 50 owl pairs, was the amount of incidental take estimated to occur under the HCP during the first 10 years of the permit's 30-year term.

Green Diamond is requesting an amendment to the 1992 ITP. The requested ITP amendment would authorize the incidental take of up to eight additional owl pairs on Green Diamond's ownership on the west slopes of the Klamath Mountains and the Coast Range of California in Humboldt and Del Norte counties. These eight incidental takes would be above and beyond the 50 owl pair incidental takes authorized by the existing ITP. The eight additional owl pair incidental takes would be authorized during the existing permit term expiring in 2022 and would provide Green Diamond operational flexibility while USFWS and Green Diamond further consider and evaluate the findings of a comprehensive review of Green Diamond's NSO HCP. Green Diamond also proposes to amend their NSO HCP to provide for initiation of new research on the habitat overlap and interaction between the barred owl (*Strix varia*) and the northern spotted owl within the Action Area. Green Diamond proposes to reinstate until 2012 monitoring and management measures, as described in the IA, for a special management area consisting of 20,310 acres of the original special management area, which are still owned by Green Diamond.

USFWS has determined that amendment of an ITP by USFWS is a major Federal action that triggers the NEPA requirement for the analysis and disclosure of the potential environmental impacts of the action. Pursuant to NEPA, the environmental consequences of the additional Federal incidental take authorizations are being analyzed in this EA with USFWS serving as the lead Federal agency.

Purpose and Need of the Proposed Action

The USFWS is responding to Green Diamond's application to amend its existing NSO HCP and ITP, pursuant to Section 10(a)(1)(B) of the ESA. Similar to the USFWS procedure for review of an application for an ITP and associated HCP, the USFWS reviews applications for ITP amendments for consistency with ESA requirements. The USFWS purpose and need in this action, therefore, is the following:

Purpose

The purpose for which this EA is being prepared is to:

- Respond to Green Diamond's application to amend its existing incidental take permit for the Covered Species (northern spotted owl, "NSO") related to activities that have the potential to result in take, pursuant to the ESA section 10(a)(1)(B) and its implementing regulations and policies;
- Protect, conserve and enhance the northern spotted owl and its habitat for the continuing benefit of the people of the United States;
- Provide a means and take steps to conserve the ecosystems depended on by the northern spotted owl;
- Ensure the long-term survival of the northern spotted owl through protection and management of the species and its habitat;
- Ensure compliance with the ESA, NEPA, and other applicable federal laws and regulations.

Need

The need for the action is based on the potential that activities proposed by Green Diamond on its property could result in the take of the northern spotted owl above the level permitted by its existing incidental take permit, thus the need to amend the existing incidental take permit.

The USFWS' approval of the requested NSO HCP amendment and issuance of an amended ITP is the NEPA "action" analyzed in this EA.

Action Area

The Action Area includes all commercial timberland acreage within 11 Hydrographic Planning Areas (HPAs) based on watershed boundaries on the west slopes of the Klamath Mountains and the Coast Range of California in Del Norte and Humboldt counties where Green Diamond owns lands or harvesting rights, during the period of such ownership within the ITP term. The Action Area currently consists of 416,533 acres, but is subject to adjustment as Green Diamond buys and sells property.

Proposed Action and Alternatives

Three alternatives are considered in this EA, as briefly described in Table ES-1. The No Action Alternative and one action alternative represent the reasonable range of alternatives to the Proposed Action. Additional alternatives were considered; those eliminated from detailed evaluation are summarized in Section 2.4 of the EA.

TABLE ES-1
Alternatives Analyzed in Detail in the Green Diamond NSO HCP Amendment

Title	Brief Description
No Action (No ITP Amendment)	<p>Continuation of Green Diamond's existing timber harvesting and forest management practices in the Action Area pursuant to existing regulations.</p> <p>Continued implementation of measures contained in Green Diamond's 1992 NSO HCP and associated IA that provide for the legal incidental take of northern spotted owls in connection with timber harvesting and forest management operations, including incidental take of up to 50 owl pairs through September 16, 2008. This level of incidental take was expected to occur during the first 10 years of operations under the 30-year ITP term. Because take has occurred at a lower rate than anticipated, USFWS extended the take period to the September 2008 date. Measures include habitat management, nest site protection, research, set-asides (timber harvest eliminated from 13,242.5 acres), and training programs. Continued implementation of measures designed to avoid take of other listed species; continued implementation of other measures to mitigate or avoid significant impacts to unlisted species.</p>
Proposed Action (ITP Amendment Providing for the Additional Incidental Take of Eight Owl Pairs)	<p>Continuation of Green Diamond's existing timber harvesting and forest management practices in the Action Area pursuant to existing regulations.</p> <p>Approval of an amendment to the 1992 NSO HCP and associated ITP authorizing the incidental take of eight additional owl pairs, reinstating until 2012 or later monitoring and no-take restrictions for the 20,310 acres of the special management area still owned by Green Diamond, initiating new research on the habitat overlap and interaction between the barred owl and NSO, and scheduling HCP review in 2012, and providing a revised NSO survey and response protocol for when barred owls are present and may interfere with the detection of NSO.</p> <p>Continued implementation of measures contained in Green Diamond's 1992 NSO HCP and associated IA, as described above for No Action.</p> <p>Continued implementation of measures designed to avoid take of other listed species; continued implementation of other measures to mitigate or avoid significant impacts to unlisted species.</p>
Alternative A (Extension of HCP with Additional Incidental Take of Eight Owl Pairs and Release of Three Set-Asides)	<p>Same as the Proposed Action except that three set-aside areas would be released for harvest entry. The three set-aside areas are Wiregrass, Fawn Prairie, and Bear Creek.</p>

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

Summary of the Public Review Process

A Notice of Availability (NOA) for the Draft EA was published in the *Federal Register* by USFWS on February 26, 2007 (72 FR 8393). The public review period of 60 days was from February 26, 2007, to April 27, 2007. The NOA informed the public that Green Diamond has proposed to amend the NSO HCP and that USFWS proposes to amend the ITP to authorize eight additional NSO incidental takes through displacement of NSO pairs. The NOA provide the interested public with the opportunity to comment on the EA prepared by USFWS in support of its proposed amendments of the incidental take permit and approval of the amended HCP.

The USFWS received one set of public comments during the public review period. In response to the comments received, additional information has been provided in this Final EA on the following topics:

- Descriptions of recent proposed revisions to designated critical habitat for two federally-listed species, the northern spotted owl and marbled murrelet, and on the potential cumulative effects associated with those proposals, should they be finalized as proposed. See EA Sections 3.7.2, 4.1.2, 4.6.5.2, and 4.7.5.2 (proposed revision to marbled murrelet critical habitat), and Sections 3.6.3, 4.1.2, 4.6.5.2, and 4.7.5.2 (proposed revision to northern spotted owl critical habitat).
- A listing of HCPs approved in the analysis area since 1992 and the potential for associated cumulative effects. Information has been added to Section 4.1.2.3 on two HCPs and a Safe Harbor Agreement which cover the northern spotted owl.
- Additional information regarding forest conditions at the landscape scale on Green Diamond lands in 1992-1994, and 2003-2006 (see Section 3.6.2.3), to provide more information comparable to the “mosaic” habitat analysis contained in Green Diamond’s 1992 NSO HCP.
- Additional information on Green Diamond’s Aquatic HCP and Candidate Conservation Agreement with Assurances (AHCP/CCAA) has been added, including information on potential cumulative effects with the Proposed Action and Alternatives of this EA (see Sections 1.6.3.2, 4.1.2, 4.2.5, 4.3.5, 4.4.5, 4.6.5, and 4.7.5). The AHCP/CCAA was approved in June 2007 after release to the public of the Draft EA for the proposed amendment to the NSO HCP.
- Two minor revisions were made to the Proposed Action and Alternative A to clarify and strengthen conservation measures, by:
 1. Changing the period of the reinstated Special Management Area to either: (a) the eight additional takes authorized under the Amended ITP have occurred, or (b) September 16, 2012, whichever is later. This period was described in the Draft EA as “until 2012”; and
 2. Providing a revised NSO survey and response protocol for when barred owls are present and may interfere with the detection of NSO.

The Proposed Action and Alternative A, incorporating these revisions, are fully described in Sections 2.2 and 2.3.

Also, in response to a comment regarding the perceived lack of review of some of the information and studies cited, several references to peer-reviewed literature have been added for sources used in this EA.

The public comments received, and USFWS' responses to those comments, are provided in Appendix C.

Finally, the area of Green Diamond lands in the Action Area changed slightly, from about 416,533 acres to about 406,962 acres, after the Draft EA had been released to the public. As described in Section 1.7 of this EA, the analyses and acreage numbers in this document have not been revised to reflect the slight change in acreage of the covered lands, because the change in ownership size is very minor, and changes in the acreage of the Green Diamond ownership within the Action Area are anticipated in the Proposed Action.

Preferred Alternative

The Preferred Alternative is the Proposed Action.

Summary of Impacts

Table ES-2 provides a comparative overview of the impacts of the Proposed Action and the alternatives for each of the resource areas assessed in this EA. Detailed analysis of impacts is contained in Chapter 4 (*Environmental Consequences*).

TABLE ES-2
Summary of Potential Environmental Impacts Associated with Each Alternative in the Action Area

No Action Alternative	Proposed Action	Alternative A
Geology, Geomorphology, and Mineral Resources		
Potential impacts, especially those relating to hillslope mass wasting, are not expected to differ from current conditions that include timber harvest around 50 NSO nest sites under continued implementation of the 1992 NSO HCP.	Timber harvest in NSO habitat around eight additional nest sites may create potential short-term, insignificant impacts.	Release of the three set-aside areas may create some potential insignificant adverse impacts. Otherwise, same as the No Action Alternative.
Hydrology and Water Quality		
Little to no potential exists for implementation of the No Action Alternative to result in adverse effects on stream hydrology and water quality when compared to existing conditions that include timber harvest around 50 NSO nest sites under continued implementation of the 1992 NSO HCP.	Timber harvest in NSO habitat around eight additional nest sites may create potential short-term, insignificant impacts.	Release of the three set-aside areas may create some potential insignificant adverse impacts to water quality by virtue of up to 903 acres made available for timber harvest under this alternative. Otherwise, same as the Proposed Action.

TABLE ES-2
Summary of Potential Environmental Impacts Associated with Each Alternative in the Action Area

No Action Alternative	Proposed Action	Alternative A
Aquatic Resources		
<p>Little to no potential exists for adverse effects on aquatic species or aquatic and riparian function compared to existing conditions that include timber harvest around 50 NSO nest sites under continued implementation of the 1992 NSO HCP. Changes in peak flows with potential to affect channel morphology, in-stream large woody debris (LWD), quantity and quality of riparian vegetation, and sedimentation and stream aggradation would not be anticipated to occur.</p>	<p>Timber harvest in NSO habitat around eight additional nest sites may create potential short-term, insignificant impacts.</p>	<p>All three set-asides in the Action Area contain Class I, Class II, or Class III watercourses and could be available for timber harvest under this alternative. Therefore, release of the three set-aside areas under Alternative A may create some potential insignificant adverse impacts to the three set-aside areas. Otherwise, same as the No Action Alternative.</p>
Vegetation/Plant Species of Concern		
<p>Vegetation management activities in riparian and upland areas would be expected to remain relatively unchanged from continued timber-harvesting practices that include timber harvest around 50 NSO nest sites under the 1992 NSO HCP, and similar species compositions would be retained. Growth projections indicate that under the current management regime, forest trends in the Green Diamond ownership will lead to increased age class and size, as well as increased total acreage with dense canopy closure.</p>	<p>Timber harvest in NSO habitat around eight additional nest sites may create potential short-term, insignificant impacts.</p>	<p>Release of the three set-aside areas may create some potential insignificant adverse impacts to these resources by virtue of being available for timber harvest under this alternative. However, Green Diamond 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), Green Diamond's own Plant Protection Program, and other measures identified during the THP preparation and review process.</p>
<p>For all listed plants and other plant species of concern, either no impacts would occur or the impacts would be minimal and, therefore, less than significant. In addition, many of the species' habitats (e.g., coastal prairies, wetlands) would not be disturbed by Green Diamond's activities or would be disturbed only incidentally; changes to these habitats are anticipated to be negligible over time. Green Diamond would continue to avoid or minimize potential adverse impacts to listed plants by adhering to measures contained in the California Forest Practice Rules (CFPRs) and maintaining its own Plant Protection Program.</p>		

TABLE ES-2

Summary of Potential Environmental Impacts Associated with Each Alternative in the Action Area

No Action Alternative	Proposed Action	Alternative A
Northern Spotted Owl		
<p>Timber harvest in northern spotted owl habitat is occurring around 50 NSO nest sites under continued implementation of the terms and conditions of the 1992 NSO HCP and incidental take permit. Additional areas of suitable northern spotted owl habitat will develop in the future up to 2022, which is expected to benefit northern spotted owls. Population shows some evidence of being in slight decline. A number of factors may be contributing to the decline, but current information is insufficient to determine cause(s), or how habitat development will affect future trends. Currently, four owl pair displacements remain under the existing IT; these four pairs represent 1.9 percent of the 213 northern spotted owl activity centers located on or adjacent to Green Diamond lands.</p>	<p>Timber harvest in NSO habitat around eight additional nest sites may create potential short-term, insignificant impacts. Habitat development and population trends similar to the No Action Alternative, except that suitable owl habitat may increase at a slightly lower rate due to permitted harvest of habitat around the eight incidental take sites. Reinstatement of the special management area will require no take of northern spotted owls within that area through 2012 or later. Research on competition and niche overlap between the spotted owl and barred owl will provide additional useful information in identifying reasons for current slight declines in local population numbers. USFWS authorization for the proposed incidental take of an additional eight owl pairs represents potential impacts to 3.8 percent of the 213 northern spotted owl activity centers located on or adjacent to Green Diamond lands.</p>	<p>The effects of Alternative A would be similar to those described for the Proposed Action, except that about 903 fewer acres of suitable habitat would be available for owls in the future under this alternative compared to the Proposed Action due to release of three set-aside areas for timber harvesting.</p>
Terrestrial Habitat/Wildlife Species of Concern		
<p>Timber harvest in northern spotted owl habitat is occurring around 50 NSO nest sites under continued implementation of the terms and conditions of the 1992 NSO HCP and incidental take permit. Growth projections indicate that under the current management regime, forest trends in the Green Diamond ownership will lead to increased age class and size, as well as increased total acreage with dense canopy closure. The species that would benefit the most from this effect include frogs, salamanders, herons, eagles, bats, marbled murrelets, and owls.</p> <p>Likewise, the number and acreage of stands with saplings and small-diameter trees would decrease over time. Wildlife species most adversely affected by these forest trends would be those that feed and breed in early successional riparian habitats (e.g., thrushes, warblers, and sparrows). However, because these species also use adjacent upland forests, impacts on these species are expected to be less than significant.</p>	<p>Timber harvest in NSO habitat around eight additional nest sites may create potential short-term, insignificant impacts. Harvest of older forest associated with the eight additional owl pairs permitted for incidental take could result in slightly lower rate of increase for older, larger forest classes than under No Action. This effect would be negligible, given the net increase of older forests projected for the Green Diamond ownership. Also, Green Diamond would continue to avoid or minimize potential adverse impacts to listed and unlisted wildlife species.</p>	<p>Similar to the Proposed Alternative. Release of the three set-aside areas under this alternative may create some potential insignificant adverse impacts to wildlife and wildlife habitat by virtue of being available for timber harvest. However, Green Diamond would continue to avoid or minimize potential adverse impacts to listed and unlisted wildlife species. Under this alternative, as with the No Action Alternative, Green Diamond would remain subject to State regulatory requirements to avoid or mitigate adverse effects of timber harvesting on all wildlife, including species listed or proposed for listing under the Federal and State ESAs.</p>

TABLE ES-2
Summary of Potential Environmental Impacts Associated with Each Alternative in the Action Area

No Action Alternative	Proposed Action	Alternative A
Air Quality		
Continued implementation of the CFPRs, Green Diamond's NSO HCP, and other Green Diamond management policies and practices are anticipated to result in some improvement in air quality (reduction in PM ₁₀ generation by improved road conditions). The improvements, however, are not anticipated to be measurably different than those anticipated under current conditions.	Same as the No Action Alternative.	Same as the No Action Alternative.
Visual Resources		
Existing visual conditions experienced by highway travelers and recreation area users would continue to occur under the No Action Alternative, including timber harvest around 50 NSO nest sites under continued implementation of the 1992 NSO HCP. Visual effects of timber harvesting could be expected to be reduced to some extent by implementing existing CFPR provisions that are designed, in part, to minimize the potential visual impacts of commercial forest management.	Timber harvest in NSO habitat around eight additional nest sites may create potential short-term, insignificant impacts.	With the exception of releasing the three set-aside areas for harvest entry, general timber harvesting and forest management activities would remain the same under Alternative A as in the Proposed Action and No Action Alternative. As a result, potential impacts to visual resources would be substantially similar to impacts described under the Proposed Action and No Action Alternatives.
Recreation		
Timber harvest levels are expected to be similar to current conditions that include 50 NSO nest sites under continued implementation of the 1992 NSO HCP and, therefore, such actions would be consistent with historical patterns of use, including the aesthetic impacts of such use. Green Diamond and other private forest landowners within the vicinity of the Action Area would continue to follow existing regulations designed to minimize visual and associated recreational effects.	Timber harvest in NSO habitat around eight additional nest sites may create potential short-term, insignificant impacts.	With the exception of releasing the three set-aside areas noted above for harvest entry, general timber harvesting and forest management activities would remain the same under Alternative A as in the Proposed Action and No Action Alternative. As a result, potential impacts to recreational resources would be substantially similar to impacts described under the Proposed Action and No Action Alternative.
Cultural Resources		
Current CFPRs contain measures for protection of cultural resources that would minimize the effects of timber harvesting on cultural resources.	Same as the No Action Alternative.	Same as the No Action Alternative.
Land Use		
Current land use on the ownership would continue in a manner consistent with local land use plans and compatible with surrounding land uses.	Same as the No Action Alternative.	Same as the No Action Alternative.

TABLE ES-2

Summary of Potential Environmental Impacts Associated with Each Alternative in the Action Area

No Action Alternative	Proposed Action	Alternative A
Socioeconomic Conditions		
Timber harvest levels under the No Action Alternative are expected to remain about the same as current conditions; therefore, job growth and local tax revenues are expected to remain similar to current conditions.	Same as the No Action Alternative.	Same as the No Action Alternative.

Introduction/Purpose and Need

The northern spotted owl (*Strix caurina occidentalis*) (NSO) was listed in 1990 as a threatened species under the Endangered Species Act of 1973, as amended (ESA). Non-Federal landowners and managers who wish to conduct activities on their land that might incidentally harm (or “take”) wildlife that is listed as endangered or threatened must first obtain an Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (USFWS). Section 10 of the ESA provides non-Federal landowners a mechanism for obtaining an ITP. To obtain a permit, the applicant must develop a Habitat Conservation Plan (HCP), designed to offset any harmful effects the proposed activity might have on the species. The HCP process allows land use to proceed while promoting listed species conservation.

This Environmental Assessment (EA) addresses the potential environmental effects that could result from implementing proposed amendments to Green Diamond Resource Company’s (Green Diamond) 1992 Northern Spotted Owl Habitat Conservation Plan and Incidental Take Permit (NSO HCP and ITP). The EA has been prepared in accordance with the National Environmental Policy Act (NEPA).

This EA contains: (1) a description of the No Action Alternative, the Proposed Action, and one other action alternative; (2) a summary description of baseline conditions; and (3) an analysis of potential environmental effects that could result from implementation of amendments to the NSO HCP and ITP.

1.1 Background

The USFWS is responding to an application from Green Diamond (previously Simpson Timber Company [Simpson]) to amend the ITP issued in 1992 in association with its NSO HCP. In April 1992, Simpson submitted an NSO HCP and ITP application for the incidental take of northern spotted owls, in conjunction with otherwise lawful timber harvesting on the firm’s properties in Del Norte, Humboldt, Mendocino, and Trinity counties, California. The effects of the NSO HCP were analyzed and described in an EA prepared and issued by USFWS (Notice of Availability in the *Federal Register* on May 27, 1992). On September 17, 1992, USFWS issued an ITP to Simpson authorizing incidental take of northern spotted owls in accordance with conditions set forth in an Implementation Agreement (IA) between USFWS and Simpson, and pursuant to Section 10(a)(1)(B) of the ESA. The NSO HCP is described in Section 2.1 of this EA. As described in Section 2.1, the level of incidental take authorized by the ITP, 50 owl pairs, was the amount of incidental take estimated to occur under the HCP during the first 10 years of the permit’s 30-year term, and anticipated that additional incidental take might occur during the permit term. Green Diamond is requesting an amendment to the 1992 ITP. The requested amendment would authorize incidental take of up to eight additional owl pairs on Green Diamond’s ownership on the west slopes of the Klamath Mountains and the Coast Range of California in Humboldt and Del Norte counties (see Section 1.4, Action Area). These incidental takes would be above and beyond the 50 owl pair takes authorized by the existing ITP, and are

expected to occur as a result of owl pairs being displaced from nest sites or activity centers by timber harvest activities. The eight additional takes would be authorized during the existing permit term expiring in 2022 and would provide Green Diamond operational flexibility while USFWS and Green Diamond further consider and evaluate the findings of a comprehensive review of Green Diamond's NSO HCP. Green Diamond also proposes to amend their NSO HCP to: (1) provide for initiation of new research on the habitat overlap and interaction between the barred owl (*Strix varia*) and the northern spotted owl within the Action Area; (2) establish, through year 2012, a new special management area of about 20,310 acres on its ownership, within which Green Diamond would not take owls; and (3) conduct a comprehensive HCP review in 2012, in addition to the comprehensive review which Green Diamond completed under the 1992 HCP and submitted with their permit amendment application.

USFWS has determined that amendment of an ITP by USFWS is a major Federal action that triggers the NEPA requirement for the analysis and disclosure of the potential environmental impacts of the action. Pursuant to NEPA, the environmental consequences of the additional Federal incidental take authorizations are being analyzed in this EA with USFWS serving as the lead Federal agency.

1.2 Purpose and Need for the Proposed Action

The USFWS is responding to Green Diamond's application to amend its existing NSO HCP and ITP, pursuant to Section 10(a)(1)(B) of the ESA. Similar to the USFWS procedure for review of an application for an ITP and associated HCP, the USFWS reviews applications for ITP amendments for consistency with ESA requirements. The USFWS purpose and need in this action, therefore, is the following:

1.2.1 Purpose

The purpose for which this EA is being prepared is to:

- Respond to Green Diamond's application to amend its existing incidental take permit for the Covered Species (northern spotted owl, "NSO") related to activities that have the potential to result in take, pursuant to the ESA Section 10(a)(1)(B) and its implementing regulations and policies;
- Protect, conserve and enhance the northern spotted owl and its habitat for the continuing benefit of the people of the United States;
- Provide a means and take steps to conserve the ecosystems depended on by the northern spotted owl;
- Ensure the long-term survival of the northern spotted owl through protection and management of the species and its habitat;
- Ensure compliance with the ESA, NEPA, and other applicable federal laws and regulations.

1.2.2 Need

The need for the action is based on the potential that activities proposed by Green Diamond on its property could result in the take of the northern spotted owl above the level permitted by its existing incidental take permit, thus the need to amend the existing incidental take permit.

The USFWS' approval of the requested NSO HCP amendment and issuance of an amended ITP is the NEPA "action" analyzed in this EA.

1.3 Decisions to Be Made

USFWS must decide whether to issue, issue with conditions, or deny the request to amend the ITP pursuant to Section 10(a)(1)(B) of the ESA. USFWS must also decide whether to issue, issue with conditions, or deny the request to amend the HCP pursuant to Section 10(a)(2)(B) of the ESA. In reaching its decision to amend the ITP and HCP, USFWS must find that the following conditions are met:

- 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 amendments to the conservation plan and procedures to deal with unforeseen circumstances will be provided
- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild
- Other measures that USFWS may require as necessary or appropriate for purposes of the conservation plan will be met and plan implementation will be assured.

1.4 Action Area

The Action Area includes all commercial timberland acreage within 11 Hydrographic Planning Areas (HPAs) (see Appendix A) on the west slopes of the Klamath Mountains and the Coast Range of California in Del Norte and Humboldt counties where Green Diamond owns lands or harvesting rights, during the period of such ownership within the ITP term. The Action Area is currently 416,533 acres (see Figure 1.4.1), but is subject to adjustment as Green Diamond buys and sells property.

1.5 Regulatory Background

Federal authorization of incidental take is subject to several 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 are applicable to management activities on Green Diamond's lands in northern California, and to activities associated with issuance of an ITP by USFWS. In essence, these laws and

regulations, which are summarized below, 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 are also summarized below.

1.5.1 Federal Regulatory Provisions Relating to Approval of ITPs

1.5.1.1 Endangered Species Act

The ESA of 1973, as amended, is administered by the secretaries of the Interior and Commerce through USFWS and the National Marine Fisheries Service (NMFS), respectively. Species listed as endangered or threatened under the ESA are provided protection as described below.

Section 9. Section 9 of the ESA and accompanying Federal regulations prohibit the unauthorized taking of fish and wildlife species listed as threatened or endangered by government, private companies, and individuals. As defined in the ESA, taking means, “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or to attempt to engage in such conduct.” By regulation, USFWS and NMFS (collectively the “Services”) have defined harm as any act that “actually kills or injures” listed fish or wildlife; harm may include, “significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife.”

Section 10. In recognition that take cannot always be avoided, Section 10(a)(1)(B) of the ESA allows the Services 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 (see Section 7 subsection below). Under Section 10(a)(1)(B), such authorizations are granted through the issuance of ITPs. Applicants for such permits must submit HCPs that specify the following:

- A complete description of the activity sought to be authorized
- Names of the species that will be covered by the permit
- Impact(s) that will likely result from the proposed taking
- Measures the applicant will take to monitor, minimize, and mitigate those impacts, and the funding that will be available to implement those measures
- Procedures that will be used to respond to unforeseen circumstances
- Alternatives to the taking and the reasons the alternatives were not chosen
- Additional measures that the USFWS or NMFS may require as being necessary or appropriate for the purposes of the plan

Section 7. Under Section 7 of the ESA, Federal agencies must ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of endangered, threatened, or proposed species or result in the destruction or adverse modification of designated critical habitat of listed species by Federal agency actions. Because issuance of an ITP is a Federal action, the USFWS conducts a Section 7 consultation on the proposed ITP issuance. This EA is being prepared to support the issuance of an amended ITP that complies with ESA Section 7.

1.5.1.2 National Environmental Policy Act

The NEPA of 1969, as amended, 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 decisionmakers 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 an amended ITP by USFWS, as defined in this EA, is a major Federal action that triggers the NEPA requirement for the analysis and disclosure of the potential environmental impacts of the action. Pursuant to NEPA, the USFWS has prepared this EA to analyze the environmental consequences of the amended Federal incidental take authorization.

1.5.1.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (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 wildlife protection treaties between the United States and Great Britain, Mexico, Japan, and Russia. As with the Federal ESA, the act also authorizes the Secretary of the Interior to issue permits for certain kinds of take. The procedures for securing such permits are found in Title 50 of the *Code of Federal Regulations* (CFR), together with a list of the migratory birds covered by the act. However, the MBTA has no provisions for permitting incidental take of migratory birds. With regard to the proposed NSO HCP and ESA incidental take permit, USFWS has recently determined that an ITP issued under Section 10 of the ESA also constitutes a MBTA Special Purpose Permit under 50 CFR 21.27 that covers only the northern spotted owl, not all migratory birds.

1.5.2 Related Federal Laws

1.5.2.1 Clean Water Act

The Clean Water Act of 1977 (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. While state laws and regulations (see Section 1.5.3.3 of this EA) implement some CWA provisions, Green Diamond’s proposed NSO HCP amendment is not intended to address Federal CWA and TMDL requirements.

1.5.2.2 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 of the NHPA is to ensure that Federal agencies consult with State and local

groups before nonrenewable 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.

1.5.3 State Regulation of Timber Harvesting and Related Activities

1.5.3.1 California Forest Practice Act and Forest Practice Rules

Overview. 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 (BOF) and administered by the California Department of Forestry and Fire Protection (CDF). Pertinent examples of California Forest Practice Rules (CFPRs) relevant to wildlife habitat management under Green Diamond's proposed amendments to its NSO HCP include: (1) the environmental review process undertaken by CDF, with input from other agencies, that applies to review and approval of proposed commercial timber operations; (2) special rules to protect fish, wildlife, and watersheds; (3) watercourse and lake protection zone rules; (4) rules for defined special treatment areas; (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 California Environmental Quality Act (CEQA), the Porter-Cologne Water Quality Control Act, and the California Endangered Species Act (CESA) (see Sections 1.5.3.2, 1.5.3.3, and 1.5.3.5, respectively).

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 the BOF and CDF 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 3-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 CDF 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 CDF that all significant adverse impacts, including cumulative effects, have been avoided or mitigated to a level of insignificance.

Green Diamond regularly submits proposed THPs to CDF for review by CDF and a State agency review team. The review team comprises the RWQCB, the California Department of Fish and Game (CDFG), and the California Geologic Service (CGS) (formerly known as the California Division of Mines and Geology [CDMG]). Additional input is received from interested State and Federal agencies, often including the California Department of Parks and Recreation, the National Park Service, USFWS, and NMFS. Green Diamond's THPs cover only small areas (generally fewer than 100 acres).

Special Rules for Wildlife and Sensitive Watersheds. The CFPRs require the retention of snags 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 below.

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. None of the planning watersheds in the Action Area have been designated as sensitive watersheds by the BOF.

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.

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 side-slopes; (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 instream obstructions to unrestricted fish passage.

Special Treatment Area. The State Coastal Commission has designated a number of special treatment areas along the north coast of California, within which general development and various management activities are restricted. Green Diamond's proposed NSO HCP Action Area does not lie within any of these designated areas.

The State BOF, however, has created a separate network of special treatment areas (STAs) that could limit the scope of silvicultural treatments, including the size of clearcut units, time intervals between harvest entries, and logging practices that may be employed. STAs

under the CFPRs are specific locations containing one or more of the following significant resource features:

- Are within 200 feet of the watercourse transition line of Federal- or State-designated wild and scenic rivers
- Are within 200 feet of national, State, regional, county, or municipal park boundaries
- Are key habitat areas of Federal- or State-designated threatened, rare, or endangered species
- Are within 200 feet of State-designated scenic highways

Approximately 1,800 acres in the Action Area are considered STAs by virtue of being within 200 feet of State or Federal park lands.

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 doing the following:

- 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

Cumulative Environmental Effects. The CFPRs provide that all THPs must address cumulative environmental effects, which are defined as two or more individual effects that, when considered together, are considerable or that compound or increase other environmental impacts. Under the CFPRs, the cumulative impact from several projects is the change in the environment that results from the incremental impacts of a project when added to other closely related past, present, and reasonably foreseeable future projects. The CFPRs provide that no THP can be approved unless it avoids or mitigates with feasible measures all significant environmental impacts, including cumulative impacts. Each THP is required to include a CEQA-based assessment of potential cumulative impacts and, if necessary, avoid or mitigate such impacts to a level of insignificance, and incorporate feasible mitigation measures that exceed those required by the CFPRs.

1.5.3.2 California Environmental Quality Act

Similar to NEPA, CEQA requires State agencies with discretionary permitting authority to evaluate the environmental effects of a proposed project. 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 levels less than significant, 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.

As noted above, the preparation, review, and approval of THPs that detail activities associated with timber harvesting on state and private lands serves as the functional equivalent of an EIR under CEQA.

1.5.3.3 Porter-Cologne Water Quality Control Act

The California Porter-Cologne Water Quality Control Act of 1969 authorizes regional water quality control boards (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 Green Diamond's ownership, 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. 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. Under the CFPRs, no THP may be approved if it would result in the violation of an applicable Basin Plan provision.

The State Water Resources Control Board (SWRCB) and regional water boards implement the Federal CWA in California under the oversight of the EPA, Region IX. Direction for implementation of the CWA is provided by 40 CFR 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 Green Diamond's northern California ownership.

1.5.3.4 Streambed Alteration

Pursuant to California Fish and Game Code Sections 1600-1603, the CDFG regulates the alteration of streambeds through streambed alteration agreements. Under these provisions, the CDFG specifies conditions that must be followed during timber operations to protect fish and wildlife resources that could be affected by the construction of stream crossings and related timber harvest activities.

1.5.3.5 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 also states that such reasonable and prudent measures shall be consistent with conserving the species, while at the same time maintain the project purpose to the greatest extent possible. CESA also prohibits take of species listed or proposed for listing as endangered or threatened under CESA, and provides a number of regulatory mechanisms to authorize the incidental take of such species. The NSO is not listed under CESA.

1.5.4 Related State Laws

1.5.4.1 Timberland Productivity Act

The California Timberland Productivity Act of 1982 (TPA) affirms the State'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. Nearly all of Green Diamond's lands within the Action Area are zoned as TPZ.

1.6 Green Diamond Planning and Management

1.6.1 Silviculture and MSP

Green Diamond's lands that would be covered by the provisions of the proposed amended NSO HCP are characterized by a number of unique conditions based on climate, tree species mix, geologic factors, and past harvesting and management history. The conifers of primary economic value on Green Diamond's lands are coast redwood and Douglas-fir, which require substantial direct sunlight to grow rapidly at young ages. Even-aged silvicultural techniques are used to promote propagation of these species throughout the North Coast redwood region. Although the use of uneven-aged regeneration systems can be beneficial to many shade-tolerant species, such as western hemlock and white fir, these systems generally are less suited to the economically valuable redwood and Douglas-fir, which grow at maximum rates when free to grow in full sunlight (Smith, 1962; USFS, 1973; Perry, 1994). On the basis of the unique growing conditions of the region and the long-term management approach implemented by Green Diamond, Green Diamond feels the continued use of even-aged regeneration tools is necessary to support its management and business objectives, as well as to achieve the state law mandates of maximum sustained production of high-quality timber products, as discussed in Section 1.6.3.3.

1.6.2 State Laws and Regulations

As noted above, Green Diamond operates its timberlands under multiple regulatory controls. The California Forest Practice Act mandates the achievement of maximum sustained production of high-quality timber products and consideration of other significant values, including protection of wildlife, fisheries, water quality, and regional economic vitality and employment. In addition, all of Green Diamond's lands that would be covered by the amended ITP are designated as TPZ under California's TPA, which limits the use of TPZ lands to growing and harvesting timber and uses compatible with those activities. California's timber harvest regulations also require compliance with water quality protection measures adopted by regional and state water boards under the Porter-Cologne Water Quality Control Act. Further, all timber harvesting is subject to the Federal and State

ESAs, and the CFPRs stipulate that no THP may be approved if it would result in an unauthorized taking of species listed under those acts.

1.6.3 Landscape and Watershed Plans

Although timber harvesting operations are regulated at the individual THP level, many of the productivity, resource protection, and environmental issues may be addressed on a larger landscape scale. Green Diamond has undertaken a number of watershed- and ownership-level planning efforts to protect terrestrial wildlife and aquatic habitat that meet or exceed state standard rules and regulations. These planning efforts are designed to address the State of California's mandates of: (1) enhancing timberland productivity; and (2) protecting endangered species, timber resources, and related environmental values. The planning efforts also seek to reconcile those mandates with Green Diamond's management objectives and the unique environmental and productivity conditions on Green Diamond's ownership. Green Diamond feels that even-aged management is also key to implementation of these other landscape management templates, including the Green Diamond NSO HCP (see Section 1.6.3.1), and achievement of maximum sustained production on Green Diamond's lands under Option (a) (see Section 1.6.3.3).

Green Diamond has developed a substantive database on site-specific and regional conditions by conducting extensive data gathering and scientific research. The results of this research are incorporated in the watershed and ownership planning efforts. These various plans form the basis of Green Diamond's short- and long-term management decisions. Many of the internal policies, programs, and measures used by Green Diamond to govern planning and management on its lands are discussed below.

1.6.3.1 1992 NSO HCP

The northern spotted owl is listed as threatened under the Federal ESA. Since surveys for northern spotted owls were initiated on Green Diamond lands in 1989, over 200 northern spotted owl nest sites or activity centers have been identified throughout its ownership in northern California. Green Diamond's four-point NSO Conservation Strategy contained in its 1992 NSO HCP comprises (1) habitat management and nest protection, (2) a spotted owl research program, (3) establishment of set-asides and special management areas in selected habitat areas, and (4) employee and contractor training. Habitat management and nest site protection measures are implemented primarily through the THP process. Green Diamond uses its NSO HCP to guide the development of individual THPs, where timber harvesting is 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 Green Diamond's property; and (3) accelerate the development of replacement habitat following harvesting.

Green Diamond conducts surveys for northern spotted owls pursuant to protocols identified in the NSO HCP and bands and monitors spotted owls where appropriate to facilitate population estimates and to gather additional demographic information.

To protect existing owl sites in select areas for purposes of avoiding take and promoting development of suitable owl habitat following harvesting, Green Diamond does not harvest timber in 39 set-aside areas. In addition, a separate "special management area" was

established for the first 10 years of the permit period, in which no take of spotted owls was allowed.

1.6.3.2 Aquatic Habitat Conservation Plan/Candidate Conservation Agreement with Assurances

In the late 1990's, Green Diamond initiated development of a multispecies Aquatic Habitat Conservation Plan/Candidate Conservation Agreement with Assurances (AHCP/CCAA). The AHCP/CCAA was prepared to support applications for an ITP and Enhancement of Survival Permit (ESP) from NMFS and USFWS. The record of NEPA actions and documents for the AHCP/CCAA are described in the Notice of Availability of Final Impact Statement for the Final Green Diamond Resource Company Aquatic Habitat Conservation Plan and Candidate Conservation Agreement with Assurances, Del Norte and Humboldt Counties, CA (71 FR 68555).

Green Diamond's permit application requested authorization for the incidental take of two fish Evolutionarily Significant Units (ESUs) and one Distinct Population Segment (DPS) that are listed as threatened under the ESA and that overlap Green Diamond's lands in northern California. These fish ESUs/DPSs are the Southern Oregon/Northern California Coast coho salmon ESU, California Coastal Chinook salmon ESU, and Northern California steelhead DPS. Green Diamond also requested authorization for the incidental take of three other fish ESUs, two fish species, and two amphibian species, all currently unlisted, should they become listed in the future. These unlisted ESUs/species are Chinook salmon (Southern Oregon and Northern California Coastal ESU, Upper Klamath/Trinity Rivers ESU), steelhead (Klamath Mountains Province ESU), coastal cutthroat trout, rainbow trout, southern torrent salamander, and tailed frog. Green Diamond proposed an AHCP/CCAA duration (permit period) of 50 years.

A Final Environmental Impact Statement that addresses the potential environmental effects of the AHCP/CCAA was released on November 27, 2006, in accordance with NEPA (71 Federal Register 68555). The AHCP/CCAA and associated Implementation Agreement was approved and signed by Green Diamond, the USFWS and NMFS in June 2007, and the permit for incidental take of the fish species under NMFS authority was issued on June 12, 2007 (72 Federal Register 36672), taking effect on July 1, 2007, with a 50-year permit period. The species covered by the ITP issued by NMFS includes all the AHCP/CCAA species listed above, except for the non-listed coastal cutthroat trout, rainbow trout, tailed frog and southern torrent salamander. These latter four species are covered by an ESP issued by the USFWS, under section 10(a)(1)(A) of the ESA, that authorizes the incidental take, should these species be listed in the future. The AHCP/CCAA was not finalized at the time of the public comment period for the Draft EA. The effects of the AHCP/CCAA and the issuance of associated permits by NMFS and USFWS have been considered in the separate EIS prepared jointly by USFWS and NMFS. This EA for the NSO HCP amendment incorporates by reference the analyses of the EIS, including the effects of Green Diamond's timber operations under the AHCP/CCAA on aquatic and other resources. In making its decision on the Proposed Action described in this EA, USFWS will consider the actions and associated environmental impacts described in the final environmental impact statement for the Aquatic HCP. Chapter 4 (Environmental Consequences) below addresses cumulative effects of the AHCP/CCAA with the Proposed Action and Alternatives.

1.6.3.3 Maximum Sustained Production Option (a) Document

Green Diamond manages its properties for the primary purpose of growing and harvesting commercial timber. Implicit in this goal is achievement of a sustained yield in perpetuity (i.e., the harvesting of timber at a rate commensurate with the ability of the land base to grow replacement trees). Green Diamond's "Option (a)" document is the company's blueprint for achieving maximum sustained production of high-quality timber products over a 100-year planning horizon. The Option (a) document is submitted as part of Green Diamond's THPs to demonstrate compliance with the CFPR mandate that each THP demonstrate achievement of MSP. Similar to the NSO HCP, the Option (a) document is premised on the primary use of even-aged regeneration methods to meet MSP and wildlife habitat objectives given the unique conditions of Green Diamond's ownership and this region. The document also provides consideration to other significant values, including protection of wildlife, fisheries, water quality, and regional economic vitality and employment.

1.6.3.4 Road Management Policy

Green Diamond has approximately 4,000 miles of management roads on its ownership in northern California. These roads are used by Green Diamond for land management activities and historically by the public for various recreational activities. Roads can be sources of erosion, particularly if improperly used or maintained. Erosion problems, road maintenance costs, as well as concerns over wildlife species sensitivity, have prompted Green Diamond over the last several years to restrict hundreds of miles to motorized public use through construction and installation of gates, barricades, and earthen berms. These restrictions benefit salmonids and other aquatic species by reducing erosion and associated sediment delivery to streams. They also benefit terrestrial wildlife species that are sensitive to local human presence. In addition, Green Diamond has invested substantial economic resources in road reconstruction and maintenance that is not associated with timber harvesting plan operations. The investment is intended to minimize further any sedimentation of aquatic habitat.

1.6.3.5 Other Programs and Measures

Other programs and measures that seek to enhance its wildlife and aquatic species conservation and ecosystem management program include the following:

- A long-term stream channel monitoring program initiated in 1995 (active and ongoing)
- Stream assessments and studies of aquatic species conducted on Green Diamond property since 1993 (active and ongoing)
- The Salmon Creek Management Plan, prepared in 1993 in coordination with CDF, the CDFG, and the North Coast RWQCB (active and currently being implemented)
- The Management Strategies for the Little River Watershed, prepared in 1999 after Green Diamond acquired the Little River timberlands formerly owned by Louisiana-Pacific Corporation (active and currently being implemented)

- A cooperative effort with the Yurok Tribe fisheries staff and the Coastal Conservancy on a long-term program to restore anadromous fish habitat in 30 basins and subbasins of the lower Klamath River (active and ongoing)
- A cooperative effort with Redwoods National Park in the upper Redwood Creek watershed to inventory roads and hillslopes and prioritize treatment areas to reduce the risk of future erosion (currently inactive, but may be resumed)
- Habitat restoration and enhancement projects completed in cooperation with restoration groups on 33 streams (active and ongoing)
- Standardized field methods to assess salmonid populations and habitat, originally developed through cooperative efforts of the Fish, Farm, and Forest Communities Forum (active and currently being implemented)
- The Redwood Creek Total Maximum Daily Load Implementation Plan proposed by the Redwood Creek Landowners Association (under consideration, but not currently implemented)

1.6.3.6 Structure of Green Diamond's Timberlands Operations

On December 31, 2001, Simpson Timber Company transferred its California timberlands assets to a new affiliate, Simpson Resource Company. The timberlands employees and management functions associated with those assets were transferred to Simpson Resource Company on June 30, 2002. Effective April 30, 2004, Simpson Resource Company changed its name to Green Diamond Resource Company. All references in this EA to past or continuing operation of Green Diamond also refer to past operation of the Green Diamond timberlands when they were owned and operated by Simpson Timber Company and during that period of time when it was known as Simpson Resource Company.

1.7 Summary of the Public Review Process

A Notice of Availability (NOA) for the Draft EA was published in the *Federal Register* by USFWS on February 26, 2007 (72 FR 8393). The public review period of 60 days was from February 26, 2007, to April 27, 2007. The NOA informed the public that Green Diamond has proposed to amend the NSO HCP and that USFWS proposes to amend the ITP to authorize eight additional NSO incidental takes through displacement of NSO pairs. The NOA provided the interested public with the opportunity to comment on the EA prepared by USFWS in support of its proposed amendments of the incidental take permit and approval of the amended HCP.

The USFWS received one set of public comments during the public review period. In response to the comments received, additional information has been provided in this Final EA on the following topics:

- Descriptions of recent proposed revisions to designated critical habitat for two federally-listed species, the northern spotted owl and marbled murrelet, and on the potential cumulative effects associated with those proposals, should they be finalized as proposed. See EA Sections 3.7.2, 4.1.2, 4.6.5.2, and 4.7.5.2 (proposed revision to marbled

murrelet critical habitat), and Sections 3.6.3, 4.1.2, 4.6.5.2, and 4.7.5.2 (proposed revision to northern spotted owl critical habitat).

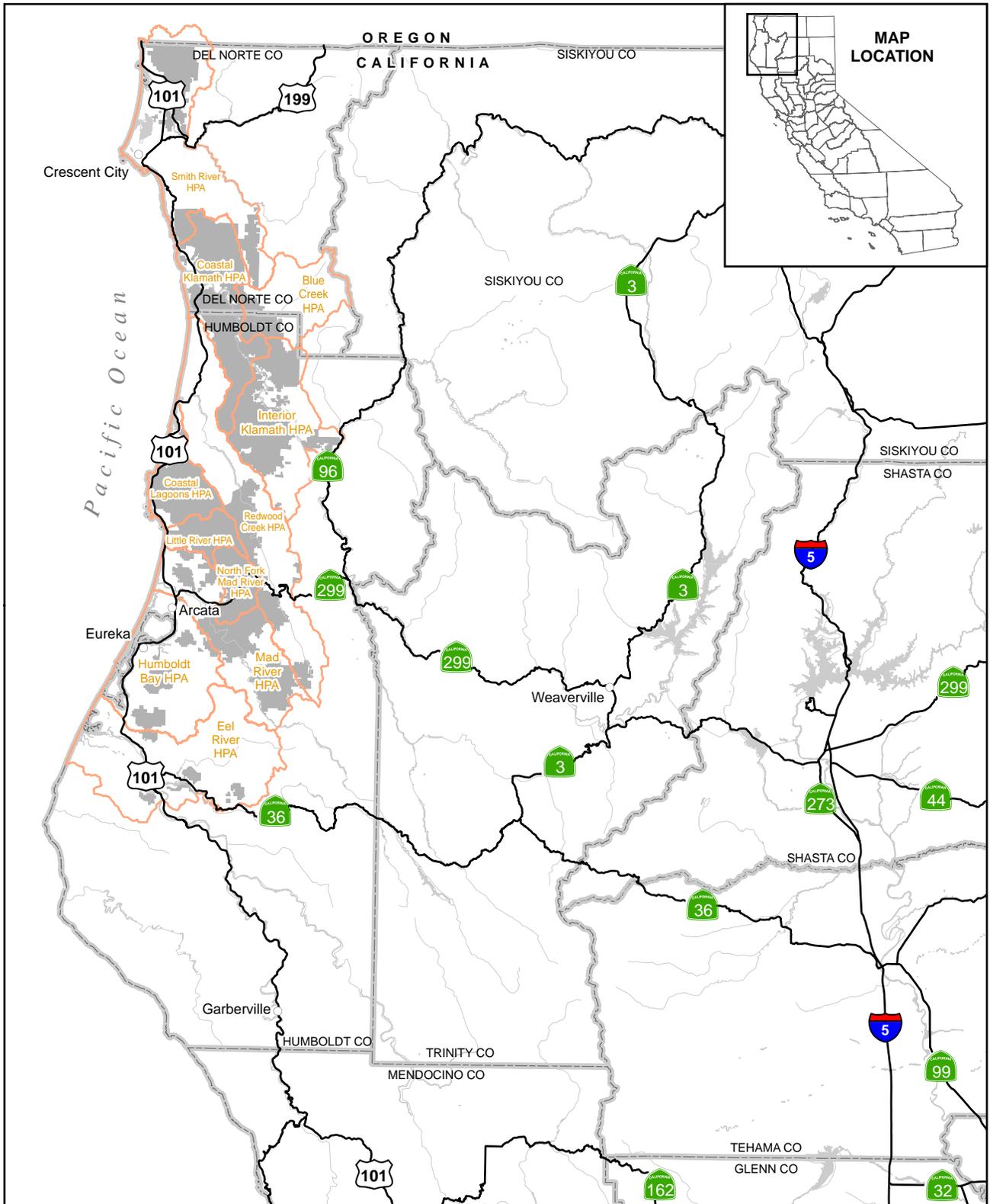
- A listing of HCPs approved in the analysis area since 1992 and the potential for associated cumulative effects. Information has been added to Section 4.1.2.3 on two HCPs and a Safe Harbor Agreement which cover the northern spotted owl.
- Additional information regarding forest conditions at the landscape scale on Green Diamond lands in 1992-1994, and 2003-2006 (see Section 3.6.2.3), to provide more information comparable to the “mosaic” habitat analysis contained in Green Diamond’s 1992 NSO HCP.
- Additional information on Green Diamond’s Aquatic HCP and Candidate Conservation Agreement with Assurances (AHCP/CCAA) has been added, including information on potential cumulative effects with the Proposed Action and Alternatives of this EA (see Sections 1.6.3.2, 4.1.2, 4.2.5, 4.3.5, 4.4.5, 4.6.5, and 4.7.5). The AHCP/CCAA was approved in June 2007 after release to the public of the Draft EA for the proposed amendment to the NSO HCP.
- Two minor revisions were made to the Proposed Action and Alternative A to clarify and strengthen conservation measures, by:
 1. Changing the period of the reinstated Special Management Area to either: (a) the eight additional takes authorized under the Amended ITP have occurred, or (b) September 16, 2012, whichever is later. This period was described in the Draft EA as “until 2012”; and
 2. Providing a revised NSO survey and response protocol for when barred owls are present and may interfere with the detection of NSO.

The Proposed Action and Alternative A, incorporating these revisions, are fully described in Sections 2.2 and 2.3.

Also, in response to a comment regarding the perceived lack of review of some of the information and studies cited, several references to peer-reviewed literature have been added for sources used in this EA.

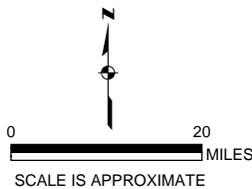
The public comments received, and USFWS’ responses to those comments, are provided in Appendix C.

After the Draft EA had been released to the public, the area of Green Diamond lands in the Action Area changed slightly, from about 416,533 acres to about 406,962 acres. Based on the size of the Action Area, this change is very minor (two percent of the ownership), and does not affect any of the conservation measures in the proposed ITP and HCP amendments, or the analyses and conclusions of this document. Changes in the ownership area were anticipated in the Proposed Action. As described in Section 1.5 above, the Action Area is subject to adjustment as Green Diamond buys and sells property. Because the change in ownership size is insignificant and within expectations in the context of the effects analyses in this document, we do not believe it is necessary to collect and reanalyze spatial data for the revised ownership. Therefore, the analyses and acreage numbers in this document have not been revised to reflect the slight change in acreage of the covered lands.



LEGEND

- CITY
- ▭ COUNTY BOUNDARIES
- ACTION AREA
- RIVERS
- ▭ HYDROGRAPHIC PLANNING AREAS
- MAJOR ROADS



**Figure 1.4-1
Action Area**

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. Agencies are directed to present the alternatives in comparative form to define the issues and provide a clear basis for decisionmakers and the public to choose among options. Three alternatives are considered in this EA, as briefly described in Table 2-1. The No Action Alternative and one action alternative represent the reasonable range of alternatives to the Proposed Action. Additional alternatives were considered; those eliminated from detailed evaluation are summarized in Section 2.4.

TABLE 2-1
 Alternatives Analyzed in Detail in the Green Diamond NSO HCP Amendment

Title	Brief Description
No Action (No ITP Amendment)	<p>Continuation of Green Diamond's existing timber harvesting and forest management practices in the Action Area pursuant to existing regulations.</p> <p>Continued implementation of measures contained in Green Diamond's 1992 NSO HCP and associated IA that provide for the legal incidental take of northern spotted owls in connection with timber harvesting and forest management operations, including incidental take of up to 50 owl pairs through September 16, 2008. This level of incidental take was expected to occur during the first 10 years of operations under the 30-year ITP term. Because take has occurred at a lower rate than anticipated, USFWS extended the take period to the September 2008 date. Measures, which Green Diamond would implement throughout the 30-year ITP term, include habitat management, nest site protection, research, set-asides (timber harvest eliminated from 13,242.5 acres), and training programs.</p> <p>Continued implementation of measures designed to avoid take of other listed species; continued implementation of other measures to mitigate or avoid significant impacts to unlisted species.</p>
Proposed Action (ITP Amendment Providing for the Additional Incidental Take of Eight Owl Pairs)	<p>Continuation of Green Diamond's existing timber harvesting and forest management practices in the Action Area pursuant to existing regulations.</p> <p>Approval of an amendment to the 1992 NSO HCP and associated ITP authorizing the incidental take of eight additional owl pairs in conjunction with timber harvest on about 1,864 acres around eight NSO nest sites, reinstating until 2012 or later monitoring and no-take restrictions for the 20,310 acres of the special management area still owned by Green Diamond, initiating new research on the habitat overlap and interaction between the barred owl and northern spotted owl, scheduling HCP review in 2012, and providing a revised NSO survey and response protocol for when barred owls are present and may interfere with the detection of NSO.</p> <p>Continued implementation of measures contained in Green Diamond's 1992 NSO HCP and associated IA, as described above for No Action.</p> <p>Continued implementation of measures designed to avoid take of other listed species; continued implementation of other measures to mitigate or avoid significant impacts to unlisted species.</p>

TABLE 2-1
 Alternatives Analyzed in Detail in the Green Diamond NSO HCP Amendment

Title	Brief Description
Alternative A (Extension of HCP with Additional Incidental Take of Eight Owl Pairs and Release of Three Set-Asides)	Same as the Proposed Action except that three set-aside areas (up to 903 acres) would be released for harvest entry. The three set-aside areas are Wiregrass, Fawn Prairie, and Bear Creek.

As required by NEPA, this EA compares the Proposed Action and the other action alternative 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 (No Incidental Take Permit Amendment)

This alternative has been developed to evaluate the site conditions, as they would occur over time with “no Federal action” or “no project,” in relation to current conditions. Under the No Action Alternative, the USFWS would not approve Green Diamond’s proposed amendment of its 1992 NSO HCP and USFWS would not amend the associated 1992 ITP.

Green Diamond’s NSO HCP. Under the No Action Alternative, Green Diamond would continue to comply with measures contained in its 1992 NSO HCP and associated IA that provide for the legal incidental take of northern spotted owls in connection with timber harvesting and management operations, including the authorized incidental take of up to 50 owl pairs. The 1992 NSO HCP estimated that this level of incidental take could occur during the first 10 years of operations under the 30-year ITP term, and provided for a review that would estimate the level of incidental take for the remainder of the permit term, following the first 10 years under the HCP. Accordingly, the 1992 ITP authorized the incidental take of up to 50 owl pairs during the first 10 years of the permit term. Because incidental take has occurred at a lower rate than anticipated, USFWS has previously amended the ITP to extend the period during which the 50 takes could occur by six years. Thus, under the No Action Alternative, the incidental take of up to 50 owl pairs could occur through September 16, 2008.

Under the 1992 NSO HCP, incidental take is evaluated based on the amount of suitable NSO habitat within a 502-acre (0.5 mi radius) circle centered on the NSO nest tree or activity center, and whether harvest occurs within 500 feet of the nest tree or activity center. Incidental take via displacement is considered to have occurred if either: 1) timber harvest reduces the amount of NSO habitat within that circle below 233 acres, of which at least 89 acres is forest 46 years and older, and the remainder is forest 31 years and older; or 2) harvest occurs within 500 feet of the nest tree or activity center. Incidental take pairs are monitored for three to five breeding seasons after displacement, and incidental takes may be removed from the cumulative take total, based on specific site occupancy and reproductive criteria, when a “take” site is used by NSO during the post-take monitoring period.

Pursuant to the NSO HCP, Green Diamond would continue to implement a four-point conservation program consisting of the following measures: (1) habitat management and

nest protection; (2) a spotted owl research program; (3) establishment of set-asides in selected habitat areas; and (4) employee/contractor training.

Under the No Action Alternative, habitat management and nest site protection measures would be implemented primarily through the THP process. Green Diamond would use its NSO HCP to guide the development of individual THPs. Timber harvesting would be planned and implemented to:

- Protect spotted owl nest sites during the nesting and fledging season
- Maintain suitable foraging, roosting, and nesting habitat on Green Diamond's property
- Estimate the amount of residual trees and snags before and after harvest
- Accelerate the development of replacement habitat following harvest

To protect nesting owls and their young from direct harm caused by timber operations during the breeding season and to identify owl activity centers, all stands scheduled to be harvested will be surveyed to HCP protocol for spotted owls during the breeding season, March 1 to August 31. Each survey response is followed up with daytime visits by Green Diamond biologists or other qualified individuals to locate the owl(s) and determine its pair status, activity center, or nest site.

As outlined in the HCP, habitat management measures for spotted owls will include owl habitat planning and overall environmental resource planning. Site-specific habitat protection or retention measures are identified for each THP initiated to provide a core for future spotted owl habitat. There are four such major owl habitat management measures:

- Retaining patches of conifers and hardwoods as future core areas for spotted owls
- Retaining more habitat than required by California Forest Practice rules for Watercourse and Lake Protection Zones (WLPZs), by increasing habitat width or percent overstory canopy retained in the zones
- Retaining green wildlife trees outside of WLPZs
- Retain all snags that are not a safety hazard

In addition to the specific timber harvest planning and owl habitat planning measures, Green Diamond will continue to incorporate, where feasible, overall resource management measures that meet or exceed the CFPR's and benefit other species of concern as well as the spotted owl.

The spotted owl research program would continue to be conducted on Green Diamond's property. This program includes banding and monitoring of spotted owls where appropriate to facilitate population estimates and to gather additional demographic information, further study of owl habitat selection, and obtaining information on key prey species. As of June 2006, Green Diamond has banded 1,594 spotted owls. Other research projects will be considered as time and funding allow.

To protect existing owl sites in select areas for purposes of avoiding take and promoting development of suitable owl habitat following harvesting, Green Diamond would continue to not harvest timber in 39 set-aside areas, comprising 13,242.5 acres. Measures associated with the separate "Special Management Area," which are described in the Implementation

Agreement, would not be implemented under this alternative, as those measures expired after the first 10 years of the permit term, as provided in the IA. (See Figure 2.1-1.)

Green Diamond will continue a training program for employees and contractors likely to encounter spotted owls to inform them of survey and monitoring protocols, familiarize them with details of the HCP, and encourage their involvement with data collection and implementation of the plan.

Implementation of the HCP's conservation and mitigation measures would continue to be governed by the implementation agreement between Green Diamond and USFWS, and funded by Green Diamond, as part of the company's ongoing operations. Green Diamond would continue to submit annual reports to USFWS, as described in the HCP.

Green Diamond Management and Other Measures. In addition, Green Diamond would continue under the No Action Alternative to conduct timber harvesting and related operations in the Action Area in accordance with existing State and Federal regulations as well as operational and policy management actions currently being implemented by Green Diamond. The applicable regulations that provide the framework for implementing No Action elements are described in Chapter 1, Section 1.5. Activities that would continue to occur as part of the No Action Alternative pursuant to existing laws and regulations are described in detail as components of the No Action Alternative in Sections 2.1.1 through 2.1.5, and include activities associated with growing, harvesting, and transporting 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; and voluntarily conducting research on wildlife and fish species and their habitats.

2.1.1 Green Diamond's Timber Harvesting and Forest Management Activities

Descriptions of the major activities associated with Green Diamond's management of its lands under this alternative are provided below:

- Harvesting and transporting timber
- Timber stand regeneration and improvement
- Road and landing construction, reconstruction, and maintenance
- Monitoring and research activities

2.1.1.1 Harvesting and Transporting Timber

Green Diamond manages its forestlands for the primary purpose of growing and harvesting timber that subsequently will be milled to produce various commercial wood products. As specified in its "Option (a)" document, Green Diamond has implemented a schedule and rate of tree harvesting that seeks to balance timber harvesting with replacement tree growth.

Lands within Green Diamond's northern California ownership are generally managed under even-aged silvicultural prescriptions; this would continue under the No Action Alternative. These areas would be replanted with seedlings, or regenerated by seed from residual trees left on site. In accordance with the CFPRs and Green Diamond's operating guidelines, even-aged regeneration harvests must not exceed 40 acres. Harvesting of timber

within even-aged units with stand age classes of 50 years or greater would be implemented under this alternative.

Historically, uneven-aged management has been focused: (1) in and around watercourse and lake protection zones and water supply areas; (2) along or around visually sensitive road and highway corridors; (3) around nest site locations of selected bird species (for example, great blue heron rookeries); (4) within some demonstration units upslope of riparian and watercourse protection corridors; (5) generally near property lines where neighborhoods exist; and (6) in geologically unstable areas that are identified for special protection. Under the No Action Alternative, uneven-aged management would continue to be focused in these areas, and would be accomplished by marking and removing individual trees or small groups or clusters of trees. Cutting cycles (the number of years between two successive harvest entries into the same stand) in uneven-aged stands on Green Diamond lands under this alternative would be 10 to 50 years.

No harvesting would occur within the 39 set-aside areas identified in Green Diamond's NSO HCP for purposes of promoting suitable owl habitat following harvesting in other areas. Combined, the 39 set-asides contain 13,242.5 acres, and range from approximately 60 to 2,000 acres in size.

Chainsaws and feller-bunchers are currently used for all tree felling and log bucking activities, but other types of mechanical felling and bucking equipment could be used under this alternative. Where possible, log yarding on Green Diamond lands would continue to be accomplished using cable-logging systems. Tractor operations would generally be confined to stands that occur on slopes of less than 40 to 45 percent, depending on proximity to other environmentally sensitive areas (for example, unstable slopes) and variability of terrain. Tractor operations also would be limited to dry months (May 1 through October 15), except for circumstances and locations defined in a winter operating plan, and would not be conducted on steep or unstable areas, pursuant to the CFPRs.

Both heel-boom and wheeled front-end loaders would be used in conjunction with log yarding, sorting, and loading activities on landings. Log trucks would be used to transport logs to a mill for further processing. Helicopters would be used within isolated harvest units to yard downed timber where road and landing access would be otherwise difficult or hazardous.

2.1.1.2 Timber Stand Regeneration and Improvement

Consistent with its sustained yield objective, Green Diamond would continue to rely on non-intensive as well as intensive timber management techniques to maximize growth and yield on its lands. Current management practices for regenerating harvested stands and promoting their growth would continue to be implemented under this alternative. These practices would include a variety of activities, such as site preparation, tree planting and occasional seeding, fertilization, precommercial and commercial thinning, pruning, prescribed burning, and cone collecting. The level and degree to which these practices would be used would depend on the regeneration method for a particular harvest unit (for example, even-aged vs. uneven-aged harvest), the amount of basal area remaining after harvesting in uneven-aged units, proximity to special treatment areas (for example, WLPZs

and nest site buffer areas), and the post-harvest existence of special elements (for example, large trees) requiring protection.

Site Preparation. Site preparation on Green Diamond forestlands could entail broadcast burning of entire harvesting units for purposes of removing concentrations of logging slash and other debris, reducing herbaceous competition, and exposing mineral soil to provide greater planting or seeding access to the site. Elimination of larger slash and debris would also eliminate potential fuel for wildfire, thereby reducing the fire hazard during the life of the future stand. Control of existing unwanted vegetation may also be facilitated through use of contact and translocated herbicides. Herbicides and adjuvants used on Green Diamond forestlands would continue to be applied consistent with the EPA registration requirements and other applicable laws or court-ordered mandates. Harvested units are usually burned in early fall to mid-winter months after slash and competing vegetation have thoroughly dried and a significant amount of rain has fallen to minimize the risk of uncontrolled fires. Burning is also conducted in early spring before fuels dry excessively. Under this alternative, these practices would continue and would be implemented in accordance with local air quality regulations. Broadcast burning would be concentrated on even-aged regeneration units; brush piles could also be used in uneven-aged areas. Pursuant to Green Diamond's 1992 NSO HCP, however, burning limitations would apply adjacent to set-aside and other sensitive owl habitat retention areas (for example, WLPZs).

Planting. Green Diamond would continue to replant each even-aged harvesting unit with approximately 300 to 500 redwood and Douglas-fir seedlings per acre in the first planting season (winter) after harvesting is completed. Seedlings would be planted 10 to 12 feet apart. Many regenerated areas would contain at least 1,000 seedlings per acre 2 years after planting, reflecting the effects of adjacent seed fall and redwood stump sprouting. Pursuant to the CFPRs, stocking surveys would be conducted and the area replanted if needed to achieve desired results.

For uneven-aged regeneration units where single tree and group selection are employed, interplanting of coniferous species could occur. These areas would generally be planted with tree species representative of the original stand and in numbers necessary to meet stocking requirements.

Vegetation Control and Stand Growth Enhancement. Green Diamond would continue to strive for a long-term stocking level of approximately 100 to 200 trees per acre, with a species composition similar to that previously occupying the site. In order to effect maximum growth in the shortest period of time, newly established stands may receive a variety of treatments subsequent to planting. These treatments would generally be initiated at the end of the second growing season and continue until the stand is approximately 35 years of age, and include chemical treatment of invasive and competing brush and herbaceous species, as well as precommercial and commercial thinning of overstocked stands. Depending on growth performance, stands may also be fertilized to enhance growth.

Herbicides. A list of all herbicides and adjuvants used on Green Diamond forestlands and the method of application are contained in Appendix B. These products are approved for forestry use and are registered by the California Department of Pesticide Regulation (CDPR) for use in forestry. In addition, EPA is responsible for regulating the sale, distribution, and use of herbicides under the Federal Insecticide, Fungicide, and Rodenticide Act. Decisions

whether to approve (register) an herbicide for sale or distribution are based on a risk/benefit standard that weighs risks to humans and the environment, considering economic, social, and ecological costs and benefits from use of the product. Herbicide application on Green Diamond lands is divided into two main categories: hand (ground) and aerial. Their use is governed by manufacturer's label specifications, the guidance provided by EPA and the CDPR, and Green Diamond's own best management practices (BMPs). In addition, site-specific application requires (1) a written recommendation of a pest control adviser (PCA), (2) supervision of a State-certified applicator, and (3) inspection by and reporting to the county agricultural commissioner.

Green Diamond BMPs for ground and aerial application of herbicides require:

- Notification to adjacent landowners living within 300 feet of a spray area or within 1,000 feet downstream of the treatment area prior to herbicide use
- Routine inspections by Green Diamond personnel in addition to county agricultural inspections
- Prohibitions against foliar treatments when wind speeds exceed 5 and 10 miles per hour for aerial and ground applications, respectively, on the spray site
- Maintenance of an untreated buffer on designated Class I and Class II watercourses at the distance prescribed for WLPZs and RMZs for ground applications, or within a 100-foot horizontal buffer zone of a Class I or II watercourse when aerially applied
- Maintenance of an untreated 100-foot horizontal buffer zone adjacent to all flowing water when aerially applied
- Prohibitions against helicopters carrying herbicides flying over Class I or Class II watercourses (if reasonably avoidable)

These BMPs are generally voluntary, but in some instances are attached as conditions to the spray permit.

Green Diamond currently applies herbicides to approximately 1 to 3 percent of its California ownership in any given year. This level of treatment converts to a range of 4,500 to 13,700 acres per year. Additionally, 50 to 100 miles of rights-of-way may be treated annually to control roadside vegetation. The use of herbicides for purposes of enhancing tree growth and controlling competing brush vegetation in even-aged regeneration units and roadside areas would continue under the No Action Alternative.

Fertilizers. Green Diamond periodically applies fertilizer to young forest stands. Treated stand ages typically vary from about 25 to 35 years old, and the fertilizer is aerially applied using helicopters. Treatment to date has been limited to nitrogen applied as urea in pill form. Application rates are nominally at 200 pounds of nitrogen per acre. Stands treated in the younger age classes may receive a second treatment 7 to 10 years before rotation.

The use of fertilizers for purposes of enhancing tree growth and controlling competing brush vegetation in even-aged regeneration units and roadside areas would continue under the No Action Alternative.

Pruning and Cone Collection. Some pruning activity would continue to occur under this alternative. Cone collection activities would also continue in both even-aged and uneven-aged stands under the No Action Alternative.

Fire Prevention and Suppression. Under the No Action Alternative, fire prevention would continue to be practiced by Green Diamond when and where necessary. This would include removal of logging slash from forestlands within 100 feet of public roads, control of public access to the forest, limitation or suspension of harvesting activities during periods of high fire danger, and prescribed burning for purposes of reducing fuel loads on the forest floor.

Fire suppression activities might also be required periodically to fight fires. Depending on the location and characteristics of a particular fire, these activities would be supervised by CDF or the U.S. Forest Service as necessary and might include constructing firelines by hand or bulldozer, lighting backfires, applying aerial fire suppressants, and felling trees or snags.

2.1.1.3 Road and Landing Construction, Reconstruction, and Maintenance

New road and landing construction might involve timber felling and removal in the road or landing right-of-way. Construction and major reconstruction activities might include excavation, filling, realignment, and recontouring of roads; installation of erosion control facilities and structures; dust abatement; road surface enhancement, such as rocking; and soil stabilization.

All new roads and landings would be constructed in accordance with practices specified in the CFPRs plus additional Green Diamond operational policies and guidelines. The location, design, timing, and construction standards of new (and upgraded) roads and landings would be generally governed by the techniques described in Weaver and Hagans (1994). Road and landing construction, reconstruction, and maintenance frequently require the application of water to road and landing surfaces. Under this alternative, water would be provided by water trucks that pump water from streams, reservoirs, lakes, and ponds located on Green Diamond forestlands. Road and landing construction, reconstruction, and maintenance may also involve the surfacing of soil roads with rock, lignin, pavement, or other surface treatments. These alternative road surface treatments would also continue as necessary under the No Action.

Historically, road and landing construction, reconstruction, and maintenance within areas outside of THP boundaries have generally occurred in an opportunistic manner to take advantage of the proximity of current THP operations and heavy equipment availability within the local area. Some activities, on the other hand, such as control of roadside vegetation, have required preparation and implementation of long-term plans. These practices would continue under the No Action Alternative.

Currently, approximately 4,000 miles of road exist and are in active use on the Green Diamond ownership. Under the No Action Alternative, there would be a slight net increase in the total number of miles of newly constructed road over the next 50 years; the number of miles of new road construction would exceed the number of miles of roads abandoned. Green Diamond would continue its existing practice of decommissioning non-management roads, and fixing road-related sediment sources, where they are appurtenant to THPs being operated by Green Diamond.

2.1.1.4 Monitoring and Research Activities

As part of the THP process and other regulatory and management regimes, including the NSO HCP, Green Diamond conducts a number of research and monitoring activities. These include compliance and effectiveness monitoring, wildlife surveys, environmental assessments, and watershed studies (for example, in the TMDL context).

2.1.2 Green Diamond's Other Operations and Activities

In addition to forest management operations noted in Section 2.1.1, other activities would be undertaken by Green Diamond and by third parties pursuant to Green Diamond authorization (for example, leases, easements, and licenses) under this alternative. Such activities would be consistent with the zoning of Green Diamond's lands as TPZ. Under California's Timberland Productivity Act, TPZ zoning is for growing and harvesting of timber and for designated "compatible uses." Compatible uses on the Green Diamond forestlands include:

- Commercial and non-commercial development and use of local rock pits and quarries
- Water use
- Harvesting and transportation of minor forest products
- Public recreation activities
- Watershed, fish and wildlife enhancement, and monitoring
- Maintenance and administrative use of roads

2.1.2.1 Rock Pits and Quarries

Under the No Action Alternative, Green Diamond would quarry rock from several rock (borrow) pit locations throughout its ownership to obtain road surfacing or filling material. These pits typically would be smaller than 2 acres. Because these pits would be excavated for purposes of road construction and maintenance associated with timber harvesting and forest management and are located more than 100 and 75 feet from Class I and Class II watercourses, respectively, they would be exempt from regulation under the Surface Mining and Reclamation Act (SMRA) as administered by the California Division of Mines and Geology.

Green Diamond would also continue extracting instream gravel from several locations throughout the ownership in compliance with permitting requirements of the CDFG.

2.1.2.2 Water Use

Onsite facilities rely on water delivery from many reservoirs, lakes, and ponds located on Green Diamond forestlands. Under the No Action Alternative, Green Diamond would continue to pump water from these sources.

2.1.2.3 Minor Forest Products

Minor forest products (for example, firewood, burls, poles, stumps, and split wood products) are currently harvested from and transported over Green Diamond lands in accordance with Green Diamond and State law permitting requirements. These products are either removed from and transported over Green Diamond lands in conjunction with active timber harvesting activities or removed from inactive landings subsequent to cessation of

timber harvesting operations during non-winter operating periods. These activities would continue under this alternative.

2.1.2.4 Public Recreation

Green Diamond currently provides recreational opportunities on its forestlands to some groups and individuals, subject to a written entry permit. Entry for these activities, which include hunting, fishing, camping, picnicking, hiking, motorcycle use and target shooting, are permitted on a limited basis within specified areas. Under the No Action Alternative, Green Diamond would continue to provide these recreational opportunities subject to Green Diamond's discretion and its permitting requirements.

2.1.3 Wildlife and Fish Habitat

This Section summarizes the practices and regulatory requirements that would be implemented by Green Diamond under the No Action Alternative with the potential to affect wildlife and fish habitat.

2.1.3.1 Snags

Under this alternative, Green Diamond would retain snags greater than 16 inches diameter at breast height (dbh) and greater than 50 feet tall that are not merchantable and do not pose a safety or fire hazard. Future recruitment of snags would occur through the retention of old-growth elements in the 39 set-aside areas, minimum overstory canopy retention standards within the WLPZ or RMZ of Class I and Class II watercourses, and retention of a variety of tree sizes and species within WLPZs or RMZs as noted above.

Snags would also be recruited pursuant to species-specific measures noted in Section 2.1.4 for listed species.

2.1.3.2 Hardwoods

Under the No Action Alternative, Green Diamond generally would not harvest hardwoods in WLPZs. Under special circumstances, Green Diamond might remove hardwoods in WLPZs to enable conifer regeneration, enhance riparian function, establish cable corridors for timber harvesting operations, or ensure safety. Outside of WLPZs, Green Diamond would retain hardwoods in all uneven-aged silvicultural areas, except where they may impede the regeneration of conifers (see paragraph below). Green Diamond's tree retention standard in even-aged management units would be one to two trees per acre. When hardwoods occur in THPs, Green Diamond would retain them in range of diameter classes and would attempt to retain them in equal ratio to conifers. In hardwood-dominated stands, two merchantable hardwood trees per acre would be retained in even-aged management units following timber harvesting. In all harvested areas, hardwood trees that show evidence of substantial wildlife use (for example, whitewash, acorn granaries, old raptor nests) or that repeatedly provide a superior crop of acorns would also have priority for retention.

Green Diamond would continue under the No Action Alternative to remove hardwoods where they impede the regeneration of conifers, subject to the retention standards noted in the paragraph above. Green Diamond may take measures to reduce the competitive influence of tanoak and madrone in stands where hardwood competition threatens the survival of the conifer seedlings. These species would be treated with herbicides or by

mechanical means. Green Diamond would not use herbicides within WLPZs along Class I and Class II watercourses or within the equipment limitation zones (ELZs) or WLPZs of Class III watercourses where water is present.

2.1.3.3 Riparian Habitat

Measures that would be implemented under the No Action Alternative for riparian habitats adjacent to Class I, II, and III watercourses, plus ponds, swamps, seeps, springs, and bogs, are described in detail below.

Class I Watercourses. Existing CFPRs require the establishment of WLPZs immediately adjacent to streams and lakes. Under the No Action Alternative, standard minimum zone widths for Class I (fish-bearing) watercourses are 150 feet, and can be increased depending on the percent slope of areas immediately upslope of these streams. Pursuant to Green Diamond's NSO HCP, Green Diamond widens WLPZs immediately adjacent to Class I watercourses wherever possible to take advantage of natural conditions.

Within a Class I WLPZ, at least 85 percent overstory canopy would be retained within 75 feet of the watercourse or lake transition line; at least 70 percent overstory canopy would be retained within the remainder of the WLPZ. The residual overstory canopy after timber harvesting would be composed of at least 25 percent of the overstory conifers existing prior to harvesting. Under No Action, this requirement would be augmented by additional measures identified in the Green Diamond NSO HCP that provide for retention of a variety of tree sizes (height and diameter) and species within WLPZs, with priority given to wildlife habitat trees.

Single tree selection harvesting would be Green Diamond's preferred harvesting method within the WLPZ of Class I watercourses. Green Diamond would retain a variety of tree sizes (height and diameter) and species within Class I WLPZs, with priority given to wildlife habitat trees and down woody material.

In addition to prescriptive measures, the design of site-specific measures within Class I WLPZs by Green Diamond foresters, as well as review of these measures by a multi-disciplinary review team, would be included in the No Action Alternative.

Class II Watercourses. Watercourse and lake protection measures for streams where aquatic habitat exists for non-fish aquatic species (Class II) would include minimum, variable WLPZ widths of 50 to 100 feet, depending on the adjacent hillslope gradient and associated erosion hazard rating. At least 50 percent total canopy closure would be retained subsequent to any commercial harvesting. However, at least 70 percent minimum total canopy closure would be retained post-harvest where it exists within the WLPZ prior to timber harvesting. Pursuant to Green Diamond's NSO HCP, Green Diamond would widen WLPZs immediately adjacent to Class II watercourses wherever possible to take advantage of natural conditions and on the basis of site-specific review where other special circumstances (e.g., geologic instabilities) warrant.

Existing regulations require that the residual overstory canopy after timber harvesting be composed of at least 25 percent of the overstory conifers existing prior to harvesting. This requirement would be augmented by additional measures identified in the Green Diamond

NSO HCP that provide for retention of a variety of tree sizes (height and diameter) and species within WLPZs, with priority given to wildlife habitat trees.

Single tree selection harvesting would be Green Diamond's preferred harvesting method within the WLPZ of Class II watercourses where more than 50 percent canopy exists prior to timber operations.

Class III Watercourses. Protection for Class III streams where no aquatic life is present but the stream is capable of transporting sediment to a Class I or Class II watercourse would include establishing 25- to 50-foot ELZs, depending on the adjacent hillslope gradient and associated erosion hazard rating. To the extent allowed by existing regulations, timber harvesting would still continue in ELZs, within which heavy equipment use would be limited. Under some circumstances, WLPZs could be established for Class III watercourses in lieu of ELZs. WLPZ widths and WLPZ protection measures for Class III watercourses would be determined from a joint on-site inspection by Green Diamond foresters and the THP review team. In the event a WLPZ is designated for a Class III watercourse, at least 50 percent of the understory vegetation present before timber operations would be retained as cover subsequent to any commercial harvesting. Even-aged management would be Green Diamond's preferred regeneration method within the ELZ of Class III watercourses; these areas are replanted subsequent to harvesting.

Ponds, Swamps, Bogs, and Seeps. Ponds, swamps, bogs, and seeps would receive Class II protection as described above. Springs would also receive Class II protection provided that they contain habitat for non-fish aquatic species.

2.1.4 Measures to Protect Federal- and State-Listed Species

Under the No Action Alternative and the terms of the 1992 NSO HCP and ITP, take of up to 50 northern spotted owl pairs over the term of the ITP would continue to be permitted provided such action is incidental to a covered activity, such as timber harvesting. For other listed species, Green Diamond would implement measures designed to avoid take of these listed species, including continuing to adhere to measures contained in the CFPRs (for example, for certain listed bird species, the CFPRs include nest protection and other measures designed to avoid take) and measures identified during the THP preparation and review process. Specific measures contained in the CFPRs or developed pursuant to the THP process that are designed for the purpose of avoiding take of other listed species and minimizing and mitigating environmental impacts to such species and their habitats would be superseded by measures contained in the NSO HCP and its accompanying ITP, thus minimizing and mitigating the impacts of incidental take and complying with other requirements of the ESA. Green Diamond would remain subject to the take prohibition for other listed species that are not covered by the NSO HCP and ITP but that may occur within the Action Area. If a species is also State-listed under CESA, Green Diamond would not undertake any HCP measures that are likely to take this species unless it also receives incidental take authorization under State law.

2.1.4.1 Northern Spotted Owl

The northern spotted owl is listed as threatened under the Federal ESA. Since surveys for northern spotted owls were initiated on Green Diamond lands in 1989, more than 200 northern spotted owl nest sites or activity centers have been identified throughout its

ownership in northern California. Under the No Action Alternative, Green Diamond would continue to comply with measures contained in its NSO HCP and associated IA that provide for the legal incidental take of up to 50 pairs of northern spotted owls in connection with timber harvesting and forest management operations. When 50 owl pairs have been taken, Green Diamond would incorporate site-specific measures into THPs, as necessary, for the purpose of avoiding unauthorized take of this species and mitigating or avoiding significant environmental impacts.

2.1.4.2 American Peregrine Falcon

The peregrine falcon is listed as endangered under CESA. Five peregrine falcon nest sites have been documented on or near Green Diamond lands. Under the No Action Alternative, Green Diamond would implement CFPR prescriptive protection measures specific to the species and incorporate into THPs site-specific measures, as necessary, for the purpose of avoiding unauthorized take and mitigating or avoiding significant environmental impacts.

2.1.4.3 Bald Eagle

Bald eagles are listed as threatened under the Federal ESA and endangered under CESA. Two bald eagle nest sites and frequent winter use in all major drainages have been documented on Green Diamond lands. Under the No Action Alternative, Green Diamond would remain subject to the take prohibition for this species. Green Diamond would seek technical assistance from USFWS or CDFG, or both, to develop and implement site-specific measures as necessary for the purpose of avoiding unauthorized take and mitigating or avoiding significant environmental impacts.

2.1.4.4 Bank Swallow

The bank swallow is listed as threatened under CESA. Bank swallows have not been observed on the Green Diamond ownership. Under the No Action Alternative, however, if bank swallows were found on Green Diamond lands, Green Diamond would incorporate site-specific measures into THPs as necessary for the purpose of avoiding unauthorized take and mitigating or avoiding significant environmental impacts.

2.1.4.5 Little Willow Flycatcher

The little willow flycatcher is listed as endangered under CESA. One willow flycatcher breeding site is known to occur in the Klamath region of Green Diamond's ownership. Under the No Action Alternative, Green Diamond would incorporate site-specific measures into THPs as necessary for the purpose of avoiding unauthorized take and mitigating or avoiding significant environmental impacts.

2.1.4.6 Marbled Murrelet

The marbled murrelet is listed as threatened under the Federal ESA and endangered under CESA. From past surveys, the marbled murrelet is known to occur in a number of residual old-growth stands in the Klamath region and one second-growth stand with residual structure in the Little River drainage. Under the No Action Alternative, Green Diamond would incorporate site-specific measures into THPs as necessary for the purpose of avoiding unauthorized take and mitigating or avoiding significant environmental impacts.

Approximately 1,400 acres of Green Diamond's current ownership are within the boundaries of a marbled murrelet critical habitat unit (CHU) (CA-03-a). Portions of adjacent lands in public ownership, such as the Redwood National and State Parks and the Headwaters Reserve, have been designated as marbled murrelet critical habitat by USFWS. However, Green Diamond is not seeking coverage for the harvest of trees in any portion of the Action Area that has been designated as critical habitat for the marbled murrelet when the harvest of those trees would affect a "primary constituent element" of critical habitat for the marbled murrelet, as defined in 50 CFR 17.95).

2.1.4.7 Western Snowy Plover

The western snowy plover is listed as threatened under the Federal ESA. Western snowy plovers are known to nest on beach and dune habitats adjacent to but not on coastal Green Diamond land near the mouth of Little River. Snowy plovers currently nest on gravel bars of the Eel River upstream to near the mouth of the Van Duzen River, and on coastal beaches and dune systems in northwest California. Western snowy plovers have not been recorded from Green Diamond lands. Under the No Action Alternative, if snowy plovers were found on Green Diamond lands, Green Diamond would incorporate site-specific measures into THPs, as necessary, for the purpose of avoiding unauthorized take and mitigating or avoiding significant environmental impacts.

2.1.4.8 Coho Salmon, Chinook Salmon, and Steelhead

The coho salmon (Southern Oregon/Northern California Coast ESU), Chinook salmon (California Coastal ESU), and steelhead (Northern California DPS) are Federally listed as threatened under the Federal Endangered Species Act (ESA). The population segment of coho salmon from Punta Gorda, California to the northern border of California is listed as threatened under the California Endangered Species Act (CESA). Under the No Action Alternative, Green Diamond would remain subject to the prohibition on unauthorized take of these species and other fish species listed (or proposed for listing under State law) in the future. Measures presently include implementation of watercourse and lake protection and other operational guidelines. Further, Green Diamond would continue to incorporate site-specific measures into THPs as necessary for the purposes of avoiding unauthorized take and mitigating or avoiding significant environmental impacts.

2.1.4.9 Tidewater Goby

The tidewater goby is listed as endangered under the Federal ESA, and occurs primarily in shallow lagoons and lower stream reaches in the Action Area where waters are brackish to fresh and fairly slow moving. Under the No Action Alternative, Green Diamond would remain subject to the prohibition on unauthorized take of this species. Measures implemented include watercourse and lake protection and other operational guidelines. Further, Green Diamond would continue to incorporate site-specific measures into THPs, as necessary, for the purposes of avoiding unauthorized take and mitigating or avoiding significant environmental impacts.

2.1.5 Measures for Other Species

Under the No Action Alternative, Green Diamond would continue to implement measures designed to mitigate or avoid significant impacts to other unlisted species considered

“sensitive” by the Board of Forestry (osprey, northern goshawk, golden eagle, great blue heron, and great egret). Green Diamond would implement CFPRs specific to these species and incorporate site-specific measures into THPs as necessary, to avoid or mitigate potentially significant environmental effects. Under the No Action Alternative, THPs would also include a cumulative effects analysis that would address past and future impacts on biological resources. This analysis would include discussion of the following topics within the context of impacts to fish and wildlife: (1) structural diversity within streams; (2) instream and upslope downed woody debris; (3) riparian vegetation; (4) presence and recruitment of snags, dens, and nest trees; (5) presence of multistoried tree canopies; hardwood cover; (6) presence of late seral forest characteristics and late seral continuity; and (7) presence of other special wildlife habitat elements.

Green Diamond would, as appropriate and with input from the multidisciplinary review team for THPs, other interested agencies, and the public, incorporate into THPs other site-specific measures designed to reduce significant individual and cumulative impacts to sensitive and other species. In addition, Green Diamond would remain subject to State and Federal laws, such as the Migratory Bird Treaty Act, Bald Eagle 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.

2.2 Proposed Action (Amended Northern Spotted Owl Habitat Conservation Plan and Incidental Take Permit)

Under the Proposed Action, Green Diamond would continue to conduct timber harvesting and related operations in accordance with existing State and Federal regulations, including the CFPRs, the Green Diamond NSO HCP and ITP, and the operational and policy management actions currently being implemented by Green Diamond. In addition, Green Diamond would amend its HCP to: (1) reinstate until either: (a) the eight additional takes authorized under the Amended ITP have occurred, or (b) September 16, 2012, whichever is later, its monitoring and management obligations, as described in the IA and including no-take restrictions, for a special management area (in addition to the existing set-aside areas) consisting of those 20,310 acres of the original special management area which are still owned by Green Diamond; (2) implement new research on the habitat overlap and interaction between the barred owl and the northern spotted owl on the covered lands; and (3) provide an HCP review in 2012, and (4) provide a revised NSO survey and response protocol for when barred owls are present and may interfere with the detection of NSO. Under this alternative, USFWS would approve an amendment to the original ITP, authorizing the incidental take of an additional eight owl pairs, in association with the amended HCP, with an HCP review scheduled for 2012 that will include: (1) a comparison of actual and estimated levels of take; (2) a comparison of actual and estimated distribution of spotted owl habitat; (3) a reevaluation of the biological basis for the conservation strategy based on the data collected through the research program and other sources; (4) a detailed analysis of the efficacy and continued need for the set-asides; (4) an estimate of spotted owl displacement (take) for the remainder of the permit period; (5) an analysis of the habitat overlap of and interactions between barred owls and spotted owls. The permitted total for incidental takes would be the original 50 pairs plus eight additional owl pairs. Under the Proposed Action, conservation and mitigation measures would continue to include habitat

management, nest site protection, owl research and surveys, set-asides (timber harvest eliminated from 13,242.5 acres), and training programs.

2.2.1 Timber Harvesting and Forest Management Activities

General forest management and timber harvesting activities noted under the No Action Alternative would continue under this alternative, but including timber harvest in suitable habitat around eight additional NSO nest sites. The use of fertilizers and herbicides for purposes of enhancing tree growth and controlling competing brush vegetation in even-aged regeneration units and roadside areas would continue under the Proposed Action. As with the No Action Alternative, the use of fertilizers and herbicides would continue to not be covered activities under the ITP.

2.2.2 Other Operations and Activities

Other operations and activities noted under the No Action Alternative would continue under the Proposed Action.

2.2.3 Wildlife and Fish Habitat

Under the Proposed Action, management practices and regulatory requirements that have the potential to affect wildlife and fish habitat, as described under the No Action Alternative relative to snags, hardwoods, and riparian habitat (Sections 2.1.3.1 through 2.1.3.3), would continue to be implemented by Green Diamond under the Proposed Action.

2.2.4 Measures to Protect Federal- and State-Listed Species

Under the Proposed Action, management practices and regulatory requirements as described for the No Action Alternative relative to Federal- and State-listed species (Section 2.1.4) would continue to be implemented by Green Diamond under the Proposed Action, except that an amended NSO HCP and associated ITP would provide for the legal incidental take of up to 58 pairs of northern spotted owls in connection with timber harvesting and forest management operations.

As part of the amended NSO HCP, Green Diamond would reinstate its monitoring and management obligations, as described in the IA and including no-take restrictions, within a special management area (in addition to the existing set-asides) consisting of those 20,310 acres of the original SMA which are still owned by Green Diamond. These obligations would continue until either: (1) the eight additional takes authorized under the Amended ITP have occurred, or (2) September 16, 2012, whichever is later. Within the reinstated SMA, Green Diamond may carry on any activity which does not result in take of spotted owls. Green Diamond would also conduct surveys and monitor spotted owls within the SMA as outlined in the HCP protocols.

Under the Proposed Action, Green Diamond would conduct a review in 2012 that would include: (1) a comparison of actual and estimated levels of take; (2) a comparison of actual and estimated distribution of spotted owl habitat; (3) a reevaluation of the biological basis for the conservation strategy based on the data collected through the research program and other sources; (4) a detailed analysis of the efficacy and continued need for the set-asides;

(4) an estimate of spotted owl incidental take for the remainder of the permit period; (5) an analysis of the habitat overlap of and interactions between barred owls and spotted owls.

USFWS (2004) indicated that barred owls may pose a significant threat to northern spotted owls because of competition for nest sites, territory, and prey items, and because of potential predation of barred owls on spotted owls. However, further research regarding this topic is required before definitive conclusions can be drawn about the nature of interactions between these two owl species, including those interactions on managed landscapes such as Green Diamond's ownership. Because of the potential threat posed by barred owls, additional research on habitat overlap and interaction between the barred owl and spotted owl on Green Diamond lands should lead to a better understanding of how barred owls may affect future management for the northern spotted owl on commercial timberlands.

The research program will likely also involve surveys for and radio marking (telemetry) of barred owls. Telemetry will provide opportunities to collect data on habitat selection, home range, diet, and competitive interactions between barred owls and spotted owls on Green Diamond lands. In 2006, the USFWS convened a team to develop a recovery plan for the northern spotted owl, which will identify goals, criteria and management actions necessary for the survival and recovery of the northern spotted owl. This plan is expected to address barred owls in the context of northern spotted owl recovery. A final, peer-reviewed recovery plan is scheduled for completion in November 2007. Green Diamond's research and management program on the barred owl will be consistent with recommendations identified in the final northern spotted owl recovery plan. Green Diamond will also revise survey and response protocols for when barred owls are present and may interfere with the detection of northern spotted owls, as follows:

- When timber harvest plan (THP) units occur within 0.5 miles of a historic spotted owl nest site or activity center that is occupied by barred owls, Green Diamond will conduct at least one stand search protocol visit to assess site occupancy of spotted owls. Biologists will conduct a thorough visit of the stand by walking the THP unit and a 500-foot buffer of suitable habitat surrounding the unit, and will look for sign from owls (roosts with whitewash, pellets, feathers, etc.) and will not attempt to elicit vocal responses from spotted owls.
- Green Diamond will seek technical assistance from the USFWS to determine whether an additional time period and survey effort is necessary to preclude a spotted owl nest site from consideration for potential displacement if barred owls occupy a spotted owl territory that was formerly: (a) newly colonized by a pair that nested, (b) perennial, or (c) newly discovered and the spotted owls have not been detected for at least three breeding seasons. Green Diamond may exercise use of a displacement (incidental take) at such sites within the three-year abandonment period.

2.2.5 Measures for Other Species

Green Diamond, under the Proposed Action, would continue to implement conservation measures, management practices, and regulatory requirements as described under the No Action Alternative (Section 2.1.5).

2.3 Alternative A (Amended Northern Spotted Owl Habitat Conservation Plan and Incidental Take Permit with Elimination of Three Set-Aside Areas)

Under Alternative A, Green Diamond would continue to conduct timber harvesting and related operations in accordance with existing State and Federal regulations, including the CFPRs, the Green Diamond NSO HCP, and the operational and policy management actions currently being implemented by Green Diamond. In addition, as for the Proposed Action, Green Diamond would amend its HCP to: (1) reinstate until either: (a) the eight additional takes authorized under the Amended ITP have occurred, or (b) September 16, 2012, whichever is later, its monitoring and management obligations, as described in the IA and including no-take restrictions, for a special management area (in addition to the existing set-aside areas) consisting of those 20,310 acres of the original special management area which are still owned by Green Diamond; (2) implement new research on the habitat overlap and interaction between the barred owl and the northern spotted owl on the covered lands; and (3) provide an HCP review in 2012, and (4) provide a revised NSO survey and response protocol for when barred owls are present and may interfere with the detection of NSO. The permitted incidental take total would be the original 50 pairs plus eight additional pairs. Under Alternative A, conservation and mitigation measures would continue to include habitat management, nest site protection, research, set-asides (timber harvest eliminated from 12,339.2 acres), and training programs. This scenario would be the same as for the Proposed Action.

In addition, under Alternative A, three set-aside areas would be released for harvest entry. The three set-aside areas are Wiregrass, Fawn Prairie, and Bear Creek. The Wiregrass and Fawn Prairie set-asides are located in Green Diamond's Korbelt operating area and the Bear Creek set-aside is located in the Klamath operating area. The acreage of each set-aside is as follows: Wiregrass – 229.3 acres; Fawn Prairie – 242.4 acres; and Bear Creek – 431.6 acres. The total area of the three set-asides is 903.3 acres, which would leave 12,339.2 acres of the original 13,242.5 set-aside acres remaining in no harvest set-asides, or a 6.8 percent reduction in set-aside area and no loss of owl sites. Release of the Bear Creek set-aside would reduce the Klamath set-aside area by 14.8 percent and release of the two Korbelt set-asides would reduce the area by 4.6 percent.

2.3.1 Timber Harvesting and Forest Management Activities

General forest management and timber harvesting activities noted for the Proposed Action would be the same under this alternative, except that the three set-aside areas noted above (Wiregrass, Fawn Prairie, and Bear Creek) would be released for prospective harvest entry.

2.3.2 Other Operations and Activities

Under Alternative A, other operations and activities would be the same as noted under the No Action Alternative and the Proposed Action.

2.3.3 Fish and Wildlife Habitat

Conservation measures for riparian habitat, large woody debris, snags, and hardwoods described for the No Action Alternative and the Proposed Action would be the same under this alternative.

2.3.4 Measures to Protect Federal- and State-Listed Species

Under Alternative A, management practices and regulatory requirements as described for the Proposed Action (Section 2.2.4) relative to Federal- and State-listed species would continue to be implemented.

2.3.5 Measures for Other Species

Green Diamond, under Alternative A, would continue to implement conservation measures, management practices, and regulatory requirements as described under the No Action Alternative (Section 2.1.5) and the Proposed Action (Section 2.2.5).

2.4 Alternatives Considered but Dismissed from Further Consideration

Other alternatives were considered by USFWS but not carried forward for detailed analysis during preparation of this EA. The alternatives considered but not carried forward are: (1) Proposed Action (ITP issuance) minus barred owl research; (2) Proposed Action (ITP issuance) plus West Nile virus research; (3) ITP coverage added for other terrestrial and aquatic species; and (4) a longer Permit term. These alternatives were not selected for detailed analysis because they do not meet USFWS' purposes and needs or the applicant's objectives, or they are beyond the scope of the EA.

2.4.1 Proposed Action minus Barred Owl Research

Barred owls may pose a significant threat to northern spotted owls because of competition for nest sites, territory, and prey items, and because of potential predation of barred owls on spotted owls (USFWS, 2004). "In areas where timber harvesting has modified northern spotted owl habitat, barred owls may have a competitive advantage over northern spotted owls (Dark et al., 1998), which prefer structurally complex older forests for nesting and roosting (Barrows, 1981; Forsman et al., 1984)." However, further research regarding this topic is required before definitive conclusions can be drawn about the nature of interactions between these two owl species, including those interactions on managed landscapes such as Green Diamond's ownership. Because of the potential threat posed by barred owls, an amended ITP to Green Diamond's application for additional incidental take of owl pairs will be linked to additional research on habitat overlap and interaction between the barred owl and spotted owl. For these reasons, this alternative was not carried forward for detailed analysis.

2.4.2 Proposed Action plus West Nile Virus Research

West Nile Virus (WNV) is an arthropod-borne virus transmitted primarily by mosquitoes. Birds are the primary (reservoir) host of WNV, although other mammals, including humans

(incidental hosts), may be infected and develop disease. WNV first appeared in the U.S. in New York City in 1999. By the end of 2004, WNV had spread across the continental U.S. (except for Washington State), causing human, equine, and avian mortality (U.S. Centers for Disease Control and Prevention [CDC], 2006). By July 2005, WNV was found in the U.S. in dead wild birds of over 200 species, including eight owl species and 14 additional raptor species (CDC, 2006). Mortality rates among infected birds vary by species, with corvids (such as jays and crows) especially susceptible. Birds can develop immunity to WNV following exposure.

The extent to which northern spotted owls will be affected by WNV is unknown.

This alternative including research on WNV infection and mortality rates in northern spotted owls was proposed during internal scoping, but not enough information is currently available to carry it forward for detailed analysis.

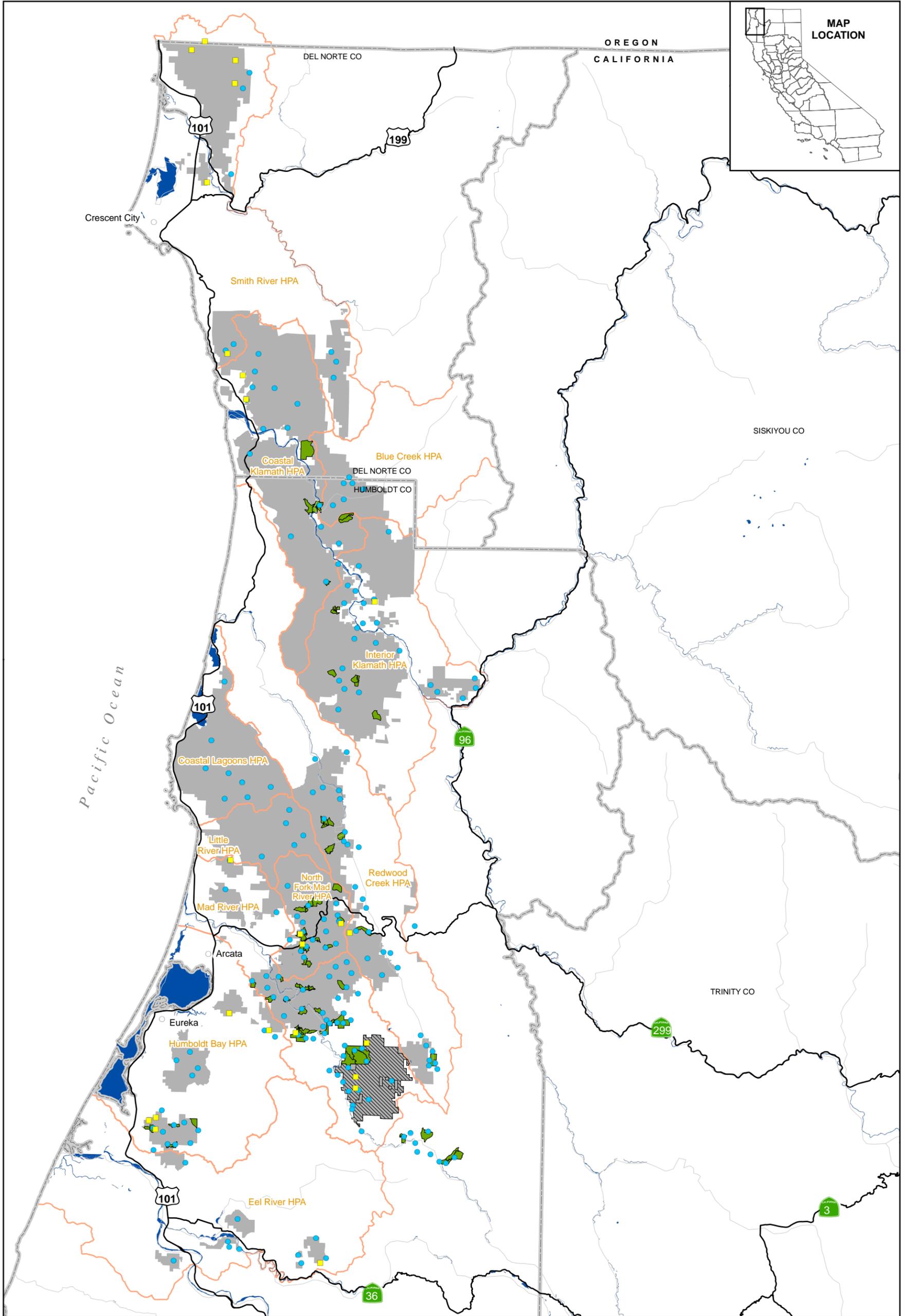
2.4.3 Extensive Terrestrial and Aquatic Species Coverage

Coverage of additional terrestrial and aquatic species was not considered as an alternative to the proposed amendment of the NSO HCP for the following reasons: (1) as discussed in Section 1.6.3.2 above, Green Diamond has already developed a separate AHCP/CCAA for several aquatic species, and USFWS and NMFS have issued incidental take authorization for these species in association with the AHCP/CCAA; (2) identifying terrestrial species as additional Permit species would require developing species-specific, upland prescriptions in the HCP. These prescriptions would be in addition to those developed for the northern spotted owl in Green Diamond's NSO HCP. While this approach would cover a broader range of species than is provided in Green Diamond's NSO HCP, the multiple species HCP would require data on each of the other species. Although Green Diamond is open to the idea of developing an HCP that would cover multiple terrestrial species, collection of the additional data and processing of required Federal (and/or State) permits would postpone both amendment of the ITP for owls, and implementation of conservation measures currently being proposed under the Proposed Action.

2.4.4 Longer Permit Term

As discussed in Section 2.2, the Federal action assessed in this EA is the issuance of an amended ITP by USFWS to Green Diamond. The amended ITP would authorize the incidental take of an additional eight owl pairs over the term of the existing Permit, scheduled to terminate in 2022. The term of the original Permit is 30 years.

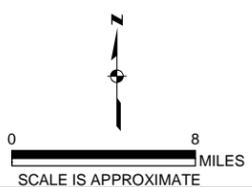
A different Permit term for the ITP assessed in this EA (longer than 30 years) was considered but not carried forward. The level of additional incidental take requested in the proposed amendment is relatively small, and would not provide much operational flexibility to Green Diamond beyond the current permit term. Also, it would be difficult to evaluate the conservation value of HCP measures so far into the future, in particular because of uncertainty about the magnitude of threats to northern spotted owls, most notably the barred owl range expansion.



LEGEND

■ BARRED OWL SITES	— RIVERS
● NORTHERN SPOTTED OWL SITES	▭ COUNTY BOUNDARIES
○ CITY	— MAJOR ROADS
▨ SPECIAL MANAGEMENT AREA	▭ HYDROGRAPHIC PLANNING AREAS
■ SET-ASIDES	■ MAJOR WATER BODIES
■ ACTION AREA	

SOURCE: GREEN DIAMOND, 2006



**Figure 2.1-1
Set-Asides, Special Management Area,
and 2003-2005 Northern Spotted Owl and
Barred Owl Sites**

Affected Environment

3.1 Introduction

This chapter describes the affected environment for resources potentially affected by implementing the Proposed Action and the alternatives. The affected environment is referred to in this EA as the Action Area, which is the focus of the impacts analysis presented in Chapter 4. The Action Area includes the 416,533 acres consisting primarily of commercial timberlands owned by Green Diamond on the west slopes of the Klamath Mountains and the Coast Range in California, within the 11 HPAs referenced in Chapter 1 and as described in Appendix A. In addition to the Action Area lands analyzed in this EA, the regional setting as presented in some of the following Sections is described to provide an overall context for the analysis of the Action Area in Chapter 4.

The following resource categories were selected for detailed analysis in the EA:

- Section 3.2 – Geology, Geomorphology, and Mineral Resources
- Section 3.3 – Hydrology and Water Quality
- Section 3.4 – Aquatic Resources
- Section 3.5 – Vegetation/Plant Species of Concern
- Section 3.6 – Northern Spotted Owl
- Section 3.7 – Other Wildlife Species of Concern/Terrestrial Habitat
- Section 3.8 – Air Quality
- Section 3.9 – Visual Resources
- Section 3.10 – Recreational Resources
- Section 3.11 – Cultural Resources
- Section 3.12 – Land Use
- Section 3.13 – Social and Economic Conditions

Because no differences in noise effects are expected as a result of issuing the proposed incidental take permit, noise issues do not warrant further analysis.

3.2 Geology, Geomorphology, and Mineral Resources

3.2.1 Introduction

North coastal California includes some of the most rapidly eroding areas in the United States. Streams draining the area, such as the Eel River, have some of the highest suspended sediment loads per unit area recorded in the world (Judson and Ritter, 1964). One fundamental reason for this occurrence is the unstable geology of the Coast Range (California Department of Water Resources [CDWR], 1982). The following Sections describe the geology and geomorphology of the Action Area and provide a broad overview of geologic characteristics in the region.

3.2.2 Regional Geology

The Action Area is located mostly within California's Coast Range geologic province. The eastern margin of the northern part of the Action Area is within the Klamath Mountains geologic province. This province includes a complex of various geologic terranes that collectively are within the convergent margin of the North American plate. Within the individual provinces and terranes, geomorphic conditions vary widely.

On a regional scale, the bedrock in the Action Area is a composite of accreted oceanic rocks and pre- and post-accretionary plutonic rocks that are overlain in places by younger depositional strata. Locally, the bedrock can vary greatly, ranging from deeply weathered sandstone and mudstone, to metasedimentary rock, greenstone, and ultramafic bedrock.

The geologic structure of the region generally is dominated by a series of north to northwest trending faults. The faults correspond to topographic highs (such as the South Fork Mountain Fault) and topographic lows (such as the Grogan Fault). Numerous northwest-trending anticlines and synclines are associated with the faulting and also contribute to the shape of the landscape.

The extensive uplift of the region is well known. The height of the mountains and the high elevation of bedrock that is composed of marine sediments and ultramafic ophiolite sequences are the most obvious indicators of this uplift.

Accretion, deformation, and uplift of the region are ongoing today, as interactions continue among the Gorda, Pacific, and North American tectonic plates along the continental margin. Slip rates along the major thrust faults in the area are on the order of several millimeters per year (California Geological Service [CGS], formerly the California Department of Mines and Geology [CDMG], 1996).

The geology of the Klamath Mountains and Coast Range geologic provinces is described in greater detail in the Sections below. Seismic hazards and faults within or near both provinces are also discussed.

3.2.2.1 Coast Range Province

The majority of the Action Area (greater than 80 percent) is located within the Coast Range Province. The rocks of the Coast Range represent oceanic crust that was accreted to the continent beginning in the mid-Jurassic period (approximately 140 million years ago). Similar to the Klamath Mountains Province, the assemblages of the Coast Range terranes are fault bounded and exhibit a sequential east to west accretionary pattern. The Coast Range Province in the Action Area is dominated by the Franciscan Complex, which includes three major belts (Eastern, Central, and Coastal). Cashman et al. (1995) and McLaughlin et al. (2000) describe the rocks of these belts and the geologic terranes in further detail. In general, the most abundant types of rock units found within these terranes consist of layered and interlayered sequences of marine sandstone (i.e., greywacke sandstone), schist, mélangé, mudstone, shale, and other common rock types such as serpentinite, chert, and conglomerate, basalt, and Coast Range ophiolitic rocks. Because the Franciscan Complex includes rock units that vary greatly in lithology, structural style, and degree of metamorphism, the rocks in the complex are also described as belonging to a specific textural zone (Blake et al., 1967). Sedimentary deposits that formed in a variety of marine to

nonmarine environments overlie the late Cenozoic to late Mesozoic accreted terranes of the Franciscan Complex. These deposits (the Late Cenozoic post-accretionary Overlap Assemblage) are partly similar in age to the Franciscan basement rocks. However, the rocks are considerably less deformed, unmetamorphosed, and less lithified than the rocks of the Franciscan Complex (McLaughlin et al., 2000). The primary rock units that occur in the overlap assemblage within the Action Area are represented by the formations of the Wildcat Group and, to a lesser extent, the Bear River beds. In general, the Wildcat Group consists predominantly of a sequence of weakly to moderately well-lithified marine sandstone, siltstone, mudstone, and nonmarine sandstones and conglomerates.

3.2.2.2 Klamath Mountains Province

Less than 20 percent of the Action Area is located within the Klamath Mountains Province. At present, five major terranes of the Klamath Mountains are recognized, and several of these terranes are subdivided into two or more geologic units. Each terrane is bordered by major faults that represent lines or sutures where plate fragments are joined (Harden, 1998).

The rocks and terranes of the Klamath Mountains Province that underlie the Action Area include the Western Jurassic Belt and Western Paleozoic and Triassic Belt, as described below.

The rocks of the Western Jurassic Belt underlie the eastern margin of the Action Area. This belt represents the youngest accreted terranes within the Klamath Mountains Province. To the west, the rocks of the Western Jurassic Belt are separated from the rocks of the Coast Range by a major fault (the South Fork Mountain Thrust Fault).

The Western Paleozoic and Triassic Belt is located to the east of the Western Jurassic Belt. One terrane (Rattlesnake Creek) of this belt occurs within the Action Area. The Western Paleozoic and Triassic Belt is separated from the Western Jurassic Belt by a complex network of thrust faults.

Rocks that may occur within both the Klamath and Coast Range provinces include units of unconsolidated or weakly consolidated Quaternary and Tertiary materials such as terrace deposits, alluvial and colluvial materials, coastal sediments, and unusual occurrences of post-accretionary intrusive rocks (e.g., Coyote Peak diatreme).

3.2.2.3 Seismic Hazards and Faults in the Action Area

Northern coastal California and the adjacent offshore area constitute one of the most seismically active areas in the State (Cashman et al., 1995). This entire area is subject to earthquakes on several onshore faults and falls within the Cascadia subduction zone, an area thought to be capable of great (magnitude 8 to 9) earthquakes (CGS, 1996). The high level of tectonic activity in the region is also attributed to the proximity of the Mendocino triple junction (McKenzie and Morgan, 1969), an offshore boundary (located south of the Action Area) which separates three major crustal plates and is the northern terminus of the San Andreas Fault.

Several moderately active crustal faults (e.g., the Little Salmon, Mad River, Trinidad, and Fickle Hill faults) are located near or within portions of the Action Area.

3.2.3 Geomorphology

3.2.3.1 Landform Development and Soils

The topography of the Action Area is highly variable and consists of landforms ranging from steep terrain with deeply incised narrow drainages, to rolling landscapes with less deeply incised drainage networks. The region has experienced high rates of uplift, deformation, and accompanying channel down cutting. Parallel to these processes, the area has experienced relatively high denudation rates and the upper reaches of many drainages have been sculpted over geologic time by repeated shallow landslides. At present, landslides are common throughout the Action Area and continue to be a major force shaping the modern landscape.

Six predominant soils series within the Action Area are Hugo, Masterson, Melbourne, Larabee, Josephine, and Atwell. The remaining soils include those soils that are either unmapped or cover smaller discontinuous Sections of the Action Area.

3.2.3.2 Landslide Classification and Landslide-Prone Terrain

Many types of hillslope mass wasting occur within the Coast Range and Klamath Mountain provinces. As mentioned in Section 3.2.3.1, landslides are common throughout the Action Area. Intense and prolonged rainfall events combined with area geology, geomorphology, and timber harvesting activities often result in conditions that are highly susceptible to excessive erosion and landslides, especially when high antecedent groundwater conditions exist. Types of landslides in the Action Area are described below based on the classifications in Crunden and Varnes (1996) and CGS (1997), with modifications to suit the conditions present in the area:

- **Shallow-Seated Landslides.** Shallow-seated landslides are generally confined to the overlying mantle of colluvium and weathered bedrock, although in some instances may involve competent bedrock as well. Most shallow landslides are rapid events and commonly leave a bare unvegetated scar after failure.
- **Deep-Seated Landslides.** Deep-seated landslides typically have a basal slip plane that extends into bedrock. Most deep-seated failures move incrementally; catastrophic failure is relatively rare. Active slides typically are vegetated with trees, grass, or both.

Landslide-Prone Terrains. Both deep and shallow landslides occur within the Action Area, with shallow landslides most common on slopes steeper than 60 percent to 70 percent. In general, steep streamside slopes, inner gorge slopes, steep headwall swales, and breaks-in-slopes have been identified as areas with greater potential for producing shallow landslides compared to adjacent slopes. Landslides are also more frequent in areas of convergent slope form where surface and ground waters tend to concentrate and where colluvial soils tend to be thickest.

3.2.4 Mineral Resources

Even though mineral resources and rock products of economic importance occur within the vicinity of Action Area, extraction and processing of these resources would not be affected by the Proposed Action or the other alternatives. Therefore, a comprehensive assessment of the mineral resources and their extraction, processing, and use in the Action Area was not undertaken for this EA.

Green Diamond operates numerous rock quarries (borrow pits) within the Action Area. These mining operations are used to supply surfacing or fill material for purposes of road construction and maintenance associated with timber harvesting and forest management. The pits are generally smaller than 2 acres in size and are located more than 100 and 75 feet from Class I and Class II watercourses, respectively. Because of their location and purpose (i.e., road construction and maintenance associated with timber harvesting and forest management), and the fact that they do not provide materials for local and State agencies, they are exempt from regulation under the Surface Mining and Reclamation Act of 1975 (SMRA), as administered by the State Mining and Geology Board. Two valid State of California permits for rock mining within the Action Area are presently held by Mercer-Fraser. However, Mercer-Fraser will only remove (load and haul) material already mined. The permits will not be renewed after they expire in 2006.

Hydrocarbon resources (natural gas) exist near the southern border of the Action Area. Currently, gas is produced in commercial quantities from an area known as the Tompkins Hill gas field. The Tompkins Hill field is located in the Eel River sedimentary basin; records indicate this basin has produced gas since 1937 (McLean, 1993).

3.3 Hydrology and Water Quality

3.3.1 Introduction

Logging, mining, road building, and grazing during 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 Action Area. The north coast of California receives some of the heaviest precipitation in the State in the form of rain, snow, or both, depending on elevation.

Enhanced runoff, erosion, sedimentation, suspended sediments, and temperature are the chief water quality concerns of these coastal drainages. Some stream reaches and watersheds have been listed as impaired water bodies by the RWQCB, and as such are subject to development of TMDLs. TMDLs will provide guidance for regulating suspended sediment concentrations or loads within certain project watersheds.

3.3.2 Watershed Characteristics

The regional watersheds, and rivers in the vicinity of the Action Area are shown in Green Diamond's fee-owned lands within the Action Area contain more than 2,500 miles of Class I and II streams, 86 percent of which are Class II watercourses. In addition, Green Diamond's fee-owned lands contain about 4,000 miles of road, 85 percent of which are categorized as "seasonal."

The Action Area is part of nine contiguous coastal drainage basins that encompass approximately 13.7 million acres in northwestern California and southern Oregon. The size of the Action Area relative to the coastal basins directly correlates to the potential influence of Green Diamond's timber operations on these basins. Green Diamond's fee ownership in the largest coastal basins (Klamath, Smith, and Eel rivers) is concentrated near the coast and is very small relative to total basin size, limiting the influence of Green Diamond's

operations on these watersheds. Upstream factors including dams, water diversions, development, and other commercial land uses (e.g., agriculture and non-Green Diamond timber management activities) further reduce the relative impact of Green Diamond's operations on these drainages. Some of the smaller coastal basins, in contrast, are largely owned by Green Diamond, and Green Diamond's management activities may be the main human-caused influence within these drainages.

3.3.3 Climate

The climate in the Action Area is highly variable, dependent on elevation and slope, but is generally representative of the climates found in northern California. Along the coast, the summer climate is moderated by coastal fog, which reduces solar radiation and contributes moisture by fog drip. The dense, often persistent, band of marine fog usually extends 20 to 30 miles inland. In the interior areas, the climate generally follows the pattern of hot, dry summers and cool, wet winters. The majority of precipitation occurs from October to March. Most of the precipitation falls as rain, although snowfall occurs at the higher elevations. Between 2,400 feet and 5,000 feet in elevation, precipitation occurs as both rain and snow.

3.3.4 Baseline Hydrologic Data

Peak flows in the northern coastal watersheds usually occur during winter storms in January. The Eel, Smith, and Klamath rivers had mean peak daily flows of 395,000 cubic feet per second (cfs), 75,500 cfs, and 397,000 cfs, respectively, for January flows during 1974 and 1975 storms. The typical annual pattern of flows for these rivers is shown in Figure 3.3-1. Note that the streams are markedly seasonal with extended low flow periods during the summer and fall. These rivers are the major drainage basins in the Action Area and are shown as examples of typical seasonal flow patterns.

3.3.5 Water Quality

Most surface waters in the Action Area have not been sampled for water quality, but key constituents of concern (temperature, suspended sediment, turbidity) have been analyzed from a number of locations. Values generally meet or exceed minimum RWQCB Basin Standards, although some of the streams are listed as impaired under Section 303(d) of the CWA. The list of waterbody impairments and existing beneficial uses is shown in Table 3.3-1.

General characteristics of Action Area streams can be derived from USGS stream monitoring records for the major rivers. Table 3.3-2 shows mean daily ranges of temperature, turbidity, and conductivity for the Klamath, Smith, and Eel rivers near their mouths. The records of high turbidity and low conductivity were all found in winter months during days of high runoff. High temperatures in late summer were all during low flow periods.

TABLE 3.3-1
Waterbody Impairment and Beneficial Uses for Impaired Water Bodies in Action Area Watersheds

Watershed	Listed Impairment	Existing Beneficial Uses ^a
Klamath River	Temperature, nutrients, dissolved oxygen	MUN, AGR, GWR, FRSH, NAV, REC1, REC2, COMM, WARM, COLD, MIGR, SPWN, EST, AQUA
Redwood Creek ^b	Sediment	MUN, AGR, IND, REC1, REC2, COMM, COLD, WILD, RARE, MIGR, SPWN, SHELL, EST
Mad River	Sediment, turbidity	MUN, AGR, IND, PROC, POW, REC1, REC2, COMM, WARM, COLD, WILD, RARE, MIGR, SPWN, EST, AQUA
Eel River	Sediment, temperature	MUN, AGR, IND, GWR, NAV, POW, REC1, REC2, COMM, WARM, COLD, WILD, RARE, MIGR, SPWN, EST, AQUA
Van Duzen River	Sediment	MUN, AGR, IND, REC1, REC2, COMM, COLD, WILD, RARE, MIGR, SPWN, AQUA
Freshwater Creek	Sediment	MUN, COMM, EST
Elk River	Sediment	MUN, COMM, EST

^a Beneficial use codes are MUN municipal and domestic, AGR agricultural, IND industrial, PROC industrial process, GWR groundwater recharge, FRSH freshwater replenishment, NAV navigational, POW hydropower generation, REC1 body contact recreation, REC2 noncontact recreation, COMM commercial and sport fishing, WARM warm freshwater habitat, COLD cold freshwater habitat, WILD wildlife habitat, RARE threatened or endangered species, MIGR migration of aquatic organisms, SPWN fish spawning, SHELL shellfish, EST estuarine habitat, AQUA aquaculture.

^b Planning and restoration for Redwood Creek will occur with the National Park Restoration Plan.

TABLE 3.3-2
Range of Mean Daily Water Quality Values for Three Action Area Rivers

Parameter	Klamath River Near Klamath	Smith River at Crescent City	Eel River at Scotia
Daily mean temperature range (°C)	4–27.5	3–21.5	5–23.5
Daily mean turbidity range (NTU)	0–95	0.2–12	0–380
Daily mean conductivity range (µmhos/cm)	95–250	63–159	90–351
Period of record	1973–1995	1973–1993	1973–1995

Source: U.S. Geological Survey stream monitoring records.

3.4 Fisheries and Aquatic Resources/Aquatic Habitat

3.4.1 Introduction

This Section describes fisheries and other aquatic resources occurring within the Action Area that could potentially be affected by the Proposed Action, other action alternatives, or the No Action Alternative. Discussions focus on nine fish, four amphibian, and one reptile species of concern occurring or potentially occurring within the Action Area. The distribution, status, life history, and factors affecting populations of these 14 species of concern are discussed. This Section also summarizes current aquatic habitat conditions within the Action Area.

3.4.2 Species of Concern

Table 3.4-1 lists the common and scientific names of the nine fish species, four amphibian species, and one reptile species of concern and their current status under the Federal and State ESAs. The designation in Table 3.4-1 of individual Evolutionarily Significant Units (ESUs) and Distinct Population Segments (DPSs) of steelhead and coho and Chinook salmon are included within the term “species” in the Federal ESA. Resident rainbow trout are considered “markedly separated” from the anadromous form and are not included in the current steelhead DPS listings (71 FR 834). The 14 fish, amphibian, and reptile species discussed in this Section occupy a wide range of stream reaches and other aquatic habitats, based on their specific habitat requirements. Because of this diversity, they are dependent on a variety of aquatic habitats.

TABLE 3.4-1
Federal and State Protective Status of Fish, Amphibian, and Reptile Species of Concern

Species Common Name	Scientific Name	Federal Status	State Status
Fish			
Southern Oregon/Northern California Coasts (SONCC) coho salmon Evolutionarily Significant Unit (ESU)	<i>Oncorhynchus kisutch</i>	FT	ST
California Coastal Chinook salmon ESU	<i>Oncorhynchus tshawytscha</i>	FT	None
Southern Oregon and Northern California Coastal Chinook salmon ESU	<i>Oncorhynchus tshawytscha</i>	None	None
Upper Klamath-Trinity Rivers Chinook salmon ESU	<i>Oncorhynchus tshawytscha</i>	None	None
Coastal cutthroat trout	<i>Oncorhynchus clarki clarki</i>	None	CSC
Klamath Mountains Province steelhead ESU	<i>Oncorhynchus mykiss</i>	None	None
Northern California steelhead DPS	<i>Oncorhynchus mykiss</i>	FT	None
Resident rainbow trout	<i>Oncorhynchus mykiss</i>	None	None
Tidewater Goby	<i>Eucyclogobius newberryi</i>	FE	CSC
Amphibians			
Southern torrent salamander	<i>Rhyacotriton variegatus</i>	None	CSC
Tailed frog	<i>Ascaphus truei</i>	None	CSC
Foothill yellow-legged frog	<i>Rana boylei</i>	FSS	CSC/CFP
Northern red-legged frog	<i>Rana aurora aurora</i>	FSS	CSC/CFP
Reptiles			
Western pond turtle	<i>Actinemys marmorata</i>	FSS	CSC/CFP

Federal Status

FE = Federal endangered species
 FT = Federal threatened species
 FSS = Forest Service sensitive species

State Status

ST = State of California threatened species
 CSC = CDFG Species of Special Concern
 CFP = California Fully Protected Species

3.4.2.1 Coho Salmon

Distribution. Globally, coho salmon spawn in coastal watersheds in both Asia and North America. Along the North American coast, coho salmon are most abundant between southern Oregon and southeast Alaska. In California, coho salmon are the second most abundant of the five species of Pacific salmon. They are found in numerous coastal drainages from the Oregon/California border south to Waddell Creek and the San Lorenzo River in Santa Cruz County (Sandercock, 1991).

Status of Populations. NMFS listed the Southern Oregon/Northern California Coasts (SONCC) coho salmon ESU as threatened (May 6, 1997, 62 FR 24588), and designated critical habitat for the SONCC coho salmon ESU (May 5, 1999, 64 FR 24049). The listing was reaffirmed June 28, 2005 (70 FR 37160). The ESU includes all naturally spawned populations of coho salmon in coastal streams between Cape Blanco, Oregon, and Punta Gorda, California, as well three artificial propagation programs.

Hatchery. Critical habitat for the SONCC coho salmon ESU includes all river reaches accessible to listed coho salmon between Cape Blanco, Oregon and Punta Gorda, California, but excludes areas above specific dams or above longstanding, naturally impassable barriers. Critical habitat consists of the water, substrate, and adjacent riparian zone of estuarine and river reaches (including off-channel habitats). Within the Action Area, the State of California listed California coastal coho salmon from Punta Gorda north to the Oregon border as threatened on March 30, 2005.

Life History and Habitat Requirements. Coho salmon typically exhibit a relatively simple, 3-year life history pattern. Adults begin freshwater spawning migrations in late summer and fall, spawn from September to March, concentrated in January and February, then die. Eggs incubate in gravels of spawning redds for about 1.5 to 4 months before hatching as alevins. Juveniles soon emerge from the gravel and begin active feeding. Juveniles typically spend up to 15 months in freshwater before migrating to the ocean in the following spring. Coho salmon generally rear for 2 years in the ocean before returning to their natal stream to spawn as 3-year-old fish. A few may return to spawn after only 1 year in the ocean and are referred to as "jacks."

Factors Affecting Populations. NMFS has identified numerous human-caused and natural factors it believes have contributed to declines of coho salmon (July 25, 1995, 60 FR 38011). Several human-caused factors, including habitat degradation, harvest, and artificial propagation, exacerbate the adverse effects of natural environmental variability caused by drought, floods, and poor ocean conditions. NMFS reported the major activities responsible for the decline of coho salmon in Oregon and California are logging, road building, grazing and mining activities, urbanization, stream channelization, dams, wetland loss, beaver trapping, water withdrawals, and unscreened diversions for irrigation (May 6, 1997, 62 FR 24588).

3.4.2.2 Chinook Salmon

Distribution. Native spawning populations of Chinook salmon are distributed along the Asian coast from Hokkaido, Japan, to the Anadyr River, and along the North American coast from central California to Kotzebue, Alaska (Moyle, 1976; Allen and Hassler, 1986; Healey, 1991). Chinook salmon spawning may occur from near tidewater in coastal

watersheds to over 3,200 kilometers (km) upstream in headwaters of the Yukon River (Major et al., 1978).

Status of Populations. NMFS listed the California Coastal Chinook salmon ESU, which includes fall- and spring-run fish, as threatened (September 16, 1999, 64 FR 50394), and has designated critical habitat for this ESU (September 2, 2005, 70 FR 542487). The California Coastal Chinook salmon ESU includes all naturally spawned populations of Chinook salmon from rivers and streams south of the Klamath River to the Russian River, California, as well as seven artificial propagation programs. Designated critical habitat for this ESU includes numerous river reaches and estuarine areas from Redwood Creek to the Russian River (70 FR 542487).

Other Chinook salmon populations within the Action Area are not listed. NMFS has determined that listing of these populations was not warranted, in separate findings for the SONCC Chinook salmon ESU (64 FR 50394, September 16, 1999) and the Upper Klamath Trinity Rivers ESU (63 FR 11482, March 9, 1998).

Life History and Habitat Requirements. Chinook salmon, like other salmon species, have complex life history characteristics and habitat needs because they are anadromous. Chinook salmon migrate extreme distances to spawn in the lower 48 states. The Action Area contains portions of rivers that are used only for spawning and juvenile rearing by this species.

Adult Chinook salmon enter streams in the Action Area from August through January. Spawning occurs in areas with clean large gravels, small cobbles, and sufficient flow to oxygenate eggs buried within the substrate. Spawning typically occurs in the fall, usually within 2 to 3 weeks after the fish reach their natal spawning grounds. Eggs incubate during the winter, then hatch from February through May. Downstream migration begins immediately after fry emergence (late February to June). Estuarine residence varies from approximately 1 to 6 weeks, depending on conditions, before individuals move to the open ocean where they feed and rear (Moyle, 1976).

Factors Affecting Populations. Because of their complex life history and range of habitat requirements, salmon can be subjected to a wide variety of environmental conditions (both natural and influenced by man) that affect their populations. These include conditions in the ocean, along freshwater migration corridors, and on their spawning grounds. Factors commonly associated with impacted salmon populations include genetic introgression from hatchery fish, ocean habitat conditions, suitability of spawning substrate (clean gravels and cobbles), water temperature, altered instream flows, and over-fishing.

Habitat alterations in the coastal river drainages have contributed to the reduction in abundance and distribution of Chinook salmon in the Action Area. Examples of such habitat alterations include: water withdrawal, conveyance, storage, and flood control (resulting in insufficient flows, stranding, juvenile entrainment, and increased stream temperatures); and logging and agriculture (resulting in loss of large woody debris, sedimentation, loss of riparian vegetation, and habitat simplification) (Spence et al., 1996; Myers et al., 1998; NMFS, 1998).

3.4.2.3 Coastal Cutthroat Trout

Distribution. Coastal cutthroat trout are found in coastal drainages from the Eel River in northern California (Dewitt, 1954) to Prince William Sound in Alaska (Trotter, 1989).

Status of Populations. NMFS determined that listing was not warranted for the Southern Oregon/California Coasts coastal cutthroat trout ESU (April 5, 1999, 64 FR 16397). In November 1999, the USFWS assumed all ESA regulatory jurisdiction over coastal cutthroat trout (April 21, 2000, 65 FR 21376), which did not affect its non-listed status in the action area. Coastal cutthroat trout are a CDFG species of special concern and a USFS sensitive species (CDFG, 2001). All populations of coastal cutthroat trout in California are considered by some biologists to be at a moderate risk of extinction (Nehlsen et al., 1991).

Life History and Habitat Requirements. Coastal cutthroat trout can exhibit both resident freshwater and anadromous life history forms. Resident populations spawn in the spring or early summer, with young fish emerging from the gravels from late spring through summer. Adults and juveniles use stream riffles and pool habitat for feeding and cover, respectively, and primarily pools and deep water habitat during winter. The resident form feeds primarily on aquatic insects, as opposed to the piscivorous (fish-eating) anadromous form (Wydoski and Whitney, 1979).

Anadromous coastal cutthroat trout exhibit a more complex life history pattern than residents spawning in smaller headwater streams and tributaries of coastal rivers to which they have access (Wydoski and Whitney, 1979). Spawning occurs primarily from late December to February, and young emerge from the gravels about mid-May. They typically remain in freshwater for 2 to 4 years before migrating to saltwater, and most outmigration to the ocean occurs from April through June (Wydoski and Whitney, 1979).

The life history and habitat requirements of coastal cutthroat while in saltwater are relatively unknown (Wydoski and Whitney, 1979). They do not appear to migrate to the open ocean, but instead use bays, estuaries, and the coastline where they feed on crustaceans and fish (Behnke, 1992).

Factors Affecting Populations. Behnke (1992) states that numbers of coastal cutthroat trout have drastically declined in many areas because of environmental alterations (mainly logging practices that result in increased sedimentation, reduced cover, and increased stream temperatures) and hybridization with non-native trout species.

3.4.2.4 Steelhead and Resident Rainbow Trout

Distribution. Steelhead are an anadromous form of rainbow trout. Coastal rainbow trout are widely distributed from the Kuskokwim River in western Alaska to Baja California (Moyle, 1976; Behnke, 1992). Steelhead occur throughout the range of coastal rainbow trout except in the northern and southern extremities (Behnke, 1992). The present southern limit of steelhead distribution is Malibu Creek, California.

Status of Populations. NMFS and USFWS currently share jurisdiction for *Oncorhynchus mykiss* under the ESA, with NMFS responsible for anadromous forms (steelhead) and USFWS for resident forms. Rainbow trout, the resident form, are currently unlisted. The Klamath Mountains Province steelhead ESU includes steelhead from the Elk River in Oregon to the Klamath and Trinity rivers in California, inclusive, overlapping the Action

Area. NMFS has evaluated the status of this ESU on multiple occasions, most recently determining that listing was not warranted (April 4, 2001, 66 FR 17845).

NMFS listed the Northern California steelhead DPS as threatened (January 5, 2006, 71 FR 834), and critical habitat was designated for this ESU/DPS on September 2, 2005 (70 FR 52488). This DPS includes all naturally spawned steelhead populations below natural and manmade impassable barriers in California coastal river basins from Redwood Creek southward to, but not including, the Russian River, and excludes resident forms. This DPS overlaps the Action Area. Designated critical habitat for this DPS includes numerous river reaches and estuarine areas from Redwood Creek south to, but not including, the Russian River.

Summer-run steelhead from the Klamath Mountains Province ESU/DPS and the Northern California ESU/DPS are on CDFG's list of species of special concern (CDFG, 2001).

Life History and Habitat Requirements. Rainbow trout can exhibit both resident freshwater and anadromous life history forms. Resident populations spawn from late summer through spring, with young fish emerging from the gravels in the spring and early summer. Steelhead (the anadromous form) generally rear for 2 years in freshwater before migrating to the ocean, where they typically spend 2 years before returning to freshwater to spawn. Although steelhead are anadromous, they display different life history strategies than Pacific salmon. The most significant difference is that some steelhead survive spawning, return to the ocean for 1 or more years, then return to spawn again. Pacific salmon only spawn once, then die.

Steelhead in the Action Area spawn from September to March, depending on the time of entry. Redds are constructed in areas of coarse gravel and cobbles. Fry emergence occurs in late spring. Freshwater residence varies from 1 to 4 years, but 1 to 2 years is predominant in the Action Area. Rearing steelhead tend to inhabit riffles and higher gradient habitats. Densities of juvenile steelhead in streams are greatest where there are good amounts of instream cover (Stoltz and Schnell, 1991).

The anadromous (steelhead) and resident (rainbow trout) forms are genetically indistinguishable when sampled from the same waters, and the life history and habitat requirements of resident rainbow trout are similar to those of steelhead while in the freshwater phase (with the possible exception of estuary and some mainstem habitats).

Factors Affecting Populations. NMFS identified several factors they considered to have contributed to the decline of the Northern California steelhead DPS. These factors include impacts from historical flooding, predation, water diversions and extraction, minor habitat blockages, poaching, timber harvest, agriculture, and mining. These human-induced impacts in the freshwater ecosystem have likely reduced the species' resiliency to natural factors for decline, such as drought and poor ocean conditions (February 11, 2001, 65 FR 6960).

Steelhead support an important recreational fishery, and incidental harvest mortality in sport and commercial fisheries may exceed 30 percent of listed populations. In addition, introduced non-native species and habitat modifications have led to increased predator populations in numerous river systems, and increased the level of predation on steelhead (Busby et al., 1996).

3.4.2.5 Tidewater Goby

Distribution. The tidewater goby is endemic to California and discontinuously distributed along the coast from Agua Hedionda Lagoon, in San Diego County, north to the mouth of the Smith River in Del Norte County (Moyle et al., 1995).

Status of Populations. The tidewater goby has been extirpated from 23 of the 134 documented locations within its historical range, and 55 to 70 (41 to 52 percent) localities are naturally so small or have been so degraded over time that long-term persistence is uncertain (USFWS, 2005). The tidewater goby was listed as endangered under the Federal ESA in 1994 (March 7, 1994, 59 FR 5494). A recovery plan was finalized in 2005 (USFWS, 2005).

Life History and Habitat Requirements. Tidewater gobies are uniquely adapted to coastal lagoons and the uppermost brackish zone of larger estuaries, rarely invading marine or freshwater habitats. The species is typically found in water less than 1 meter (3.3 feet) deep and salinities of less than 12 parts per thousand. It avoids areas of strong current and wave action. Although its closest relatives are marine species, the tidewater goby lacks a marine life history phase. The species occurs in loose aggregations on the substrate in shallow water less than 3 feet deep. Eggs are deposited in vertical burrows excavated in clean, coarse sand. Larval gobies are found midwater around vegetation until they become benthic and begin feeding on small invertebrates and insect larvae.

Factors Affecting Populations. Principal threats to the tidewater goby include loss and modification of habitat due to coastal development and other activities, water diversions and drought conditions, predatory and competitive introduced fish species, habitat channelization, and degraded water quality (December 11, 1992, 57 FR 58770; USFWS, 2005).

3.4.2.6 Southern Torrent Salamander

Distribution. The southern torrent salamander is one of four species in the genus *Rhyacotriton* and is the most southerly ranging. Southern torrent salamanders occur within the coastal conifer forest belt of northern California and southern Oregon, specifically from southern Mendocino County, California, through the Coast Ranges to northern Oregon (Good and Wake, 1992). In California, this species is found in the coastal forests of northwestern California south to Mendocino County (Anderson, 1968). Bury and Corn (1988a) believed that these salamanders are distributed as isolated, discrete populations, especially in heavily managed or drier forests.

Status of Populations. On June 6, 2000, in response to a petition to list the southern torrent salamander, the USFWS determined that the species did not warrant listing as endangered or threatened (65 FR 35951). However, USFWS noted that the species remained a vulnerable species, and of concern.

The southern torrent salamander was a candidate for State listing as a threatened species. However, the California Fish and Game Commission ruled that this petition was not warranted and that CDFG should continue to consider the species as a species of special concern.

Life History and Habitat Requirements. Southern torrent salamanders have very specific habitat requirements of cold, shallow, flowing headwaters in humid coniferous forests (Nussbaum and Tait, 1977; Nussbaum et al., 1983; Diller and Wallace, 1996; Welsh and

Lind, 1996). They are found most frequently in seeps, springs, and intermittent streams (Welsh, 1993) or in shallow water seeping through moss-covered gravel (Nussbaum et al., 1983). They appear to avoid open deep-water channels (Stebbins, 1985; Welsh, 1993). Adults are semi-aquatic and are found next to larvae in streams, or under rocks or debris in saturated streamside habitats; larvae are aquatic and usually occur in loose gravel in streambeds (Nussbaum and Tait, 1977; Nussbaum et al., 1983). Southern torrent salamanders rarely move far from moist areas as they are very sensitive to desiccation. Riparian areas are thought to be important to the species for foraging (Corn and Bury, 1989) and for courtship and reproduction (Nussbaum et al., 1983). Shade and high surface water availability are needed for movement within riparian areas.

Factors Affecting Populations. The petition to list the southern torrent salamander cited habitat fragmentation, population declines, and inhibited dispersal capability throughout the species' range as significant threats to the species. Evidence indicates that timber harvesting and road building can negatively affect habitat for the southern torrent salamander. Direct effects of these activities include disturbance of substrate and killing of individual salamanders. Indirect effects include sedimentation of substrate used by the salamanders, increases in water temperatures to lethal levels, potential loss of permanent water flow, and potential increases in predator populations. In coastal northern California, however, Diller and Wallace (1996) reported populations of southern torrent salamanders from a high proportion of streams in managed forests. The species' long lifespan may enable it to persist in marginal habitats until conditions improve. Southern torrent salamanders may also be able to follow cracks, fissures, and other interstices in the substrate to find moist, cool conditions beneath the surface of the stream's substrate.

3.4.2.7 Tailed Frog

Distribution. The tailed frog is the only member of the genus *Ascaphus*. It is endemic to the Pacific Northwest and is widely distributed from northwestern California to British Columbia and western Montana (Nussbaum et al., 1983). In California, they occur from sea level to 6,500 feet elevation, mostly at sites receiving more than 40 inches of precipitation annually in Siskiyou, Del Norte, Trinity, Shasta, Tehama, Humboldt, Mendocino, and possibly Sonoma counties (Bury, 1968). Throughout much of its range the species is distributed as disjunct populations (Metter, 1968). Bury and Corn (1988a) believed that isolated, discrete populations most likely occurred in drier forests and heavily managed lands.

Status of Populations. Tailed frog currently is a CDFG species of special concern.

Life History and Habitat Requirements. Tailed frogs are found in and along small, swift, permanent, mountain streams with rocky substrates and low water temperatures buffered by dense vegetation (Nussbaum et al., 1983; Reichel and Flath, 1995; Daugherty and Sheldon, 1982). Streams supporting tailed frogs primarily occur in mature (Aubry and Hall, 1991) or old-growth coniferous forests (Bury, 1983; Bury and Corn, 1988a). More tailed frogs were observed in older Douglas-fir-dominated, mixed hardwood-conifer forests near cold, clear, fast-flowing streams than in younger forests with the same type streams (Welsh, 1990). In the Coast Range of western Oregon, Corn and Bury (1989) found tailed frogs were more common in dense, moist, and young and mature forests, and absent from recent clearcuts. However, Diller and Wallace (1999) reported that a high proportion of streams in managed forests in coastal northern California had populations of tailed frogs. These streams flow

through older, consolidated geologic formations that provide rocky substrates, and dominate the Green Diamond ownership.

Factors Affecting Populations. Tailed frogs were considered rare for many years, but are now known to occur in high densities in suitable habitats (Nussbaum et al., 1983). Bury and Corn (1988a) and Welsh (1990) believed that long-term, range-wide reductions or extinctions of tailed frogs were likely caused by local extirpations, increased population fragmentation, habitat loss, restricted gene flow, and limited recolonization of streams when habitats are re-established. Although the survival of tailed frogs may depend on protection of cool flowing streams and adjacent forest habitats (Bury and Corn, 1988b), timber harvesting is not incompatible with such protection (Welsh, 1990). Bury and Corn (1988a) recommended establishing protection zones for tailed frogs by retaining deciduous and small (cull) trees around streams while felling merchantable timber away from the streams.

3.4.2.8 Foothill Yellow-Legged Frog

Distribution. The foothill yellow-legged frog is found west of the Oregon Cascades and south to Baja California, Mexico. In California, the foothill yellow-legged frog was historically distributed throughout the foothills of most drainages from the Oregon border to the San Gabriel River. This species is currently found throughout the northern and central Coast Ranges and Sierra Nevada foothills (Jennings and Hayes, 1994).

Status of Populations. The foothill yellow-legged frog has become absent from many locations where it was historically present in the Sierra Nevada foothills and southern portions of its range. The species is still abundant in many drainages in northwestern California and appears to still be distributed throughout its historical range. Jennings and Hayes (1994) described this species as endangered in central and southern California south of the Salinas River; threatened in the west slope drainages of the Sierra Nevada and southern Cascade Mountains east of the Sacramento and San Joaquin rivers; and of special concern in the Coast Ranges north of the Salinas River. The foothill yellow-legged frog is considered a species of special concern and is fully protected by the State of California. This species also is considered a sensitive species by the USFS.

Life History and Habitat Requirements. This species is typically associated with valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadow habitat types (Zeiner et al., 1988). Foothill yellow-legged frogs are closely confined to the vicinity of permanent streams (Leonard et al., 1993) and intermittent streams (Hayes and Jennings, 1988). Shallow streams with a rocky substrate (at least cobble size) are preferred (Hayes and Jennings, 1988). Within streams with these characteristics, foothill yellow-legged frogs prefer riffles to other stream habitats (Hayes and Jennings, 1988). Foothill yellow-legged frogs appear to prefer streams with partial shading, often avoiding streams with very high (i.e., greater than 90 percent) or very low (i.e., less than 2 percent) stream shading (Hayes and Jennings, 1988). Females attach eggs to cobbles and boulders in shallow water where the eggs survive better than those laid in narrower and deeper channels. Kupferberg (1996) reported that most breeding sites were used repeatedly from year to year.

Factors Affecting Populations. The reduction in this species' distribution has been attributed primarily to dam building and flood control, mining, farming and canal building, urbanization (Jennings, 1988), and the introduction of aquatic predators (i.e., various fishes and bullfrogs) (Jennings and Hayes, 1994).

3.4.2.9 Northern Red-Legged Frog

Distribution. The northern red-legged frog is found in California, Oregon, Washington, and Canada (Nussbaum et al., 1983; Leonard et al., 1993). In California, this subspecies of red-legged frog is found west of the Cascade crest and as far south as Humboldt County. Northern red-legged frog and populations intermediate between northern and California red-legged frogs extend from Marin County north to the California/Oregon border (Jennings and Hayes, 1994).

Status of Populations. Declines in northern red-legged frog populations have been reported in British Columbia, Washington, and Oregon (Jennings and Hayes, 1994). Sufficient information has not yet been collected in California to assess overall population trends (Jennings and Hayes, 1994). The northern red-legged frog is considered a species of special concern and is fully protected by the State of California, and is considered a sensitive species by the USFS.

Life History and Habitat Requirements. Most northern red-legged frogs are found in moist or wet forest areas and riparian habitats below 2,800 feet (Nussbaum et al., 1983), but they have been reported up to 4,680 feet (Leonard et al., 1993). During the nonbreeding season, the red-legged frog is highly terrestrial and can be found up to 1,000 feet from water (Nussbaum et al., 1983). The red-legged frog feeds almost exclusively on land, along the water's margin, and in the vegetation (Licht, 1986), but it typically breeds in marshes, bogs, ponds, lakes, and slow-moving streams with dense streamside vegetation (Stebbins, 1972, Leonard et al., 1993). Studies by Aubry and Hall (1991) and Corn and Bury (1989) have shown the highest abundance in mature forest, with lower numbers in old-growth forest, young forest, and clearcuts. In addition, Aubry and Hall (1991) found positive correlations between red-legged frog abundance and the density of broadleaf trees and percent cover of mid-canopy broadleaf trees.

Factors Affecting Populations. Little information is available concerning the causes for the observed decline of this subspecies, but bullfrog and exotic predatory fish introductions, pesticides, herbicides, coastal development, and timber harvesting have been implicated as contributing factors (Blaustein et al., 1995; Jennings and Hayes, 1994).

3.4.2.10 Western Pond Turtle

Distribution. The western pond turtle historically ranged nearly continuously in most Pacific drainages from Klickitat County, Washington, to northern Baja California, Mexico, chiefly west of the Sierra-Cascade crest (Jennings and Hayes, 1994). In California, this species was historically present in most Pacific slope drainages between the Oregon and Mexican borders (Jennings and Hayes, 1994).

Status of Populations. Jennings and Hayes (1994) consider the western pond turtle to be threatened in California and endangered from the Salinas River south along the coast and inland from the Mokelumne River southward. Although the western pond turtle appears to

still occur in most areas where it was reported historically, some populations are showing little or no recruitment. Substantial declines in western pond turtle numbers have been reported outside of California (see Jennings and Hayes, 1994). The western pond turtle is considered a species of special concern and is fully protected by the State of California. This species also is considered a sensitive species by the USFS.

Life History and Habitat Requirements. The western pond turtle has been described as an aquatic habitat generalist (Holland, 1991). The western pond turtle requires some slack-or slow-water aquatic habitat and inhabits a wide variety of fresh or brackish, permanent or intermittent water bodies. It typically occurs in marshes, lakes, ponds, brackish waters, slow-moving streams and rivers with adjacent vegetation mats, partially submerged logs, boulders, mudflats, and undercut banks and rootwads to serve as either basking or cover habitat (Blaustein et al, 1995). Habitats that lack these refugia are typically avoided by the turtle (Holland, 1994). Aquatic over-wintering sites are found along undercut banks and in soft mud of ponds (Holland, 1994). Western pond turtles can be sensitive to human disturbance, which can affect basking and nesting (Blaustein et al., 1995).

Western pond turtles use terrestrial habitats for nesting and hibernation (Holland, 1994). Mating occurs in April and May, and females move away from watercourses from June through August and migrate upslope to excavate nests up to 1,640 feet from the water's edge (Rathbun et al., 1992). Females are very sensitive to disturbance during this time and may return to the watercourse if disturbed (Holland, 1994). Time spent in terrestrial habitats is variable, varying from locations in southern California where turtles have remained for 2 to 3 months to locations in Oregon where turtles have remained at overwintering sites for up to 8 months. Overwintering sites generally have been located on slopes less than 35 degrees in duff composed of conifer or broadleaf material (Holland, 1994). Hatchlings may overwinter in nest sites (Rathbun et al., 1992).

Factors Affecting Populations. Agricultural activities, urbanization, flood control, water diversion projects, and introduced predatory fish have contributed to population declines (Jennings and Hayes, 1994). Bullfrogs prey on hatchling and juvenile turtles and bass are known to prey on the smallest juveniles (Jennings and Hayes, 1994). Protection of suitable nesting habitat associated with existing populations and reduction in mortality of the younger age groups of turtles have been recommended to reverse the declining trend observed in western pond turtle populations (Jennings and Hayes, 1994).

3.4.3 Other Aquatic Resources

Other representative groups of aquatic resources present within the Action Area besides the fish, amphibian, and reptile species of concern described above include the following:

- Other native fish species such as lamprey, sturgeon, suckers, smelt, sculpins, and minnows
- Non-native (introduced) salmonids such as brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), and hatchery-reared rainbow trout (*Oncorhynchus mykiss*)
- Non-native, nonsalmonid fishes such as sunfish and bass
- A variety of aquatic invertebrates such as insects, crustaceans, clams, and snails

Numerous interactions can occur among these representative groups under existing conditions. Introduced salmonids can adversely affect some species of native salmonids by competing for space or food, or in some cases by preying on smaller life stages of native salmonids. For example, brook trout and brown trout can potentially compete for food and space with some life stages of native salmonids, and larger brown trout tend to feed largely on other fish. Native fishes, such as sculpin, provide a food source for native salmonids and introduced salmonids. All native aquatic species, including aquatic invertebrates, which are a major food source for most fish during all or parts of their lives, benefit from the same broad conditions that benefit anadromous salmonids. These conditions include cool, clean water and access to complex, diverse habitat.

3.4.4 Aquatic Habitat Conditions

In general, the region encompassed by the Action Area is characterized by the following:

- The steep and rugged terrain of the Coast Ranges and Klamath Mountains
- Geologic formations that range in age from preJurassic to Recent and are marked by extensive folds and fault lines
- Several highly unstable geologic formations, including the Franciscan, Wildcat, and Falor formations
- Seasonally intense precipitation
- More than a century of logging, mining, road building, and grazing

Combined, these factors have altered stream conditions and increased hillslope erosion in most coastal watersheds. As a result of excess sedimentation and potential temperature concerns in several inland areas, the Klamath River, Redwood Creek, Mad River, Eel River, and Van Duzen River watersheds are included on the CWA Section 303(d) list of impaired watersheds developed by EPA and SWRCB (see Table 3.3-1 for a listing of 303(d) listed watersheds and pollutants). Current habitat conditions and status of aquatic species of concern vary by geographic location. The ecological implications of land management activities on aquatic and riparian habitat, fish, and amphibians are summarized in Chapter 4, Environmental Consequences.

3.5 Vegetation/Plant Species of Concern

3.5.1 Introduction

This Section describes vegetation contained within the Action Area and relies on data made available from Green Diamond, the California Natural Diversity Database (CNDD), CDFG, and USFWS. Action Area vegetation has been grouped into habitat type classifications. The frequency, composition, and spatial distribution of habitat types within Action Area and the general character of the Action Area have been characterized by data provided by Green Diamond.

Green Diamond uses a cover type classification system that focuses on merchantable timber for timber management purposes. Aerial interpretation and ground-truthing is performed

according to the established criteria of this system. Biologists at Green Diamond developed a computer algorithm that converts the merchantable timber cover type classification system into the California Wildlife Habitat Relationships (CWHR) System (Mayer and Laudenslayer, 1988). The CWHR system was used in this analysis to identify potential wildlife use within the Green Diamond ownership and to compare existing conditions with future wildlife habitat trends under each project alternative. The current habitat conditions are described below according to CWHR, with the exception of "bare land" and "unclassified," which are classes defined by Green Diamond. The habitat codes, size classes, and canopy closure classes in the CWHR system are defined in Table 3.5-1.

TABLE 3.5-1
Definitions of CWHR Habitat, Size Class, and Canopy Closure Class Codes

Code/Class	Definition
Habitat Codes	
BARE	Bare
CSC	Coastal Scrub
DFR	Douglas-Fir
KMC	Klamath Mixed Conifer
LAC	Lacustrine
MHC	Montane Hardwood-Conifer
MHW	Montane Hardwood
MRI	Montane Riparian
PGS	Perennial Grassland
RDW	Redwood
RIV	Riverine
UNCL	Unclassified
URB	Urban
WTM	Wet Meadow
Size Classes	
1	Stand has a quadratic mean diameter of < 1"
2	Stand has a quadratic mean diameter of 1" to 5.9"
3	Stand has a quadratic mean diameter of 6" to 10.9"
4	Stand has a quadratic mean diameter of 11" to 23.9"
5	Stand has a quadratic mean diameter of 24" to ≥ 32 "
6	Stand has Size Class 5 trees over a distinct layer of Size Class 4 or 3 trees; total canopy closure is at least 60 percent
Canopy Closure Classes	
S (sparse)	Stand has 10 to 24.9 percent total canopy closure
P (open)	Stand has 25 to 39.9 percent total canopy closure
M (moderate)	Stand has 40 to 59.9 percent total canopy closure
D (dense)	Stand has 60 to 100 percent total canopy closure

Unclassified land represents areas that Green Diamond has never surveyed, since most of these areas are lands where some other entity has cutting rights. Bare lands are areas where vegetation is absent, for any one of a number of reasons. These lands are mostly a collection of bare rock outcrops, major landslides, and rock pits (i.e., areas being mined for rock to use on roads).

The classifications derived from the model are based on larger-scale habitat characteristics; that is, small inclusions of a particular habitat type may be generally incorporated into another CWHR classification. Further, it is possible that some of the habitat on the Green Diamond ownership is identified as Montane Riparian habitat. The algorithm is not able to distinguish this habitat type from other forest habitat types. Therefore, no Montane Riparian habitat has been identified in the data presented in this Section. For the most part, Green Diamond does not have these narrow riparian zones mapped as distinct polygons in their geographic information system (GIS). As a consequence of the fact that much of Green Diamond's property would qualify as a temperate rainforest, the riparian vegetation is not significantly different from the surrounding forest across much of the area. The distinctly unique riparian areas present within the ownership are either rare enough, or small enough, such that Green Diamond has not delineated them.

The areas that have been classified as Riverine rather than Riparian are legitimate riverine areas, consisting of large enough bodies of flowing water and their associated beds/bars (submerged in winter; exposed in summer). These areas have been typed out as polygons that are classified in the system as "nonforested waterways." While the CWHR classifications derived from the computer algorithm may be imprecise, they are sufficient for characterizing the Green Diamond ownership and for determining potential impacts from action and no action alternatives.

Sensitive plant species potentially occurring within the Action Area were identified through the CNDD, Green Diamond observations, and discussions with USFWS and CDFG. Information from the CNDD was made available via regularly updated computer software called RAREFIND. Sensitive species lists were generated for each of the USGS 7.5-foot quadrangles (over 50 quadrangles, 1 million acres) containing the Action Area. This information was then entered into an ACCESS database to associate species occurrence within the Action Area.

3.5.2 Regional Setting

3.5.2.1 General Vegetative Character

Productive soils, moderate temperatures, and seasonally abundant moisture support a mixed cover of dense forest and prairie vegetation within the Action Area. Redwood is the dominant tree on the relatively moist floodplains, low stream terraces, and lower hillslopes adjacent to the main channel. On the upper slopes, Douglas-fir is the dominant conifer associated with western hemlock, tanoak, and Pacific madrone.

Areas of natural prairie and woodland vegetation are intimately associated with forested areas throughout much of the Action Area. The most common communities of nonforest vegetation are grass prairies, grass-bracken-fern prairies, oak-grass woodlands, oak-poison oak-grass woodlands, and oak-madrone-brush woodlands. The origin of the grass and grass-bracken-fern prairie is partly the result of hillslope mass wasting, natural fires and

fires set by local Native American tribes, and lateral variability in soil parent materials (Swanston et al., 1995).

Eleven CWHR habitat types are present within the Green Diamond ownership. While it is unlikely, more habitat types may be present on land that may be acquired by Green Diamond in the future. In addition to the 11 CHWR habitat types, Green Diamond has included two classifications to describe land cover within its ownership – Bare (BARE) and Unclassified (UNCL). Of the 13 habitat types that are present, however, only five are forested: Montane Hardwood (MHW), Klamath Mixed Conifer (KMC), Douglas-fir (DFR), Redwood (RDW), and Montane Hardwood-Conifer (MHC). Five nonforested vegetative habitat types that are present and intermixed with the forested habitat types are Perennial Grassland (PGS), Wet Meadow (WTM), Riverine (RIV), Lacustrine (LAC), and Bare. Other nonforested habitat types that are present within the Green Diamond ownership include Coastal Scrub (CSC), Urban (URB), and Unclassified. CSC, URB, and UNCL lands are not generally associated with commercial timberlands. Therefore, they are not included in the Action Area (see Section 3.1, Introduction), and not described or analyzed in detail in this EA. Table 3.5-2 provides a breakdown of the distribution and abundance of the forested and nonforested habitat types within the Green Diamond ownership. Figure 3.5-1 provides a graphic display of the habitat types within the Green Diamond ownership as distributed throughout the Action Area.

TABLE 3.5-2
Percent Composition of Habitat Type Within Green Diamond Ownership

CWHR Classification	Total Ownership Acreage (%)
Redwood (RDW)	54.75
Douglas-Fir (DFR)	18.74
Montane Hardwood-Conifer (MHC)	13.74
Montane Hardwood (MHW)	9.13
Perennial Grassland (PGS)	1.56
Coastal Scrub (CSC)	1.11
Riverine (RIV)	0.67
Urban (URB)	0.14
Bare (BARE)	0.11
Unclassified (UNCL)	0.04
Klamath Mixed Conifer (KMC)	0.01
Wet Meadows (WTM)	0.00
Lacustrine (LAC)	0.00

More than 96 percent of the Green Diamond ownership is forested. RDW is the most common forest habitat type. RDW is also the most common habitat type of all habitats present. It represents 54.8 percent of the acreage found within forested habitat types.

RDW is followed in percent composition by DFR (18.7 percent), MHC (13.7 percent), and MHW (9.1 percent). KMC only accounts for about 26 acres (0.01 percent). DFR, KMC, and MHW are found primarily within the eastern portion of the Green Diamond ownership, whereas RDW and MHC are found primarily along the western portion, or closer to the coast. MHC is found only in the northwestern portion of the Green Diamond ownership.

The primary hardwood species that are represented within the MHW and MHC habitat types are red alder, tanoak, Pacific madrone, Oregon white oak, and black oak. Red alder is the dominant overstory species in the riparian areas. Tanoak and Pacific madrone occur along ridge lines and mid-slope areas and are intermixed with conifers. Oregon white oak and black oak occur in the drier transition zones between Douglas-fir forests and prairies.

A long history of logging in the region has resulted in a mixture of even-aged stands. The general stand composition and structure within the Green Diamond ownership were determined using GIS data and CDFG's CWHR criteria. Approximately 12 percent of the Green Diamond ownership is characterized by age classes greater than 60 years. Most of the older vegetation is located within the drainage basins in the Coastal Lagoons, Mad River, and Little River areas (see Figure 3.5-2). Table 3.5-3 provides a summary of forest age classes on Green Diamond ownership and corresponding CWHR size classes. Other characteristics of note are as follows:

- Approximately 64 percent of Green Diamond's forested ownership is classified as CWHR size class 1 to size class 3.
- Approximately 33 percent of Green Diamond's forested ownership is classified as CWHR size class 4 stands with an average dbh ranging from 12 to 24 inches.
- Approximately 4 percent of the Green Diamond's forested ownership is classified as CWHR size class 5 and 6.
- More than 63 percent of the forested habitat within the Green Diamond ownership has dense canopy closure.

TABLE 3.5-3

Age Classes of Forest on Green Diamond Ownership and Corresponding CWHR Size Classes Expressed as a Percentage of the Total Forested Area

Age (yrs)	CWHR Size Class			
	1 and 2	3	4	5 and 6
0-9	10.44	0.00	0.00	0.00
10-19	12.79	0.01	0.00	0.00
20-29	0.60	11.24	1.94	0.05
30-39	0.20	6.61	10.98	0.14
40-49	0.25	10.56	8.16	0.56
50-59	0.53	3.52	5.98	0.26
60-69	0.59	0.48	3.01	0.93
70-79	0.02	0.75	1.56	0.62
80+	0.58	4.32	1.30	1.01

3.5.2.2 CWHR Classifications

Bare Ground. This land cover type includes rock pits, slides, and outcrops. Only 0.11 percent or 465 acres of this land cover type is found in the Action Area.

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 characteristic 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, Pacific madrone, sugar pine, ponderosa pine, and black oak are common components of the canopy, with Oregon grape, California blackberry, dwarf rose, and poison oak occurring in the shrub layer. Forbs and grasses include Pacific trillium, western sword fern, inside-out flower, broadleaf starflower, deer vetch, vanilla leaf, bracken fern, western fescue, common beargrass, and whitevein shinleaf. On the wettest sites, Port Orford cedar and Pacific yew are present in the canopy and common shrubs include vine maple, California hazel, and Pacific rhododendron.

Following disturbance, 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 dryer sites. Snags and downed logs, an important structural component of this habitat, increase in density or volume with stand age. 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.

DFR represents about 18.7 percent of the Green Diamond ownership, with 82,848 acres recorded. Most of this habitat type (nearly 60 percent) is found within the eastern portion of the Green Diamond ownership. Very little of the DFR habitat type is found in the southern areas of Green Diamond ownership (only 750 acres of the 82,848 acres recorded as DFR).

About 71 percent of this habitat type is characterized as size class 1 through 3, with the remaining 29 percent characterized as size class 4 through 6. Size class 6, however, accounts for less than 1.0 percent of the DFR habitat. Size class 1 is the most abundant, accounting for about 35 percent of this habitat type. The next most abundant class (31 percent) is class 3. About 59 percent of this habitat type is characterized as having a dense canopy.

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 very similar to the mixed conifer type, it is distinguished by its higher species diversity. Douglas-fir and white fir are the dominant tree species, with Shasta red fir, lodgepole pine, Jeffrey pine, mountain hemlock, western white pine, Brewer spruce, canyon live oak, and black oak also included in the community. The understory comprises a rich shrub layer consisting of chinquapin, Sierra laurel, Saddler oak, dwarf rose, manzanita, huckleberry, oak, snowberry, and Oregon grape, as well as a well-developed and diverse herbaceous layer.

Following disturbance, 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.

KMC represents less than 26 acres (0.01 percent) of the Green Diamond ownership. All habitat present has been classified as KMC1P (size class 1, open).

Lacustrine. Lacustrine habitats are inland depressions or dammed riverine channels containing standing water. This habitat type represents only 8 acres within the Green Diamond ownership.

Montane Hardwood-Conifer. The MHC habitat type occurs throughout California and occurs extensively in both Del Norte and Humboldt counties on coarse, well-drained soils, at elevations ranging from 1,000 to 4,000 feet. This habitat type is a transition between the conifer dominated forests and the montane hardwood and is distinguished by having at least a third of the canopy species comprised of hardwoods and at least a third conifers. Typical canopy species include ponderosa pine, Douglas-fir, incense cedar, black oak, tanoak, Pacific madrone and golden chinquapin.

The multilayered dense canopy precludes much understory vegetation; however, shrubs often become abundant following disturbance. Immediately after disturbance resprouting hardwoods dominate with a tall stand of mixed conifers and hardwoods developing within 15 to 20 years. The conifers generally grow faster, reaching moderate size in 30 to 50 years, while the hardwoods require 60 to 90 years to fully recover.

MHC represents about 14 percent of the Green Diamond ownership, with 60,779 acres recorded. About 73 percent of this habitat type is characterized as size class 3, with the remaining 27 percent characterized as size class 4 through 6. Size class 6 accounts for less than 2 percent of the MHC habitat type on the Green Diamond ownership. About 93 percent of the MHC habitat type within the Green Diamond ownership is characterized as having a dense canopy.

Montane Hardwood. The MHW habitat ranges throughout California mostly west of the Cascade-Sierra Nevada crest. East of the crest, it is found in localized areas of Placer, El Dorado, Alpine and San Bernardino counties. Elevations range from 100 meters (m) (300 feet) near the Pacific Ocean to 2,745 m (9,000 feet) in southern California. A typical montane hardwood habitat is composed of a pronounced hardwood tree layer, with an infrequent and poorly developed shrub stratum, and a sparse herbaceous layer. Tree heights tend to be uniform at most ages in mature stands where hardwoods occur, but subordinate to conifers. Snags and downed woody material generally are sparse throughout the montane hardwood habitat.

In the Coast Range and Klamath Mountains, dominant canopy species include canyon live oak or huckleberry oak with a variety of conifer associates. Canyon live oak often forms pure stands on steep canyon slopes and rocky ridge tops. It is replaced at higher elevations by huckleberry oak. At higher elevations, oaks are scattered in the overstory among ponderosa pine, Coulter pine, California white fir, and Jeffrey pine, the latter on serpentine

and peridotite outcrops. Middle elevation associates are Douglas-fir, tanoak, Pacific madrone, California-laurel, California black oak, and bristlecone fir. Knobcone pine, gray pine, Oregon white oak, and coast live oak are abundant at lower elevations. Understory vegetation is mostly scattered woody shrubs (manzanita, mountain-mahogany, poison oak) and a few forbs.

MHW represents about 9 percent (or 40,387 acres) of the Green Diamond ownership in the Action Area.

Montane Riparian. Although not specifically delineated by Green Diamond (given the small scale of this habitat type relative to the Action Area), the MRI habitat type likely occurs within the Action Area. This diverse habitat type occurs throughout the Klamath, Cascade, Coast and Sierra Nevada mountains on seasonally flooded or saturated soils at elevations up to 8,000 feet. Winter 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, bigleaf maple, dogwood, Sitka spruce, Hooker willow, arroyo willow, and box elder. The herbaceous layer is generally lush and frequently dominated by ferns. The transition to nonriparian vegetation is frequently abrupt. This habitat type is relatively stable but may contain a mosaic of stages depending on the flood history.

Perennial Grassland. Perennial grassland habitat type, including coastal prairie, is restricted to the central and northern coastal areas, occurring within 65 miles of the shoreline at elevations up to 3,300 feet. This habitat type often occurs on ridges and south-facing slopes intermixed with forest and scrub habitats. Native perennial bunchgrasses, such as California oat grass, Pacific hairgrass, and Idaho fescue are common, as well as several non-native perennial and annual grasses, including sweet vernal grass, redtop, Kentucky bluegrass, and softgrass. Bracken fern, coast carex, and numerous forbs are also present in this habitat type.

Considered to be relatively stable under natural disturbance regimes, PGS has been significantly impacted by overgrazing, fire suppression, cultivation, and the introduction of non-native species.

PGS represents approximately 1.6 percent (or 6,892 acres) of the Green Diamond ownership in the Action Area.

Redwood. The RDW habitat type refers to the mixed conifer forests that occur in the moist coastal environments at elevations ranging from sea level up to 3,000 feet. Redwoods are found throughout this range, but are only dominant in a narrow band within 10 miles of the coast. Further inland, Douglas-fir becomes the dominant canopy species. Common associated species include Sitka spruce, grand fir, Pacific madrone, and tanoak. Western red cedar and western hemlock are present, but are not significant species in the canopy. The moist climate and fertile soils result in a generally lush understory growth of shrubs, ferns, herbs, and grasses. Common understory species include Oregon-grape, salal, coast rhododendron, ocean spray, huckleberry, snowbrush, ceanothus, sword fern, deer fern, and salmonberry.

This habitat type typically recovers rapidly from disturbance. Within 10 years, the early herbaceous vegetation is replaced by shrubs and redwood sprouts. Within 30 to 60 years, the shrub stage is followed by a mixture of conifers and hardwoods, with persistent shrubs remaining in the understory. A mature stand dominated by redwoods with a second canopy layer of Douglas-fir requires at least 150 years to develop.

RDW represents about 55 percent of the Green Diamond ownership, with 241,973 acres recorded. Most of this acreage (nearly 44 percent) is found in the near coastal areas. Redwood is least common in the interior areas near the eastern margins of the Action Area. About 58 percent of the RDW habitat type is characterized as size class 1 through 3, with the remaining 42 percent characterized as size class 4 through 6. Size class 6 accounts for less than 1 percent of the RDW habitat type. Size class 4 is the most abundant, accounting for approximately 37 percent of this habitat type. The next most abundant class (35 percent) is class 3. Almost 59 percent of the RDW habitat type within the Green Diamond ownership is qualified as having a dense canopy.

Riverine. This classification refers strictly to waterways and is specifically described in Section 3.3 (Hydrology and Water Quality). Although the Green Diamond GIS system does not include riparian zones around these riverine habitats, Green Diamond has completed numerous field studies to determine riparian habitat characteristics within the Action Area. Riparian vegetation in the coastal watersheds of northern California support a diversity of tree species, including alder, willows, western red cedar, coastal redwood, Sitka spruce, Douglas-fir, western hemlock, and big leaf maple. Channel habitat typing and assessment within the Action Area was conducted on 41 stream reaches for nearly 60 miles of stream channel. Canopy closure, as measured from the center of the stream, ranged from 70 to 95 percent in seven out of eight sub-basins sampled. Canopy closure was only 34 percent in one sub-basin because of a recent wildfire. Species composition within 50 feet of the bankfull channel was predominantly deciduous (69 percent to 91 percent) along all eight streams. The shift in composition favoring deciduous species is due in part to past harvesting practices and current restrictions on management activities within riparian areas. The predominant species observed in the riparian areas was red alder.

Wet Meadows. Wet meadows occur extensively throughout the Klamath Mountain ranges at elevations ranging from 4,600 to 6,000 feet on soils saturated throughout the growing season. This type occurs in northern Humboldt County and throughout Del Norte County. The herbaceous layer is composed of a rich diversity of grasses, sedges, rushes, and forbs with shrubs and trees sparse or absent. Important species include thingrass, abrupt-beaked sedge, Nebraska sedge, tufted hairgrass, needle spikerush, Nevada rush, iris leaf rush, pullup muhly, and paniced bulrush. Willow and bilberry are the only shrubs that may occur in any significant abundance.

Long-term succession eventually leads to replacement of wet meadows with forests; however, significant disturbance, such as overgrazing or altered hydrology, is generally required to allow tree invasion to occur.

This habitat type represents only 10 acres (less than 0.01 percent) of the Green Diamond ownership.

3.5.3 Plant Species of Concern

Rare plant species were identified using a February 2006 query of the Action Area (described in Chapter 1). This information was loaded into a database to sort by species. Species identified as potentially occurring within the Action Area may, in fact, be located within the eleven HPAs but outside of the Action Area boundaries. The CNDD identified 43 rare plant species located within the Action Area. Of these 43 species, 3 are Federally or State listed as endangered, beach layia (*Layia carnosa*), Kneeland Prairie penny-cress (*Thlaspi californicum*), and western lily (*Lilium occidentale*). Beach layia is a resident of coastal dune habitats and is unlikely to be found on the Green Diamond ownership. Kneeland Prairie penny-cress occurs locally on a single serpentine outcrop, and is not found on the current Green Diamond ownership. In addition to the listed species, 29 of the 43 rare plant species were initially identified as occurring on Green Diamond property or having the potential to occur, based on known locations, habitat associations and distribution. Twelve of the 43 species have a low potential for occurrence on the Green Diamond ownership. An additional 15 rare plant species are known to occur on the Green Diamond ownership through rare plant surveys conducted under Green Diamond's own Plant Protection Program (Green Diamond, 2001). The habitat association and potential for occurrence of the 58 rare plant species are summarized in Table 3.5-4.

Western lily (the one endangered species with potential to occur in the Action Area) is a seasonal perennial herb blooming from June to July. Its range extends from coastal southwestern Oregon to Humboldt County, California. Habitats include coastal scrub and prairie, freshwater marshes, and coniferous forest openings, generally at elevations less than 300 feet. Habitat loss and degradation, reduced disturbance regimes, grazing, and over-collection of bulbs pose the greatest threats to this species. Potential impacts in the area could result from road building and timber removal. The western lily is currently listed as endangered under the Federal ESA. This species is known to occur just south of Humboldt Bay, and near Crescent City in the coastal plain.

3.6 Northern Spotted Owl

3.6.1 Introduction

This Section describes the biology and habitat requirements of the northern spotted owl within the Action Area. The distribution, status, and life history of the northern spotted owl are discussed, as well as other factors affecting populations of the northern spotted owl within the Action Area that could potentially be affected by the Proposed Action, other action alternatives, or the No Action Alternative.

TABLE 3.5-4
Plant Species of Special Concern Potentially Occurring within the Green Diamond Ownership

Species	USFWS	CDFG	CNPS	Habitat Associations	Potential for Occurrence in Action Area
Bald Mountain milk-vetch <i>Astragalus umbraticus</i>			2	Cismontane woodland, lower montane coniferous forest	Known to occur on Green Diamond property
Beach layia <i>Layia carnosa</i>	FE	SE	1B	Coastal dunes	Low due to limited habitat availability
Bensoniella <i>Bensoniella oregano</i>	—	—	1B	Stream banks, meadows, bogs, fens lower montane coniferous forest	Known to occur on Green Diamond property
Bolander's reed grass <i>Calamagrostis bolanderi</i>	—	—	4	Bogs, fens, marshes, meadows, closed-cone conifer forest, coastal scrub	Known to occur on Green Diamond property
California pinefoot <i>Pityopus californicus</i>	—	—	4	Broadleafed upland forest, lower montane coniferous forest, north coast coniferous forest, upper montane coniferous forest	Known to occur on Green Diamond property
California pitcher plant <i>Darlingtonia californica</i>	—	—	4	Sphagnum bogs, seeps, and along trickling streams	Known to occur on Green Diamond property
Coastal triquetrella <i>Triquetrella californica</i>	—	—	1B	Coastal bluff scrub, coastal scrub	Moderate potential for occurrence, some habitat present
Coast checkerbloom <i>Sidalcea oregana</i> ssp. <i>eximia</i>	—	—	1B	Endemic to Humboldt County. Gravely soils in meadows and seeps. North coast coniferous and lower montane coniferous forests	Known to occur on Green Diamond property
Coast fawn lily <i>Erythronium revolutum</i>	—	—	2	Moist areas and streambanks within bogs and fens	Known to occur on Green Diamond property
Dark-eyed gilia <i>Gilia millefoliata</i>	—	—	1B	Coastal dunes	Low due to limited habitat availability
Del Norte buckwheat <i>Eriogonum nudum</i> var. <i>paralinum</i>	—	—	2	Coastal Prairie, Northern Coastal Scrub	Moderate potential for occurrence, some habitat present
Flaccid sedge <i>Carex leptalea</i>	—	—	2	Meadows, bogs, fens, marshes and swamps	Known to occur on Green Diamond property

TABLE 3.5-4
Plant Species of Special Concern Potentially Occurring within the Green Diamond Ownership

Species	USFWS	CDFG	CNPS	Habitat Associations	Potential for Occurrence in Action Area
Great Burnet <i>Sanguisorba officinalis</i>	—	—	2	Marshes, swamps, bogs, fens, seeps, riparian areas, meadows, broad-leaved upland forest, north coast coniferous forest	Moderate potential for occurrence, some habitat present
Green sedge <i>Carex viridula</i> var. <i>viridula</i>	—	—	2	Meadows, bogs, fens, marshes and swamps	Moderate potential for occurrence, some habitat present
Heart-leaved twayblade <i>Listera cordata</i>	—	—	4	Bogs, fens	Known to occur on Green Diamond property
Henderson's fawn lily <i>Erythronium hendersonii</i>	—	—	2	Lower montane coniferous forests	Good potential for occurrence
Howell's jewel flower <i>Streptanthus howellii</i>	—	—	1B	Lower montane coniferous forests, associated with serpentine	Moderate potential for occurrence, some habitat present
Howell's montia <i>Montia howellii</i>	—	—	1A	Vernally wet sites, meadows, northeast coniferous forest	Known to occur on Green Diamond property
Howell's sandwort <i>Minuartia howellii</i>	—	—	1B	Chaparral, Jeffrey-pine/oak woodland, serpentine	Moderate potential for occurrence, some habitat present
Humboldt Bay owl's-clover <i>Castilleja ambigua</i> ssp. <i>humboldtiensis</i>	—	—	1B	Coastal salt marsh	Low due to limited habitat availability
Indian pipe <i>Monotropa uniflora</i>	—	—	2	Broad-leaved upland forest and north coast coniferous forest, often associated with redwoods and western hemlock	Known to occur on Green Diamond property
Kellogg's lily <i>Lilium kelloggii</i>	—	—	4	Openings, disturbed areas in redwood and yellow pine forests	Known to occur on Green Diamond property
Kneeland Prairie penny-cress <i>Thlaspi californicum</i>	FE	—	1B	Serpentine soils in Kneeland Prairie, near Kneeland Airport	Low due to limited distribution and limited habitat availability
Koehler's stipitate rock-cress <i>Arabis koehleri</i> var. <i>stipitata</i>	—	—	1B	Lower montane coniferous forests, chaparral, associated with serpentine	Moderate potential for occurrence, some habitat present

TABLE 3.5-4
Plant Species of Special Concern Potentially Occurring within the Green Diamond Ownership

Species	USFWS	CDFG	CNPS	Habitat Associations	Potential for Occurrence in Action Area
Lakeshore sedge <i>Carex lenticularis</i> var. <i>limnophila</i>	—	—	2	Wetlands, meadows	Moderate potential for occurrence, some habitat present
Leafy-stemmed miterwort <i>Mitella caulescens</i>	—	—	2	North coast and lower montane coniferous forest, broad-leaved upland forest, meadows	Known to occur on Green Diamond property
Longbeard lichen <i>Usnea longissima</i>	—	—	—	North coast coniferous forest, and broadleaved upland forest	Known to occur on Green Diamond property
Lyngbye's sedge <i>Carex lyngbyei</i>	—	—	2	Coastal salt marsh	Low due to limited habitat availability
Mad River fleabane daisy <i>Erigeron maniopotamicus</i>	—	—	1B	Meadows and seeps, open disturbed areas (road cuts); rocky areas	Moderate potential for occurrence, some habitat present
Maple-leaved checkerbloom <i>Sidalcea malachroides</i>	—	—	1B	Coastal woodlands and clearings, often in disturbed areas. Broad-leaved upland forest, coastal prairie, coastal scrub, north coast coniferous forest	Known to occur on Green Diamond property
Marsh pea <i>Lathyrus palustris</i>	—	—	2	Coastal prairie, coastal scrub, bogs, fens, marshes, swamps, lower montane coniferous forests	Moderate potential for occurrence, some habitat present
Marsh violet <i>Viola palustris</i>	—	—	2	Coastal scrub, bogs and fens	Moderate potential for occurrence, some habitat present
Meadow Sedge <i>Carex praticola</i>	—	—	2	Moist to wet meadows	Known to occur on Green Diamond property
Naked flag-moss <i>Discelium nudum</i>	—	—	2	Coastal bluff scrub, on clay banks	Low due to limited habitat availability
Nodding semaphore grass <i>Pleuropogon refractus</i>	—	—	4	Meadows, wetlands, riparian	Known to occur on Green Diamond property
Northern clustered sedge <i>Carex arcta</i>	—	—	2	Bogs and fens, moist places in north coast coniferous forest	Moderate potential for occurrence, some habitat present; not known on Green Diamond property
Oregon coast Indian paintbrush <i>Castilleja affinis</i> ssp. <i>litoralis</i>	—	—	2	Coastal bluff scrub, Coastal dunes, Coastal scrub	Moderate potential for occurrence, some habitat present

TABLE 3.5-4
Plant Species of Special Concern Potentially Occurring within the Green Diamond Ownership

Species	USFWS	CDFG	CNPS	Habitat Associations	Potential for Occurrence in Action Area
Oregon fireweed <i>Epilobium oreganum</i>	—	—	1B	Bogs, fens, meadows, montane coniferous forest	Moderate potential for occurrence, some habitat present; not known on Green Diamond property
Pink sand-verbena <i>Abronia umbellata</i> ssp. <i>breviflora</i>	—	—	1B	Beaches and coastal dunes	Low due to limited habitat availability
Pacific gilia <i>Gilia capitata</i> ssp. <i>pacifica</i>	—	—	1B	Coastal bluff scrub, Chaparral, coastal prairie Valley and foothill grassland	Moderate potential for occurrence, some habitat present
Redwood lily <i>Lilium rubescens</i>	—	—	4	Chaparral, lower montane coniferous forest, upper montane coniferous forest, and sometimes serpentine	Known to occur on Green Diamond property
Robust false lupine <i>Thermopsis robusta</i>	—	—	1B	North coast coniferous forest, broad-leaved upland forest	Known to occur on Green Diamond property (Blue Creek Mt., Johnson)
Running pine <i>Lycopodium clavatum</i>	—	—	2	Moist areas in north coast coniferous forest, marshes and swamps. Known in California only from Humboldt County	Known to occur on Green Diamond property
Seacoast ragwort <i>Senecio bolanderi</i> var. <i>bolanderi</i>	—	—	2	Coastal scrub, north coast coniferous forest	Known to occur on Green Diamond property
Serpentine catchfly <i>Silene serpicicola</i>	—	—	1B	Chaparral, lower montane coniferous forest/serpentinite openings; gravelly or rocky	Moderate potential for occurrence, some habitat present; not known on Green Diamond property
Serpentine sedge <i>Carex septicola</i>	—	—	2	Meadows and seeps, serpentinite	Moderate potential for occurrence, some habitat present; not known on Green Diamond property
Siskiyou checkerbloom <i>Sidalcea malviflora</i> ssp. <i>patula</i>	—	—	1B	Coastal bluff scrub, coastal prairie, and North Coast coniferous forest	Known to occur on Green Diamond property
Siskiyou false hellebore <i>Veratrum insolitum</i>	—	—	4	Stream banks, moist meadows	Known to occur on Green Diamond property
Slender false lupine <i>Thermopsis gracilis</i> var. <i>gracilis</i>	—	—	4	Meadows	Known to occur on Green Diamond property

TABLE 3.5-4
Plant Species of Special Concern Potentially Occurring within the Green Diamond Ownership

Species	USFWS	CDFG	CNPS	Habitat Associations	Potential for Occurrence in Action Area
Small ground cone <i>Boschniakia hookeri</i>	—	—	2	North coast coniferous forest	Known to occur on Green Diamond property
Sonoma manzanita <i>Arctostaphylos canescens</i> ssp. <i>sonomensis</i>	—	—	1B	Chaparral, lower montane coniferous forest	Good potential for occurrence
Sugar scoop; lace flower <i>Tiarella trifoliata</i> var. <i>trifoliata</i>	—	—	3	Lower montane coniferous forest, north coast coniferous forest	Known to occur on Green Diamond property
Suksdorf's wood sorrel <i>Oxalis suksdorfii</i>	—	—	4	Broadleaved upland forest, North Coast coniferous forest	Known to occur on Green Diamond property
Tracy's romanzoffia <i>Romanzoffia tracyi</i>	—	—	2	Ocean bluffs	Low due to limited habitat availability
Trailing black currant <i>Ribes laxiflorum</i>	—	—	4	Redwood forest	Known to occur on Green Diamond property
Vanilla grass <i>Hierochloa odorata</i>	—	—	2	Meadows and seeps	Known to occur on Green Diamond property
Western lily <i>Lilium occidentale</i>	FE	—	1B	Early successional bogs, fens, coastal scrub, and prairie, on poorly-drained soils, within about 4 miles of coast	Moderate potential for occurrence; some habitat present; no specimens found during THP surveys
White-flowered rein orchid <i>Piperia candida</i>	—	—	4	Coniferous and mixed evergreen forest	Known to occur on Green Diamond property

U.S. Fish and Wildlife Service (USFWS) Federal Listing Categories

FE = Federal Endangered

California Department of Fish and Game (CDFG) State Listing Categories

SE = California Endangered

California Native Plant Society (CNPS)

CNPS 1A = Presumed extinct in California

CNPS 1B = Rare, threatened, or endangered in California and elsewhere

CNPS 2 = Rare, threatened, or endangered in California, but more common elsewhere

CNPS 3 = Need more information—a review list

CNPS 4 = Limited distribution—a watch list

3.6.2 Northern Spotted Owl Biology

The following description of northern spotted owl (*Strix occidentalis caurina*) biology is taken from Green Diamond's Northern Spotted Owl Habitat Conservation Plan Phase One Comprehensive Review (Green Diamond, 2006), the Scientific Evaluation of the Status of the Northern Spotted Owl (Courtney et al., 2004), and the Conservation Strategy for the Northern Spotted Owl (Thomas et al., 1990). Thomas et al. (1990) summarized research findings available at that time. Courtney et al. (2004) updated the findings and conclusions from Thomas et al. (1990) based on a substantial body of research conducted after 1990. Green Diamond (2006) presents the results of research conducted on Green Diamond's managed forests in northern California.

3.6.2.1 General Habitat Associations

Courtney et al. (2004) described the general habitat requirements as follows:

“In general, studies completed by 1990 showed that Northern Spotted Owls consistently used old-growth forests, forests of mixed mature and old-growth, or, especially in the redwood region, mature forest with structural characteristics similar to old-growth stands, for foraging, roosting and nesting in proportions greater than expected based on availability. In the redwood zone of coastal California, spotted owls used younger stands for nesting more than elsewhere in the species' range, although in the majority of young redwood stands used for nesting, residual (older) trees were present.”

Courtney et al. (2004) indicated that the forest stand structural attributes identified as important components of northern spotted owl habitat by Thomas et al. (1990) are the same as those identified during later studies. Structural attributes that are positively associated with foraging, roosting and nesting include vertical canopy layering, tree height or diameter diversity, canopy volume, canopy closure, snag diameter, snag basal area or volume, tree diameter, and log volume. Courtney et al. (2004) emphasized that, as was noted in Thomas et al. (1990), structural attributes of relatively young redwood stands are similar to attributes that accrue only in very old forests in most of the owl's range. The use pattern in the redwood forests appears to be associated in part with the relatively rapid growth rate of redwood trees, producing forests with “mature” characteristics at a relatively young age.

3.6.2.2 Nest Site Characteristics

Northern spotted owls in the Action Area and in the redwood forest zone typically nest in younger stands than elsewhere in the subspecies range (Courtney et al., 2004). Spotted owl nest microsites on Green Diamond lands have a greater basal area of large conifers, greater canopy height, lower basal area of small hardwood trees, lower canopy closure, and greater log volume than random sites within nest stands. Similarly, nest stands have a greater basal area of large conifers, lower basal area of small conifers, fewer conifer saplings, steeper slopes, and higher ground cover of shrubs, ferns, forbs, and tree seedlings than random stands. These findings are consistent with habitat associations of northern spotted owls at several spatial scales throughout the range of the subspecies (Courtney et al., 2004).

3.6.2.3 Suitable Habitat and Nest and Roost Site Characteristics on Green Diamond Land

As noted in Green Diamond (2006), a major premise of their 1992 HCP was that habitat suitable for owls would increase throughout the 30-year period of the plan. The distribution of area in each of the forest stand age classes changes through time as stands age and enter older age classes or as stands are harvested and enter younger age classes. Green Diamond (2006) indicated that foraging, roosting, and occasional nesting occurred in stands 31 to 45 years old, and forest stands > 45 years old were considered to be prime nesting and roosting habitat as well as foraging habitat. This finding is supported by owl studies on Green Diamond lands (Thome et. al, 1999, 2000; Diller and Thome 1999).

The USFWS' EA for the 1992 HCP projected the area of both of these older age classes to increase over the life of the plan (Table 3.6-1), and data from Green Diamond show that increases did occur between 1992 and 2002, similar to those projected for the first ten years of the NSO HCP (Table 3.6-2). Table 3.6-2 (1992 and 2002 columns) shows the actual change in acres by age class during the first 10 years of the HCP. Table 3.6-2 is based on the same 383,106-acre land base considered in the USFWS EA on the 1992 HCP, minus lands sold between 1992 and 2002, thus the total ownership acreage in Table 3.6-2 is less than in Table 3.6-1. Additional lands that have been added to the Green Diamond holdings since 1992 are not included in Tables 3.6-1 or 3.6-2, in order to allow comparison with the same land base analyzed in 1992, without confounding effects of habitat acres on added lands. Lands acquired since 1992 are included in Table 3.6-3, which shows recent (2006) and projected areas in the different stand age classes. To have a consistent basis for comparisons, all subsequent discussion of actual or projected acreage changes by stand age class are based on the data in Table 3.6-2, unless otherwise stated.

TABLE 3.6-1

Projections from USFWS' 1992 EA, for Acres of Green Diamond Timberland Stands in Owl Habitat Age-Classes from 1991-2021 (Based on the 1991 Green Diamond ownership. The data in this table do not include lands acquired or sold since 1991.)

Stand Age (yrs)	1991	1996	2001	2011	2021
0-7	40,750	34,860	35,179	33,506	42,772
8-30	157,559	140,780	116,485	85,112	89,932
31-45	77,451	103,952	126,714	112,957	79,146
46+	67,214	68,096	73,066	120,517	140,907
ROG/MIX	17,768	13,054	9,298	8,650	7,985
NF	22,364	22,364	22,364	22,364	22,364
Total	383,106	383,106	383,106	383,106	383,106

NF = Nonforested land, no direct value to owls.

ROG/MIX = Hardwood and brush cover types with minor old-growth residual component, and remnant old-growth cover types

Source: USFWS, 1992a.

TABLE 3.6-2

Actual (1992 and 2002) and Projected (2012 and 2022) Area of Green Diamond Land (acres) in Spotted Owl Habitat, Resulting from Timber Harvest Practices and Increasing Stand Age (based on those lands owned by Green Diamond throughout the 1992–2002 period)

Stand Age (yrs)	1992	2002	Net Change from 1992 to 2002	2012	2022
0–7	52,538	25,479	-27,059	27,877	42,935
8–30	137,793	109,331	-28,462	85,321	75,279
31–45	75,442	120,369	44,927	98,233	73,149
46+	68,515	78,899	10,384	124,355	144,422
Suitable Owl Habitat	143,957	199,268	55,311	222,589	217,572
NF	15,314	15,524	210	13,816	13,816
Total	349,602	349,602		349,602	349,602

Notes: The apparent increase in non-forested area between 1992 and 2002 was due to a reclassification of 210 acres as non-forest. Acreage is based on the common land area in Green Diamond ownership between 1992 and 2002; the common land area allows for comparisons of growth and harvest between time periods. Thus the data in this table excludes lands acquired or sold between 1992 and 2002.

NF = Nonforested land, no direct value to owls.

Source: Source: Green Diamond 2006a, Table 2.1; and Hamm, 2006a.

TABLE 3.6-3

Actual (2006) and Projected (2012 and 2022) Area of Green Diamond Land (acres) in Spotted Owl Habitat (based on the current [2006] Green Diamond ownership in the Action Area)

Stand Age (yrs)	2006	2012	2022
0–7	37,090	40,113	48,582
8–30	123,972	112,582	101,415
31–45	113,972	104,955	93,615
46–60	69,240	80,896	73,143
61–80	30,936	31,511	49,212
81+	13,528	15,654	19,979
Old-Growth	6,898	6,146	5,911
46+	120,602	134,207	148,245
Suitable Owl Habitat	234,574	239,162	241,860
NF	14,959	14,904	14,904
Total	410,595	406,761	406,761

Notes: Forest habitat information on 3,834 acres was not available for forecasting in 2012 and 2022 hence the difference in total acres from 2006. Acres for 2006 are based on the actual Green Diamond land base for that year; the 2012 and 2022 projections are based on the current 2006 land base.

NF = Nonforested land, no direct value to owls.

Source: Green Diamond 2006a, Table 2.2; and Hamm, 2006a, 2007c.

Green Diamond used GIS to estimate the area of spotted owl habitat between 1992 and 2002. Based on the original HCP definition, owl habitat increased 38 percent, from 143,895 acres in

1992 to 199,184 acres in 2002 (Table 3.6-2). This represents an increase in over 55,000 acres of suitable habitat between 1992 and 2002.

Green Diamond (2006; personal communication 2007) characterized northern spotted owl use of nest stands and the landscape composition of nest stands and random locations as follows:

- Stand cover types used by spotted owls for nesting were redwood/hardwood (17 percent), redwood/Douglas-fir/hardwood (25 percent), Douglas-fir/hardwood (23 percent), and hardwood/conifer (35 percent). The distribution of nest stand cover types did not differ from random stands ($\chi^2 = 4.365$, $df = 3$, $P = 0.225$). Eighteen percent of nests occurred in stands 31 to 45 years old, 35 percent in stands 46 to 60 years old, 30 percent in stands 61 to 80 years old, 7 percent in stands 81 to 200 years old, and 10 percent in stands > 200 years old. Sixty-two percent of owl pairs nested in stands with residual, older trees present; 38 percent nested in even-aged stands. Among stands dominated by hardwoods, 90 percent contained residual trees. Snag density was low in both nest and random stands.
- Landscape composition around nests differed from random locations on Green Diamond land, with nest locations containing more 31- to 45-year-old and 46- to 60-year-old forest. The amount of clearcut area (0- to 7-year-old forest) did not differ between nest and random sites on Green Diamond land; this was also found by Meyer et al. (1998) in Oregon. In contrast to all other studies of northern spotted owls except one in the eastern Cascades of Washington, landscapes surrounding nests did not contain more older forest (> 60 years in the Green Diamond study) than random landscapes (summarized in Courtney et al., 2004).

An analysis of habitat mosaics in 502-acre circles around 60 nest sites and 60 random locations on Green Diamond lands found that there was significantly ($P < 0.05$) more acreage in the 31 to 45 and 46 to 60 age-classes around nests than around random points (1992 HCP, Table 22; Folliard et al., 2000). A landscape analysis on Green Diamond lands indicated that areas of high owl density had over twice the amount of stands of 46+ year-old stands than areas of low northern spotted owl density and over six times more than areas not used by owls (Folliard et al., 2000).

Green Diamond has data on 1992 and 2003 forest conditions on the Green Diamond ownership (Keith Hamm, Green Diamond, personal communication, July 5, 2007 and July 6, 2007), that allows some comparisons to the previous habitat mosaic analysis. The new data were generated from information and analytic tools not available in 1992, including digitized geographic information system (GIS) maps of forest stand age data for Green Diamond lands in 1992 and 2003. The data represent composition, by stand age, for 497-acre circles (used to approximate an NSO territory) centered on the random points (Table 3.6-4). The new data set is based on a large number of random points (4,860 points for 1992 forest conditions and 6,842 points for 2003). The habitat mosaic analysis in the 1992 HCP was, by comparison, based on manual mapping methods, and on a sample size of 60 random points.

The results of the 1992 and more recent analysis are not entirely comparable because methods differed substantially between the two analyses, and the newer data set was generated for another purpose. Thus, the newer data set uses slightly different stand age categories

(Table 3.6-4), and the 2003 data include lands acquired after 1992. In particular, the 2003 data includes approximately 70,000 acres of commercial timberlands acquired from Louisiana Pacific after 1992; these acquired lands are similar, on a coarse level, to the other Green Diamond lands in terms of stand age and distribution (Hamm, 2007b). The new analysis does, however, provide a backward-looking evaluation of 1992 versus 2003 conditions on the Green Diamond ownership in the Action Area.

We know from other data (Table 3.6-2) that suitable NSO habitat (age 31 years and older) increased from about 41 percent of the ownership to about 57 percent of the ownership between 1992 and 2002; this is based on the 349,602 acres of Green Diamond lands which remained in their ownership throughout 1992 to 2002. Using forest stand ages of 41 years or greater as a rough proxy for NSO habitat (the data do not have a 31-to-40-year category), the recent data show a similar pattern of change, with an increase in the average amount of forest 41 years and older from about 104 acres (about 21 percent of the 497-acre circle) to 172 acres (about 35 percent of the 497-acre circle), an increase of about 14 percent (Table 3.6-4). The analysis also indicates an average decrease of about 12 to 13 percentage points for stands aged younger than 40 years, a small decrease in the area of stands aged 81 and older, and little change in the proportion of the circles in forest stands of age 21 to 40 years (Table 3.6-4). These numbers, and the relatively similar standard errors for the 1992 and 2003 numbers, are consistent with the property-wide pattern (Table 3.6-2) and with the expectations of the 1992 HCP for an increase in suitable NSO habitat across the ownership, with no obvious change in the spatial distribution, such as patchiness or 'clumpiness', of suitable NSO habitat.

TABLE 3.6-4

1992 and 2003 Composition of Habitat, by Forest Stand Age Class, for 497-Acre (800-m radius) Circles Centered around Randomly-Selected Points on the Green Diamond Ownership. (Data represent the averages [\pm standard errors] for 4,000+ random points. See text for details.)

Stand Age (yrs)	1992 Acres	2003 Acres	Change (acres)
0-5	65.0 \pm 1.34	42.7 \pm 0.61	-22.3
6-20	141.7 \pm 1.92	101.5 \pm 1.44	-40.2
21-40	185.7 \pm 2.35	180.9 \pm 2.00	-4.8
41-60	51.1 \pm 1.62	116.5 \pm 1.77	+65.4
61-80	22.5 \pm 0.87	35.5 \pm 0.82	+13.0
81+	30.6 \pm 0.72	19.8 \pm 0.48	-10.8
Total, 41+ yrs	104.2	171.7	+67.5

Source: Hamm, 2007a.

3.6.2.4 Foraging Ecology

Northern spotted owls eat a wide variety of prey, but nocturnal, arboreal or semi-arboreal small mammal species predominate in diets. Green Diamond (2006) summarized the results of range-wide prey studies (Cutler and Hays, 1991; Ward et al., 1998; Forsman et al., 2001; Hamer et al., 2001; Forsman et al., 2004) as well as those conducted on its own lands. Range-wide study results summarized in Green Diamond (2006) indicated that small mammals made up 81 to 98 percent of the prey items and 81 to 99 percent of biomass consumed by northern spotted owls. Woodrats (*Neotoma* spp.) dominated the diet in the

Oregon and California Klamath Province (one study area each), comprising 28 to 39 percent of prey items and 49 to 71 percent of prey biomass. Green Diamond (2006) analyzed northern spotted owl prey items on its lands from 1989 to 2004 and found that dusky-footed woodrats (*Neotoma fuscipes*) comprised almost three-fourths of the spotted owl prey biomass. The two next most important prey species in terms of biomass were brush rabbits (*Sylvilagus bachmani*) and northern flying squirrels (*Glaucomys sabrinus*), representing 8.9 and 7.7 percent of prey biomass, respectively. These results were similar to those reported by Smith et al. (1999), who found that dusky-footed woodrats dominated the diets of California Spotted Owls in terms of frequency and biomass.

Dusky-footed woodrats typically are associated with dense vegetation that offers protective cover, an abundant food source, and sites for construction of stick “houses” (Hooven, 1959; Horton and Wright, 1944; Murray and Barnes, 1969). Studies conducted on Green Diamond lands generally agree with these findings. Green Diamond (2006) indicated that on their lands:

“The results of this study were consistent with other studies of woodrat abundance and habitat associations. Sakai and Noon (1993) found dusky-footed woodrat abundance highest in the sapling brushy pole timber stage (15–40 years) in Douglas-fir forests in northwest California. They (Sakai and Noon) found that woodrats were absent in small saw timber and large saw timber, which equated to the 2 older age classes of forest in this (the Green Diamond) study.”

Both Green Diamond woodrat studies indicated that in the redwood/Douglas-fir zone of the Green Diamond ownership, woodrats are in greatest abundance in young stands less than 40 years of age.

After reviewing the extensive body of literature, Courtney et al. (2004) indicated that prey availability, numbers, and behavior may play a major role in determining habitat selection by spotted owls. They further noted that habitat type and structure directly influence prey species composition, abundance, and availability and that the composition of northern spotted owl diet may vary at the scale of individual territories as habitat varies.

3.6.2.5 Habitat Fragmentation, Stand Age, and Edge Effects

Studies conducted after 1990 show that home range size is influenced by the degree of forest fragmentation and proportion of home range in mature and old forest, with increased home range size found in more fragmented landscapes and in home ranges containing a smaller proportion of mature and old-growth forest (Courtney et al., 2004). They also indicated that home range size is related to the primary prey species consumed by spotted owls, with larger home ranges occurring where flying squirrels dominated the diet and smaller home ranges where woodrats dominated the diet.

Studies by Green Diamond (Green Diamond 2006, McDonald et al. 2006) indicate that despite the biases inherent in their study (associated with use of visual observations to study foraging in spotted owls), it is apparent that northern spotted owls tend to spend the greatest amount of time in older stands (> 40 years) during their nocturnal period of activity. Stands 10 to 20 years old also received high use, and although not a high proportion of all locations (7.7 percent of radio telemetry locations, and 16.9 percent of

visual locations), spotted owls used recent clearcuts (0 to 4 years) more than anticipated based on previous radio telemetry studies. In addition, foraging in recent clearcuts was apparently not an atypical behavior of just a few birds, as 13 of 22 radio-telemetered birds were recorded in these areas on at least one occasion.

Green Diamond (2006) states that:

“...the high use in the older stands relates to their (owl’s) ability to use these stands to forage for certain species of prey (e.g., flying squirrels, tree voles, birds, etc.) as well as engaging in other nocturnal behaviors. In contrast, use of the younger stands were most likely only associated with foraging for species such as dusky-footed woodrats that are known to be abundant in young stands (Sakai and Noon, 1993). We (the authors) believe that the high use in the 10-20 yr old stands occurs because these stands had high densities of woodrats (Sakai and Noon, 1993), and spotted owls were able to forage relatively well in stands of this age. We (the authors) postulate that the rapid development of coastal forests results in sufficient stand development and canopy lift during the 10-20 age class that woodrats become more vulnerable to avian predators. In contrast, brushy clearcuts that are 5-9 years old may have relatively high numbers of woodrats, but they may be too dense to permit access by avian predators. The 0-4 yr old clearcuts may contain relatively few prey items, but those present should be quite vulnerable to an avian predator.”

Recent larger clearcuts lack suitable residual trees as hunting perches, except along the edge, and therefore are structurally poor for sit-and-wait predators such as the spotted owl.

Courtney et al. (2004) discussed reproductive success relative to prey abundance and availability as follows:

“...in areas where woodrats (or other prey associated with early-seral stages) are dominant in the diet of Northern Spotted Owl, (e.g., in the Roseburg area, Klamath Mountains), reproductive success was correlated with a high amount of edge between known spotted owl habitat and other habitat types (Anthony et al., 2002; Anthony et al., 2000; Franklin et al., 2000). This is consistent with high dusky-footed woodrat densities in early-seral habitat, where they have the opportunity to move into and through adjacent habitat types (Sakai and Noon, 1993; 1997). Woodrats show no aversion to crossing sharp ecotones into old-growth, where they are more vulnerable to predation by Northern Spotted Owls (Sakai and Noon, 1993). As woodrats may be unavailable to spotted owls in dense young forest (Forsman et al., 1984; Gutiérrez, 1985; Carey et al., 1992; C. Zabel, U. S. For. Serv. pers. comm. cited in Sakai and Noon, 1993; Rosenberg and Anthony, 1992; Zabel et al., 1993), young stands may be important source areas for spotted owl prey. High availability of prey in edge ecotones may then increase spotted owl reproductive success. Radio-tagged woodrats were often killed by predators (both mammals and raptors) with many of the carcasses found in old forest adjacent to younger areas (Sakai and Noon, 1993, 1997).”

3.6.2.6 Habitat Overlap and Interaction Between Barred Owls and Northern Spotted Owls

Green Diamond (2006) summarized the westward range expansion of the barred owl (*Strix varia*) relative to the distribution of the northern spotted owl as follows:

“Barred owls (*Strix varia*) and Northern Spotted Owls are closely related, are similar in morphology (barred owls are approximately 15 percent larger), and have similar habitat associations where their ranges overlap (Courtney et al. 2004). Barred owls expanded their range from eastern to western North America in the latter part of the 20th century, arriving in Washington in 1965 (Rogers, 1966), Oregon in 1974 (Taylor and Forsman, 1976) and California in 1981 (Evens and LeValley, 1982). The barred owl’s range now overlaps essentially all of the range of the Northern Spotted Owl.”

The expansion of the barred owl range in California since 1981 has been rapid, with potential effects on spotted owl populations including competition for food and habitat, predation, and hybridization (Dark et al., 1998). Only one study (in Washington) has focused on home range and diet of sympatric barred and spotted owls (Hamer, 1988; Hamer et al., 2001). Barred owl home ranges were much smaller than those of spotted owls in Washington (Hamer, 1988) and barred owls had a more diverse diet than sympatric spotted owls (Hamer et al., 2001). Home range and dietary overlap between these two species have not been studied in Oregon or California, although a study in Oregon found that occupancy of spotted owl sites declined after barred owls were detected within 0.5 mi (0.8 km) of the spotted owl territory center (Kelly et al., 2003).

Green Diamond (2006) also noted the following:

“In some regions, barred owl pairs occupy many territories formerly occupied by Northern Spotted Owls (e.g., Olympic peninsula, Scott Gremel, personal communication; Washington Cascades, Pearson and Livezey 2003 and Herter & Hicks 2000). In these areas it is not known whether barred owls directly displaced spotted owls, or whether spotted owls vacated their territories for some other reason, allowing the barred owls to colonize the vacant areas. Occupancy of former spotted owl territories by barred owls has occurred on many types of land ownership (National Parks, National Forests, BLM Districts, tribal land, State land, timber company land, etc.; Courtney et al., 2004), including those that experienced timber harvest and those not available for timber harvest.”

In Redwood National and State Parks, adjacent to Green Diamond land, the number of historical and current spotted owl activity centers in which barred owls were detected rose gradually between 1993 and 2004, concurrent with a decline in the number of spotted owls in the activity centers (Schmidt, 2005). Green Diamond (2006) identified 43 barred owl sites on Green Diamond lands between 1993 and 2005 based on barred owl responses incidental to spotted owl surveys. An upward trend occurred in the number of barred owl sites during this period while the level of spotted owl survey effort remained relatively constant, indicating an apparent increase in the number of barred owls.

A covariate analysis of spotted owl and barred owl data used in the 2004 meta-analysis conducted by Anthony et al. (2004, 2006) showed few meaningful relationships between

barred owl presence and the fecundity and survival of spotted owls. However, Courtney et al. (2004) indicated that many of the field researchers participating in the meta-analysis believed that barred owls had a greater effect on spotted owl site occupancy than indicated by the analysis (Anthony et al., 2004, 2006; Kelly et al., 2003).

Courtney et al. (2004) summarized potential long-term northern spotted owl viability relative to barred owls as follows:

“It is possible that Spotted Owls will be able to maintain their viability in spite of the Barred Owl invasion in such habitats; alternatively the current low densities of Barred Owls may be nothing more than a historical accident or temporal lag, soon to be swamped by rapid population growth, higher density, wider habitat use. The history of the Barred Owl invasion elsewhere is consistent with the latter hypothesis: Barred Owls were initially thought to exist “throughout the range of the Northern Spotted Owl...as scattered pairs or individuals” (Anderson et al. 1990:42), but have increased rapidly in the last decade. We have no means of distinguishing between alternate scenarios, which carry different risks for Spotted Owl conservation.”

3.6.2.7 Regional Distribution and Population Status

One scale for assessing effects on the NSO is at the physiographic province level. In the critical habitat determination (USFWS, 1992b), 1992 draft NSO recovery plan (USFWS, 1992c), and later in NWFP documents (FEMAT, 1993; Lint, 2005), the USFWS and others defined physiographic provinces within the NSO range. Twelve such provinces have been identified, based on local climatic, geological and resultant vegetative conditions within the NSO range (FEMAT, 1993; Lint, 2005). The Action Area is primarily (more than 80 percent) within the California Coast Physiographic Province, which includes about 5.7 million acres extending from the Oregon border south to the San Francisco Bay. This province falls between the Pacific Ocean to the west and the California Klamath Physiographic Province to the east, which includes the remainder of Green Diamond’s lands. While there is no accurate accounting of current numbers of northern spotted owls, the California Department of Fish and Game maintains a database that indicates northern spotted owl activity centers within California. A query of that database revealed 1,390 known northern spotted owl activity centers within the California Coastal Province (Gould, pers. comm., 2006). This estimate is rough and may represent an overestimate of currently active activity centers, because the database is cumulative over time, and surveys have not been completed to determine if owls are still resident at many of these sites. However, this negative bias in the number could be more than offset by the number of undiscovered owl sites within extensive areas with either incomplete or no surveys. Nevertheless, the number of known activity centers has clearly increased since 1992, most likely because of increased survey efforts. In general, owls in the province appear densely and continuously distributed along the coastline from the Oregon border to southern Sonoma County, where a gap occurs isolating the southernmost population center in Marin. The distribution of owls on the eastern edge of the province is much less dense.

Green Diamond participated in two previous region-wide meta-analyses of northern spotted owl demographic data, in December 1998 and January 2004 (Franklin et al., 1999,

and Anthony et al., 2004 and 2006, respectively), along with all other ongoing demographic studies of northern spotted owls in the United States.

Courtney et al. (2004) provides the most recent summary of the current population status of the northern spotted owl on both a range-wide and regional basis. Two methods have been used to estimate the annual rate of population change (λ_{RJS} = lambda calculated by the reparameterized Jolly-Seber method). While there are differences in how λ is estimated, in both cases, $\lambda = 1$ indicates a stationary population, $\lambda < 1$ indicates a declining population, and $\lambda > 1$ indicates an increasing population. Courtney et al. (2004) concurred with and summarized the results of the demographic trends provided by the recent meta-analysis conducted by Anthony et al. (2004). Excerpts from Courtney et al. (2004) follow.

“The estimated rate of population change from the most recent meta-analysis ranged from 0.896 to 1.005 and was < 1.0 on 12 of 13 study areas reported by Anthony et al. (2004). However, in only four of these 12 were 95 percent confidence intervals for $\lambda_{RJS} < 1.0$: for the two study areas in the eastern Cascades, Washington, Warm Springs (eastern Cascades, Oregon), and Simpson [Green Diamond] lands of Coastal California. Two meta-analyses of the annual rate of population change were completed for 13 and 8 combined study areas across the range of the Northern Spotted Owl. The mean λ_{RJS} for all 13 study areas was 0.959 and for the eight monitoring study areas was 0.975, indicating average annual population declines of 4.1 percent for all 13 study areas and 2.5 percent for the 8 study areas, neither of which were different from a stationary population based on the 95 percent confidence intervals. However, these averages across all study areas should be viewed cautiously because they ignore regional variation; the key point is that declines in Northern Spotted Owl populations may be occurring in some areas and not in others. These results, which indicate lower demographic performance, may indicate a worsening of performance from 1998 to 2003, simple statistical variation, or both. It is difficult, on the information available, to be sure whether or not current conditions are worse now (2004) than they were five years ago.

The cause(s) of northern spotted owl population declines from 1990-2003 are poorly understood. Hypothesized reasons for decline include displacement of Spotted Owls by Barred Owls, loss of habitat to wildfire, loss of habitat to logging on State, private, and tribal lands, forest defoliation from insects, and advancing forest succession toward climax fir communities in the absence of fire (Anthony et al., 2004; Anthony et al., 2006; L. Irwin, pers. comm. cited in Courtney et al., 2004; USFWS, 2007). Weather extremes may also be a factor in some populations. Franklin et al. (2000) predicted that northern spotted owl populations may experience periods of decline, especially if habitat quality had been degraded from past land management practices.

Green Diamond (2006) summarized the results of population and productivity monitoring on its lands as follows:

“Estimates of realized population change represented the trend in owl numbers (on Green Diamond lands) over the entire period of study (from 1990–2002). The trend represents the ratio of the population size in each year,

expressed relative to the initial population in the first year (1990). The data indicates that (the) population of Spotted Owls on the Green Diamond study area was apparently stable or increasing until the late 1990's when the population appeared to begin a downward trend. During this time, apparent nonjuvenile survival remained constant, but there were three years in a row with below average fecundity from 1998–2000.”

3.6.2.8 Status of Populations within the Action Area

As one indication of the change in population, Green Diamond (2006) reported the number of northern spotted owl sites on the Green Diamond demographic study. The Green Diamond demographic study area is one of several such study areas within the NSO range, where long-term NSO demographics are monitored. This study area consists of spotted owl sites within and adjacent to (typically < 0.5 miles) the ownership that receive consistent survey effort across years. Because the study area includes adjacent owl sites, the number of owls located on the Green Diamond ownership is smaller, as seen in Table 3.6-5. Since 1990, Green Diamond has captured a total of 1,617 spotted owls in the study area.

TABLE 3.6-5

Number of Northern Spotted Owl Sites on the Green Diamond Demographic Study Area (GD-DSA), the Special Management Area (SMA), and Entire Green Diamond Ownership (the count for this latter includes SMA sites)

Year	GD-DSA: SA	GD-DSA: NSA	DSA Total	GD Ownership	SMA	WCSA
1992	39	136	175	114	11	41
1993	41	140	181	112	9	41
1994	38	137	175	115	9	38
1995	36	123	159	96	9	33
1996	37	112	149	89	7	34
1997	38	112	150	91	8	35
1998	36	114	150	107	9	36
1999	35	105	140	105	9	29
2000	33	102	135	100	8	31
2001	35	100	135	103	10	31
2002	35	107	142	102	10	33
2003	32	101	133	103	11	29
2004	36	90	126	104	11	34
2005	25	89	114	92	5	34

Notes: Sites within the demographic study area are classified as either associated with set asides (SA) or outside of set asides (NSA). The Willow Creek Study Area (WCSA) is located east of GD ownership and data are provided for comparison of trends. See text for additional details.

NA = Not available

Green Diamond (2006) also reported the distribution of owl activity centers or nest sites with respect to the set-asides established by the 1992 NSO HCP. Table 3.6-5 shows trends in the number of activity centers or nest sites located within or near (< 500 feet) the boundaries of set-asides, and for activity centers or nest sites outside of these areas, from 1992 through 2005. The number of activity centers or nest sites within or near set-asides declined from 39 in 1992 to 25 in 2005 (Table 3.6-5).

Some of the changes in numbers of owl sites for the ownership and the special management area are due to fluctuations in the size of the Green Diamond ownership, notably the acquisition in 1997-1998 of a large area of timberlands, and the sale in 2004-2005 of part of the original special management area (established for the first 10 years of the HCP). Some owl sites were associated with these two parcels, contributing to ownership increases in 1998, and SMA and ownership decreases in 2005. The number of owl sites within the current Action Area is represented by the 2005 ownership data in Table 3.6-5. Data is also presented for the Willow Creek demographic study area, which the HCP chose as a comparison for Green Diamond owls, as it was the only other study in the area collecting long-term demographic data. It can be seen that in all areas, including the Willow Creek demographic study area east of Green Diamond lands, the number of owl sites decreased over time.

Reproductive success of spotted owls monitored on the study area is shown in Table 3.6-6. Data presented in Courtney et al. (2004) and reproduced as Table 4.2 in Green Diamond (2006) indicate that fecundity of northern spotted owl on Green Diamond lands between 1993 and 2003 was slightly lower than the range-wide mean (0.326 versus 0.369). There is also evidence of a slight decline in fecundity on Green Diamond lands over this period (Green Diamond, 2006) Adult survival was apparently stable over time. Evidence for population decline in the Green Diamond study area was moderate, as noted in the quote in Section 3.2.6.7 and shown in Table 3.6-5. For the period from 1993 through 2003, the estimated rate of northern spotted owl population change (λ_{RJS}) on the Green Diamond demographic study area was 0.97 (SE = 0.012). The 95 percent confidence intervals for λ_{RJS} fall below 1.0 for the Green Diamond study area, indicating that this rate of change was statistically different from a stable population ($\lambda_{RJS} \geq 1$) and providing evidence that the population was declining from 1993-2003 (Green Diamond, 2006). The direct demographic factors that determine rate of population change are survival, fecundity, and adult emigration rates. Green Diamond does not have data on adult emigration, but indicated that there are no known reasons to hypothesize that this may have changed during the period of study. Green Diamond (2006) noted that survival appeared constant, suggesting that a change in fecundity was responsible for the downward trend in the spotted owl population starting in the late 1990s. This trend corresponded with 3 consecutive years with poor nesting success, starting in 1998. Green Diamond speculated that poor springtime weather conditions or a region-wide decline in key prey species may be at fault, but could not definitively identify these or other factors as being responsible for the population decline.

TABLE 3.6-6
Reproductive Success of Northern Spotted Owls on the Green Diamond Demographic Study Area from 1992 to 2006

Years	# Pairs Monitored	# Pairs Nesting	# Pairs Successful	# Owlets Fledged	# Owlets Fledged/Pair
1992	126	87	73	109	0.86
1993	92	36	20	31	0.34
1994	131	85	76	117	0.89
1995	106	47	30	39	0.37
1996	117	77	62	95	0.81
1997	94	40	35	57	0.61
1998	100	51	29	40	0.40
1999	111	25	20	30	0.27
2000	120	60	40	62	0.52
2001	114	74	58	99	0.87
2002	112	59	43	68	0.61
2003	91	20	16	23	0.25
2004	94	60	51	83	0.88
2005	98	61	32	50	0.51

3.6.3 Federally Designated Critical Habitat for Northern Spotted Owl

Critical habitat for the northern spotted owl has been designated under Section 4(a)(3) of the ESA. Critical habitat is defined as “(i) the specific areas within the geographical area occupied by the species, at the time it is listed...on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed...upon a determination ... that such areas are essential for the conservation of the species” (16 *United States Code* [USC] 1532[5][A]).

Critical habitat for the NSO was designated in 1992 (57 FR 1796), and does not include any designated critical habitat on Green Diamond lands in the Action Area. A proposed revision of NSO critical habitat (72 Federal Register 32450; June 12, 2007) was published after the draft EA for this action was issued, and does not include any Green Diamond lands within the areas proposed for the revised critical habitat designations. The 1992 critical habitat designation included 99,909 acres of critical habitat within the California Coast Ranges physiographic province, while the proposed revision includes 131,866 acres in the province. Only Federal lands are included in the 1992 critical habitat designation, and in the 2007 revised critical habitat proposal.

3.7 Wildlife Species of Concern/Terrestrial Habitat

This Section relies on data made available from Green Diamond, CNDD, CDFG, and USFWS and describes other wildlife species of concern within the Action Area for the Proposed Action and other action alternatives. Discussions focus on seven wildlife species of concern occurring or potentially occurring within the Action Area. This Section also summarizes current terrestrial wildlife habitat conditions within the Action Area.

3.7.1 Study Methodology

Vegetation was grouped into habitat type classifications as described in Section 3.5.1. Known or potential wildlife use within these defined habitat types was then described primarily using the CWHR system (Mayer and Laudenslayer, 1988) and CNDD. Rare wildlife species were identified using a February 2006 query of the CNDD for the 11 HPAs within the Action Area (described in Chapter 1). This information was loaded into a database to sort by species and HPA. Species identified as potentially occurring within the Action Area may, in fact, be located within one of the HPAs but outside of the Action Area boundaries.

3.7.1.1 Summary of CWHR Habitat Characterizations

Douglas-Fir. The Douglas-fir habitat occurs within a matrix of habitat types and supports a high diversity of wildlife species. Common bird species include northern spotted owl, western flycatcher, chestnut-backed chickadee, golden-crowned kinglet, Hutton's vireo, solitary vireo, hermit warbler, and the varied thrush. Several amphibians are also found associated with this habitat type, including Pacific giant salamander, southern torrent salamander, Del Norte salamander, black salamander, clouded salamander, tailed frog, and northwestern garter snake. Mammal species typically associated with this habitat are fisher, deer mouse, dusky-footed woodrat, western red-backed vole, Douglas' squirrel, Trowbridge's shrew, and shrew-mole.

Klamath Mixed Conifer. Numerous small meadows and seeps found throughout this habitat type and the high diversity of vegetation make this an excellent habitat for wildlife, including species, such as the northern spotted owl and peregrine falcon.

Lacustrine. According to Mayer and Laudenslayer (1988), the Lacustrine habitat type supports about 23 percent of the species in the CWHR database, including 18 mammals, 101 birds, 9 reptiles, and 22 amphibians.

Montane Hardwood. Bird and animal species characteristic of this habitat type include disseminators of acorns (scrub and Steller's jays, acorn woodpecker, and western gray squirrel) plus those that use acorns as a major food source, including wild turkey, mountain quail, band-tailed pigeon, California ground squirrel, dusky-footed woodrat, black bear, and mule deer. Deer also use the foliage of several hardwoods. Many amphibians and reptiles are found on the forest floor of this habitat. Among them are Mount Lyell salamander, Oregon salamander, relictual slender salamander, western fence lizards, and sagebrush lizard. Snakes include rubber boa, western rattlesnake, California mountain king snake, and sharp-tailed snake.

Montane Hardwood-Conifer. The diversity of vegetation within this habitat type is excellent for wildlife. Older trees and snags provide important habitat for cavity nesters, and many of the hardwoods are masting species characterized by periodic prolific seed production. The seeds provide food resources for birds and mammals.

Perennial Grassland. Grasslands provide important habitat for numerous wildlife species, including the peregrine falcon, burrowing owl, northern harrier, California vole, Roosevelt elk, and black-tailed deer.

Redwood. The redwood habitat type supports a high diversity of wildlife species. Nearly 200 species of wildlife use redwoods for food, cover, and other habitat needs. The canopy supports western flycatcher, Steller's jay, chestnut-backed chickadee, golden-crowned kinglet, Vaux's swift, raven, and varied thrush. The trunks attract pygmy nuthatches, hairy woodpeckers, northern spotted owls, northern flying squirrels, and Douglas' squirrels. The branches provide suitable nesting habitat for marbled murrelet and Sonoma and red tree voles. On the forest floor, one finds blue grouse, Townsend's chipmunks, Trowbridge's and Pacific shrews, elk, mule deer, salamanders, and wrens. Redwoods support other sensitive, rare, and endangered species, such as red-legged frog, Oregon salamander, osprey, ringtail, fisher, and peregrine falcon.

Riverine. The open water zones of large rivers provide resting and escape cover for many species of waterfowl. The open water area also provides good hunting ground for gulls, terns, osprey, and bald eagle. Near-shore waters provide food for waterfowl, herons, shorebirds, belted-kingfisher, and American dipper. Many insect-eating birds are also commonly found along waterways, including swallows, swifts, and flycatchers. Small mammals commonly found in this habitat type include river otter, mink, muskrat, and beaver.

Wet Meadows. Wet meadows provide important habitat for numerous bird species, including waterfowl, as well as mammals, such as mule deer and elk. Species that may be found in this habitat type include foothill yellow-legged frog, northern harrier, merlin, sharp-shinned hawk, northern goshawk, and Oregon salamander.

3.7.2 Summary of Wildlife Species of Concern

A February 2006 query of the CNDD identified 16 wildlife species (excluding the northern spotted owl) of special concern located within the Action Area. As a result of discussions among USFWS, CDFG, and Green Diamond, another 33 wildlife species were added to the sensitive wildlife species list developed for purposes of this EA. Of the 49 sensitive wildlife species identified, six species are Federally-listed: marbled murrelet, western snowy plover, and Oregon silverspot butterfly. Five species are State listed: American peregrine falcon, bald eagle, bank swallow, little willow flycatcher, and marbled murrelet. Five of these species are known or thought to occur within the Action Area. There is no suitable habitat for the Oregon silverspot butterfly on commercial timberlands constituting the Action Area. Western snowy plovers are known to nest on coastal beaches and dune systems in northwest California, but none have been recorded on Green Diamond lands. Pacific fisher (a Federal candidate species) is found in the Action Area. Since the release of the Draft EA, one species, the bald eagle, was removed from the Federal list of threatened and endangered species (72 Federal Register 37346; July 9, 2007). The bald eagle remains Federally-protected under the Bald and Golden Eagle Protection Act.

The habitat association and distribution of the 49 special-status wildlife species are summarized in Table 3.7-1. The habitat requirements, occurrence and distribution, and life history characteristics of the seven Federally or State-listed species that potentially occur within the Action Area, and the candidate Pacific fisher, are described following Table 3.7-1.

TABLE 3.7-1
Special-Status Wildlife Species Potentially Occurring Within the Green Diamond Ownership and Action Area

Species	USFWS	CDFG	BOF	Habitat Associations	Potential for Occurrence in Action Area
Birds					
American peregrine falcon <i>Falco peregrinus anatum</i>	—	CE	BFS	Breeds on high cliffs near wetlands, lakes and rivers	Moderate potential for occurrence, some habitat present; infrequently observed (two active tree nests and three to four other historical eyries).
Bald eagle <i>Haliaeetus leucocephalus</i>	—	CE	BFS	Nests in large old-growth, trees near ocean shore, lakes and rivers	Regular winter inhabitant; five nest sites known on/adjacent to ownership (Mad River and Klamath River; moderate potential for occurrence in other areas; some habitat present).
Bank swallow <i>Riparia riparia</i>	—	CT	—	Colonial nester in riparian area with vertical sandy banks composed of fine soils	Moderate potential for occurrence, some habitat present; none observed.
Black swift <i>Cypseloides niger</i>	—	CSC	—	Breeds in small colonies adjacent to waterfalls in deep canyons and coastal bluffs, forages widely	Low potential for occurrence as a result of limited habitat availability.
Black-crowned night heron <i>Nycticorax nycticorax</i>	—	—	—	Margins of lacustrine, large riverine, and fresh and saline emergent habitats	Moderate potential for occurrence, some habitat present.
Cooper's hawk <i>Accipiter cooperii</i>	—	CSC	—	Open woodlands, nests in riparian areas	Known to occur on Green Diamond property; appear to be ubiquitous. Moderate potential for occurrence in other areas.
Golden eagle <i>Aquila chrysaetos</i>	—	CSC	BFS	Rolling foothills and open mountain terrain in oak woodlands and most major forested habitats.	Occasionally seen in the open woodlands of the eastern portion of the Green Diamond ownership, but no nests documented. Low potential for occurrence in other areas.
Great blue heron <i>Ardea herodias</i>	—	—	BFS	Colonial nester in large trees near wet meadows, marshes, lake margins, rivers and streams and tidal flats	Foraging known to occur on Green Diamond property. Two rookeries known (Eel River and Klamath River). Moderate potential for occurrence in other areas.
Great egret <i>Ardea alba</i>	—	—	BFS	Colonial nester in large trees near marshes, tidal flats, rivers and lakes	Moderate potential for occurrence, some habitat present. Foraging only.

TABLE 3.7-1
Special-Status Wildlife Species Potentially Occurring Within the Green Diamond Ownership and Action Area

Species	USFWS	CDFG	BOF	Habitat Associations	Potential for Occurrence in Action Area
Little Willow flycatcher <i>Empidonax traillii brewsteri</i>	—	CE	—	Riparian areas with extensive willow vegetation	One breeding site known in the Klamath region. Low potential for occurrence in other areas.
Marbled murrelet <i>Brachyramphus marmoratus</i>	FT	CE	—	Late seral conifer forest and marine waters	Known to occur in a number of residual old-growth stands in the Klamath region and one-second growth stand with residual structure in the Maple Creek drainage. Low potential for occurrence in other areas.
Merlin <i>Falco columbarius</i>	—	CSC	—	Frequents coastlines, open grassland, woodlands, lakes, wetlands, edges and early successional forest stages	Low potential for occurrence. Not seen except for coastal bottoms in winter. Probably do not occur within ownership, except as a possible migrant.
Northern harrier <i>Circus cyaneus</i>	—	CSC	—	Open habitats including grasslands, scrublands, and wetlands	Moderate potential for occurrence. Observed in nonforested areas of ownership.
Northern goshawk <i>Accipiter gentilis</i>	—	CSC	BFS	Nests in mature and old-growth coniferous forests with sparse ground cover	Low potential for occurrence; rare or absent from Green Diamond ownership. Known to nest in eastern Humboldt County.
Olive-sided flycatcher <i>Contopus borealis</i>	—	—	—	Forest and woodland riparian zones	Moderate potential for occurrence. Commonly seen throughout the Green Diamond ownership; confirmed nest sites.
Osprey <i>Pandion haliaetus</i>	—	CSC	BFS	Freshwater lakes, bays, ocean shore, large streams	Known to occupy and reproduce within Green Diamond property (Ah Pah Ridge, Arcata South, Fields Landing, McWhinney Creek, Requa). Moderate potential for occurrence in other areas.
Purple martin <i>Progne subis</i>	—	CSC	—	Forest and woodland with cavity trees and riparian zones	Occasionally seen throughout the ownership and several nest sites known in Korbel tract. Moderate potential for occurrence in other areas.
Sharp-shinned hawk <i>Accipiter striatus</i>	—	CSC	—	Early to mid seral forest and riparian zones. Frequently seen throughout ownership, but specific nest sites have not been confirmed	Moderate potential for occurrence. Ubiquitous throughout the ownership. Nest sites observed in older 2nd growth stands.
Short-eared owl <i>Asio flammeus</i>	—	CSC	—	Marshlands, grasslands, and forest clearings	Moderate potential for occurrence. Seen at several sites throughout the ownership, but no known breeding sites.

TABLE 3.7-1
Special-Status Wildlife Species Potentially Occurring Within the Green Diamond Ownership and Action Area

Species	USFWS	CDFG	BOF	Habitat Associations	Potential for Occurrence in Action Area
Snowy egret <i>Egretta thula</i>	—	—	—	Riverine, emergent wetland, lacustrine, and estuarine habitats. Nests in large trees in the vicinity of foraging areas.	Low potential for occurrence due to limited habitat availability.
Tricolored blackbird <i>Agelaius tricolor</i>	—	CSC	—	Highly colonial species, largely endemic to California. Requires open water with protected areas for nesting	Moderate potential for occurrence, most numerous in the Central Valley. Rare, local breeder in Humboldt County.
Vaux's swift <i>Chaetura vauxi</i>	—	CSC	—	Conifer forest with large snags	Moderate potential for occurrence. Frequently observed flying over Green Diamond's timberlands. Nests and/or roost sites documented in Klamath and Korbel
Western burrowing owl <i>Athene cucularia</i>	—	CSC	—	Grasslands and shrublands	Low potential for occurrence, limited habitat present. Seen in winter at the old office site in the Arcata "bottoms," and along the Bald Hill Road. No known breeding sites.
Western snowy plover <i>Charadrius alexandrinus nivosus</i>	FT	CSC	—	Sandy beaches, salt ponds and levees, gravel bars along coastal rivers	Low potential, none have been recorded on Green Diamond lands.
White-tailed kite <i>Elanus leucurus</i>	—	—	—	Nests along rivers and marshes associated with oak woodlands in foothills and valley margins, forages in open meadows and grasslands	Moderate potential for occurrence, some habitat present.
Yellow warbler <i>Dendroica petechia brewsteri</i>	—	CSC	—	Riparian woodland	Moderate potential for occurrence. Seen commonly throughout Green Diamond's ownership, but no work done to confirm nest sites.
Yellow-breasted chat <i>Icteria virens</i>	—	CSC	—	Riparian thickets and early seral forest	Low potential for occurrence, some habitat present. Rare occurrences in the Mad River area in 1996.
Mammals					
Fringed myotis <i>Myotis thysanodes</i>	—	—	—	Roosts in mines, caves, trees, and buildings; feeds along forest edges and over forest canopy	Moderate potential for occurrence. Presumed to occur within the ownership, but their presence has not been confirmed.
Humboldt marten <i>Martes americana humboldtensis</i>	—	—	—	Late seral conifer forest and nearby associated dense brushfields	Low potential for occurrence, some habitat present. Recently detected on Green Diamond lands in Bear Creek and Pecwan Creek (Klamath River tributaries), and close to the ownership in the Goose Creek drainage (tributary of the South Fork Smith River).

TABLE 3.7-1
Special-Status Wildlife Species Potentially Occurring Within the Green Diamond Ownership and Action Area

Species	USFWS	CDFG	BOF	Habitat Associations	Potential for Occurrence in Action Area
Long-legged myotis <i>Myotis volans</i>	—	—	—	Roosts in hollow trees, crevices, mines, and buildings; feeds in open habitats	Moderate potential for occurrence. Presumed to occur within the ownership, but their presence has not been confirmed.
Long-eared myotis <i>Myotis evotis</i>	—	—	—	Roosts in trees, crevices, mines, caves and buildings; feeds within forest, and over water	Moderate potential for occurrence. Presumed to occur within the ownership, but their presence has not been confirmed.
Pacific fisher <i>Martes pennanti pacifica</i>	FC	CSC	—	Coniferous forests and shaded riparian areas	Known to occur on Green Diamond property from coastal to inland areas.
Pallid bat <i>Antrozous pallidus</i>	—	CSC	—	Roosts in trees, caves, crevices, and buildings; feeds in a variety of open habitats	Moderate potential for occurrence. Occurs throughout the region, roosting sites include trees, caves and rock crevices.
Sonoma tree vole <i>Arborimus poma</i>	—	CSC	—	Douglas-fir, redwood, and montane hardwood-conifer forests	Moderate potential for occurrence. Known to occur within ownership.
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	—	CSC	—	Humid coastal regions of central and northern California, southern Oregon	Moderate potential for occurrence. Presumed to occur within the ownership, but their presence has not been confirmed.
White-footed vole <i>Arborimus albipes</i>	—	CSC	—	Mature conifer forests, small streams with dense alder and shrub cover	Low potential for occurrence. Presumed rare within the ownership, but their presence has not been confirmed.
Yuma myotis <i>Myotis evotis</i>	—	—	—	Roosts in buildings, trees, mines, caves, crevices, and bridges; feeds over water	Moderate potential for occurrence. Presumed to occur within the ownership, but their presence has not been confirmed.
Reptiles and Amphibians					
Del Norte salamander <i>Plethodon elongatus</i>	—	CSC	—	Redwood, Douglas-fir, mixed conifer, montane hardwood, mixed hardwood-conifer forests	Known to occur on Green Diamond property.
Foothill yellow-legged frog <i>Rana boylei</i>	—	CSC	—	Partly shaded shallow streams with rocky substrate, in a variety of habitats	Known to occur on Green Diamond property along most Class I and some Class II streams.
Northern red-legged frog <i>Rana aurora aurora</i>	—	CSC	—	Humid forests with intermixed hardwoods and grasslands, stream sides	Commonly seen throughout the Green Diamond ownership.
Western pond turtle <i>Actinemys marmorata</i>	—	CSC	—	Ponds and slow-moving riverine reaches, in grasslands, and wooded and forested areas	Good potential for occurrence. Known from Mad River, Lower Klamath, Van Duzen River, and Redwood Creek areas.

TABLE 3.7-1
Special-Status Wildlife Species Potentially Occurring Within the Green Diamond Ownership and Action Area

Species	USFWS	CDFG	BOF	Habitat Associations	Potential for Occurrence in Action Area
Southern torrent salamander <i>Rhyacotriton variegatus</i>	—	CSC	—	Permanent streams in coastal redwood, Douglas-fir, mixed conifer, montane hardwood, and montane riparian forests	Commonly seen throughout the Green Diamond ownership in suitable habitat.
Tailed frog <i>Ascaphus truei</i>	—	CSC	—	Permanent streams in montane hardwood-conifer, redwood, Douglas-fir, and ponderosa pine forests	Commonly seen throughout the Green Diamond ownership in suitable habitat.
Invertebrates					
Fort Dick limnephilus caddisfly <i>Limnephilus atercus</i>	—	—	—	Unknown. Most <i>Limnephilus</i> larvae live in lentic habitats, but some are known from streams and cold springs.	Low potential for occurrence. Known only from the type locality and Waldo Lake, Lane Co., Oregon.
Ground beetle <i>Scaphinotus behrensi</i>	—	CSC	—	Wooded areas with moist microhabitats, including logs and tree trunks	Moderate potential for occurrence, some habitat present.
Karok Indian snail <i>Vespericola karokorum</i>	—	—	—	Under leaf litter and woody debris in riparian areas with alder and maple	Moderate potential for occurrence, some habitat present.
Mardon skipper <i>Polites mardon</i>	—	—	—	Prairies and meadows, particularly in mesic serpentine soils	Low potential for occurrence. Known from two locations in Del Norte County.
Oregon silverspot butterfly <i>Speyeria zerene hippolyta</i>	FT	—	—	Coastal meadows in Del Norte County. The larvae feed only on the foliage of violets, primarily the western dog violet (<i>Viola adunca</i>)	Low potential for occurrence. Apparently extirpated from a site north of Smith River near Hwy 101, outside of Action Area. Extant population known in the vicinity of Lake Earl.
Pomo bronze shoulderband snail <i>Helminthoglypta arrosa pomensis</i>	—	—	—	Dense redwood forest	Unknown.

U.S. Fish and Wildlife Service (USFWS) Federal Listing Categories

FE = Federal Endangered

FT = Federal Threatened

FC = Federal Candidate

California Department of Fish and Game (CDFG) State Listing Categories

CE = California Endangered

CT = California Threatened

CSC = California Species of Special Concern

California Board of Forestry Forest Practice Rules

BFS = Sensitive Species

American Peregrine Falcon (*Falco peregrinus anatum*). Breeding territory typically includes the inland coastal mountains and the Klamath, Cascade, and Sierra Nevada mountain ranges. Breeding sites are generally on high cliffs with dominant views, and are often near lakes, and rivers or other sources of water. The peregrine falcon preys mainly on birds, striking with its feet in midair, but will also take small mammals and other prey. Perching sites and abundance of prey are important habitat characteristics. Use of organochlorine pesticides, particularly DDT, was the main reason for the peregrine's decline in population; however, habitat modification also impacts this species. Formerly listed as endangered, American peregrine populations recovered sufficiently to be delisted across its entire range in 1999 (August 25, 1999, 64 FR 46541); it is still listed as endangered by the State.

Foraging habitat for this species occurs widely, such as over forested canyons and areas where Riverine habitat is found. Two currently known active nest sites and one historical nest site exist on the Green Diamond ownership. Two additional historically active nest sites are located on other ownerships immediately adjacent to Green Diamond lands. Nesting in large residual redwood trees and snags, a phenomenon only rarely documented, has been documented on Green Diamond lands.

Bald Eagle (*Haliaeetus leucocephalus*). Western breeding and wintering territory for the bald eagle includes the Pacific Coast from Alaska to Baja California. Ocean shorelines, lake margins, and river courses in northwestern California provide essential breeding areas. Nesting sites are typically associated with large old-growth, or forests with open-branched canopies such as ponderosa pines. Bald eagles roost communally during the winter. Pesticides, habitat loss, and human disturbances are the primary threats to this species.

Nesting pairs of bald eagles have been observed along the Mad River and Klamath River on the Green Diamond ownership.

Bank Swallow (*Riparia riparia*). The bank swallow breeds across North America from Alaska to California, but it winters in the tropics. They breed in colonies near riverbanks and creeks. This species requires vertical banks or cliffs with fine-textured soils to dig nesting holes. Most birds lay their eggs and forage for their young at the same time.

Some habitat for this species is present in the Action Area where Riverine habitat is found.

Little Willow Flycatcher (*Empidonax traillii* ssp. *brewsteri*). The little willow flycatcher breeds in California from Tulare County north, along the western side of the Sierra Nevada and Cascades, extending to the coast in northern California. This species nests in riparian deciduous shrubs, preferably thickets of willows, at elevations ranging from 100 to 8,000 feet. Foraging typically occurs in wet meadows and montane riparian habitats. Most of the remaining breeding populations occur in isolated mountain meadows of the Sierra Nevada and Cascades. However, a nesting pair was observed in upper Bear Creek south of the lower Klamath River in 1998 (Hunter et al., 2005), and a possible breeding population occurs along the Klamath River. **These locations are in the Action Area.**

Marbled Murrelet (*Brachyramphus marmoratus*). This species is found along the north Pacific Rim from Asia to North America. Breeding populations in northern California are divided into two regions: (1) Del Norte and northern Humboldt counties, from the Smith River south to Little River; and (2) south-central Humboldt County along the Van Duzen and Eel rivers.

In the Action Area and elsewhere in California, murrelets nest on large platforms high in live old-growth trees, such as provided by large tree limbs, usually within old-growth redwood forests. Extensive loss of this old-growth habitat is presumably the primary reason for the species' decline in California. This species is known to occur in a number of residual old-growth stands in the Klamath region and one second-growth stand with residual structure in the Hydrologic Unit (this stand is in the Maple Creek drainage). Survey results and consultations with USFWS, CDFG, and CDF indicate that 20 stands are located on Green Diamond's current fee ownership. These stands have been identified as suitable for murrelet nesting based on levels of observed murrelet activity and stand characteristics. Stands are located near Terwer, Hunter, Mynot, Hoppaw, and Wilson creeks, as well as the coastal area. Eggshell fragments found in one stand, Big Mynot, provided direct evidence of murrelet nesting (Simpson, 1998), but surveys indicate nesting is likely in other stands.

Federally Designated Critical Habitat for Marbled Murrelet. Critical habitat for the marbled murrelet has been designated under Section 4(a)(3) of the ESA. Critical habitat is defined as "(i) the specific areas within the geographical area occupied by the species, at the time it is listed...on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed...upon a determination ... that such areas are essential for the conservation of the species" (16 *United States Code* [USC] 1532[5][A]).

Approximately 3.9 million acres of critical habitat distributed in 32 critical habitat units was designated for the marbled murrelet in 1996 (24 May 1996, 61 FR 26526). The purpose of this designation was to identify habitat considered most essential to eventual recovery of populations and delisting of the species in terms of habitat, distribution, and ownership. This designated critical habitat includes predominantly Federally owned lands (approximately 78 percent), followed by State and local government land (21 percent), and private land (1 percent). Much of the designated critical habitat on Federal lands consists of large, contiguous blocks of late-successional forest or areas expected to develop into such habitat in the range of the species within the Late-Successional Reserve system established in the Northwest Forest Plan (USDA and USDI, 1994). Non-Federal lands were also included as critical habitat where large blocks of Federal land were inadequate or unavailable and where protection of habitat was considered crucial to sustaining the distribution of populations, such as in the Action Area (USFWS, 1997). Under Section 7(a)(2) of the Federal ESA, federal action agencies are required to consult with the USFWS when their actions may affect the marbled murrelet. In such a consultation, the federal action agency has a duty to ensure that any action they authorize, fund, or carry out does not result in the destruction or adverse modification of designated critical habitat. A designation as critical habitat has no specific regulatory impact on landowner actions on private land that do not involve federal agency funds, authorizations or permits. However, landowners must consult with the USFWS before taking actions on their property that could harm or kill protected species or destroy their habitat, regardless of whether critical habitat has been designated.

On September 12, 2006, the USFWS issued a proposal to revise the currently designated critical habitat for the marbled murrelet (71 FR 53838). If finalized as proposed, the revision would reduce the designated critical habitat to about 221,692 acres, and would exclude from designation large areas already protected under other existing regulations or plans, such as the Northwest Forest Plan.

Critical Habitat on Green Diamond Ownership. Approximately 1,400 acres of Green Diamond's current ownership is within the boundaries of a marbled murrelet critical habitat unit (CA-03-a). Portions of adjacent lands in public ownership, such as the Redwood National and State Parks, and the Headwaters Reserve have also been designated as marbled murrelet critical habitat. Within the boundaries of the critical habitat unit, only those areas that contain one or both primary constituent elements are, by definition, critical habitat. These elements are (1) individual trees with potential nesting platforms, and (2) forested areas within 0.5 mile of individual trees with potential nesting platforms, and a canopy height of at least one-half the site potential tree height (USFWS, 1997). Areas without any primary constituent elements are excluded by definition from critical habitat. As described in the 1996 designation of critical habitat for the marbled murrelet, forests with the second primary constituent element are likely to contribute to the conservation of murrelets by reducing differences in microclimates associated with forested and unforested areas, reduce the potential for windthrow during storms, and provided a landscape that has a higher probability of occupancy by marbled murrelets (24 May 1996, 61 FR 26526). Most of the critical habitat on Green Diamond's lands is currently not suitable for murrelet nesting, but was identified by the USFWS as important to develop suitable habitat for marbled murrelet conservation in the future (USFWS, 1997).

Green Diamond is not seeking coverage under the NSO HCP or ITP amendment for the harvest of trees in any portion of the Action Area that has been designated as critical habitat for the marbled murrelet when the harvest of those trees would affect a "primary constituent element" of critical habitat for the marbled murrelet, as defined in 50 CFR 17.95 (adopted May 24, 1996 61 FR 26256).

Proposed Revision to Federally Designated Critical Habitat for Marbled Murrelet. On September 12, 2006, the USFWS published a proposal to revise critical habitat for the marbled murrelet (71 FR 53838). The proposal identified 3,590,642 acres as meeting the definition of critical habitat, but of that area proposed to exclude from designation 3,368,950 acres that are already protected under other existing regulations or plans, such as the Northwest Forest Plan. The proposed revision would, therefore, reduce designated critical habitat for the species from the current 3.9 million acres to about 221,692 acres. Within northern California, a total of 693,200 acres of Federal lands (477,300 acres), state lands (175,500 acres) and private lands (40,400 acres) are currently designated as critical habitat. The proposed revision would include a total of 112,037 acres of city, county, and state (92,834 acres) and private (37,500 acres) land in northern California.

The proposed revision of murrelet critical habitat includes changes to the current designated critical habitat in the Action Area. One proposed critical habitat unit, the Del Norte/Northern Humboldt unit (Unit 11), is within the Action Area, and includes 158,232 acres in multiple subunits located in Del Norte and northern Humboldt Counties in northern California. Within the area of the proposed Unit 11, approximately 257,582 acres,

or more than 99 percent, occurs on Federally-managed lands. These lands were identified as having the features essential to the conservation of the species (i.e., the primary constituent elements, as defined at 50 CFR 424.12(b)). As described in the proposed rule (71 FR 53838, page 53849), the USFWS proposed to exclude all 257,582 acres of Federally-managed lands within Unit 11 from final revised critical habitat designation. This proposed exclusion, based on Section 4(b)(2) of the Act, considered the adequacy of existing management and management plans in protecting marbled murrelet habitat on those lands into the foreseeable future (71 FR 53838, page 53855).

On the Green Diamond ownership, the proposed critical habitat revision includes 650 acres of Green Diamond lands known as the Miracle Mile Habitat Complex, in the Terwer Creek watershed (tributary to Klamath River), in Del Norte County. The 650-acres proposed as critical habitat includes both forest stands that contain trees with potential nesting platforms, plus the surrounding forested areas within 0.5 mi of the stands. This complex is not currently designated as critical habitat for the species, but is considered to be occupied by nesting murrelets.

In a process independent of the proposed revision of murrelet critical habitat, approximately 357 of the 650 acres of the proposed Miracle Mile Habitat Complex have been proposed to be managed in the future under a conservation easement developed to ensure protection of marbled murrelet nesting habitat (71 FR 53838, page 53849; Stuyvesant/Humboldt Coast Oil Spill, Final Damage Assessment and Restoration Plan/Environmental Assessment; June 2007; available at: <http://www.dfg.ca.gov/ospr/organizational/scientific/nrda/stuy-darp-final.pdf>). The approximate 357 acres includes 135 acres of old growth forest, which is all of the suitable murrelet nesting habitat in the complex, plus a 222 acre buffer of second-growth forest.

The proposed critical habitat revision would also remove from designated critical habitat the approximate 1,400-acres of Green Diamond's ownership that are currently within designated critical habitat unit CA-03-a. As noted previously, only those forest stands within this 1,400-acre area which contain one or more primary constituent elements are, by definition, critical habitat.

Oregon Silverspot Butterfly (*Speyeria zerene hippolyta*). The Oregon silverspot is found along the coast in northern California and Oregon. The Oregon silverspot occupies early-successional, coastally-influenced grassland habitats that contain the caterpillar host plant, early blue violet (*Viola adunca*) including coastal "salt spray" meadows, stabilized dunes, and montane meadows near the coast. The grasslands that the Oregon silverspot inhabits provide larval host plants (violets), adult nectar sources, and wind protection. Wind protection is provided by trees and shrubs within and adjacent to inhabited meadows. The butterfly may retreat into these trees and shrubs on windy days. A population of Oregon silverspot butterflies is known from the vicinity of Lake Earl in coastal Del Norte County.

Pacific Fisher (*Martes pennanti pacifica*). Fishers are distributed throughout coniferous and mixed forests of Canada and northern portions of the United States. Historically, in western North America they ranged from northern British Columbia to central California, and east through northern Idaho, Montana, and possibly portions of Wyoming. The range of fishers

decreased during the 1800s and 1900s as a result of trapping, logging, and conversion of forests for agriculture and development. In Washington, Oregon, and California, fishers are estimated to occupy only 20 percent of their historical range (USFWS, 2004). Based on the absence of recent sightings, fishers are extirpated or nearly extirpated from Washington and most of Oregon (USFWS, 2004). They also are believed extirpated from lowland areas of British Columbia although they still occur in higher elevation areas.

A petition to list the West Coast Distinct Population Segment (DPS) of the fisher as threatened or endangered was filed with the USFWS in December 2000. On April 8, 2004, we determined that listing of the West Coast DPS of the fisher was warranted, but precluded by higher priority listing actions (69 FR 18769). As a result, the West Coast DPS of the fisher was added to the Federal list of candidate species. A group of vertebrates constitutes a DPS when the group is discrete from other populations and is significant to its taxon. A group is discrete if it is "markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, and behavioral factors." Using the DPS policy, West Coast populations of the fisher are considered "markedly separated" from other populations within the United States.

Substantial efforts have been made in recent years to assess the status of fishers and other forest carnivores in California using systematic grids of baited track and camera stations (Zielinski et al., 1995, 1997, 2000). Zielinski et al. (1995) compiled the results of standardized surveys conducted throughout California between 1989 and 1994. The results indicated that fishers occupy less than half of the range they did in the early 1900s in California.

The current range of Pacific fisher is divided into two populations separated by about 260 miles (420 km) (Zielinski et al., 1995). One population is in northwestern California in portions of Del Norte, Siskiyou, Humboldt, Trinity, and Shasta counties, and across into Oregon in Curry, Josephine, and Jackson counties. The other is in the southern Sierra Nevada Mountains in portions of Mariposa, Madera, Fresno, Tulare, Kern, Mono, and Inyo counties. The population of the southern Sierra Nevada Mountains appears isolated from the northern Sierra Nevada Mountains population (Zielinski et al., 1995).

Throughout its range, fishers are associated with conifer and mixed conifer forests, in particular mature forests with large decadent trees which provide resting and den sites, such as platforms and cavities. In California, fisher use Douglas-fir, Montane Hardwood-Conifer, Montane Hardwood, pine (Ponderosa Pine, Jeffrey Pine, Lodgepole Pine), mixed conifer (Sierran Mixed Conifer and Klamath Mixed Conifer), and true fir (White Fir and Red Fir) forest types (Self and Kerns, 2001; Zielinski et al., 2000; 2004), as classified using the CWHR system. In northern California, Zielinski et al. (2000) reported that roughly 45 percent of fishers detected with track plates were in pine types, 25 percent were in Douglas-fir, 18 percent were in the mixed conifer types, and 11 percent were in the true fir types. Working in a coastal area of northern California, Beyer and Golightly (1996) detected fishers in mixed redwood/Douglas-fir forest comprising Sitka spruce and red alder with occasional redwoods. Klug (1997) found similar results on commercial timberlands on the north coast of California, and other studies have found fishers in coastal redwood forests

Klug (1997) conducted a master's study on Green Diamond lands and found that although fishers were generally well distributed across Green Diamond's ownership, detections occurred more frequently at higher elevations (and farther from the coast), in forests with a predominant Douglas-fir component, greater amounts of hardwood, and greater volume of logs. The mean age of forests in which fishers were detected was 42.3 years and there was no difference in forest age between areas with and without fisher detections. Green Diamond's unpublished telemetry data on rest and den sites used by fishers indicated that live decadent conifers (particularly hemlock) were most commonly used for rest sites, while live decadent hardwoods and whitewood snags were used for den sites. The past and current telemetry work on fishers indicates that fishers readily move throughout the landscape, and with the possible exception of the most recent of clearcuts, there is no evidence that they avoid younger stands. A second master's study utilizing telemetry and remote camera sets was initiated in 2002. This project, which is nearing completion, estimated the abundance of fishers and continued work on rest and den sites. All of the work done to date on Green Diamond's ownership indicates that fishers in the coastal redwood zone utilize forests in a manner similar to spotted owls (Hamm, 2006b).

3.8 Air Quality

This Section describes ambient air quality conditions in a regulatory context, and the potential impacts of the project on air quality issues of concern. General information on climate is described in Section 3.3.3.

The Action Area is located in the North Coast Air Basin, under the authority of the North Coast Unified Air Quality Management District (AQMD). The air quality of a region is determined by the quantities and types of pollutants emitted, and by the concentrations and accumulations of those pollutants under the influences of local meteorology and topography. The North Coast Air Basin is considered to have good air quality.

The Clean Air Act of 1967, as amended in 1990 (42 U.S.C. 7401, et seq.), established national ambient air quality standards for several pollutants, including ozone, carbon monoxide, and particulate matter less than 10 microns in diameter (PM₁₀). In addition, State of California clean air standards have been in existence since 1968. Green Diamond lands are in attainment for all State and Federal air quality standards in Del Norte and Humboldt counties, with the exception of the State standard for PM₁₀ (North Coast Unified AQMD, 1997).

Ambient PM₁₀ standards are designed to prevent respiratory disease and protect visibility. Suspended particulate matter less than 10 microns in diameter can potentially reach the lungs when inhaled and cause respiratory health concerns. Few particles larger than 10 microns in diameter reach the lungs. In 1993, a chemical mass balance study of PM₁₀ was performed by the North Coast Unified AQMD. For this study, 37 samples were collected approximately every 6 days in both Crescent City and Eureka. The results indicated that local PM₁₀ originates from various sources, as shown in Table 3.8-1.

TABLE 3.8-1
PM₁₀ Source Apportionment for Crescent City and Eureka (Yearly Average)

Source	Crescent City (%)	Eureka (%)
Vehicles	23.1	43.7
Sea salts	34.9	24.7
Wood stoves*	21.7	12.6
Dust	8.9	6.6
Pulp mills/particle board driers	4.0	5.5
Nitrates	1.3	1.8
Sulfates	1.7	0.6
Unknown	4.5	4.6
Total	100	100

* In winter months, wood stoves contribute a substantially higher proportion of PM₁₀ emissions.

Source: North Coast Unified AQMD, 1994.

Incidence of PM₁₀ attributable to timber management is typically a result of slash burning and roadway dust entrainment. The AQMD study did not specifically characterize slash burning as a separate source of PM₁₀. However, PM₁₀ attributed to wood stoves likely includes particulate matter resulting from other wood combustion sources (e.g., slash burning). Slash burning is controlled by the AQMD through the issuance of burn permits, which include provisions for burn restriction during atmospheric conditions that escalate PM₁₀ nonattainment.

3.9 Visual Resources

3.9.1 Introduction

This Section identifies areas where the Action Area may be visible to the general public, and focuses on adjacent public lands and nearby roadways. The Action Area is interspersed among several public recreation areas, including Six Rivers National Forest (containing the recreation-oriented Smith River unit) and the Redwood National and State Parks complex. Adjacent lands are described in detail in Section 3.12 (Land Use), and recreation use on these adjacent lands is described in Section 3.10 (Recreational Resources).

3.9.2 Viewpoints

The primary public recreation areas with views of the Action Area are the Redwood National and State Parks. The Action Area borders the parks in several areas, including most of the Redwood Creek watershed boundary. Limited viewing may also be possible from portions of the Smith River unit of Six Rivers National Forest, and from several other State park areas in central and southern Humboldt County. However, adjacency to parklands is limited in these areas.

U.S. Highway 101 is the primary roadway in the Action Area. Highway 101 is a designated scenic highway in Del Norte County from approximately Crescent City to the south boundary of Del Norte Coast Redwoods State Park, and is considered eligible for scenic highway designation in the remainder of Del Norte and Humboldt counties. All other highways in the vicinity of the Green Diamond ownership (U.S. Highway 199, U.S. Highway 299, and State Route [SR] 36) are considered eligible for scenic highway designation (Caltrans, 2006). Primary areas for viewing the Action Area from these highways are described in the next paragraph.

As Highway 101 proceeds south through Del Norte and Humboldt counties, it is likely that travelers will be able to view the Action Area in various locations, primarily in the area north of Crescent City, near the Klamath River confluence, and north of McKinleyville. In portions of this area, panoramic views of the Action Area are possible from Highway 101, depending on topography in the vicinity. Views of the Action Area from Highway 101 south of Eureka are limited. Highway 299 passes through a portion of the Action Area east of Arcata. Views of the Action Area from Highway 199 and SR 36 are limited.

3.10 Recreational Resources

3.10.1 Introduction

Green Diamond provides recreational opportunities on its forestlands to groups and individuals, subject to written permit authorization. These activities are permitted on a limited basis within specified areas, and include hunting, fishing, camping, picnicking, hiking, motorcycle use, and shooting. The Action Area is also adjacent to several national and State parks and recreation areas, as described below and in Section 3.9 (Visual Resources).

3.10.2 Recreational Resources in the Vicinity of the Action Area

The Action Area is in the vicinity of the Eel, Klamath, and Smith rivers, portions of which are designated Federal Wild and Scenic Rivers. Portions of the Action Area may also be viewed from the Smith River National Recreation Area near Jedediah Smith Redwoods State Park. The 300,000-acre Smith River National Recreation Area is a highly-valued recreation area by the USFS and the public. Recreation area users can kayak, canoe, boat, fish, swim, and view wildlife. Smith River National Recreation Area is accessible through a walk-in area off of the main roads. The nearby Six Rivers National Forest is also open to camping and hiking at both developed campsites and undeveloped forest sites by permit.

The Jedediah Smith and Del Norte Coast Redwoods State Parks are jointly managed by the National Park Service and California State Department of Parks and Recreation, and are part of the Redwood National and State Park complex. The Redwood National and State Park complex comprises approximately 110,000 acres, of which a small portion is adjacent to the Action Area. In conjunction with another nearby State park (Prairie Creek Redwoods), these sites are considered to be "World Heritage Sites" and "International Biosphere Reserves." Panoramic and close-up views of different tree and vegetation types draw national and international visitors to the parks. The parks allow camping, hiking, horseback riding, and scenic driving.

The Merlo State Recreation Area allows fishing and small boats on coastal lagoons. The Humboldt Lagoons State Park allows camping and hiking, and fishing at the tide pools. The Humboldt Lagoons State Park is open to boating, fishing, hiking, bird and wildlife viewing, and picnicking. The Headwaters Reserve area encompasses 6,400 acres and is managed jointly by the Bureau of Land Management (BLM) and California Department of Parks and Recreation. Use is limited to day-hiking only. The King Range Landscape Conservation Area encompasses 60,000 acres and is managed by the BLM. The area promotes a variety of uses, including hiking, camping, hunting, and seashore activities.

3.11 Cultural Resources

3.11.1 Introduction

The earliest inhabitants of the north coast region of California are thought to be ancestors of the Karok, which were probably adapted to inland hunting and gathering and arrived sometime around 5,000 years ago (Hildebrant, 1981). Further investigations indicate that exploitation of marine resources apparently was not an important part of the subsistence patterns of the northwest coast until relatively recently. Local tribal groups represented in the Action Area include the Tolowa, Yurok, Wiyot, Hupa, Chilula, and Whilkut tribes.

3.11.2 Tolowa

The historical territory of the Tolowa comprises most of present-day Del Norte County, extending from the Winchuck River on the California-Oregon border to Wilson Creek, approximately 17 miles south of Crescent City. Tolowa settlements were strongly oriented toward the coast, with some seasonal occupation along the Smith River drainages to take advantage of particular seasonal resources (Williams et al., 1982). Smelt, salmon, steelhead, and acorns were the staples of their diet, and were gathered, dried, processed, and stored in late summer/early fall in preparation for winter. Berries, shellfish, and sea lions, as well as deer and elk, were also gathered and hunted by the Tolowa (Gould, 1978; Williams et al., 1982).

Traditional areas of sacred and ceremonial importance to Tolowa continue to be used today. Goddard (1913) describes these areas as located near trails, on the crest of ridges, and a few in the neighborhood of springs (Maniery and Williams, 1982). The Tolowa recognized five sacred high points within their territory, including Signal Hill and French Hill. Lesser peaks were also considered to hold healing or spiritual power and were revered (Drucker, 1937).

3.11.3 Yurok

The Yurok historically occupied and continue to occupy the lower reach of the Klamath River from approximately Bluff Creek downstream to the river's mouth at Requa, with some settlements along the Trinity River and along the coast primarily south of the Klamath River (Pilling, 1978). The Yurok are recognized for their skills in riverine salmon fishing, and traditional subsistence animal species also include ocean fish, sturgeon, sea lion, whale, deer, elk, and duck. Acorns, berries, bulbs, and grass seed are staple plant foods (Bearss, 1969). Like other North Coast tribes, the Yurok were skilled at basketmaking and woodworking. The Yurok are especially known for their redwood canoes, which were up to 40 feet long. In addition, redwood was used as a building material.

3.11.4 Wiyot

The historical center of Wiyot culture is around Humboldt and Arcata Bays, from Little River south to the Bear River Mountains. The Wiyot were known as a “tidewater” people, and, unlike most other tribes in northwestern California, were probably more closely affiliated with still water than the ocean or rivers (Nomland and Kroeber, 1936). Fish, primarily salmon, were the main source of animal protein, and the Wiyot also consumed mollusks (especially clams), sea lions, and deer and elk, as well as plant foods. Like other cultures in the area, the Wiyot used redwood extensively as a building material.

3.11.5 Hupa, Chilula, and Whilkut

The Hupa inhabited the area surrounding the lower reaches of the Trinity River from approximately Salyer to approximately 6 miles above the confluence with the Klamath River (Wallace, 1978). The Hupa relied heavily on salmon and acorns as food sources, but also consumed other fish (e.g., lampreys), deer, and elk, as well as various plant staples (Wallace, 1978). Like other tribes of the north coast of California, the Hupa were skilled in basketmaking and woodworking, but obtained their dugout redwood canoes in trade with the Yurok (Heizer, 1978; Wallace, 1978).

Chilula territory is closely affiliated with the lower reaches of Redwood Creek in what is now Redwood National Park (Bearss, 1969). Chilula villages were generally located adjacent to Redwood Creek from near the inland edge of the heavy redwood belt to a few miles above Minor Creek (Bearss, 1969). In the summer, the Chilula camped on the highland prairies of the Bald Hills, where seeds and roots were plentiful and game was abundant (Bearss, 1969). At one time, the Chilula were known as the Bald Hill Indians (Wallace, 1978). As with the other tribes of the north coast of California, salmon was a staple of the Chilula diet, and fishing was practiced on Redwood Creek (Wallace, 1978). However, the smaller size of Redwood Creek relative to other watercourses in the area did not support the use of dugout redwood canoes by the Chilula (Wallace, 1978). In terms of their culture, the Chilula were very similar to the Hupa in many ways (Wallace, 1978).

The Whilkut people inhabited the higher reaches of Redwood Creek and the Mad River, including the forested area between the two drainages (Wallace, 1978). Very little is known about the Whilkut people.

3.12 Land Use

3.12.1 Introduction

The Action Area is located within Del Norte and Humboldt counties, both of which contain significant amounts of land (both Federal and private) in timber production. Del Norte County is 705,920 acres, of which most is under State or Federal ownership as parks/recreation areas or national forests (County of Del Norte, 1996). Private commercial forestlands in Del Norte County comprise approximately 146,771 acres, including Green Diamond fee-owned lands. Humboldt County is 2,286,270 acres in size, with approximately 990,000 acres as private lands devoted to timber production (Humboldt County, 1984).

3.12.2 Land Use Setting

The Action Area in Del Norte County borders a mix of other land uses, primarily other timber production areas and parks and recreation areas. Most of the eastern border of the Action Area in Del Norte and Humboldt counties borders the Six Rivers National Forest, which is managed by the USFS for multiple uses, including timber production and recreation. The Action Area also borders the Redwood National and State Parks (Redwood National Park, and Jedediah Smith, Del Norte Coast, and Prairie Creek Redwoods State Parks), which are managed jointly by the National Park Service and the California Department of Parks and Recreation. Other State park areas are also located nearby the Action Area. Commercial timber harvesting is not allowed in the parks, and resource preservation and recreation values are the primary management emphases. The Action Area also borders the Hoopa Indian Reservation in northeastern Humboldt County. Green Diamond lands border other industrial and nonindustrial forestlands on the east and west throughout central Humboldt County. The western boundary of the Headwaters Reserve, managed by BLM and the California Department of Parks and Recreation, abuts the Action Area in central Humboldt County. Other portions of the Action Area are generally surrounded by other industrial and nonindustrial forestlands.

Developed population centers near the Action Area in Del Norte County are generally not present. The primary Humboldt County population center within the vicinity of the Action Area is the Eureka/Arcata area. Other towns near the Action Area include Fortuna, Rio Dell, and Carlotta.

3.12.3 Land Use Regulations

Local land use regulations that apply to the Action Area include the general plans and zoning ordinances of both Del Norte and Humboldt counties. Action Area lands are designated as “Forestry” in the Del Norte County General Plan, and as “Timber Production” in the Humboldt County General Plan. These designations are applied to areas that have essential characteristics for timber production, and are intended to conserve forest resource values of the designated area. Most of the Action Area is zoned as Timber Production Zone (TPZ). Created in accordance with California’s Timberland Productivity Act of 1982, the classification is intended to promote continued timberland management. Land use in a TPZ classification is restricted to growing and harvesting timber, in addition to other compatible uses.

3.13 Social and Economic Conditions

3.13.1 Introduction

Timber management activities within the Action Area can influence local social and economic conditions. For the purposes of this analysis, the geographic area of influence with regard to socioeconomic effects is considered to be Del Norte and Humboldt counties.

3.13.2 Social Factors

As shown in Table 3.13-1, both Del Norte and Humboldt counties have experienced relatively steady population growth over the past decade. For example, during the 1990s, Del Norte County’s population grew by 11 percent while Humboldt County grew by

6 percent. These are both slightly less than the State's growth rate over the same period of 13 percent. As shown in Table 3.13-1, the population of both Del Norte and Humboldt counties continued to increase for the period from 2000 to 2005.

TABLE 3.13-1
Del Norte and Humboldt Counties Population, January 1991 to 2005

Year	Del Norte	Humboldt
1991	25,500	120,400
1992	26,900	122,400
1993	27,450	124,000
1994	27,700	124,600
1995	27,850	124,700
1996	27,800	124,200
1997	28,200	125,800
1998	28,300	125,900
1999	27,750	125,900
2000	27,507	126,518
2001	27,553	127,098
2002	27,768	127,986
2003	28,086	128,243
2004	28,557	130,392
2005	28,895	131,334

Source: California Department of Finance, Demographic Research Unit. 2006.
<http://www.dof.ca.gov/HTML/DEMOGRAP/Druhpar.asp> (Accessed January 4, 2006).

Because of the rural character of the two counties, the lifestyles of its residents are closely tied to the land. In the EIS for the Six Rivers National Forest Management Plan (USFS, 1995), four social groups were identified based on values and behaviors relating to natural resource management. Members of the "amenity emphasis" and "environmental priority" groups place a high value on maintaining the natural resources of the region, although for different ... reasons. "Commodity dependent" residents are economically linked to the utilization of natural resources, and are very closely tied to their resource-based lifestyle. The "Native American" group is linked to the biological resources of the forest area for cultural and social reasons, including subsistence and commercial fishing. Members of the "Native American" group may also be employed in the forest products sector and thus are economically dependent on the industry. Membership in these groups is not mutually exclusive; it is common for members to identify with more than one social group at a time (USFS, 1995).

3.13.3 Economic Factors

Historically, lumber and wood products manufacturing have been important industries in Del Norte and Humboldt counties. The forest products industry reached a high point in the north coast region of California during the post-World War II housing boom in the 1950s. The industry has seen a significant decrease in employment since that time, when it dominated the region's economy (USFS, 1995).

Table 3.13-2 shows the employment data for Del Norte and Humboldt counties by industry sectors. The employment distribution is similar for both counties with retail trade and services having the greatest percentage of employment. Del Norte County has a significantly higher percentage of employment in State government at 21 percent compared to 6 percent for Humboldt County. The relatively large percentage of State employees in Del Norte County is attributable to the Pelican Bay State Prison.

TABLE 3.13-2
Del Norte and Humboldt Counties Employment by Industry, 2004

Industry	Del Norte County		Humboldt County	
	Jobs	%	Jobs	%
Total Farm	370	5	1,200	2
Total Natural Resources Mining and Construction	240	3	2,900	6
Natural Resources and Mining	NA	—	500	1
Construction	NA	—	2,400	5
Total Manufacturing	140	2	4,000	8
Wood Products Manufacturing	NA	—	2,200	4
Residual-Miscellaneous Manufacturing	NA	—	700	1
Food Manufacturing & Beverage & Tobacco	NA	—	600	1
Residual-Textile Mills	NA	—	500	1
Trade, Transportation and Utilities	1,190	15	9,600	19
Information	100	1	600	1
Financial Activities	200	3	2,000	4
Leisure and Hospitality	880	11	3,400	7
Professional and Business Services	160	2	5,700	11
Educational and Health Services	980	12	5,300	11
Other Services	90	1	1,900	4
Federal Government	150	2	900	2
State Government	1,640	21	3,100	6
Local Government	1,810	23	9,100	18
Total Employment	7,950		49,700	

Notes: Numbers have been rounded.

Natural Resources and mining category includes logging and mining.

Source: California Employment Development Department, Labor Market Information Service. 2006.
<http://www.labormarketinfo.edd.ca.gov/cgi/databrowsing/?PageID=145#Resources> (Accessed January 6, 2006).

As illustrated in Table 3.13-2, lumber and wood products manufacturing and forestry play a relatively small role in each county's economy in terms of employment. This is down from the industry peak during the 1950s when forest products accounted for approximately 34 percent of the North Coast region's employment (USFS, 1995). The California Employment Development Department projects little change in employment in the lumber and wood products sector in the two counties for the immediate future, with Del Norte showing no change from 2001 to 2008 and Humboldt showing a projected 4.5 percent decrease in forest and conservation workers and a 14.3 percent decrease in sawmill employment during this period.

Average annual unemployment in the two counties, as well as the State of California, is shown in Table 3.13-3. Both counties typically experience higher unemployment rates than the State as a whole. Del Norte County spent most of the 1990s in double-digit unemployment, ranging from 3 to 5 percentage points higher than the State average. Humboldt County's unemployment was only slightly over the State average for the past decade.

TABLE 3.13-3
County and State Unemployment, 1990 to 2005

Year	Del Norte (%)	Humboldt (%)	California (%)
1990	12.1	7.9	5.8
1991	12.3	8.8	7.7
1992	15.5	10.1	9.1
1993	14.3	10.0	9.4
1994	12.1	8.6	8.6
1995	12.3	8.3	7.8
1996	10.4	7.7	7.2
1997	10.2	7.4	6.3
1998	10.3	7.2	5.9
1999	8.0	6.5	5.3
2000	7.4	5.8	5.0
2001	8.1	6.0	5.4
2002	8.8	6.7	6.7
2003	8.6	6.9	6.8
2004	8.1	6.5	6.2
2005	7.4	5.9	5.3

Source: California Employment Development Department, Labor Market Information.
<http://www.calmis.ca.gov/htmlfile/county.htm> (Accessed January 6, 2006).

Simpson Timber Company, an affiliate of Simpson Resource Company, formerly employed 675 people in timberlands, milling, and administrative operations. In late 2001, Simpson Timber Company went through a restructuring in which a new company, Simpson Resource Company, was created to own and operate the timberlands. Effective April 30, 2004, Simpson Resource Company changed its name to Green Diamond Resource Company (the Permit applicant). The number of employees at Green Diamond is approximately 265. Work activities performed by these employees includes secretarial, bookkeeping, and accounting; planning and logistics associated with resource management operations, including road construction and maintenance, site preparation, planting, vegetation control, pruning, precommercial thinning, commercial timber harvesting, and cone collection; and mechanical and repair activities. All activities are conducted over the entire year; consequently, the 265 jobs are year-round.

In addition to work conducted by Green Diamond employees themselves, many of the forest management activities (e.g., tree planting, precommercial thinning, logging, fertilizer application) are contracted directly to other firms. The mills dependent on Green Diamond timber in the region employ approximately 410 people.

Additional contributions of the Green Diamond lands to local economic conditions include the indirect effect of employee wages on the purchase of goods and services from local businesses, and the contribution of yield taxes on timber purchases, which are distributed to Del Norte and Humboldt counties.

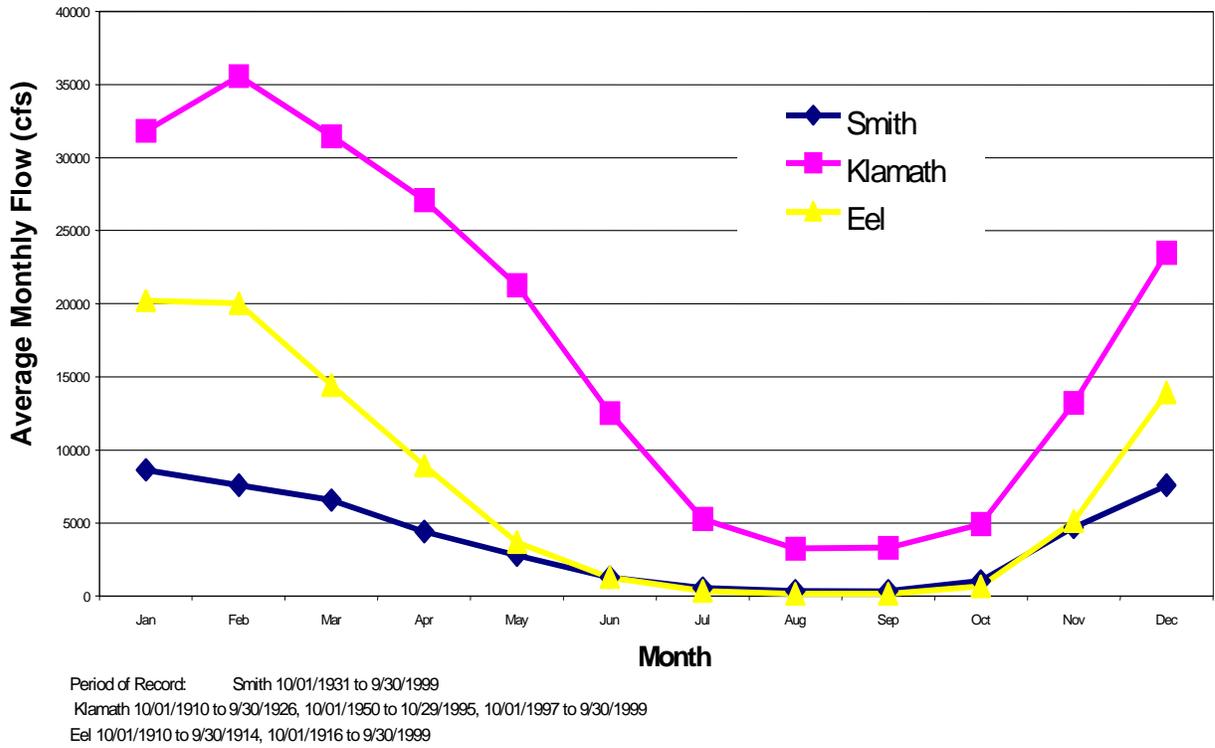
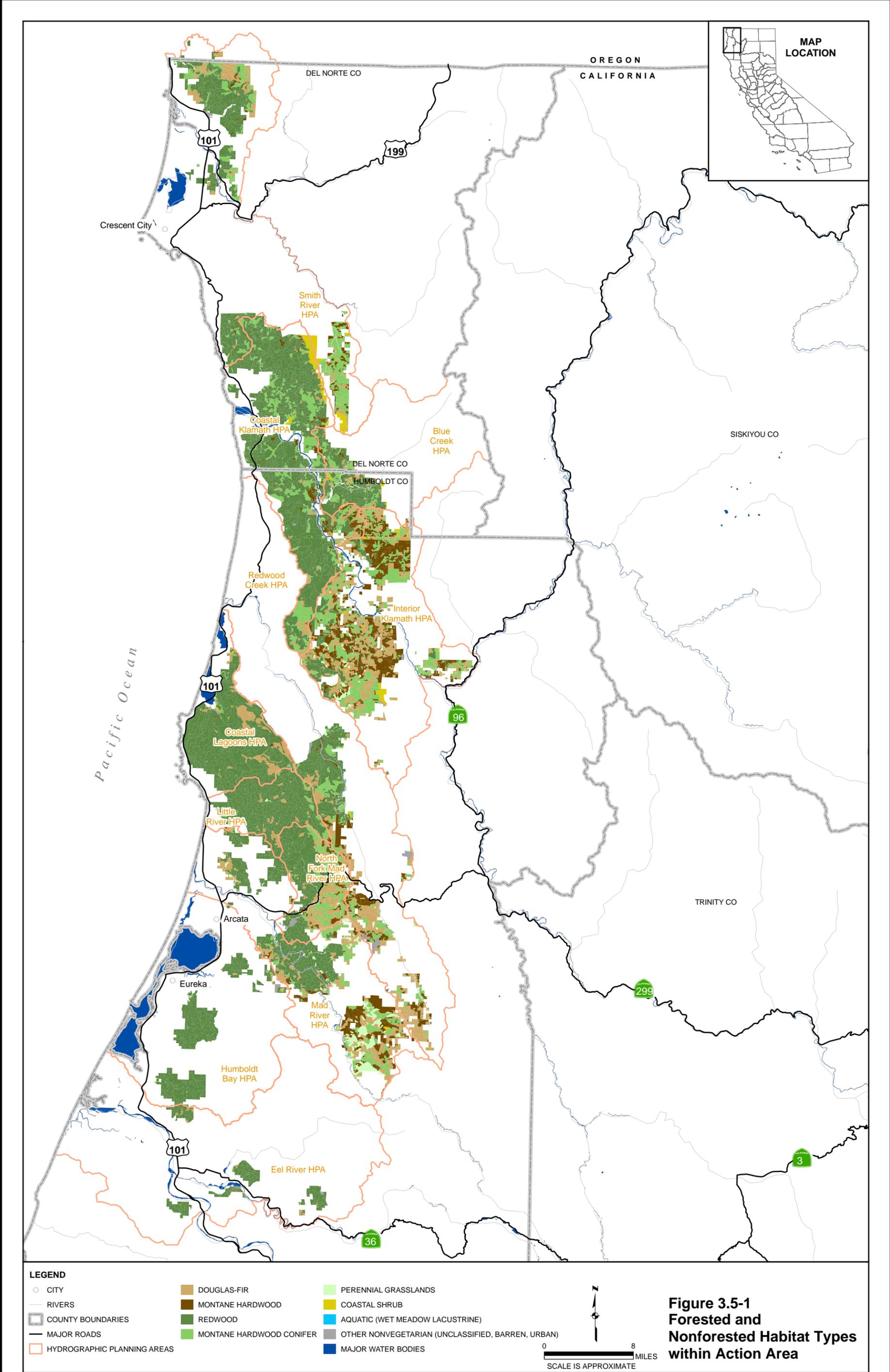
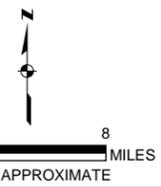


FIGURE 3.3-1
Average Monthly Flows of Project Rivers

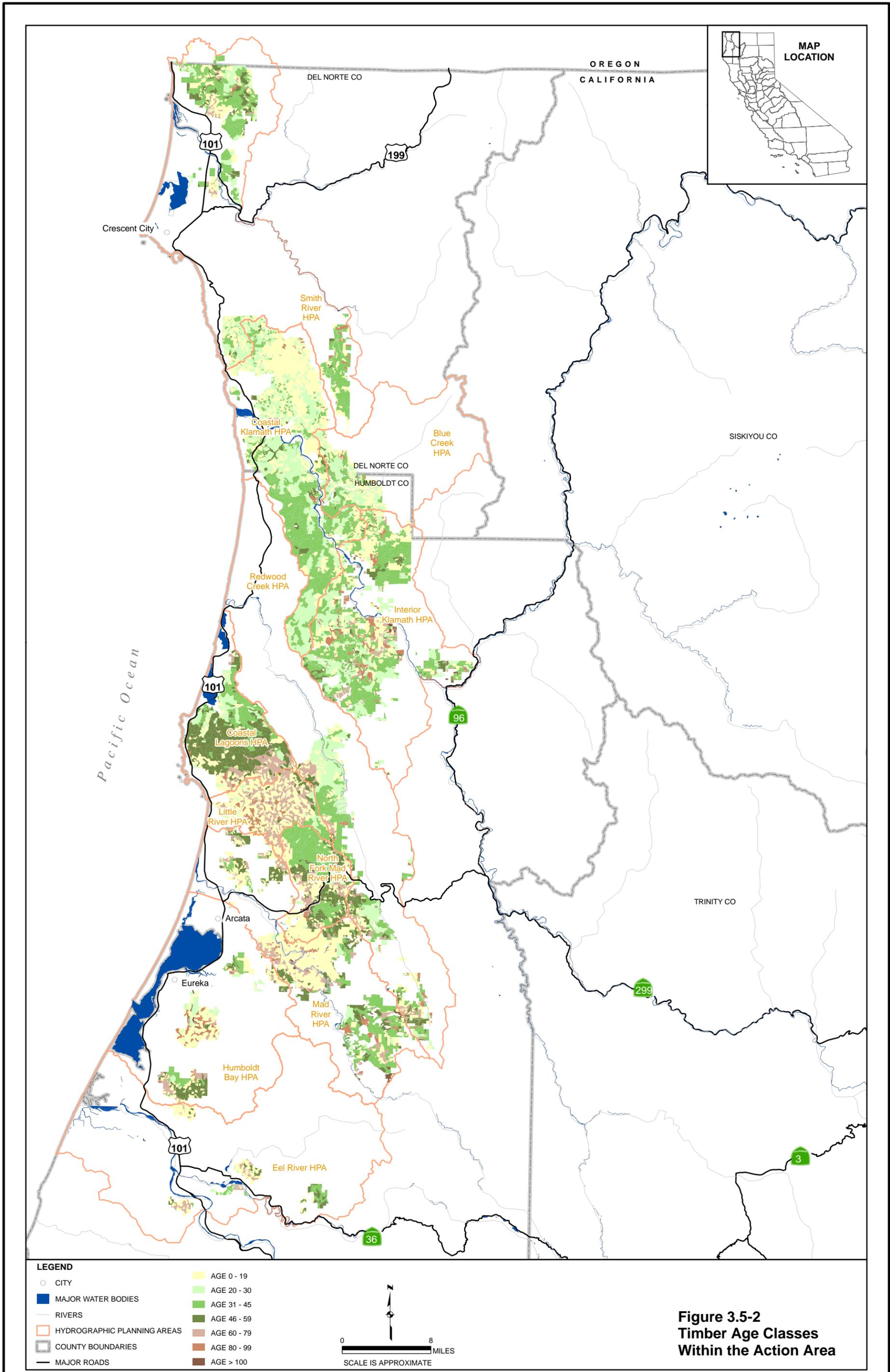


LEGEND

- CITY
- RIVERS
- COUNTY BOUNDARIES
- MAJOR ROADS
- HYDROGRAPHIC PLANNING AREAS
- DOUGLAS-FIR
- MONTANE HARDWOOD
- REDWOOD
- MONTANE HARDWOOD CONIFER
- PERENNIAL GRASSLANDS
- COASTAL SHRUB
- AQUATIC (WET MEADOW LACUSTRINE)
- OTHER NONVEGETARIAN (UNCLASSIFIED, BARREN, URBAN)
- MAJOR WATER BODIES



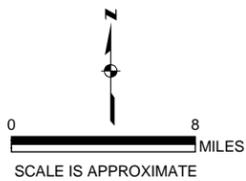
**Figure 3.5-1
Forested and
Nonforested Habitat Types
within Action Area**



LEGEND

- CITY
- MAJOR WATER BODIES
- RIVERS
- HYDROGRAPHIC PLANNING AREAS
- COUNTY BOUNDARIES
- MAJOR ROADS

- AGE 0 - 19
- AGE 20 - 30
- AGE 31 - 45
- AGE 46 - 59
- AGE 60 - 79
- AGE 80 - 99
- AGE > 100



**Figure 3.5-2
Timber Age Classes
Within the Action Area**

Environmental Consequences

4.1 Introduction

This chapter presents the results of the impacts analysis for the Proposed Action (USFWS issuance of an ITP amendment providing for the incidental take of eight owl pairs in addition to those permitted under the existing ITP), Alternative A (USFWS issuance of an ITP amendment providing for the incidental take of eight additional owl pairs and release of three set-asides), and a No Action Alternative (continued implementation of the 1992 NSO HCP without USFWS issuance of an amended ITP). The impact analysis focuses on the potential beneficial and adverse effects on resources that could result from implementing the Proposed Action, Alternative A, or the No Action Alternative. The impacts of the 1992 NSO HCP, that constitutes the No Action Alternative, were evaluated in a previous EA and a Finding of No Significant Impact (FONSI), issued on September 14, 1992, prepared by the USFWS.

Section 4.1 discusses the geographic scope of the analysis (Section 4.1.1) and the approach to the cumulative impact analysis (Section 4.1.2). Sections 4.2 through 4.13 present the impact analysis for the resource areas. Within each of these resource category Sections, analysis of the direct, indirect, and cumulative impacts of the Proposed Action and alternatives is conducted. Section 4.14 summarizes the individual resource category cumulative impact analyses.

In addition to the consideration of direct, indirect, and cumulative impacts, CEQ regulations implementing NEPA require that the analysis of potential impacts resulting from implementation of the Proposed Action and other action alternatives include a discussion of any adverse environmental impacts which cannot be avoided, the relationship between short-term uses of human environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources that would be involved (40 CFR Section 1502.16).

4.1.1 Scope of the Impacts Analysis

The physical scope for analysis of direct and indirect impacts in this EA is the Action Area, which includes 416,533 acres of Green Diamond ownership within the 11 hydrographic planning areas (HPAs) referenced in Chapter 1 (Introduction/Purpose and Need) and Chapter 3 (Affected Environment). The 11 HPAs are listed and described in Appendix A of this EA. As discussed in Chapter 2 (Proposed Action and Alternatives), it is important to note that the Proposed Action (USFWS issuance of an ITP amendment providing for the incidental take of an additional eight owl pairs) does not include authorization or regulation of future timber harvesting operations on Green Diamond lands, nor does the Proposed Action include the authorized incidental take of 50 NSO pairs associated with Green Diamond's 1992 NSO HCP, which were previously analyzed and approved. Under all alternatives considered in this document, future Timber Harvesting Plans (THPs) will be authorized by CDF. Under the No Action Alternative, Green Diamond would continue to

prepare THPs in accordance with the requirements of the CFPRs, other applicable laws, the 1992 NSO HCP, and Green Diamond's management policies. In contrast, under the Proposed Action, Green Diamond would prepare THPs in accordance with the same requirements as the No Action, but also with the additional conservation measures associated with the amended HCP and ITP.

4.1.2 Cumulative Impacts Analysis

4.1.2.1 NEPA Requirements for Cumulative Impacts Assessment

The CEQ regulations implementing NEPA define a "cumulative impact" for purposes of NEPA as follows:

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable **future** actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR Section 1508.7)

The CEQ (1997) also requires development of a baseline (or benchmark) "against which to compare predictions of the effects of the proposed action and reasonable alternatives."

4.1.2.2 Approach to Cumulative Effects in this EA

General Approach. Potential cumulative impacts (both beneficial and adverse) are assessed relative to the No Action Alternative for each of the separate resource category Sections in this chapter (see Sections 4.2 through 4.13). For the No Action Alternative, potential effects are assessed in terms of trends and future conditions resulting from continued implementation of the existing 1992 NSO HCP/ITP.

Cumulative impacts would occur if the **incremental** impacts of the Proposed Action (or the incremental impact of the individual proposed action alternatives, result in a significant effect when they are added to the environmental impacts of past, present and reasonably foreseeable actions. For an impact to be considered cumulative, these incremental impacts must be related in space and time, so that they are either capable of combining (when considering potential incremental impacts of future projects) or have, in fact, combined (when considering impacts of current and past projects).

Baseline. The CEQ requires that a baseline (or benchmark) be used for assessing incremental impacts to resource areas, and the CEQ cites the no action alternative as the appropriate benchmark (CEQ, 1997). The benchmark used in this EA is the No Action Alternative, as described in Chapter 2.

Actions that Could Have Associated Cumulative Effects. Past, present, and reasonably foreseeable future actions that have the potential to combine with incremental effects of the Proposed Action (or Alternative A) to result in cumulative impacts, are those that:

- Have an application for operations pending before an agency with permit authority, or
- Are of a similar character, could affect similar environmental resources, or are located in geographic proximity to the Proposed Action (CEQ, 1997).

On the basis of the criteria listed above, several actions were considered for inclusion in the cumulative impacts analysis, as follows:

1. Previously authorized take of NSO on Green Diamond, Pacific Lumber Company (PALCO), and lands covered by smaller-scale HCPs and Safe Harbor Agreements, and on Federal and Tribal lands
2. Implementation of conservation measures contained in the PALCO Multi-Species HCP on PALCO lands
3. Implementation of Conservation Measures Contained in the Regli Estate and Terra Springs HCPs, and the Forster-Gill Safe Harbor Agreement
4. Pursuant to the CFPRs, continued USFWS coordination with other landowners in the region who do not have existing HCPs
5. Continued implementation of NSO guidelines contained in the Northwest Forest Plan on Federal lands
6. NSO management within the Redwood National and State Parks based on USFWS consultation under ESA Section 7 process and decision documents
7. NSO management on Hoopa and Yurok tribal lands based on USFWS consultation under ESA Section 7 process and decision documents
8. Proposed revisions to designated critical habitat for the marbled murrelet or northern spotted owl.
9. Implementation of conservation measures contained in Green Diamond's recently approved Aquatic HCP/Candidate Conservation Agreement with Assurances (CCAA)
10. Residential development and operation of existing residential infrastructure

On the basis of further review, actions (1 through 9) were determined to meet the criteria for consideration as other actions in this cumulative impacts analysis. These actions are described in detail in Section 4.1.2.3.

As noted in Section 1.6.3.2, the USFWS and NMFS recently issued separate permits to Green Diamond for an Aquatic HCP and CCAA (action number 8 above) for Green Diamond lands within this Action Area. That process was independent of the proposed amendment to Green Diamond's NSO HCP, and had its own NEPA analysis, which evaluated the impacts of issuance of an ITP and an Enhancement of Survival Permit (ESP) in association with the AHCP and CCAA, respectively. Potential cumulative effects of implementation of Green Diamond's Aquatic HCP/CCAA on various resources are addressed below in the cumulative effects sections for those resources.

The remaining action (number 10 - residential development) is not considered an "other action" and is not included as "other cumulative actions" in the analysis of cumulative impacts in this EA because the extent of residential development is somewhat speculative and limited information is available about this activity within the 11 HPAs. Although some local residential development may be possible in the future, and could be destructive to northern spotted owl habitat, the majority of NSO habitat is located on public lands (USFS,

NPS, BLM, CA administered lands, etc) or lands zoned for commercial timber production (Timberland Production Zone[TPZ]). The development of such lands for residential use would be restricted due to significant legal constraints limiting residential development on state and federally owned public lands in addition to constraints posed by zoning laws at the local level. Therefore, potential impacts to NSO habitat from residential development would be insignificant.

Geographic Scope of Cumulative Assessment. The CEQ guidelines state that cumulative effects analyses should be limited to the effects that can be evaluated meaningfully by the decision makers. The guidelines further state that the area to use in defining the cumulative impacts geographical boundary should extend to the point at which the resource is no longer affected significantly (CEQ, 1997). The area for conducting the cumulative impact assessment for the northern spotted owl is the California Coast Physiographic Province, as described in Section 3.6.2.7. The geographical boundary of the cumulative impact area for other resource areas (e.g., geology, hydrology and water quality, aquatic resources) described in this EA is defined as the 11 HPAs that encompass Green Diamond's California ownership and surrounding lands in common watersheds. The cumulative effects analysis groups the HPAs and analyzes them together, because the resource data are too limited at the individual HPA scale to allow quantitative analysis of cumulative impacts at the HPA scale.

Major land ownership as a percentage of total HPA acreage for the HPAs addressed in this EA is presented in Table 4.1-1. The geographic location of the major land ownership is shown in Figure 4.1-1.

TABLE 4.1-1
Land Ownership as a Percentage of Total in the 11 HPAs

HPA	Green Diamond	PALCO	Other Commercial Timberland	USFS/BLM	Parks	Other
North Fork Mad River	89.8	0.0	0.0	0.0	0.0	10.2
Little River	87.7	0.0	0.0	0.4	0.4	11.5
Coastal Klamath	82.1	0.0	0.9	3.1	5.7	8.3
Coastal Lagoons	74.6	0.0	0.7	0.0	9.2	16.2
Interior Klamath	51.7	0.0	0.0	6.3	0.3	41.7
Mad River	41.3	0.3	4.7	0.9	0.0	52.8
Smith River	24.3	0.0	13.3	19.5	15.9	27.1
Blue Creek	19.2	0.0	0.0	47.2	0.0	33.6
Redwood Creek	17.5	0.0	4.5	3.3	41.8	32.8
Humboldt Bay	12.6	22.2	7.6	5.3	0.2	52.1
Eel River	3.9	27.0	4.4	0.5	0.0	64.1

4.1.2.3 Other Actions Assessed in the Cumulative Impacts Analysis

The other past, present, and reasonably foreseeable actions included in the cumulative analysis are discussed below. State and Federal land management actions outside the 11 HPAs are not assessed because almost no timber harvesting occurs on these State and Federal lands and activities on these lands are extremely limited. Other actions are as follows:

- Previously authorized take of NSO on Green Diamond, PALCO, and lands covered by smaller-scale HCPs and Safe Harbor Agreements, and on Federal and Tribal lands.** Previously authorized take is described separately below under the sections for PALCO lands, Federal lands (Northwest Forest Plan), Tribal lands, and small-scale HCPs and Safe Harbor Agreements. Previously authorized take of NSO on Green Diamond lands is described elsewhere in this document (see Sections 2.1, 3.6, and 4.6).
- Implementation of Conservation Measures Contained in the PALCO Multi-Species HCP on PALCO Lands.** PALCO lands occur within the southern most HPAs of the Green Diamond ownership, primarily in the Eel River and Humboldt Bay HPAs. On these PALCO lands, which are outside the Action Area (per Section 1.4), the CFPRs are supplemented by additional measures contained in the PALCO Multi-Species HCP (PALCO, 1999). The PALCO HCP and incidental take permit, implemented in 1999 and covering a 50-year period, authorizes take of northern spotted owls over approximately 211,000 acres of commercial timberland in Humboldt County, much of which is located within the Humboldt Bay and Eel River HPAs. The USFWS estimated the take of northern spotted owls over the 50-year permit term to include the loss of at least 48 activity centers due to removal of suitable habitat, and harassment of at least 156 activity centers due to disturbance from timber harvest activities during the breeding season. The conservation strategy for the northern spotted owl contained in the PALCO HCP is a habitat- and performance-based approach that includes the harvest, retention, and recruitment of requisite habitat types and elements within watershed assessment areas and around individual activity sites, as well as requirements to retain a specific number of owl activity sites on the covered lands (108 activity sites for the remainder of the PALCO permit term), with occupancy and reproductive performance criteria for those activity sites. Harvest of owl habitat is permitted in and around activity sites which are not among the 108 designated sites. The PALCO strategy is complemented by a number of activities that include (1) minimizing disturbance to northern spotted owls activity sites, (2) monitoring to determine whether these efforts maintain a high-density and productive population of spotted owls on the ownership, and (3) applying adaptive management techniques when PALCO, USFWS, CDFG, and the scientific community learn more about the biology of the northern spotted owl and/or assess how well management objectives are met.

PALCO's NSO strategy also relies on other conservation elements of the HCP for retention and recruitment of potential foraging, roosting, and nesting habitat in watersheds across the PALCO ownership. Specifically, PALCO establishes a series of marbled murrelet reserves that are large, contiguous areas of second growth and old growth incorporating most of the larger remaining stands of uncut old-growth redwood on the ownership. Timber harvesting within these reserves is limited to habitat enhancement projects that will provide secondary benefits to the northern spotted owl

over the 50-year Permit term (1999 to 2049). In addition, PALCO will implement silvicultural prescriptions that favor attainment of mature forest conditions within a 300-foot selective harvest buffers on PALCO property that is directly adjacent to old-growth redwood in State parks. The PALCO HCP also establishes riparian management zones (RMZs) that extend out to 170 feet and 75 to 100 feet on Class I and Class II streams, respectively. RMZ management and widths may change based on watershed analysis. The RMZs include an inner no-cut area and an outer band of selective harvest where no even-aged management is allowed.

- **Implementation of Conservation Measures Contained in the Regli Estate and Terra Springs HCPs, and the Forster-Gill Safe Harbor Agreement.** Three other USFWS-approved conservation plans for the NSO exist in the California Coast Province. For the lands covered by these plans, the management of NSO habitat is guided by the measures of those HCPs, and incidental take coverage is provided; each of these three plans cover relatively small areas. The Regli Estate HCP covers the incidental take of one pair of NSOs on 480 acres in the vicinity of Fortuna, California, within the Eel River HPA, but outside of the Action Area. The HCP covers harvest of about 113 acres of NSO habitat, and protects or creates habitat on about 160 acres on-site. The Terra Springs LLC HCP, in Napa County, covers the incidental take of NSO associated with conversion of 22 acres of roosting/foraging habitat to vineyard, and the on-site protection and enhancement of 41 acres of habitat, located on a 76-acre parcel about one mile from a known NSO site. The ITP for this HCP was issued effective March 3, 2004. The Forster-Gill, Inc. Safe Harbor Agreement for NSO covers land in the vicinity of Blue Lake, California, in the Mad River watershed within the assessment area. This agreement provides for creation and enhancement of more than 200 acres of NSO habitat over the agreement period of 80 years, and provides the landowner authorization for incidental take of NSOs that move onto the enrolled lands, so long as baseline conditions and terms of the agreement are maintained. The permit for this Safe Harbor Agreement was issued on June 18, 2002. Continued USFWS Coordination with Other Landowners in the Region Who Do Not Have Existing HCPs. The management regimes on other commercial timberland throughout the 11 HPAs and the province are characterized by application of the CFPRs. With the exception of the PALCO Multi-Species HCP, the Regli Estate HCP, and the Forster-Gill Safe Harbor Agreement described above, no other company-specific conservation strategy for the management of terrestrial wildlife or aquatic habitat is known to exist within the 11 HPAs. Within the province, one other small-scale HCP (Terra Springs LLC HCP) also covers incidental take of NSO. On commercial timberlands within the 11 HPAs and the province which are not covered by an HCP or Safe Harbor Agreement, therefore, the CFPRs (as described in Section 1.5.3.1 and Sections 2.1.4 and 2.1.5), would continue to be implemented under all the alternatives. These include requirements for landowners to coordinate with USFWS prior to timber harvest operations for the purpose of avoiding unauthorized take of the northern spotted owl and, as necessary, developing site-specific measures to mitigate or avoid significant environmental impacts.
- **Continued Implementation of NSO Guidelines Contained in the Northwest Forest Plan on Federal Lands.** The Northwest Forest Plan (NWFP) was approved and implemented through amendment of individual National Forest and BLM land management plans in 1994. This plan guides management of the vast majority of Federal

lands within the range of the NSO, primarily through the standards and guidelines of various land use allocations. Five land use allocations (covering approximately 15.4 million acres or 63 percent of the Federal lands) likely contribute to development and maintenance of clusters of reproductively successful northern spotted owls. These reserve allocations include Late-Successional Reserves, Managed Late-Successional Areas, Congressionally Reserved Areas, Reserve Pair Areas, and some Adaptive Management Areas. The remaining allocations, including Administratively Withdrawn Areas, Riparian Reserves, Matrix, Connectivity Blocks, and some Adaptive Management Areas contribute in various ways to connectivity between the large reserve areas. In some cases, forest conditions on these connectivity allocations may aggregate into landscapes capable of supporting resident northern spotted owls. The location and duration of such conditions is unknown (USFWS, 2004). The NWFP also provides the basis for aquatic and riparian resource management on U.S. Forest Service and Bureau of Land Management lands within the 11 HPAs. NWFP standards were developed to provide a wide range of benefits to many unlisted as well as listed species on the basis of Federal multiple-use management principles. Under the NWFP, riparian buffers of 300 feet, 150 feet, and 100 feet are applied around all Class I, Class II, and Class III streams, respectively. Minimal timber harvesting is allowed within these zones.

- NSO Management within Redwood Parks Based on USFWS Consultation under ESA Section 7 Process and Decision Documents.** Within the Redwood National and State Parks (RNSP) there are 40,921 acres of old-growth forest, all of which is considered suitable spotted owl nesting, roosting, and foraging habitat. Prior to park establishment and expansion, timber harvest occurred in old-growth stands on land that is now within the parks. Upwards of 50,000 acres were harvested using seed tree retention and clearcut harvest prescriptions. These stands are now between 24 and 100 years old. As of 2004, a total of 21,953 acres of second-growth forest is greater than or equal to 40 years of age and may be considered suitable for nesting and roosting by spotted owls. Forested stands greater than 40 years old may be suitable for spotted owls where they contain residual old growth trees in sufficient numbers to provide the stand structure requisite for nesting and roosting habitat. An estimated 263 acres contain residual old growth assumed to be suitable for spotted owls. Some unknown proportion of the remaining second growth may be suitable foraging habitat (Schmidt, 2005; USDI and CDPR, 1999). Home range inventories indicate a downward trend in spotted owl presence in the RNSP. In recent years, spotted owls have been located in just 2 out of 13 historic territories inventoried. In 9 of the other 11 instances, barred owls have moved into the former spotted owl core areas (in some cases occupying the old spotted owl nest tree). Any activities that may result in take of northern spotted owls will require consultation with USFWS under ESA Section 7.
- NSO Management on Hoopa and Yurok Tribal Lands Based on USFWS Consultation under ESA Section 7 Process and Decision Documents. Approximately 2,541 acres of suitable northern spotted owl habitat occur within Yurok reservation boundaries.** Past actions (through 1995) in the Yurok Indian Reservation have removed 234 acres and degraded 45 acres of suitable northern spotted owl habitat since 1994. In the year 2000, formal consultation for the Cappell Creek "B" timber sale, USFWS authorized the incidental take of two northern spotted owl activity centers as a result of removal of 115 acres of habitat within their home ranges. Proposed harvest for 2006 on the Yurok

Reservation will likely occur in suitable owl habitat within the home range boundaries of two additional owl activity centers. Since both of these activity centers are already below habitat thresholds, it is anticipated that both of them will be result in "take." The proposed harvest will remove an additional 112 acres of nesting/roosting habitat and 135 acres of foraging habitat for a total of 247 acres of suitable habitat.

As of January 1, 2003, approximately 56,921 acres of suitable northern spotted owl habitat occurred within Hoopa reservation boundaries, including 36,891 acres of nesting/roosting habitat and 20,030 acres of foraging habitat. In addition, the reservation contains 5,985 acres of dispersal habitat not already identified as nesting/roosting/foraging habitat. Surveys conducted since 1991 have resulted in identification of 53 spotted owl territories known to occur on Hoopa reservation lands. Four of the 53 territory centers are currently below incidental take thresholds set by the USFWS relative to the amount of available suitable habitat. Two of these territories are currently below the incidental take threshold within the 0.7-mile buffer surrounding the activity center; one territory is below the incidental take threshold within its 1.3-mile buffer; and one territory is below the threshold in both the 0.7-mile and 1.3-mile buffers.

Timber management through 2008 is expected to remove a total of 2,405 acres of nesting/roosting/foraging habitat, affecting 43 of 53 territories on the Reservation. As a result, three of the 43 activity centers would either fall below or be reduced further below the suitable habitat thresholds within the 0.7- or 1.3-mile analysis areas. Timber harvesting through 2008 would reduce the amount of dispersal habitat on the reservation from 62,906 acres (69 percent of the reservation area) to 60,113 acres (66 percent of the reservation area). The USFWS anticipates that owl pairs associated with 11 northern spotted owl activity centers could be taken through 2008 on Hoopa reservation lands.

- **Proposed revisions to designated critical habitat for the marbled murrelet and northern spotted owl.** As described in Section 3.6.3 above, a proposed revision of NSO critical habitat was published (72 Federal Register 32450; June 12, 2007) after the Draft EA for this Proposed Action was issued. The areas identified for critical habitat under the proposed revision do not include any Green Diamond lands. The 1992 critical habitat designation, which is the critical habitat designation currently in effect, includes 99,909 acres of critical habitat within the California Coast Ranges Physiographic Province, while the proposed revision includes 131,866 acres in the province. Thus, the proposed revision, in its current form, would increase designated critical habitat for the NSO by about 31,957 acres in the province. Only Federal lands are included in the 1992 critical habitat designation, and in the 2007 proposed critical habitat revision.

As described in Section 3.7.2 above, the USFWS also published a proposed revision of marbled murrelet critical habitat (71 Federal Register 53838; September 12, 2006). The proposed revision would reduce designated critical habitat for murrelets range wide from the current 3.9 million acres to about 221,692 acres, if implemented as proposed. The proposal would exclude from designation large areas that meet the definition of critical habitat but already protected under other existing regulations or plans, such as the Northwest Forest Plan. Details of this proposal are provided in Section 3.7.2. The critical habitat revision would, if implemented as proposed, remove from critical habitat designation the approximate 1,400-acres of Green Diamond's ownership that are currently within designated critical habitat unit CA-03-a, and would add critical habitat

designation to 650 acres of Green Diamond's ownership in the Terwer Creek drainage of the Klamath River, an area known as the Miracle Mile Complex.

- **Implementation of conservation measures contained in Green Diamond's recently approved Aquatic HCP/Candidate Conservation Agreement with Assurances (CCAA).** An AHCP/CCAA and associated Implementation Agreement (IA) was approved and signed by Green Diamond, the USFWS and NMFS in June 2007, and the permit for incidental take of the fish species under NMFS authority was issued on June 12, 2007 (72 Federal Register 36672), taking effect on July 1, 2007, with a 50-year permit period. The ITP issued by NMFS provides for the incidental take of two fish Evolutionarily Significant Units (ESUs) and one Distinct Population Segment (DPS) that are listed as threatened under the ESA and that overlap Green Diamond's lands in northern California. These fish ESUs/DPSs are the Southern Oregon/Northern California Coast coho salmon ESU, California Coastal Chinook salmon ESU, and Northern California steelhead DPS. The ITP issued by NMFS also authorizes the incidental take of three other fish ESUs, currently not listed, should they become listed in the future. An Enhancement of Survival Permit (ESP) issued by the USFWS authorizes the incidental take of two fish species and two amphibian species, currently unlisted, should they become listed in the future. These unlisted ESUs/species are Chinook salmon (Southern Oregon and Northern California Coastal ESU, Upper Klamath/Trinity Rivers ESU), steelhead (Klamath Mountains Province ESU), coastal cutthroat trout, rainbow trout, southern torrent salamander, and tailed frog.

Under the AHCP/CCAA, measures previously employed by Green Diamond to protect Class I, II, and III streams will be supplemented by Green Diamond's AHCP/CCAA Conservation Strategy, which includes enhanced riparian management zone (RMZ) widths, enhanced riparian protection within the RMZs, and establishment of equipment exclusion zones (EEZs). Green Diamond would also implement *ownership-wide* mitigation, management, and monitoring measures that include:

- implementation of an ownership-wide Road Management Plan that provides for selective and road-related fish passage enhancement (barrier removal); implementation of practices that are designed to minimize sediment discharge to Class I, II, and III streams; and decommissioning of some roads
- protection of unique geomorphic features, such as channel migration zones and floodplains
- adoption of various slope stability and ground disturbance measures
- effectiveness and compliance monitoring, plus adaptive management and structured feedback loops

4.2 Geology, Geomorphology, and Mineral Resources

The purpose of this Section is to evaluate the potential impacts of implementing the Proposed Action (amendments to the 1992 NSO HCP and associated ITP), Alternative A (HCP/ITP amendment plus release of three set-asides to timber harvest), and the No Action Alternative as they relate to geology, geomorphology, and mineral resources. Potential

direct adverse impacts include acute or chronic changes in geomorphic and hydrologic processes that affect soil productivity, delivery of surface materials to streams and rivers, and hillslope stability in the Action Area. Geomorphology and geologic resources in the Action Area can be affected in several ways. Primarily, the effects are related to movement of surface materials, including soils, weathered rock, and sediment (i.e., hillslope mass wasting). When delivered to streams, these materials can affect water quality (see Section 4.3, Hydrology and Water Quality) and fish habitat (see Section 4.4, Aquatic Resources). Currently, sediment inputs to Action Area stream networks result from existing roads, implementation of THPs, natural conditions, and legacy conditions.

Several potential resource issues within the Action Area (i.e., mineral-resource depletion, fire-prevention and fire-suppression activities, and earthquakes or volcanic eruptions) would have no or negligible direct or indirect impacts as a result of implementing the Proposed Action or Alternative A. These issues are discussed below, but are not analyzed in greater detail in this EA.

- The Proposed Action or the other alternatives would not affect the extraction and processing of mineral resources (Section 3.2.4, Mineral Resources) in the Action Area. Green Diamond's rock pits are generally less than 2 acres in size; are located more than 100 and 75 feet from Class I and II streams, respectively; and are exempt from SMARA regulations. Any extraction of in-stream gravel from locations throughout the Action Area would be conducted in compliance with permitting and regulatory requirements of the CDFG and other State or Federal regulations. These activities would be the same for the No Action Alternative, Proposed Action, and Alternative A. Also, instream gravel extraction would not be a covered activity under the Proposed Action or Alternative A.
- The Proposed Action or the alternatives would not affect wildfire prevention and suppression activities in the Action Area. Depending on the location and characteristics of a particular fire, uncontrolled fires, areas of high-intensity burns, and fire-suppression activities can potentially result in conditions leading to increased sediment delivery and hillslope mass wasting. Under the various alternatives, wildfire prevention and wildfire suppression activities would continue to be practiced by Green Diamond when and where necessary.
- Although the proposed ITP would provide increased operational flexibility regarding where harvest occurs, the total area harvested is expected to be similar under all the alternatives. The total area subject to harvest is speculative and could even be greater under the No Action, should restrictions around the eight NSO sites direct harvest toward younger stands not occupied by owls, and where yields per acre would be less than in the older forest typical around NSO nest sites. The potential for soil compaction to result from implementing the Proposed Action or any of the alternatives is, however, expected to be similar and are, therefore, not assessed in detail in this EA.
- The likelihood or magnitude of earthquakes or volcanic eruption will be unaffected by implementation of the Proposed Action or the other alternatives; therefore, these events are not assessed in detail in this EA.

4.2.1 Methodology

Potential direct adverse impacts include acute or chronic changes in geomorphic and hydrologic processes that affect soil productivity, delivery of surface materials to streams and rivers, and hillslope stability in the Action Area. Potential effects could be localized or dispersed over a wide area. As noted above, potential indirect adverse impacts relate to: (1) the possible loss of spotted owl habitat as a result of hillslope mass wasting triggered by timber harvest activities, and (2) the resulting effect this could have on spotted owls.

4.2.2 No Action Alternative

Continued implementation of the 1992 NSO HCP under the No Action Alternative would have no significant effects on the potential for mass soil movement or, consequently, the loss of northern spotted owl habitat compared to existing conditions.

4.2.3 Proposed Action

Authorization of an additional eight owl pair incidental takes under the Proposed Action would have insignificant adverse impacts on Action Area geology and geomorphology when compared to the No Action Alternative. As a result, potential impacts to the geology and geomorphology within the Action Area under the Proposed Action would be similar to those under the No Action Alternative.

4.2.4 Alternative A

With the exception of the release of the three set-asides under this alternative, general timber harvesting and forest management activities would be similar to those under Alternative A as in the Proposed Action. As a result, potential impacts to the geology and geomorphology within the Action Area would be similar. Release of the three set-aside areas may create some potential insignificant adverse impacts to geology and geomorphology in the Action Area.

4.2.5 Cumulative Impacts—Geology, Geomorphology, and Mineral Resources

The assessment of potential cumulative impacts on geology and geomorphology was conducted using the approach described in Section 4.1.2, Cumulative Impacts Analysis.

4.2.5.1 Impacts Associated with Other Actions

Cumulative effects on geology and geomorphology with respect to this analysis would be related to the potential for a cumulative increase in hillslope mass wasting and consequent loss of northern spotted owl habitat within the 11 HPAs. The conservation measures specific to the northern spotted owl and other wildlife species as a result of implementation of Green Diamond's AHCP/CCAA, the PALCO HCP, the NWFP, together with prohibitions on timber harvesting on Federal and State Park lands, will collectively serve to minimize the risk of hillslope mass wasting on Green Diamond, PALCO, and Federal lands within the 11 HPAs. Continued USFWS consultation and coordination with tribal representatives and other landowners in the region who do not have existing HCPs may not necessarily minimize the potential for management-related landslide occurrences in these areas. Some of these potential effects, such as those associated with timber harvest, may be minimized as a result of tribal consultations with NMFS (through the Bureau of Indian Affairs), when a

tribal activity may adversely affect Federally-listed salmonids. A slightly greater, albeit not significant, potential for hillslope mass wasting and an associated loss of northern spotted owl habitat exists on these lands compared to lands where HCP or NWFP conservation measures provide additional protections.

4.2.5.2 Cumulative Impacts Associated with the Proposed Action and Alternative A

Overall, it is anticipated that the cumulative effect of implementing all of the resource management programs described in Section 4.1.2.3 will collectively serve to minimize the risk of hillslope mass wasting on Green Diamond, PALCO, and Federal lands within the 11 HPAs. As noted in Sections 4.2.3 and 4.2.4 above, implementation of the Proposed Action or Alternative A also would not result in significant adverse impacts to geology and geomorphology.

4.3 Hydrology and Water Quality

As described in Section 3.3, Hydrology and Water Quality, the primary water quality parameters of concern for the evaluation of project impacts are suspended sediment, turbidity, and water temperature.

Potential impacts to hydrology and water quality are assessed in this EA over broad geographic areas rather than for individual project features. This evaluation focuses on impacts to watersheds through changes in flow, water temperature, and sediment inputs.

Hydrology in forested areas can be affected by peak flows during storm events that can cause scour, alter channel morphology, and cause flooding. 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 Action Area hydrology (Beschta et al., 1995; Lewis, 1998). Stream temperatures can be affected by changes to direct shading, reduced surface and groundwater flows, and sediment deposition (MacDonald et al., 1991).

4.3.1 Methodology

Methods to evaluate the significance of the alternatives to Action Area hydrology and water quality are those qualitative and quantitative techniques used in evaluating: (1) changes in peak and low (base) flows, (2) changes in slope stability and soil delivery to the streams (see Section 4.2, Geology, Geomorphology, and Mineral Resources), and (3) changes in riparian vegetation and shading (Section 4.4, Aquatic Resources). Those evaluations are used to assess relative changes in hydrology, sediment delivery, and water temperature, respectively.

Changes in stream hydrology and water quality would be significant: (1) if they result in increased flooding conditions or scouring, or (2) if they produce degraded water quality conditions that exceed water quality guidelines or criteria (such as Basin Plan limits). Changes are evaluated by comparing conditions expected over time under the Proposed Action and Alternative A with those conditions expected over time under the No Action Alternative.

4.3.2 No Action Alternative

Under the No Action Alternative, owl habitat and forestry management measures would be implemented primarily through the THP process and governing CFPRs. The CFPRs include measures to protect hydrology and water quality in the Action Area by incorporating WLPZ requirements such as 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 side-slopes; (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 instream obstructions to unrestricted fish passage.

Continued implementation of the 1992 NSO HCP and CFPRs under the No Action Alternative would not result in significant (1) increased flooding conditions or scouring, or (2) produce degraded water quality conditions that exceed water quality guidelines or criteria (such as Basin Plan limits). Implementation of the No Action Alternative would result in insignificant adverse effects on stream hydrology and water quality when compared to existing conditions.

4.3.3 Proposed Action

The ability to harvest around eight NSO sites has the potential to increase timber harvest compared to No Action, and for this to result in increased effects. The Proposed Action would allow timber harvest on up to 1,864 acres around eight NSO nest sites. As discussed below (Section 4.6.3), 1,864 acres represents a worst-case scenario; the actual effect is expected to be offset, at least in part, by reduced harvest elsewhere on the ownership. The Proposed Action would also be regulated under the THP process and governing CFPRs and impacts would be substantially similar to the No Action Alternative, i.e., the Proposed Action would not result in either increased flooding conditions or scouring, or degraded water quality conditions that exceed water quality guidelines or criteria. As such, implementation of the Proposed Action would have no significant impact on area hydrology and water quality when compared to the No Action Alternative.

4.3.4 Alternative A

Release of the three set-aside areas may create some potential adverse impacts to water quality because up to 903 acres may be made available for timber harvest under this alternative. However, these impacts would be insignificant. With the exception of the release of the three set-asides under this alternative, general timber harvesting and forest management activities would remain the same under Alternative A as in the Proposed Action and No Action Alternatives. As a result, potential impacts to the hydrology and water quality within the Action Area would be the same.

4.3.5 Cumulative Impacts—Hydrology and Water Quality

The assessment of potential cumulative impacts on hydrology and water quality was conducted using the approach described in Section 4.1.2, Cumulative Impacts Analysis.

Past timber management within the 11 HPAs has affected peak flows, water temperatures, and sedimentation of streams. Changes in peak flows (timing and intensities) have resulted in additional water runoff throughout 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 for some of the HPAs have also been modified by dams, water diversions, development, and agriculture (see Section 3.3.2, Watershed Characteristics). These activities have resulted in adverse environmental conditions in some locations, including insufficient stream flows. Increases in stream temperatures also have occurred.

Several of the larger watercourses in the 11 HPAs are listed as water quality impaired under Section 303(d) of the CWA. In many cases, the listed cause of impairment is excessive sedimentation of streams. Adverse existing conditions relating to excessive sediment have resulted from past activities and include stream channel aggradation, pool filling, and cementation of bed substrate. It is assumed that during past sediment-loading activities, turbidity levels were above the desired levels.

4.3.5.1 Impacts Associated with Other Actions

Cumulative effects on hydrology and water quality with respect to this analysis would be related to the potential for a cumulative increase or potential increase in flooding conditions or scouring, or degraded water quality conditions that exceed water quality guidelines or criteria within the 11 HPAs. The conservation measures specific to the northern spotted owl and other wildlife species for the PALCO HCP and the NWFP, together with prohibitions on timber harvesting on Federal and State Park lands, will collectively serve to minimize the potential for management-induced events that could trigger flooding, and would generally help to maintain or improve existing water quality conditions on PALCO and Federal lands within the 11 HPAs. Further, it is anticipated that implementation of the measures contained in Green Diamond's AHCP/CCAA Conservation Strategy would result in equivalent or improved water quality conditions over time. One potential impact that could result from implementation of the AHCP/CCAA is a slight (and less than significant) change in water temperature resulting from increased shade attributable to overstory canopy closure retention requirements. Another possible impact is locally increased peak flows on a short-term basis following harvesting. These impacts would be insignificant given implementation of the riparian management prescriptive measures included in AHCP/CCAA Conservation Strategy.

On the other hand, continued USFWS consultation and coordination with tribal representatives and other landowners in the region who do not have existing HCPs may not necessarily minimize the potential for such impacts in these areas. Some of these potential effects, such as those associated with timber harvest, may be minimized as a result of tribal consultations with NMFS (through the Bureau of Indian Affairs), when a tribal activity may adversely affect Federally-listed salmonids. A slightly greater, albeit not significant, potential for flooding and degraded water quality conditions exists on these lands compared to lands where HCP or NWFP conservation measures provide additional protections.

4.3.5.2 Cumulative Impacts Associated with the Proposed Action and Alternative A

Overall, it is anticipated that the cumulative effect of implementing all of the resource management programs described in Section 4.1.2.3 will collectively serve to minimize the risk of flooding, stream channel scouring, or degraded water quality conditions on Green Diamond, PALCO, and Federal lands within the 11 HPAs. As noted in Sections 4.2.3 and 4.2.4 above, implementation of the Proposed Action or Alternative A also would not result in significant adverse impacts to hydrology and water quality.

4.4 Aquatic Resources

This Section addresses the potential for impacts to fisheries, plus aquatic and riparian function and habitat quality, in the Action Area as a result of implementing the Proposed Action and Alternative A. The following discussion assesses the potential for impacts to occur to these aquatic resources.

4.4.1 Methodology

Methods used to evaluate the potential for adverse or beneficial effects on aquatic resources are based on anticipated changes in hydrology, riparian conditions, sediment production and delivery, and the resulting changes in aquatic habitat quality. These anticipated changes and potential effects are evaluated as part of the No Action Alternative, the Proposed Action, and Alternative A. Management activities have the potential to affect aquatic resources in several ways. The following potential impacts on habitat and biota are evaluated in this Section:

- Changes in peak flows that have the potential to affect channel morphology through bed scour and bank erosion
- Reduction (over time) in the amount of large woody debris that could be recruited into the watercourses, contributing to reduced sediment storage sites, and reduced pool numbers and volumes
- Removal of riparian vegetation resulting in altered thermal regimes, changes in nutrient cycling, and destabilization of streambanks
- Increases in sediment supplies from surface erosion, hillslope mass wasting, and bank erosion, leading to channel aggradation, loss of pool volume, and degradation of spawning gravels

These potential changes to the stream channel and associated riparian areas could adversely or beneficially affect the quantity and quality of aquatic habitat for species through changes in temperature, sedimentation, habitat complexity, and connectivity. Habitat complexity refers primarily to instream habitat, which provides cover for fish and helps define and add complexity to the stream channel through undercut banks, pools, and other features. Connectivity refers to stream corridor connectivity, which is important to those species with complex life histories (multiple developmental stages), movement, and migration strategies.

4.4.2 No Action Alternative

As noted in Section 4.2 (Geology and Geomorphology) and Section 4.3 (Hydrology and Water Quality), the hillslope mass wasting, hydrologic, and water quality conditions and processes that could impact aquatic species, as well as aquatic and riparian function, would not be significantly affected by continued implementation of the 1992 NSO HCP under the No Action Alternative compared to existing conditions. No significant changes in (1) peak flows with potential to affect channel morphology, (2) in-stream LWD, (3) quantity and quality of riparian vegetation, and (4) sedimentation and stream aggradation would be anticipated to occur as a result of continued implementation of the conservation measures contained in the 1992 NSO HCP.

4.4.3 Proposed Action

As noted in Section 4.2 (Geology and Geomorphology) and Section 4.3 (Hydrology and Water Quality), USFWS approval of an additional eight owl pair incidental takes in conjunction with timber harvest around nest sites, and associated conservation measures under the Proposed Action, would have no significant impact on Action Area geology, geomorphology, hydrology, and water quality when compared to the No Action Alternative. As a result, potential impacts from implementation of the Proposed Action to aquatic species, as well as aquatic and riparian function, within the Action Area would be similar to those under the No Action Alternative.

4.4.4 Alternative A

With the exception of the release for timber harvest of the three set-asides noted above, general timber harvesting and forest management activities would remain the same under Alternative A as in the Proposed Action. As a result, potential impacts to geology, geomorphology, hydrology, and water quality within the Action Area would be similar. Release of the three set-aside areas under Alternative A may create some potential insignificant adverse impacts to these resources in the Action Area by virtue of being available for timber harvest under this alternative, and because all three set-asides contain Class I, Class II, or Class III watercourses.

4.4.5 Cumulative Impacts—Aquatic Resources

The purpose of this cumulative impact assessment is to evaluate the potential effects of the Proposed Action and Alternative A on aquatic species and aquatic and riparian function. The assessment of potential cumulative impacts on aquatic resources was conducted using the approach described in Section 4.1.2, Cumulative Impacts Analysis.

4.4.5.1 Impacts Associated with Other Actions

The conservation measures specific to the northern spotted owl and other wildlife species for the PALCO HCP and the NWFP, together with prohibitions on timber harvesting on Federal and State Park lands and implementation of conservation measures contained in Green Diamond's AHCP/CCAA, will collectively serve to minimize the risk of hillslope mass wasting and to hydrologic and water quality conditions and processes with potential to impact aquatic species, as well as aquatic and riparian function. On the other hand, continued USFWS consultation and coordination with tribal representatives and other

landowners in the region who do not have existing HCPs may not necessarily minimize the potential for impacts to geologic, hydrologic and water quality conditions and processes, and, by extension, impacts to aquatic species and aquatic/riparian function. Some of these potential effects, such as those associated with timber harvest, may be minimized as a result of tribal consultations with NMFS (through the Bureau of Indian Affairs), when a tribal activity may adversely affect listed salmonids. A slightly greater, albeit not significant, potential for impacts to aquatic species, as well as aquatic and riparian function, exists on these lands compared to lands where HCP or NWFP conservation measures provide additional protections.

4.4.5.2 Cumulative Impacts Associated with the Proposed Action and Alternative A

Overall, it is anticipated that the cumulative effect of implementing all of the resource management programs described in Section 4.1.2.3 will collectively serve to minimize the risk to aquatic species and aquatic and riparian function on Green Diamond, PALCO, and Federal lands within the 11 HPAs. As noted in Sections 4.2.3 and 4.2.4 above, implementation of the Proposed Action or Alternative A also would not result in significant adverse impacts to geomorphology, hydrology, and water quality. Similarly, it follows that implementation of the Proposed Action or Alternative A would not result in significant incremental adverse impacts to aquatic species and aquatic/riparian function.

4.5 Vegetation/Plant Species of Concern

The purpose of this Section is to evaluate the potential impacts of implementing the Proposed Action, Alternative A, and the No Action Alternative as they relate to vegetation and plant species of special concern. Growth projections indicate that under the current management regime, forest trends on the Green Diamond ownership will lead to increased tree age class and size, as well as increased total acreage with dense canopy closure.

The timing of past harvesting activity over the Green Diamond ownership has resulted in a current mosaic of age classes dominated by forests types less than 60 years old, with approximately 85 percent of the ownership supporting forests in these age classes. Twelve percent of the property is in forest types 60 years old or older. The proportion of the area in these older age classes is expected to remain at this level or increase over the remaining term of the NSO HCP permit for two reasons:

- CFPR adjacency constraints that are applied to even-aged harvesting units result in retention of many stands far past planned rotation age. If harvesting of a tract of mature timber is initiated around age 50, the harvesting of much of that tract will be constrained into the following decade, and the harvest of a few stands will be constrained past 70 years of age. This effect has been demonstrated in Green Diamond's long term operating plan (i.e., Option (a) document).
- Current rules and regulations, interacting with provisions of the NSO HCP, result in harvesting restraints or prohibitions on approximately 12 percent of the Action Area.

4.5.1 Methodology

The assessment for vegetation and plant species of concern is based on data collected and documented in the affected environment discussion of vegetation and plant species of special concern (see Section 3.5, Vegetation/Plant Species of Concern), widely accepted ecological principles of natural succession, and the latest understanding of forest succession in managed timberlands. A key premise of this assessment is that nonriparian lands under all the alternatives would be managed in accordance with existing regulations, other applicable laws, Green Diamond's NSO HCP, and Green Diamond operational policies and guidelines. The assessment focuses on habitat type, vegetation structure, and canopy closure for each of the alternatives. As discussed in Section 3.5, habitat types for vegetation are based on the California Wildlife Habitat Relationships (CWHR) System (Mayer and Laudenslayer, 1988). The CWHR classification identifies habitat type, size class, and canopy-cover class. In this EA, the CWHR classification system is applied in the context of continued management of Green Diamond's timber resources to achieve maximum sustained production (MSP) of high-quality timber products (see Sections 1.5.4.1 and 1.6.3). The CWHR system is used in this analysis to identify potential changes to habitat type within Green Diamond's ownership and to compare existing conditions with future vegetative habitat conditions. The assessment in this Section is the basis for assessing impacts to the northern spotted owl (Section 4.6) and other wildlife species (Section 4.7).

4.5.2 No Action Alternative

4.5.2.1 General Effects

In the context of Green Diamond's Option (a) document, changes to habitat type (i.e., species composition), size class, and canopy-cover class can occur on an individual harvest-unit basis. Size class and canopy closure within an individual timber harvest unit could change depending on the extent of timber harvesting conducted. This could occur both in upland areas (where even-aged management is applied) and in riparian areas (where selective harvest is conducted). Species composition in individual harvest units, however, is not anticipated to change because areas are not CWHR-reclassified on the basis of timber harvesting. For example, when a montane hardwood/conifer forest is harvested, it retains its CWHR-assigned classification as a montane hardwood/conifer forest. Only the size class and canopy-cover class would change. This example applies to all the forest types described in Section 3.5, Vegetation/Plant Species of Concern.

4.5.2.2 Effects in Upland Areas

As stated in Green Diamond's Option (a) document, timber stands in upland (non-riparian) areas on the Green Diamond ownership are considered ready for harvest once they enter the 50-year age class. State law, however, constrains both the size of even-aged harvest units and the timing of adjacent even-age harvesting operations. As a result, many stands may not be harvested until they reach the 70-year age class. The estimated average age of stands harvested is expected to be approximately 55 years as the property approaches full "regulation."

4.5.2.3 Riparian Management Effects

The timber harvesting cycle within riparian corridors, where uneven-age management is predominately practiced, is generally between 10 and 50 years. Under the No Action Alternative, the potential for changes in species composition, size class, and canopy-cover class would be most evident in the riparian areas where complete stand replacement prescriptions, typical of the more upland areas, do not exist and individual tree selection and harvesting practices result in heavier emphasis on mid- to late-seral-stand development.

Historically, uneven-aged timber management within the Action Area has focused on WLPZs, water supply areas, visually sensitive road corridors, nest sites of selected bird species, and residential property lines. Throughout much of the Action Area, management practices that occurred prior to implementation of the CFPRs in 1973 emphasized removal of most large conifers from the riparian zone. Before the CFPRs were implemented, decades of timber harvesting in the riparian zone altered the species composition and age classes of trees along stream channels. The removal of valuable conifer species from riparian zones led to the establishment and later predominance of early successional hardwood species, such as alders and willows, during this period.

Existing regulations, while allowing harvesting in riparian areas, provide guidelines that are designed to promote riparian stand diversity and enhance aquatic habitats. Under the No Action Alternative, these regulations and guidelines provide for retention of a variety of tree sizes (height and diameter) and species within RMZs, with priority given to wildlife habitat trees. Under the No Action Alternative, therefore, riparian areas would trend towards a stand composition comprised of a greater number of mature trees. Also, more conifers would be maintained compared to existing conditions, where mostly hardwoods currently exist in riparian areas.

The No Action Alternative is expected to provide the conditions in which a greater number of large trees could be present, over time, in riparian areas in the Action Area. These conditions indicate an overall trend toward development of a greater number of large trees within riparian areas. Vegetation management activities in riparian areas would be expected to remain relatively unchanged from existing timber-harvesting practices, and similar species compositions would be retained.

4.5.2.4 Listed Plant Species and Other Plant Species of Concern

Under the No Action Alternative, Green Diamond would continue to exercise the precautions necessary to comply with the prohibitions on take of listed plants. Take of Federally listed plants is not prohibited under the ESA on non-Federal lands, unless take prohibitions under State law exists. Green Diamond 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), Green Diamond's own Plant Protection Program, and other measures identified during the THP preparation and review process. Existing regulations require that THPs include measures to avoid or minimize potential adverse impacts to listed plant species and other species of concern (if they occur) to a level of insignificance.

Green Diamond's Plant Protection Program (Green Diamond, 2001) is a three-tiered program that is based on an ongoing agreement with CDFG. Under Phase I of the agreement, Green Diamond avoids all listed plants/plant species of concern (referred to as "sensitive plants") or their habitats within THP project areas. Under Phase II of the agreement (currently being implemented by Green Diamond), Green Diamond surveys for sensitive plants in accordance with protocols approved by CDFG. Plant surveys are conducted in advance of operations within a project area or a generally larger area if specific project area boundaries are unknown. If the surveys indicate that sensitive plants do not exist within the project area, Green Diamond is allowed to initiate timber harvesting and related activities even if sensitive plant habitats are present. When plants are found, Green Diamond further consults with CDFG to determine appropriate site-specific mitigation for those plants that are incorporated into THPs, as necessary. If surveys are not possible due to project planning and timing, Green Diamond avoids sensitive plants and their habitats as provided under the Phase I portion of the agreement. Phase III plant protection measures, still under discussion with CDFG, would provide for development of a more comprehensive, long-term strategy for the entire ownership that will likely incorporate surveys for sensitive plants, impact avoidance and risk minimization measures, and monitoring. The suite of Phase III protection measures will be based on site-specific data collected during Phase II surveys. Green Diamond's botanist has responsibility for implementing the program, and training is provided to Green Diamond foresters on sensitive plant and habitat recognition. The Plant Protection Program is applied on all projects that are THP-related.

As described in Section 3.5.3, Plant Species of Concern, rare plant species were identified using a February 2006 query of the CNDD for species occurring within the 11 HPAs. Species identified as occurring within this area may, in fact, be located outside of the NSO HCP Action Area boundaries. Three plant species listed as Federal- or State-endangered occur within the 11 HPAs: beach layia (*Layia carnosa*), Kneeland Prairie penny-cress (*Thlaspi californicum*), and western lily (*Lilium occidentale*). Beach layia is a resident of coastal dune habitats and is unlikely to be found on the Green Diamond ownership. Kneeland Prairie penny-cress occurs locally on a single serpentine outcrop, and is not found on the current Green Diamond ownership. Western lily is not known to occur on Green Diamond lands, and is primarily associated with wetland habitats that are protected from forestry activities under the CFPRs. These circumstances minimize potential effects within the habitat associations for western lily, if it is found in the Action Area.

Table 4.5-1 presents: (1) a list of the rare plant species known to occur or likely to occur within the 11 HPAs and the Green Diamond ownership; (2) their habitat association; and (3) a summary of potential impacts associated with the No Action and other alternatives. For all species and all alternatives, either no impacts would occur or the impacts would be minimal and, therefore, less than significant. In addition, many of the species' habitats (e.g., coastal prairies, wetlands) would not be disturbed by Green Diamond's activities or would be disturbed only incidentally; changes to these habitats are anticipated to be negligible over time.

TABLE 4.5-1
Plant Species of Special Concern—Habitat Association and Potential Impacts

Species	Habitat Associations	Impacts
Listed Species		
Western lily <i>Lilium occidentale</i>	Early successional bogs, fens, coastal scrub, and prairie, on poorly-drained soils, within about 4 miles of coast	None. Timber harvesting not allowed on bogs, fens, coastal scrub, and prairie habitats. Special protections for wetland areas in existing regulations. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Nonlisted Species of Concern		
Bald Mountain milk-vetch <i>Astragalus umbraticus</i>	Cismontane woodland, lower montane coniferous forest	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Bensoniella <i>Bensoniella oregana</i>	RIV, meadows, bogs, fens, coniferous forests	None. Not likely to occur in timberlands; mostly associated with wetlands. Special protections in existing regulations for habitat associations.
Bolander's reed grass <i>Calamagrostis bolanderi</i>	Bogs, fens, marshes, meadows, closed-cone conifer forest, coastal scrub	None. Incidental and less-than-significant disturbance possible in forest areas. Special protections in existing regulations for meadows and seeps. Other potential impacts mitigated through adherence to general protection measures contained in existing regulations.
California pinefoot <i>Pityopus californicus</i>	Broad-leaved upland forest, lower montane coniferous forest, north coast coniferous forest, upper montane coniferous forest	None. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
California pitcher plant <i>Darlingtonia californica</i>	Sphagnum bogs, seeps, and along trickling streams	None. Incidental and less-than-significant disturbance possible in forest areas. Special protections in existing regulations for meadows and seeps. Other potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Coastal triquetrella <i>Triquetrella californica</i>	Coastal bluff scrub, coastal scrub	None. No timber harvesting in habitat areas; incidental and less-than-significant disturbance possible. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Coast checkerbloom <i>Sidalcea oregana</i> ssp. <i>eximia</i>	Meadows and seeps, coniferous forests	None. Incidental and less-than-significant disturbance possible in forest areas. Special protections in existing regulations for meadows and seeps. Other potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Coast fawn lily <i>Erythronium revolutum</i>	Moist areas and streambanks within bogs and fens	None. Incidental and less-than-significant disturbance possible in forest areas. Special protections in existing regulations for meadows and seeps. Other potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Del Norte buckwheat <i>Eriogonum nudum</i> var <i>paralinum</i>	CSC, PGS, open places along immediate coast	None. No timber harvesting in habitat areas (PGS and CSC); incidental and less-than-significant disturbance possible. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Flaccid sedge <i>Carex leptalea</i>	Meadows, bogs, fens, marshes and swamps	None. Not likely to occur in timberlands; mostly associated with wetlands. Special protections in existing regulations for habitat associations.

TABLE 4.5-1
Plant Species of Special Concern—Habitat Association and Potential Impacts

Species	Habitat Associations	Impacts
Great Burnet <i>Sanguisorba officinalis</i>	Marshes, swamps, bogs, fens, seeps, RIV, meadows, broad-leaved and coniferous forests	None. Not likely to occur in timberlands; mostly associated with wetlands. Special protections in existing regulations for meadows, marshes, and other wetland areas. Other potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Henderson's fawn lily <i>Erythronium hendersonii</i>	Coniferous forests	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Howell's jewel flower <i>Streptanthus howellii</i>	Coniferous forests	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Howell's montia <i>Montia howellii</i>	Vernally wet sites, coniferous forest	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Howell's sandwort <i>Minuartia howellii</i>	Chaparral, Jeffrey-pine/oak woodland, serpentine	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Indian pipe <i>Monotropa uniflora</i>	Often associated with redwoods and western hemlock; broad-leaved and coniferous forests	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Kellogg's lily <i>Lilium kelloggii</i>	Openings, disturbed areas in redwood and yellow pine forests	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Koehler's stipitate rock cress <i>Arabis koehleri</i> var. <i>stipitata</i>	Chaparral, coniferous forests	Less than significant. Broad range of habitats. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Lakeshore sedge <i>Carex lenticularis</i> var. <i>limnophila</i>	Wetlands, meadows	None. Not likely to occur in timberlands; mostly associated with wetlands. Special protections in existing regulations for habitat associations.
Leafy-stemmed miterwort <i>Mitella caulescens</i>	North coast and lower montane coniferous forest, broad-leaved upland forest, meadows	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Longbeard lichen <i>Usnea longissima</i>	North coast coniferous forest, and broad-leaved upland forest	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Mad River fleabane daisy <i>Erigeron maniopotamicus</i>	Meadows and seeps, open disturbed areas (road cuts); rocky areas	None. Incidental and less-than-significant disturbance possible in forest areas. Special protections in existing regulations for meadows and seeps. Other potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Maple leaved checkerbloom <i>Sidalcea malachroides</i>	Coastal woodlands and clearings, often in disturbed areas. CSC, PGS, broad-leaved and coniferous forests	Less than significant. CSC and PGS not harvested, and little disturbance in broad-leaved forest types. Broad range of habitats. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.

TABLE 4.5-1
Plant Species of Special Concern—Habitat Association and Potential Impacts

Species	Habitat Associations	Impacts
Marsh pea <i>Lathyrus palustris</i>	PGS, CSC, bogs, fens, marshes, swamps, coniferous forests	None. CSC, PGS, and wetlands not harvested. Broad range of habitats. Special protections in existing regulations for wetland areas. Other potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Marsh violet <i>Viola palustris</i>	CSC, bogs and fens	None. CSC and wetlands not harvested. Special protections in existing regulations for bogs and fens.
Meadow Sedge <i>Carex praticola</i>	Moist to wet meadows	None. Mostly associated with wetlands. Meadow and wetland protections in existing regulations.
Nodding semaphore grass <i>Pleuropogon refractus</i>	Meadows, wetlands, riparian	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Northern clustered sedge <i>Carex arcta</i>	Bogs and fens, moist places in north coast coniferous forest	None. Special protections in existing regulations for bogs and fens.
Oregon coast Indian paintbrush <i>Castilleja affinis</i> ssp. <i>litoralis</i>	Coastal bluff scrub, coastal dunes, coastal scrub	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Oregon fireweed <i>Epilobium oreganum</i>	Bogs, fens, meadows, coniferous forests	Less than significant. Species mostly associated with wetlands. Wetland and meadow protections in existing regulations. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Pacific gilia <i>Gilia capitata</i> ssp. <i>pacifica</i>	Coastal bluff scrub, chaparral, coastal prairie Valley and foothill grassland	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Robust false lupine <i>Thermopsis robusta</i>	Broad-leaved and coniferous forests	Less than significant. Little disturbance in broad-leaved forests. Broad range of habitats. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Running pine <i>Lycopodium clavatum</i>	Moist areas, marshes and swamps, coniferous forests	None. Species mostly associated with wetlands. Wetland protections in existing regulations. Other potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Seacoast ragwort <i>Senecio bolanderi</i> var. <i>bolanderi</i>	Coastal scrub, north coast coniferous forest	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Serpentine catchfly <i>Silene serpicicola</i>	Chaparral, lower montane coniferous forest/serpentinite openings	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Serpentine sedge <i>Carex serpicicola</i>	Meadows and seeps, serpentinite	None. Incidental and less-than-significant disturbance possible in forest areas. Special protections in existing regulations for meadows and seeps. Other potential impacts mitigated through adherence to general protection measures contained in existing regulations.

TABLE 4.5-1
Plant Species of Special Concern—Habitat Association and Potential Impacts

Species	Habitat Associations	Impacts
Siskiyou checkerbloom <i>Sidalcea malviflora</i> ssp. <i>patula</i>	Coastal bluff scrub, coastal prairie, and north coast coniferous forest	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Siskiyou false hellebore <i>Veratrum insolitum</i>	Stream banks, moist meadows	None. Incidental and less-than-significant disturbance possible in forest areas. Special protections in existing regulations for meadows and seeps. Other potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Small ground cone <i>Boschniakia hookeri</i>	Coniferous forests	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Sonoma manzanita <i>Arctostaphylos canescens</i> ssp. <i>Sonomensis</i>	Chaparral, coniferous forests	Less than significant. Broad range of habitats. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Sugar scoop; lace flower <i>Tiarella trifoliata</i> var. <i>trifoliata</i>	Lower montane coniferous forest, north coast coniferous forest	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Suksdorf's wood sorrel <i>Oxalis suksdorfii</i>	Broad-leaved upland forest, north coast coniferous forest	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Trailing black currant <i>Ribes laxiflorum</i>	Redwood forest	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.
Vanilla grass <i>Hierochloe odorata</i>	Meadows and seeps	None. Incidental and less-than-significant disturbance possible in forest areas. Special protections in existing regulations for meadows and seeps. Other potential impacts mitigated through adherence to general protection measures contained in existing regulations.
White-flowered rein orchid <i>Piperia candida</i>	Coniferous and mixed evergreen forest	Less than significant. Potential impacts mitigated through adherence to general protection measures contained in existing regulations.

CSC = Coastal Scrub

LAC = Lacustrine

PGS = Perennial Grassland

RIV = Riverine

WTM = Wet meadow

4.5.3 Proposed Action

4.5.3.1 General Effects

Because timber harvesting, forest management activities, as well as most NSO HCP conservation measures, under the Proposed Action would be similar to those of the No Action Alternative, potential effects on vegetation and plant species of concern and their habitats within the Action Area would be the same as described above for the No Action Alternative (see Section 4.5.2). The amount of habitat 46 years old or greater would continue to increase over the remainder of the permit period.

As with the No Action Alternative, the Proposed Action would provide for implementation of measures contained in the NSO HCP that could result in long-term beneficial effects on wildlife species associated with mid- to late-seral habitat types (see Section 4.7, Terrestrial Habitat/Wildlife Species of Concern). As described above for the No Action Alternative, only a small proportion of the trees within WLPZs would be harvested under the Proposed Action; those that remain would continue to mature, following removal of adjacent upland stands. The Proposed Action would permit timber harvest activities at eight additional spotted owl sites, thereby reducing the amount of older forest in these areas below the “no-take” habitat thresholds for owl sites, as defined in the NSO HCP. Apart from the authorized incidental take of those spotted owl pairs, the additional timber harvest at these sites would otherwise be subject to the management practices and regulatory requirements as described for the No Action, relative to Federal- and State-listed species, and to other species. This harvest would be dispersed over space and time in a manner such that it would represent a minimal annual increase in the amount of forest entering younger age classes, and a minimal annual decrease in the amount of forest in older age classes. In the context of Green Diamond’s ownership, the additional area subject to harvest as a result of the eight additional incidental takes would not result in any significant impact to vegetation or plant species of concern. Timber harvest at eight additional NSO nest sites would result in short-term impacts to 1,864 acres, which represent 0.5 percent of the Action Area. This represents a worst-case scenario; the actual effect is expected to be offset, at least in part, by reduced harvest elsewhere on the ownership.

4.5.3.2 Listed Plant Species and Other Plant Species of Concern

The impacts described for beach layia, Kneeland Prairie pennycress, and western lily would be the same under the Proposed Action as those described for the No Action Alternative. Under the Proposed Action, Green Diamond would continue to minimize adverse effects on listed plants and plant species of concern, including continuing to adhere to measures contained in the CFPRs (special protections afforded to meadows and wetlands), Green Diamond’s own Plant Protection Program, and other measures identified during the THP preparation and review process.

4.5.4 Alternative A

Because timber harvesting, forest management activities, and most NSO HCP conservation measures under Alternative A would be similar to those under the No Action Alternative and the Proposed Action, potential effects on vegetation and plant species of concern and their habitats within the Action Area would be similar to those described above for the No

Action Alternative. The amount of habitat 46 years old or greater would continue to increase over the remainder of the permit period. Timber harvest around eight additional NSO nest sites (up to 1,864 acres) and within the three set-asides (up to 903 acres) would occur on up to 2,767 acres, which represents about 1.2 percent of current NSO habitat on the Green Diamond ownership. As discussed for the Proposed Action (see Section 4.5.3.1), this is a worst-case scenario.

Release of the three set-aside areas under Alternative A may create some potential insignificant adverse impacts to these resources in the Action Area because the areas will be available for timber harvest under this alternative. However, Green Diamond 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), Green Diamond's own Plant Protection Program, and other measures identified during the THP preparation and review process. Existing regulations require that THPs include measures to avoid or minimize potential adverse impacts to listed plant species and other species of concern (if they occur) to a level of insignificance.

4.5.5 Cumulative Impacts—Vegetation/Plant Species of Concern

The assessment of potential cumulative impacts on vegetation and plant species of concern was conducted using the approach described in Section 4.1.2, Cumulative Impacts Analysis.

As noted in the previous impact discussions in this Section, growth projections indicate that under the current management regime, forest trends in the Green Diamond ownership will lead to increased age class and size, as well as increased total acreage with dense canopy closure. Changes in habitat type, size class, and canopy-cover class would be most evident in the riparian areas.

Although certain minimal habitat disturbances are anticipated to occur, no significant impacts to listed plant species or other plant species of concern are expected. Under all alternatives, including No Action, the Proposed Action, and Alternative A, Green Diamond would continue to exercise the precautions necessary to comply with the prohibitions on take of listed plants and would continue to minimize potential adverse effects on listed plants.

4.5.5.1 Impacts Associated with Other Actions

Under Green Diamond's AHCP/CCAA, only a small proportion of the trees within RMZs would be harvested; those that remain would continue to mature, following removal of adjacent upland stands. Trees in the RMZs would age throughout the term of the AHCP/CCAA. Also, conservation measures associated with Green Diamond's AHCP/CCAA and the PALCO HCP are designed to avoid, mitigate, or reduce potential adverse impacts to plant species of concern by requiring surveys and implementing site-specific measures developed under consultation with CDFG and/or USFWS as appropriate. These measures augment existing regulatory protections for listed plant species and plant species of concern. Continued implementation of the CFPRs on commercial timberlands and comparable measures on tribal timberlands, within the 11 HPAs where HCPs do not currently exist would result in a more varied vegetation mosaic over the landscape trending toward development of a greater number of mid- and late-seral forest types, especially in riparian areas. Continued implementation of the CFPR measures designed to protect riparian vegetation and avoid impacts to occupied marbled murrelet and bald eagle habitat

would provide the conditions in which a greater number of large trees could become present, over time, in riparian areas that overlap with murrelet and bald eagle habitat in the Action Area. Vegetation management activities in riparian areas would be expected to remain relatively unchanged from existing timber-harvesting practices, and similar species compositions would be retained. On non-Green Diamond timberlands, continued implementation of measures contained in the CFPRs (special protections afforded to meadows and wetlands) and other measures identified during the THP preparation and review process would minimize potential adverse impacts to listed plants and other plant species of concern to a level of insignificance.

The NWFP is based on an ecosystem approach to conservation of natural resources and includes wide, fixed-width riparian buffers prior to a completed watershed analysis and provides a wide range of benefits to many listed and unlisted plant species and their habitats. Current benefits to vegetation resources and plant species in those HPAs where Federal agencies are the predominant land managers would be expected to continue into the future.

Resource management strategies in lands administered by the State of California and the National Park Service generally allow no commercial timber harvesting; although thinning of some timber stands may occur occasionally for stand improvement purposes. The low-level of active land management practices within park lands may result in a certain homogenization of upslope forest vegetation types over time, where the trend would be promotion of late-seral forests and associated shade-tolerant tree species.

Overall, the combined cumulative effect of these resource management programs would be a trend toward development of a greater number of mid- to late-seral forest stands within the 11-HPA assessment area, beyond currently existing levels. Impacts to plant species of concern would be less than significant.

4.5.5.2 Cumulative Impacts Associated with the Proposed Action and Alternative A

As noted in Sections 4.5.3 and 4.5.4 above, implementation of the Proposed Action or Alternative A would result in increased age class and size, as well as increased total acreage with dense canopy closure, in riparian and upland forest areas throughout the Green Diamond ownership within the 11 HPAs. These trends will serve to improve conditions for the northern spotted owl. In addition, Green Diamond would continue to minimize adverse effects on listed plants and plant species of concern by continuing to adhere to measures contained in the CFPRs (special protections afforded to meadows and wetlands), Green Diamond's own Plant Protection Program, and other measures identified during the THP preparation and review process. In combination with the other resource management programs described above in Section 4.5.5.1, implementation of the Proposed Action or Alternative A would result in insignificant impacts to vegetation and plant species of concern.

4.6 Northern Spotted Owls

The purpose of this Section is to evaluate the potential impacts of implementing the Proposed Action, Alternative A, and the No Action Alternative on the northern spotted owl.

4.6.1 Methodology

The assessment for northern spotted owls is based on information in the *Green Diamond Resource Company Northern Spotted Owl Habitat Conservation Plan Phase One Comprehensive Review* (Green Diamond, 2006a); data collected and documented in the Affected Environment discussion for the species (Section 3.6 of this EA); widely accepted ecological principles of natural succession; and information provided in the following three major northern spotted owl evaluations and status reviews: *Status and Trends in Demography of Northern Spotted Owls* (Anthony et al., 2004, 2006), *Scientific Evaluation of the Status of the Northern Spotted Owl* (Courtney et al., 2004), and *A Conservation Strategy for the Northern Spotted Owl* (Thomas et al., 1990). A key premise of this assessment is that nonriparian lands under all the alternatives would be managed in accordance with existing regulations, other applicable laws, Green Diamond's NSO HCP, and Green Diamond operational policies and guidelines.

The analysis of the northern spotted owl alternatives focuses on four types of effects:

- Effects related to projected habitat changes
- Effects related to the rate of northern spotted owl population change
- Effects at the local Green Diamond population level
- Effects at the northern spotted owl physiographic province level

Unavoidable overlap among the various discussions of these effects is addressed in the most appropriate location of this EA Section.

Expected habitat changes within certain riparian zones and implications for the northern spotted owl would be the same for all alternatives because the riparian conservation measures described in Chapter 2 of this EA for the No Action Alternative also apply to the Proposed Action and Alternative A. The assessment of impacts related to upland northern spotted owl habitat focuses on the effects of the projected changes in the distribution of northern spotted owl habitat age-classes among the alternatives. The assessment of impacts related to northern spotted owl demographic performance and trends on Green Diamond lands focuses on potential effects of incidental take on λ (lambda, the rate of population change) at present and in the future. Relationships between the reported demographic performance and trends and potential northern spotted owl use of the observed and projected increasing area of suitable habitat are also addressed.

The assessment area for conducting the cumulative impact assessment for the northern spotted owl is the California Coast Physiographic Province, as described in Section 3.6.2.7.

4.6.2 No Action Alternative

Under the No Action Alternative, Green Diamond would continue to comply with measures contained in its 1992 NSO HCP and associated Implementation Agreement. The measures provide for the legal incidental take of northern spotted owls in connection with timber

harvesting and management operations, including the authorized incidental take of up to 50 owl pairs. To date, 46 northern spotted owl pairs have been taken by displacement, leaving a balance of four owl pairs that can be taken under the current permit.

4.6.2.1 Effects Related to Projected Habitat Changes

Riparian Zones. Growth projections indicate that under the current management regime, forest trends on the Green Diamond ownership will lead to an increase in acreage of the 31 to 45 year and 46+ year age classes, as well as increased total acreage with dense canopy closure. Further, current rules and regulations, interacting with provisions of the NSO HCP, result in harvesting restraints or prohibitions on approximately 12 percent of Green Diamond's ownership in the Action Area. These trends and harvesting prohibitions would provide minor benefits to northern spotted owls. Managed riparian areas will provide improved movement corridors for northern spotted owls as they mature. The edge between these older riparian forests and adjacent younger forest stands may provide improved foraging conditions for spotted owls (Franklin et al., 2000, McDonald et al., 2006). This topic is addressed below in more detail under *Potential Effects of Projected Changes in Habitat*.

Upland Areas. There was a net increase of over 55,000 acres in the 31 to 45 years and 46+ years age classes between 1992 and 2002 and additional areas of suitable habitat will develop in the future up to 2022 (see Table 3.6-2).

Another consideration is the age distribution of stands within the 46+ age class. Northern spotted owls are known to prefer the characteristics of structurally complex older forests for roosting and nesting (Thomas et al., 1990), including older, second-growth forests in northwest California (Folliard, 1993). If the current population is limited by the amount of suitable habitat, future increases in the area of suitable habitat would benefit the Green Diamond northern spotted owl population. If the current population is limited by the quality of suitable habitat, and if quality is related to stand age within older forests, the effect of future habitat changes is less clear. Information is unavailable, such as in Green Diamond (2006a), on whether stand age within the 46+ age class is currently a factor affecting the size or demographics of the northern spotted owl population. Green Diamond (2006a) stated that 18 percent of nests occurred in stands 31 to 45 years old, 35 percent in stands 46 to 60 years old, 30 percent in stands 61 to 80 years old, 7 percent in stands 81 to 200 years old, and 10 percent in stands >200 years old. Differences in reproductive success for northern spotted owl nesting in different age stands was not presented by Green Diamond (2006a), but the above data suggests that stand age may be an important factor in nest site selection.

In the NSO HCP, Green Diamond maintained that most stands 46+ would be used by owls in the future as they are now, but recognized that this could not be guaranteed. Green Diamond therefore proposed to monitor the ages of stands in relation to their use by spotted owls so that appropriate management changes to the conservation strategy could be made, if necessary.

Conclusions from 1992 NSO HCP EA. The 1992 NSO HCP EA (USFWS, 1992a) reached several conclusions regarding the 1992 NSO HCP for Green Diamond lands. These conclusions, followed by current observations (italicized) regarding their validity in light of current northern spotted owl data, are presented below.

- “With respect to possible impacts of habitat loss, both the amount and long-term availability of potential habitat projected to result from forest maturation would benefit spotted owls in the plan area, including those displaced by timber harvesting.”

This conclusion is still appropriate and valid with regard to habitat trends, in light of projected and actual changes in suitable northern spotted owl habitat on Green Diamond lands (Tables 3.6-2 and 3.6-3).

- “The set-asides and special management area, together with the other components of the proposed conservation program, are expected to fully mitigate the possible effects of ongoing timber harvesting on spotted owls.”

This conclusion may not be entirely valid today in light of the rate of northern spotted owl population change ($\lambda_{RJS} < 1.0$) on Green Diamond lands between 1993 and 2003. A detailed discussion regarding this conclusion using currently available data follows further below.

- “The mitigation and monitoring measures, together with the other components of the proposed conservation program, are expected to fully mitigate the possible effects of ongoing timber harvesting on spotted owls. No significant adverse impacts to the local, regional, or range-wide population of spotted owls would result, and the beneficial effects of the proposed conservation program would contribute to the survival and recovery of the species.”

This conclusion also may not be entirely valid today and a thorough discussion follows below.

Potential Effects of Projected Changes in Habitat. Under No Action, the NSO population on Green Diamond and nearby lands could respond to recent (since 1992) and projected increases in suitable habitat area in several ways. Projected increases in the area of suitable northern spotted owl habitat could fully or partially offset any adverse effects of ongoing timber harvest, including authorized incidental takes, or the effect could be minimal. These outcomes could be the result of timber harvest and land management, of factors unassociated with land management, or a combination of the two.

The area of suitable northern spotted owl habitat has increased since 1992 and is projected to increase by 23,321 acres between 2002 and 2012, based on a comparison of the same land base over time (Table 3.6-2). During this time, the increase occurs in the older (46+ year) forest age class, which generally is higher quality habitat. This area of new suitable habitat could potentially support additional northern spotted owl sites, or support owls displaced by timber harvest, but it is not possible to predict the actual response by owls, without knowledge of a number of factors, as discussed below.

In northwestern California, annual survival of territorial northern spotted owls was positively associated with the amounts of interior old-growth forest and with the length of edge between those forests and other vegetation types (Franklin et al., 2000). Reproductive output was negatively associated with interior forest, but positively associated with edge between mature and old-growth conifer forest and other vegetation types. Olson et al. (2004) and Dugger et al. (2005) reported a similar relationship between the amount of old-growth forest and increased survival in southern Oregon. Both Franklin et al. (2000) and Olson et al. (2004) reported that reproductive output was positively related to the amount of early successional edge habitat. Noon and Blakesley (2006) state that the findings of these

three studies suggest that in southern Oregon and northwestern California a mixture of early-, mid-, and late-seral forests may be best for owl reproduction but that substantial amounts of old growth forest are needed for high survival rates. Noon and Blakesley (2006) summarized some general patterns that have emerged from these three studies and the recent demographic spotted owl meta-analyses as follows:

“Reproductive rates generally show extensive annual variation that is strongly related to climate variation. In contrast, annual survival rates show little temporal variation, but the spatial variance component is most strongly related to the amount of old growth forest within the vicinity of the nest or primary roost site.”

Besides providing more suitably-aged forest habitat for owls, the increased area of older forest under No Action may promote higher annual northern spotted owl survival rates (Franklin et al., 2000; Olson et al., 2004; and Dugger et al., 2005). However, spatial data to allow comparisons of the patch size and configuration of the old-growth and mature forest stands studied by others (Franklin et al., 2000; Olson et al., 2004; Dugger et al., 2005) with those projected to occur on Green Diamond lands are not available. In addition, it is not known whether spotted owls in coastal managed forests utilize forest structure in the same manner as spotted owls in more interior, less managed forests, as studied by the authors cited above. Therefore, while research indicates that annual survival may increase as the area of older forest stands increases, it is premature to draw a definitive conclusion regarding possible changes in northern spotted owl survival in response to Green Diamond forest management practices.

Green Diamond’s management will also result in a higher degree of habitat heterogeneity, that will result from a mixture of early-, mid-, and late-seral forests and relatively large amounts of edge habitat between forest stands of different ages. Based on the studies discussed above, the increasing amount of older forest and heterogeneous stand conditions on Green Diamond’s lands would be expected to be good for foraging and reproduction. As noted above, it is speculative to assume that spotted owls in coastal managed forests utilize forest structure in the same manner as spotted owls in more interior largely unmanaged forests. Studies done on Green Diamond’s land indicated that dusky-footed woodrats, the primary prey of spotted owls in this area, increased rapidly in young regenerating stands (Hamm, 1995 and Hughes, 2006). A similar pattern of high prey populations in younger stands has been reported for the more interior study areas of Franklin et al. (2000) and Olson et al. (2004), but the actual rate of stand and prey population development likely varies among these regions.

The studies by Franklin et al. (2000) and Olson et al. (2004) suggest that high quality NSO habitat represents a balance between older forest and large amounts of forest edge, in a diverse mosaic with small patches of younger forest with convoluted edges, dispersed within and around a main patch of mature and old-growth forest. They suggested that dispersed patches of different vegetation types and seral stages within a matrix of mature and old-growth forest may provide a stable prey resource that buffers against the effects of climate on prey populations, and hence, spotted owls. Dugger et al. (2005), on the other hand, concluded that their findings, from a more interior study area, provided more evidence for the importance of older forest habitats on both northern spotted owl reproductive success and apparent survival.

Based on the studies discussed above, the relationship between habitat heterogeneity and owl productivity depends on habitat types, habitat patch sizes, and the juxtaposition of patches of various ages. Specific data regarding these habitat attributes, and how prey species respond to them, are not available for comparisons among the areas studied by Franklin et al. (2000), Olson et al. (2004) on Green Diamond lands, although radiotelemetry research on Green Diamond lands (McDonald et al. 2006) indicated a habitat use pattern consistent with the findings of Franklin et al. (2000). Therefore, while increasing older forest and high habitat heterogeneity has the potential of improving owl productivity, and ultimately λ , it is not possible to estimate the specific effects of Green Diamond's ongoing forest management on future northern spotted owl population sizes and demographics.

Demographic Trends. Table 4.6-1 lists the estimated λ_{RJS} for 13 northern spotted owl populations in Washington, Oregon, and California. Green Diamond (2006b) summarized current information regarding regional northern spotted owl populations. They indicate that:

“Based on recent genetics studies (Haig et al., 2001 and Haig et al., 2004) and documented movements of spotted owls within and outside the Green Diamond spotted owl study area (Green Diamond, 2006a), the northern spotted owls within the study area are a functional part of the northern spotted owl population within coastal California extending north throughout the Klamath Province and into southern Oregon as far north as approximately Roseburg.”

TABLE 4.6-1

Estimated Rate of Population Change for Northern Spotted Owls (λ_{RJS}), with Standard Error and 95% Confidence Interval (after Anthony et al. 2004, Table 22, and summary by Courtney et al. 2004)

Study Area	(λ_{RJS})	SE	95% CI	
			Lower	Upper
Washington				
Wenatchee	0.917	0.018	0.882	0.952
Cle Elum	0.938	0.019	0.901	0.976
Rainier	0.896	0.055	0.788	1.003
Olympic	0.956	0.032	0.893	1.018
Oregon				
Coast Ranges	0.968	0.018	0.932	1.004
H. J. Andrews	0.978	0.014	0.950	1.005
Warm Springs	0.908	0.022	0.866	0.951
Tyee	1.005	0.019	0.967	1.043
Klamath	0.997	0.034	0.930	1.063
South Cascades	0.974	0.035	0.906	1.042
California				
NW California	0.985	0.013	0.959	1.011
Hoopa	0.980	0.019	0.943	1.017
Green Diamond	0.970	0.012	0.947	0.993

Source: Table 4.3 from Green Diamond (2006a).

The estimates of λ_{RJS} listed in Table 4.6-1 represent 13 demographic study areas of northern spotted owls throughout Washington, Oregon, and California. While the three demographic study areas in northwest California do not necessarily represent demographic characteristics throughout the entire region, they represent the best available data for the analysis area.

The best available data indicate that northern spotted owls are well distributed throughout most of northwestern California (see Figure 4.6-1), clearly indicating that Green Diamond owls are not an isolated population. Also, there is the potential for extensive movement of spotted owls throughout the region, particularly during the dispersal of juvenile owls. Green Diamond (2006c) reported dispersal distances ranged from 0.5 to 93 miles, with a mean of 7.7 miles for 138 juvenile males. One hundred twenty-seven juvenile females dispersed an average of 10.3 miles, with a range of 0.8 to 87.4 miles. Diller (2006) indicated that both juvenile immigration and emigration are occurring between Green Diamond and surrounding lands, and these movements are generally reciprocal.

The dispersal of owls into Green Diamond lands from adjacent habitat could provide demographic support for Green Diamond owl numbers, particularly if immigrants reproduce successfully. Data on the net effect of immigration/emigration are not available, but have a sustained effect on Green Diamond owls, immigration would require growing populations regionally. Currently, this is not the case, as λ is below 1.0 for the three demographic study areas in the region – Hoopa, Northwest California, and Green Diamond.

4.6.2.2 Effects Related to the Rate of Northern Spotted Owl Population Change

As described in Section 3.6, data from Green Diamond lands indicate that the population of northern spotted owls was apparently stable or increasing until the late 1990s, when the population appeared to begin a slight downward trend. For the period from 1993 through 2003, the estimated rate of northern spotted owl population change (λ_{RJS}) on Green Diamond land was 0.970 (SE = 0.012), slightly lower, but not statistically different from the two nearby study areas (Table 4.6-1). The 95 percent confidence interval for λ_{RJS} did not include 1.0 for Green Diamond lands, indicating that this rate of change was statistically below that of a stable population and providing evidence that the population was declining from 1993 to 2003 (Green Diamond, 2006a).

Conditions Affecting Rate of Population Change. The slight downward trend in λ_{RJS} for the northern spotted owl population on Green Diamond lands between 1993 and 2003 occurred during a period when the following conditions were in place:

- Area of suitable-aged forest was projected to increase between 1990 and 2003 (Table 3.6-1)
- Area of suitable-aged forest actually increased by over 55,000 acres between 1992 and 2002 (Table 3.6-2)
- Number of incidental takes (displacements) was below the number projected and authorized during the first 16 years of the HCP

Green Diamond (2006a) discussed the direct and indirect factors that determine or may influence, respectively, the rate of population change as follows:

“The direct demographic factors that determine rate of population change (λ) are survival, fecundity and adult emigration rates. We have no data on adult emigration, but there are no known reasons to hypothesize that this may have changed during the period of study. Since survival appeared constant, this suggests that a change in fecundity was responsible for the downward trend on λ starting in the late 1990s. In the early years of the study, fecundity showed an even-odd year effect with poor years of fecundity in the odd years being offset by higher fecundity in the even years. However, starting in 1998, this pattern changed and there were three years in a row with poor nesting success. Franklin et al. (2000) demonstrated that weather, specifically cold wet spring weather, had a strong negative influence on fecundity. Although we lack site-specific weather data, weather records from Eureka, California indicated that the years 1998-2000 had average amounts of late winter and spring rainfall. Depending on the timing of spring storms (e.g., extended rainfall during the initiation of incubation), it is still possible that weather was the driving factor in the poor reproduction during this period. It was also possible that there was a region-wide decline in key prey species, but all these explanations remain highly speculative.”

Other factors that could indirectly affect survival or fecundity may include interaction and competition with barred owls, potential adverse effects of displacements authorized under the ITP, or, as yet, other unidentified factors.

The cause(s) of Northern Spotted Owl population declines from 1990 to 2003 are poorly understood (USFWS, 2005). Hypothesized reasons for decline include displacement of spotted owls by barred owls, loss of habitat to wildfire, loss of habitat to logging on State, private, and tribal lands, forest defoliation due to insects, and advancing forest succession toward climax fir communities in the absence of fire (Anthony et al., 2004). Meta-analyses of Northern Spotted Owl demographic rates have not included habitat, weather, or prey covariates.

Possible Effects of Barred Owls on Northern Spotted Owl Population. Evidence for potential competition between barred owls and northern spotted owls is based on anecdotal information on encounters between the two species. Barred owls react more aggressively towards northern spotted owls than the reverse. With respect to competitive dynamics between the two species, although uncertainties exist with the available data, the preponderance of the evidence gathered thus far is consistent with the hypothesis that barred owls are playing some role in northern spotted owl population decline, particularly in Washington and portions of Oregon and the northern coast of California (USFWS, 2004).

The most recent summary of effects of the barred owl range expansion on spotted owls is provided by Noon and Blakesley (2006). They indicate that the mechanisms of competition may be through aggressive displacement of spotted owls by barred owls or competition for similar prey species. There was apparently little evidence for an effect of barred owls on spotted owl fecundity from 1990 to 2003, but some indication of an adverse effect on spotted owl survival in three Washington study areas (Anthony et al. 2004). Noon and Blakesley

(2006) also state that because barred owls are habitat generalists, it was generally believed that spotted owls would find refuge in late-successional forests within late-successional reserves (LSRs). However, barred owls in parts of Washington reached their highest densities within LSRs not subject to timber harvest (Pearson and Livezey, 2003).

Occupancy of former spotted owl territories by barred owls has occurred on many types of land ownership including national parks, national forests and BLM lands, tribal land, State land, and timber company land (Courtney et al., 2004), including areas with timber harvest and areas not available for harvest. Anthony et al. (2004) reported few meaningful relationships between barred owl occurrence and fecundity and survival of spotted owls based on the few studies conducted to date. However, Olson et al. (2005) showed that barred owls had a negative influence on occupancy rates of spotted owls and productivity. Kelly et al. (2003) also found a significant effect on northern spotted owl site occupancy when barred owls sites were within 0.8 km. Schmidt (2005) suggested that barred owl presence within northern spotted owl territories negatively affected northern spotted owl occupancy (or survey detectability) on historical northern spotted owl sites within Redwood National and State Parks. In those parks, the number of historic and current spotted owl activity centers in which barred owls were detected has risen gradually between 1993 and 2004, concurrent with a decline in the number of spotted owls in the activity centers (Schmidt, 2005). Green Diamond (2005a) reported an increase in barred owl sites in recent years, which corresponds to a period when spotted owls sites have decreased.

It should be noted that if barred owls are influencing occupancy rates by displaced spotted owls, there would be little potential impact on estimates of spotted owl fecundity, due to the way fecundity is measured (see below, Possible Effects of Timber Harvest on Northern Spotted Owl Population). This could explain the conclusion by Iverson (2004) that northern spotted owl reproductive success was independent of barred owl presence or absence. Displacement of northern spotted owls from nest sites or established territories may not influence estimates of spotted owl fecundity, but would reduce overall productivity of the spotted owl population by reducing the number of nesting attempts or the number of young fledged. Either of these outcomes would reduce recruitment into the breeding population and ultimately the overall population size in the areas where the displacements are occurring.

Competition for Habitat. Barred owls use a variety of habitats in both actively managed and undisturbed conditions (Hamer, 1988; Dunbar et al., 1991). Thus, in areas where timber harvesting has modified northern spotted owl habitat, barred owls may have a competitive advantage over northern spotted owls (Dark et al., 1998), which prefer structurally complex older forests for nesting and roosting (Barrows, 1981; Forsman et al., 1984). Barred owls may displace northern spotted owls in territorial interactions (Hamer, 1988; Dark et al., 1998). Further investigation may be warranted to determine implications on conservation of the northern spotted owl.

Green Diamond Land. Barred owl detections have been recorded while doing spotted owl surveys on Green Diamond lands since spotted owl surveys were first initiated in 1989. In recent years, some effort has been made to determine if barred owl detections represented barred owl nest sites or activity centers. However, assessment of barred owl sites on Green Diamond land has remained somewhat subjective since most barred owl detections have not been followed up with daytime site visits. Given these qualifications, the number of

barred owl “sites” on Green Diamond lands remained low from 1993 to 1999, but began to increase in 2000 (Table 4.6-2). The increase between 1999 and 2000 coincided with an apparently stable or increasing northern spotted owl population until the late 1990s when the population appeared to begin a downward trend. Green Diamond (2006a) does not have data to evaluate whether a cause-and-effect relationship exists between the apparent increase in the number of barred owl sites and the decrease in northern spotted owls beginning in the late 1990s.

TABLE 4.6-2
Number of Barred Owl (BO) “Sites” on Green Diamond Lands by Year

Year	1993	1994	1995	1996	1998	1999	2000	2001	2002	2003	2004	2005
Number of BO sites	1	2	3	1	1	2	7	6	7	14	12	9

Source: Green Diamond (2006a), Figure 3.14.

Courtney et al. (2004) indicated that many of the field researchers participating in the meta-analysis believed that barred owls had a greater effect on spotted owl site occupancy than indicated by the analysis (Anthony et al., 2004; Kelly et al., 2003). Until further research is conducted, possible effects of barred owls on northern spotted owls also remains speculative.

Potential Effects of Timber Harvest on Northern Spotted Owl Population. Fecundity is estimated using the number of known adult females in the breeding population. If some action causes an adult female to leave the study area, to become undetected by surveys, or to die, that individual no longer contributes to the fecundity estimate for the Green Diamond population, although the action may in fact affect the fecundity of that individual. Thus, a displacement would affect the estimated owl fecundity statistic for Green Diamond lands only if the female survives, remains on, and is detected on the study area. Although fecundity estimates are female-based, male owls contribute significantly to the reproductive effort of a pair (Gutiérrez et al., 1995), and, thus displacement of a male may also affect fecundity.

Green Diamond timber harvest activities have resulted in 46 net displacements since implementation of the HCP, and 4 additional displacements are authorized under the current ITP. The survival and fecundity of northern spotted owl pairs displaced by timber harvest activities under the current ITP were not presented by Green Diamond (2006a). Green Diamond has limited data regarding the fate of owls displaced by timber harvest under the existing ITP. Some northern spotted owls directly or indirectly displaced by timber harvest have been documented to move to adjacent suitable habitat and continue normal owl behaviors including successful nesting (Green Diamond, 2006b). However, other owls were never observed after being displaced, and these displaced owls had no effect on estimates of fecundity, but their survival was assumed to be “0”, and thus negatively affected population growth (λ) estimates, as would displaced owls that experienced lower fecundity after displacement.

The actual No Action scenario, including ongoing and future effects of Green Diamond land management (under implementation of the existing NSO HCP), likely lies somewhere between the two extremes of complete loss of displaced owls, and no effect on displaced owls. Some displaced females would probably nest successfully and others would not, and

displacement would likely have some negative influence on survival of pair members, and hence on λ for the population of spotted owls on Green Diamond's land.

The increasing area of suitable habitat over the ITP period might offset any reduction in the survival and recruitment rates of owls impacted by displacements, if it results in an overall increase in survival and fecundity for the owls not impacted by the timber harvest.

4.6.2.3 Effects at the Green Diamond Population and Province Levels

Neither the significance of λ less than 1.0 nor definitive conclusions regarding long-term northern spotted owl population viability at the local, regional, or range-wide population levels were addressed by expert teams of northern spotted owl biologists in any of the recent analyses: Status and Trends in Demography of Northern Spotted Owls, 1985-2003 (Anthony et al., 2004), Scientific Evaluation of the Status of the Northern Spotted Owl (Courtney et al., 2004), USFWS' 5-Year Review for the species (USFWS, 2004), or Green Diamond (2006a). All these papers report the observed λ for the 13 study sites included in the demographic meta-analysis (Table 4.6-1). Our 5-year review found that populations of northern spotted owls continue to decline across the range of the species, with the most severe declines occurring in the northern portion of the range (Washington and British Columbia), while populations in the southern portion of the range are either slightly declining, stable, or slightly increasing (USFWS, 2004).

An analysis of λ , by definition, only allows one to draw conclusions about what happened in the past. The conclusion that λ was less than 1.0 for most demographic study areas throughout the range of the northern spotted owls does not provide any direct predictions concerning long-term northern spotted owl population viability at local, regional, or range-wide scales. However, if the current negative rate of population change ($\lambda_{RJS} = 0.97$) continues, the northern spotted owl population occupying Green Diamond lands would decline slowly over time. For example, a constant population change at a rate of 0.97 (this equals a 3 percent annual decline) over a 15-year period would result in a total population decline of about 37 percent over that period. Assuming the factors that contributed to the recent negative rate of population change on Green Diamond lands continue to exert the same effect on λ , any further reduction in fecundity or survival because of the four remaining displacements authorized under the existing ITP would exert further downward pressure on populations.

To provide context regarding the scale of potential population level effects, the four remaining displacements authorized under the No Action Alternative represent 1.9 percent of the 213 northern spotted owl activity centers located on or adjacent to Green Diamond lands. Based on the continued recruitment of new owl habitat, there will continue to be a substantial area of unoccupied and suitable northern spotted owl habitat available within the Green Diamond ownership for displaced owls to occupy (Table 3.6-2).

At a broader scale, the 2006 California Department of Fish and Game's database indicates that roughly 1,390 northern spotted owl activity centers occur in the California Coast Physiographic Province (Gould, 2006). While this number has limitations (see Section 3.6.2.7), it represents the best available data at the province level. Based on this estimate, the four remaining displacements represent about 0.57 percent of the northern spotted owl activity centers within the province.

In summary, it is consistent with the authorized incidental take of NSO under Green Diamond's current NSO HCP that the population would experience at least temporary effects associated with displacement of owls from established nesting sites. Given the long-term trend of increasing suitable habitat, the net result of the interaction of displacement effects and habitat increases is unknown. In general, the individual and combined effects of the different factors potentially affecting northern spotted owl populations remains speculative based on the current science. Site-specific evidence exists for negative effects on fecundity from weather and site occupancy from apparent competition with barred owls, but the causal factors for the range-wide decline in the spotted owl population is not known. Declines in the past 13 years on Green Diamond lands coincided with a number of authorized NSO incidental "takes" under their NSO HCP. Regardless of the mechanism(s) for the decline, that trend does not appear to be specific to Green Diamond's management, since demographic parameters of the local owl population is similar, or only very slightly lower than, other owl populations studied within the region. Future demographic analyses incorporating additional data on habitat, weather, and barred owl covariates may lend insight to factors and interactions influencing spotted owl populations.

4.6.3 Proposed Action

Under the Proposed Action, USFWS would approve an amendment to the original NSO HCP ITP. Under this alternative, Green Diamond would: (1) reinstate until 2012 Green Diamond's monitoring and management obligations for the approximately 20,310 acres of the original special management area still owned by Green Diamond, (2) initiate new research on the habitat overlap and interaction between the barred owl and northern spotted owl; (3) in plan-year twenty (2012), review the efficacy of the conservation measures and the status of habitat overlap and interaction between the northern spotted owl and barred owl; and (4) authorize the incidental take of up to eight additional northern spotted owl pairs.

The Proposed Action, issuance of an amended ITP, would allow timber harvest to occur around up to eight NSO sites, where ESA take prohibitions would otherwise prevent or limit harvest. The NSO HCP defines take to occur based on forest characteristics within a 502-acre (1-mile diameter) circle centered on a nest site or activity center. Specifically, take is defined to occur if harvest causes either of the following: (1) the area of stands aged 31 years or older, within the 502-acre area, is reduced below 233 acres; or (2) the area of stands aged 46 years or older, within the 502-acre area, is reduced below 89 acres. In addition, take is defined if harvest occurs within 500 feet of a nest site or activity center, regardless of the amount of habitat present within the larger circle. If the Proposed Action allowed harvest within the entire area of eight 502-acre circles, the area affected would be a maximum of about 1,864 acres of suitable NSO habitat (forest of 31 years or older; this represents 0.5 percent of the Action Area, or 0.8 percent of current suitable NSO habitat per Table 3.6-3. This maximum area affected includes about 712 acres of forest of 46 years or older (0.2 percent of the Action Area, and 0.6 percent of current forest of this stand age class, per Table 3.6-3).

Reports from field biologists indicate that barred owl presence can inhibit spotted owl response and detection during spotted owl surveys. The Proposed Action would revise Green Diamond's owl survey method by providing extra survey effort in situations where barred owls have occupied a historic spotted owl site. The extra survey effort of proposed timber harvest units could result in detection of spotted owls which might be missed by their current survey method. The likelihood of this occurring is unknown. However, in this situation, the extra survey effort could benefit spotted owls if it results in detecting a spotted owl which would have been otherwise missed. A missed owl could unknowingly be impacted by harvest. The ability to harvest around eight NSO sites has the potential to increase timber harvest compared to No Action, and for this to result in increased effects. However, we expect the change in total area harvested, and thus of potential effects, to be limited by: (1) the small area of potential effects in the context of the entire Green Diamond ownership within the Action Area, and (2) constraints on Green Diamond harvest planning and operations, that include timber volume targets, maximum clearcut size of 20 acres, and adjacency restrictions that limit Green Diamond's rate of harvest and the effects on the entire acreage within a given owl circle.

The area affected consists of those acres where the Proposed Action would allow timber harvest over the ITP term, which represents a maximum of 0.5 percent of the Action Area. This represents a small area, relative to the ownership, and effects would be spread out over a period of about three years, based on the past rate of NSO "takes" under Green Diamond's current ITP. Second, Green Diamond's timber harvest is governed in part by a Maximum Sustainable Production (MSP) Plan under "Option A" of the CFPRs (see Section 1.5.3.1), that specifies timber yield (volumes) for the ownership. Although the proposed ITP would provide increased operational flexibility regarding where harvest occurs, the total area harvested is expected to be similar under all the alternatives, as Green Diamond would plan harvest to achieve MSP timber volume goals consistent with the CFPRs and its Option A plan. As a consequence, the total area subject to harvest could be greater under No Action, should restrictions around the eight NSO sites direct harvest toward younger stands not occupied by owls, and where yield per acre would be less than in the older forest typical around NSO nest sites.

Although harvest patterns are too uncertain to predict an actual decrease in forest area affected by harvest under the Proposed Action, the effect on size of the area subject to timber harvest is expected to be less than significant compared to No Action, and similarly to have an insignificant effect on those resources (e.g., water quality) for which adverse impacts could increase with a larger area of harvest.

4.6.3.1 Effects Related to Projected Habitat Changes

Riparian Zones. Potential benefits to northern spotted owls from additional older aged stands suitable for northern spotted owl occupancy within riparian zones would be similar to those described for the No Action Alternative.

Upland Areas. The set-asides, special management area, conservation and monitoring measures, and projected acres in each of the age-classes shown in Table 3.6-2 would also not change under the Proposed Action when compared to the No Action Alternative.

Green Diamond (2006b) analyzed the effects of the Proposed Action relative to the changes in forest age-classes over time, projecting increases in forest in the 46+ year age class (Tables 3.6-1 and 3.6-2). This analysis is summarized in *Proposed Amendments to the Habitat Conservation Plan for the Northern Spotted Owl on the California Timberlands of Green Diamond Resource Company* (Green Diamond, 2006b), parts of which are included below.

One approach to assessing the impact of the increased level of incidental take on the northern spotted owl population proposed by Green Diamond (2006b) is to consider it in terms of available habitat for the maintenance of northern spotted owl territories or sites. As noted above, some northern spotted owls displaced by timber harvest have been documented to move to adjacent suitable habitat and continue normal owl behaviors including successful nesting.

Green Diamond (2006b) states:

“‘Conservation’ commitments and regulatory obligations governing Green Diamond timber harvests tend to accelerate regrowth of suitable Northern Spotted Owl habitat (e.g., habitat retention within harvest units and large robust riparian reserves) in most areas within Green Diamond ownership causing Northern Spotted Owl (displacement) sites to become suitable for re-occupation within 20 to 30 years following a displacement. In addition take will only result in a localized loss of owl sites. Across the (Green Diamond) ownership, harvested habitat will be replaced through maturing of younger timber stands with no net loss of habitat in the age classes currently used for nesting or roosting by Northern Spotted Owls. Therefore, the projected habitat change and availability of suitable habitat will not be affected by the 8 additional Northern Spotted Owl displacements.”

This conclusion regarding no significant effects of additional displacements on projected habitat change is appropriate, assuming that the replacement habitat is comparable in quality to that lost due to harvest. However, potential indirect effects related to the potential for northern spotted owls to disperse into and use these new suitable habitats in the future are discussed below.

Whether or not future increases in the area of suitable northern spotted owl habitat would mitigate some or all of the potential adverse effects of additional displacements on fecundity, survival and ultimately λ depends on the same factors discussed for the No Action Alternative. These relate to whether or not the additional suitable habitat results in an overall increase in fecundity and survival of the remaining spotted owl population on Green Diamond’s land such that it offsets potential negative effects due to the eight additional displacements.

Similarly, the potential benefits of future increases in suitable northern spotted owl habitat on Green Diamond lands would be the same as described for the No Action Alternative. Potential effects related to habitat attributes that would result from Green Diamond management actions would also be the same as described for the No Action alternative. Additional suitable habitat will be a potential positive result of Green Diamond’s management, but would only benefit the local northern spotted owl population if the population is being limited by the amount or quality of suitable roosting and nesting habitat.

It is not known what has limited λ on Green Diamond lands in the past. However, given that fecundity is the only demographic parameter that has declined on Green Diamond lands in recent years (Anthony et al., 2006) and habitat quantity has been relatively constant to increasing over this period (Green Diamond, 2006a), it is most likely related to either weather or prey populations, or, possibly, some subtle habitat quality changes not discernable from the available data. However, this is speculative and there is no way to predict whether or not population level benefits will result from the addition of suitable habitat.

4.6.3.2 Effects Related to the Rate of Northern Spotted Owl Population Change

As described in Section 4.6.2 for the No Action Alternative, there was a slight downward trend in the estimated λ for the Green Diamond northern spotted owl population between 1993 and 2003 in spite of an increase in the area of suitable nesting and roosting habitat for northern spotted owls between 1992 and 2002 (Table 3.6-2).

This occurred during a period when the rate of incidental takes (displacements) was below that projected and authorized in the 1992 NSO HCP and ITP. Green Diamond has only limited data regarding the fate of a portion of northern spotted owls that have been displaced by past timber harvest activities, and the effect of displacement on survival, fecundity and ultimately λ of the population under the current ITP is not known. The Proposed Action would result in eight displacements in addition to those allowed under the current ITP.

As described for the No Action Alternative, displacement through timber harvest has the potential to have a negative impact on fecundity (or population recruitment) and survival rates for the Green Diamond northern spotted owl population compared to an undisturbed population. There are several potential biological mechanisms for the impacts including inability to locate a new nest site, reduced survival or fecundity due to changes in the home range, and disruption of adjacent pairs of owls due to adjustments in the home range of the displaced owls. The actual effect lies between all displaced owls moving to a new location with no change in survival or reproduction of displaced or neighboring owls and the other extreme of all displaced owls dying without reproducing again and disrupting the normal behaviors of their neighboring owls. The actual effect of eight additional northern spotted owl displacements on λ likely lies somewhere between these two extremes; some displaced pairs would probably nest successfully with little effect on their survival and fecundity and that of their neighboring owls and others would not. However, any reduction in survival or fecundity of the overall northern spotted owl population on Green Diamond lands would contribute to lower λ .

Because it is not known what factors are responsible for the current downward trend in λ , there is no way to predict the impact that additional displacements would have on the long-term trends for the northern spotted owl population occupying Green Diamond lands. For example, in a demographic study area centered on national forest lands inland from Green Diamond, and where recent timber harvest is much less than on Green Diamond lands, λ appears to be declining (Anthony et al., 2006), suggesting that factors other than timber harvest may be affecting spotted owl trends in the region.

4.6.3.3 Effects at the Green Diamond Population and Province Levels

As described for the No Action Alternative, definitive conclusions cannot be drawn regarding long-term northern spotted owl population viability at the local, physiographic province, or range-wide levels (Anthony et al., 2004; Courtney et al., 2004; USFWS, 2004; Green Diamond 2006a). As noted above, an analysis of λ , by definition, only allows one to draw conclusions about what happened in the past. The conclusion that λ_{RJS} was < 1.0 for most demographic study areas throughout the range of the northern spotted owls does not provide any direct evidence concerning long-term northern spotted owl population viability at local, regional, or range-wide scales. Similar to the No Action Alternative, if the current negative rate of population change ($\lambda_{RJS} = 0.970$) continues, the northern spotted owl population occupying Green Diamond lands would decline slowly over time. Assuming all the factors remain constant that contributed to a λ of less than 1 in recent years on Green Diamond lands, any further reduction in fecundity or survival because of the eight additional displacements that would be authorized under the Proposed Action would incrementally exert further downward pressure on λ and have negative long-term implications for the northern spotted owl population on Green Diamond lands.

To provide perspective regarding potential population level effects, the eight additional incidental takes that would be permitted under the Proposed Action represent 3.8 percent of the 213 northern spotted owl activity centers located on or adjacent to Green Diamond lands in 2006. Based on current and projected amounts of forest habitat, there is and will continue to be a substantial area of unoccupied and suitable northern spotted owl habitat available within the Green Diamond ownership for displaced owls to occupy (Table 3.6-2). As discussed in Section 4.6.3 above, this is expected to reduce the population effects of the take of eight owl pairs, to the extent that the displaced owls relocate to and reproduce in unoccupied suitable habitat.

A new draft NSO recovery plan was released by the USFWS (72 Federal Register 20865; April 26, 2007) after the Draft EA for Green Diamond NSO HCP Amendments was circulated for public review. The 2007 Draft Recovery Plan identifies a network of Managed Owl Conservation Areas (MOCA) on Federal lands to provide the primary contribution for northern spotted owl recovery. The draft plan also identifies Conservation Support Areas (CSA), which are between or adjacent to MOCAs, where habitat contributions by private, State and Federal lands are expected to increase the likelihood of spotted owl recovery, by providing demographic support to owl populations in MOCAs, or facilitating dispersal of juvenile owls among MOCAs (USFWS, 2007). The 2007 Draft Recovery Plan identifies four CSAs on Green Diamond lands: CSA-01, CSA-04, CSA-06, and CSA-07 which overlap the special management area and set-asides. Thus, the special management area and set-asides would provide for habitat as identified in the CSAs among MOCAs C-02, C-03, C-27, C-34 and C-04.

As indicated above for the No Action Alternative, the eight additional incidental takes represent about 0.6 percent of the rough estimate of 1,390 northern spotted owl activity centers within the California Coast Physiographic Province.

4.6.4 Alternative A

Under this alternative, USFWS would amend the NSO HCP ITP to authorize the additional displacement of eight owl pair sites. The permitted total would be the original 50 pairs plus eight additional displacements for a total of 58. No direct injuring or killing of owls would be allowed. In addition to the harvest of suitable habitat around 8 additional NSO nest sites, three set-aside areas would be released for harvest entry. The three set-aside areas are Wiregrass, Fawn Prairie, and Bear Creek. The Wiregrass and Fawn Prairie set-asides are located in Green Diamond's Korbel operating area and the Bear Creek set-aside is located in the Klamath operating area. The acreage of each set-aside is as follows: Wiregrass, 229.3; Fawn Prairie, 242.4; Bear Creek, 431.6. The total area of the three set-asides is 903.3 acres, which would leave 12,339.2 acres of the original 13,242.5 set-aside acres remaining in no harvest set-asides, or a 6.8 percent reduction in set-aside area and no loss of owl sites. Release of the Bear Creek set-aside would reduce the Klamath set-aside area by 14.8 percent and release of the two Korbel set-asides would reduce the area by 4.6 percent. The amount of habitat 46+ years old continues to increase over the remainder of the permit period. Conservation and mitigation measures continue to include habitat management, nest site protection, research, set-asides, reinstatement of the special management area, plan review, and training programs.

4.6.4.1 Effects Related to Projected Habitat Changes

Riparian Zones. Minor benefits to northern spotted owls from additional older aged stands suitable for northern spotted owl occupancy within riparian zones because of implementation of the AHCP/CCAA would be similar to those described for the No Action Alternative.

Upland Areas. The set-aside areas were viewed as suitable for owl occupancy at the time they were established as set-asides. Except for the removal of the three set-asides the projected change in the future area of suitable northern spotted owl habitat would be similar to those under the Proposed Action. Compared to the actual net gain in suitable habitat area since 1990 and the projected gains between the current time and 2021 (Table 3.6-1), the removal of 903.3 acres represents 0.24 percent of the current and projected future area of suitable northern spotted owl habitat that will be present. The potential for the new suitable habitat to mitigate the additional incidental takes or to benefit the Green Diamond northern spotted owl population would be similar to those described for the Proposed Action because the affected acreages are similar in the context of the overall Green Diamond ownership. Timber harvest around eight additional NSO nest sites and within the three set-asides would occur over 2,767 acres, which represent about 1.2 percent of available NSO habitat on the Green Diamond ownership.

4.6.4.2 Effects Related to the Rate of Northern Spotted Owl Population Change

Alternative A would include the same additional incidental takes as the Proposed Action and the impacts related to the northern spotted owl rate of population change would be the same as those described for the Proposed Action.

4.6.4.3 Effects at the Green Diamond Population and Province Levels

Northern spotted owl population level effects at the local level would be virtually the same as those described for the Proposed Action.

4.6.5 Cumulative Impacts

4.6.5.1 Current Regional Conditions Relative to Potential Cumulative Effects

Industrial and nonindustrial private ownership dominate the California Coast Physiographic Province (USFWS, 1992a), with Federal lands found in scattered small blocks of Bureau of Land Management and larger blocks of National Park Service lands (USFWS, 2003).

Table 4.1-1 indicates that Green Diamond ownership ranges from 12.6 to 89.8 percent of the acreage of the 11 watershed units, with many exceeding 50 percent ownership by Green Diamond. State lands are limited to parks and a State forest. The continued presence of owls in the province depends on State and private lands; Federal lands alone are insufficient to maintain owls throughout the province (USFWS, 1992).

The draft recovery plan for the northern spotted owl (USFWS, 1992b) identified significant threats and their severity to the northern spotted owl in the province, summarized below. At the province level, these threats continued to persist (USFWS, 2003).

- Low populations – low threat
- Overall population decline – moderate threat
- Limited habitat – moderate threat
- Declining habitat – moderate threat
- Distribution of habitat or populations – moderate threat
- Isolation of provinces – severe threat
- Predation and competition – increasing threat
- Vulnerability to natural disturbance – low threat

The 2007 Draft Recovery Plan reviews threats, and concluded that competition from barred owls is now elevated to a significant, pressing threat across the range of the NSO, including the north coast of California (USFWS, 2007).

Several options are available for management of owl population centers and dispersal opportunities. The primary purpose of these management options with respect to conservation needs of the northern spotted owl within the province is to provide demographic support by maintaining population centers (clusters of owls) throughout the province, and to maintain habitat connectivity between and among population centers within the province and with Federal Northwest Forest Plan (NWFP) lands in neighboring provinces. In general, the USFWS approach in the California Coastal Physiographic Province is to address conservation of the northern spotted owl through the development of HCPs and to manage individual owl sites on a case-by-case basis.

There are about 2.5 million acres of suitable northern spotted owl habitat within the California Coastal Physiographic Province. This estimate does not account for loss of suitable habitat on non-Federal lands since the last update in 1999 by the U.S. Forest Service's Remote Sensing Lab. Twenty-one small, scattered Northern Spotted Owl Critical Habitat Units occur in the province, all located on Federal lands. No tribal, State or private lands were designated as Critical Habitat, or are included in a proposed revision to NSO Critical Habitat (72 Federal Register 32450; June 12, 2007).

The status of NSO in the California Physiographic Province is described in Section 3.6.2.7 and elsewhere, and demographic trends from available studies are described in Section 4.6.2. Green Diamond (2006a) data suggest that apparent survival rates for adult male and female northern spotted owl on their lands remained constant from 1990 to 2001, while fecundity declined.

4.6.5.2 Cumulative Effects of the Proposed Action

Cumulative effects on the northern spotted owl with respect to this analysis would be related to cumulative loss of habitat and potential incidental take of owl sites that could threaten northern spotted owl populations in the California Coastal Province. Each of the other actions included for consideration under this cumulative effects analysis (see Section 4.1.2.3) is intended to be consistent with the USFWS-identified management options regarding conservation needs of the northern spotted owl within the province (USFWS, 1992b, 2003).

Habitat Loss. In the 1990 listing rule for the northern spotted owl, the USFWS identified historic loss of habitat and continuing loss of habitat to timber harvest among habitat-related threats (55 FR 26114). The USFWS' 5-Year Review found that the magnitude and intensity of the threat of habitat loss and modification has diminished considerably since 1990, at least on federally-managed lands (USFWS, 2004). As described for the Proposed Action, Green Diamond's management policies on its lands have resulted in a substantial increase in the area of suitable northern spotted owl habitat and these increases are projected to continue into the future until at least 2022 (Table 3.6-2). In combination with the other actions listed in Section 4.1.2.3, a modified Green Diamond NSO HCP that continues to increase the amount of suitable northern spotted owl habitat would not be expected to contribute to significant cumulative adverse effects on this subspecies.

As discussed in Section 4.5.5, the combined cumulative effect of resource management programs on public and private lands would be a trend toward development of a greater number of mid- to late-seral forest stands within the 11-HPA assessment area, beyond currently existing levels. This trend is expected to result in a positive effect for NSO habitat in the assessment area.

Take of Northern Spotted Owls. Under the other non-Federal and Federal activities potentially affecting the northern spotted owl in the province, as described in Section 4.1.2.3, no take of northern spotted owl is allowed except when permitted by USFWS under an ITP or recovery permit. The amended Green Diamond HCP would not be expected to contribute to significant cumulative effects on this subspecies, as described above in Section 4.6.3. Potential cumulative benefits within the province may result from the increasing area of suitable habitat on Green Diamond lands if northern spotted owl populations use these areas in the future.

Population Trends. Predation and competition were identified as generally increasing threats to the northern spotted owl population within the province (USFWS, 1992a, 2004). Barred owls may pose a significant threat to northern spotted owls due to competition for both nest sites and prey items using a variety of habitats in both actively managed and undisturbed conditions (Hamer, 1988; Dunbar et al., 1991; Courtney et al., 2004). The manner in which habitat management affects interactions between barred and spotted owls is largely unknown, although a recent review (Courtney et al., 2004) speculated that the apparent slower rate of

barred owl invasion in some redwood areas might be explained by spotted owls using denser second-growth forests more widely, or lack of preference for these areas by barred owls. One hypothesis considered by Courtney et al. (2004) is that timber harvest may increase competition between the species, by favoring barred owls over spotted owls, which prefer structurally complex older forests for nesting and roosting (Barrows, 1981; Forsman et al., 1984). Also, initial reports suggested that barred owls are more associated with younger forest types, but more recent reports have found barred owls often in mature and old-growth forests (Courtney et al., 2004). The 46+ year-old forest stands that are projected to increase in area on Green Diamond lands (Table 3.6-2) are expected to include these more structurally complex stand characteristics and may favor northern spotted owls over barred owls. However, further research regarding competition and niche overlap between these species is required (and will be conducted under the Proposed Action) before definitive conclusions can be drawn. Other older HCPs, CCAAs, and management plans within the province and coordinated by USFWS and State agencies may not have addressed the issue of competition between barred owls and northern spotted owl. This type of analysis will be required before a thorough cumulative impact assessment of forest management practices on the dynamics of barred owl and northern spotted owl competition can be prepared.

Overall population decline was identified as a moderate-level threat to northern spotted owl population within the province (USFWS, 1992a). The recent meta-analysis of 13 northern spotted owl populations conducted by Anthony et al. (2004, 2006) supports this evaluation, having found that the estimated rate of population change (λ_{RJS}) ranged from 0.896 to 1.005 and was less than 1.0 on 12 of 13 study areas across the range of the northern spotted owl. λ_{RJS} was less than 1.0 at the three areas within the California Coast Province included in the meta-analysis including the Northwest California, Hoopa, and Green Diamond sites (Table 4.6-1). Hypothesized reasons for the decline include displacement of spotted owls by barred owls, loss of habitat to wildfire, loss of habitat to logging on State, private, and tribal lands, forest defoliation due to insects, and advancing forest succession toward climax fir communities in the absence of fire (Anthony et al., 2004). None have been specifically identified as being responsible for the population decline.

Many areas that support nesting northern spotted owl within the province, including most of the other actions considered in this cumulative assessment (see Section 4.1.2.3), were not included in the meta-analysis. Therefore, it is not possible to draw definitive conclusions regarding the northern spotted owl population trend across the entire province. However, a continuation of the observed downward trend in these three areas would have negative implications for the province-wide northern spotted owl population.

With respect to other non-Federal and Federal activities potentially affecting northern spotted owl populations within the province, including all of the other actions described in Section 4.1.2.3, no take of owl sites is allowed except as authorized by USFWS (e.g., under an incidental take permit with HCP or incidental take statement in a Section 7 biological opinion).

Finally, to provide some perspective regarding the magnitude of potential population level effects, the eight additional displacements that would be authorized under the Proposed Action represent 3.8 percent of the 213 northern spotted owl activity centers located on or adjacent to Green Diamond lands in 2006. The five permitted incidental takes of owl sites allowed by the existing ITP under the No Action Alternative would also be allowed under the Proposed Action for a total of 13 more incidental take of owl sites over the term of this

amendment. These 13 incidental takes represent 6.1 percent of the 213 northern spotted owl activity centers located on or adjacent to Green Diamond lands. There is and will continue to be a substantial area of unoccupied and suitable northern spotted owl habitat available within the Green Diamond ownership for displaced owls to occupy (Table 3.6-2). At a larger geographic scale, the eight additional incidental takes represent about 0.6 percent of the rough estimate of 1,390 northern spotted owl activity centers within the California Coast Physiographic Province.

Proposed Critical Habitat Changes. As noted above in EA Sections 3.6.3 and 3.7.2, the USFWS has recently proposed revisions to the designated critical habitat for northern spotted owls and marbled murrelets, respectively. The USFWS believes it is speculative to assume that a final revised critical habitat for marbled murrelets or northern spotted owl will match that recently proposed; this makes analysis of the cumulative effects of the proposed changes difficult.

For northern spotted owl critical habitat, if the current proposal were to be adopted as the final revised critical habitat determination, the cumulative effect on owl habitat and populations in the analysis area would likely be minimal and neutral or beneficial, because (1) all current critical habitat and all proposed revised critical habitat occurs on federal lands, thus there would be no change on Green Diamond lands or within the Action Area, (2) owls within and outside designated critical habitat would continue to be subject to the take prohibitions of the Act, and (3) the proposed revision would increase the area of designated critical habitat for the owl in the California Coast Physiographic Province by a net of 31,957 acres (about 32 percent). The increase of designated critical habitat by 32 percent could have a small beneficial effect for NSO.

For marbled murrelet critical habitat, if the current proposal were to be adopted as the final revised critical habitat determination, the cumulative effect on owl habitat and populations would likely be minimal because, although the revision as proposed would result in a substantial decrease of designated critical habitat for murrelets within the California Coast Physiographic Province for NSO, and at the Action Area scale, the decrease is accounted for primarily by excluding from designation areas that meet the definition of critical habitat but are already protected under other existing regulations or plans, such as HCPs and the Northwest Forest Plan, where conservation of marbled murrelet habitat is currently a management goal, and thus the change would have minimal effect on land management and owl habitat.

At the scale of the California Coast Physiographic Province, which includes most of Green Diamond's lands, about 312,106 acres are currently designated as marbled murrelet critical habitat, while the proposed revision identifies about 245,980 acres as meeting the definition of critical habitat, of which approximately 195,380 acres are proposed for exclusion from designation because they occur either on Federally-managed lands where conservation of murrelet habitat is a required management goal under existing regulations or plans, or on about 6,636 acres of land covered by the Pacific Lumber Company HCP, which includes a marbled murrelet conservation plan that provides for the conservation of the species.

At the Action Area scale, the cumulative effect of adoption of the proposed revision of murrelet critical habitat on owl habitat and populations would be minimal. Within the proposed Del Norte/Northern Humboldt Unit, which overlaps the Action Area, nearly all

(more than 99 percent) of the area identified as meeting the definition of critical habitat, approximately 257,582 acres, are proposed for exclusion from designation because they occur on Federally-managed lands where conservation of murrelet habitat is a required management goal under existing regulations or plans. On these lands, management is not expected to change if the proposed revision is adopted. Other reasons for the cumulative effects to be minimal in the Action Area are: (1) suitable murrelet nesting habitat within the one proposed new critical habitat area on Green Diamond lands, the Miracle Mile Complex, is currently managed to avoid take of marbled murrelets, and will likely be protected in perpetuity under a conservation easement in the future; and (2) the proposed dropping of critical habitat designation of the approximately 1,400 acres of Green Diamond lands in Unit CA-03-a would have minimal effect on management of those acres, because little of that area currently meets the critical habitat definition by containing one or more primary constituent elements (see Section 3.7.2), and thus little would receive any benefits of designation under the ESA. Also, as described in EA Section 3.7.2, Green Diamond is not seeking authorization to harvest trees within any marbled murrelet designated critical habitat unit, when harvest would affect a "primary constituent element" and would thus affect habitat meeting the definition of marbled murrelet critical habitat. As noted previously, for an area to receive ESA protections as critical habitat, it must meet three conditions: (1) be within a designated critical habitat unit; (2) contain one or more primary constituent elements; and (3) involve Federal agency funds, authorization, or permits.

In summary for proposed critical habitat changes, the proposed revisions to northern spotted owl and marbled murrelet critical habitat, if implemented as proposed, are not expected to result in substantive changes to NSO habitat conditions in the areas affected by the proposed revisions.

Overall, the proposed amendments to the HCP, when considered together with other past, present, and reasonably foreseeable actions, are not expected to result in significant adverse cumulative effects on the northern spotted owl.

4.6.5.3 Cumulative Effects of Alternative A

The cumulative effects of Alternative A would be similar to those described for the Proposed Action because the differences between these alternatives are so small. About 903 fewer acres of suitable habitat would be available for owls in the future under this alternative compared to the Proposed Action. The three set-asides represent about 0.24 percent of the total NSO habitat available on the Green Diamond ownership.

4.7 Terrestrial Habitat/Wildlife Species of Concern

The purpose of this Section is to evaluate the potential impacts of implementing the Proposed Action, Alternative A, and the No Action Alternative as they relate to terrestrial habitat and wildlife species of concern.

4.7.1 Methodology

The assessment for terrestrial habitat and wildlife species of concern relies on information collected and documented in Section 3.7 (Terrestrial Habitat/Wildlife Species of Concern) and Section 4.5 (Vegetation/Plant Species of Concern). The assessment also relies on widely

accepted associations between habitat type and wildlife use. As discussed below and in the affected environment discussion in Sections 3.5 (Vegetation/Plant Species of Concern) and 3.7 (Other Wildlife Species of Concern/Terrestrial Habitat), habitat types for terrestrial wildlife are based on the CWHR System (Mayer and Laudenslayer, 1988). The CWHR classification identifies habitat type, size class, and canopy-cover class. Projected changes in vegetation type and structure have the potential to affect various wildlife species that depend on particular habitat characteristics to meet life requisites. Changes resulting from alterations in stand characteristics are simultaneously beneficial for some species groups and adverse for other groups.

As discussed in Section 4.5, Vegetation/Plant Species of Concern, a core premise of this assessment is that nonriparian lands under all the alternatives would generally be managed in accordance with the CFPRs, other applicable laws, Green Diamond's NSO HCP, and Green Diamond operational policies and guidelines.

The analysis of the alternatives is a qualitative assessment that focuses on the impacts associated with potential changes to habitat. The assessment focuses on CWHR habitat type, vegetation structure, and canopy closure for each of the alternatives considered for further evaluation. The existing terrestrial-wildlife habitat conditions are described in Section 3.7 of this EA. As indicated, this qualitative analysis focuses on the potential changes to wildlife within forested areas. Most of the nonforested natural habitat types described in Section 3.5 are either protected under existing regulations or do not have practical use to Green Diamond, other than as incidental access areas.

4.7.2 No Action Alternative

4.7.2.1 General Effects

Under the No Action Alternative, existing State regulations are augmented by additional measures identified in the Green Diamond NSO HCP, that provide for retention of a variety of tree sizes (height and diameter) and species within WLPZs, habitat retention areas (groups of retained trees greater than one-half acre) and individual tree clumps, with priority given to wildlife habitat trees. Over the term of the Permit, vegetation structure in riparian stands in the Action Area is expected to remain about the same or slowly improve, over time, as the No Action Alternative's riparian management prescriptions are implemented over greater portions of the Green Diamond ownership. Implementation of the No Action Alternative is, therefore, expected to result in static or improved wildlife habitat conditions within the Action Area relative to existing conditions. Under the No Action Alternative, a greater number of mature trees or late-seral-forest stands would exist within riparian areas throughout the Action Area, especially within northern spotted owl protection zones, relative to existing conditions. The species that would benefit the most from this effect include frogs, salamanders, herons, eagles, bats, marbled murrelets, and owls.

Similarly, as discussed in Section 4.5, under current management forest trends on the Green Diamond ownership in general will lead to increased age class and size, as well as increased total acreage with dense canopy closure. These trends would be expected to result in long-term beneficial effects on wildlife species that use these habitats relative to existing conditions.

Under the No Action Alternative, the number and acreage of stands with saplings and small-diameter trees would decrease over time. Wildlife species most adversely affected by these forest trends would be those that feed and breed in early successional riparian habitats (e.g., thrushes, some warbler species, and sparrows). However, because these species also use adjacent upland forests, impacts on these species are expected to be less than significant. Lands within the Action Area have been managed for timber production for decades and the species that thrive there today have done so in the presence of the disturbances associated with timber management.

4.7.2.2 Riparian Management Effects

Implementation of the No Action Alternative will continue to provide special benefits to frogs and salamanders as a result of the anticipated increase in the amount and quality of available habitat for breeding and feeding. Similar increases in riparian habitat for feeding and roosting, for bats, owls, and similar animals, should reduce competition for tree nesting and roosting sites among these types of animals. The increased amount of late-seral-forest habitat within riparian corridors, anticipated as a result of implementation of the No Action Alternative, would benefit herons and eagles through creation of a more varied habitat base for foraging and nesting.

4.7.2.3 Listed Wildlife Species and Other Wildlife Species of Concern

Under the No Action Alternative, Green Diamond would remain subject to State regulatory requirements to avoid or mitigate adverse effects of timber harvesting on all wildlife, including species listed or proposed for listing under the Federal and State ESAs. Continued compliance with existing regulations and implementation of Green Diamond's NSO HCP should result in a trend toward forest development that promotes greater structural diversity and a greater number of stands with late-seral forest characteristics, relative to what currently exists (especially within WLPZs). This trend is beneficial to listed species, presumed or known to occur in the Action Area, that breed or forage in older trees or late-seral stands. These species include the bald eagle and northern spotted owl. The trend is also beneficial to other wildlife species of concern presumed or known to occur in the Action Area that are associated with late-seral conditions (e.g., osprey, Vaux's swift, Pacific fisher, Humboldt marten, and red and Sonoma tree voles).

Table 4.7-1 presents: (1) a list of all the wildlife species of concern (listed and unlisted) known or likely to occur within the Action Area; and (2) a summary of potential impacts associated with the No Action and other alternatives. For all species and all action alternatives, either no impacts would occur or the impacts would be minor. Minor beneficial effects are anticipated to occur to those species that are in riparian or late seral forest habitats.

TABLE 4.7-1
Wildlife Species of Special Concern—Habitat Associations and Potential Impacts

Species	Habitat Associations	Potential Impacts		
		No Action	Proposed Action	Alternative A
Birds				
American peregrine falcon <i>Falco peregrinus anatum</i>	Breeds on high cliffs near wetlands, lakes and rivers	Changes in populations are anticipated to be negligible over time due to low species occurrence.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Bald eagle <i>Haliaeetus leucocephalus</i>	Nests in large old growth trees near ocean shore, lakes, and rivers	Other species-specific conservation measures could include timber stand retention adjacent to high-value habitat on public lands.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Bank swallow <i>Riparia riparia</i>	Colonial nester in riparian area with vertical sandy banks composed of fine soils	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Black swift <i>Cypseloides niger</i>	Breeds in small colonies adjacent to waterfalls in deep canyons and coastal bluffs, forages widely	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Black-crowned night heron <i>Nycticorax nycticorax</i>	Margins of lacustrine, large riverine, and fresh and saline emergent habitats	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Coopers hawk <i>Accipiter cooperi</i>	Open woodlands, nests in riparian areas	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Golden eagle <i>Aquila chrysaetos</i>	Rolling foothills and open mountain terrain in oak woodlands and most major forested habitats.	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Great blue heron <i>Ardea herodias</i>	Colonial nester in large trees near wet meadows, marshes, lake margins, rivers and streams, and tidal flats	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Great egret <i>Ardea alba</i>	Colonial nester in large trees near marshes, tidal flats, rivers, and lakes	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.

TABLE 4.7-1
Wildlife Species of Special Concern—Habitat Associations and Potential Impacts

Species	Habitat Associations	Potential Impacts		
		No Action	Proposed Action	Alternative A
Little willow flycatcher <i>Empidonax traillii brewsteri</i>	Riparian areas with extensive willow vegetation	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Marbled murrelet <i>Brachyramphys marmoratus</i>	Late-seral and old-growth conifer forest and marine waters	However, minor beneficial effects may occur in the long term as a result of implementation of enhanced riparian protection measures and other conservation measures, changes in associated habitats and populations are anticipated to be negligible over time. Other species-specific conservation measures could include timber stand retention adjacent to high-value habitat on public land.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Merlin <i>Falco columbarius</i>	Frequents coastlines, open grassland, woodlands, lakes, wetlands, edges, and early successional forest stages	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Northern harrier <i>Circus cyaneus</i>	Open habitats including grasslands, scrublands, and wetlands	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Northern goshawk <i>Accipiter gentilis</i>	Nests in mature and old-growth coniferous forests with sparse ground cover	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.

TABLE 4.7-1
Wildlife Species of Special Concern—Habitat Associations and Potential Impacts

Species	Habitat Associations	Potential Impacts		
		No Action	Proposed Action	Alternative A
Northern spotted owl <i>Strix occidentalis caurina</i>	Old growth or mixed mature-old growth forests	The No Action is anticipated to lead to impacts commensurate with the NSO HCP. Despite harvest of suitable habitat around eight NSO nest sites, suitable habitat would continue to increase over the Green Diamond ownership as projected. Currently permitted incidental takes may be one of several factors contributing to reduced NSO fecundity and a slight downward trend in the local population.	Despite harvest of suitable habitat around eight additional NSO nest sites, suitable habitat would continue to increase as projected over the Green Diamond ownership. Proposed additional displacements may be one of several factors that contribute to reduced NSO fecundity, which affects the rate of NSO population change. Planned barred owl research may provide information useful for NSO recovery	Despite harvest of suitable habitat around eight additional NSO sites and in three set-asides, Alternative A measures would provide similar benefits to this species as the Proposed Action. Potential effects of additional displacements on fecundity would also be similar to those described for the Proposed Action.
Olive-sided flycatcher <i>Contopus borealis</i>	Forest and woodland riparian zones	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Osprey <i>Pandion haliaetus</i>	Freshwater lakes, bays, ocean shore, large streams	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Purple martin <i>Progne subis</i>	Forest and woodland with cavity trees, and riparian zones	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Sharp-shinned hawk <i>Accipiter striatus</i>	Early- to mid-seral forest and riparian zones	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Short-eared owl <i>Asio flammeus</i>	Marshlands, grasslands, and forest clearings	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Snowy egret <i>Egretta thula</i>	Riverine, emergent wetland, lacustrine, and estuarine habitats. Nests in large trees in the vicinity of foraging areas.	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.

TABLE 4.7-1
Wildlife Species of Special Concern—Habitat Associations and Potential Impacts

Species	Habitat Associations	Potential Impacts		
		No Action	Proposed Action	Alternative A
Tricolored blackbird <i>Agelaius tricolor</i>	Highly colonial species, largely endemic to California; requires open water with protected areas for nesting	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Vaux's swift <i>Chaetura vauxi</i>	Conifer forest with large snags	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Western burrowing owl <i>Athene cunicularia</i>	Grasslands and shrublands	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Western snowy plover <i>Charadrius alexandrinus nivosus</i>	Sandy beaches, salt ponds and levees, gravel bars along coastal rivers	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
White tailed kite <i>Elanus leucurus</i>	Nests along rivers and marshes associated with oak woodlands in foothills and valley margins, forages in open meadows and grasslands	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Yellow warbler <i>Dendroica petechia brewsteri</i>	Riparian woodland	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Yellow-breasted chat <i>Icteria virens</i>	Riparian thickets and early-seral forest	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.

TABLE 4.7-1
Wildlife Species of Special Concern—Habitat Associations and Potential Impacts

Species	Habitat Associations	Potential Impacts		
		No Action	Proposed Action	Alternative A
Mammals				
Fringed myotis <i>Myotis thysanodes</i>	Roosts in mines, caves, trees, and buildings; feeds along forest edges and over forest canopy	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
American marten <i>Martes americana</i>	Late-seral conifer forest	Changes in associated habitats and populations are anticipated to be negligible over time. Other species-specific conservation measures could include timber stand retention adjacent to high-value habitat on public land and thinning of overstocked stands in neighboring Redwood National Park (RNP).	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Long-legged myotis <i>Myotis volans</i>	Roosts in hollow trees, crevices, mines, and buildings; feeds in open habitats	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Long-eared myotis <i>Myotis evotis</i>	Roosts in trees, crevices, mines, caves, and buildings; feeds within forest and over water	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Pacific fisher <i>Martes pennanti pacifica</i>	Coniferous forests and shaded riparian areas; prefers large trees with structural features such as cavities and natural platforms denning and rest sites	Changes in associated habitats and populations are anticipated to be negligible over time. Other species-specific conservation measures could include timber stand retention adjacent to high-value habitat on public land.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Pallid bat <i>Antrozous pallidus</i>	Roosts in trees, caves, crevices, and buildings; feeds in a variety of open habitats	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.

TABLE 4.7-1
Wildlife Species of Special Concern—Habitat Associations and Potential Impacts

Species	Habitat Associations	Potential Impacts		
		No Action	Proposed Action	Alternative A
Sonoma tree vole <i>Arborimus pomio</i>	Douglas fir, redwood, and montane conifer-hardwood forests	Changes in associated habitats and populations are anticipated to be negligible over time. Other species-specific conservation measures could include timber stand retention adjacent to high-value habitat on public land.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	Humid coastal regions of central and northern California, and southern Oregon	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
White footed vole <i>Arborimus albipes</i>	Mature conifer forests, small streams with dense alder and shrub cover	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Yuma myotis <i>Myotis evotis</i>	Roosts in buildings, trees, mines, caves, crevices, and bridges; feeds over water	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Reptiles and Amphibians				
Del Norte salamander <i>Plethodon elongatus</i>	Redwood, Douglas-fir, mixed conifer, montane hardwood, mixed hardwood-conifer forests	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Foothill yellow legged frog <i>Rana boylei</i>	Partly shaded shallow streams with rocky substrate, in a variety of habitats	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Northern red-legged frog <i>Rana aurora aurora</i>	Humid forests with intermixed hardwoods and grasslands, streamsides	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Southern torrent salamander <i>Rhyacotriton variegatus</i>	Seeps, springs, and streams in coastal redwood, Douglas fir, mixed conifer, montane hardwood, and montane-riparian forests	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.

TABLE 4.7-1
Wildlife Species of Special Concern—Habitat Associations and Potential Impacts

Species	Habitat Associations	Potential Impacts		
		No Action	Proposed Action	Alternative A
Tailed frog <i>Ascaphus truei</i>	Permanent streams in montane-conifer hardwood, redwood, Douglas fir, and ponderosa pine forests	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Western pond turtle <i>Actinemys marmorata marmorata</i>	Ponds and swamps in grasslands, and mixed conifer-hardwood forests	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Invertebrates				
Fort Dick limnephilis caddisfly <i>Limnephilis atercus</i>	Unknown. Most <i>Limnephilus</i> larvae live in lentic habitats, but some are known from streams and cold springs	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Ground beetle <i>Scaphinotus behrensi</i>	Wooded areas with moist microhabitats, including logs and tree trunks	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Karok Indian snail <i>Vespericola karokorum</i>	Under leaf litter and woody debris in riparian areas with alder and maple	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Mardon skipper <i>Polites mardon</i>	Prairies and meadows, particularly in mesic serpentine soils	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Oregon silverspot butterfly <i>Speyeria zerene hippolyta</i>	Coastal meadows in Del Norte County; larvae feed only on the foliage of violets, primarily the western dog violet (<i>Viola adunca</i>)	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.
Pomo bronze shoulderband snail <i>Helminthoglypta arrosa pomoensis</i>	Dense redwood forest	Changes in associated habitats and populations are anticipated to be negligible over time.	Similar to No Action, with timber harvest around eight additional NSO nest sites.	Similar to Proposed Action, with release of three set-asides to timber harvest.

4.7.3 Proposed Action

4.7.3.1 General Effects

Because timber harvesting and forest management activities under the Proposed Action would be similar to those under the No Action Alternative, except for harvest of suitable habitat around eight additional NSO nest sites, potential effects on wildlife species of concern and their habitats within the Action Area would be the similar to those described above for the No Action Alternative (see Section 4.7.2). Timber harvest activities on 1,864 acres that would be allowed under this alternative within the additional eight incidental take sites would be conducted pursuant to the conservation measures contained in the NSO HCP. These measures provide for retention of a variety of tree sizes (height and diameter) and species within WLPZs, habitat retention areas (groups of retained trees greater than one-half acre) and individual tree clumps, with priority given to wildlife habitat trees. These measures could result in long-term beneficial effects on wildlife species associated with mid- to late-seral habitat, and are anticipated to result in the same or similar effects compared to those anticipated to occur under the No Action Alternative.

The Proposed Action would allow timber harvest activities at eight additional spotted owl sites, thereby reducing the amount of older forest in these areas below the “no-take” habitat thresholds for owl sites, as defined in the NSO HCP. Apart from the authorized incidental take of those spotted owl pairs, the additional timber harvest at these sites would otherwise be subject to the management practices and regulatory requirements as described for the No Action, relative to Federal- and State-listed species, and to other wildlife species. This harvest would be dispersed over space and time in a manner such that it would represent a minimal annual increase in the amount of forest entering younger age classes, and a minimal annual decrease in the amount of forest in older age classes. In some years, the amount of older forest harvested as a result of the action would be offset by forest growth and maturation of stands into suitable owl habitat, and the overall trend of increasing suitable owl habitat would occur. In the context of Green Diamond’s ownership, the additional area subject to harvest as a result of the eight additional incidental takes would not result in any significant impact to wildlife populations that use these forest age classes.

4.7.3.2 Riparian Management Effects

Implementation of the Proposed Action will continue to provide special benefits to frogs and salamanders as a result of the anticipated increase in the amount of available habitat for breeding and feeding. Similar increases in riparian habitat for feeding and roosting, for bats, owls, and similar animals, should reduce competition for tree nesting and roosting sites among these types of animals. The increased amount of late-seral-forest habitat within riparian corridors, anticipated as a result of implementation of the Proposed Action would benefit herons and eagles through creation of a more varied habitat base for foraging and feeding. These measures are anticipated to result in similar effects compared to those anticipated to occur under the No Action Alternative.

4.7.3.3 Listed Wildlife Species and Other Wildlife Species of Concern

Potential benefits to listed species under the Proposed Action would be similar to those described under the No Action Alternative. Implementation of State regulations, augmented by additional measures identified in the Green Diamond NSO HCP, would continue to

provide benefits to listed species that breed or forage in older trees and late-seral-forest stands, such as bald eagles, and northern spotted owls (Table 4.7-1). These measures would also provide comparable benefits for other wildlife species of concern (unlisted species) presumed or known to occur in the Action Area. These would include species that breed or forage in older trees or late-seral stands (e.g., osprey, Vaux's swift, Pacific fisher, Humboldt marten, and Sonoma and red tree voles).

4.7.4 Alternative A

Forest management activities and most NSO HCP conservation measures would be the same under Alternative A as under the No Action Alternative and the Proposed Action. Timber harvest would be allowed around eight additional NSO nest sites and in three set-asides. Potential effects on terrestrial wildlife habitat and wildlife species of concern within the Action Area would be similar to those described above for the Proposed Action. The amount of habitat 46 years old or greater would continue to increase over the remainder of the permit period.

Release of the three set-aside areas under Alternative A may create some potential insignificant adverse impacts to these resources in the Action Area by virtue of being available for timber harvest under this alternative. However, Green Diamond would continue to avoid or minimize potential adverse impacts to listed and unlisted wildlife species. Under this alternative, Green Diamond would remain subject to State regulatory requirements to avoid or mitigate adverse effects of timber harvesting on all wildlife, including species listed or proposed for listing under the Federal and State ESAs.

Continued compliance with existing regulations and implementation of Green Diamond's NSO HCP should over time also result in a trend toward forest development that promotes greater structural diversity and a greater number of stands with late-seral forest characteristics, relative to what currently exists, (especially within WLPZs). This trend is beneficial to listed species, presumed or known to occur in the Action Area, that breed or forage in older trees or late-seral stands. These species include the bald eagle, and northern spotted owl. The trend is also beneficial to other wildlife species of concern presumed or known to occur in the Action Area that are associated with late-seral conditions (e.g., osprey, Vaux's swift, Pacific fisher, Humboldt marten, and red and Sonoma tree voles).

4.7.5 Cumulative Impacts—Terrestrial Habitat/Wildlife Species of Concern

The assessment of potential cumulative impacts on terrestrial wildlife habitat and wildlife species of concern was conducted using the approach described in Section 4.1.2, Cumulative Impacts Analysis. The assessment area for cumulative impacts consists of the 11 HPAs that contain Action Area lands owned by Green Diamond, and other lands that are predominantly either privately owned, administered by a Federal resource management agency, or are State or Federal park lands. Resource management strategies being applied in these HPAs, combined with future management strategies that would be used by Green Diamond, have the potential to result in cumulative effects on terrestrial-wildlife habitat and wildlife species of concern.

Although certain habitat disturbances are anticipated to occur, no significant effects on listed terrestrial wildlife species or other wildlife species of concern are expected under any

of the alternatives. Under all alternatives, including the No Action, Green Diamond would: (1) implement specific measures contained in existing regulations, or developed pursuant to the THP process; and (2) implement measures contained in the NSO HCP. Existing regulations also require that impacts to other wildlife species of concern (if they occur) be minimized to a level of insignificance. This cumulative impact assessment considers other predominant conservation or management strategies, besides Green Diamond's, that are being implemented in the 11 HPAs.

4.7.5.1 Impacts Associated with Other Actions

Conservation measures associated with the PALCO HCP are designed to: (1) promote riparian and upland wildlife habitat quality; (2) minimize and mitigate the impacts of incidental take of specified species; (3) minimize potential adverse impacts to listed wildlife species; and (4) minimize or mitigate potential adverse impacts to wildlife species of concern, using various general conservation prescriptions and species-specific conservation measures. Additional measures contained in the PALCO HCP that are specific to the marbled murrelet, but have secondary benefits to northern spotted owls and other terrestrial wildlife species, include: (1) establishing a series of reserves, which are large, contiguous areas of second growth and residual old growth surrounding the major remaining stands of uncut old growth on PALCO lands; and (2) limiting timber harvesting within these reserves to habitat enhancement projects that benefit the marbled murrelet (through the year 2049); and (3) implementing silvicultural prescriptions, outside the reserve areas, that favor attainment of mature forest conditions within 300-foot selective harvest buffers on PALCO property, adjacent to old-growth redwood in State parks. These measures augment existing CFPR protections for listed wildlife species and wildlife species of concern. The beneficial effects of the PALCO HCP on terrestrial habitat and wildlife species of concern would primarily occur within the Eel River and Humboldt Bay HPAs, where PALCO has substantial ownership.

As discussed in Section 4.5, Vegetation/Plant Species of Concern, forest trends in the Green Diamond ownership will lead to increased age class and size, as well as increased total acreage with dense canopy closure. The accelerated development of mid- and late-seral stand types as a result of implementation of the conservation measures under the AHCP/CCAA is anticipated to be most pronounced within riparian areas. These trends would be expected to result in some long-term beneficial effects to northern spotted owls and other wildlife species that use these habitats.

On private commercial timberlands where HCPs do not currently exist, continued implementation of measures contained in the CFPRs (special protections afforded to certain species of concern, and to features such as wetlands, wet meadows, watercourse and lake protection zones, and snags) and other measures identified during the THP preparation and review process would minimize potential adverse impacts to listed and other wildlife species of concern to a level of insignificance. Continued implementation of existing regulations on these lands would result in a more varied vegetation mosaic over the landscape, trending toward development of a greater number of mid- and late-seral forest types. Continued implementation of the CFPR measures designed to protect riparian vegetation and minimize potential impacts to marbled murrelet and bald eagle habitat would provide for a greater number of large trees, over time, in riparian areas. Vegetation management activities in

riparian areas would be expected to remain relatively unchanged from existing timber-harvesting practices, and similar species compositions would be retained.

On the largest area of tribal timberlands in the assessment area, the Hoopa Valley Tribe manages its timberlands under a Forest Management Plan with habitat standards that meet or exceed those of the CFPRs.

The resource management strategies on lands administered by the USFS and BLM include the continued implementation of aquatic and riparian resource guidelines contained in the NWFP for Federal lands. These strategies are generally conservative and low-priority in nature; do not allow timber harvesting or other activities in wide, fixed-width riparian buffers prior to a completed watershed analysis; and provide a wide range of benefits to wildlife species of concern that rely on these habitats for feeding, roosting, or shelter. The NWFP strategy also places heavier emphasis on late-seral-stand development that would favor species with late-seral habitat associations, such as frogs, salamanders, herons, eagles, bats, marbled murrelets, and owls. The USFS management plan for the Six Rivers National Forest also contains general and species-specific management directions that provide benefits to wildlife species of concern that rely on upland habitat associations. Current benefits to terrestrial habitat and wildlife species of concern, in those HPAs where Federal agencies are the predominant land managers, would be expected to continue into the future.

Resource management strategies on lands administered by the State of California and the National Park Service essentially allow no commercial timber harvesting; although pre-commercial thinning of some timber stands may occur occasionally for purposes of stand improvement. In addition, streamside and upslope activities that would affect riparian resources are extremely limited. The absence of active land management practices within park lands may result in a certain homogenization, over time, of upslope forest vegetation types, and, consequently, terrestrial habitat types, which favor species that rely primarily on late-seral habitat associations. Thinning of some stands in combination with the absence of commercial harvesting of mature and over-mature trees would accelerate this process. Positive benefits associated with continuation of low-level management in the parks would accrue to those species that rely on these habitat associations. Species that rely on early-seral or mid-seral habitat associations would not be as strongly favored, and populations of these species may actually decrease over time, as these habitats decline on park lands. However, current population levels of many early- and mid-seral species are not likely reflective of population levels that existed historically in the area, as a result of logging, mining, and other human activities in the past 100 years, which have increased the amount of these seral stages.

For the reasons discussed above (Section 4.6.5.2, "Proposed Critical Habitat Changes"), the proposed amendments to the HCP, when considered together with the revisions to northern spotted owl and marbled murrelet critical habitat (if implemented as proposed), are not expected to result in significant adverse cumulative effects on terrestrial habitat or wildlife species of concern.

Overall, the cumulative result of implementing all of these resource management programs, when considered together with the proposed amendments to the HCP, would be a trend toward development of more mid- to late-seral forest stands within each of the 11 HPAs, beyond currently existing levels. This trend would favor species with late seral habitat associations. Impacts to wildlife species of concern, however, would be relatively insignificant.

4.7.5.2 Cumulative Impacts Associated with the Proposed Action and Alternative A

As discussed in Section 4.5, Vegetation/Plant Species of Concern, under the current management regime, forest trends in the Green Diamond ownership will lead to increased age class and size, as well as increased total acreage with dense canopy closure. These trends are expected to continue under the Proposed Action and Alternative A. The development of mid- and late-seral stand types as a result of implementation of the conservation measures under the Proposed Action and other alternatives is anticipated to be most pronounced within riparian areas. These trends would be expected to result in some long-term beneficial effects on wildlife species that use these habitats. The impact of implementation of the Proposed Action or Alternative A would be to provide additional incremental benefits to wildlife species with mid- to late-seral habitat associations, as noted above.

4.8 Air Quality

The purpose of this Section is to evaluate the potential impacts to air quality associated with implementing the Proposed Action or Alternative A relative to the No Action Alternative.

4.8.1 Methodology

As discussed in Section 3.8, Green Diamond-owned lands in Del Norte and Humboldt counties are in attainment for all State and Federal air quality standards, with the exception of the California standard for PM₁₀. The analysis in this Section focuses on whether implementation of the Proposed Action or Alternative A would result in degradation of existing air quality.

4.8.2 No Action Alternative

Existing sources of PM₁₀ in Del Norte and Humboldt counties include vehicles, sea salts, wood stoves (particularly in the winter months), dust, pulp mills, nitrates, sulfates, and other unknown sources. Management actions by timberland owners in the vicinity of the Action Area are also contributors to particulate emissions (see Section 3.8). Incidence of PM₁₀ from Green Diamond's timber management is typically attributable to slash burning and roadway dust entrainment.

In addition to the NSO HCP, Green Diamond would continue to implement ownership-wide mitigation, management, and monitoring measures in accordance with the requirements of the CFPRs.

Conservation measures (e.g., restrictions on areas in which timber can be harvested, exclusion of heavy equipment in WLPZs) could reduce Green Diamond's contributions to area PM₁₀ over time by improving road conditions (and reducing PM₁₀ visibility impacts). Although these measures are anticipated to result in some improvement in air quality (reduction in PM₁₀ generation by improved road conditions), the improvements are not anticipated to be measurably different than those anticipated under current conditions.

4.8.3 Proposed Action

Potential impacts to air quality from implementing the Proposed Action Alternative would be similar to those under the No Action Alternative. Green Diamond would continue to implement measures contained in the NSO HCP and the CFPRs. General timber harvesting and forest management activities, road management and riparian conservation measures would remain the same for the Proposed Action Alternative, but would occur around eight additional NSO nest sites.

4.8.4 Alternative A

As under the Proposed Action, Green Diamond would continue to implement measures contained in the NSO HCP and CFPRs. Impacts would be similar to those under the Proposed Action. General timber harvesting and forest management activities would remain the same under Alternative A as in the Proposed Action and No Action Alternatives.

4.8.5 Cumulative Impacts—Air Quality

Other commercial timberland owners, plus State and Federal land managers, who administer nearby publicly owned timberlands, are anticipated to continue with similar practices that have the potential to result in impacts to air quality in the 11 HPAs. On this basis (and because Green Diamond's timber operations with the potential to affect air quality would not change under the Proposed Action or any of the alternatives), the cumulative result of implementing any of these resource management programs is not expected to be significant.

4.9 Visual Resources

The purpose of this Section is to evaluate the potential impacts to visual resources associated with implementing the Proposed Action or Alternative A relative to the No Action Alternative.

4.9.1 Methodology

For this analysis, an impact to visual resources would occur if the quality of the landscape was diminished as a result of implementing the Proposed Action or Alternative A.

4.9.2 No Action Alternative

Green Diamond would continue to conduct timber harvesting in the Action Area in accordance with existing regulations and guidelines discussed in Section 2.1 of this EA, in accordance with the requirements of the CFPRs. This includes establishment of WLPZs for Class I, II, and III streams, limited activities within the Class I and II WLPZs, and ELZs for Class III WLPZs.

Green Diamond's activities have the potential to affect aesthetic resources by introducing elements that interrupt the visual continuity of the landscape, such as even-aged harvesting. Timber harvesting within the Action Area would be conducted within sight of scenic highways (e.g., U.S. Highway 101 and State Highway 299) and recreation areas on adjacent public lands (e.g., Redwood National and State Parks, Smith River National

Recreation Area). These operations can diminish aesthetic resources enjoyed by the public. Existing visual conditions experienced by highway travelers and recreation area users would continue to occur under the No Action Alternative. Visual effects of timber harvesting could be expected to be reduced to some extent by implementing existing provisions that are designed, in part, to minimize the potential visual impacts of commercial forest management. These measures are:

- Individual clearcuts cannot exceed 30 acres.
- Individual clearcuts shall be separated by an area at least as large as the clearcut or 20 acres, whichever is smaller, and shall be separated by at least 300 feet in all directions.
- Units adjacent to a clearcut cannot undergo even-aged harvesting until after a specified amount of time has passed, or the clearcut has regenerated to an approved age- or size-class composition.
- Clearcuts should be defined by logical unit boundaries but may be irregularly shaped and variable in size in order to mimic natural patterns and features found in landscapes.
- Special consideration for aesthetic enjoyment must be given to silvicultural treatments and timber operations within 200 feet of the edge of the traveled surface of any permanent road maintained by the County or the State, or within 200 feet of adjacent non-Federal lands not zoned for timber production.

4.9.3 Proposed Action

As under the No Action Alternative, general timber harvesting and forest management activities would remain the same for the Proposed Action, but would occur around eight additional NSO nest sites. Green Diamond would continue to implement measures contained in the NSO HCP and the CFPRs. Accordingly, the potential for impacts to visual resources is expected to be similar to the conditions described above for the No Action Alternative.

4.9.4 Alternative A

As under the No Action Alternative (and the Proposed Action), Green Diamond would continue to implement the NSO HCP and CFPRs. With the exception of releasing the three set-aside areas noted above for harvest entry, general timber harvesting and forest management activities would remain the same under Alternative A as in the Proposed Action. As a result, potential impacts to visual resources within the Action Area would be substantially similar to impacts described under the Proposed Action

4.9.5 Cumulative Impacts—Visual Resources

Similar minor visual differences could also occur in other private forestlands in the 11 HPAs, but State and Federal lands located within the analysis area for determining cumulative impacts would continue to be managed to meet visual quality objectives. Accordingly, overall the individual and cumulative result of implementing any of these resource management programs would be less than significant in cumulative impact area over time.

4.10 Recreation

The purpose of this Section is to evaluate the potential impacts to recreation from implementation of the Proposed Action or Alternative A.

4.10.1 Methodology

As discussed in Section 3.10, Recreational Resources, Green Diamond offers limited access to its forestlands to groups and individuals for recreational activities of hunting, fishing, camping, picnicking, hiking, mountain biking, motorcycle and horseback riding, and shooting. A recreation impact would occur when the recreational experiences enjoyed by the public are diminished by activities conducted within the Action Area. This assessment is based on the potential for the Proposed Action or Alternative A to diminish enjoyment of recreational opportunities listed above. Because of the ongoing nature of timber harvesting activities over such a broad geographic area, it is not possible to accurately predict when and where specific impacts would occur.

4.10.2 No Action Alternative

Under the No Action Alternative, Green Diamond would continue to conduct timber harvesting in the Action Area in accordance with existing regulations, guidelines, and management practices discussed in Section 2.1 of this EA. Timber harvesting in the Action Area would be conducted within sight of recreation areas on adjacent public lands, including highly sensitive recreation areas such as the Smith River National Recreation Area and the Redwood National and State Parks complex. These operations can diminish aesthetic resources enjoyed by the public. However, timber harvest levels under the No Action Alternative are expected to be similar to current conditions throughout the Action Area and, therefore, such actions would be consistent with historical patterns of use, including the aesthetic impacts of such use. Green Diamond and other private forest landowners within the vicinity of the Action Area would continue to follow existing regulations designed to minimize visual and associated recreational effects (see Section 4.9, Visual Resources).

4.10.3 Proposed Action

As under the No Action Alternative, general timber harvesting and forest management activities would remain the same for the Proposed Action Alternative, but would occur around eight additional NSO nest sites. Green Diamond would continue to implement measures contained in the NSO HCP and the CFPRs. Accordingly, the potential for impacts to recreational resources is expected to be similar to that of the No Action Alternative.

4.10.4 Alternative A

As under the Proposed Action, Green Diamond would continue to implement the NSO HCP and CFPRs. With the exception of releasing the three set-aside areas noted above for harvest entry, general timber harvesting and forest management activities would remain the same as in the Proposed Action. As a result, potential impacts to recreational resources within the Action Area would be substantially similar to impacts described under the Proposed Action and No Action Alternatives.

4.10.5 Cumulative Impacts—Recreation

Because the Proposed Action's conservation measures are associated with existing timber harvesting activities, which would not change under the Proposed Action, no cumulative impact would occur from implementing the Proposed Action in association with other private forestlands in the 11 HPAs. In addition, State and Federal lands within the cumulative impact area would continue to be managed to meet recreational objectives. Accordingly, potential individual and cumulative impacts would be less than significant.

Further, alterations to fish and wildlife habitat resulting from timber harvesting conducted under the Proposed Action and alternatives including the No Action alternative, would also be consistent with historical practices. Based on the analysis in Section 4.4 (Aquatic Resources) and Section 4.7 (Terrestrial Habitat/Wildlife Species of Concern), changes to fish and wildlife habitat under all of the alternatives would continue to support wildlife viewing, hunting, and fishing opportunities. Other expected habitat improvements throughout the 11 HPAs as a result of continued implementation of the PALCO HCP, continued implementation of existing regulations on other commercial timberlands, continued management of USFS and BLM lands pursuant to Northwest Forest Plan guidelines, and continued management of State and national parks would also provide benefits. Accordingly, overall the individual and cumulative result of implementing any of these resource management programs would be less than significant in the 11-HPA assessment area over time.

4.11 Cultural Resources

The purpose of this Section is to evaluate the potential impacts of implementing the Proposed Action or Alternative A, relative to the No Action Alternative, on cultural resources.

4.11.1 Methodology

Timber harvesting and other management operations can result in impacts to individual sites (or resources) and to resource networks (e.g., trails). Impacts to cultural resources would be significant if they did not comply with existing regulations for protecting cultural resources. Federal agencies have a duty under the National Historic Preservation Act (NHPA) to consider potential impacts to cultural resources for actions which are determined to be undertakings. The USFWS has determined that issuance of the amended ITP to Green Diamond, as described in the Proposed Action and Alternative A, constitutes an undertaking to the limited extent that we authorize take incidental to non-Federal actions that are not themselves Federal undertakings, but which may result in take of northern spotted owls and in such an instance would require Federal authorization to lawfully proceed.

4.11.2 No Action Alternative

Under the No Action Alternative, Green Diamond will continue to comply with the CFPRs in the preparation of THPs, when conducting timber harvest operations in the Action Area. Pursuant to the CFPRs, the following steps must be taken in preparation of THPs:

- Conduct an archaeological record search at the Northwest Information Center North Coast Information Center (Yurok Tribe, Culture Department).

- Contact local Native Americans identified by the Native American Heritage Commission (NAHC) 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. California Department of Forestry and Fire Protection (CDF) would determine if a substantial adverse change to the resource would occur, and protection measures would be developed to reduce the impact to a less than significant level.
- 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.

Typical examples of site specific measures which have been used by Green Diamond and other commercial timber land owners that are designed to achieve a finding from CDF of “no substantial adverse change” include, but are not limited to:

- No timber operations within a site’s boundary or within a site’s Special Treatment Zone (STZ). The STZ is defined as the area extending outward from a site’s boundary to a distance of 100 feet.
- Allowance of limited timber operations within a site and STZ or only within the STZ. These limited operations are designed to avoid impact on a site’s cultural or historical value. Such limited operations may include, but are not limited to:
 - Directional falling of timber from within a site’s boundary, towards a site’s edge and into the STZ and 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, landing or skid trails. RPFs must mark trees in advance, and if trees cannot be directionally fallen, for reasons of safety, they may not be cut without submission and approval of alternative approaches which will achieve the same outcome.
 - Required extensive archeological surveys (i.e., subsurface testing) and onsite monitoring to ensure road construction or reconstruction within a site or STZ avoids impacts on the site’s cultural or historical value.

- Roads and landings within a site or STZ, which are proposed for use and maintenance, are covered with geotextile fabric and capped with culturally sterile material sufficient to conduct use and maintenance without scarifying preexisting road material. These roads and landings are also drained to avoid deflection of water onto site areas.
- Skid trails within a site or STZ, which 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 archeological 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 site and notify CDF, and resource protection measures would be implemented. In the event of discovery or recognition of any human remains outside a dedicated cemetery, no further disturbance of the site or any nearby area would occur until the county coroner determined that no investigation of the cause of death is required. If the remains are of Native American origin, then the descendants of the deceased Native Americans must make a recommendation to the landowner or the person responsible for the excavation work for means of treating or disposing of, with appropriate dignity, the human remains of any associated grave goods as provided in Public Resources Code Section 5097.98. Further work could occur if the NAHC was unable to identify a descendant or the descendant failed to make a recommendation within 24 hours after being notified by the Commission.

4.11.3 Proposed Action

Under the Proposed Action, Green Diamond would continue timber harvest activities in the Action Area in accordance with existing regulations and ownership-wide mitigation, management, and monitoring measures in accordance with the requirements of the CFPRs, and the cultural resources protections discussed above for the No Action Alternative. The minimization and mitigation measures in this alternative would not change the way in which State cultural resources regulations are applied. Green Diamond would continue to implement ownership-wide mitigation, management, and monitoring measures in accordance with the requirements of the CFPRs, and would continue to comply with the cultural resources protections discussed above for the No Action Alternative.

All of the activities that could result in the incidental take of NSO, and thus require an ITP, are timber harvest activities subject to the THP review process, pursuant to the CFPRs administered by CDF. As a result of applying the CFPRs, effects to cultural and historic properties are expected to be equivalent to or less than those of the No Action Alternative.

4.11.4 Alternative A

Under Alternative A, Green Diamond would continue timber harvest activities in the Action Area in accordance with existing regulations and ownership-wide mitigation, management, and monitoring measures in accordance with the requirements of the CFPRs, and the cultural resources protections discussed above for the No Action Alternative. The minimization and mitigation measures in this alternative would not change the way in which State cultural resources regulations are applied. Green Diamond would continue to

implement ownership-wide mitigation, management, and monitoring measures in accordance with the requirements of the CFPRs, and would continue to comply with the cultural resources protections discussed above for the No Action Alternative.

All of the activities that could result in the incidental take of NSO, and thus require an ITP, are timber harvest activities subject to the THP review process, pursuant to the CFPRs administered by CDF. As a result of applying the CFPRs, effects to cultural and historic properties are expected to be equivalent to or less than those of the No Action Alternative.

4.12 Land Use

The purpose of this Section is to evaluate the potential impacts on land use from implementing the Proposed Action or Alternative A relative to the No Action Alternative.

4.12.1 Methodology

Land use impacts are typically described as inconsistencies with applicable land use plans and policies. In accordance with California law, local governments directly control land use through the adoption of general plans and zoning ordinances. The general plan provides policy direction regarding land use, and the zoning code provides specific mechanisms to implement general plan policies. As described in Section 3.12, Land Use, the Green Diamond forestlands and other private forestlands in the vicinity of the Action Area are included within the General Plans and Zoning Ordinances of Del Norte and Humboldt counties. Conflicts with adjacent land uses (e.g., incompatibilities with the type or intensity of existing or planned surrounding uses) are also a type of land use impact. Other regulatory mechanisms, such as the CFPRs, the Basin Plan of the North Coast Regional Water Quality Control Board, and various endangered species recovery plans, indirectly control land use; compatibility with these plans is described elsewhere in this document, under the appropriate resource category heading.

4.12.2 No Action Alternative

The General Plans of both Del Norte and Humboldt counties designate the Green Diamond forestlands in the Action Area as suitable for timber production. This designation is consistent with past and intended future use of the Action Area. Because the No Action Alternative would continue essentially the same type of management activity as is currently practiced (i.e., timber production), it is consistent with the Del Norte County and Humboldt County General Plans. With regard to zoning, most of the Green Diamond forestlands in the Action Area are designated as TPZ in the Zoning Ordinances of Del Norte County and Humboldt County. As described above, 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 on the Green Diamond forestlands, it is consistent with the intent of the TPZ district.

4.12.3 Proposed Action and Alternative A

Implementation of the Proposed Action or Alternative A would not result in the creation of a new and incompatible land use and would, therefore, have no impact on land use plans and policies within the Action Area.

4.12.4 Cumulative Impacts—Land Use

Timber management activities on the Green Diamond forestlands are also consistent with activities occurring on other commercial forestlands in the areas. Implementation of the No Action Alternative would not result in the creation of a new and incompatible land use, because timber management activities on the Green Diamond forestlands would be consistent with past management activities and with existing land use plans and policies. Additionally, the TPZ zoning establishes the presumption that timber harvesting is expected to and would occur in the future, and the Timberland Productivity Act states that “timber operations conducted [on TPZ land pursuant to the CFPRs]...shall not constitute a nuisance, public or private.”

Land use activities under the Proposed Action and Alternative A would occur in a similar manner as under the No Action Alternative. Accordingly, the cumulative result on land use of any of these resource management programs would be less than significant in the 11-HPA assessment area over time.

4.13 Socioeconomic Conditions

The purpose of this Section is to evaluate the potential impacts of implementing the Proposed Action or Alternative A, relative to the No Action Alternative, on socioeconomic conditions.

4.13.1 Methodology

Over the term of NSO HCP and its amendments, key socioeconomic indicators (e.g., Green Diamond employment) are likely to be affected by several internal and external influences (e.g., market forces in the lumber and wood products sector) that are unrelated to the NSO HCP and its amendments. This analysis assesses the potential for such changes to occur under the Proposed Action and the alternatives. In addition, 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).

4.13.2 No Action Alternative

As discussed above, key socioeconomic indicators are likely to be affected by several internal (i.e., Green Diamond-related) and external influences that are unrelated to the NSO HCP and its amendments. In addition, regulatory requirements will continue to affect management activities in the vicinity of the Action Area and have the potential to affect timber harvesting (and socioeconomic conditions, including subsistence and commercial fishing by Native Americans) in the absence of an approved amendment to the NSO HCP. Consequently, some changes in socioeconomic conditions relative to current conditions could occur. The ability to predict them, however, is subject to market indicators and influences that are not readily evident or are unknown. For the purposes of this analysis,

timber harvest levels under the No Action Alternative are expected to remain about the same as current levels and, therefore, changes in socioeconomic conditions are assumed to be minor.

4.13.3 Proposed Action and Alternative A

Overall, the average volume of timber harvested from the Action Area would be the same under the Proposed Action and Alternative A as would be expected under the No Action Alternative. The socioeconomic consequences of changes in timber harvesting levels are not expected to be significant. Timber harvesting activities would continue to occur on the Green Diamond forestlands and, therefore, the need would still exist for Green Diamond to employ timber management and support staff.

No changes in timber harvesting levels are anticipated from one alternative to another and would, therefore, have a negligible effect on local businesses supported by the indirect effects of Green Diamond employment. Likewise, yield taxes paid to Del Norte and Humboldt counties would not change by a substantial amount. Similarly, implementation of the Proposed Action or Alternative A would have a negligible effect on Native Americans dependent on subsistence and commercial fishing in the region and improvements in Native American socioeconomic conditions would be minor.

Overall effects on the local economy due to timber harvesting on other private forestlands in the vicinity of the Action Area are not expected to be substantial for the reasons described above. Management activities on adjacent State and Federal lands are expected to remain similar to current conditions. For these reasons, potential individual impacts on socioeconomic conditions would be less than significant.

4.13.4 Environmental Justice

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994), requires Federal agencies to make the achievement of environmental justice part of their mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. EO 12898 further stipulates that the agencies conduct their programs and activities in a manner that does not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination because of their race, color, or national origin. The Presidential Memorandum that accompanied EO 12898 states that a NEPA document should include analysis of "effects in minority communities and low-income communities."

Potentially affected minority populations in the Action Area include the Yurok Nation and Hoopa Tribe. The close proximity of Yurok and Hoopa lands to Green Diamond lands has resulted in close coordination between Green Diamond and the tribes regarding issues of shared concern, such as road use, timber harvesting, and wildlife.

As presented in Sections 4.2 through 4.13, the potential impacts of the Proposed Action and alternatives would be less than significant. In addition, under all alternatives, timber harvesting levels are expected to remain similar to current levels. On this basis, the Green Diamond workforce (as of January 1, 2006) 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 implementing the Proposed Action or Alternative A. Because all impacts would be less than significant, there would be no environmental justice impacts.

4.13.5 Cumulative Impacts—Socioeconomic Conditions

Covered activities on the Green Diamond forestlands are consistent with activities occurring on other commercial forestlands in the 11-HPA assessment area for cumulative impacts. Implementation of the Proposed Action and Alternative A would not substantively change the socioeconomic conditions compared with the No Action Alternative and existing conditions and, therefore, would not result in cumulative impacts.

4.14 Summary of Cumulative Impacts

This Section presents a summary of the detailed cumulative effects analyses located at the end of each of the resources discussion in this chapter.

4.14.1 No Action Alternative

4.14.1.1 Northern Spotted Owls

Growth projections indicate that under the current management regime, forest trends in the Green Diamond ownership will lead to increased age class and size, as well as increased total acreage with dense canopy closure. Changes in habitat type, size class, and canopy-cover class would be most evident in the riparian areas. There was a net increase of over 55,000 acres in the 31 to 45 and 46+ age classes between 1992 and 2002 and additional areas of suitable habitat will develop in the future up to 2022. Future increases in the area of suitable habitat are expected to benefit the Green Diamond northern spotted owl population. However, recent demographic studies indicate that the local population may be in a slight decline. A number of factors, including (1) weather conditions; (2) a region-wide decline in key prey species; (3) interaction and competition with barred owls; (4) loss of habitat to wildfire; (5) loss of habitat to logging on State, private, and tribal lands; (6) forest defoliation from insects; (7) advancing forest succession toward climax fir communities in the absence of fire; (8) potential adverse effects of displacements allowed under the ITP; and other factors have been identified as potential contributors to the recent decline in reproduction by spotted owls on the ownership, as well as within the region. These explanations remain speculative.

4.14.1.2 Other Environmental Resources

Hillslope mass wasting, hydrologic, and water quality conditions and processes that could impact aquatic species, as well as aquatic and riparian function, would not be affected by continued implementation of the 1992 NSO HCP under the No Action Alternative compared to existing conditions. Changes in (1) peak flows with potential to affect channel morphology, (2) in-stream LWD, (3) quantity and quality of riparian vegetation, and (4) sedimentation and stream aggradation would not be anticipated to occur as a result of continued implementation of the conservation measures contained in the 1992 NSO HCP. Likewise, although certain minimal habitat disturbances are anticipated to occur, no significant impacts to listed plant species or other plant species of concern are expected.

Growth projections indicate that under the current management regime, forest trends in the Green Diamond ownership will lead to increased age class and size, as well as increased total acreage with dense canopy closure. The species that would benefit the most from this effect include frogs, salamanders, herons, eagles, bats, marbled murrelets, and owls. Likewise, the number and acreage of stands with saplings and small-diameter trees would decrease over time. Wildlife species most adversely affected by these forest trends would be those that feed and breed in early successional riparian habitats (e.g., thrushes, warblers, and sparrows). However, because these species also use adjacent upland forests, impacts on these species are expected to be less than significant.

Potential impacts to air quality; visual, recreational, and cultural resources; and land use and socio-economics under the No Action Alternative are not anticipated to be measurably different than those anticipated under current conditions.

4.14.2 Proposed Action and Alternative A

4.14.2.1 Northern Spotted Owls

The Proposed Action would result in timber harvest around eight additional NSO nest sites. Green Diamond's management policies have resulted in a substantial increase in the area of suitable northern spotted owl habitat and these increases are projected to continue into the future until at least 2022. In combination with the other actions listed in Section 4.1.2.3, a modified Green Diamond NSO HCP that continues to increase the amount of suitable northern spotted owl habitat would not be expected to contribute to significant cumulative adverse effects on the NSO. Potential cumulative benefits within the California Coastal Province may result from the increasing area of suitable habitat on Green Diamond lands if northern spotted owl populations use these areas in the future. The 46+ year-old forest stands that are projected to increase in area on Green Diamond lands are expected to include more structurally complex stand characteristics that may favor northern spotted owls over barred owls. However, further research regarding competition and niche overlap between these species is required (and would be conducted under the Proposed Action and Alternative A) before conclusions can be drawn.

The incidental take of eight additional NSO pairs that would be authorized under the Proposed Action represents 3.8 percent of the 213 northern spotted owl activity centers located on or adjacent to Green Diamond lands in 2006. The four permitted incidental takes of owl sites allowed by the existing ITP under the No Action Alternative would also be allowed under the Proposed Action for a total of 12 more incidental take of owl sites over the term of this amendment. These 12 incidental takes represent 5.6 percent of the 213 northern spotted owl activity centers located on or adjacent to Green Diamond lands. There is and will continue to be a substantial area of unoccupied and suitable northern spotted owl habitat available within the Green Diamond ownership for displaced owls to occupy.

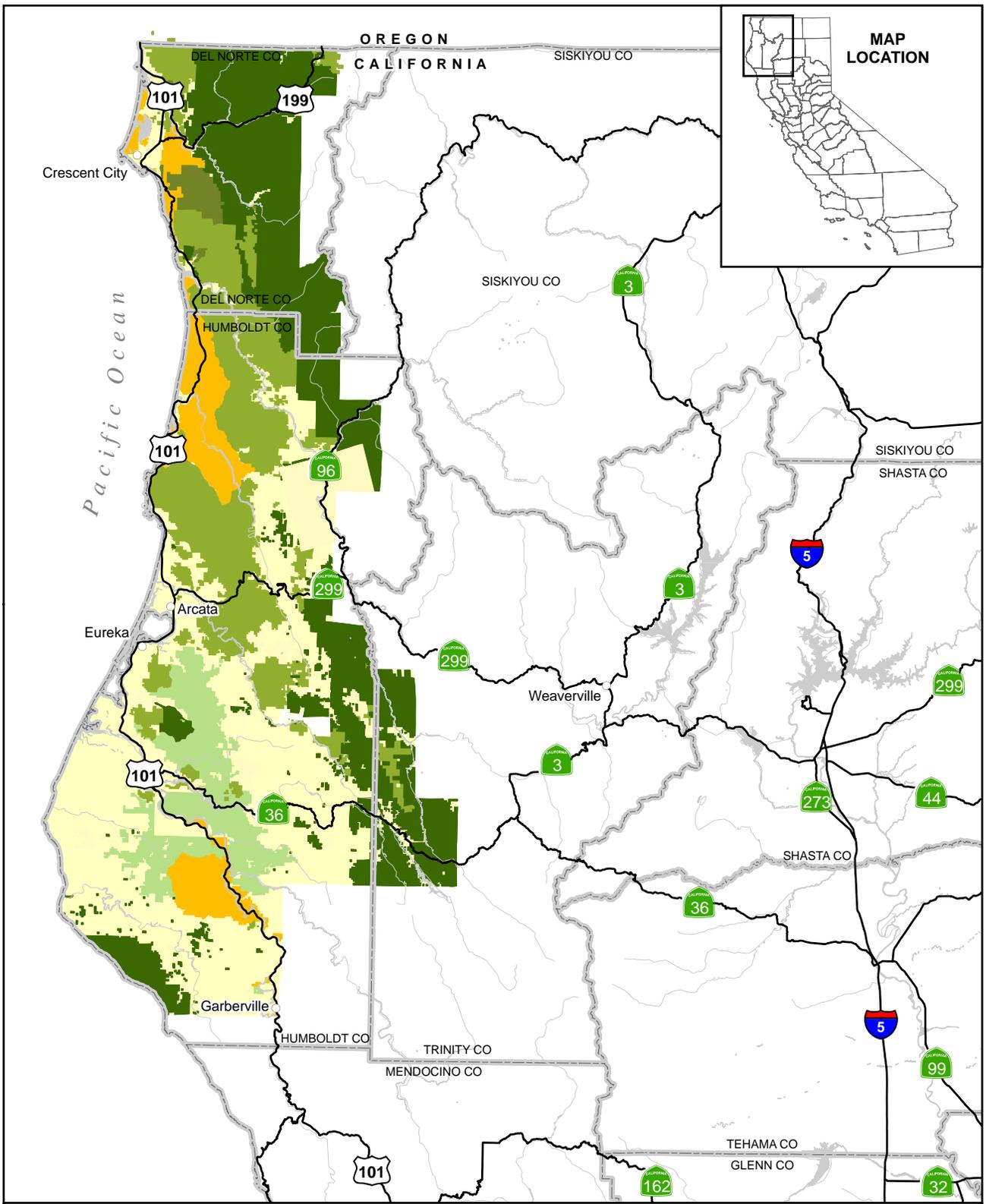
The eight additional incidental takes represent about 0.6 percent of the rough estimate of 1,390 northern spotted owl activity centers within the California Coast Physiographic Province.

The cumulative effects of Alternative A would be similar to those described for the Proposed Action because the differences between these alternatives are small in the context of the overall Green Diamond ownership. About 903 fewer acres of suitable habitat in

three set-asides would be available for owls in the future under this alternative compared to the Proposed Action.

4.14.2.2 Other Environmental Resources

Implementation of the Proposed Action or Alternative A, in combination with other Federal and non-Federal resource protection and management programs within the 11 HPA cumulative assessment area, would not result in adverse impacts to other environmental resources and, for the most part, would be indistinguishable from effects anticipated under the No Action Alternative.

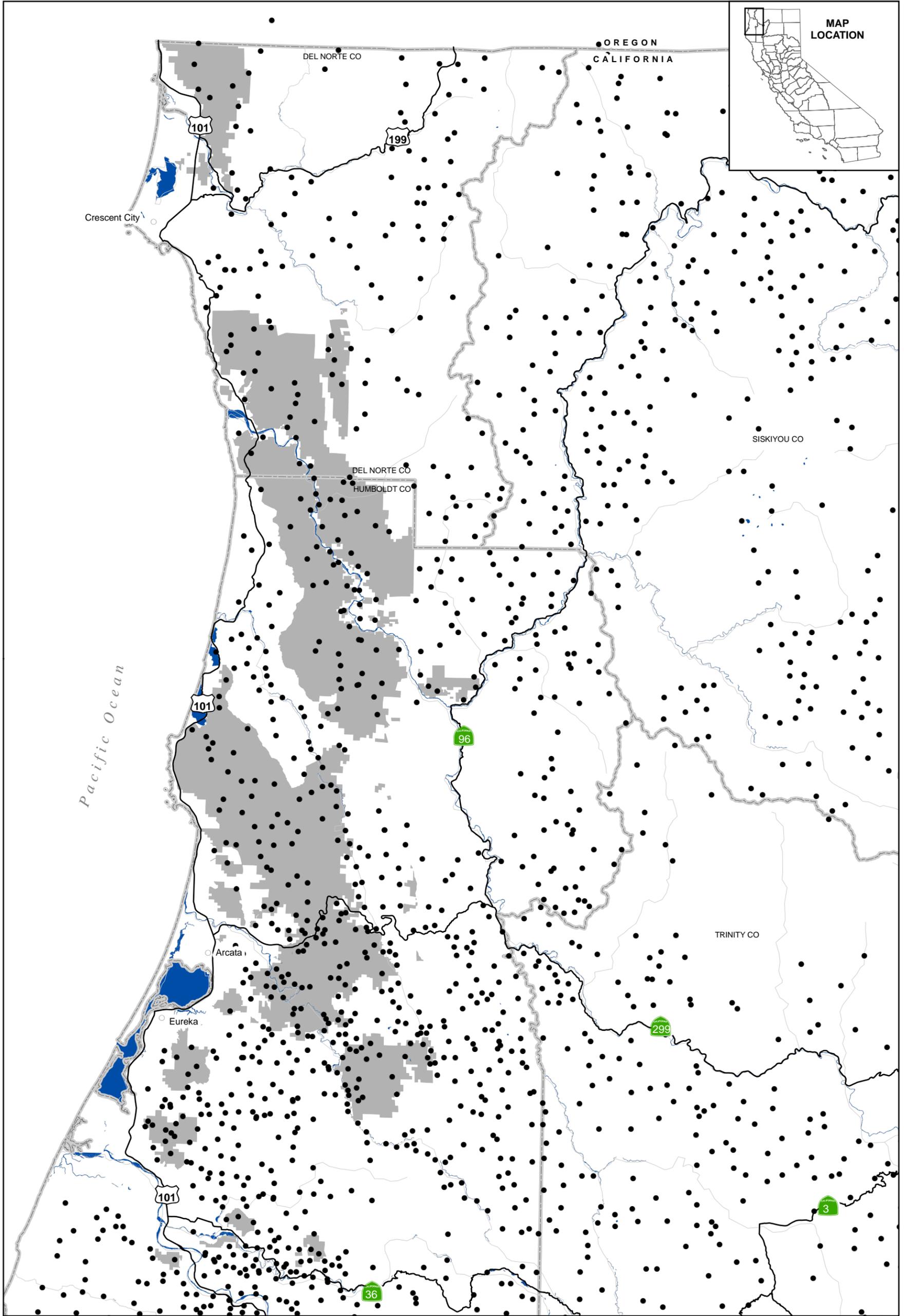


LEGEND

○ CITY	■ GREEN DIAMOND RESOURCE COMPANY
— RIVERS	■ PACIFIC LUMBER COMPANY
▭ COUNTY BOUNDARIES	■ USFS AND BLM
— MAJOR ROADS	■ STATE AND NATIONAL PARKS
	■ OTHER

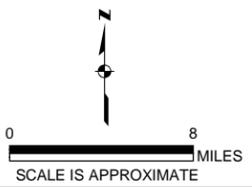

 0 20
 MILES
 SCALE IS APPROXIMATE

**Figure 4.1-1
Regional Land
Ownership**



- LEGEND**
- NSO SITES
 - CITY
 - ACTION AREA
 - COUNTY BOUNDARIES
 - MAJOR ROADS
 - MAJOR WATER BODIES
 - RIVERS

SOURCE: CDEG DATABASE (GOULD, 2006)



**Figure 4.6-1
Historic NSO Sites
1974 to Present on or in the
Vicinity of the Action Area**

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References

Chapter 1

Perry, D.A. 1994. *Forest Ecosystems*. Baltimore, Maryland: The Johns Hopkins University Press.

Smith, D.M. 1962. *The Practice of Silviculture*. 7th ed. New York: John Wiley & Sons.

U.S. Forest Service (USFS). 1973. "Silvicultural Systems for the Major Forest Types of the United States." *U.S. Department of Agriculture Handbook*. No. 445.

Chapter 2

Barrows, C.W. 1981. "Roost Site Selection by Spotted Owls: An Adaptation to Heat Stress." *Condor*. 83: 302-309.

Dark, S.J., R.J. Gutierrez, and G.I. Gould. 1998. "The Barred Owl (*Strix varia*) Invasion in California." *Auk*. 115: 50-56.

Forsman, E.D., E.C. Meslow, and H.M. Wight. 1984. "Distribution and Biology of the Spotted Owl in Oregon." *Wildlife Monographs*. 87: 1-64.

U.S. Centers for Disease Control and Prevention (CDC). 2006.

<http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>. Accessed March 2006.

U.S. Fish and Wildlife Service (USFWS). 2004. *Northern Spotted Owl, Five-Year Review: Summary and Evaluation*. U.S. Fish and Wildlife Service, Portland, Oregon. November. Available at: http://www.fws.gov/pacific/ecoservices/endangered/recovery/pdf/NSO_5-yr_Summary.pdf.

Weaver, W.E., and D.K. Hagans. 1994. *Handbook for Forest and Ranch Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Maintaining and Closing Roads*. Prepared for the Mendocino County Resource Conservation District by Pacific Watershed Associates.

Chapter 3

Allen, M.A., and T.J. Hassler. 1986. "Species Profile: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Pacific Southwest): Chinook Salmon." *USFWS Bio. Rep.* 82(11.49) TREL-84-4.

Anderson, P.R. 1968. The reproductive and developmental history of the California tiger salamander. M.A. thesis. Fresno State College, Fresno, California.

Anderson, D.R., J. Bart, T.C. Edwards, Jr., C.B. Kepler, and E.C. Meslow. 1990. *1990 Status Review: Northern Spotted Owl* *Strix occidentalis caurina*. U.S. Fish and Wildlife Service, Department of the Interior. 95 pp.

Anthony, R.G., M.C. Hansen, K.A. Swindle, and A.M. Ellingson. 2000. *Demographic Characteristics of Northern Spotted Owls on Lands Managed by the Oregon Department of Forestry*. Final Research Report to the Oregon Department of Forestry. Oregon Cooperative Fish and Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon.

Anthony, R.G., G.S. Olson, S. Ackers, E. Forsman, W.J. Ripple, and E.M. Glenn. 2002. Predicting Abundance and Demographic Performance of Northern Spotted Owls from Vegetative Characteristics: Report on Results of Western Oregon Cascades - H.J. Andrews Experimental Forest. As Part of The Northern Spotted Owl Effectiveness Monitoring Plan for The Northwest Forest Plan. Unpublished Annual Report. Oregon Cooperative Fish and Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon.

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.P. Burnham, G.C. White, C.J. Schwarz, J. Nichols, J.E. Hines, G.S. Olson, S.H. Ackers, S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.P. Gerhardt, S.A. Gremel, R.J. Gutiérrez, P.J. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, and S.G. Sovern. 2004. *Status and Trends in Demography of Northern Spotted Owls, 1985-2003*. Draft. Oregon Cooperative Fish and Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon.

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.P. Burnham, G.C. White, C.J. Schwarz, J.D. Nichols, J.E. Hines, G.S. Olson, S.H. Ackers, L.S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.P. Gerhardt, S.A. Gremel, R. J. Gutiérrez, P.J. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, S.G. Sovern. 2006. "Status and Trends in Demography of Northern Spotted Owls, 1985-2003." *Wildlife Monographs*. 163: 1-48.

Aubry, K.B., and P.A. Hall. 1991. "Terrestrial Amphibian Communities in the Southern Washington Cascade Range." *Wildlife and Vegetation of Unmanaged Douglas-fir Forests*. L.F. Ruggiero, K.B. Aubry, A.B. Carey, and M.H. Huff, eds. PNW-GTR-285. U.S. Department of Agriculture Forest Service, Portland, Oregon. pp. 327-338.

Bearss, Edwin C. 1969. *Redwood National Park: History Basic Data; Indians of the Redwoods National Park*. U.S. Department of the Interior, National Park Service, Division of History, Office of Archeology and Historic Preservation (reprinted 1982).

Behnke, J. 1992. "Native Trout of Western North America." *American Fisheries Society Monograph No. 6*. Bethesda, Maryland.

Beyer, K.M., and R.T. Golightly, Jr. 1996. *Distribution of Pacific Fisher and Other Forest Carnivores in Coastal Northwestern California*. Final Report. California Department of Fish and Game. Contract # FG-3156-WM. 28 pp.

Blake, M.C., W.P. Irwin, and R.B. Coleman. 1967. *Upside-down Metamorphic Zonation, Blueschist Facies, Along a Regional Thrust in California and Oregon*. USGS Professional Paper 575C. pp. 1-9.

Blaustein, A.R., J.J. Beatty, D.A. Olson, and R.M. Storm. 1995. *The Biology of Amphibians and Reptiles in Old-growth Forests in the Pacific Northwest*. PNW-GTR-337. U.S. Department of Agriculture Forest Service. 98 pp.

- Bury, R.B. 1968. "The Distribution of *Ascaphus truei* in California." *Herpetologica*. 24(1): 39-46.
- Bury, R.B. 1983. "Differences in Amphibian Populations in Logged and Old-growth Redwood Forest." *Northwest Science*. 57 (3): 167-178.
- Bury, R.B., and P.S. Corn. 1988a. "Douglas-fir Forests in the Oregon and Washington Cascades: Relation of the Herpetofauna to Stand Age and Moisture." *Management of Amphibians, Reptiles, and Small Mammals in North America*. R.C. Szaro, K.E. Severson, and D.R. Patton, eds. Gen. Tech. Rep. RM-166. U.S. Department of Agriculture Forest Service, Rocky Mountain Forest and Range Experiment Station, Ft. Collins, Colorado. pp 11-22.
- Bury, R.B., and P.S. Corn. 1988b. "Responses of Aquatic and Streamside Amphibians to Timber Harvest: A Review." *Streamside Management: Riparian Wildlife and Forestry Interactions*. K.J. Raedake, ed. Institute of Forest Resources, University of Washington, Contribution 59. pp 165-1,981.
- Busby, P.J., T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status Review of West Coast Steelhead from Washington, Idaho, Oregon, and California. NOAA Technical Memorandum, NMFS-NWFSC-27. U.S. Department of Commerce.
- California Department of Finance, Demographic Research Unit. 2006. <http://www.dof.ca.gov/HTML/DEMOGRAP/Druhpar.asp>. Accessed January 4, 2006.
- California Department of Fish and Game (CDFG). 2001. *State and Federally Listed Endangered and Threatened Animals of California*. Habitat Conservation Division, California Natural Diversity Database.
- California Department of Transportation (Caltrans). 2006. *Scenic Highway Program*. http://www.dot.ca.gov/hq/LandArch/scenic_highways/scenic_hwy.htm. Accessed January 31, 2006.
- California Department of Water Resources (CDWR). 1982. *Mad River Watershed Erosion Investigation, Northern District*. June.
- California Department of Finance, Demographic Research Unit. 2006. <http://www.dof.ca.gov/HTML/DEMOGRAP/Druhpar.asp> (Accessed January 4, 2006).
- California Employment Development Department, Labor Market Information Service. 2006. <http://www.calmis.ca.gov/htmlfile/county.htm>. Accessed January 6, 2006.
- California Geological Service (CGS). 1996. *Probabilistic Seismic Hazard Assessment for the State of California*. Open-File Report 96-08.
- California Geological Service (CGS). 1997. *Factors Affecting Landslides in Forested Terrain*. DMG Note 50.
- Carey, A.B., S.P. Horton, and B.L. Biswell. 1992. "Northern Spotted Owls: Influence of Prey Base and Landscape Character." *Ecological Monographs*. 62(2): 223-250.
- Cashman, S.M., H.M. Kelsey, and D.R. Harden. 1995. *Geology of the Redwood Creek Basin, Humboldt County, California: Geomorphic Processes and Aquatic Habitat in the Redwood Creek Basin, Northwestern California*. U.S. Geological Survey Professional Paper 1454-B. pp. B1-B13.

CDFG. See California Department of Fish and Game.

CGS. See California Geological Service.

Corn, P.S., and R.B. Bury. 1989. "Logging in Western Oregon: Responses of Headwater Habitats and Stream Amphibians." *Forest Ecology and Management*. 29: 39-57.

Del Norte, County of. 1996. *Del Norte County General Plan Element Revision*. Draft Background Report. Prepared by Mintier & Associates, Jones & Stokes Associates, Dowling Associates, and the Del Norte Community Development Department, Crescent City, California.

Courtney, S.P., J.A. Blakesley, R.E. Bigley, M.L. Cody, J.P. Dumbacher, R.C. Fleischer, A.B. Franklin, J.F. Franklin, R.J. Gutiérrez, J.M. Marzluff, and L. Sztukowski. 2004. *Scientific Evaluation of the Status of the Northern Spotted Owl*. Sustainable Ecosystems Institute, Portland, Oregon. September.

Crunden, D.M., and D.J. Varnes. 1996. "Landslide Types and Processes." *Landslides: Investigation and Mitigation*. A.K. Turner and R.L. Schuster, eds. Transportation Research Board, National Research Council Special Report 247. pp. 36-75.

Cutler, T.L., and D.W. Hays. 1991. "Food Habits of Northern Spotted Owls in High Elevation Forests of Pelican Butte, Southwestern Oregon." *Northwestern Naturalist*. 72: 66-69.

Dark, S.J., R.J. Gutierrez, and G.I. Gould. 1998. "The Barred Owl (*Strix varia*) Invasion in California." *Auk*. 115: 50-56.

Daugherty, C.H., and A.L. Sheldon. 1982. "Age Determination, Growth and Life History of a Montana Population of the Tailed Frog (*Ascaphus truei*)." *Herpetologica*. 38 (4): 461-468.

Dewitt, J.W. 1954. "A Survey of the Coastal Cutthroat Trout, *Salmo clarki clarki* (Richardson) in California." *California Department of Fish and Game Bulletin*. 40: 329-335.

Diller, L.V., and R.L. Wallace. 1996. "Distribution and Habitat of *Rhyacotriton variegatus* in Managed, Young Growth Forests in North Coastal California." *Journal of Herpetology*. 30: 184-191.

Diller, L.V., and R.L. Wallace. 1999. "Distribution and Habitat of *Ascaphus truei* in Streams in Managed, Young Growth Forests in North Coastal California." *Journal of Herpetology*. 33: 71-79.

Diller, L.V., and D.M. Thome. 1999. "Population Density of Northern Spotted Owls in Managed Young-growth Forests in Coastal Northern California." *Journal of Raptor Research*. 33: 275-286.

Drucker, P. 1937. "The Tolowa and their Southwest Oregon Kin." *University of California Publications in American Archaeology and Ethnology*. 36 (4): 221-230.

Evens, J., and R. LeValley. 1982. "The Spring Migration, Middle Pacific Coast Region." *American Birds*. 36: 889-892.

Folliard, Lee B., Kerry P. Reese, and Lowell V. Diller. 2000. "Landscape Characteristics of Northern Spotted Owl Nest Sites in Managed Forests of Northwestern California." *Journal of Raptor Research*. 34 (2): 75-84.

- Forest Ecosystem Management Assessment Team [FEMAT]. 1993. *Forest Ecosystem Management: an Ecological, Economic, and Social Assessment*. Portland, Oregon: U.S. Department of Agriculture; U.S. Department of the Interior [et al.].
- Forsman, E.D., E.C. Meslow, and H.M. Wight. 1984. "Distribution and Biology of the Spotted Owl in Oregon." *Wildlife Monographs*. 87: 1-64.
- Forsman, E.D., J. Reid, L. deLambert, S. Graham, and J. Mowdy. 2001. "Demographic Characteristics of Northern Spotted Owls (*Strix occidentalis*) on the Tyee Study Area, Roseburg, Oregon: 1985-2001." *Wildlife Habitat Relationships in Washington and Oregon FY2002*. Oregon State University, Corvallis, Oregon.
- Forsman, E.D., R.G. Anthony, E.C. Meslow, and C.J. Zabel. 2004. "Diets and Foraging Behavior of Northern Spotted Owls in Oregon." *Journal of Raptor Research*. 38 (3): 214-230.
- Franklin, A.B., K.P. Burnham, G.C. White, R.J. Anthony, E.D. Forsman, C. Schwarz, J.D. Nichols, and J. Hines. 1999. Range-wide Status and Trends in Northern Spotted Owl Populations. Unpublished Report. Colorado Cooperative Fish and Wildlife Research Unit, Colorado State University, Fort Collins, Colorado.
- Franklin, A.B., D.R. Anderson, R.J. Gutiérrez, and K.P. Burnham. 2000. "Climate, Habitat Quality, and Fitness in Northern Spotted Owl Populations in Northwestern California." *Ecological Monographs*. 70 (4): 539-590.
- Goddard, P.E. 1913. "Wayside Shrines in Northwestern California." *American Anthropologist*. 15: 702-703.
- Good, D.A., and D.B. Wake. 1992. "Geographic Variation and Speciation in the Torrent [sic] Salamanders of the Genus *Rhyacotriton* (Caudata: Rhyacotritonidae)." *University of California Publications in Zoology*. 126: 1-91.
- Gould, R.A. 1978. "Tolowa." *Handbook of North American Indians*. Volume 8: California. R.F. Heizer, ed. Smithsonian Institution, Washington, D.C.: U.S. Printing Office.
- Gould, Gordon. 2006. California Department of Fish and Game, BIOS Project Biogeographic Data Branch, California. Personal communication with Ken Hoffman/U.S. Fish and Wildlife Service, Arcata, California. April 25.
- Green Diamond Resource Company. 2001. *Summary of Simpson Timber Company's 2001 Botanical Field Surveys*. Internal Document.
- Green Diamond Resource Company. 2006. *Northern Spotted Owl Habitat Conservation Plan, Phase One Comprehensive Review*. August 30, 2006. 87 pp.
- Gutiérrez, R.J. 1985. "An Overview of Recent Research on the Spotted Owl." *Ecology and Management of the Spotted Owl in the Pacific Northwest*. R.J. Gutiérrez and A.B. Carey, tech. coords. PNW-GTR-185. U.S. Department of Agriculture Forest Service, Pacific Northwest Research Station, Portland, Oregon. pp 39-49.
- Hamer, T.E. 1988. Home Range Size of the Northern Barred Owl and Northern Spotted Owl in Western Washington. M.S. thesis. Western Washington University, Bellingham, Washington.

- Hamer, T.E., D.L. Hays, C.M. Senger, and E.D. Forsman. 2001. "Diets of Northern Barred Owls and Northern Spotted Owls in an Area of Sympatry." *Journal of Raptor Research*. 35 (3): 221-227.
- Hamm, Keith/Green Diamond Resource Company. 2006a. Personal communication with Gary Falxa/U.S. Fish and Wildlife Service. June 14.
- Hamm, Keith/Green Diamond Resource Company. 2006b. Personal communication with Gary Falxa/U.S. Fish and Wildlife Service, Arcata, California. June 26.
- Hamm, Keith/Green Diamond Resources Company. 2007a. Personal communication with Gary Falxa/U.S. Fish and Wildlife Service. July 6.
- Hamm, Keith/Green Diamond Resources Company. 2007b. Personal communication with Gary Falxa/U.S. Fish and Wildlife Service. July 19.
- Hamm, Keith/Green Diamond Resources Company. 2007c. Personal communication with Gary Falxa/U.S. Fish and Wildlife Service. September 4.
- Harden, D.R. 1998. *California Geology*. Upper Saddle River, New Jersey: Prentice Hall, Inc.
- Hayes, M.P., and M.R. Jennings. 1988. "Habitat Correlates of Distribution of the California Red-legged Frog (*Rana aurora draytonii*) and the Foothill Yellow-legged Frog (*Rana boylei*): Implications for Management." *Management of Amphibians, Reptiles, and Small Mammals in North America.*, R.C. Szaro, K.E. Severson, and D.R. Patton, eds. Gen. Tech. Rep. RM-166. U.S. Department of Agriculture Forest Service, Rocky Mountain Forest and Range Experiment Station, Ft. Collins, Colorado. pp. 144-158.
- Healey, M.C. 1991. "Life History of Chinook Salmon (*Oncorhynchus tshawytscha*)." *Pacific Salmon Life Histories*. C. Groot and L. Margolis, eds. Vancouver, British Columbia: UBC Press. pp 313-393.
- Heizer, R.F. 1978. *Handbook of North American Indian*. Volume 8: California. Smithsonian Institution, Washington, D.C.: U.S. Printing Office.
- Herter, D.R., and L.L. Hicks. 2000. "Barred Owl and Spotted Owl Populations and Habitat in the Central Cascade Range of Washington." *Journal of Raptor Research*. 34: 279-286.
- Hildebrant, W.R. 1981. Native Hunting Adaptations on the North Coast of California. Ph.D. dissertation. Department of Anthropology, University of California, Davis.
- Holland, D.C. 1991. *A Synopsis of the Ecology and Current Status of the Western Pond Turtle Clemmys marmorata*. Final Report. U.S. Department of the Interior, U.S. Fish and Wildlife Service, San Simeon, California.
- Holland, D.C. 1994. *The Western Pond Turtle: Habitat and History*. U.S. Department of Energy, Bonneville Power Administration, Portland, Oregon. Contract No. DE-B179-92BP62137.
- Hooven, E.F. 1959. *Dusky-Footed Wood Rat in Young Douglas-Fir*. Oregon Forest Research Center, Corvallis, Oregon. Research Note 41. 23 pp.
- Horton, J.S., and J.T. Wright. 1944. "The Wood Rat as an Ecological Factor in Southern California Watersheds." *Ecolog*. 25: 341-355.

- Humboldt, County of. 1984. *Humboldt County General Plan, Volume I: Framework Plan*. Humboldt County Community Development Services Department, Eureka, California.
- Hunter, J.E., D. Fix, G.A. Schmidt, and J.C. Power. 2005. *Atlas of the Breeding Birds of Humboldt County, California*. Redwood Region Audubon Society, Eureka, California.
- Jennings, M.R. 1988. "Natural History and Decline of Native Ranids in California." *Proceedings of the Conference on California Herpetology*. P.R. DeLisle, P.R. Brown, B. Kaufman, and B.M. McGurty, eds. Southwestern Herpetologists Society, Special Publication (4). pp. 61-72.
- Jennings, M.R., and M.P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California*. California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California.
- Judson, S., and D.F. Ritter. 1964. "Rates of Regional Denudation in the United States." *Journal of Geophys. Res.* 69 (11): 3395-3401.
- Kelly, E.G., E.D. Forsman, and R.G. Anthony. 2003. "Are Barred Owls Displacing Spotted Owls?" *Condor*. 105: 45-53.
- Klug, R.R. 1997. Occurrence of Pacific Fisher (*Martes pennanti pacifica*) and the Habitat Attributes Associated with their Detections. M.S. thesis. Humboldt State University, Arcata, California. 50 pp.
- Kupferberg, S.J. 1996. "Hydrologic and Geomorphic Factors Affecting Conservation of a River-breeding Frog (*Rana boylei*)." *Ecological Applications*. 6: 1332-1344.
- Leonard, W.P., H.A. Brown, L.L.C. Jones, K.R. McAllister, and R.M. Storm. 1993. *Amphibians of Washington and Oregon*. Seattle Audubon Society, Seattle, Washington.
- Licht, L.E. 1986. "Food and Feeding Behavior of Sympatric Red-legged Frogs, *Rana aurora*, and Spotted Frogs, *Rana pretiosa*, in Southwestern British Columbia." *Canadian Field Naturalist*. 100: 22-31.
- Lint, J., tech. coord. 2005. *Northwest Forest Plan – The First 10 Years (1994–2003): Status and Trends of Northern Spotted Owl Populations and Habitat*. PNW-GTR-648. U.S. Department of Agriculture Forest Service, Pacific Northwest Research Station, Portland, Oregon. 176 pp.
- Major, R.L., J. Ito, S. Ito, and H. Godfrey. 1978. "Distribution and Origin of Chinook Salmon (*Oncorhynchus tshawytscha*) in Offshore Waters of the North Pacific Ocean." *Int. North Pac. Fish. Comm. Bull.* 38.
- Maniery, J.G., and M.L. Williams. 1982. *Cultural Resources Survey, California Nickel Project, Del Norte County, California*. Prepared for Theodoratus Cultural Research for submission to Dames and Moore, San Francisco, California. On file, Northwest Information Center, Sonoma State University, Rohnert Park, California.
- Mayer, K.E., and W.F. Laudenslayer, eds. 1988. *A Guide to Wildlife Habitats of California*. California Department of Forestry and Fire Protection, Sacramento, California.
- Meyer, J.S., L.L. Irwin, and M.S. Boyce. 1998. Influence of habitat abundance and fragmentation on northern spotted owls in western Oregon. *Wildlife Monographs* no. 139.

- McDonald, T.L., B.F.J. Manly, R.M. Nielson, and L.V. Diller. 2006. "Discrete-choice Modeling in Wildlife Studies Exemplified by Northern Spotted Owl Nighttime Habitat Selection." *Journal of Wildlife Management*. 70: 375-383.
- McKenzie, D.P., and W.J. Morgan. 1969. "Evolution of Triple Junctions." *Nature*. 224, 5125. pp. 124-133.
- McLaughlin, R.J., S.D. Ellen, M.C. Blake, Jr., A.S. Jayko, W.P. Irwin, K.R. Aalto, G.A. Carver, and S.H. Clarke, Jr. 2000. *Geology of the Cape Mendocino, Eureka, Garberville, and Southwestern part of the Hayfork 30 x 60 Minute Quadrangles and Adjacent Offshore Area, Northern California*. U.S. Geological Survey Pamphlet to accompany Miscellaneous Field Studies MF-2336. pp. 2-26.
- McLean, H. 1993. "Humboldt Basin Province (080)." *Petroleum Exploration Plays and Resource Estimates, 1989, Onshore United States: Region 1, Alaska; Region 2, Pacific Coast*. R.B. Powers, ed. U.S. Geological Survey Bulletin, Reston, Virginia. pp A126-A129.
- Metter, D.E. 1968. "*Ascaphus truei*." *Catalog of American Amphibians and Reptiles*. 69.1-69.2.
- Moyle, P.B. 1976. *Inland Fishes of California*. Berkeley: University of California Press.
- Moyle, P.B., R.M. Yoshiyama, J.E. Williams, and E.D. Wikramanayake. 1995. *Fish Species of Special Concern in California*. 2nd ed. California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California.
- Murray, K.F., and A.M. Barnes. 1969. Biochemical Systematics of the Genus *Arborimus*. M.S. thesis. Humboldt State University, Arcata, California. 46 pp.
- Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California. U.S. Dept. Commerce, NOAA Tech Memo NMFS-NWFSC-35.
- Nehlsen, W., J.E. Williams, and J.A. Lichatowich. 1991. "Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho, and Washington." *Fisheries*. 16: 4-21.
- National Marine Fisheries Service (NMFS). 1998. *Factors Contributing to the Decline of Chinook Salmon: An Addendum to the 1996 West Coast Steelhead Factors Decline Report*. Available from: NMFS, Protected Resources Division, Portland, Oregon.
- Nomland, G.A., and A.L. Kroeber. 1936. *Wiyot Towns*. Berkeley: University of California Press.
- North Coast Unified Air Quality Management District. (AQMD). 1994. *North Coast PM₁₀ Characterization Study*.
- North Coast Unified Air Quality Management District (AQMD). 1997. *Summary of Air Monitoring Data in the North Coast Air Quality Management District*. June.
- Northwest Forest Plan (U.S. Department of Agriculture, Forest Service, U.S. Department of the Interior-Bureau of Land Management). 1994. *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Departments Within the Range of the Northern Spotted Owl. Standards and Guidelines for Management of Habitat for Late Successional and*

- Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl*. USDA Forest Service, USDI-BLM. April 13.
- Nussbaum, R.A., and C.K. Tait. 1977. "Aspects of the Life History and Ecology of the Olympic Salamander, *Rhyacotriton olympicus* (Gauge)." *The American Midland Naturalist*. 98 (1): 176-199.
- Nussbaum, R.A., E.D. Brodie, Jr., and R.M. Storm. 1983. *Amphibians and Reptiles of the Pacific Northwest*. Moscow, Idaho: University of Idaho Press.
- Pearson, R.R., and K.B. Livezey. 2003. "Distribution, Numbers, and Site Characteristics of Spotted Owls and Barred Owls in the Cascade Mountains of Washington." *Journal of Raptor Research*. 37: 265-275.
- Pilling, A.R. 1978. "Yurok." *Handbook of North American Indians*. Volume 8: California. Heizer, R.F., ed. Smithsonian Institution, Washington, D.C.: U.S. Printing Office.
- Rathbun, G.B., N. Seipel, and D. Holland. 1992. "Nesting Behavior and Movements of Western Pond Turtles, *Clemmys marmorata*." *Southwestern Naturalist*. 37: 319-324.
- Reichel, J., and D. Flath. 1995. "Identification of Montana's Amphibians and Reptiles." *Montana Outdoors*. 26 (3): 15-34.
- Rogers, T.H. 1966. "The Fall Migration. Northern Rocky Mountain-Intermountain Region." *Audubon Field Notes*. 20: 74.
- Rosenberg, D.K., and R.G. Anthony. 1992. "Characteristics of Northern Flying Squirrel Populations in Young Second- and Old-Growth Forests in western Oregon." *Canadian Journal of Zoology*. 70: 161-166.
- Sakai and Noon. 1993. "Dusky Footed Woodrat Abundance in Different-Aged Forests in Northwestern California." *Journal of Wildlife Management*. 57 (2): 373-382.
- Sakai and Noon. 1997. "Between-Habitat Movement of Dusky Footed Woodrats and Vulnerability to Predation." *Journal of Wildlife Management*. 61: 343-350.
- Sandercock, F.K. 1991. "Life History of Coho Salmon." *Pacific Salmon Life Histories*. C. Groot, and L. Margolis, eds. Vancouver, British Columbia: UBC Press. pp. 395-446.
- Schmidt, K. 2005. Northern Spotted Owl Monitoring and Inventory, Redwood National and State Parks, 2004 Annual Report. Unpublished. 20 pp.
- Self, S.E., and S.J. Kerns. 2001. Pacific Fisher Use of a Managed Forest Landscape in Northern California, Unpublished report. Sierra Pacific Industries, Redding, California. 34 pp. Available at: http://www.spi-ind.com/Our_Forests/PDF/WRPNo6.pdf.
- Simpson Timber Company. 1998. *Arcata Redwood Company (ARCo) Marbled Murrelet HCP*. Internal Review Draft. November 9.
- Smith, Richard B., M.Z. Peery, R.J. Gutiérrez, and W.S. LaHaye. 1999. "The Relationship Between Spotted Owl Diet and Reproductive Success in the San Bernardino Mountains, California." *Wilson Bulletin*. 111 (1): 22-29.

- Spence, B.C., G.A. Lomnický, R.M. Hughes, and R.P. Novitzki. 1996. *An Ecosystem Approach to Salmonid Conservation*. TR-4501-96-6057. Man Tech Environmental Research Services Corporation, Corvallis, Oregon.
- Stebbins, R.C. 1972. *California Amphibians and Reptiles*. Berkeley: University of California Press.
- Stebbins, R.C. 1985. *Western Reptiles and Amphibians*. 2nd ed. Peterson Field Guides No. 16. Boston, Massachusetts: Houghton Mifflin Company.
- Stoltz, J., and J. Schnell. 1991. *Trout*. Harrisburg, Pennsylvania: Stackpole Books.
- Swanston, D.N., R.R. Ziemer, and R.J. Janda. 1995. *Rate and Mechanics of Progressive Hillslope Failure in the Redwood Creek Basin, Northwestern California*. U.S. Geological Survey Professional Paper 1454-E. pp. E1-E15.
- Taylor, A.L., Jr., and E.D. Forsman. 1976. "Recent Range Extensions of the Barred Owl in Western North America, Including the First Records for Oregon." *Condor*. 78: 560-561.
- Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990. *A Conservation Strategy for the Northern Spotted Owl*. Report of the Interagency Scientific Committee To Address the Conservation of the Northern Spotted Owl. Portland, Oregon. May.
- Thome, D.M., C.Z. Zabel, and L.V. Diller. 1999. "Forest Stand Characteristics and Reproduction of Northern Spotted Owls in Managed North-coastal California Forests." *Journal of Wildlife Management*. 63: 44-59.
- Thome, D.M., C.J. Zabel, and L.V. Diller. 2000. "Spotted Owl Turnover and Reproduction in Managed Forests of North-coastal California." *Journal of Field Ornithology*. 71: 140-146.
- Trotter, P.C. 1989. "Coastal Cutthroat Trout: A Life History Compendium." *Trans. Am. Fish. Soc.* 188: 463-473.
- U.S. Fish and Wildlife Service (USFWS). 1992a. *Final Environmental Assessment for Proposed Issuance of a Permit to Allow Incidental Take of Northern Spotted Owls on the California Timberlands of Simpson Timber Company*. Portland, Oregon.
- U.S. Fish and Wildlife Service (USFWS). 1992b. "Final Rule, Determination of Critical Habitat for the Northern Spotted Owl." *Federal Register*. 57: 1796-1838. January 15.
- U.S. Fish and Wildlife Service (USFWS). 1992c. *Draft Recovery Plan for the Northern Spotted Owl*. Portland, Oregon.
- U.S. Fish and Wildlife Service (USFWS). 1997. *Draft Environmental Assessment of the HCP for the Marbled Murrelet and ITP Application*. Submitted by Arcata Redwood Company. January 29.
- U.S. Fish and Wildlife Service (USFWS). 2004. *Northern Spotted Owl, Five-Year Review: Summary and Evaluation*. U.S. Fish and Wildlife Service, Portland, Oregon. November. Available at: http://www.fws.gov/pacific/ecoservices/endangered/recovery/pdf/NSO_5-yr_Summary.pdf.
- U.S. Fish and Wildlife Service (USFWS). 2005. *Recovery Plan for the Tidewater Goby (Eucyclogobius newberryi)*. Portland, Oregon. vi + 199 pp.

- U.S. Fish and Wildlife Service (USFWS). 2007. *2007 Draft Recovery Plan for the Northern Spotted Owl (Strix occidentalis caurina): Merged Options 1 and 2*. Portland, Oregon. 170 pp.
- U.S. Forest Service (USFS). 1995. *Six Rivers National Forest Final Environmental Impact Statement*.
- Wallace, W.J. 1978. "Hupa, Chilula, and Whilkut." *Handbook of North American Indians*. Volume 8: California. R.F. Heizer, ed. Smithsonian Institution, Washington, D.C.: U.S. Printing Office.
- Ward, J.P., Jr., R.J. Gutiérrez, and B. R. Noon. 1998. "Habitat Selection by Northern Spotted Owls: The Consequences of Prey Selection and Distribution." *Condor*. 100: 79-92.
- Welsh, H.H., Jr. 1990. "Relictual Amphibians and Old-growth Forests." *Conservation Biology*. 4 (3): 309-319.
- Welsh, H.H., Jr. 1993. A Hierarchical Analysis of the Niche Relationships of Four Amphibians from Forested Habitats in Northwestern California. Ph.D. dissertation. University of California, Berkeley.
- Welsh, H.H., Jr., and A.J. Lind. 1996. "Habitat Correlates of the Southern Torrent Salamander *Rhyacotriton variegatus* (Caudata: Rhyacotritonidae), in Northwestern California." *Journal of Herpetology*. 30: 385-398.
- Williams, M., J.G. Maniery, and J. George. 1982. *Cultural Resources Inventory, Gasquet Mountain Nickel/Cobalt Project, Del Norte County, California*. Prepared for California Nickel Corporation, Eureka, California.
- Wydoski, R.S., and R.R. Whitney. 1979. *Inland Fishes of Washington*. Seattle: University of Washington Press.
- Zabel, C. 1993. U.S. Forest Service personal communication cited in Sakai and Noon.
- Zabel, C.J., H.F. Sakai, and J.R. Waters. 1993. "Association Between Prey Abundance, Forest Structure, and Habitat Use Patterns of Spotted Owls in California." *Journal of Raptor Research* 27(1): 59. Abstract of presentation, Spotted Owl Symposium, annual meeting of the Raptor Research Foundation, Inc., Bellevue, Washington. November 11-15, 1992.
- Zeiner, D.C., W.F. Laudenslayer, and K.E. Mayer, eds. 1988. *California's Wildlife. Volume I. Amphibians and Reptiles*. California Statewide Wildlife Habitat Relationships System, California Department of Fish and Game, Sacramento, California.
- Zielinski, W.J., R.L. Truex, C.V. Ogan, and K. Busse. 1997. "Detection Surveys for Fishers and American Martens in California, 1989-1994: Summary and interpretations." *Martes: Taxonomy, Ecology, Techniques and Management*. G. Proulx, H.N. Bryant, and P.M. Woodard, eds. Proceedings of the Second International Martes Symposium. August 12-16, 1995. Provincial Museum of Alberta, Edmonton, Alberta, Canada. pp 372-392.
- Zielinski, W.J., R.L. Truex, L.A. Campbell, C.R. Carroll, and F.V. Schlexer. 2000. Systematic Surveys As A Basis For The Conservation Of Carnivores In California Forests. Unpublished report.

Zielinski, W.J., R.L. Truex, G.A. Schmidt, F.V. Schlexer, K.N. Schmidt, and R.H. Barrett. 2004. "Home Range Characteristics of Fishers in California." *Journal of Mammalogy*. 85: 649-657.

Zielinski, W.J., T.E. Kucera, and R.H. Barrett. 1995. "Current Distribution of the Fisher, *Martes pennanti*, in California." *California Fish and Game*. 81: 104-112.

Chapter 4

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.P. Burnham, G.C. White, C.J. Schwarz, J. Nichols, J.E. Hines, G.S. Olson, S.H. Ackers, S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.P. Gerhardt, S.A. Gremel, R.J. Gutiérrez, P.J. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, and S.G. Sovern. 2004. *Status and Trends in Demography of Northern Spotted Owls, 1985-2003*. Draft. Cooperative Fish and Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon. April 30. 180 pp.

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.P. Burnham, G.C. White, Carl J. Schwarz, J.D. Nichols, J.E. Hines, G.S. Olson, S.H. Ackers, L.S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.P. Gerhardt, S.A. Gremel, R. J. Gutiérrez, P.J. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, S.G. Sovern. 2006. "Status and Trends in Demography of Northern Spotted Owls, 1985-2003." *Wildlife Monographs*. 163: 1-48.

Barrows, C.W. 1981. "Roost Site Selection by Spotted Owls: An Adaptation to Heat Stress." *Condor*. 83: 302-309.

Beschta, R.L., M.R. Pyles, A.E. Skaugset, and C.G. Surfleet. 1995. "Peak Flow Responses to Forest Practices in the Western Cascades of Oregon." *Journal of Hydrology*. 233: 102-120.

CEQ. See Council on Environmental Quality.

Council on Environmental Quality (CEQ). 1997. *The Council on Environmental Quality (CEQ) Guidelines*.

Courtney, S.P., J.A. Blakesley, R.E. Bigley, M.L. Cody, J.P. Dumbacher, R.C. Fleischer, A.B. Franklin, J.F. Franklin, R.J. Gutiérrez, J.M. Marzluff, and L. Sztukowski. 2004. *Scientific Evaluation of the Status of the Northern Spotted Owl*. Sustainable Ecosystems Institute, Portland, Oregon. September.

Dark, S.J., R.J. Gutierrez, and G.I. Gould. 1998. "The Barred Owl (*Strix varia*) Invasion in California." *Auk*. 115: 50-56.

Diller, Lowell/Green Diamond Resource Company. 2006. Personal Communication with USFWS and CH2M HILL. April 18, 2006.

Dugger, K.M., F. Wagner, R.G. Anthony, and G.S. Olson. 2005. "The Relationship Between Habitat Characteristics and Demographic Performance of Northern Spotted Owls in Southern Oregon." *Condor*. 107: 863-878.

- Dunbar, D.L., B.P. Booth, E.D. Forsman, A.E. Hetherington, and D.J. Wilson. 1991. "Status of the Spotted Owl, *Strix occidentalis*, and Barred Owl, *Strix varia*, in Southwestern British Columbia." *Canadian Field Naturalist*. 105: 464-468.
- Foliard, L. 1993. Nest Site Characteristics of Northern Spotted Owls in Managed Forests of Northwest California. M.S. thesis. University of Idaho. 114 pp.
- Forsman, E.D., E.C. Meslow, and H.M. Wight. 1984. "Distribution and Biology of the Spotted Owl in Oregon." *Wildlife Monographs*. 87: 1-64.
- Franklin, A.B., D.R. Anderson, R.J. Gutiérrez, and K.P. Burnham. 2000. "Climate, Habitat Quality, and Fitness in Northern Spotted Owl Populations in Northwestern California." *Ecological Monographs*. 70 (4): 539-590.
- Gould, Gordon/California Department of Fish and Game. 2006. Personal communication with Ken Hoffman/USFWS.
- Green Diamond Resource Company. 2001. *Summary of Simpson Timber Company's 2001 Botanical Field Surveys*. Internal Document.
- Green Diamond Resource Company. 2006a. *Northern Spotted Owl Habitat Conservation Plan, Phase One Comprehensive Review*. August 30, 2006. 87 pp.
- Green Diamond Resource Company. 2006b. *Proposed Amendments to the Habitat Conservation Plan for the Northern Spotted Owl on the California Timberlands of Green Diamond*.
- Green Diamond Resource Company. 2006c. *13th Annual Report*. Submitted to the United States Fish and Wildlife Service by Green Diamond Resource Company, in fulfillment of requirements specified in condition I of permit #PRT-767798, incidental take permit for northern spotted owls, under Section 10 (a) (1) (B) of the Endangered Species Act. February.
- Gutierrez, R.J., A.B. Franklin, and W.S. Lahaye. 1995. Spotted Owl (*Strix occidentalis*). In: *The Birds of North America*, No. 179 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.
- Hamer, T.E. 1988. Home Range Size of the Northern Barred Owl and Northern Spotted Owl in Western Washington. M.S. thesis. Western Washington University, Bellingham, Washington.
- Haig, S.M., T.D. Mullins, E.D. Forsman, P.W. Trail, and L. Wennerberg. 2004. "Genetic Identification of Spotted Owls, Barred Owls, and their Hybrids: Legal Implications of Hybrid identity." *Conservation Biology*. 18: 1347-1357.
- Haig, S.M., Wagner, R.S., Forsman, E.D., and T.D. Mullins. 2001. "Geographic Variation and Genetic Structure in Spotted Owls." *Conservation Genetics*. 2 (1): 25-40.
- Hamm, K.A. 1995. Abundance of Dusky-footed Woodrats in Managed Forests of North Coastal California. M.S. Thesis, Humboldt State University, Arcata, CA. 46 pp.
- Hughes, K.D. 2006. Habitat Associations of Dusky-footed Woodrats in Managed Douglas-fir/Hardwood Forests of northern California. M.S. Thesis, Humboldt State University, Arcata, CA. 41 pp.

- Iverson, W.F. 2004. "Reproductive Success of Spotted Owls Sympatric with Barred Owls in Western Washington." *Journal of Raptor Research*. 38 (1): 88-91.
- Kelly, E.G., E.D. Forsman, and R.G. Anthony. 2003. "Are Barred Owls Displacing Spotted Owls?" *Condor*. 105: 45-53.
- Lewis, J. 1998. "Evaluating the Impacts of Logging Activities on Erosion and Suspended Sediment Transport in the Caspar Creek Watersheds." *Proceedings of the Conference on Coastal Watersheds: The Caspar Creek Story*. R.R. Ziemer, tech. coord. PSW-GTR-168. USDA Forest Service, Pacific Southwest Research Station, Albany, California. pp. 15-24. May.
- MacDonald, L.H., A.W. Smart, and R.C. Wissmar. 1991. *Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska*. EPA/910/9-91-001. Region 10, Seattle, Washington.
- Mayer, K.E., and W.F. Laudenslayer, eds. 1988. *A Guide to Wildlife Habitats of California*. California Department of Forestry and Fire Protection, Sacramento, California.
- McDonald, T.L., B.F.J. Manly, R.M. Nielson, and L.V. Diller. 2006. "Discrete-choice Modeling in Wildlife Studies Exemplified by Northern Spotted Owl Nighttime Habitat Selection." *Journal of Wildlife Management*. 70: 375-383.
- Noon, B.R., and J.A. Blakesley. 2006. "Conservation of the Northern Spotted Owl Under the Northwest Forest Plan." *Conservation Biology*. 20: 288-296.
- Olson, G.S., R.J. Anthony, E.D. Forsman, E. Glenn, J. Reid, P.J. Loschl, and W.J. Ripple. 2004. "Modeling Demographic Performance of Northern Spotted Owls Relative to Forest Habitat in Oregon." *Journal of Wildlife Management*. 68: 1039-1053.
- Olson, G.S., R.J. Anthony, E.D. Forsman, S.H. Ackers, P.J. Loschl, J.A. Reid, K.M. Dugger, E.M. Glenn, and W.J. Ripple. 2005. "Modeling of Site Occupancy Dynamics for Northern Spotted Owls, with Emphasis on the Effects of Barred Owls." *Journal of Wildlife Management*. 69: 918-932.
- Pacific Lumber Company (PALCO). 1999. *Pacific Lumber Company Multi-Species Habitat Conservation Plan*.
- Pearson, R.R., and K.B. Livezey. 2003. "Distribution, Numbers, and Site Characteristics of Spotted Owls and Barred Owls in the Cascade Mountains of Washington." *Journal of Raptor Research*. 37: 265-275.
- Schmidt, K. 2005. Northern Spotted Owl Monitoring and Inventory, Redwood National and State Parks, 2004 Annual Report. Unpublished. 20 pp.
- Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990. *A Conservation Strategy for the Northern Spotted Owl*. Report of the Interagency Scientific Committee To Address the Conservation of the Northern Spotted Owl. Portland, Oregon. May.
- U.S. Department of the Interior (USDI) and California Department of Parks and Recreation (CDPR). 1999. *Redwood National and State Parks, Humboldt and Del Norte Counties; Final General Management Plan/General Plan; Environmental Impact Statement/Environmental Impact Report Vol. 1*. Crescent City, California.

U.S. Fish and Wildlife Service (USFWS). 1992a. *Final Environmental Assessment for Proposed Issuance of a Permit to Allow Incidental Take of Northern Spotted Owls on the California Timberlands of Simpson Timber Company*. Portland, Oregon.

U.S. Fish and Wildlife Service (USFWS). 1992b. *Draft Recovery Plan for the Northern Spotted Owl*. Portland, Oregon.

U.S. Fish and Wildlife Service (USFWS). 2003. *Section 7 Evaluation for Issuance of an Endangered Species Act Section 10(a)(1)(B) Permit for Northern Spotted Owls to Terra Springs, LLC*. Prepared for the Terra Springs LLC HCP. U.S. Fish and Wildlife Service, Arcata, California.

U.S. Fish and Wildlife Service (USFWS). 2004. *Northern Spotted Owl, Five-Year Review: Summary and Evaluation*. U.S. Fish and Wildlife Service, Portland, Oregon. November. Available at: http://www.fws.gov/pacific/ecoservices/endangered/recovery/pdf/NSO_5-yr_Summary.pdf.

U.S. Fish and Wildlife Service (USFWS). 2005. *Recovery Plan for the Tidewater Goby (Eucyclogobius newberryi)*. Portland, Oregon. vi + 199 pp.

U.S. Fish and Wildlife Service (USFWS). 2007. *2007 Draft Recovery Plan for the Northern Spotted Owl (Strix occidentalis caurina): Merged Options 1 and 2*. Portland, Oregon. 170 pp.

Glossary

λ_{RJS}	Estimated rate of population change (lambda) for Northern Spotted Owls, based on the reparameterized Jolly-Seber method. λ_{RJS} is estimated directly from mark-recapture data and does not require the assumption of a stationary population. λ_{RJS} incorporates reproduction, survival, and recruitment, and allows for time-specific estimation of λ (estimate of population trend). λ_{RJS} reflects whether the population of territorial female owls had been replaced (Franklin et al., 1999; Franklin et al., 2004). $\lambda = 1$ indicates a stationary population, $\lambda < 1$ indicates a declining population, and $\lambda > 1$ indicates an increasing population.
Action Area	Green Diamond ownership within the 11 Hydrographic Planning Areas (see below) on the west slopes of the Klamath Mountains and the Coast Range of California in Del Norte and Humboldt counties, during the period of such ownership within the term of the Incidental Take Permit (ITP).
Age class	One of the intervals into which the age range of trees is divided for classification or use in management.
Basal area	The cross-sectional area of a single stem, including the bark, measured at breast height (4.5 feet above the ground).
Broadcast burning	A prescribed fire allowed to burn over a designated area with well-defined boundaries to achieve some land management objective.
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.

Candidate Conservation Agreement with Assurances (CCAA)	An agreement between a non-Federal property owner and the Service(s), in which the property owner commits to implement conservation measures for a proposed or candidate species or a species likely to become a candidate or proposed in the near future. The property owner also receives assurances from the Service(s) that additional conservation measures will not be required and additional land, water, or resource use restrictions will not be imposed should the currently unlisted species become listed in the future (64 Federal Register 116, 32727). This agreement accompanies an Enhancement of Survival Permit (see below) issued under Section 10(a)(1)(A) of the ESA.
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 Practices 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. As defined in Green Diamond's AHCP/CCAA, Class II watercourses do not contain fish, but do support or provide habitat for aquatic vertebrates. 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 Practices 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.
Codominant trees	Trees with crowns that form the general level of the forest canopy and receive full light from above, but comparatively little light from the sides. Codominants usually have medium-sized crowns, but are crowded on the sides.
Commercial harvest	Removal of merchantable trees from a stand.
Covered Activities	Certain activities carried out by Green Diamond in the Action Area that may result in incidental take of covered species and all those activities necessary to carry out the commitments reflected in the NSO HCP and IA.
Cull	A tree or log that does not meet merchantable specifications.

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.
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.
Dominant tree	A tree whose crown extends above the general level of the forest canopy and receiving full light from above and partly from the sides.
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.
Eleven (11) HPAs	The area encompassed by the 11 Hydrographic Planning Areas identified in Appendix A of the EA.
Endangered	A plant or animal that is in danger of extinction throughout all or a significant portion of its range.
Enhancement of Survival Permit (ESP)	A permit issued by the Service(s) pursuant to ESA Section 10(a)(1)(A) for any act that enhances the propagation or survival of a listed species and that would otherwise be prohibited by ESA Section 9. The permit that authorizes incidental take of species covered by a CCAA.
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.
Extirpate	The elimination of a species from a particular area.
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.
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.
Green Diamond's ownership	Commercial timberlands that Green Diamond owns in fee and lands owned by others subject to Green Diamond harvesting rights.
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, 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, feeding or sheltering.

Harvesting	All activities necessary to cut, remove, and transport timber products from the Action 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.
Heel-boom loader	A stationary piece of log loading equipment located on roads and landings, similar to a construction crane, that uses a crane-like grapple to deck, move, and load logs onto log trucks from one central pivot point.
Hydrographic Planning Area (HPA)	The hydrographic areas and hydrologic units that encompass Green Diamond's California ownership and surrounding lands in common watersheds.
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.
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 Habitat Conservation Plan (HCP) that minimize and mitigate the impacts of incidental take.
Issuance criteria	The criteria specified in the ESA and Federal regulations for issuance of an ITP or ESP; also, the criteria specified in the CCAA policy for an ESP.
ITP species	The covered species for which Green Diamond is seeking an ITP or ESP.
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.”
Legacy conditions	Conditions that exist across the landscape that result from previous land and forest management activities.
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.
Mature forest	A defined stand of trees for which the annual net rate of growth has culminated. Stand age, diameter of dominant trees, and stand structure at maturity vary by forest cover types and local site conditions. Mature stands generally contain trees with a smaller average diameter, less age-class variation, and less structural complexity than old-growth stands of the same forest type.
Maximum extent practicable	Term 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.
Merchantable	Trees or stands having the size, quality, and condition suitable for marketing under a give economic condition, even if not immediately accessible for logging.
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.
Multilayered	Term applied to forest stands that contain trees of various heights and diameter classes and, therefore, support foliage at various heights in the vertical profile of the stand.
Multistoried	See “multilayered.”
National Marine Fisheries Service (NMFS)	The Federal agency that is the listing authority for marine resources and anadromous fish under the Endangered Species Act.

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.
Overstory	That portion of trees in a forest that forms the uppermost layer of foliage.
Permit	The Incidental Take Permit (ITP) issued by USFWS to Green Diamond pursuant to ESA Section 10(a)(1)(A).
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 CFR. § 230.10(a)(2)). “Practicable” is not specifically defined in the Endangered Species Act.
Precommercial thinning	Thinning or pruning of dense young forest trees to achieve optimum diameter growth and increase the eventual value of the tree.
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.
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.
Residual	A tree that remains standing after some event such as selection harvest.
Rookery	A nesting or roosting colony of gregarious birds.
Rotation	The planned number of years between the regeneration of an even-aged stands and its final cutting at a specified stage.
Rotation age	The age of a stand when it is harvested at the end of a rotation.

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.
Second-growth	Timber stands established after natural or human-caused removal of the original stand or previous forest growth.
Selection harvest	The removal of 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.
Shade tolerant trees	Tree species capable of reproducing under the shade of parent trees. These species have characteristics such as the ability to photosynthesize in limited light intensity and ability to withstand root competition from competing trees.
Silviculture	The specific methods by which a forest stand or area is harvested and regenerated over time to achieve the desired management objectives.
Single-tree selection harvest	The selection of individual trees for harvest, where new regeneration occurs in their place and all species represented in pretreatment stands are represented post harvest where feasible. Retention standards in stands after harvest are as follows: Site I—125-square-foot basal area; Sites II and III—75-square-foot basal area; Sites IV and V—50-square-foot basal area.
Site index	A measure of forest productivity expressed as the height of the dominant trees in a stand at an index age.
Site potential tree height	The height that a dominant tree may attain given the site conditions where it occurs.
Size class	The categorization of trees into one of the following four dbh classes: seedling (<1"), sapling (1" to 4.9"), pole (5" to 11.9"), sawtimber (12" and larger).
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(15), “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.
Stocking level	The degree to which trees occupy the land, measured by basal area or number of trees by size and spacing, compared with a stocking standard; that is, the basal area or number of trees required to fully use the land’s growth potential.
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(18) 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 with respect to Federally listed endangered species of wildlife.” Federal regulations further define these terms and provide the same taking prohibitions for threatened wildlife species. Take of threatened and endangered species is prohibited under Section 9 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.”

Terrace	A valley bottom landform composed of glacial or alluvial fill that occurs at a higher elevation than the active floodplain or channel migration zone.
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 Action Area. Also see Harvesting.
Timber Harvesting Plan (THP)	A plan 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.
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.
Windthrow	Trees blown down by wind; also called blowdown.
Yarding	A method of bringing logs to a roadside area or landing for truck transport.

APPENDIX A

Hydrographic Planning Areas

APPENDIX A

Hydrographic Planning Areas

The Action Area is located within eleven (11) Hydrographic Planning Areas (HPAs). The HPA areas are part of nine contiguous coastal drainage basins that encompass approximately 13.7 million acres in northwestern California and southern Oregon. Some of the HPAs represent a small proportion of the total area in the coastal basins of which they are a part, while others encompass the entire basin.

TABLE A-1
Hydrographic Planning Areas

HPA	HPA Acreage	Green Diamond Acreage Within HPA (Action Area)	Approximate Green Diamond Percentage of Total
Smith River Hydrographic Region	181,999	44,177	24.3
Coastal Klamath Hydrographic Region	108,150	88,760	82.16
Blue Creek Hydrologic Unit	80,303	15,393	19.2
Interior Klamath Hydrographic Region	128,006	66,139	51.7
Redwood Creek Hydrologic Unit	188,335	33,038	17.5
Coastal Lagoons Hydrographic Region	53,592	39,981	74.6
Little River Hydrologic Unit	29,703	26,041	87.7
Mad River Hydrographic Region	119,686	49,376	41.3
North Fork Mad River Hydrologic Unit	31,416	28,209	89.8
Humboldt Bay Hydrographic Region	138,719	17,484	12.6
Eel River Hydrographic Region	205,160	7,933	3.9
Total	1,265,069	416,532	32.9

APPENDIX B

Final EA Distribution List

Final EA Distribution List

Federal Government

U.S. Congress

Senator Dianne Feinstein
331 Hart Senate Office Building
Washington, D.C. 20510-0504

Senator Barbara Boxer
112 Hart Senate Office Building
Washington, D.C. 20510-0505

Congressman Mike Thompson
U.S. House of Representatives
119 Cannon House Office Building
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Bureau of Land Management

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U.S. Forest Service

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National Marine Fisheries Service

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APPENDIX C

Responses to Comments

Responses to Comments

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April 26, 2007

**Comment on Proposed
Northern Spotted Owl Habitat Conservation Plan Amendment
and Draft Environmental Analysis
for Green Diamond Resources Northwest California Timberlands**

by Felice Pace

Submitted on behalf of himself,
the Environmental Protection Information Center (EPIC),
and the Northcoast Environmental Center (NEC)

I. Executive Summary:

Simpson/Green Diamond Resources made a 30-year deal with the Department of Interior in 1992. Under that deal and for the past 15 years GDR cut and removed hundreds of thousands of large trees from NW California watersheds. In the process of removing those trees GDR "took" +/- 50 pairs of Northern Spotted Owls (NSOs). Now GDR wants to change the terms of the deal so that it can cut trees it said it would not cut in the original deal. GDR wants to liquidate many of the last remaining large trees on the lands to which it holds title. If allowed, this logging is expected to "take" another 8 pairs of owls by removing the forest habitat on which these owls depend. Furthermore, GDR wants to wait another 10 years before evaluating whether the Habitat Conservation Plan it has had for over 15 years is doing what it claims – maintaining a viable population of NSOs while pursuing clearcut logging for "maximum sustainable production" of logs at the mill.

LC1-1 GDR has proposed an Amendment to its permit to "take" NSOs to facilitate this additional logging. GDR made a deal and now it wants to change the terms in mid-stream, without any independent or comprehensive evaluation of its performance under the current take permit and at the expense of - public trust resources. What is needed before any permit change is granted is a comprehensive, independent evaluation of how well GDR has satisfied the NSO conservation promises made in its 1992 Habitat Conservation Plan and accompanying "take" permit. Until such an independent evaluation is complete, until GDR has demonstrated that it has conserved NSOs on its holdings as promised in its HCP, the US Fish and Wildlife Service should not grant a permit amendment.

The Northern Spotted Owl is in accelerated decline and we do not really know why (FWS Status Review, 2004; NSO Draft Recovery Plan, 2007, see 72 FR 20865). The NSO is in decline on the Simpson-Green Diamond Resources Northwest California holdings and we don't know why. There is evidence the GDR has not met its obligations under the existing HCP. Specifically, it appears that FWS and GDR quietly redefined the rules of the game to disguise the fact that, given the definition of "take" in the HCP, GDR has already exceeded the allowable take under the existing "take" permit.

LC1-2 GDR now proposes taking 8 more pairs of owls. While it is not disclosed in the Environmental Assessment (EA) that accompanies the proposed permit amendment, this will likely facilitate liquidation of many of the remaining old trees and much of the last older forests on the GDR ownership (see HCP inventory data and THP data on logging since 1992). The specific plots of land proposed for clearcutting are not identified but they are likely among the most remote, difficult to log and geologically unstable lands present in an ownership characterized by unstable, landslide-prone lands. The rivers below these lands are mostly listed as “sediment impaired” and the proposed additional “take” will likely result in more and accelerated landsliding.

For all of the above reasons and for many more reasons described below it is not in the public interest – nor is it in the NSOs interest – to approve the proposed Amendment.

LC1-3 The Draft EA is substantially inadequate and does not meet the requirements of NEPA. It lacks real cumulative effects analysis and disclosure of key facts and models. Essentially the contractor – CH2MHill – repeats generic information, and tells us that because the Forest Practice Rules are good we should not worry about impacts on wildlife, plants, and water. The California FPRs are not certified by EPA as Best Management Practices (BMPs); nor are they accepted by the State and Regional Water Boards as adequate to fulfill Clean Water Act (CWA) and Porter-Cologne Act requirements. The EA does not indicate how CWA/Basin Plan requirements will be met or if they will be met.

LC1-4 NEPA requires assessment of the actual impacts on specifically identified lands and sites. The Draft EA does not identify the sites that will be logged if the Amendment is approved or assess the impacts that will result from this logging. Thus, the Draft EA does not satisfy these key requirements of NEPA. Furthermore, CEQ guidance and NEPA regulations indicates that an EA is not appropriate. The impacts of, and alternatives to, this “major federal action” should be analyzed in an Environmental Impact Statement (EIS).

LC1-5 **For all the reasons above the FWS should reject this proposed piecemeal Amendment, wait for the outcome of the multi-species aquatic HCP under development and encourage GDR to either embark upon a multi-species terrestrial HCP or live with the commitments it made in the original HCP. Before allowing even more “take” via clearcut logging a comprehensive, independent review of GDR’s performance under the existing HCP is needed. The review which GDR has completed of its own performance under the ESA is biased, incomplete and does not provide a basis for allowing additional “take” of a species which is still in uncontrolled decline.**

II. Key Facts:

LC1-6 ♦ No data or analysis in the EA indicates whether the original HCP, ITP and Implementation Agreement – including its assumptions and the expected impacts in the accompanying environmental analysis – are actually working as intended. The only substantive review of how the HCP is performing was conducted by Green Diamond Resources (GDR, 2006). However, this document is referred to in the EA as “draft”. It clearly has not undergone peer review and, while it claims to be “comprehensive,” it is not. The GDR report fairly represents GDR’s views on NSO biology and conservation; it supports GDR’s wishes to clearcut even more land, but it does not provide a basis for evaluating the performance of GDR and the validity of its NSO HCP.

- LC1-7 [♦ There are independent indications (see, for example, the FWS 2004 NSO Status Review) that “take” and habitat modification have exceeded what was anticipated in the original HCP and accompanying EA.
- LC1-8 [♦ The FWS has proposed a 95% reduction in Critical Habitat for the Marbled Murrelet. The impact of that proposal on GDR NW California NSOs has not been assessed.
- LC1-9 [♦ Similarly, the FWS is preparing to release a new Critical Habitat rule for the NSO. According to FWS staff, that proposal will be released in June of 2007. Conservationists believe, based on reliable information, that the new NSO Critical Habitat rule will, like the recent murrelet CH rule and other critical habitat changes made under the present administration, result in a dramatic reduction in the amount of critical habitat designated for NSO protection and recovery. The potential impacts, including cumulative impacts, of this reasonably foreseeable action must be analyzed in the present NEPA process.
- LC1-10 [♦ A proposed multi-species HCP from GDR for aquatic species is under review by NMFS and FWS. This is a connected action, and should be considered. However, the results of the analysis of that proposed HCP is not yet available for evaluation of the impacts of the proposed Amendment. This significant new information should be considered and analyzed as part of the present NEPA process.
 ♦ GDR has reportedly indicated that it will propose a multi-species terrestrial HCP in the future. However, it wants this Amendment in the meantime so that it can “take” 8 additional pairs of NSOs – and the remaining large trees on thousands of acres.
- LC1-11 [♦ GDR wants to increase “take” of NSOs by 16%. But GDR doesn’t want to assess the impact of this increased “take” until 2012. Allowing a company to take an ESA-listed species now and study the impact of that take only after it has already occurred is not in the public interest, and does not comply with applicable law and regulation.

III. Contract Compliance:

LC1-12 [An HCP is a contract for a specified period of time. Contracts are legally enforceable commitments that may not be changed except by mutual agreement. Such agreement is usually forthcoming only if proposed changes are in the mutual interest of all contracting parties. Here, the proposed changes to the HCP clearly benefit the permittee, but it is far from clear that the public would receive commensurate benefits.

The Simpson/GDR HCP has allowed GDR to continue the liquidation of older forests on their California holdings. In exchange GDR agreed to maintain a certain amount of “owl” habitat – defined as forests of a certain age. GDR would very likely be crying “foul” if the government – based on new information – proposed additional logging restrictions as an Amendment to the ITP. Under those circumstances, GDR would insist that all information used be peer-reviewed. The public has the same rights: we believe that a deal is a deal and that Simpson/GDR should not be allowed to change the rules of the game to modify a contract in their own interest and to the detriment of the public interest.

We believe the proposed HCP Amendment is not in the public interest. Available information clearly indicates this fact; the information needed to justify the proposed Amendment has not

been provided by GDR. The studies and models on which the argument for the Amendment is based have not been peer-reviewed and are not available for public review. Key, site-specific information is simply missing and the independent data that is available indicates that the proposed Amendment should not be granted. For these reasons, the proposed Amendment must be rejected as not in the public interest.

LC1-12

IV. Major Flaws:

◆ Neither GDR nor the FWS has addressed the key habitat issue: nesting habitat. In its HCP, GDR told the public how much older forest habitat (>46 years) it had and how much it projected growing over the 30-year HCP period. It also identified “nesting habitat” in terms of a mosaic of forest types and ages and it projected how much of this habitat it would grow over the course of the HCP. But neither nesting habitat *per se* nor the GDR nesting mosaic are evaluated in the proposed amendment. **Without essential information on the trends in nesting habitat, it is not possible to adequately analyze the proposed amendment.** GDR claims to have “taken” fewer than the 50 pairs allowed under the HCP. However, this claim is based on a quiet agreement between GDR and the FWS in 1995 under which owls that were taken were declared not to have been taken (“Exhibit A: Green Diamond Resource Company, Northern Spotted Owl Habitat Conservation Plan, Phase One Comprehensive Review, August 2006.)

LC1-13

◆ This controversial gyration is referred to as “displacement removal.” Under the practice FWS agreed not to count a take if GDR could find owls in the territory where the habitat had been taken. Breeding success was not necessary for “displacement removal” to be granted. There was no peer review, no independent verification, and no reliable indication whether the owls would survive over time or survive to reproduce. If GDR could clearcut the habitat and still find owls there over 4 of the next 5 years, the “take” was considered to have not occurred. **This is a bait-and-switch flaw because the HCP is predicated on maintaining certain ages of habitat and because owl presence is no indication of persistence. By secretly changing the rules of the game mid-stream, FWS has undermined public confidence in its willingness to protect the public interest. By the original rules of the HCP contract and ITP, GDR has already taken more than the 50 NSO pairs authorized by the FWS in the original “take” permit. Not satisfied, GDR now wants to take even more owls.**

LC1-14

V. NEPA Compliance:

1. By FWS’s admission the proposed Amendment is a “major federal action.” Major federal actions require preparation of an EIS. The decision of FWS to only do an EA is arbitrary and capricious and not in accord with NEPA, the regulations implementing NEPA or Council on Environmental Quality (CEQ) NEPA guidance. If an EIS had been prepared on the original HCP and the original “take” permit, it would be possible to tier to it in assessing the impacts of the proposed Amendment. However, in this case, there is no EIS to which an EA can be tiered.

LC1-15

Recommendation: An EIS should be prepared for this “major federal action.”

2. Under NEPA an EA is prepared to determine whether the “hard look” required in an EIS is needed. Because the EA lacks substantive analysis in key areas, and contains many unanswered questions and “black box” assertions, an EIS must be required.

Recommendation: The FWS should take a close look at the CEQ guidance concerning when an EIS is required. We request that FWS address in writing and release to the public its evaluation of the CEQ EIS criteria. How does FWS justify not doing an EIS?

LC1-15

3. When assessing potential impacts to other species, including other state and federally listed species as well as non-listed species, the CH2MHill Draft EA relies almost entirely on the California Forest Practice Rules. Essentially we are told the FPRs are good and since GDR will follow them, these species will be OK.

This is a deeply flawed assessment. For example, the FPRs are not certified by the Environmental Protection Agency (EPA) as Best Management Practices. This means that when it comes to aquatic species the FPRs cannot be relied upon to justify a finding that “no significant impact” will occur. Also, NMFS is on record (testimony before the Board of Forestry and in published reports) that the FPRs in general and the Threatened and Impaired Watershed Rules in particular are not adequate to protect listed salmonid species.

LC1-16

In addition, **regardless of the federal HCP provisions, California law expressly prohibits the take of NSO**, because it is a fully protected species within the order *Strigiformes* (see Fish & Game Code section 3503.5).

Recommendation: Require substantial disclosure and analysis of potential impacts on other species. Explain how approval of the proposed Amendment will not result in additional impacts, including cumulative impacts, on other listed and sensitive non-listed species.

4. The Amendment will result in increased logging – especially increased logging of the older age classes. The impact of this increased cutting has not been analyzed or disclosed as required by NEPA. The Draft Amendment EA assumes that every acre of land to which GDR holds title are equally subject to impacts when logged. However, the remaining owl territories protected under the HCP are unlikely to be typical of GDR’s landholdings. These areas still have older forests and this generally indicates areas that are more remote, steeper, more unstable and more prone to mass landsliding. In other words, they are likely the artifacts of the historical logging: “easier” sites were logged first.

LC1-17

We can’t say for sure what the character of these sites is because the EA does not provide site-specific characteristics. Therefore, the site-specific characteristics have not been considered in the Draft EA. The EA contains no substantive analysis of the actual lands that will be clearcut either in terms of their geology, their erodibility or whether they contain other environmental risks. Instead, the EA assumes essentially that every GDR acre is like every other acre in terms of environmental risk. Assumption is no substitute for analysis. The draft EA fails to adequately identify the areas where owls will be taken. Therefore the public and decision makers cannot effectively evaluate the impacts of the proposed additional “take”.

Recommendation: Require GDR to actually identify and study the lands that will be logged if the Amendment is granted. What are the geomorphic characteristics of these sites? Are they prone to landsliding? If so, what is the likely result if they are clearcut? What other

- LCI-17 species are using/depending on these lands. NEPA requires site-specific data and site-specific analysis. The Amendment is not a generic or programmatic action; it is a proposal to clearcut 8 specific, occupied NSO territories. NEPA is not satisfied by the generic analysis that CH2MHill has produced in the draft EA.
- LCI-18 5. NEPA does not allow fragmented analysis. Yet, in this case, NMFS and FWS are performing an analysis for one proposed GDR HCP (multi-species aquatic) on the one hand and for the proposed Amendment on the other hand. This is a NEPA violation. These are connected actions under NEPA and must be evaluated as such.
- Recommendation:** Either combine the NEPA analysis for the Amendment with that for the proposed multi-species HCP or wait for that larger analysis to be completed and incorporate its findings if and as appropriate.
- LCI-19 6. The issue of forest roads is not adequately analyzed or addressed. Nothing from the extensive literature on the impacts of road density on wildlife is cited or used. The critical issue of road maintenance is not addressed at all. Road maintenance practices are critical to the assessment of watershed impacts. The change in level of road building and road density that will result from the additional logging is not analyzed or addressed. In addition, how many individuals or entities actually hold permits from GDR to enter and use these roads and lands? The Draft EA identifies the GDR permit system but does not quantify the level of use under these permits.
- Recommendation:** Require disclosure of how much additional road building will take place as well as projected changes in road density over time. Include temporary roads in the analysis. Also require disclosure of permitted human use and analysis of related impacts.
- LCI-20 7. The NEPA process typically begins with a scoping phase designed to elicit information and issues from the interested and affected members of the public. This apparently was not done in this case. This is unfortunate since identification of issues important to the public is a key way an agency determines if an EIS is required. Absent scoping you should default to an EIS.
- Recommendation:** Publish a new notice in the Federal Register including notification of specific dates and locations for public scoping meetings and comment solicitation.
- LCI-21 8. GDR has engaged in habitat conversions: natural grasslands have been planted to trees. The impacts of this habitat conversion are not discussed in the Draft EA.
- Recommendation:** Require identification of habitat conversions and assessment of the impacts of the conversion.
- LCI-22 9. Fire is a critical issue. Unless GDR's fire risk reduction is adequate, the habitat it says it is growing could burn up. In fact, statistically speaking, a portion of the habitat that grows on the GDR holdings will be lost or degraded by fire. The EA discloses that all GDR does is lock its gates (but not to everyone) and "treat" logging slash "within 100 feet of roads." This is not adequate logging hazard removal. The US Forest Service generally piles and burns slash within 300 feet of roads. Even staying on public roads, one can observe the high logging slash hazards present on GDR's clearcuts. Also, fire research (which should be cited in the EA but is not) clearly indicates that clearcuts, plantations and younger forests are more prone to catastrophic wildfire as compared to older, selectively logged forests.

<p>LC1-22</p>	<p>Concerning fire research for the Klamath Province see the work of Carl Skinner and others at the PSW research Station. (See, e.g., http://www.fs.fed.us/psw/topics/fire_science/)</p> <p>What happens if fire comes before GDR broadcast burns the clearcuts? How much habitat per decade can reasonably be expected to be lost to fire under the proposed management scheme of clearcuts and maximum 40-80 year logging rotation?</p> <p>Recommendation: Require assessment and disclosure of expected habitat loss to fire under various management alternatives, including logging slash treatment alternatives.</p>
<p>LC1-23</p>	<p>10. The excessively high Klamath River water temperatures are disclosed but not how GDR clearcut management impacts water temperature. Yet research generally indicates that shade-over-water effectiveness is directly related to location. Shade provided over streams higher in the watershed is generally more effective at ameliorating water temperature as compared to shade lower in the watershed. (See: http://www.google.com/search?hl=en&client=firefox-a&rls=org.mozilla:en-US:official&hs=Phc&sa=X&oi=spell&resnum=0&ct=result&cd=1&q=effect+of+shade+on++water+temperature&spell=1)</p> <p>Under its current management scheme, however, GDR is clearcutting the headwall swales and logging the shade trees over class 3 waters.</p> <p>Recommendation: Require analysis of the impact of the management scheme on shade and thereby on water temperature. What is the potential for GDR via shade on tributaries to ameliorate the Klamath’s temperature impairment?</p>
	<p>Cumulative Impacts are a major NEPA issue for which we have a separate section below.</p>
	<p>VI. Cumulative Impact Analysis:</p> <p>NEPA requires the analysis and disclosure of cumulative past, present and foreseeable future actions. The cumulative impacts analysis presented by CH2MHill in the EA is wholly inadequate. In fact, we are not provided with an analysis but rather with a recitation. Although this superficial gloss on a cumulative impacts analysis is altogether too familiar – it is typical of that provided for timber harvest plans (THPs) – it is not adequate under NEPA or the ESA.</p>
<p>LC1-24</p>	<p>Key to assessment of cumulative impacts is the Environmental Baseline (EB). If the EB is not properly defined, cumulative impacts cannot be properly assessed. The EB claimed in the Draft EA is in error; it has not been defined or described as required under applicable NEPA regulations and guidelines.</p>
<p>LC1-25</p>	<p>A partial list of foreseeable future actions ignored in the Draft EA’s Cumulative Impacts discussion includes:</p> <ul style="list-style-type: none"> ◆ The proposed 95% reduction in Marbled Murrelet critical habitat. ◆ The proposed reductions in NSO critical habitat, now in preparation. ◆ The proposed multi-species aquatic HCP for the same GDR ownership. ◆ Changes in habitat on adjacent ownerships and GDR’s own pending land deals. ◆ Listing of the Lower Klamath as “sediment impaired” pursuant to the CWA.

- ◆ NCWQCB actions relevant to “waivers”, watershed wide WDRs, etc.
 - ◆ A number of HCPs for NSO have been approved since 1992. These are all cumulative actions, which now need to be evaluated as past and ongoing projects.
- LC1-25 The analysis of key issues required by law is inadequate in many cases, and entirely lacking in others. For example, the USFS assesses cumulative watershed impacts via two methodologies: sediment models and Equivalent Road Acres. No cumulative watershed impacts analysis is included in the EA.
- LC1-26 Similarly, cumulative terrestrial wildlife assessment also uses models. There are habitat models and CDFG uses road density thresholds. Nothing of this sort is included in the Draft EA.

LC1-27 **From the above summary it is evident that the Draft EA does not contain a credible or sufficient Cumulative Impacts Analysis. The cumulative effects analysis in the Draft EA boils down to this: “The Forest Practice Rules will take care of it.” The assertion is not accurate. Nor does it satisfy the requirements of NEPA.**

Recommendation: Require a substantive Cumulative Impacts Analysis completed in accordance with accepted best methods and standards, which includes at least the additional issues noted above.

VII. ESA Compliance (these are NEPA issues too):

LC1-28 1. Neither GDR nor the FWS has addressed the key habitat issue: nesting habitat. In its 1992 HCP GDR told the public how much older forest habitat (>46 years) it had, and how much it projected growing over the 30 year HCP period. It also identified “nesting habitat” in terms of a mosaic of forest types and ages and it projected how much of this habitat it would grow over the course of the HCP. But neither nesting habitat nor the GDR nesting mosaic is evaluated in the draft EA. Instead habitat projections from the original HCP are repeated without additional substantive data or analysis. Without essential information on the trend in nesting habitat, a meaningful analysis of the proposed amendment cannot be made.

Recommendation: Require disclosure of: (1) GDR’s current nesting habitat mosaics as compared to what the HCP projected; and (2) The variation over time of the nesting mosaic habitat under each alternative presented in the EA. GDR should have been conducting research on whether its experimental habitat mosaic approach to nesting habitat has worked for the owls. GDR’s “Phase One Comprehensive (sic) Review” of the HCP, recently made available fails to include this information. GDR should be required to disclose its research or explain why it has failed to conduct it.

LC1-29 2. The information and analysis of impacts of alternatives on NSOs is fragmentary, poorly organized and confusing. CEQ NEPA regulations require that environmental analysis be clear and understandable. It is even unclear whether and where the habitat information provided is based on models, assumptions and projections. Absent clear and convincing data that the NSO is doing better than projected in the HCP, additional “take” cannot be legally authorized.

Recommendation: The HCP approach is a habitat approach; not an actual owl population approach. This was GDR’s choice when it developed the HCP. Environmental review should not switch back and forth depending on when the data is favorable to approval. A detailed, clear and technically reviewable assessment of how GDR has performed to date in terms of the habitat promises (including nesting habitat as a distinct type) it made in the EA for the



1992 HCP, as well as distinct projections of nesting and other habitat over time, should be included in the final environmental analysis.

LC1-29

3. Comparison of Redwood State and National Park and GDR data on owl diet (see “Comprehensive Review”) indicates that owls living on GDR controlled land prey more on woodrats (48% v 31%) and less on tree voles (16% v 18%) and deer mice (5% v <1%). GDR uses extensive woodrat data to argue for the efficacy of younger forest age classes for NSOs. However, the diet of GDR owls may reflect GDR’s historic logging practices more than an actual presence.

LC1-30

Since NW California owls were not studied prior to the liquidation of old growth forests on private industrial timberlands, assumptions based on current diet should be used with caution; current woodrat dominated diet may be an artifact of cutting history, not food preference. The poor reproduction performance of GDR’s NSO population, gives one indication that the historic switch to woodrat diets may not be leading to effective reproduction. The over-reliance on woodrats (because the tree voles and other old growth prey species have been eliminated) may or may not be a good thing. For example, on the negative side, focusing on woodrat prey exposes NSOs to greater predation by great Horned Owls and to more competition with Barred owls.

LC1-31

Recommendation: An independent – or at minimum a peer-reviewed – study of how the NSO is really doing on GDR lands is needed before the FWS can conclude that the owl is doing well enough (e.g. reproducing at a rate adequate to support persistence over time) on those lands and therefore that additional “take” by clearcutting should be authorized.

VIII. CWA Compliance:

LC1-32

The EA is entirely off base when it comes to CWA compliance. First, its authors appear to be unaware that the Lower Klamath has been listed as “sediment impaired”. This means that the following section of the Basin Plan applies: *Controllable water quality factors shall conform to the water quality objectives contained herein. When other factors result in the degradation of water quality beyond the levels or limits established herein as water quality objectives, then controllable factors shall not cause further degradation of water quality. Controllable water quality factors are those actions, conditions, or circumstances resulting from man’s activities that may influence the quality of the waters of the State and that may be reasonably controlled.* (Basin Plan @ Page 3-1.00).

Recommendation: Require an analysis indicating how each alternative will comply with the provision cited above. This must be analysis and not assertion. How much sediment will be delivered to the Klamath River under each alternative? And if there is sediment delivery, how will this delivery be fully offset? This is what the CWA requires.

The CWA is administered by the state. The relevant state board is the North Coast Regional Water Quality Board. That Board now requires watershed-wide permits – unless the landowner qualified for a waiver. GDR has not applied for or been granted any permits for the NW California ownership. It does not appear to be eligible for a waiver and clearly has no finding from the NCWQCB that it is eligible for a waiver. Therefore the EA cannot claim that GDR is in compliance with the CWA.

Recommendations:

LC1-32

1. Present evidence in the environmental analysis to back up the assertion in the EA that the GDR's NW California holdings are and will continue to be in compliance with the CWA prior to further considering its request for an HCP Amendment.

2. Require an analysis concerning whether the alternatives comply with Basin Plan requirements, including the provision cited above.

IX. Failure to consult with affected federal tribes:

LC1-33

Pursuant to executive order, the FWS is required to consult with federal tribes that may be impacted by the proposed major federal action. The following tribes must be consulted with prior to making a decision on the proposed Amendment: Yurok Tribe, Smith River Rancheria, Wiyot Tribe, Elk Valley Rancheria, Resighini Rancheria, Big Lagoon Rancheria, and Trinidad Rancheria. We see no evidence that such consultation has occurred, which inhibits our ability to meaningfully and fully comment.

X. What FWS should do?

LC1-34

An independent and scientifically credible assessment is needed to determine whether the Simpson/GDR has performed up to expectations established in its NSO HCP. Without such an assessment, granting the Amendment would constitute an act of blind faith on the part of the FWS concerning the assertions that Simpson/GDR has made about that performance. In light of the continued decline in NSO reproduction and population, such blind faith is not in the public interest. FWS should tell GDR that it will need to fund such an assessment designed by FWS and executed by independent specialists, prior to consideration of any changes in the HCP.

XI. Information request:

LC1-35

Please provide us with copies of the following. If you believe you cannot disclose some of the requested information please send us what you can provide now and write to us telling us why the other information cannot, in your view, be disclosed:

- ◆ Metadata for models used by GDR to translate from GIS to forest age classes.
- ◆ Metadata for models used by GDR to project forest habitat and age-classes over time
- ◆ List with full contact information including e-address for all individuals, tribes, governments, agencies and organizations who/which comment of the EA; the same information for the original HCP.
- ◆ Record of consultations with federal tribes concerning the proposed Amendment.

XII. Summary and Conclusion:

The proposed HCP Amendment is a "major federal action" which takes place at a time when breeding NSOs are declining range-wide – including locally – at rates not anticipated by the original status reviews and CH designations, nor by the Northwest Forest Plan.

The proposed HCP Amendment also comes at a time when, by terms of the original HCP before modified by quiet agreement between GDR and FWS, GDR has already “taken” more owls and, we suspect, considerably more nesting habitat than was projected in the HCP and authorized in the ITP.

Furthermore, the “Comprehensive Review” conducted by GDR on its HCP performance is not, in fact, comprehensive. For example, the GDR review fails to address what has happened to nesting habitat as defined by independent owl biologists or even the nesting mosaic (designed by GDR and never peer-reviewed) during 15 years of logging under the HCP and associated “take.” **FWS and the EA should acknowledge that there has not been any independent or peer-reviewed assessment of GDR’s performance under the HCP or of the NSOs status on GDR holdings and that GDR’s review of its own performance is incomplete and inadequate.**

NEPA requires an EIS to fully evaluate the impacts of and alternatives to the proposed Amendment. The status of the focal species of the HCP alone (see FWS Status Review 2004) strongly indicates that it is necessary for the FWS to take the “hard look” which can only be delivered by an adequate EIS. In addition, there are impacts to a variety of listed, candidate and other species of concern that are likely because the Amendment would allow cutting on some of the most unstable and landslide-prone terrain in the GDR holdings.

LC1-36 [It is clear that what has been proposed by GDR is an Amendment to allow more clearcutting and more take. It is also clear that the proposed Amendment is not supported by the facts and that the Draft EA does not satisfy the requirements of NEPA. The proper course of action is for the FWS to deny the GDR request for an amendment to its Take Permit pending a credible, independent review of GDR performance under the HCP and the current Take Permit.

Thank you for your careful consideration of these comments. Please reply, and continue to provide information relevant to this proposal, to each of the undersigned.

Sincerely yours,

/s/
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Enclosures:

Significant new information on Barred owls
2003 Conservation group Comments on NSO Status Review

Enclosure 1:**Significant new information on Barred owls**

Barred owl competition and displacement are significant concerns emerging in the ongoing status review for the northern spotted owl. There are at least four new reports and presentations raising the concern that barred owls could displace spotted owls and adversely affect their survival.

Robert R. Pearson. **Spotted Owl Habitat Considerations with regard to Barred Owl Presence**
<http://www.sei.org/owl/meetings/Presentations/March/Pearson.pdf>

Kelly, E. G., E. D. Forsman and R. G. Anthony **Is the Barred Owl Displacing the Northern Spotted Owl?**
<http://www.sei.org/owl/meetings/Presentations/December/Kelly.pdf>

Robert R. Pearson and Kent B. Livezey. **Distribution, numbers, and site characteristics of Spotted Owls and Barred Owls in the Cascade Mountains of Washington**
<http://www.sei.org/owl/meetings/Presentations/December/LivezeyPearson.pdf>

Scott Gremel. **The Effects of Barred Owls on Spotted Owls in Olympic National Park, Washington.** <http://www.sei.org/owl/meetings/Presentations/December/SEI-SGPres.pdf>

LC1-37

Barred owl numbers are clearly increasing (yet the methods used to detect them may vastly underestimate their numbers), their habitat and prey preferences appear to overlap with the spotted owl, and they can interbreed with unknown consequences. This is not just a hypothetical concern. According to recent monitoring of barred owl on the Willamette National Forest—

”The percentage of sites containing at least a single barred owl (*Strix varia*) increased dramatically between 2000 and 2001; the high level of barred owl responses continued into 2002 as well (Figure 5)... it is important to note that our survey methods are not designed to locate barred owls. ... The data do suggest, however, that barred owls are becoming increasingly common in the study area and several pairs of spotted owls have been either displaced or are inhibited from responding to our surveys as a result. In addition, a second hybrid owl was located on the study area in the Horse Creek LSR.”

[Figure 5 referenced above shows that barred owl singles jumped from an average of about 4 % of sites in 1988-2000, to 15% of sites in 2001 and 2002.]

ANNUAL RESEARCH REPORT. FY 2002. 5 December 2002. Title: The Ecology of Northern Spotted Owls (*Strix occidentalis caurina*) on the Willamette National Forest, Oregon: Habitat Use and Demography. Principal Investigator: Dr. Robert Anthony (Demography-RWU 4203).
<http://www.reo.gov/monitoring/nso/reports/HJA2002-annual-report.pdf>

One of the implications of barred owls competition is that the agencies may need to protect all the remaining mature and old growth forest habitat in order to increase the chances that spotted owls and barred owls can co-exist. In order to retain options while this issue is being sorted out the agency must consider protecting all remaining old forest.

LC1-38

Enclosure 2: 2003 Conservation group Comments on NSO Status Review, which we hereby incorporate into our comments above.

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 2600 SE. 98th Avenue, Suite 100
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 owl_information@r1.fws.gov
<http://www.eswr.com/fr/f042103.htm>

RE: Northern spotted owl status review

June 19, 2003

Dear U.S. Fish & Wildlife Service:

Please accept the following information from Northwest Ecosystem Alliance, Oregon Natural Resources Council, Audubon Society of Portland, Klamath-Siskiyou Wildlands Center, and Cascadia Wildlands Project concerning the northern spotted owl status review noticed in the Federal Register, April 21, 2003, Volume 68, Page 19569-19571. <http://www.eswr.com/fr/f042103.htm>. NWEA represents over 8,000 members who, along with the considerable membership of ONRC, PAS, KSWC, and CWP, use and enjoy the Northwest's wildlands and wildlife and share NWEA's mission to protect and restore wildlife habitat in the northern Pacific region.

The northern spotted owl was listed as "threatened" in 1990, and regional analysis indicate that populations remain on a downward trajectory (Franklin et al. 1999) with certain demographic areas exhibiting precipitous declines (Forsman et al. 2002, Forsman et al. 2000, Herter unpublished, Fleming unpublished, Franklin et al. 1999) and imminent localized extinctions. Owl populations in Canada have crashed and will likely be gone soon (see <http://www.nytimes.com/2002/12/04/international/americas/04CANA.html>, http://www.wildernesscommittee.org/campaigns/endangered_species/spotted_owl/ite_report/logging_to_extinction.pdf). There is no available evidence that would alter the conclusions from 1990 that the northern spotted owl is in danger of extinction. In fact, available scientific evidence indicates that the northern spotted owl warrants listing as "endangered" under the Endangered Species Act.

You request information on the spotted owl status that has come available since the time of listing or most recent status review, including: population and demographic trend data; studies of distribution, dispersal and habitat use and suitability; genetics and species competition investigations; surveys of habitat amount, distribution, and quality; analyses of adequacy of existing regulatory mechanisms and conservation measures; research on threats including habitat destruction or modification, overutilization, disease or predation, and other natural and manmade factors; and other new information. Of particular importance is information and analysis regarding new statistical techniques that influence predictions of long-term population trends, dispersal abilities and behavior, habitat selection, population size estimates, habitat distribution and amount, and taxonomy.

This information is found in documents prepared by academics in the nation's university system, published in professional society's journals, compiled by federal and state wildlife and management agencies, collected by amateur birding groups and individuals, and prepared by private forestry corporations. It is readily available through review of biological, ecological and management literature databases (available at most major state and university library systems), internet research on government and other websites, and through requests to business, non-profits, and individuals. We incorporate all this information by reference.

Since the northern spotted owl was listed in 1990, the Northwest Forest Plan was developed and in the NEPA analysis associated with the Northwest Forest Plan, significant consideration was given to northern spotted owl. See, for example, the 1993 FEMAT report, pages IV-13 to IV-15 and IV-148 to IV-151, and the February 1994 FSEIS, pages 3&4-211 to 245, and Appendix J and G <http://www.or.blm.gov/nwfpnepa/>. Although deemed critical to owl survival, non-federal lands were not evaluated as part of the owl viability assessment (FEMAT, p. IV-150). Given the likelihood of localized extinctions in the owls range, consideration of non-federal lands to owl survival and recovery is a fundamental aspect of the status review.

The major areas of concern for the northern spotted owl have been documented as and continue to include:

- low and declining population levels,
- low inherent fecundity,
- decline in population of territorial females,
- low nest occupancy rates,
- significant cumulative habitat loss,
- aggressive industrial logging on state and private lands,
- range reductions and gaps in the range.

Other possible threats to northern spotted owl include: natural disturbance, pathogens that harm or destroy habitat, diseases, displacement, and prey competition.

Northern Spotted Owl Background

The northern spotted owl is a medium-sized, highly-territorial bird that lives in mature and old-growth forests of western Washington, western Oregon, and northwestern California. By the 1980's, scientists expressed concern about the long-term viability of the owl as a species in light of the effects of continuing logging of its habitat. See Portland Audubon Soc'y v. Lujan, 884 F.2d 1233, 1235 (9th Cir. 1989). An Interagency Scientific Committee formed to study the species concluded that existing forest policy was "a prescription for the extinction of the spotted owls." Report of the Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl, A Conservation Strategy for the Northern Spotted Owl, 55 Fed. Reg. 40,412, 40,413 (1990). Because the owl is recognized as an indicator species for the health of mature and old-growth ecosystems, the plight of the owl prompted wide-spread concern among scientists and policy-makers. Portland Audubon, 884 F.2d at 1235.

In 1987, environmental groups petitioned to list the owl as a threatened or endangered species under the ESA. FWS refused to take action until it was compelled to do so by a federal district court. See Northern Spotted Owl v. Hodel, 716 F. Supp. 479, 483 (W.D. Wash. 1988) (concluding that FWS' refusal to list owl was arbitrary and capricious). FWS designated the owl as a threatened species on June 26, 1990. See Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Northern Spotted Owl, 55 Fed. Reg. 26,114 (June 26, 1990).

After listing the owl, FWS failed to designate critical habitat for the species. Again, the federal court was called upon to intercede; again, the court found that FWS had abused its discretion and acted contrary to law. *Northern Spotted Owl v. Lujan*, 758 F. Supp. 621, 626 (W.D. Wash. 1991). Under court order, FWS issued a proposed designation of critical habitat for the owl in May 1991. On January 15, 1992, FWS issued its Final Rule designating critical habitat. See *Endangered and Threatened Wildlife and Plants; Determination of Critical Habitat for the Northern Spotted Owl*, 57 Fed. Reg. 1796 (Jan. 15, 1992). Although timber interests challenged the designation of the owl's critical habitat, arguing among other things that the designation violated the National Environmental Policy Act ("NEPA"), the Ninth Circuit ultimately rejected that challenge and upheld the owl's critical habitat designation. *Douglas County v. Babbitt*, 48 F. 3d 1495 (9th Cir. 1995). The twin issues of ESA listed status and designation of critical habitat have not been judicially addressed since that time.

ESA Background

Congress enacted the ESA "to provide a means whereby the ecosystems upon which endangered and threatened species may be conserved [and] to provide a program for the conservation of such endangered species and threatened species." 16 U.S.C. § 1531(b). The Act defines species to include "any subspecies of fish or wildlife or plants, and any distinct population segment ["DPS"] of any species of vertebrate fish or wildlife which interbreeds when mature." *Id.* § 1532(16). A species is "endangered" when it "is in danger of extinction throughout all or a significant portion of its range," *id.* § 1532(6), and it is "threatened" when it is likely to become endangered within the foreseeable future. *Id.* § 1532(20).

The Secretary of Interior is charged with listing species as threatened or endangered in accordance with a carefully circumscribed listing process. First, the ESA establishes tight timeframes for listing determinations. See *id.* § 1533(b)(3)(A) (90-day preliminary finding); *id.* § 1533(b)(3)(B) (12-month deadline for proposed listing); *id.* § 1533(b)(6) (one-year from proposed to final listing). Second, listing determinations must be made "solely on the basis of the best scientific and commercial data available . . ." *Id.* § 1533(b)(1)(A). Third, the Secretary (or FWS to whom the Secretary has assigned responsibility) must determine whether a listing is warranted based on any one of the following five listing factors:

- (A) the present or threatened destruction, modification, curtailment of its habitat or range;
- (B) overutilization for commercial, recreational, scientific, or educational purposes;
- (C) disease or predation;
- (D) the inadequacy of existing regulatory mechanisms; or
- (E) other natural or manmade factors affecting its continued existence.

Id. § 1533(a)(1).

When a species is listed as endangered or threatened under the ESA, the Act mandates that the Secretary simultaneously designate "critical habitat" for that species. 16 U.S.C. §1533(a)(3). Critical habitat is defined by the Act as:

- (i) the specific areas within the geographical area occupied by the species, at the time it is listed . . . on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
- (ii) specific areas outside the geographical area occupied by the species at the time it is listed . . . upon a determination by the Secretary that such areas are essential for the conservation of the species.

16 U.S.C. § 1532(5)(A); see also *Northern Spotted Owl v. Lujan*, 758 F. Supp. 621, 629 (W.D. Wash. 1991) (“critical habitat is a central component of the legal scheme developed by Congress to prevent the permanent loss of species”).

Once a species is listed and critical habitat designated, various safeguards apply to prevent activities that will cause harm to members of the species, that will jeopardize the survival and recovery of the species in its native ecosystem, or that will adversely modify or destroy its designated critical habitat. See 16 U.S.C. §§ 1536, 1538. Ultimately, the ESA’s goal is recovery of listed species to the point where they no longer need ESA protection. *Id.* § 1531(b)-(c).

We understand that the Service has taken the approach of starting this status review from the listing decision. The Service should also examine and rely upon the petition to list the northern spotted owl and the administrative and judicial records leading up to the listing decision.

Northern Spotted Owl Status

Population Trends

Northern spotted owl population trends have been analyzed at several demographic study areas, and also through range-wide status reviews (Franklin et al. 1999, Forsman et al. 1993). These studies showed that owls were declining between 1 and 8 percent, with an estimated average annual decline of 4 percent range-wide. At the time, it was calculated that certain populations were dropping at rates as high as 12 percent in Washington (Olympic, Wenatchee), 12-17 percent in Oregon (South Cascades, East Eugene, Warm Springs Tribe), and 12 percent in California (Hoopa Tribe). When juvenile emigration is factored, it was estimated that certain populations, like Olympic, would not reach a stable populations size.

More recent research findings from these demographic study areas demonstrates that populations declines continue at high rates, and may be accelerating. These studies show that Washington’s owl populations are plummeting. In the Cle Elum study area, the owl’s population has decreased by 64 percent from 1992 to 2002—from 120 owls to 44 owls. Between 2001 and 2002, the owl’s population decreased by 22 percent. (Forsman et al. 2002). Other studies in the central Cascades of Washington for the same 10-year period show a drop of 53 and 66 percent (Fleming unpublished, Herter unpublished). On the Olympic peninsula, owls continue to drop more than 10 percent per year (Forsman et al. 2000).

Spotted Owl Habitat

Northern spotted owl range has been reduced and continues to shrink. Northern spotted owls occurred from Canada to California in the Cascade range to the Coastal mountains. Now there are significant gaps in the species distribution. Northern spotted owls are not found in many places where they once were common, such as Western Washington Lowlands Province.

FWS Biological Opinions, another important source of information for the status review, determined that “[The Western Washington] physiographic province, and subprovince, is highly fragmented and continues to suffer from declining habitat. The Service has determined that in this physiographic province, declining quantity and quality of suitable habitat poses a severe threat to spotted owl populations (FWS Biological Opinion on the I-90 Land Exchange). In particular, the Service has noted that high levels of timber harvest on the Gifford Pinchot National Forest have resulted in low habitat quantity and high fragmentation (FWS Biological Opinion on the I-90 Land

Exchange). Given the collapse of populations in Canada, and significant declines in the demographic study areas of Washington, all northern populations may soon be gone.

Extent of Habitat Loss

As recognized in the original listing decision, the population of northern spotted owls has likely declined significantly due to loss of habitat caused by logging. Recent modeling work can help us estimate the significance of the loss of habitat. Using a model based on historic fire size and historic fire frequency, Wimberly et al. (2000) estimated the mean percentage of old growth and late successional forest in the Oregon coast range during the prior 3000 years. The amount of mature and old-growth forests that serve as suitable owl habitat in the coastal ranges is outside the historic range of variability and significantly below historic minimums. At the province scale, the mean percentage of old growth in the Oregon Coast Range was estimated at between 39 and 55 percent. The mean percent of late-successional forest showed less variation at between 66 to 76 percent.

The authors also noted that currently

the entire Coast Range province contains approximately 5% old growth and 11% late successional forests. These estimates fall far below the 5% quantiles for percent old growth and percent late successional forest modeled at the province scale. . . . Current levels of old growth and late successional forests are so low that even halving the natural fire rotation or doubling the mean fire size [in the historic model] would not bring them within the estimated provincial-scale ranges of historical variability.

Michael C. Wimberly, Thomas A. Spies, Colin J. Long, and Cathy Whitlock; "Simulating Historical Variability in the Amount of Old Forests in the Oregon Coast Range," Conservation Biology, Pages 167-180, Volume 14, No. 1, February 2000; <http://www.fs.fed.us/pnw/pubs/journals/0010.pdf>

This modeling is consistent with the findings of the February 1994 FSEIS for the Northwest Forest Plan, which found that Option 9, later adopted in the ROD, would not restore long-term average conditions for older forests even after 100 years FSEIS page 3&4-45.
<http://www.or.blm.gov/nwfpnepa/>

The bottom line is that there is a serious shortage of suitable owl habitat and the owl will not recover until suitable habitat is brought back close to the mid-point of the historic range of variability, but such recovery of habitat may never occur across the range of the owl under the existing regulatory framework.

Loss of Habitat Through Transfer

About 5,000 acres of BLM lands within the range of the northern spotted owl were transferred to the Coquille tribe in 1995 and the tribe planned and executed large clearcuts of mature and old growth forest. http://www.umpqua-watersheds.org/blm/coquille_forest.html

Almost 70,000 acres of the Siuslaw National Forest are being considered for transfer to the Coos, Lower Umpqua and Siuslaw Tribes including about 40,000 acres of mature and old-growth forest within the range of the northern spotted owl. The proposed legislation effectuating the transfer (S. 868, 108th Congress, 1st Session) will not have adequate safeguards to ensure protection and restoration of owl suitable habitat. This land transfer will shift the objectives of land management from conservation and restoration toward "economic self-sufficiency" for the tribes. "[T]he Tribes will establish revenue generating enterprises to meet Tribal budget requirements rather than increased

dependence on declining federal appropriations. The restored forestland base will be a crucial component of these revenue sources.” <http://www.ctclusi.org/content/resources/agendaForSelf.pdf> Since many necessary restoration tasks are not economically self-supporting and the tribes have many economic needs (education, housing, health services, etc.), the restoration goals of the Northwest Forest Plan could easily be forgotten while the economic goals will become paramount and much of the remaining spotted owl nesting habitat will be lost.

Habitat Recovery

The Northwest Forest Plan assumes that young plantations that resulted from clearcutting will become functional late-successional forest (suitable for owls, among other things). This recovery will occur through either passive or active management. This assumption may not be sound.

Jerry Franklin et al. (2002) reports that there are multiple pathways toward late seral conditions. Recent studies by Tappener (1997) and Poage (2002) and indicate that young plantations may not be developing along traditional pathways toward late-successional condition. Active management may be required in some cases to allow young forests to develop along a trajectory toward functional late-successional forest. This raises two issues with respect to the owls. (1) This active management (thinning, underplanting, snag creation, down woody debris augmentation, invasive species control, prescribed fire, etc.) is not being done at nearly the rate that it may be required to restore late-successional habitat and remain consistent with the assumptions behind the Northwest Forest Plan, and (2) Thinning in and near occupied sites may harm owls in the short-term by making existing nests more vulnerable to predation.

Anticipated restoration of owl habitat is not happening at the rate necessary to conserve the species. The Northwest Forest Plan calls for extensive thinning and other restoration activities to develop complex older forests with large trees suitable as owl habitat. Funds are not being appropriate and expended to conduct pre-commercial thinning and density management that may be required to develop large trees and large limbs. (Powell 2001) This report documents significant unmet density management needs on federal lands both east and west of the Cascades but a significant portion of the need is within the range of the owl. The trends over time are 1) increasing need for DM and 2) decreasing attainment of DM, and therefore 3) a growing backlog of unmet needs.

There is significant uncertainty about whether habitat recovery as anticipated by the Northwest Forest Plan will occur and how it will affect owls in the short and long term.

Existing Regulatory Mechanisms

Habitat management plans (HCPs) have been developed for federal and non-federal lands in the Pacific Northwest (e.g. U.S. Departments of Agriculture and Interior 1993, ODF 1995, USFWS 1996, 1997b). Reserves of suitable owl habitat were established as part of the Northwest Forest Plan (U.S. Departments of Agriculture and Interior 1993), but habitat in large portions of these reserves will not be suitable for 50-100 years. The Northwest Forest Plan is not a recovery plan and the future of the spotted owl is tenuous during this 50- to 100-yr time period.

Federal lands governed by the Northwest Forest Plan do have a restoration mandate for certain areas including Late Successional Reserves and Riparian Reserves. Over time it is expected that significant areas on federal lands covered by the Northwest Forest Plan will someday recover and

become owl habitat, but the benefits of the Northwest Forest Plan are in the distant future and the path from here to there is uncertain.

The critical elements of the Northwest Forest Plan that support northern spotted owl populations are being significantly modified by the Bush administration. If the proposed modifications to the Aquatic Conservation Strategy are adopted, it will lead to less project-level consideration of impacts to upland (outside riparian areas) forests and may accelerate loss to suitable owl habitat <http://www.reo.gov/acs/index2.htm>.

In addition, the most recent DSEIS on survey and manage (http://www.or.blm.gov/nwfpnepa/FSIES-2003/DSEIS_S-M_20030509.pdf) discloses that up to 26,000 acres of forest currently protected by “known site” buffers could be released for logging under the preferred alternative. A significant but unknown portion of this acreage is within the range of the northern spotted owl.

Suitable owl habitat continues to be harvested through HCPs, and FWS must consider the habitat logging that was anticipated and has occurred under these Plans as part of the status review. In Washington, several HCPs have been accepted by FWS since the owl was listed including Plum Creek (two HCPs: one for I-90 and one for inland areas), Simpson (Olympic peninsula), Port Blakely (Eddy tree farm), Murray Pacific (central Washington), Washington Department of Natural Resources (across the state), Green River (central Washington), and Cedar River (central Washington). A management plan for all non-federal lands, based on the controversial and politically-influenced “Forest and Fish Report” is underdevelopment, and also should be examined as part of the status review.

The importance of considering habitat management agreements cannot be overstated. For example, the Plum Creek HCP allows incidental take on two-thirds of the spotted owl home range circles in the next twenty years and in all 88 home range circles after 20 more years. The Cle Elum demographic study area, site of the Washington states most extreme population declines, is directly impacted by Plum Creek owl habitat management plans. The DNR HCP, which impacts owls on the Olympic peninsula – where owl populations have been consistently sliding toward extinction at rates over 10 percent annually since demographic studies were initiated, retains insufficient amounts of habitat around nest trees, classifies non-suitable (“sub-mature”) habitat as suitable (such overestimates permits liquidation of suitable habitat), and ignores the role of juvenile owl emigration from the Cascades and Oregon coast.

In Oregon, FWS has accepted HCPs from Weyerhaeuser (one for Willamette Valley and one for Millacoma), Oregon Department of Forestry (Elliot State Forest), Grover Tree Farm, and Coast Range Conifers. A management plan for Oregon Department of Forestry’s Tillamook/Clatsop region is underdevelopment, and also should be examined as part of the status review. In Oregon about 30% of the remain owls habitat will be destroyed over the next 25-30 years while owl habitat will not be created in the late successional reserves for 80-200 years. In addition, the HCP for the Elliot State Forest in SW Oregon is being rewritten to give the state more discretion to log when and where they want.

A new proposal to make timber the dominant use on state forest land has passed the Oregon State House. <http://www.registerguard.com/news/2003/06/12/d2.or.timberbill.0612.html> If this measure becomes law, it will accelerate the loss of owl habitat and foreclose the restoration of owl habitat for the foreseeable future.

In California, FWS has accepted HCPs from Pacific Lumber, Simpson, and Regli Estate. Oregon Department of Forestry. Others under development should be examined as part of the status review.

Threats

Infrequent but large forest fires occur in the range of the spotted owl. The Biscuit fire in SW Oregon affected some owl habitat, and other large fires should be expected before the reserves have recovered to provide significant nesting habitat. http://www.biscuitfire.com/baer_summary.htm There are no technologies or regulatory mechanisms available to significantly modify fire behavior, but we can expect continued fire suppression which is likely to cause future fires to increase in size and intensity.

Port Orford Cedar root disease called *Phytophthora lateralis* is killing thousands of Port Orford Cedar trees yearly. This disease, and the efforts to “sanitize” areas of the forests infected by the disease, has the potential to eliminate large numbers of nest trees and potential nest trees in SW Oregon and NW California. [http://www.or.blm.gov/planning/Port-Orford-cedar SEIS/](http://www.or.blm.gov/planning/Port-Orford-cedar_SEIS/)

Sudden oak death syndrome has recently been confirmed in Douglas-fir trees. If it continues to spread more broadly, it could degrade and destroy northern spotted owl suitable habitat.

Diseases

West Nile virus affects owl populations, and has recently been confirmed in the Pacific Northwest. This disease and others are important to consider as part of the status review.

Summary

The major points are that: (1) owl populations are declining and the rate of decline is accelerating; (2) habitat loss continues; (3) habitat recovery in the reserves established under the Northwest Forest Plan will take 50-100 years; (4) Habitat management agreements that allow extensive owl mortality were based overly optimistic predictions and contortions of owl needs; (5) changes in priorities on state lands and transfer of federal land to tribes could impact current and future owl habitat; (6) proposed changes to the Northwest Forest Plan could affect current and future habitat; (7) new pathogens and viruses threaten owls and their habitat; (8)

Sincerely,

Dave Wertz

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Northern Spotted Owl references

The information and analysis below, and attached as a tif file, and the literature cited in all of these documents, are critical to review during consideration of the northern spotted owl status:

Anderson, D.R., K.P. Burnham, A.B. Franklin, R.J. Gutiérrez. 2000. Climate habitat quality, and fitness in northern spotted owl in northwestern California. *Ecol. Monogr.* 70(4):539-590.

Anthony, R.G., E.D. Forsman, E.G. Kelly. 2003. Are barred owls displacing spotted owls? *The Condor* 105:45-53.

Anthony, R.G., B.L. Biswell, A. Ellington, E.D. Forsman, P.J. Loschl, E.C. Meslow, G.S. Miller, J.A. Reid, D.R. Seaman, S.G. Sovern, K.A. Swindle, M. Taylor, J.A. Thraikill, F.F. Wagner. 2002. Natal and breeding dispersal of northern spotted owls. *J. Wildl. Manage.* 66(4):1-35.

Bingham, B.B., B.R. Noon. 1997. Mitigation of habitat "take:" application to habitat conservation planning. *Cons. Biol.* 11(1):127-139.

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- Bingham, B.B., B.R. Noon. 1998. The use of core areas in comprehensive mitigation strategies. *Cons. Biol.* 12(1):241-243.
- Bond, M.L., A.B. Franklin, R.J. Gutiérrez, W.S. LaHaye, C.A. May, M.E. Seamans. 2002. Short-term effects of wildfires on spotted owl survival, site fidelity, mate fidelity, and reproductive success. *Wildlife Society Bulletin* 30(4):1022-1028.
- Carlson, P.C., A.B. Franklin, R.J. Gutiérrez, and D. Pavlacky. 2003. Population ecology of the northern spotted owls (*Strix occidentalis caurina*) in northwestern California: annual results, 2002. U.S. Department of Agriculture, Forest Service, Region 5, Annual Progress Report.
- Diller, L.V., D.M. Thome, C.J. Zabel. 1999. Forest stand characteristics and reproduction of northern spotted owls in managed north-coastal California forests. *J. Wildl. Manage.* 63(1):44-59.
- Everett et al. 1997. Structure of northern spotted owl nest stands and their historical conditions on the eastern slope of the Pacific Northwest Cascades, USA. *Forest Ecology and Management*.
<http://www.fs.fed.us/pnw/pubs/journals/spottedowl.pdf>
- Dawdy, Philip. They Flew, Flew Away. See <http://www.seattleweekly.com/features/0316/news-owls.php>
- Forest Ecosystem Management Assessment Team. 1993. Forest Ecosystem Management: An ecological, economic, and social assessment. USDA Forest Service Pacific Northwest Region, Portland, Oregon, USA.
- Forsman, Eric D. et al. 1993. Demography of the Northern Spotted Owl. Workshop Proceedings. Fort Collins, CO. *Studies in Avian Biology* No. 17. Cooper Ornithological Society. 122p.
- Forsman et al. 2000 http://www.reo.gov/monitoring/nso/reports/N110202_4_OLYNPS01.pdf
- Forsman et al. 2002
http://www.reo.gov/monitoring/nso/reports/N110202_5_CLEELUM01.pdf
- Franklin et al. 1999. Range-wide status and trends in northern spotted owl populations. Colorado Cooperative Fish and Wildlife Research Unit. USGS. Ft. Collins, Co.
http://www.reo.gov/monitoring/nso/reports/N110202_3_1999-REPORT-FINAL-DRAFTREV.pdf
- Franklin, A.B., J.E. Hunter, R.J. Gutiérrez. 1995. Habitat configuration around spotted owl sites in northwestern California. *The Condor*. 97:684-693.
- Franklin, Alan, B. et al. 2000. *Ecological Monographs* 70(4):539-590. Ecological Society of America
- Franklin, Jerry F., Thomas A. Spies, Robert Van Pelt, Andrew B. Carey, Dale A. Thornburgh, Dean Rae Berg, David B. Lindenmayer, Mark E. Harmon, William S. Keeton, David C. Shaw, Ken Bible, Jiquan Chen. 2002. Disturbances and structural development of natural forest ecosystems with silvicultural implications, using Douglas-fir forests as an example; *Forest Ecology and Management* 155 (2002) 399-423. <http://research.eeescience.utoledo.edu/lees/pubs/franklin2002.pdf>
- Herter, unpublished. See <http://www.seattleweekly.com/features/0316/news-owls.php>

Lehmkuhl, J.F., M.G. Raphael. 1993. Habitat pattern around northern spotted owl locations on the Olympic Peninsula, Washington. *J. Wildl. Manage.* 57(2):302-314.

Poage, N.J. and J.C. Tappeiner. 2002. Long-term patterns of diameter and basal area growth of old-growth Douglas-fir trees in western Oregon. *Canadian Journal of Forest Research* 32 (7): 1232-1243. http://www.nrc.ca/cgi-bin/cisti/journals/rp/rp2_abst_e?cjfr_x02-045_32_ns_nf_cjfr7-02

Tappeiner, J.C., D.W. Huffman, D. Marshall, T.A. Spies, and J.D. Bailey. 1997. Density, ages, and growth rates in old-growth and young-growth forests in coastal Oregon. *Can. J. For. Res.* 27: 638-648.

Thomas, J.W., Raphael, M.G., Anthony, R.G., Forsman, E.D., Gunderson, A.G., Holthausen, R.S., Marcot, B.G., Reeves, G.H., Sidell, J.R., Solis, D.M. 1993. Viability assessments and management considerations for species associated with late-successional and old-growth forests of the Pacific northwest. USDA Forest Service.

U.S. Department of Agriculture, and U.S. Department of the Interior. 1994. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the Northern Spotted Owl. U.S.D.A. Forest Service and U.S.D.I. Bureau of Land Management. Portland, Oregon, USA.

USDA and USDI 1994, Record of Decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the Northern Spotted Owl. April 1994.

USDA Forest Service, US Department of Commerce National Marine Fisheries Service, USDI Bureau of Land Management, Fish & Wildlife Service, and National Park Service, and Environmental Protection Agency 1993. Forest ecosystem management: An ecological, economic and social assessment. Report of the Forest Ecosystem Management Assessment Team (FEMAT).

Demography Data:

A summary of demography data for the northern spotted owl can be found at:

<http://www.reo.gov/monitoring/reports.htm#nso>

Northern Spotted Owl effectiveness Monitoring Northwest Forest Plan 2002 Annual Summary Report

<http://www.reo.gov/monitoring/nso/reports/Annsumm02.pdf>

Northern spotted owl effectiveness monitoring plan for the Northwest Forest Plan.

http://www.fs.fed.us/pnw/pubs/gtr_440.pdf

Demographic characteristics of spotted owls in the Oregon Coast Ranges, 1990-2001

http://www.reo.gov/monitoring/nso/reports/N110202_9_ORNCOAST01.pdf

Population Ecology of the Northern Spotted Owl in Northwestern California: Annual Results, 2001

http://www.reo.gov/monitoring/nso/reports/N110202_7_NCAANNRPT01.pdf

2001 Annual Report, Spotted Owl Monitoring in Olympic National Park

http://www.reo.gov/monitoring/nso/reports/N110202_4_OLYNPS01.pdf

Demographic Characteristics of Spotted Owls in the Southern Oregon Cascades, December 2001
http://www.reo.gov/monitoring/nso/reports/N110202_10_SouthCas01.pdf

Demographic characteristics of northern spotted owls (*Strix occidentalis*) on the Tyee Study Area, Roseburg, Oregon: 1985-2001.
http://www.reo.gov/monitoring/nso/reports/N110202_11_TYEE01.pdf

Demographic Characteristics of Northern Spotted Owls in the Klamath Mountain Province of Oregon.
http://www.reo.gov/monitoring/nso/reports/N110202_8_ORKLAM01.pdf

The Ecology of Northern Spotted Owls on the Willamette National Forest, Oregon: Habitat Use and Demography.
http://www.reo.gov/monitoring/nso/reports/N110202_6-2001-annual-report.pdf

Demography of Spotted Owls on the east slope of the Cascade Range, Washington, 1989-2001
http://www.reo.gov/monitoring/nso/reports/N110202_5_CLEELUM01.pdf

Annual Spotted Owl Monitoring Summary for 2000
<http://www.reo.gov/monitoring/nso/monrpt00edit.pdf>

Range-wide status and trends in northern spotted owl populations
http://www.reo.gov/monitoring/nso/reports/N110202_3_1999-REPORT-FINAL-DRAFTREV.pdf

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Response to Comment LC1-1

The original HCP anticipated changes and additional incidental take. This can be seen in that the HCP and permit period is 30 years, while the original permit provided for a first increment of incidental take, the level estimated for the first 10 years

Green Diamond's Northern Spotted Owl Habitat Conservation Plan (NSO HCP) and Incidental Take Permit (ITP) have a period of 30 years with a comprehensive review scheduled after the first 10 years of the plan. The purpose of the comprehensive review was to evaluate the efficacy of the northern spotted owl conservation measures in the plan. In addition, the comprehensive review was to address the need and timing of any subsequent comprehensive review and the permit-holder's need for additional authorization of owl displacement. When approved in 1992, the FWS and Green Diamond clearly contemplated that the permittee would consider HCP and permit amendments in response to the findings of the comprehensive review, and the permit-holder's need for additional incidental take authorization (1992 NSO HCP, pages 203-205; Intra-Service Biological Consultation, page 2; Implementation Agreement, section III.F). Green Diamond's proposed amendments to modify its research program, schedule another comprehensive review, seek additional incidental take authorization, and reinstate the special management area prescriptions that would otherwise expire are consistent with the terms of the 1992 HCP.

The proposed increase in incidental take authorization, eight additional pairs, is consistent with the 1992 NSO HCP. The 1992 NSO HCP and ITP anticipated and authorized the incidental take of up to 50 northern spotted owl pair through habitat modification resulting from timber harvest on approximately 383,000 acres over the first ten years of the plan. For much of the past 13 years Green Diamond managed the 383,000 acres plus about 74,000 acres acquired since 1992; recent land sales have dropped the current ownership to about 416,500 acres. On this larger landscape, displacement has occurred on 44 northern spotted owl sites through plan year thirteen. This is an average of 3.4 northern spotted owl pairs displaced per year since 1992, substantially less than the maximum of 5 sites per year estimated and permitted in 1992, while occurring on a larger land base than used for the 1992 incidental take estimates.

Response to Comment LC1-2

This comment appears to be based on the assumption that NSO are only associated with the oldest and largest trees in a managed landscape such as the Green Diamond ownership. Studies conducted on Green Diamond's ownership have shown NSO to use second-growth stands which dominate the ownership. However, the studies show that owls do tend to select the larger residual components such as remnant old trees for roosting and nesting in young managed stands (Thome et al., 1999 and Folliard et al., 2000). In addition, Thome et al. (1999) found that the highest reproduction was associated with owls that nested in younger stands with a high component of residual older trees. These studies and others (Franklin et al., 2000 and McDonald et al., 2006) support the hypothesis that the best habitat for NSO in this portion of their range is a mosaic of young and older forests. Younger stands are important habitat for dusky-footed woodrats (Hamm, 1995 and Hughes, 2006), which are the primary prey for NSO in this portion of their range. The

primary conservation strategy of the GD HCP is that, over time, regrowth of young stands will offset the loss of mature stands that have been harvested. The critical residual component of young stands will be maintained following harvest through retention of individual trees, tree clumps and habitat retention areas. In addition, the tree retention associated with protecting watercourses, wet areas and unstable ground required under the California Forest Practice Rules (CFPRs) and Green Diamond's Aquatic Habitat Conservation Plan and Candidate Conservation Agreement with Assurances (Aquatic HCP/CCAA) will provide for future older residual components within a matrix of younger stands. The Aquatic HCP/CCAA took effect on July 1, 2007, with a 50-year permit period.

Were it to occur, the loss of large trees and older forest from Green Diamond's ownership would likely impact NSO, as studies indicate that that older forest stands and structural elements are important to spotted owls. Management of Green Diamond's land under their NSO HCP includes conservation measures designed to minimize and mitigate the impacts of incidental take. Evidence to date indicates that the habitat retention strategy of the HCP is succeeding in maintaining NSO habitat. As shown in EA table 3.6-3, the projected amount of suitable owl habitat (older forest) is expected to increase through the end of the permit term in 2022. Between 1992 and 2002, the amount of suitable owl habitat on GD ownership increased by 38 percent due to net increasing stand age. The preferred alternative will also retain 39 spotted owl set-asides across the ownership, totaling 13,242.5 acres, where timber harvest is not allowed, and which are largely comprised of older, larger trees. The preferred alternative will also reinstate protections on an additional 20,310-acre special management area, where no take is allowed. Although it has not been quantified, the current retention standards under the California Forest Practice Rules, and the NSO HCP will provide for greater retention of residual trees in the future, relative to measures that existed when the plan was signed in 1992.

The comment regarding effects on sediment delivery to streams is apparently based on the assumption that NSO are associated with the old growth forest, and in the most remote and unstable areas where timber harvesting is more logistically difficult and expensive. This assumption is not supported by the distribution of owls within Green Diamond's ownership (Diller and Thome, 1999). These published results indicated that NSO were well distributed throughout the ownership, and in areas with a mosaic of young and mature managed stands, owl densities were among the highest reported within the range of the NSO. Furthermore, geologically unstable areas are protected under the California FPRs and Green Diamond's Aquatic HCP/CCAA, which was recently approved by the USFWS and NOAA Fisheries, and associated permits issued by those agencies. This Aquatic HCP/CCAA covers listed and unlisted salmonid fish species, as well as 2 unlisted amphibian species, tailed frog and southern torrent salamander, which are associated with forest streams and headwaters. In the FEIS for the Aquatic HCP/CCAA, issued jointly by the USFWS and NOAA Fisheries, sediment impacts from Green Diamond's past, present, and future operations on geologically unstable areas are specifically addressed with respect to aquatic species. FWS has considered the Aquatic HCP/CCAA and its FEIS in making its decision concerning the proposed amendment to the NSP HCP.

Response to Comment LC1-3

The EA does include a cumulative effects analysis, which the Service believes meets NEPA requirements. However, as noted in responses to other questions, some information has been added to the cumulative effects analyses, as a result of comments received.

See the response to Comment #28 regarding Federal Clean Water Act/Basin Plan requirements.

The commenter is correct that the EA does not identify specific sites to be logged. This was not done in the 1992 HCP, or in this amendment. Neither NEPA nor ESA require specific site areas be identified prior to issuing the amended ITP. Specific areas to be logged would be identified during the normal timber harvest planning process, as currently occurs under the existing HCP. While specific sites to be logged are not identified, the EA does describe and analyze the expected nature and magnitude of the effects of logging associated with the proposed action (the issuance of an amended ITP to allow incidental take of 8 additional NSO sites) on NSO (see EA Section 4.6.3) and on vegetation (Section 4.5.3), wildlife (Section 4.7.3), and other resources (elsewhere in Chapter 4).

Response to Comment LC1-4

The Service evaluated the proposed action in the context of NEPA requirements, and determined that an EA was the appropriate form for the initial NEPA analysis. Based on the analysis in the EA, and NEPA guidance for when an EIS is required, we have found that the proposed federal action does not meet the EIS threshold of “significantly affect the quality of the human environment”. The USFWS has reviewed the CEQ criteria for actions requiring an EIS; that review is part of the record for the project.

We agree with the comment that the proposed action qualifies as a “major federal action”, and thus triggers a NEPA analysis. “Major federal actions” trigger NEPA analysis, however, not an EIS. The EA meets the requirements of NEPA.

Response to Comment LC1-5

The proposed amendment to the NSO HCP and ITP is not an unanticipated, piecemeal change. The 1992 NSO HCP called for an estimate of annual take for the remainder of the permit, as part of the required 10-year comprehensive review, indicating (as noted in the response to Comment 1) that additional incidental take authorization would be considered upon the completion of that review. The USFWS allowed Green Diamond to defer submittal of the comprehensive review beyond permit year 10 because Green Diamond agreed to do more extensive NSO research and because their operations resulted in less displacement and incidental take than the USFWS expected during the first decade of the HCP. Accordingly, the comprehensive review completed in 2006 was quite extensive, and included results of biological studies on Green Diamond lands not anticipated by USFWS in 1992.

The comment suggests waiting for the outcome of the Aquatic HCP/CCAA. That HCP/CCAA has now been approved by USFWS and NOAA Fisheries. In making its decision on the proposed action, USFWS will consider the actions and associated environmental impacts described in the final environmental impact statement for the Aquatic HCP (see EA 1.6.3.2).

The USFWS agrees that a multiple-species terrestrial HCP could have conservation benefits for species other than the NSO, however, the species put forth for coverage by habitat conservation plans are the choice of the applicant, and multiple-species plans are not a statutory requirement. A multi-species terrestrial HCP was considered as an alternative but was dismissed from further consideration (EA Section 2.4.3). A multi-species terrestrial HCP is beyond the intent and design of the comprehensive review process under the 1992 NSO HCP, although the USFWS would work with Green Diamond on such a proposal if the company were to voluntarily pursue a multi-species terrestrial HCP in the future.

Response to Comment LC1-6

The USFWS believes that the available information, including Green Diamond's annual and Phase One comprehensive review reports and from other sources, is sufficient basis for evaluating and authorizing the proposed additional incidental take of 8 owl pairs.

As required by the ITP for the 1992 HCP, Green Diamond provides annual reports on HCP activities to the Service, including details specified by the HCP. We find these reports to meet the requirements of the 1992 HCP and ITP, and to be in compliance with it. We have not found these reports to be biased or incomplete. In addition to these annual reports, Green Diamond has contacted the Service at times with questions related to HCP interpretation, to ensure their compliance with the HCP; we find this to be evidence that Green Diamond is working with the Service in good faith, to remain in compliance with their HCP and associated ITP.

Green Diamond provided a "Phase One" comprehensive review report, included as an attachment to their permit amendment application and received by the Service in late August 2006. This report was required by the 1992 HCP, and includes items specified by the HCP: (1) a comparison of actual and estimated levels of owl displacement; (2) a comparison of actual and estimated distribution of owl habitat; (3) a reevaluation of the biological basis for the conservation strategy based on the data collected through the research program and other sources; (4) a detailed analysis of the efficacy of and continued need for the set-asides and of the long-term viability of the owl population on Green Diamond's property; and (5) an estimate of the annual owl displacement for the remainder of the permit period. This is the first phase of Green Diamond's reporting, with additional analyses to be reported in the future. The future report will include sophisticated modeling and other analyses which exceed the requirements of the comprehensive review called for by the 1992 HCP, which were met by the "Phase One" review provided by Green Diamond. The EA analysis does rely heavily on data collected and reported by Green Diamond, because it is Green Diamond that has collected NSO data on their lands, and that has funded studies. However, much of this data has been subject to external review, including publication in peer-reviewed journals, review through the NSO demographic meta-analyses (discussed below), and review of graduate student theses based on owl-related studies on Green Diamond lands.

Although not required by the HCP, Green Diamond has contributed to the range-wide NSO demographic “meta-analyses” in 1998 and 2004, and has collected NSO demographic data on their lands since 1990. The meta-analysis effort has resulted in outside review and analyses of the Green Diamond’s demographic data, both at the spatial scale of the Green Diamond study area, and in analyses that included the other demographic study areas within the three-state NSO range (Franklin et al., 1999 and Anthony et al., 2004, 2006). In addition to information in the comprehensive review report and the demographic analyses, Green Diamond provided the USFWS with other information for use in the EA’s effects analyses.

With respect to authorizing additional incidental take, the EA (Section 1.1) and Green Diamond’s Phase One review both note that the proposed permit amendment for additional incidental take would provide Green Diamond operational flexibility while they and the USFWS further consider and evaluate the findings of the comprehensive review of the HCP. Because of the complexity of the information developed by Green Diamond, including ongoing studies, the evaluation of the information and of future incidental take may require several more years.

As pointed out by the commenter, the Draft EA referred to Green Diamond’s comprehensive review as “draft” in two places. The EA was in error, as this report, received as part of Green Diamond’s permit amendment application, was not draft, nor was it labeled as such. This error has been corrected in Final EA. The Service believes that the information provided by the Phase One comprehensive review meets the requirements of the HCP and ITP, and that the information provided in that review and from other sources is sufficient basis for evaluating and authorizing the proposed additional incidental take of 8 owl pairs.

Response to Comment LC1-7

We reviewed the USFWS’ 2004 5-year status review and the 2004 scientific evaluation of the status of NSO (“Scientific evaluation of the status of the Northern Spotted Owl,” Sustainable Ecosystems Institute, by S.P. Courtney and others), prepared under contract with USFWS, to assist with the Service’s 5-year status review. Neither document evaluates the issues of habitat modification and take on Green Diamond lands, relative to expectations under the 1992 HCP. Those documents discuss demographic parameters of NSO populations on various demographic study areas, including the GD demographic study area, but not in the context of the HCP. We are not aware of scientific documents that support the claim made in this comment.

Response to Comment LC1-8

The sections of the EA addressing marbled murrelet critical habitat (Sections 3.7.2, 4.1.2, 4.6.5.2, and 4.7.5.2) have been changed to include additional information regarding marbled murrelet critical habitat, as proposed for revision (71 Federal Register 53838, September 12, 2006), and on the potential cumulative impacts with the proposed action, on northern spotted owls and other resources, should the proposed critical habitat revision be finalized.

The Service’s intra-Service Section 7 consultation for the proposed action considers effects on murrelet critical habitat and determined that the proposed action will not affect the marbled murrelet or its critical habitat.

Response to Comment LC1-9

Text has been added to Sections 3.6.3, 4.1.2, 4.6.5.2, and 4.7.5.2 of the EA addressing northern spotted owl critical habitat as currently designated, and as recently proposed for revision, and on the potential cumulative impacts with the proposed action on northern spotted owls and other resources, should the proposed critical habitat be finalized.

The intra-Service ESA Section 7 consultation for the proposed action considers effects on NSO critical habitat and determined that the proposed action will not affect NSO critical habitat.

Response to Comment LC1-10

The Aquatic HCP/CCAA is the product of years of development and discussions between Green Diamond, USFWS and NOAA Fisheries, beginning in 1997 and long predating Green Diamond's application for an amendment to its permit for the NSO HCP. The Aquatic HCP/CCAA and associated permits took effect July 1, 2007. The effects of the Aquatic HCP/CCAA and the issuance of associated permits by the USFWS and NOAA Fisheries have been considered in a separate NEPA document, an EIS prepared jointly by USFWS and NOAA Fisheries. That EIS took into account the existing NSO HCP. The EA for the NSO HCP amendment incorporates by reference the analyses of the EIS, notably for the effects of Green Diamond's timber operations under the Aquatic HCP/CCAA on aquatic resources, under the No Action alternative.

Response to Comment LC1-11

The impact assessment has occurred, consistent with law and regulation. Under NEPA, the USFWS prepared an Environmental Assessment for this proposed action, which evaluated the impacts of the additional incidental take, prior to the USFWS issuing a permit amendment to allow the additional incidental take of NSO.

In addition to the impact analysis in the EA, the USFWS evaluated the impacts of the additional incidental take on NSO under the proposed NSO HCP and ITP amendments pursuant to ESA section 7 consultation (per 16 U.S. Code 1536(a)). Green Diamond also addressed the impacts of the proposed additional incidental take authorization in their comprehensive review report (2006) and application for a proposed amendment to the NSO HCP and incidental take permit.

Response to Comment LC1-12

Comment noted. Public interest is not the standard under NEPA nor for issuance of ITPs under the ESA. The USFWS is required to respond to ITP requests and grant a permit if the issuance criteria are met (issuance criteria are at: 50 CFR 13.21; 50 CFR 17.32(b)(2); and ESA section 10(a)(2)(B)).

Considerable information is in Draft EA and in Green Diamond's comprehensive review, phase 1 report, which were made available to the public both via the internet, upon request, and at public libraries in Humboldt and Del Norte counties. In addition, as noted in the

response to Comment #2, several peer-reviewed and published scientific studies support the basic premise of the HCP that habitat for spotted owls can be maintained through a dynamic process of harvesting and re-growth of habitat (Thome et al., 1999; Diller and Thome, 1999; and McDonald et al., 2006). Also, the monograph by Franklin et al. (2000), published in an eminent journal and based on independent research on a study area adjacent to Green Diamond lands, provides strong support for the dynamic nature of spotted owl habitat in this portion of their range.

An independent and scientifically credible assessment of the status of NSO on Green Diamond's land was conducted in 2004 (Anthony et al. 2004, 2006). The results of this assessment have been summarized and published in a peer-reviewed scientific journal (Anthony et al., 2006) and are summarized in the EA (Section 4.6.2.1 and 4.6.2.2). This indicated that the owl population in Green Diamond's NSO demographic study area was stable or increasing before the late 1990's, then began a slight downward trend ($\lambda = 0.97$). Data from other owl populations studied in the region, the Hoopa and Willow Creek (Northwest California) study areas, also suggest potential downward trends (λ estimate < 1) there also. The downward trend in NSO populations on Green Diamond lands, and elsewhere, is of concern to the USFWS. The fact that population trends appear to be downward elsewhere in the region, suggests that the cause is not simply the level of timber harvest on Green Diamond's lands. For example, population trends are also downward on the nearby Northwest California (or Willow Creek) demographic study area, an area that is largely federal (National Forest) lands, where timber harvest has been very light over the past 15-20 years. Also, an independent analysis of habitat suitability (Anthony et al., 2006, Appendix F), found that habitat conditions for the Green Diamond (or Simpson) study area, located on private timber lands were comparable to those on adjacent federal lands. In fact, 12 percent more of the potential owl habitat on the Green Diamond study area had habitat suitability scores in the highest 2 categories, compared to potential owl habitat on adjacent federal lands. As described in the EA (Section 4.6.2.2), the data indicate that, for two primary components of λ , NSO survival rates on Green Diamond lands were relatively stable over time, while fecundity showed a downward trend over time. By comparison, studies on the nearby Willow Creek area suggested downward trends in fecundity and survivorship, and stable survival rates and slightly increasing fecundity on the Hoopa study area. It is not known with certainty what is driving the trend in fecundity, but spring weather explains much of the variation in this demographic parameter (Franklin et al., 2000 and Olson et al., 2005).

Response to Comment LC1-13

Additional information has been added to the EA (Section 3.6.2.3) regarding habitat conditions on the Green Diamond ownership, at a landscape scale, in 1992 and 2003. This data provides comparison with some findings of the "mosaic analysis" presented in the original 1992 HCP on spatial distribution of forest stands of different ages across the Green Diamond ownership. In response to the comment regarding evaluations of Green Diamond's mosaic analysis and nesting habitat analyses, these studies have been published in peer-reviewed scientific journals (landscape mosaic analysis: Folliard and others, 2000; nesting habitat analyses; Thome and others, 1999, 2000; and Diller and Thome, 1999).

Response to Comment LC1-14

The HCP and Implementation Agreement required the permittee (Green Diamond) to report harvest around owl nest sites which reduced NSO habitat below the HCP threshold levels, as a presumed “displacement” of the resident NSO pair (Implementation Agreement Section II.C.1.a). The HCP’s initial harvesting thresholds that would trigger a report of displacement were based on a master’s study (Folliard, 1993) which quantified the amount of habitat associated with nesting spotted owls on Green Diamond’s ownership. There was high variation associated with the amount of different habitat elements associated with owls and the threshold for incidental take was set at one standard deviation from the mean condition.

In recognition that harvesting that reduced habitat conditions below the established thresholds would not necessarily cause actual harm, the IA (Section II.C.1.a) provided that monitoring of the owl pairs potentially affected by the harvesting would be carried out in the years following to determine whether actual essential behavioral patterns were actually impaired by the harvesting and, therefore, whether “take” had actually occurred. The USFWS’ Intra-Service Section 7 Consultation for the 1992 HCP and ITP application, dated September 14, 1992, also discussed how post-harvest monitoring could find that owl pairs assumed to be incidentally taken by displacement (based on the HCP’s thresholds) might in fact continue to breed at an alternate site.

After about 2 years of HCP implementation, monitoring of “taken” owl pairs demonstrated that, in some cases, harvest below the reporting threshold had not affected the occupancy or reproduction of the “taken” owls, and had not resulted in take as defined in the ESA, which includes actual death or injury, including harm through impairment of essential behavioral patterns. Green Diamond and USFWS subsequently discussed treatment of owl displacements and when “take” occurs. The 1995 letter referenced in the comment documented the methodology USFWS and Simpson agreed to use to determine when “take” occurs under Green Diamond’s NSO HCP, based on the post-harvest occupancy and reproductive success of owl pairs that are initially considered as taken under the thresholds of the 1992 HCP. Thus, this process reconciled the theoretical take threshold established in the HCP and the actual biological impact of harvesting on owl pairs. As a result of reviewing reported “takes” with this methodology, a number of instances of harvest reducing habitat below thresholds were determined not to have actually caused the displacement or take of owls. Therefore, those instances were not counted against the incidental take limit of 50 NSO pairs. This clarification was consistent with the ITP and the IA, and with the USFWS’ intra-Service Section 7 consultation on issuance of the 1992 permit.

Response to Comment LC1-15

See response to Comment LC1-4.

Response to Comment LC1-16

The EA addresses aquatic impacts, including impacts to aquatic species. As stated in the EA, the effects of the current proposed action, the issuance of an ITP amendment to permit incidental take of 8 additional NSO sites, is not expected to significantly affect aquatic

resources, compared to the No Action alternative; see EA Sections 4.2.3, 4.3.3, and 4.4.3 for further discussion of this. As noted above (response to Comments 2 and 10 above), effects to listed and other salmonid species of Green Diamond's timber operations was recently evaluated in the FEIS for Green Diamond's Aquatic HCP/CCAA; harvest levels, patterns and aquatic effects under No Action, Proposed Action, and Alternative A, for the NSO HCP amendment are expected to fall within the range of activities analyzed for the proposed action in the FEIS. The effects on NSO are addressed in detail in EA Section 4.6, and to terrestrial habitat and wildlife species in EA Section 4.7.

The comment referred to the take prohibitions under California Fish and Game Code section 3503.5, which prohibits the take of birds or destruction of nest or eggs of all birds of prey. "Take" under California Fish and Game Code (section 86) is defined more narrowly than under the federal ESA, being limited to mean to "...hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Thus, "take" does not directly address habitat loss and displacement of birds, as it does under the ESA. The form of incidental "take" anticipated under the proposed HCP amendment is displacement due to habitat harvest, something which has not been interpreted as subject to the take prohibitions of California Fish and Game Code section 3503.5. The comment also describes the NSO as "a fully protected species" under California law; the NSO is not listed as "fully protected" (California Fish and Game Code section 3511 lists all "fully protected" birds).

Response to Comment LC1-17

See response to Comments LC1-2 and LC1-3.

Response to Comment LC1-18

See response to Comment LC1-10.

Response to Comment LC1-19

As discussed in previous responses and in the EA, the proposed action may affect location of timber harvest, but not the overall level of harvest on Green Diamond's lands. Similarly, the proposed action may affect road location (by directing harvest to some occupied stands and away from alternative harvest locations), but not the total amount or type of roads on the Action Area. The FEIS for the Aquatic HCP/CCAA includes a detailed assessment of the effects of road construction and use under Green Diamond's Aquatic HCP/CCAA. Because that HCP/CCAA has recently been completed and taken effect, it forms part of the No Action and alternatives for the proposed NSO HCP amendment, and the analyses for those effects are found in the FEIS and incorporated by reference.

Response to Comment LC1-20

We addressed the comment regarding the need for an EIS in the response to Comment #4; as stated there, the USFWS disagrees that an EIS is required. Public scoping meetings are not required for preparation of an EA. In accordance with NEPA regulations and guidance,

public input was sought on the EA and on the amendments to the HCP and IA, via a Notice of Availability, published in the Federal Register on February 26, 2007, which provided a 60-day comment period.

Response to Comment LC1-21

Reforestation, including tree planting in grasslands, is not a covered activity under Green Diamond's NSO HCP, and therefore are not part of the proposed action. We do not anticipate that the proposed action will affect in any way Green Diamond's management of grasslands, and open grasslands are not a habitat typically used by NSO. In response to this comment, however, we provide the following information regarding past and future planting of grasslands on their ownership:

Green Diamond presently owns about 7,000 acres of prairie land as part of their property in Del Norte and Humboldt counties. Within the past ten years, Green Diamond has planted commercial conifer seedlings on approximately 560 acres of prairie. This amounts to slightly less than one percent of available prairie per year. Green Diamond has identified about 1,200 acres of current prairie that may be planted at some time in the future. Poor survival of planted seedlings and economic uncertainties are expected to limit future prairie conversion to a rate no more than that of the past ten years, and to no more than the approximate 1,200 acres in total.

Response to Comment LC1-22

The EA does not provide a detailed analysis of the impacts of fire management, because alternatives for logging slash treatment or fire management are not part of the action being considered. General forest management activities, including slash treatment and fire management, will continue under all alternatives evaluated, consistent with applicable laws and regulations. Also, as described in the EA (Section 4.6.3), the Proposed Action, when compared to No Action, is expected to affect the location of harvest units, but not the total acres of forest harvested on the Green Diamond ownership. Therefore, the Proposed Action is not expected to significantly affect logging slash treatment or fire management.

Response to Comment LC1-23

The proposed action would affect 8 NSO sites. Effects of GD timber operations to aquatic species and habitat, including Class III water temperatures, were analyzed separately in the EIS for the Aquatic HCP/CCAA.

Response to Comment LC1-24

Under NEPA, cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (CEQ regulations,

section 1508.7). Under NEPA analyses, the No Action alternative forms the benchmark for comparison of the effects of the other alternatives. See CEQ Forty Questions, #3; (46 Federal Register 18026).

The term “environmental baseline” can have multiple meanings, depending on the context of its use. The No Action alternative includes the effects of past, present and reasonably foreseeable future actions that would occur in the absence of an agency decision to implement one of the other action alternatives. The cumulative effects analysis, in comparing the action alternatives against No Action, does account for past, present and reasonably foreseeable future actions, as required under NEPA. For example, the effects analysis describes, under the Effected Environment and No Action section, the effects of past and present activities, including Green Diamond’s existing NSO HCP, on resources including vegetation and plant species of concern (EA 3.5 and 4.5), NSO (EA 3.6, 4.6.2), terrestrial habitat and wildlife species of concern (EA 3.7 and 4.7.2), and fisheries and aquatic resources/aquatic habitat (EA 3.4 and 4.4). The cumulative impacts analysis can be found in EA Section 4.1.2, individually at the end of each resource sections of EA chapter 4 (Section 4.2 through 4.13), and in summary form in EA Section 4.14.

Response to Comment LC1-25

- Proposed revision of NSO Critical Habitat:
See response to Comment #8
- Proposed revision of Marbled Murrelet Critical Habitat:
See response to Comment #9
- The Green Diamond Aquatic HCP/CCAA:
See responses to Comments #2, 5, and 10
- Changes in habitat on adjacent ownerships, and Green Diamond’s pending land deals
Response: Changes in habitat on adjacent ownership are discussed, in terms of cumulative impacts, in EA Section 4.1.2.3. We are not aware of pending land deals on Green Diamond ownership, other than the potential conservation easement discussed in the response to Comment #8 (murrelet critical habitat). In any event, the NSO HCP allows for changes in Green Diamond ownership. The comprehensive HCP review, to occur in 2012, will provide an opportunity to review the habitat conditions on Green Diamond’s ownership, and the effects of any land deals on those habitat conditions, relative to expectations as described in the EA (Section 3.6.2, 4.6 and elsewhere).
- Listing of lower Klamath as sediment impaired under CWA:
See response to Comment #28

- NCWQB actions relevant to “waivers” and watershed wide Waste Discharge Requirements, etc.

Response: This comment is presumably regarding CWA and other aquatic issues. See responses to Comment #28, regarding CWA compliance, and to #2 regarding other sediment impacts.

- HCPs approved for NSO since 1992.

Response: Since 1992, the principal HCP that has been approved for NSO within the California Coast Ranges physiographic province, and in the vicinity of Green Diamond’s ownership, is the Pacific Lumber Company’s HCP, which includes the NSO as a covered species. The PALCO HCP is included (EA Section 4.1.2.3) in the cumulative effects analysis. Two other approved NSO HCPs within the province (Regli Estate and Terra Springs LLC HCPs) are too small in area and impact to have measurable cumulative effect. A summary of each has been added to the cumulative effects section of the EA. The Forster-Gill Safe Harbor Agreement, which covers NSO, is discussed in EA Section 4.1.2.3.

Response to Comment LC1-26

For cumulative aquatic/watershed impacts, cumulative effects were considered in Section 4 of the EA; see also the responses to Comment #2 and others, and the incorporation by reference of the FEIS and other documents related to Green Diamond’s Aquatic HCP/CCAA. For wildlife habitat impacts, we believe that detailed modeling is not justified for this action which is relatively minor in terms of impact magnitude, and that the EA’s analyses of wildlife habitat impacts (Section 4), including cumulative impacts (Section 4.7.5), are sufficient.

Response to Comment LC1-27

Please see the response to Comments 3, 26, 27 and 28. The cumulative effects analysis does cite the CFPRs as a regulatory process mechanism which would minimize potential adverse impacts on private lands subject to commercial timber harvest, where HCPs do not exist. The effects analysis, however, also cites land management on other lands, including lands under the Pacific Lumber Company HCP, federal lands (Forest Service, Bureau of Land Management, and National Park Service), tribal lands, and State Park lands within the analysis area. Collectively, these ownerships comprise a large percentage of the lands within the analysis area, outside of the Green Diamond lands.

Response to Comment LC1-28

See response to Comment LC1-13.

Response to Comment LC1-29

The relevant data and assessment requested are included in the EA (see Sections 3.6.2, 4.5, and 4.6). We acknowledge that the treatment is difficult, in part because of the complexity of comparing habitat conditions over an ownership base that has changed in size due to acquisitions and property sales since 1992. We will clarify the discussion in the final EA.

Response to Comment LC1-30

As noted in #13 above, and described in the EA (Sections 3.6 and 4.6), the best available science to date indicates that a mosaic of young and older forests provides the best habitat for owls in this portion of their range. Because the proposed action is on land that has been commercial timberland since the early to mid 1900s, where extremely little uncut forest remains, comparison to old-growth conditions would be misleading. NSO exist on the GD ownership in its current form, and that is the basis for analysis, not a pre-historic condition that no longer exists and won't exist within the time frame of the proposed action (next 1 to 2 decades).

Response to Comment LC1-31

Neither NEPA nor ESA specifically require a study of the Green Diamond NSO population viability. The USFWS has evaluated the effects on the NSO in the EA, and in its intra-Service ESA Section 7 consultation for the proposed action. The USFWS has recently (2004) completed a range-wide status review of the NSO, and the findings of that review were considered and cited in our analyses.

Response to Comment LC1-32

Neither Green Diamond's original NSO HCP nor the proposed HCP amendment are intended to ensure compliance with the Federal Clean Water Act of 1977 (CWA) or the related Total Maximum Daily Loads (TMDLs), which are established under CWA authority for water bodies not meeting established water quality standards. The EA (Section 3.4.4) recognizes that certain water bodies within the Plan Area are listed as water quality impaired under the Clean Water Act and identified on the 303(d) list because of sediment or other pollution that has occurred in the past, and in some cases continues to occur. This issue is also addressed in the FEIS for Green Diamond's Aquatic HCP/CCAA. The USFWS' Permit issuance criteria require that authorized take occur pursuant to an otherwise lawful activity. Green Diamond's activities in its HCP-covered lands remain subject to all other applicable laws, including actions or restrictions that could result from the TMDL process under the Federal CWA and any other related water quality protection requirements under the State Porter-Cologne Water Quality Act.

The FEIS for the Aquatic HCP/CCAA, which focused on aquatic species and their habitats, discusses potential contributions of some elements of the Aquatic HCP/CCAA towards achievement of CWA-identified beneficial uses. Because the NSO HCP is a terrestrial-focused plan, the proposed action is unlikely to have measurable effects on

CWA and TMDLs, beyond those associated with the general timber harvest activities analyzed in the FEIS. The harvest under the proposed NSO HCP amendment would fall within the activities analyzed in the Aquatic HCP/CCAA, in terms of aquatic effects. A small contribution towards CWA beneficial uses might result from the harvest restrictions associated with the 20,310-acre special management area reinstated under the proposed action, and with the 39 NSO set-asides established under the original HCP; for the latter, any benefits, however, would also occur under the No Action Alternative.

Response to Comment LC1-33

The USFWS provided the Draft EA and proposed HCP amendment to area tribes for their review and comment. Tribes contacted included: Hoopa Tribal Council; Yurok Tribal Council; and the Karuk Tribal Council. We received no responses.

Response to Comment LC1-34

As stated in our response to Comment #6, we found that Green Diamond's 10-year Comprehensive Review submitted with the permit amendment application was sufficient. We have also reviewed the results of the NSO demographic analyses, the USFWS' 5-year status review, and other recent studies, as described in the EA Sections 3.6 and 4.6. As described in the EA, we acknowledge uncertainty regarding the future status of the NSO, particularly in light of the range expansion of the Barred Owl. The proposed HCP amendment includes a study of the interactions between NSO and Barred Owls, which we expect will increase our understanding of this threat. The USFWS considered these data, and the relatively small scale of the proposed action, which would permit the incidental take of 8 NSO pairs, in the context of an NSO population in northern California which remains large, and which today is larger than was estimated in 1992. In light of these factors, and the analyses in our EA and intra-Service Section 7 consultation, we determined that the action will not significantly affect the quality of the human environment, and meets the issuance criteria under the ESA.

Response to Comment LC1-35

The forest age class model results, provided by Green Diamond, are reported in the EA; the metadata used in those models is the property of Green Diamond, and as proprietary information was not available to the USFWS. Information provided to the USFWS is on file in the Arcata Fish and Wildlife Office, and is available through the Freedom of Information Act. We address tribal consultations in our response to Comment 29. A total of one set of comments on the EA and proposed action were received. This comment came from that single set of comments; no other comments were received or are available.

A summary of comments received for the original 1992 NSO HCP and Draft EA, and the USFWS' responses, were provided in the final 1992 EA. That document is on file in the Arcata Fish and Wildlife Office.

Response to Comment LC1-36

The comment is correct that the Proposed Action will allow for increased incidental take: the proposed action evaluated is the issuance of an amended incidental take permit that would allow incidental take of 8 additional NSO sites.

The EA (Section 4.6.3) discusses the potential for increased harvest under the Proposed Action, and concludes that while the Proposed Action will affect the location of harvest, the total area harvested is expected to be similar under all alternatives, and might even be larger under the No Action alternative compared to the Proposed Action.

Response to Comment LC1-37

Enclosure 1 to the letter from Mr. Pace contained links to information regarding barred owls and their potential effects on northern spotted owls. The USFWS has described and evaluated potential effects of the expansion of the barred owl range into the range of the northern spotted owl, including competitive effects. For this discussion, refer to EA Sections 3.6.2.6 (Affected Environment – Habitat Overlap and Interaction between Barred Owls and Northern Spotted Owls), 4.6.2.2 (Environmental Consequences – No Action – Effects Related to the Rate of Northern Spotted Owl Population Change), 4.6.3 (Environmental Consequences – Proposed Action), and 4.6.5.2 (Cumulative Effects of the Proposed Action). In addition, as part of the amendments to their NSO HCP, Green Diamond will be initiating new research on the habitat overlap between the barred owl and northern spotted owl, which would provide information on competitive effects of barred owl on the spotted owl, one of the factors noted in Enclosure 1 to the comment letter.

Response to Comment LC1-38

Enclosure 2 to the letter from Mr. Pace contained links to information provided previously to the USFWS during the 2003 public review period for the agency's status review for the northern spotted owl. The information provided is not in the form of specific comments regarding the Proposed Action of amending Green Diamond's ITP and associated HCP and IA. However, we acknowledge the receipt of the information in this enclosure, and believe that the EA addresses the major points raised in the enclosure that are pertinent to the Proposed Action, including: population levels and trends; fecundity; cumulative effects including those of habitat loss and other incidental take permits; and diseases potentially affecting the owl.

Works Cited

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.P. Burnham, G.C. White, C.J. Schwarz, J. Nichols, J.E. Hines, G.S. Olson, S.H. Ackers, S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.P. Gerhardt, S.A. Gremel, R.J. Gutiérrez, P.J. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, and S.G. Sovern. 2004. *Status and Trends in Demography of Northern Spotted Owls, 1985-2003*. Draft. Oregon Cooperative Fish and Wildlife Research Unit, Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon.

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.P. Burnham, G.C. White, C.J. Schwarz, J.D. Nichols, J.E. Hines, G.S. Olson, S.H. Ackers, L.S. Andrews, B.L. Biswell, P.C. Carlson, L.V. Diller, K.M. Dugger, K.E. Fehring, T.L. Fleming, R.P. Gerhardt, S.A. Gremel, R. J. Gutiérrez, P.J. Happe, D.R. Herter, J.M. Higley, R.B. Horn, L.L. Irwin, P.J. Loschl, J.A. Reid, S.G. Sovern. 2006. "Status and Trends in Demography of Northern Spotted Owls, 1985-2003." *Wildlife Monographs*. 163: 1-48.

Diller, L.V., and D.M. Thome. 1999. "Population Density of Northern Spotted Owls in Managed Young-growth Forests in Coastal Northern California." *Journal of Raptor Research*. 33: 275-286.

Folliard, Lee B., Kerry P. Reese, and Lowell V. Diller. 2000. "Landscape Characteristics of Northern Spotted Owl Nest Sites in Managed Forests of Northwestern California." *Journal of Raptor Research*. 34 (2): 75-84.

Folliard, L. 1993. Nest Site Characteristics of Northern Spotted Owls in Managed Forests of Northwest California. M.S. thesis. University of Idaho. 114 pp.

Franklin, A.B., K.P. Burnham, G.C. White, R.J. Anthony, E.D. Forsman, C. Schwarz, J.D. Nichols, and J. Hines. 1999. Range-wide Status and Trends in Northern Spotted Owl Populations. Unpublished Report. Colorado Cooperative Fish and Wildlife Research Unit, Colorado State University, Fort Collins, Colorado.

Franklin, A.B., D.R. Anderson, R.J. Gutiérrez, and K.P. Burnham. 2000. "Climate, Habitat Quality, and Fitness in Northern Spotted Owl Populations in Northwestern California." *Ecological Monographs*. 70 (4): 539-590.

Green Diamond Resource Company. 2006. *13th Annual Report*. Submitted to the United States Fish and Wildlife Service by Green Diamond Resource Company, in fulfillment of requirements specified in condition I of permit #PRT-767798, incidental take permit for northern spotted owls, under Section 10 (a) (1) (B) of the Endangered Species Act. February.

Hamm, K.A. 1995. Abundance of Dusky-footed Woodrats in Managed Forests of North Coastal California. M.S. Thesis, Humboldt State University, Arcata, CA. 46 pp.

Hughes, K.D. 2006. Habitat Associations of Dusky-footed Woodrats in Managed Douglas-fir/Hardwood Forests of northern California. M.S. Thesis, Humboldt State University, Arcata, CA. 41 pp. McDonald et al. 2006

McDonald, T.L., B.F.J. Manly, R.M. Nielson, and L.V. Diller. 2006. "Discrete-choice Modeling in Wildlife Studies Exemplified by Northern Spotted Owl Nighttime Habitat Selection." *Journal of Wildlife Management*. 70: 375-383.

Olson, G.S., R.J. Anthony, E.D. Forsman, S.H. Ackers, P.J. Loschl, J.A. Reid, K.M. Dugger, E.M. Glenn, and W.J. Ripple. 2005. "Modeling of Site Occupancy Dynamics for Northern Spotted Owls, with Emphasis on the Effects of Barred Owls." *Journal of Wildlife Management*. 69: 918-932.

Thome, D.M., C.Z. Zabel, and L.V. Diller. 1999. "Forest Stand Characteristics and Reproduction of Northern Spotted Owls in Managed North-coastal California Forests." *Journal of Wildlife Management*. 63: 44-59.

Thome, D.M., C.J. Zabel, and L.V. Diller. 2000. "Spotted Owl Turnover and Reproduction in Managed Forests of North-coastal California." *Journal of Field Ornithology*. 71: 140-146.



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