Final Environmental Impact Statement for the Elliott State Research Forest Habitat Conservation Plan

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Cover Photo Credits: Elliott State Forest (background; Ryan Singleton, Oregon Department of State Lands); northern spotted owl (top inset; Derek Acomb, California Department of Fish and Wildlife); coho salmon (middle inset; John and Karen Hollingsworth, U.S. Fish and Wildlife Service [FWS]); marbled murrelet (bottom inset; Rich MacIntosh, FWS)

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COVER SHEET

Title of Proposed Action:	Issuance of Incidental Take Permits for the Elliott State Research Forest Habitat Conservation Plan
Subject:	Final Environmental Impact Statement
Lead Agency:	U.S. Fish and Wildlife Service
Cooperating Agencies:	National Marine Fisheries Service, Oregon Department of Fish and Wildlife, Oregon Department of Forestry
County/State:	Coos and Douglas Counties, Oregon

Abstract:
This environmental impact statement (EIS) evaluates the environmental consequences of the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) issuing incidental take permits (ITPs) associated with the Elliott State Research Forest Habitat Conservation Plan (HCP), in accordance with section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended. The Oregon Department of State Lands (DSL) prepared the HCP in support of its permit applications. DSL is seeking take authorization from FWS and NMFS for three species: northern spotted owl, marbled murrelet, and Oregon Coast coho. The permits, if issued, would authorize take of the covered species that may occur incidental to DSL's forest management and research activities on 83,326 acres of forest lands in Douglas and Coos Counties overseen by the State Land Board. The EIS presents effects of the proposed HCP and three alternatives on geology and soils, water resources, vegetation, fish and wildlife, air quality, climate change, recreation and visual resources, cultural resources, tribal resources, socioeconomics, and environmental justice. FWS, as the federal lead agency, prepared this EIS pursuant to the Services' NEPA requirements under the Council on Environmental Quality's regulations (40 CFR 1500–1508, May 2022), as well as internal agency guidance. FWS and NMFS will make separate decisions on whether to issue an ITP to the applicant, relying on the criteria for ITPs set forth in ESA and its implementing regulations.

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Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
ACS	American Community Survey
APE	area of potential effects
BLM	Bureau of Land Management
BOF	Board of Forestry
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CRW	conservation research watersheds
CSF	Common School Fund
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DSL	Oregon Department of State Lands
EFU	exclusive farm use
EJ	environmental justice
ELZ	equipment limitation zone
EIS	environmental impact statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESRF	Elliott State Research Forest
FB	fish-bearing
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FMP	forest management plan
FR	*Federal Register*
FWS	U.S. Fish and Wildlife Service
FR	*Federal Register*
FRIA	Forest Road Inventory and Assessment
FWS	U.S. Fish and Wildlife Service
GHG	greenhouse gas
GIS	geographic information system
HCP	habitat conservation plan
HLDP	high landslide delivery potential
HSI	habitat suitability index
HUC	hydrologic unit code
IPCC	Intergovernmental Panel on Climate Change
ITP	incidental take permit
LMP	land management plan
MBF	thousand board feet

MBTA	Migratory Bird Treaty Act
MMBF	million board feet
MRW	management research watersheds
MT	metric ton
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OAR	Oregon Administrative Rules
ODEQ	Oregon Department of Environmental Quality
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
OHV	off-highway vehicle
ORS	Oregon Revised Statute
Oregon FPA	Oregon Forest Practices Act
OSU	Oregon State University
PM10	particulate matter 10 microns or less in diameter
PM2.5	particulate matter 2.5 microns or less in diameter
PNFB	perennial non-fish-bearing
RCA	riparian conservation area
RMA	riparian management area
RMP	resource management plan
Services	National Marine Fisheries Service and U.S. Fish and Wildlife Service
SHPO	State Historic Preservation Officer
SSBT	salmon, steelhead, and bull trout
THPO	Tribal Historic Preservation Officer
TMDL	total maximum daily load
USC	United States Code
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
XNFB	non-fish-bearing, non-perennial, not HLDP

Executive Summary

Introduction

The U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) (collectively, the Services) propose to issue incidental take permits (ITPs) to the Oregon Department of State Lands (DSL or applicant). The ITPs would authorize take of endangered and threatened species resulting from DSL's management and research activities on the Elliott State Research Forest in accordance with the requirements of the Endangered Species Act (ESA). Section 9 of the ESA and federal regulations prohibit the taking of a species listed as endangered or threatened. The ESA defines *take* to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The Services may issue permits under limited circumstances to take listed species incidental to, and not the purpose of, otherwise lawful activities. Section 10(a)(1)(B) of the ESA and implementing regulations provide for authorizing incidental take of listed species. DSL prepared the Elliott State Research Forest Habitat Conservation Plan (HCP) in support of its applications to the Services for the ITPs.

The proposed issuance of an ITP supported by the HCP is a federal action under the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321 et seq.). This environmental impact statement (EIS) was prepared pursuant to the Services' NEPA requirements. FWS is the lead federal agency responsible for preparing the EIS, and NMFS, the Oregon Department of Forestry (ODF), and Oregon Department of Fish and Wildlife (ODFW) are cooperating agencies.

Proposed Federal Action and Decisions to be Made

The Services are reviewing the ITP applications, received on October 10, 2022, as updated subsequently with a revised supporting HCP submitted on December 6, 2024. The Services will base their permit decisions on the statutory and regulatory criteria of the ESA. These decisions will also be informed by the data, analyses, and findings in this EIS and public comments received on the EIS and HCP. The Services will independently document their determinations in separate ESA Section 10 findings documents, ESA Section 7 biological opinions, and NEPA Records of Decision developed at the conclusion of the ESA and NEPA compliance processes. If the Services find that all requirements for issuance of the ITPs are met, they will issue the requested permits, subject to terms and conditions deemed necessary or appropriate to carry out the purposes of ESA Section 10.

Purpose and Need for Federal Action

The purpose of the federal action considered in this EIS is to fulfill the Services' Section 10(a)(1)(B) conservation authorities and obligations under the ESA to address the applications requesting authorization of incidental take of three species listed as threatened under the ESA—the northern spotted owl (*Strix occidentalis*), marbled murrelet (*Brachyramphus marmoratus*), and Oregon Coast coho salmon (*Oncorhynchus kisutch*). The applicant has determined that operation of the Elliott State Research Forest as proposed would likely result in take of these ESA-listed species and is looking for a long-term solution that assures compliance with the ESA.

The need for the federal action is to respond to the applicant's request for ITPs for the covered species and covered activities as described in the HCP. The Services will review the ITP applications to determine if they meet issuance criteria; those criteria include that the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking, that the applicant will ensure that adequate funding for the HCP will be provided, that the applicant has provided procedures to deal with unforeseen circumstances, and that the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild. The Services will also ensure that issuance of the ITPs complies with other applicable federal laws, regulations, treaties, and applicable executive orders, as appropriate.

Public Involvement

FWS initiated the public scoping process for this EIS by publishing the Notice of Intent (NOI) to prepare an EIS in the *Federal Register* (FR) on May 5, 2022 (87 FR 26778). The NOI can be accessed at https://www.regulations.gov/document/FWS-R1-ES-2022-0029-0001. The NOI announced FWS's intent to prepare an EIS, provided information on the public scoping meeting, and requested comments from all interested parties on the scope of issues and alternatives to consider in preparing the EIS. The comment period was from May 5 to June 6, 2022. FWS hosted a virtual scoping meeting on May 16, 2022. Appendix 1-B, *Scoping,* and Chapter 5, *Summary of Submitted Alternatives, Information, and Analyses,* summarize comments received during the scoping period, which FWS considered when developing this EIS.

In accordance with requirements set forth in NEPA (42 USC 4321 et seq.) and its implementing regulations and the ESA, FWS published a Notice of Availability of the Draft EIS and HCP on November 18, 2022 (87 FR 69291). The notice requested public comments on the Draft EIS and HCP and announced a public meeting.

The original comment period was from November 18, 2022, to January 3, 2023, which FWS extended to January 10, 2023, in response to commenter requests (87 FR 77877). FWS hosted a virtual public meeting on December 13, 2022. The Draft EIS and a recording of the public meeting are available at https://www.fws.gov/project/elliott-state-research-forest-habitat-conservation-plan.

Comments were accepted electronically via www.regulations.gov. Comments received were considered in the preparation of this Final EIS. Appendix 1-C, *Responses to Comments on the Draft EIS*, describes the public review process in more detail and provides responses to the substantive comments received, which cite where appropriate clarifications were made in the Final EIS.

Alternatives

FWS analyzed four alternatives in detail in the Draft EIS, including the no action alternative and the proposed action (Elliott State Research Forest HCP). Chapter 2, *Proposed Action and Alternatives*, describes additional alternatives that FWS considered but eliminated from detailed study.

Alternative 1: No Action Alternative

Under the no action alternative, the Services would not issue ITPs to DSL for the covered activities described in Chapter 2, Section 2.1.2.2, *Covered Activities*, and DSL would not implement the proposed HCP. The no action alternative assumes that DSL would manage the Elliott State Research Forest using a take avoidance approach to ESA compliance. DSL would manage the forest consistent with the Oregon Forest Practices Act (FPA) (Oregon Administrative Statutes [ORS] Chapter 527 and Oregon Administrative Rules [OAR] Chapter 629) as most recently updated in January 2024.[1]

For purposes of this analysis, the no action alternative assumes the following restrictions on forest management activities to avoid take of ESA-listed species in the absence of the proposed HCP.

- **Northern spotted owl:** DSL would avoid incidental take through habitat protections included in the *Revised Recovery Plan for Northern Spotted Owl* (FWS 2011), *FWS Protocol for Surveying Proposed Management Activities that May Impact Northern Spotted Owls* (FWS 2012), and *Biological Opinion on Northwest Oregon District, Bureau of Land Management Harvest and Routine Activities* (FWS 2020). DSL would avoid incidental take from habitat modification for northern spotted owl by protecting nest sites and suitable habitat[2] within home ranges (FWS 2011).[3] This includes maintaining a 70-acre no-harvest zone around the nest site, a minimum of 50% of suitable habitat within the core use area (0.5-mile radius around the nest site) and a minimum of 40% of suitable habitat within the provincial home range (in the Oregon Coast region, a 1.5-mile radius around the nest site) (FWS 2012).[4] DSL would also implement seasonal restrictions on certain maintenance activities and equipment use during the critical breeding period and the nesting season (FWS 2020).
- **Marbled murrelet:** DSL would avoid incidental take through compliance with OAR 635-100-0137, *Survival Guidelines for Marbled Murrelet.* The guidelines specify that "prior to implementing a project that removes trees and has the potential to take marbled murrelets, approved surveys of the project area shall be conducted for a minimum of two consecutive years to determine if it is occupied by murrelets." Timber harvest would not be permitted in occupied sites and in a 100-meter (328-foot) buffer surrounding occupied sites. For the purpose of analysis, occupied habitat is assumed to include the known occupied and modeled potential marbled murrelet habitat identified in the HCP (EIS Figure 2-1). The guidelines also include seasonal restrictions on certain activities (e.g., heavy equipment use, prescribed burns) with which DSL would be required to comply.
- **Oregon coast coho:** DSL would avoid incidental take through compliance with the Oregon FPA (ORS 527; OAR 629). Riparian protections would include riparian management areas (RMAs) to be applied to either side of streams (Table ES-1). Equipment limitation zones (ELZs) would be applied beyond the end of RMAs on certain stream types. Steep slope protections would support delivery of large wood and regulate sediment delivery to fish-bearing streams (ORS 629-630-0900 through 629-630-0925). A 25-foot RMA would be applied along designated debris flow traversal areas and no treatment would be allow in slope retention areas.

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[1] Although, per SB 1501, the revisions to OAR 629-600-0100 approved in October 2022 could roll back if an ITP for an approved HCP consistent with the Private Forest Accord report (Conservation Coalition and Working Forest Coalition 2022) is not issued by December 31, 2027, these protections were deemed reasonably foreseeable for purposes of the no action alternative.

[2] Suitable habitat includes marginal, suitable, and highly suitable habitat as defined in Davis et al. 2016.

[3] References for cited sources in this EIS are located in Appendix 2-A, *References.*

[4] Standards for maintaining suitable habitat in owl circles apply to the full circle, regardless of ownership.

Table ES-1. Riparian Management Areas, No Action Alternative

Stream Type[a]	Prescribed Width (Slope Distance)[b]
Large or medium SSBT or other fish-bearing stream	110 feet
Small SSBT or other fish-bearing stream	100 feet
Large or medium perennial non-fish-bearing stream	75 feet
Small, perennial non-fish-bearing stream, tributary to SSBT stream	75 feet from the confluence with the SSBT stream for the first 500 feet 50 feet on the next 650 feet (up to 1,150 feet from the confluence with the SSBT stream)
Small, perennial non-fish-bearing stream, tributary to other (not SSBT) fish-bearing stream	75 feet from the confluence with the fish-bearing stream for up to the first 600 feet
Other non-fish-bearing stream (seasonal)	0

[a] Stream types are defined in the Oregon FPA.

[b] RMA widths are measured using slope distance from the edge of the active channel, or channel migration zone if present, on each side of the stream. RMA lengths on non-fish-bearing streams are measured from the confluence with a fish-bearing stream. Due to the average slope of the landscape, measuring buffers along the slope results in a less protective buffer than a horizontal buffer of the same width.

RMA = riparian management area

SSBT = salmon, steelhead, and bull trout

Further assumptions regarding forest management practices under the no action alternative are identified in Section 2.1.1, *Alternative 1: No Action*, and Chapter 3, *Affected Environment and Environmental Consequences*.

In areas where harvest is not prohibited by take avoidance restrictions, the no action alternative assumes that DSL would conduct clearcut harvest.

Alternative 2: Proposed Action

The proposed action evaluated in this EIS is the issuance by the Services of ITPs with 80-year permit terms that would authorize incidental take of covered species from covered activities in the permit area and implementation of the HCP. Identified as the proposed action in the Draft EIS, FWS designates this as the preferred alternative. Below is a summary of the information in Chapter 2, Section 2.1.2, *Alternative 2: Proposed Action.*

Permit and Plan Area

The HCP permit area includes 83,326 acres of DSL-managed lands[5] in Douglas and Coos Counties and is the location where all covered activities and conservation actions would occur. The HCP plan area includes the permit area, 8,897 acres of Board of Forestry lands overseen by the State Board of Forestry and managed by ODF, 124 acres of State Land Board lands managed by ODF, and 161 acres of private inholdings. Lands in the plan area that are outside of the permit area are included in the

[5] Most of the permit area is comprised of former School Lands, which were granted to the state through the Oregon Admission Act to contribute funds to school districts through the Common School Fund. The State Land Board decoupled these lands from the Common School Fund in 2023, meaning that revenue from these lands is no longer obligated to the Common School Fund.

plan area to accommodate any future land exchanges between the Permittee and adjacent land owners.[6]

Covered Activities

The covered activities represent all projects and activities for which the Permittee is requesting authorization for incidental take. Broadly, the covered activities include forest management activities (i.e., timber harvest and supporting management activities), infrastructure, research activities, and implementation of the HCP's conservation strategy. HCP Chapter 3, *Covered Activities,* describes the covered activities in more detail.

- S**tand-level treatments and allocations:** The permit area is subdivided into two general areas—the conservation research watersheds (CRW) and management research watersheds (MRW). The CRW would be managed as a contiguous reserve where restoration thinning would be allowed in some areas. The MRW would be managed for multiple outcomes (e.g., timber production, conservation) and would be available for a range of treatment types—intensive, extensive, and restoration thinning—applied in varying proportions by subwatershed. Riparian conservation areas (RCAs) would be applied to streams throughout the permit area, with varying widths based on stream type and location (Table ES-1). Treatment types by allocation are summarized below.
    - **CRW and MRW Reserve Allocations (Reserves):** Treatments would be limited to restoration thinning in stands younger than 65 years old (as of 2020), which would include thinning intended to enhance forest complexity and habitat by transitioning young, dense plantations in Reserves toward greater compositional, successional, and structural diversity. Restoration thinning would remove between 20 and 80% of pre-harvest stand density. Most treatments would consist of single-entry thinnings during the first 20 years of the permit term. Thinnings in the CRW in the third decade of the permit term would be limited to 3,500 acres. In the MRW Reserves, additional thinning after the single-entry thinning in the first 20 years is allowed. Thinning of any CRW or MRW Reserve stand that reaches 80 years old prior to treatment would require concurrence from the Services and compliance with the relevant provisions outlined in HCP Chapter 7, *Implementation and Assurances*. Salvage harvest would not occur in Reserves, with limited exceptions described in HCP Section 3.4.2.3, *Salvage Harvest*.
    - **Extensive Allocations:** Treatments would aim to achieve both structural complexity and timber harvest objectives at the stand level. Specific treatments would vary by stand but would include a single variable density regeneration harvest with between 20 and 80% retention of pre-harvest stand density and up to two or three thinning treatments depending on the stand age. Variable density regeneration harvests could include dispersed (i.e., distribution of harvest and leave trees) or aggregated (i.e., patches of harvest and leave trees) retention. Minimum retention standards are exclusive of adjacent RCAs at the subwatershed level but inclusive at the stand level.
    - **Intensive Allocations:** Treatments would consist of clearcut harvest at a minimum 60-year rotation in stands of 65 years or younger (as of 2020). Treatments would aim to maximize

[6] Lands could be incorporated into the permit area and covered by the HCP if they were transferred, exchanged, or sold in the future, or otherwise subject to an agreement between the Permittee and the relevant landowner or manager, through the process outlined in HCP Section 7.6.2, *Permit Amendments*.

commercial value but would meet or exceed Oregon FPA retention standards. Up to two commercial thinnings would occur between 25 and 50 years.

- **Volume Replacement Allocations**: Treatment would be the same as Reserves unless modeled potential marbled murrelet habitat within Extensive allocations was found to be ineligible for harvest due to occupancy by marbled murrelet. In these cases, an equivalent amount of timber volume would become available for treatment consistent with Extensive allocations.
- **Flexible Allocations:** Stands 65 years old or younger (as of 2020) would be available for intensive (with a minimum 50-year rotation) or extensive treatments, tribal holistic or longer-rotation forestry, or other treatments. Stands greater than 65 years old (as of 2020) would be eligible for extensive treatments, tribal holistic, or longer-rotation forestry. Minimum rotation age in intensive treatments would be 50 years.
- **Flexible Extensive Allocations:** Treatments would be as described for Extensive allocations.
- **Riparian conservation areas:** In RCAs, forest management would be limited to up to 1,200 acres of restoration thinning in stands 65 years of age or younger (as of 2020), with up to two restoration thinning entries allowed in half of this acreage and a single entry in the other half. Restoration thinning in the CRW RCAs would be limited to the first 30 years of the permit term, with most thinning occurring in the first 20 years. Restoration thinning in the MRW RCAs would not be subject to a timing limitation. Table ES-2 shows RCA widths.

Table ES-2. Riparian Conservation Areas, Proposed Action

Stream Type[a]	Adjacent Allocation	Width (feet)[b]
Fish-bearing (FB) stream	CRW Reserves MRW Volume Replacement and Flexible Extensive allocations and all allocations along the Lower Millicoma River mainstem	200
	MRW Flexible and Flexible Extensive allocations and Reserve, Extensive, and Intensive allocations along the Lower Millicoma River Non-Mainstem	120
	MRW Reserve, Extensive, and Intensive allocations not adjacent to the Lower Millicoma River	100
Perennial non-fish-bearing (PNFB) stream	CRW Reserve allocations MRW Volume Replacement and Flexible Extensive allocations	200
	All other MRW allocations	50
High landslide delivery potential (HLDP)[c] stream	CRW Reserve allocations MRW Volume Replacement, and Flexible Extensive allocations	200
	All other MRW allocations in the Lower Millicoma subwatershed	120
	All Other MRW allocations	50
XNFB[d] stream	All allocations	0

[a] Stream types are those defined in the OSU Modeled Stream Network (2020) and are defined based on fish presence, perenniality, and susceptibility to landslide-associated debris flows that deliver wood and sediment to fish-bearing streams.

[b] Measured as the horizontal distance from each side of the channel migration zone.

[c] High landslide delivery potential (HLDP) streams are defined as non-fish-bearing streams with high likelihood of delivering wood to fish-bearing streams.

[d] Non-fish-bearing non-perennial streams that are not HLDP streams.
CRW = conservation research watersheds; MRW = management research watersheds

- **Supporting management activities:** Supporting management activities are activities conducted as a part of harvest regimes (e.g., tree planting, landing construction, precommercial thinning and pruning, slash removal), those required for infrastructure construction and maintenance (e.g., mechanical vegetation control, heavy equipment use, hazard tree removal) and those necessary for research or restoration projects (e.g., small fixed-wing aircraft or helicopter use, tree climbing, tree felling). Prescribed fire, including single or multiple controlled burns that incorporate Indigenous Knowledge, may be used to manage fuels and increase or maintain suitable conditions for species of cultural value to local tribal communities.
- **Supporting infrastructure:** Supporting infrastructure is needed to facilitate the research platform and programs and includes roads and related facilities, quarries, and communication sites/lookouts.
    - **Road system management:** Construction, use, maintenance, daylighting, and vacating of roads and related facilities are covered activities. The HCP caps the construction of new permanent roads to 40 miles, at a rate of up to 1 mile per year. Any new temporary roads not vacated within 5 years of construction would count toward the cap.
    - **Quarries:** The HCP caps the construction of new quarries to two, located only in the MRW and outside of Reserves and RCAs.
    - **Communication site/lookout maintenance:** The HCP covers the maintenance of two existing communication sites and one lookout in the permit area.
- **Potential research projects:** This covered activity includes active research that would occur as part of stand-level treatments. This research would include physical manipulation of the landscape or resources that may alter habitat for covered species and involve direct contact with the covered species.
- **Indigenous cultural use of cedar trees:** This covered activity includes removal or selective use of individual cedar trees over 65 years of age (as of 2020) over the course of the permit term for Indigenous cultural practice.
- **Covered activities related to conservation measures and implementation:** Covered activities related to conservation measures and implementation include the following:
    - Riparian restoration and stream enhancement
    - Road restoration and network reduction
    - Research on the covered species
    - Habitat enhancement for northern spotted owl and marbled murrelet
    - Survey and monitoring requirements
    - Barred owl management and research

Covered Species

The covered species include the Oregon coast coho, northern spotted owl, and marbled murrelet Table ES-3 lists the covered species and their state and federal listing statuses.

Table ES-3. Covered Species

Species	Status [a] State	Status [a] Federal	Federal Jurisdiction
Fish			
Oregon Coast coho (*Oncorhynchus kisutch*)	--	FT	NMFS
Birds			
Northern spotted owl (*Strix occidentalis*)	ST	FT	FWS
Marbled murrelet (*Brachyramphus marmoratus*)	SE	FT	FWS

[a] SE = state-listed as endangered; ST = state-listed as threatened; FT = federally listed as threatened.
NMFS = National Marine Fisheries Service; FWS = U.S. Fish and Wildlife Service

Conservation Strategy

The HCP conservation strategy includes biological goals and objectives for each covered species, which broadly describe desired future conditions and how they will be achieved. It also includes conservation measures, actions that the Permittee would implement to avoid, minimize, and mitigate (or offset) impacts on covered species from covered activities such that the impact of the taking is minimized and mitigated to the maximum extent practicable, as required under ESA Section 10(a)(2)(A) and the Services' implementing regulations. Lastly, it includes conditions that the Permittee would apply to covered activities to avoid and minimize potential effects on covered species.

Conservation Measures

- **Conservation Measure 1, Targeted Restoration and Stream Enhancement:** This conservation measure would include restoration and stream enhancement projects, focusing on key restoration actions identified in the *Elliott State Forest Watershed Analysis* (BioSystems et al. 2003), *Final ESA Recovery Plan for Oregon Coho Salmon* (NMFS 2016), and local watershed plans, along with other opportunistic projects when there is a need. Instream wood placement and gravel augmentation projects would be targeted at fish-bearing streams within or adjacent to all harvest operations when the stream is below the desired level of wood, as identified in HCP Section 5.3.4.3, *Oregon Coast Coho*.

  As described in Section 2.1.2.2, *Covered Activities*, restoration thinning would be permitted in RCAs that are 65 years or less in age (as of 2020). The rationale for vegetation management in RCAs is described in HCP Section 3.3.7, *Riparian Conservation Areas*, and HCP Appendix A, *Active Management of Riparian Conservation Areas*. RCA restoration thinning would occur consistent with the standards described under *Riparian Conservation Areas,* in Section 2.1.2.2, *Covered Activities*. An initial assessment of RCA thinning inside the ELZ (0 to 35 feet) will occur on up to 160 acres of RCAs along fish-bearing and non-fish-bearing streams prior to thinning in other ELZs. These projects would be monitored and evaluated to determine if outcomes are enhancing the ecological function of RCAs while minimizing adverse effects on coho.

  The following vegetation management actions would be applied:

  - All trees cut in the first 50 feet of any RCA would be left on the ground, tipped toward the stream, or placed into the stream.

- Outside of 50 feet, up to 20% of the volume of cut logs (consisting of the largest cut trees) would be left on the ground, felled towards the stream channel, or placed in the stream channel. Trees that are byproducts of restoration thinning treatments (i.e., those not left on the ground or tipped toward or felled into streams) may be sold to offset the cost of treatments.

This conservation measure may also include beaver restoration projects (e.g., installation of a beaver dam analog, beaver habitat enhancement). The Permittee would coordinate this work with regional partners, ODFW, FWS, and NMFS to ensure beaver management actions fit into the larger context of salmonid recovery and statewide beaver management principles.

- **Conservation Measure 2, Expand RCAs on Select MRW Streams**: This conservation measure includes expanded RCAs in the following locations in the MRW. These RCAs are included in Table ES-2 along with those defined as part of the RCA covered activity and are measured as the horizontal distance from each side of the channel migration zones.
    - Along the Lower Millicoma River from its entry into the southwest portion of the permit area through the confluence with Elk Creek: 200 feet along the fish-bearing mainstem and 120 feet on high landslide delivery potential (HLDP) streams and any fish-bearing tributaries to the mainstem.
    - In Volume Replacement and Flexible Extensive allocations: 200 feet on fish-bearing, HLDP, and perennial non-fish-bearing streams.
- **Conservation Measure 3, Reduce Density and Negative Impacts of the Forest Road Network in the Permit Area**: This conservation measure includes a commitment to decrease the current road density in the permit area through road vacating in 10-year increments over the permit term. It also includes a commitment to a formal road assessment in the first 12 years of the permit term to identify the degree of hydrologic connectivity of the road network in the permit area that would, along with monitoring, guide decisions on where to prioritize road vacating and other improvements (e.g., culvert removal). This study would also inform the tracking of road density throughout the permit term.
- **Conservation Measure 4, Barred Owl Management and Research**: This conservation measure includes collaboration with FWS and other federal and state management agencies to develop a research approach that will integrate with the HCP's other monitoring and data collection commitments for the northern spotted owl. Management will remove barred owl in amounts intended to facilitate improved conditions for northern spotted owl. This strategy will be developed in the first 16 months of the permit term and implementation will start the following year. Monitoring will be developed in collaboration with FWS to assess the effectiveness of barred owl management.
- **Conservation Measure 5, Harvest and Thinning Adjacent to Occupied Marbled Murrelet Habitat:** This conservation measure prescribes buffers and exceptions to buffers for restoration thinning in CRW and MRW Reserves and any treatment in the MRW outside of Reserves that is proposed to occur in modeled potential marbled murrelet habitat adjacent to designated occupied habitat.

Conditions on Covered Activities

The following conditions would also apply to covered activities throughout the permit term.

- **Condition 1, Seasonal Restrictions around Northern Spotted Owl Nest Sites:** This condition includes seasonal restrictions on forest management activities within specified distances of northern spotted owl nest sites, including the 22 historic activity centers and new nest sites found in the permit area during the permit term.
- **Condition 2, Retention of Northern Spotted Owl Nesting Core Areas:** This condition specifies that there would be no harvest (i.e., no modification or treatment) in a 100-acre nesting core area surrounding at least the 22 historic activity centers, made up of the highest-quality contiguous habitat. The distance between the designated activity center and the edge of the nesting core area will be contiguous with the nest site. The areas of protection could be shifted based on occupancy data in coordination with FWS.
- **Condition 3, Retention of Northern Spotted Owl Core Use Areas:** This condition requires that, per the guidance in the revised Recovery Plan (FWS 2011) for northern spotted owl, at least 50% (more than 251 acres) of the highest-quality contiguous habitat in the 502-acre northern spotted owl core use areas around the 22 historic activity centers will be retained as nesting, roosting, and foraging habitat[7] at all times. The 502 acres do not need to be in a circle but will consist of the best contiguous habitat, and the edge of the core use area will be no less than 300 feet from the nest location. The location of nesting, roosting, and foraging habitat within the core use areas may change, as long as the target continues to be met. The areas of protection could be shifted based on occupancy data in coordination with FWS.
- **Condition 4, Retention of Habitat in Northern Spotted Owl Home Ranges:** This condition requires that, per the guidance in the revised Recovery Plan for northern spotted owl (FWS 2011), at least 40% of the northern spotted owl home range (a 1.5-mile buffer around the nest site) is maintained as nesting, roosting, and foraging habitat around at least 22 activity centers. This is equivalent to 1,809 acres of nesting, roosting, and foraging habitat in each home range. The areas of protection could be shifted based on occupancy data in coordination with FWS.
- **Condition 5, Maintenance of Northern Spotted Owl Dispersal Landscape:** This condition requires that at least 40% of the MRW is retained as dispersal habitat, per the standards set forth in Thomas et al. (1990), which are met when at least 50% of trees are at least 11 inches in diameter at breast height with at least 40% canopy cover.
- **Condition 6, Seasonal Restrictions in Marbled Murrelet Occupied Habitat:** This condition includes seasonal restrictions on forest management activities in and near designated occupied marbled murrelet habitat.
- **Condition 7, Survey Requirements for Modeled Potential Marbled Murrelet Habitat:** This condition lays out a process for surveying modeled potential marbled murrelet stands (HCP Chapter 2, Figure 2-11) for marbled murrelet presence ahead of any proposed treatment. Through desktop review, field assessment, and surveys, the Permittee would determine if marbled murrelets are present in a given stand. If marbled murrelets are present, contiguous

[7] In the HCP, this is assumed to mean habitat that contains all of the elements of nesting, roosting, and foraging habitat (per Davis et al. 2016, highly suitable and suitable habitat), not habitat that only supports foraging (per Davis et al. 2016, marginally suitable habitat).

habitat would be retained and the treatments would be reallocated to areas not occupied by the species.

- **Condition 8, Limits on Harvest and Designation Changes in Occupied and Modeled Potential Marbled Murrelet Habitat:** This condition prohibits treatments in modeled potential marbled murrelet habitat unless it is determined unoccupied through the process in Condition 7. Any changes to an occupied stand designation will be handled in accordance with HCP Section 7.6*, Modifications to the HCP*.
- **Condition 9, Maintaining Aggregate Amount of Marbled Murrelet Occupied Habitat Over Time:** This condition requires no temporal loss of the aggregate number of acres of designated occupied marbled murrelet habitat or habitat suitability index (HSI)-weighted acres[8] as a result of harvest treatments in the permit area. This condition also requires preserving potential marbled murrelet habitat across the permit area by maintaining an area-weighted mean marbled murrelet HSI value. At a minimum, acres of habitat suitable for marbled murrelet occupancy would not fall below 2022 forest conditions at any point during the permit term.
- **Condition 10, Management on Steep Slopes:** This condition specifies that intensive harvest would avoid unstable slopes identified by the Slope Stability Analysis tool (TerrainWorks 2021) unless they were found to be suitable for harvest via field survey. For extensive and restoration thinning treatments, field surveys and retention commitments would be applied to reduce risks related to treatments on unstable slopes. New road construction (temporary and permanent) would be located in stable locations (e.g., ridge tops, stable benches, flats) and cable or tethered logging systems (i.e., non-ground-disturbing methods) would primarily be used on slopes greater than 40%. Additionally, treatments in stands 65 years old or younger (as of 2020) would be focused on previously logged stands, where construction of new roads would be minimal.
- **Condition 11, Road Construction and Management:** This condition includes road design standards to ensure hydrologic disconnection from streams and operational standards to reduce erosion and stream sedimentation from construction and maintenance. This condition also specifies that culvert removal and replacement would meet NMFS and ODFW fish passage criteria.

Monitoring and Adaptive Management

The proposed action would include a monitoring and adaptive management program (HCP Chapter 6, *Monitoring and Adaptive Management*). The program is intended to ensure compliance with the HCP, assess the status of covered species habitat, and evaluate the effects of management actions such that the conservation strategy, including the biological goals and objectives, is achieved.

Alternative 3: Increased Conservation

Under Alternative 3, the HCP would include the same permit area, covered species, permit term, and monitoring and adaptive management program as the proposed action. The HCP's covered activities and conservation strategy would be modified in the following ways.

[8] An HSI provides a quantifiable measure of the suitability of individual forest stands in the permit area as potential marbled murrelet nesting habitat, and provides a means of evaluating edge effects caused by timber harvest on this habitat (HCP Appendix D, *Marbled Murrelet Habitat Suitability Index Approach*).

All known occupied and modeled potential existing marbled murrelet habitat, northern spotted owl core use areas, and stands over 80 years old (as of 2020) in areas available for extensive treatments would be allocated to Reserves. Northern spotted owl habitat requirements and the conservation strategy's conditions for northern spotted owls (Conditions 1 through 5) would apply to any future northern spotted owl activity centers.

RCAs in the MRW would be modified as described below (Table ES-4).

- 100-foot RCAs on fish-bearing streams under the proposed action would be expanded to 120 feet.
- 50-foot RCAs on perennial non-fish-bearing streams and HLDP streams under the proposed action would be expanded to 120 feet.
- Non-fish-bearing, non-perennial, non-HLDP streams that are second order or greater, which have no RCA under the proposed action, would receive 35-foot RCAs.

In addition to the proposed action limitation of conducting restoration thinning in RCAs only in stands less than 65 years old (as of 2020), restoration thinning in RCAs would also be prohibited on slopes greater than 65% and would be limited to removing a maximum of 5% of existing shading.[9]

Table ES-4. Riparian Conservation Areas, Alternative 3

Stream Type[a]	Adjacent Allocation	Width (feet)[b]
Fish-Bearing (FB)	CRW Reserves MRW Volume Replacement, Flexible Extensive, Lower Millicoma River mainstem	200
	All Other MRW Allocations	120
Perennial Non-Fish-Bearing (PNFB)	CRW Reserves MRW Volume Replacement, and Flexible Extensive	200
	All Other MRW Allocations	120
High Landslide Delivery Potential (HLDP)[c]	CRW Reserves MRW Volume Replacement, and Flexible Extensive	200
	All Other MRW Allocations	120
XNFB[d]	CRW and MRW, 2^{nd} order streams and higher	35
	CRW and MRW, 1^{st} order streams	0

[a] Stream types are those defined in the OSU Modeled Stream Network (2020) and are defined based on fish presence, perenniality, and susceptibility to landslide-associated debris flows that deliver wood and sediment to fish-bearing streams.
[b] Measured as the horizontal distance from each side of the channel migration zone.
[c] Non-fish-bearing streams with high likelihood of delivering wood to fish-bearing streams.
[d] Non-fish-bearing non-perennial streams that do not have high likelihood of delivering wood to fish-bearing streams.
CRW = conservation research watershed; MRW = management research watershed

Conservation Measure 3 would be modified to specify that, in order to count as a road removed from the permanent road network, roads must be fully vacated (i.e., road infrastructure must be removed from the landscape and the area restored to natural conditions). Fully vacating a road would include

9 The amount of trees removed from a particular stream segment would depend on site conditions contributing to shade, such as aspect, topography, density and tree height.

additional measures (Chapter 2, Section 2.1.3, *Alternative 3: Increased Conservation*) to those defined in the Oregon FPA and included in the proposed action.

Alternative 4: Increased Harvest

Under Alternative 4, the HCP would include the same permit area, covered activities, covered species, permit term, and monitoring and adaptive management program as the proposed action but the covered activities and conservation strategy would be modified as described below.

The areas in the CRW and MRW Reserves that are located outside of designated occupied and modeled potential marbled murrelet habitat would be reallocated as follows. Stands 65 years of age or younger (as of 2020) would be reallocated to Intensive allocations, and stands over 65 years of age (as of 2020) would be reallocated to Extensive allocations. RCAs in the CRW would be modified to be the same width as RCAs in the MRW (Table ES-5). Additionally, Alternative 4 would not include Conservation Measure 2, which expands RCAs on certain streams, or the requirement in Conservation Measure 3 to reduce the overall density of the road network in the permit area. Alternative 4 would also not include Condition 10, which limits management on steep slopes.

Table ES-5. Riparian Conservation Areas, Alternative 4

Stream Type[a]	Area	Buffer Distance[b] (Horizontal Distance)
Fish-bearing (FB) streams	All	100 feet
Non-fish-bearing, perennial (PNFB) streams and high landslide delivery potential (HLDP[c]) streams	All	50 feet
XNFB[d] streams	All	0 feet

[a] Stream types are those defined in the OSU Modeled Stream Network (2020) and are defined based on fish presence, perenniality, and susceptibility to landslide-associated debris flows that deliver wood and sediment to fish-bearing streams.

[b] Measured as the horizontal distance from each side of the channel migration zone.

[c] Non-fish-bearing streams with high likelihood of delivering wood to fish-bearing streams.

[d] Non-fish-bearing non-perennial streams that do not have high likelihood of delivering wood to fish-bearing streams.

Summary of Impact Analysis

Table ES-6 summarizes the impacts that could occur under the proposed action and alternatives for all environmental issues analyzed in the EIS. Chapter 3, *Affected Environment and Environmental Consequences*, provides a detailed analysis of potential effects. Cumulative impacts are analyzed in Chapter 4, *Cumulative Effects*, and are not included in the table.

Table ES-6. Summary of Potential Impacts

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
Geology and Soils		
More intensive treatments (i.e., clearcut and variable density harvest) and road construction and use, especially on steep slopes, would increase erosion and the potential to induce shallow-rapid landslides and associated events (i.e., debris flow and debris torrent). Compliance with Oregon FPA riparian protections, steep slope protections, and reforestation and road management requirements would reduce erosional effects and the potential to induce landslide from these activities. Riparian buffers and steep slope protections would increase large wood recruitment and decrease fine sediment delivery to streams from these events.	Reduced harvest, expanded riparian protections, a limit on construction of permanent roads, and a commitment to reduce road density would reduce erosion and the potential to induce landslide compared to the no action alternative. Reduced potential to induce landslide would result in a corresponding reduction in landslide-related effects on streams, but in the event of debris flows, wider riparian buffers would increase large wood recruitment and better regulate sediment delivery to streams compared to under the no action alternative.	**Alternative 3:** Reduced harvest, increased riparian protections, and additional requirements on road vacating would reduce erosion and potential to induce landslide compared to all alternatives. In the event of debris flows, the widest riparian buffers and strictest steep slope protections would increase large wood recruitment and better regulate sediment delivery to streams compared to all alternatives. **Alternative 4:** The greatest area available for more intensive treatments and narrowest riparian buffers would result in the highest level of erosion and greatest potential to induce landslide of all alternatives. Erosion and potential to induce landslide from road use and management would be similar to the no action alternative. The narrowest riparian buffers and lowest steep slope protections would result in the least large wood recruitment and sediment regulation in the event of debris flow of all alternatives.

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
Water Resources		
Water Supply		
Timber harvest, road management, and prescribed burns would increase water yield by removing vegetation, decreasing evapotranspiration, and compacting soil. As harvested stands regrow, annual yield would decrease. These effects on water yield are not anticipated to be detectable at the subwatershed scale. If fog drip is a significant portion of precipitation, water yield may decrease under all alternatives.	Increases in water yield from harvest are projected to be undetectable at the subwatershed scale. However, effects of harvest in West Fork Millicoma River and Loon Lake-Mill Creek subwatersheds are near the detection limit and could be detectable when combined with effects of road management and prescribed burning. Increased restrictions on road management and salvage harvest would decrease the potential for associated impacts.	**Alternative 3:** Increases in water yield from harvest are projected to be undetectable at the subwatershed scale. Increased restrictions on road management and salvage harvest would have the greatest reduction in associated impacts. **Alternative 4**: Increases in water yield would be greatest, with impacts projected to be detectable in the West Fork Millicoma subwatershed and potentially the Loon Lake–Mill Creek subwatershed.
Peak Flows and Channel Condition		
Timber harvest would increase peak flows and could result in adverse effects on channel condition. Road construction and prescribed burns would have similar effects. Increased peak flows would not be detectable at the subwatershed scale, but where stream reaches drain areas with substantial forest cover loss, peak flows would increase and at the local scale. As RMAs mature, they would increase the potential for large wood recruitment and, therefore, decrease peak flow velocity and coarse sediment transport.	Increases in peak flows from harvest would not be detectable at the subwatershed scale, but the potential for adverse local effects would remain. Expanded riparian protections and limits on road construction would further reduce some adverse effects compared to the no action.	**Alternative 3:** Effects from harvest would be similar to the proposed action but expanded riparian protections and stricter road vacating requirements would reduce local effects on peak flows and channel condition. **Alternative 4:** Effects would be similar to or greater than the no action alternative.
Low Flows		
Effects of harvest are projected to be undetectable at the subwatershed scale under all alternatives. At the local scale, some units would experience beneficial effects (increased low flows). Other activities would have both adverse and beneficial localized effects.	At the local scale, three units are projected to have adverse effects (decreased low flows), while beneficial effects would generally be greater in extent and magnitude than the no action alternative. Annual harvest limits, expanded riparian protections, increased large wood recruitment and placement potential, and stream enhancements (Conservation Measure 1) could	**Alternative 3:** At the local scale, there would be no adverse effects, and beneficial effects would increase compared to the other alternatives. **Alternative 4:** At the local scale, there would be some adverse effects and lower beneficial effects compared to the other alternatives.

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
	reduce localized adverse effects compared to the no action alternative.	
Water Quality		
Timber harvest, mechanical vegetation removal, road management activities, and prescribed burns would have the most extensive effects on water quality. These activities can adversely affect water quality by increasing stream temperature, sediment delivery, and herbicide concentration. Quarries could increase turbidity, sedimentation, oil and grease, mineral concentration, and pH of surface water. Best management practices in compliance with the CWA, CZMA, and state regulations, including the Oregon FPA, would reduce these effects.	Expanded riparian protections and stream enhancements (Conservation Measure 1) would reduce stream temperature and better regulate sedimentation compared to the no action alternative. Effects of salvage harvest and road management and use would be reduced compared to the no action. Effects of herbicide use and prescribed burning would be similar to the no action.	**Alternative 3:** Effects on water quality would be less than other alternatives due to expanded riparian protections, increased restrictions on restoration thinning, reduced harvest and associated road use, and increased road vacating requirements. **Alternative 4:** Effects on water quality would be greatest due to increased harvest activity and decreased riparian protections.
Groundwater		
Timber harvest and prescribed burns would temporarily increase groundwater recharge and upwelling. Road abandonment, decommissioning, maintenance, and drainage repair would increase groundwater recharge. Road construction and quarry activities would decrease groundwater recharge. Overall effects on groundwater recharge would depend on location and timing of management activities. Construction and management activities would pose some risk to groundwater quality, especially pesticide use; these effects would be reduced through compliance with regulations, including the Oregon FPA.	Effects from harvest would be similar to the no action alternative but the amount of recharge and risk to groundwater quality would vary at the subwatershed scale. Expanded riparian protections and increased wood recruitment would increase beneficial effects on recharge and upwelling. Increased steep slope protections and monitoring requirements would reduce the potential for change in groundwater discharge and flow paths. The commitment to reduce road density in the permit area (Conservation Measure 3) would decrease effects on groundwater compared to the no action alternative.	**Alternative 3:** Groundwater recharge and associated risks to groundwater quality would be lowest among the alternatives. Expanded riparian protections and increased wood recruitment would increase beneficial effects on recharge and upwelling compared to all alternatives. Additional requirements for road vacating would result in beneficial effects compared to other alternatives. **Alternative 4:** Groundwater recharge and associated risks to groundwater quality would be greatest among the alternatives. Riparian protections and large wood recruitment and associated beneficial effects would be lowest.
Flood Hazard		
Timber harvest, salvage harvest, prescribed burns, and road construction could increase flood hazard by decreasing floodwater storage or conveyance capacity; redirecting	Expanded riparian protections and large wood recruitment compared to the no action alternative would decrease flood velocity and	**Alternative 3:** Adverse effects on flood hazard would be lowest due to the least area available for harvest, greatest riparian protections, and increased road vacating requirements.

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
floodwaters; and increasing flood flow velocity, erosion, and sedimentation potential. Road maintenance, road drainage repair, and closing or vacating roads in floodplains could reduce flood hazard by improving drainage and infiltration capacity, increasing floodwater storage capacity, and decreasing flood velocity. Compliance with CWA, CZMA, and floodplain regulations would reduce adverse effects.	reduce erosion. The limits on road construction would reduce erosion and flood risk.	**Alternative 4:** Adverse effects on flood hazard would be highest due to the greatest area available for harvest and narrowest riparian buffers.
Vegetation		
Forest Age and Structure		
Clearcut harvest would result in a patchwork of clearcuts and younger replanted stands around older Douglas-fir forest stands in areas where harvest is restricted to avoid take. Stands in these restricted areas would increase in age and have more complex forest structures, while clearcut areas would have reduced biodiversity and forest complexity. Salvage harvest would remove standing dead trees and reduce understory complexity. Prescribed burns would decrease understory structure.	Stand age, complexity, and canopy cover would increase compared to the no action alternative. Restoration thinning would accelerate late-seral forest conditions and improve the health of stands in Reserves and RCAs. Increased restrictions on salvage harvest could result in more standing dead matter, understory organic matter, and structural complexity than under the no action alternative. Effects from prescribed burns would be similar to the no action alternative.	**Alternative 3:** Stand age, complexity, and canopy cover would increase compared to all alternatives. Salvage would be restricted in a larger area than the proposed action and the potential to alter forest structure after disturbance would be lowest of all alternatives. **Alternative 4:** Stand age, complexity, and canopy cover would be lowest of all alternatives. The potential for salvage harvest to alter forest structure after disturbance would be highest.
Spread of Invasive Weeds		
Harvest and road construction and maintenance would increase the opportunity for invasive weeds to spread. Impacts would be reduced through best management practices and compliance with the Oregon FPA.	Reduced area available for harvest and additional limits on road construction would reduce the potential to spread invasive species compared to the no action alternative.	**Alternative 3:** The least area available for harvest would result in the lowest risk of spread of invasive species. Effects of road management would be similar to the proposed action. **Alternative 4:** The greatest area available for harvest would result in the highest potential to spread invasive weeds. Effects from road management activities would be similar to the no action alternative.

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
Special-Status Plant and Fungus Species		
There are no state or federally listed plant or fungus species likely to occur in the study area. However, forest management activities have the potential to affect rare or imperiled plant and fungus species through harvest and habitat degradation.	Reduced area available for harvest would reduce the potential to affect rare and imperiled plant and fungus species compared to the no action alternative.	**Alternative 3:** The least area available for harvest would result in the lowest potential to affect rare and imperiled plant and fungus species. **Alternative 4:** The greatest area available for harvest would result in the greatest potential to affect rare or imperiled plant or fungus species.
Wetland Vegetation		
Timber harvest and road construction are unlikely to occur in wetlands. Effects of harvest on wetlands would be minimized through compliance with the Oregon FPA and the CWA under all alternatives. Salvage harvest in response to disturbance events would have the potential to affect additional wetland areas.	Expanded riparian protections and restrictions on salvage harvest would reduce indirect effects on wetlands.	**Alternative 3:** Expanded riparian protections and salvage restrictions compared to all alternatives would result in the lowest potential for effects on wetlands. **Alternative 4:** Decreased riparian protections and salvage restrictions compared to all alternatives would result in the greatest potential for effects on wetlands.
Fish and Wildlife		
Oregon Coast Coho Salmon (covered)		
Timber harvest, road construction and use, construction and operation of quarries, post-disturbance salvage, and prescribed burns would reduce the quality of salmonid habitat for all three distinct population units in the study area through effects on wood recruitment, sedimentation, stream temperature, peak and low flows, and habitat complexity, quantity, and connectivity. Compliance with Oregon FPA, including riparian and steep slope protections and road management requirements, would reduce but not eliminate adverse effects.	Reduced area available for harvest, annual harvest caps, expanded riparian and steep slope protections and road management requirements, and commitments to address barriers to fish passage and implement a monitoring and adaptive management plan would reduce adverse effects on all populations compared to the no action alternative.	**Alternative 3:** Reduced harvest and expanded riparian protections and road management requirements compared to all alternatives would result in the least adverse effects on all coho populations. **Alternative 4:** Increased area available for harvest and decreased riparian protections compared to all alternatives would result in the most adverse effects on all coho populations.

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
Noncovered Fish Species		
Effects on noncovered fish species would be similar to those described for coho. Habitat quality would be reduced for a range of noncovered native fish. Compliance with Oregon FPA would reduce but not eliminate adverse effects.	As described for coho, decreased harvest and expanded protections, restrictions, and commitments would reduce effects on noncovered fish species compared to the no action alternative.	**Alternative 3:** Reduced harvest and expanded protections compared to all alternatives would result in the least adverse effects. **Alternative 4:** Increased harvest and decreased protections compared to all alternatives would result in the most adverse effects.
Noncovered Stream-Dependent Wildlife Species		
Effects on noncovered stream-dependent wildlife species, especially those that coexist with fish, would be similar to the effects described for fish. Timber harvest, road construction and use, construction and operation of quarries, post-disturbance salvage, and prescribed burns would reduce the quality of amphibian habitat through loss of vegetation complexity, effects on stream temperature, and loss of habitat connectivity. Effects would be greater on species that reside in headwaters or fishless streams due to less riparian protection in these areas.	Effects on noncovered stream-dependent wildlife species would be the same as those described for fish in areas where riparian buffers are greater than under the no action. Riparian buffers on some non-fish-bearing streams are narrower than under the no action alternative; in these locations, effects on amphibians would be greater than under the no action alternative.	**Alternative 3:** Reduced harvest and expanded protections compared to all alternatives would result in the least adverse effects. **Alternative 4:** Increased harvest and decreased protections compared to all alternatives would result in the most adverse effects.
Northern Spotted Owl (covered)		
Take of northern spotted owl would not be authorized. Habitat removal or modification through timber harvest would be the primary adverse effect. Nesting, roosting, and foraging habitat (late-seral and old-growth forest stands) would decrease slightly for the first 20 years and then increase over the remainder of the analysis period for a net increase of 27% by the end of the analysis period. Habitat would be highly fragmented across the permit area, increasing risk of exposure to indirect effects of harvest activities (e.g., noise, human disturbance). Road construction and quarry activities would result in potential habitat	Take of northern spotted owl would be authorized. Nesting, roosting, and foraging habitat would be 18% greater at the end of the analysis period and habitat connectivity would increase compared to the no action alternative. Impacts of construction and use of roads and quarries would be reduced compared to the no action. Prohibition of salvage harvest in Reserves and RCAs and retention standards in areas available for extensive treatments would provide opportunities for habitat to recover following disturbance. The HCP's conservation strategy would provide a greater measure of certainty that northern	**Alternative 3:** The amount and connectivity of habitat would be more than other alternatives. The increased area of salvage harvest restrictions would increase potential for habitat to recover after disturbance compared to all alternatives. **Alternative 4:** The amount and connectivity of habitat would be least of the alternatives by the end of the analysis period. Impacts of roads and quarries and the ability of habitat to recover following disturbance would be similar to the no action.

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
removal or modification. Disturbance events may shift species distribution and salvage following disturbance events would remove habitat. Monitoring would be limited to required occupancy surveys prior to harvest, and no adaptive management, including response to barred owl competition, would occur under the no action alternative.	spotted owl habitat would be maintained for the species' conservation needs. In addition, research conducted on reducing the effects of barred owls under the proposed action is expected to benefit the species as a whole. The adaptive management process would facilitate incorporation of new scientific information about listed species and advances in forest management techniques and facilitate adjustment of conservation measures to improve the conservation strategy.	
Marbled Murrelet (covered)		
Take of marbled murrelet would not be authorized. Habitat removal or modification through timber harvest of unoccupied habitat would be the primary effect on marbled murrelet. Based on forest stand age projections, total projected habitat (late-seral and old-growth forest stands) would decrease slightly for the first 20 years and then increase for the remainder of the analysis period for a net increase of 27%. Habitat would be highly fragmented across the permit area. Road construction and quarry development would result in potential habitat removal or modification. Avoidance of occupied habitat would shift if species distribution shifted. Following disturbance, restoration of disturbed areas would not be required, and salvage in these areas would remove habitat. Monitoring would be limited to required occupancy surveys before harvest to determine species presence, but there would be no permit area-wide monitoring requirements and no provisions for adaptive management.	Take would be authorized and may result from edge effects, but would be minimized by Conservation Measure 5, which includes a commitment and procedures for establishing buffers to limit the creation of new sharp edges. Condition 9 provides additional protection of marbled murrelet habitat. Habitat would be 18% greater at the end of the analysis period and habitat connectivity would increase compared to the no action alternative. Impacts of construction and use of roads and quarries would be reduced compared to the no action. Prohibition of salvage harvest in Reserves and RCAs and retention standards in areas available for extensive treatments would provide opportunities for habitat to recover following disturbance. The HCP's conservation strategy would provide a greater measure of certainty that marbled murrelet habitat would be maintained for the species' conservation needs. The adaptive management process would facilitate incorporation of new scientific information about listed species and advances in forest management techniques and facilitate	**Alternative 3:** The amount and connectivity of habitat would be more than other alternatives. The increased area of salvage harvest restrictions would increase potential for habitat to recover after disturbance compared to all alternatives. **Alternative 4:** The amount and connectivity of habitat would be least of the alternatives by the end of the analysis period. Impacts of roads and quarries and the ability of habitat to recover following disturbance would be similar to the no action.

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
	adjustment of conservation measures to improve the conservation strategy.	
Noncovered Forest-Dependent Wildlife Species		
Combined late-seral and old-growth forest would increase by the end of the analysis period but would be highly fragmented. Early- and mid-seral forest would fluctuate between increases and decreases over the analysis period, which could affect species associated with these seral stages. Some species could benefit from the presence of clearcut openings and early-seral forest stands following clearcut timber harvest, while others could experience disruptions in feeding, breeding, and foraging behavior from habitat fragmentation. Structural changes that decrease snags and coarse woody debris, such as clearcutting, could affect these species, potentially more than changes in forest stand age. Noise, visual disturbance, vegetation removal, and road management activities could result in injury, death, habitat removal, or behavior disruptions for noncovered species. Following disturbance, salvage in areas not occupied by listed species would remove habitat.	Late-seral and old-growth habitat would increase and the permit area would contain larger, more contiguous habitat areas, increasing dispersal habitat and decreasing exposure to noise and human disturbance, benefiting species that depend on these forest types compared to the no action. Clearcut openings, forest edges, and early-seral forest stands would benefit species dependent on this habitat type, but less than the no action alternative. Salvage restrictions would reduce effects compared to the no action alternative. Implementation of the HCP's adaptive management plan would reduce effects on noncovered species that occupy the same types of habitats as the covered species.	**Alternative 3:** The amount and connectivity of late-seral and old-growth habitat would increase and clearcut openings and early seral would decrease compared to the other alternatives. Increased salvage restrictions would reduce effects compared to the other alternatives. **Alternative 4:** The amount and connectivity of late-seral and old-growth stands would decrease and forest edge and openings would increase compared to all alternatives. Reduced salvage restrictions would increase effects associated with these activities compared to other alternatives.
Noncovered Species Dependent on Wetlands and Riparian Habitat		
Timber harvest could reduce riparian and wetland function through vegetation removal and ground disturbance, resulting in effects on wetland and riparian dependent wildlife. Riparian buffers would reduce these effects. Effects of other activities would be minimized through existing regulatory guidance and practices.	Reduced area available for harvest, annual harvest caps, expanded riparian protections, a limit on construction of permanent roads, and a commitment to reduce road density would reduce these effects more than the no action alternative. Additionally, Conservation Measure 1 may create beaver habitat, which could benefit other wildlife dependent on aquatic and riparian habitat.	**Alternative 3:** Reduced harvest and expanded riparian protections would reduce effects compared to other alternatives. **Alternative 4:** Increased harvest and decreased riparian protections would increase effects compared to other alternatives.

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
Air Quality		
Forest management activities would result in emissions from the use of vehicles and equipment and from prescribed burns that emit air pollutants. Effects would be localized, short-term, and intermittent and would comply with existing regulatory requirements and are not expected to violate ambient air quality standards.	Emissions are expected to be less than under the no action alternative due to the decreased harvest activity and the limit on road construction.	**Alternative 3:** Emissions are expected to be least due to the least amount of harvest activity and the limit on road construction. **Alternative 4**: Emissions are expected to be similar to the no action due to amount of harvest activity.
Climate Change		
Net average annual carbon sequestration would decrease compared to existing conditions.	Net average annual carbon sequestration would increase compared to existing conditions.	**Alternative 3:** Net average annual carbon sequestration would increase twice as much as the proposed action. **Alternative 4:** Net average annual carbon sequestration would decrease twice as much as the no action alternative.
Recreation and Visual Resources		
Supply of Recreation		
Any increases in the permanent road network could expand recreation access. Harvest activities may temporarily restrict access to recreation sites. Forest management activities may restrict the development of future dispersed recreation activities, but planning around seasonal restrictions for species protection would reduce adverse effects.	Limits on road construction and the commitment to reduce road density in the permit area could reduce recreation access compared to the no action alternative.	**Alternative 3:** Same as proposed action. **Alternative 4:** Effects would be between the proposed action and no action alternative because road construction would be limited but there would be no commitment to reduce road density.
Quality or Value of Recreation		
Increases in the road network could decrease value of non-motorized recreation, while road closures could increase value. The presence of older forests and associated complex understory development would continue to support the value of recreation for hiking, backpacking, and wildlife watching. Habitat for covered terrestrial species would generally	If total operational roads decrease compared to the no action, road-related disturbance could decrease marginally which could increase the quality of recreation for people engaged in non-motorized recreation. Increased older forests would increase the value of hiking, backpacking, and wildlife watching. Decreased clearcuts could reduce the value of hunting.	**Alternative 3:** Improved water quality and aquatic species habitat could improve the quality of water-based recreation experience compared to all alternatives. Other effects would be similar to the proposed action. **Alternative 4:** Adverse effects on water quality and aquatic species habitat could reduce the

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
increase over time, which could benefit recreationists who value them. Localized changes in habitat for deer and elk could have both beneficial and adverse effects on these populations, while openings and early-seral stands from harvest would provide desirable conditions for hunting. Where fish habitat quality is adversely affected, participation in, and the value of, recreational fishing in the permit area could be adversely affected. Adverse effects on water quality would have a minimal effect on the quality of water-based recreation. Dispersed camping areas in the permit area lie in no-treatment areas that would mature into older forests, increasing the value of recreation for campers who prefer older stands. Jerry Phillips Reserve and Cougar Pass Lookout lie within the home range of the northern spotted owl; harvest in this area would be limited by suitable habitat retention requirements, which would maintain the recreational value for hikers, assuming the associated nest site remains occupied by the species. Recreation at popular sites east of the permit area such as Loon Lake Recreation Area and BLM campgrounds would not experience effects related to views of the permit area because the adjacent lands are in areas off-limits to harvest due to species occupancy.	Improved views from camping areas and the Cougar Pass lookout could benefit quality of users' recreational experience compared to the no action alternative. Adverse effects on views from Loon Lake could decrease the quality of users' recreational experience compared to the no action alternative.	quality of water-based recreation experience compared to all alternatives. .
Vegetation Patterns, Visual Resources		
Although forested landscapes are dynamic by nature, clearcut harvest would result in a higher degree of localized visual changes, adversely affecting visual resources by creating larger areas that have been visibly disturbed and harvested.	Retention of larger areas of older forest stands with greater connectivity compared to the no action alternative would be beneficial for visual resources and views in the permit area (including from camping areas, the Cougar Pass lookout, and roadways). Some views of the	**Alternative 3:** Retention of the largest areas of older forest stands with greatest connectivity would result in the greatest benefit for visual resources and views in the permit area. Adverse effects on views of the permit area from Loon Lake would be the same as the proposed action.

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
	permit area from Loon Lake would be degraded compared to the no action alternative.	**Alternative 4:** Effects would be similar to the no action alternative.
Visual Access		
Under all alternatives, the primary change in visual access would result from any expansion or reduction in the permanent road network. Construction of permanent roads is expected to be minimal and would likely be seen as a visual extension of the existing roadway system.		
Scenic Byways Views		
Under all alternatives, Oregon State law establishes buffers along scenic byways to manage these visually sensitive corridors. Forestlands near visually sensitive scenic byways would be managed in the same manner under all alternatives. Therefore, it is not anticipated that any of the alternatives would substantially alter or degrade views associated with scenic byways.		
Cultural Resources		
Under all alternatives, timber harvest and forest management activities could cause ground disturbance or changes to the setting and could have potential effects on cultural resources. Locations that may contain cultural resources are known and mapped and would be reviewed in advance of any DSL activity that has potential to affect historic properties. DSL would follow applicable regulations, policies, and procedures to minimize effects on cultural resources.		
Tribal Resources		
Fish and Wildlife Species		
Forest management activities would reduce the quality of fish habitat in the study area, with more adverse effects on some species of cultural value such as those that occupy higher-gradient habitats and headwaters and non-salmonid species like Pacific lamprey. Compliance with regulations would reduce but not eliminate adverse effects. Forest management activities would increase some habitat types for deer and elk important for hunting but reduce others and would reduce habitat connectivity. Expansion of the operational road network could increase access to fish and wildlife species valued by tribes, but it is expected to be minimal.	Adverse effects on fish species important to the tribes would be reduced compared to the no action alternative. For deer and elk, habitat for hiding and concealment would increase but foraging habitat would decrease. The commitment to reduce road density in the permit area could reduce recreation access compared to the no action alternative.	**Alternative 3:** Adverse effects on fish species of value to tribal members would be reduced compared to all alternatives. Effects on hunting would be similar to the proposed action. **Alternative 4:** Adverse effects on fish species important to the tribes would increase compared to all alternatives. Effects on hunting would be similar to the no action alternative. Effects on tribal access would be between the proposed action and no action.

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
Availability of or Access to Plants		
Clearcut harvest would disturb understory plants of value to tribal members and reduce plant diversity. Availability of plants valued by tribes that rely on older forest, would increase in areas where harvest is restricted. Expansion of the operational road network could increase tribal access but is expected to be minimal.	Reduced clearcut harvest and increased variable density harvest and restoration thinning would result in a more diverse and connected forest landscape with potentially a greater variety of plants of value to tribal members. Incorporation of Indigenous Knowledge and the inclusion of Flexible allocations would also likely improve the variety of plant species of value to tribal members. Inclusion of indigenous cultural use of cedar trees as a covered activity under the proposed action would improve access to this culturally significant resource compared to the no action alternative. Increased restrictions on salvage and prescribed burns would decrease the potential the effects of these activities on riparian and wetland-dependent plant species compared to the no action alternative. Tribal access could be reduced compared to the no action alternative as described under recreation.	**Alternative 3:** Reduced clearcut harvest would increase the diversity of plant species of value to tribal members compared to all alternatives. Increased restrictions on salvage and prescribed burns would decrease effects on wetland and riparian-dependent plant species compared to all other alternatives. Access would be the same as the proposed action. **Alternative 4:** Increased clearcut harvest compared to all alternatives would result in the highest level of disturbance of understory plants of value to tribal members and reduction in plant diversity. Reduced no-treatment areas compared to all alternatives would result in the least benefit to species dependent on older forests. Restrictions on salvage harvest, prescribed burns, and road management and their associated effects would be between the proposed action and no action.
Timber Harvest and Available Forest Products		
In addition to direct jobs and labor income in the logging and milling industries, timber harvest in the permit area would support nonforestry jobs, labor income, value added, and output through indirect and induced effects under all alternatives. Economic activity also arises from collection of other forest products for commercial and noncommercial purposes. Some of this economic activity could contribute to employment and income for tribal groups.		
Socioeconomics		
Income and Employment Levels		
Timber harvest would generate direct jobs and income in the forestry, logging, and milling industries, supporting timber companies and mills in southwestern Oregon. These activities would also generate indirect and induced jobs and income in the communities throughout the study area and more broadly throughout	Reduced timber harvest volume would support fewer related direct, indirect, and induced jobs and less labor income compared to the no action alternative. Jobs and income for tribal members could be supported through prescribed burning, thinning, and native plantings undertaken by tribal members.	**Alternative 3:** Reduced timber volume would support fewer related direct, indirect, and induced jobs and less labor income compared to all alternatives. Jobs and income from research and education would be the same as the proposed action.

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
Oregon and California. The permit area would continue to support employment and income directly associated with nonharvest forest management activities, special forest product collection for commercial use, grazing, and any guided recreation.	Research and educational programs would support more related jobs and labor income than the no action alternative. To the extent that potential reductions in the road network in the permit area result in decreased visitation from outside the region, jobs and income associated with recreation could decrease.	**Alternative 4:** Timber harvest volume and associated support for direct, indirect, and induced jobs and labor income would be greater than under all other alternatives. Jobs and income from research and education would be similar to the proposed action.
Government Revenue		
Forest management activities would generate timber sale revenues available for appropriation by the Oregon legislature, with the current default providing for revenues to be credited to the CSF. Forest Products Harvest Tax revenues would fluctuate as the forest matures and the volume of timber of harvestable age changes. Forest management activities would also generate revenue for other state taxes.	Harvest in the permit area would not contribute to the CSF. Lower timber harvest volumes would decrease the amount of Forest Products Harvest Tax revenue and shift the distribution of other state tax revenues over time compared to the no action alternative.	**Alternative 3:** Effects on the CSF and other state taxes would be similar to the proposed action. Lower timber harvest volumes would decrease Forest Product Harvest Tax revenue relative to all alternatives. **Alternative 4:** Effects on the CSF and other state taxes would be similar to the proposed action. Tax revenue from the Forest Products Harvest Tax would be greater than all other alternatives.
Value of Ecosystem Services		
Access to special forest products may increase (minimally) with the development of new permanent roads. The value of subsistence and commercial fishing in the permit area could be adversely affected if adverse effects on fish reduce the availability of fish or increase the effort required for fishing. Localized changes in habitat for deer and elk could have both beneficial and adverse effects on these populations. Openings and early seral stands after harvest would create desirable conditions for hunting. The social value of carbon would decrease. No effects on public water systems are anticipated. However, where and when water quality is adversely affected, additional treatment of water may be necessary for	Increased old-growth and late-seral forests, decreased early- and mid-seral forests, greater limits on salvage harvests, and use of prescribed burns could increase the variety of plant species for collection but reduce opportunities for firewood collection. Where improvements in habitat quality occur, the value of subsistence and commercial fishing could increase if it increases the availability of fish or decreases the effort required for fishing. Hiding and concealment habitat for deer and elk would increase while foraging habitat would decrease, along with openings valued by hunters compared to the no action. Net carbon sequestration would represent an increased social value compared to the no action.	**Alternative 3:** The social value of carbon would be greatest. Increased protections would increase value for people who value habitat and species conservation compared to all other alternatives. Other effects would be similar to the proposed action. **Alternative 4:** The social value of carbon would decrease compared to the no action. Other effects would be similar to the no action alternative.

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
downstream users of private surface water intakes, increasing the cost of drinking water. Declines in water quality and associated value of water-based recreation are not expected. Loss of habitat and threatened and endangered species could diminish the economic well-being of people who care about their survival if it affects overall species population health. The permit area could continue to support the value of cultural services and forest-based educational services, as the area of late-seral and old-growth forests would generally increase over the analysis period. Property values in areas adjacent to the permit area could be minimally affected by increased drinking water treatment costs.	Potential changes to the value of ecosystem services related to surface water quality regulation would be reduced compared to the no action alternative. Increased beneficial effects and decreased adverse effects on coho and improved outcomes for northern spotted owl and marbled murrelet compared to the no action alternative would benefit the economic well-being of people who care about their survival. Increases in older forests would increase beneficial effects on value for forest visitors who prefer this forest type compared to the no action. Reduced clearcut harvest and increased variable density harvest and restoration thinning and the use of prescribed burns to maintain suitable conditions for species of cultural value to local tribal communities, would result in a greater variety of plant species for tribal use than the no action alternative. Integration of Indigenous Knowledge and collaboration with the tribes would reduce the loss of open habitats for deer and elk. Opportunities for research and educational programs would increase compared to the no action alternative. Adverse effects on views from some residences along Loon Lake could reduce property values of those residences. Like the no action, where and when water quality is adversely affected, downstream users of private intakes may experience treatment costs for drinking water, which could affect property values for the affected residences.	

Alternative 1: No Action	Alternative 2: Proposed Action	Alternatives 3 and 4
Environmental Justice		
Potential disproportionately high and adverse effects on low-income and minority communities were identified for recreation, cultural resources, and socioeconomics (income and employment, value of ecosystem services).	Potential disproportionately high and adverse effects on low-income and minority communities were identified for the same resources as the no action alternative. Decreased timber harvest and increased habitat protections compared to the no action alternative could either increase or reduce adverse impacts on these populations. Reduced access to collect special forest products relative to the no action alternative would disproportionately affect these populations.	**Alternative 3:** Decreased timber harvest and increased habitat protections compared to all alternatives could either increase or reduce adverse impacts on low-income and minority communities. **Alternative 4:** Impacts on low-income and minority communities would be similar to the no action alternative.

BLM = Bureau of Land Management; CSF = Common School Fund; CWA = Clean Water Act; CZMA = Coastal Zone Management Act; DSL = Oregon Department of State Lands; FPA = Forest Practices Act; RCA = riparian conservation area

Chapter 1
Purpose and Need

1.1 Introduction

The U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) (collectively, the Services) propose to issue incidental take permits (ITPs) to the Oregon Department of State Lands (DSL or applicant). The ITPs would authorize take of three threatened or endangered species resulting from forest management and research activities on the Elliott State Research Forest in accordance with the requirements of the federal Endangered Species Act (ESA). Section 9 of the ESA and federal regulations prohibit the taking of a species listed as endangered or threatened. The ESA defines *take* to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[1] The Services have further defined *harm* by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering (50 Code of Federal Regulations [CFR] 17.3; 50 CFR 222.102). The Services may issue permits under limited circumstances to take listed species incidental to, and not the purpose of, otherwise lawful activities. ESA Section 10(a)(1)(B) and implementing regulations provide for authorizing incidental take of listed species. DSL prepared the Elliott State Research Forest Habitat Conservation Plan (HCP) in support of its applications to the Services for the ITPs.

The proposed issuance of an ITP supported by the HCP is a federal action under the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321 et seq.). This environmental impact statement (EIS) was prepared pursuant to the Services' NEPA requirements under the Council on Environmental Quality's regulations (40 CFR 1500–1508, May 2022). FWS is the federal lead agency responsible for preparing the EIS and NMFS, the Oregon Department of Forestry (ODF), and Oregon Department of Fish and Wildlife (ODFW) are cooperating agencies. As a cooperating agency, NMFS may adopt the EIS in accordance with 40 CFR 1506.3.

1.2 Proposed Federal Action and Decisions to be Made

The Services are reviewing the ITP applications, received on October 10, 2022, as updated subsequently with a revised supporting HCP submitted on December 6, 2024, for incidental take of the species under their jurisdiction (one application was submitted to each agency). If the Services find that all requirements for issuance of the ITPs are met, they will each issue a separate permit, subject to terms and conditions deemed necessary or appropriate to carry out the purposes of ESA Section 10. The Services will base their decisions on ESA statutory and regulatory criteria. These decisions will also be informed by the analysis of best available scientific information, findings in the EIS, and public comments received on the Draft EIS and HCP. The Services will independently document their determinations in separate ESA Section 10 findings documents, ESA Section 7

[1] Appendix 1-A, *Glossary*, presents definitions of terms used in the EIS.

biological opinions, and NEPA Records of Decision developed at the conclusion of the ESA and NEPA compliance processes. Under Section 10(a)(1)(B) of the ESA, the Services may each issue an ITP conditioned on implementation of the HCP, issue an ITP conditioned on implementation of the HCP and other specified measures, or deny the ITP application.

1.3 Purpose and Need for Federal Action

The purpose of the federal action considered in this EIS is to fulfill the Services' Section 10(a)(1)(B) conservation authorities and obligations under the ESA to address the applications requesting authorization of incidental take of three species listed as threatened under the ESA—the northern spotted owl (*Strix occidentalis*), marbled murrelet (*Brachyramphus marmoratus*), and Oregon Coast coho salmon (*Oncorhynchus kisutch*). The applicant has determined that operation of the Elliott State Research Forest as proposed would likely result in take of these ESA-listed species and is looking for a long-term solution that assures compliance with the ESA.

The need for the federal action is to respond to the applicant's request for ITPs for the covered species and covered activities as described in the HCP. The Services will review the ITP applications to determine if they meet issuance criteria; those criteria include that the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking, that the applicant will ensure that adequate funding for the HCP will be provided, that the applicant has provided procedures to deal with unforeseen circumstances, and that the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild. The Services will also ensure that issuance of the ITPs complies with other applicable federal laws, regulations, treaties, and applicable executive orders, as appropriate.

1.4 Scoping and Public Engagement

FWS initiated the public scoping process for this Draft EIS by publishing the Notice of Intent (NOI) to prepare an EIS in the *Federal Register* (FR) on May 5, 2022 (87 FR 26778). The NOI can be accessed at https://www.regulations.gov/document/FWS-R1-ES-2022-0029-0001. The NOI announced FWS' intent to prepare an EIS, provided information on the public scoping meeting, and requested comments from all interested parties on the scope of issues and alternatives to consider in preparing the EIS. The comment period was from May 5 to June 6, 2022. FWS hosted a virtual scoping meeting on May 16, 2022. Appendix 1-B, *Scoping*, summarizes comments received during the scoping period (see Chapter 5, *Summary of Submitted Alternatives, Information, and Analyses*, for a summary of the alternatives, information, and analyses submitted by state, tribal, and local governments and other public commenters during the scoping process pursuant to 40 CFR 1502.17). FWS considered input from the public in determining the scope of this EIS. FWS also provided additional information (news releases, factsheets, and frequently asked questions) on their project website: https://www.fws.gov/project/elliott-state-research-forest-habitat-conservation-plan.

1.5 Draft EIS Public Comment Period

In accordance with requirements set forth in NEPA (42 USC 4321 et seq.) and its implementing regulations and the ESA, FWS published a Notice of Availability of the Draft EIS and HCP in the *Federal Register* on November 18, 2022 (87 FR 69291). The notice requested public comments on the Draft EIS and HCP and announced the public meeting.

The original comment period was from November 18, 2022, to January 3, 2023, which the Service extended to January 10, 2023, in response to commenter requests (87 FR 77877). FWS hosted a virtual public meeting on December 13, 2022. The Draft EIS and a recording of the public meeting are available online at https://www.fws.gov/project/elliott-state-research-forest-habitat-conservation-plan. Comments were accepted electronically via www.regulations.gov.

Comments received have been considered in the preparation of this Final EIS. Appendix 1-C, *Responses to Comments on the Draft EIS*, describes the public review process in more detail and provides responses to the substantive comments received, including noting where appropriate clarifications to were made to this Final EIS.

1.6 Changes between the Draft and Final EIS

The Final EIS reflects changes to the Draft EIS to address substantive comments received on the Draft EIS and HCP, reflect updated data and changes to the HCP, provide clarification, correct inadvertent errors, and provide additional information for the impact analysis. No substantial new circumstances or information about the significance of adverse effects that bear on the analysis were identified as a result of these changes (40 CFR 1502.9(d)(1)).

Table 1-1 summarizes key updates by chapter and section.

Table 1-1. Changes Made to the EIS between the Draft and Final

Chapter or Section	Summary of Changes
Chapter 1, *Purpose and Need*	• Added description of public outreach for the Draft EIS • Added Section 1.6, *Changes to the EIS between the Draft and Final*

Chapter 2, *Proposed Action and Alternatives*	• Updated no action alternative description (Section 2.1.1) to reflect updates to the Oregon Forest Practices Act (Oregon FPA) and Forest Practice Administrative Rules
	• Designated Alternative 2 as the preferred alternative (Section 2.1.2).
	• Updated proposed action and alternatives mapping to reflect updated data and expanded permit area
	  ○ Removed Northern Spotted Owl Activity Center 46
	  ○ Updated marbled murrelet modeled potential and designated occupied habitat layers to reflect recent LiDAR data and modeling
	  ○ Expanded permit area to include the approximately 788-acre East Hakki parcel
	• Updated proposed action to reflect changes to the HCP (Section 2.1.2)
	  ○ The marbled murrelet experiment was removed, resulting in 1,400 acres of modeled potential marbled murrelet habitat moving from Extensive allocations to MRW Reserves under the proposed action, which decreased the area available for variable density harvest and

<table>
<tr><th>Chapter or Section</th><th>Summary of Changes</th></tr>
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increased both the area available to restoration thinning and the area not available for treatment.
Three new allocations were added—Flexible, Flexible Extensive, and Volume Replacement—which apply the same range of treatments considered in the Draft EIS (i.e., no harvest, restoration thinning, variable density harvest, and clearcuts). This resulted in an increase of area off limits to treatment, an increase in the area available for clearcuts, and a decrease in area available for restoration thinning under the proposed action. This change also affected distribution of acreage under Alternatives 3 and 4.
Detail was added to the description of treatments in Extensive allocations
A cap on restoration thinning in RCAs was added
Equipment limitation zones were added
Conservation Measure 1, Targeted Restoration and Stream Enhancement, was updated to reflect changes to limits on removal of trees from RCAs
Conservation Measure 3, Reduce Density and Negative Impacts of the Forest Road Network in the Permit Area, was updated to expand the commitment
Conservation Measure 5, Harvest and Thinning Adjacent to Occupied Marbled Murrelet Habitat, was added
Condition 10, Management on Steep Slopes, was updated

Updated Alternative 3 to remove the broader application of Conservation Measure 3 to the entire permit because this has now been included under the proposed action (Section 2.1.3)
Updated Alternative 4 to remove commitments under Conservation Measure 3 and Condition 10 (Section 2.1.4)
Updated Section 2.2, Alternatives Dismissed from Detailed Consideration, as follows:

Removed the expanded permit area alternative, which included the East Hakki Ridge parcel in the permit area, as this parcel has now been included in the permit area under the proposed action and Alternatives 3 and 4.
Added description of an Early Seral Stewardship alternative considered based on feedback received as a result of tribal consultation.

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<tr><td>Chapter 3, Affected Environment and Environmental Consequences</td><td>

The analyses in this chapter were updated to incorporate the updates to data and to the HCP described above.

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<tr><td>Section 3.1, Introduction</td><td>

Updated description of the areas available for different treatment types under the proposed action and alternatives
Updated Table 3.1-1 and Figure 3.1-1 based on updated proposed action and alternatives
Fixed error in Draft EIS including all RCAs as available for restoration under Alternative 4. Only stands under 65 years of age as of 2020 are eligible for restoration. The older stands are now allocated to no treatment.

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Chapter or Section	Summary of Changes
Section 3.2, *Geology and Soils*	• Clarified no action effects based on updates to the Oregon FPA • Updated proposed action effects based on updates to commitments related to steep slopes and road management • Consolidated discussion of erosion impacts into this section instead of presenting here and in Section 3.3, *Water Resources*
Section 3.3, *Water Resources*	• Updated description of surface water drinking water source areas • Updated peak and low flow impacts based on updated projections in appendix and added a local-scale analysis • Added detail to the water temperature analysis • Added description of the Clean Water Act compliance requirements and process • Added details on herbicide uses related to forest management, risks of herbicides in water resources, current waterbody impairments by toxins, and the regulations in place to prevent transport of herbicides into waters
Section 3.4, *Vegetation*	• Updated affected environment for special-status plants and fungi to reflect more recent data and documented occurrence within 2 miles of the permit area • Updated projected acres of seral stages and associated figures to reflect updated stand age projections based on updated proposed action and alternatives • Updated potential area of disturbance relevant to spread of invasive species based on updated proposed action and alternatives • Updated wetland impacts to reflect adherence to Oregon FPA rules • Updated the analysis of forest resilience to include fire resilience
Section 3.5, *Fish and Wildlife*	• Updated wildlife habitat projections and figures to reflect updated stand age projections • Updated impacts on fish and aquatic species based on updated water resources analysis • Updated impacts on forest-dependent wildlife based on updates to stand age projections, species' habitat commitments, and salvage harvest restrictions under the proposed action
Section 3.6, *Air Quality*	• Clarified applicable policies and regulations
Section 3.7, *Climate Change*	• Clarified historical fire regime in the permit area based on updated fire history research • Updated estimates of carbon emissions and sequestration based on updated proposed action and alternatives • Updated method and data used to estimate carbon sequestration
Section 3.8, *Recreation and Visual Resources*	• Addressed effects on specific recreation sites as requested in public comments • Added description of viewsheds from specific recreational and residential areas as requested in public comments
Section 3.10, *Tribal Resources*	• Updated to reflect ongoing consultation with tribal governments • Updated to reflect updates to relevant impacts analyses (fish, wildlife, vegetation) and to consider additional commitments in the HCP related to tribal practices
Section 3.11, *Socioeconomics*	• Updated affected environment to reflect recent estimates for social value of carbon regulation and a more detailed description of surface water drinking water source areas

Chapter or Section	Summary of Changes
	• Updated economic impacts of harvest to reflect changes to the proposed action and alternatives • Updated the value of ecosystem services to reflect updated effects in the water quality, fish and wildlife, recreation and visual resources, climate change, and tribal resources sections
Section 3.12, *Environmental Justice*	• Updated to reflect updated effects in all other resource sections
Chapter 4, *Cumulative Effects*	• Updated to reference recreational use in forestland, per input from public comments • Recognized the applicant's public indication of entering into carbon market • Updated discussion of cumulative effects on vegetation to include fire resilience
Appendix 1-C, *Responses to Comments on the Draft EIS*	• Added appendix presenting responses to comments received on the Draft EIS
Appendix 3.3, *Water Resources Technical Supplement*	• Updated equivalent clearcut harvest projections based on updated proposed action and alternatives • Updated peak and low flow analyses based on the equivalent clearcut harvest projections and added an analysis of localized effects
Appendix 3.4, *Vegetation Technical Supplement*	• Updated stand age projections based on updated proposed action and alternatives • Moved updated description of stand age projection assumption from EIS Section • Updated Table 2 to reflect more recent data and special-status plants and fungi with documented occurrences within 2 miles of the permit area • Added Table 3 summarizing acreages of mapped wetland classifications in the permit area • Moved discussion of applicable wetlands regulations to EIS Section 3.4
Appendix 3.10, *Tribal Resources Technical Supplement*	• Updated to reflect ongoing consultation with tribal nations

Chapter 2
Proposed Action and Alternatives

This chapter describes the alternatives analyzed in detail in this EIS and the alternatives considered but eliminated from detailed analysis. FWS identified a reasonable range of alternatives to consider for detailed study in the EIS through a structured screening process, which was informed by the comments received during the scoping process.

2.1 Alternatives Analyzed in Detail

This section provides a description of the following four alternatives the FWS analyzed in detail in this EIS:

- Alternative 1: No Action
- Alternative 2: Proposed Action/Preferred Alternative (Elliott State Research Forest [ESRF] HCP)
- Alternative 3: Increased Conservation
- Alternative 4: Increased Harvest

All alternatives analyzed in detail include forest management activities (i.e., timber harvest and reforestation, thinning, and supporting management activities and infrastructure), but the implementation of these activities would vary as described in the following subsections.

2.1.1 Alternative 1: No Action

NEPA requires that the federal agency consider impacts of a no action alternative, which serves as a baseline with which to compare impacts of the proposed action and any action alternatives. Under the no action alternative, the Services would not issue incidental take permits (ITPs) to DSL for the covered activities described in Section 2.1.2.2, *Covered Activities*, and DSL would not implement the proposed HCP and research design. DSL's mandate to manage lands under its jurisdiction with the objective of obtaining the greatest benefit for the people of the state, consistent with the conservation of the resource under sound techniques of land management, would remain in place, and DSL would continue to be subject to ESA as well as other federal, state, and local requirements for any forest management activities in the ESRF. The no action alternative assumes that DSL would manage the ESRF using a take avoidance approach to ESA compliance. This assumption is for analysis purposes, and DSL does not intend to implement the no action alternative. FWS received public comments during scoping that the no action alternative should assume there is no timber harvest; however, given DSL's mandate to manage the ESRF, this was not considered a reasonable assumption if the Services do not issue the requested ITPs.

DSL would manage the ESRF consistent with the Oregon Forest Practices Act (FPA) (Oregon Revised Statute [ORS] 527 and Oregon Administrative Rules [OAR] Chapter 629). The analysis of the no action alternative assumes the rules as most recently updated in January 2024.[1]

For purposes of this analysis, the no action alternative assumes the following restrictions on forest management activities would be implemented to avoid take of ESA-listed species in the absence of the proposed HCP. Further assumptions regarding forest management practices are identified as appropriate in Chapter 3, *Affected Environment and Environmental Consequences*.

- **Northern spotted owl (*Strix occidentalis*):** DSL would avoid incidental take through habitat protections included in the *Revised Recovery Plan for Northern Spotted Owl* (FWS 2011)[2], the FWS *Protocol for Surveying Proposed Management Activities that May Impact Northern Spotted Owls* (FWS 2012), and the *Biological Opinion on Northwest Oregon District, Bureau of Land Management Harvest and Routine Activities* (FWS 2020). DSL would avoid incidental take from habitat modification for northern spotted owl by protecting nest sites and suitable habitat[3] within home ranges (FWS 2011). This includes maintaining a 70-acre no-harvest zone around the nest site, a minimum of 50% of suitable habitat within the core use area (0.5-mile radius around the nest site) and a minimum of 40% of suitable habitat within the provincial home range (in the Oregon Coast region, a 1.5-mile radius around the nest site) (FWS 2012).[4]

  DSL would also implement seasonal restrictions on certain maintenance activities and equipment use during the critical breeding period and the nesting season (FWS 2020).

  Figure 2-1 shows the existing northern spotted owl activity centers that overlap with the permit area. The actual number of activity centers protected could change throughout the analysis period if new sites are identified or if existing sites are found to be unoccupied.

- **Marbled murrelet (*Brachyramphus marmoratus*):** DSL would avoid incidental take through compliance with OAR 635-100-0137, *Survival Guidelines for Marbled Murrelet*. This policy states that "state agencies shall designate and protect occupied sites and associated buffers on state-owned, managed, and leased lands" such that all continuous suitable habitat[5] in a project area is designated as an occupied site. The guidelines specify that "prior to implementing a project that removes trees and has the potential to take marbled murrelets, approved surveys of the project area shall be conducted for a minimum of two consecutive years to determine if it is occupied by murrelets." Timber harvest would not be permitted in occupied sites or in a 100-meter (328-foot) buffer surrounding occupied sites. Figure 2-1 shows marbled murrelet habitat in the permit area as defined by Betts and Yang (unpublished data 2023). The habitat defined as designated occupied constitutes "occupied sites" and would be unavailable for harvest along with the associated buffer. Other areas in the permit area, including the modeled potential habitat, could be determined occupied based on surveys, in which case they would also be protected as "occupied sites." The guidelines also include seasonal restrictions on certain

[1] Although, per SB 1501, the revisions to OAR 629-600-0100 approved in October 2022 could roll back if an ITP for an approved HCP consistent with the Private Forest Accord report (Conservation Coalition and Working Forest Coalition 2022) is not issued by December 31, 2027, these protections were deemed reasonably foreseeable for purposes of the no action alternative.

[2] References for cited sources in this EIS are in Appendix 2-A, *References.*

[3] Suitable habitat includes marginal, suitable, and highly suitable nesting and roosting habitat as defined in Davis et al. 2016.

[4] Standards for maintaining suitable habitat in owl circles apply to the full circle, regardless of ownership.

[5] Per OAR 635-100-0137, *continuous* means no gaps in suitable habitat wider than 328 feet (100 meters).

activities (e.g., heavy equipment use, controlled burns) with which DSL would be required to comply.

- **Oregon coast coho (*Oncorhynchus kisutch*):** DSL would avoid incidental take through compliance with the Oregon FPA (ORS 527; OAR 629). Riparian protections would include riparian management areas (RMAs) that would be applied to either side of streams. Buffers are applied to the stream types defined in the Oregon FPA. Table 2-1 shows the width of RMAs and Figure 2-1 shows the RMAs. In addition to RMAs, 35-foot equipment limitation zones (ELZs) would be applied upstream of RMAs on small, perennial non-fish-bearing streams that are tributaries to salmon, steelhead, and bull trout (SSBT) or other fish-bearing streams and on all seasonal streams.[6] RMAs and ELZs would be measured along the slope of the stream bank (rather than horizontally, as under the proposed action). Due to the average slope of the landscape, this results in a smaller buffer than a horizontal buffer of the same width.

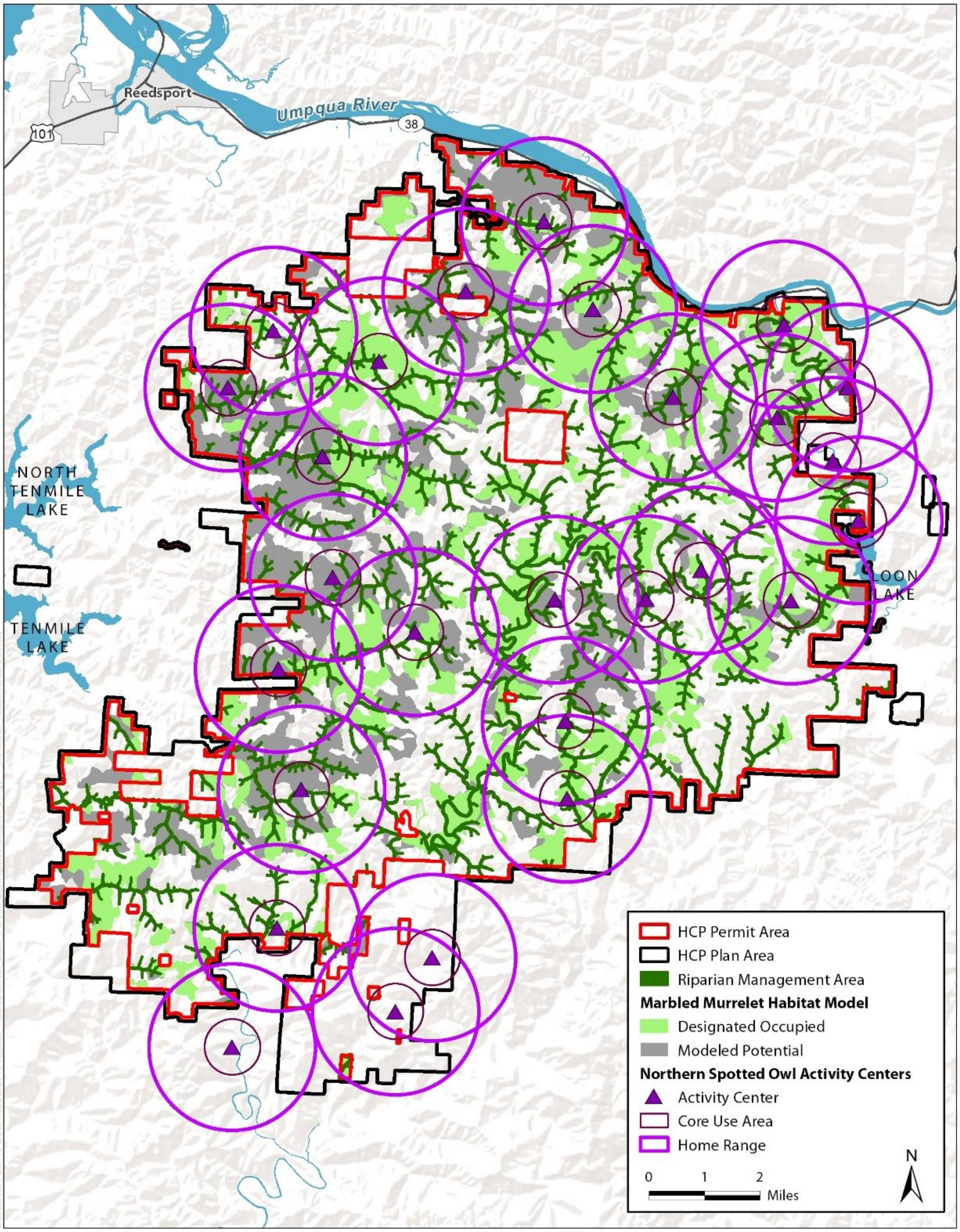
Table 2-1. Riparian Management Areas by Stream Type, No Action Alternative

Stream Type[a]	Prescribed Width (Slope Distance)[b]
Large or medium SSBT or other fish-bearing stream	110 feet
Small SSBT or other fish-bearing stream	100 feet
Large or medium perennial non-fish-bearing stream	75 feet
Small, perennial non-fish-bearing stream, tributary to SSBT stream	75 feet from the confluence with the SSBT stream for the first 500 feet 50 feet on the next 650 feet (up to 1,150 feet from the confluence with the SSBT stream)
Small, perennial non-fish-bearing stream, tributary to other (not SSBT) fish-bearing stream	75 feet from the confluence with the fish-bearing stream for up to the first 600 feet
Other non-fish-bearing stream (seasonal)	0

[a] Stream types are defined in the Oregon FPA.
[b] RMA widths are measured using slope distance from the edge of the active channel, or channel migration zone if present, on each side of the stream. RMA lengths on non-fish-bearing streams are measured from the confluence with a fish-bearing stream. Due to the average slope of the landscape, measuring buffers along the slope results in a less protective buffer than a horizontal buffer of the same width.
RMA = riparian management area
SSBT = salmon, steelhead, and bull trout

[6] R-ELZs require retention of trees less than 6 inches diameter at breast height and shrubs where possible, and ELZs limit equipment use but do not have the same retention requirement as R-ELZs (OAR 629-600-0100). R-ELZs or ELZs apply until the end of the stream channel (OAR 629-643-0105).

Figure 2-1. Designated Occupied and Modeled Potential Marbled Murrelet Habitat, Existing Northern Spotted Owl Activity Centers, and Riparian Management Areas



Under the no action alternative, vegetation management in RMAs would be allowed to achieve ecological objectives (OAR 629-643-0000 [3] and [5]) per the limitations described in OAR 629-643-0400.

Under the no action alternative, designated debris flow traversal areas and slope retention areas would be protected to support delivery of large wood and regulate sediment delivery to fish-bearing streams consistent with maintaining or improving aquatic habitat within large basins over long timeframes (ORS 629-630-0900 through 629-630-0925). Designated debris flow traversal areas would receive a 25-foot no-harvest buffer on either side of qualifying stream channels and slope retention areas would include no-harvest restrictions on hillslopes likely to contribute landslide-derived sediment to fish-bearing streams. Both types of steep slope protection areas would be determined by the slopes model and displayed on ODF maps and the ODF reporting and notification system.

In areas where harvest is not prohibited by take avoidance restrictions, as described above, the no action alternative assumes that DSL would conduct clearcut harvest.

The following are additional assumptions about other forest management activities for the no action alternative:

- **Roads:** DSL would conduct road system management activities in support of timber harvest that would include construction, maintenance, use, and vacating of permanent and temporary roads, and construction and maintenance of landings and drainage structures. Because the permit area has an extensive existing road network, DSL anticipates that the need to expand the permanent road network would be minimal. Road system management activities would be required to adhere to Oregon FPA requirements for road construction and maintenance (OAR 629-625-0000 through 629-625-0920). This includes the Forest Road Inventory and Assessment and State-led Abandoned Roads Inventory processes, which would require DSL to bring inactive or abandoned roads and culverts into compliance with the Oregon FPA rules.
- **Water developments:** DSL would operate existing water developments for firefighting or for filling water trucks that may be on standby during controlled burning. There are no plans for the construction of new water developments.
- **Quarries:** DSL would continue to operate the existing quarry for road maintenance and rock slope protection materials and may construct new quarries during the analysis period. In the absence of an HCP, there would be no limit on the number of new quarries that could be constructed, but siting and development of quarries would be required to follow applicable Oregon FPA requirements.
- **Communication sites and lookouts:** DSL would maintain existing lookouts and communication sites in the ESRF that are leased to the Oregon Department of Transportation/Oregon State Police and Coos Forest Protective Association. This would include vegetation clearing to maintain appropriate fire breaks around these sites.
- **Prescribed burns:** DSL may implement prescribed burns in the ESRF in accordance with applicable Oregon FPA requirements (OAR 629-615-0300). The primary use of prescribed burning would be of slash piles on landings following harvest. Other, more infrequent use of fire would include broadcast burning of harvest units for site preparation prior to planting and underburning areas for fuels reduction purposes.

- **Chemical use:** DSL may conduct chemical application (e.g., herbicides and pesticides)[7] for forest management using either aerial application methods (i.e., fixed-wing airplane, helicopter, unmanned aerial system) or ground methods.
- **Salvage harvest:** As described above, DSL would avoid incidental take of Oregon Coast coho through compliance with the Oregon FPA. The Oregon FPA allows for alternative vegetation retention prescriptions (including OAR 629-605-0500 and 629-643-0300)[8] in RMAs in response to catastrophic events like wildfires. The take avoidance measures described above for habitat occupied by northern spotted owl and marbled murrelet would also apply following a disturbance event in areas occupied by these species.

For projects where take cannot be avoided, DSL would have the option to pursue project-by-project incidental take authorization in accordance with Section 10 of the ESA. A project-by-project approach would result in variable application, or non-application, of the avoidance and minimization measures and adaptive management approach included in the proposed HCP. Without knowing the details of any future project-specific proposal, it is not possible to analyze its effects, and so it is not assumed for purposes of evaluating the no action alternative.

2.1.2 Alternative 2: Proposed Action

The proposed action evaluated in this EIS is the Services' issuance of ITPs, which would authorize incidental take of covered species from covered activities in the permit area, and implementation of the conservation strategy described in the associated HCP, over 80-year permit terms. Identified as the proposed action in the Draft EIS, FWS designates this as the preferred alternative. This section summarizes the HCP permit area and plan area, covered activities, covered species, conservation strategy, and monitoring and adaptive management framework. Full descriptions of these topics are provided in HCP Chapter 1, *Introduction*, HCP Chapter 3, *Covered Activities*, HCP Chapter 5, *Conservation Strategy*, and HCP Chapter 6, *Monitoring and Adaptive Management*.

2.1.2.1 Permit Area and Plan Area

The HCP permit area includes 83,326 acres of DSL-managed lands[9] in Douglas and Coos Counties and is the location where all covered activities and conservation actions would occur.

The HCP plan area includes the permit area, 8,897 acres of Board of Forestry lands overseen by the State Board of Forestry and managed by ODF, 124 acres of State Land Board lands managed by ODF, and 161 acres of private inholdings. Lands within the plan area but outside the permit area are

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[7] Although chemical application is not a covered activity under the proposed action, it is considered in the EIS analysis under all alternative because difference in the amount and intensity of other covered activities would drive differences in application of chemicals.

[8] In April 2024, ODF released proposed rule revisions to OAR 629-643-0000 and 629-643-0300. Senate Bill 1501 (2022) requires the board to complete post-disturbance harvest rulemaking by November 30, 2025.

[9] Most of the permit area is comprised of former School Lands, which were granted to the state through the Oregon Admission Act to contribute funds to school districts through the Common School Fund. The State Land Board decoupled these lands from the Common School Fund in 2023, meaning that revenue from these lands is no longer obligated to the Common School Fund.

included in the plan area to accommodate any future land exchanges between the Permittee and adjacent landowners.[10]

Figure 2-2 shows the permit area and plan area.

2.1.2.2 Covered Activities

The covered activities represent all projects and activities for which the Permittee is requesting authorization of incidental take. Broadly, the covered activities include forest management activities (i.e., timber harvest and supporting management activities), infrastructure, research activities, and implementation of the HCP's conservation strategy. HCP Chapter 3, *Covered Activities,* describes the covered activities in more detail.

Stand-Level Treatments and Allocations

The permit area is divided into two general areas—the conservation research watersheds (CRW) and management research watersheds (MRW). The CRW (33,571 acres) would be maintained as a contiguous reserve where restoration thinning would be allowed in some areas. The MRW (49,735 acres) would be managed for multiple outcomes (e.g., timber production, conservation) and would be available for a range of treatment types.

The HCP defines seven distinct geographic allocations, within which specific treatments would be allowed: Intensive, Extensive, Reserve, Volume Replacement, Flexible, Flexible Extensive, and RCAs. The CRW contains only Reserves and RCAs. The MRW contains all allocation types. Figure 2-3 shows the locations of these allocations.

The HCP defines the following three treatment types that would be implemented in the permit area:

- Intensive treatments would include clearcut harvest, which removes nearly all trees in a stand. Up to two commercial thinnings may be conducted prior to clearcut harvest to increase wood production.
- Extensive treatments would include variable density harvest to achieve multi-aged stands and thinnings to increase wood production in some cases and achieve restoration objectives in others.
- Restoration thinning would reduce stand density to restore ecological function.

Table 2-2 presents the area that would be available for each treatment type within each allocation and the area where no treatment would be allowed. The following sections describe the allocations and associated treatment types and operation standards.

[10] Lands could be incorporated into the permit area and covered by the HCP if they were transferred, exchanged, or sold in the future, or otherwise subject to an agreement between the Permittee and the relevant landowner or manager, through the process outlined in HCP Section 7.6.2*, Permit Amendments*.

Figure 2-2. HCP Permit Area and Plan Area

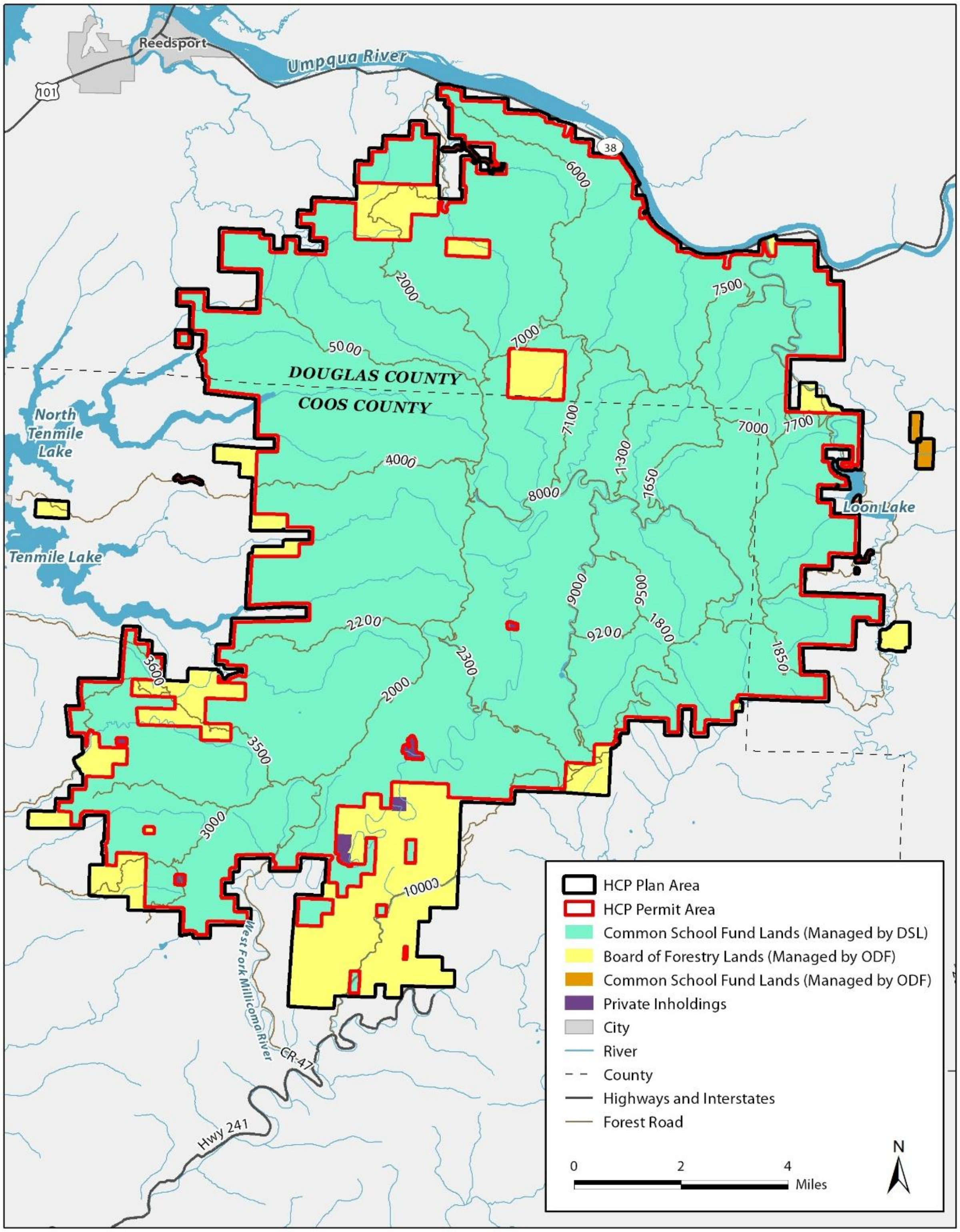
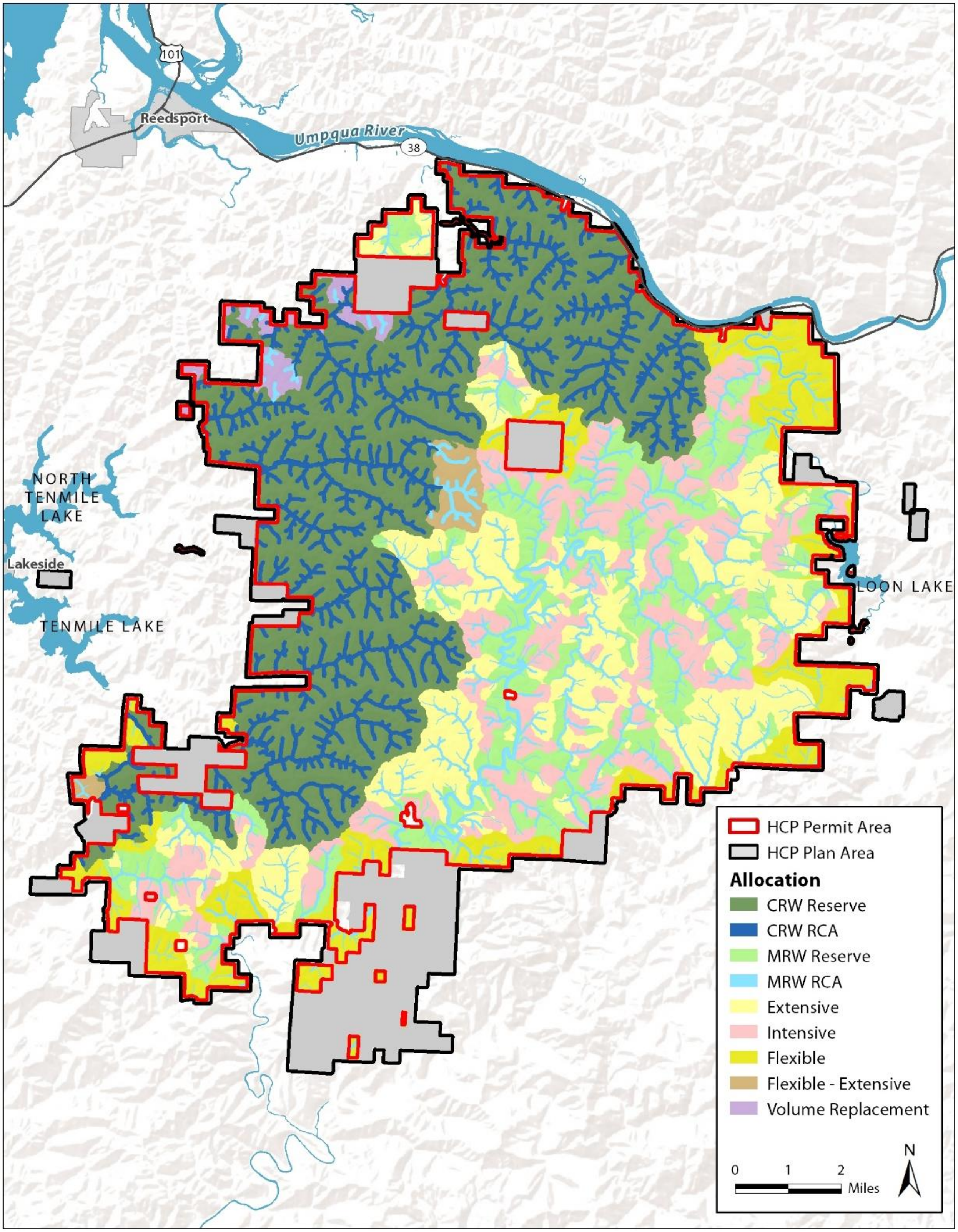


Figure 2-3. Allocations under the Proposed Action[a]



[a] This figure shows the total area in RCAs that would be eligible for thinning (5,919 acres). However, restoration thinning in RCAs could only occur on up to 1,200 acres.

Table 2-2. Area Available for Each Treatment Type in Each Allocation in the Permit Area, Proposed Action

Treatment	Allocation	Acres
Intensive[a]	Intensive	9,912
	Flexible	5,899
	Total	**15,811**
Extensive	Extensive	10,870
	Volume Replacement[b]	943
	Flexible Extensive	819
	Flexible	801
	Total	**13,433**
Restoration Thinning Only	CRW and MRW Reserves	9,202
	CRW and MRW RCAs	1,200
	Total	**10,402**
No Treatment	CRW and MRW Reserves	26,649
	CRW and MRW RCAs	14,824
	Flexible	2,187
	Total	**43,660**
All Treatments	**Grand Total**	**83,306**

CRW = conservation research watershed
MRW = management research watershed
RCA = riparian conservation area
[a] As described in Chapter 3, *Affected Environment and Environmental Consequences*, rotation ages in intensive treatments would differ in Intensive and Flexible allocations.
[b] Volume Replacement allocations would only be available for treatments if areas in Extensive allocations were determined to be unharvestable due to marbled murrelet occupancy.

CRW and MRW Reserve Allocations

Treatments in the CRW and MRW Reserves would be limited to restoration thinning in stands 65 years old or younger as of 2020. Restoration thinning treatments would be intended to enhance forest complexity and habitat by transitioning young, dense plantations toward greater compositional, successional, and structural diversity. To set an existing plantation stand on a trajectory to meet the objectives of the restoration thinning, between 20 and 80% of the pre-harvest stand density may be removed, depending on the starting conditions and thinning goal. In CRW and MRW Reserves, most treatments would consist of single-entry thinnings in the first 20 years of the permit term. CRW Reserves comprise a contiguous area on the western side of the permit area. In CRW Reserves, up to 3,500 acres of additional thinnings (first or second entry) may occur in the third decade of the permit term to meet restoration objectives that were not achieved during the initial 20 years. In the MRW Reserves, additional thinning after the single-entry thinning in the first 20 years is allowed. Thinning of any CRW or MRW Reserve stand that reaches 80 years old prior to treatment would require concurrence from the Services and compliance with the relevant provisions outlined in HCP Section 7.6, *Modifications to the HCP,* and HCP Section 7.2.5, *Implementation and Adaptive Management Committee*. Salvage harvest would not occur in CRW and MRW Reserves, with limited exceptions described in HCP Section 3.4.2.3, *Salvage Harvest*. See HCP Section 3.3.1, *Conservation Research Watersheds and Management Research Watersheds Reserve*

Allocations, for additional details on the operations standards that would be implemented in CRW and MRW Reserve allocations.

Extensive Allocations

Treatments in Extensive allocations (i.e., extensive treatments) would aim to achieve both structural complexity and timber harvest objectives at the stand level. Specific treatments would vary by stand but would include a single variable density regeneration harvest and up to two or three thinning treatments depending on the stand age, as described below. Variable density regeneration harvests could include dispersed (i.e., distribution of harvest and leave trees) or aggregated (i.e., patches of harvest and leave trees) retention. Minimum retention standards are exclusive of adjacent RCAs at the subwatershed level but inclusive at the stand level.

In stands aged between 65 and 150 years (as of 2020), a single variable density regeneration harvest and up to three thinnings could be implemented to promote the development of complex forest structure, function, and composition. Regeneration harvests would occur on an average of 100-year rotations. Outside of the variable density regeneration harvest areas, up to three thinnings could occur to achieve extensive forestry objectives. Retention requirements for these treatments include: (a) a minimum of 20% retention of the original stand density and (b) an average of at least 50% retention (ranging from 20 to 80%) of original stand density across all extensively managed stands in this age cohort. There is an overall 3,200-acre limit on variable retention regeneration harvest in stands aged 65 to 150 years (as of 2020) during the permit term.

In stands 65 years or younger (as of 2020), one variable retention regeneration harvest and up to three thinnings may occur to achieve extensive forestry objectives. Retention at the stand level would range from 20 to 80%.

No treatments would occur in stands over 150 years old (as of 2020).

Any obvious discrete stands or individual trees in younger stands that clearly predate the 1868 fire would not be removed, with limited exceptions due to safety issues in camp sites, logging operations, and other circumstances. Salvage harvest may occur in Extensive allocations affected by natural disturbances such as fire, drought, disease, wind, and insects and would follow the operations standards outlined for Extensive treatments. Salvage harvest operations would follow the operations standards for Extensive allocations and consider the biological legacy of the stand prior to the disturbance event. HCP Section 3.3.3, *Extensive Allocations*, provides additional details on the operations standards that would be implemented in Extensive allocations.

Intensive Allocations

Treatments in Intensive allocations (i.e., intensive treatments) use clearcut harvest techniques to maximize commercial value. Intensive treatments would be limited to trees less than 65 years old (as of 2020) and would have minimum 60-year rotations. Up to two commercial thins would occur between 25 and 50 years into the harvest rotation. Intensive treatments would meet or exceed Oregon FPA retention standards. Any individual trees in Intensive allocations that predate the 1868 fires would not be removed through intensive treatments. Salvage harvest may occur in stands in Intensive allocations that are affected by natural disturbances such as fire, drought, disease, wind, and insects. Salvage harvest in Intensive allocations would consider the biological legacy of the stand prior to the disturbance event. HCP Section 3.3.2, *Intensive Allocations*, provides additional details on the operations standards that would be implemented in Intensive allocations.

Volume Replacement Allocations

Volume Replacement allocations would be treated as Reserves (Section 3.3.1, *Conservation Research Watersheds and Management Research Watersheds Reserve Allocations*) unless modeled potential marbled murrelet habitat within Extensive allocations was found to be ineligible for harvest due to occupancy by marbled murrelet. In these cases, acreage in the Volume Replacement allocations that produces an equivalent amount of timber volume as the Extensive allocation acreage found to be ineligible would become available for extensive treatments. Treatments and operations standards would be generally the same as described for Extensive allocations in HCP Section 3.3.3, *Extensive Allocations*.

Flexible Allocations

Treatments in Flexible allocations would vary depending on stand age outside of areas off-limits to harvest due to covered species habitat. Stands 65 years old or younger (as of 2020) would be available for intensive or extensive treatments, tribal holistic or longer-rotation forestry, or other treatments. Stands greater than 65 years old (as of 2020) would be eligible for extensive treatments, tribal holistic, or longer-rotation forestry. Intensive treatments in Flexible allocations would be the same as described in HCP Section 3.2.2, *Intensive Allocations,* except that the minimum rotation age would be 50 years. Operations standards for extensively treated stands in Flexible allocations would be generally the same as described for Extensive allocations in HCP Section 3.3.3, *Extensive Allocations*.

Flexible Extensive Allocations

Extensive treatments would be implemented in Flexible Extensive allocations. Treatments and operations standards would be generally the same as described for Extensive allocations in HCP Section 3.3.3, *Extensive Allocations*.

Riparian Conservation Areas

RCAs would be established along streams in the Oregon State University (OSU) Modeled Stream Network (2020) throughout the permit area based on fish presence, landslide delivery potential, and perenniality. Similar to CRW and MRW Reserves, treatments in RCAs would be limited to restoration thinning of stands 65 years of age or younger (as of 2020). The objective of restoration thinning in RCAs is to support the development of key ecological processes for coho that are associated with healthy riparian forests. In RCAs, these treatments would be limited to up to 1,200 acres, with up to two restoration thinning entries allowed in half of this acreage and a single entry in the other half. Restoration thinning in the CRW RCAs would be limited to the first 30 years of the permit term, with most thinning occurring in the first 20 years. Restoration thinning in the MRW would not be subject to a timing limitation. No restoration thinning would occur in RCA stands older than 80 years at the time of treatment without concurrence from the Services. Restoration thinning in RCAs would be required to maintain a minimum density of 40 square feet of conifer basal area per acre, focusing retention on the largest of existing trees on the site or those with the greatest likelihood to enhance the long-term ecological functions of the RCAs.

Hand felling would be used for thinning on most slopes greater than 40%, and whenever possible on slopes less than 40%. Thinned trees would not be removed from RCAs on high landslide delivery potential (HLDP)[11] streams. Salvage harvest would not be permitted in RCAs, with limited exceptions described in HCP Section 3.4.2.3, *Salvage Harvest*. Table 2-3 shows RCA widths, and HCP Section 3.3.7, *Riparian Conservation Areas,* provides additional details on the operation standards that would be implemented in RCAs.

In addition to RCAs, the use of ground-based and cable yarding equipment would be limited within a 35-foot ELZ applied to either side of Oregon FPA-defined stream types (OAR 629-600-0100), which would include all streams except XNFB[12] segments that do not meet Oregon FPA stream type definitions for seasonal streams. HCP Section 3.3.7.3, *Equipment Limitation Zone*, describes specific restrictions in these areas.

Table 2-3. Riparian Conservation Areas by Stream Type and Adjacent Allocation, Proposed Action

Stream Type[a]	**Adjacent Allocation**	**Width (feet)[b]**
Fish-bearing (FB) stream	CRW Reserves MRW Volume Replacement and Flexible Extensive allocations and all allocations along the Lower Millicoma River mainstem	200
	MRW Flexible and Flexible Extensive allocations and Reserve, Extensive, and Intensive allocations along the Lower Millicoma River Non-Mainstem	120
	MRW Reserve, Extensive, and Intensive allocations not adjacent to the Lower Millicoma River	100
Perennial non-fish-bearing (PNFB) stream	CRW Reserve allocations MRW Volume Replacement and Flexible Extensive allocations	200
	All other MRW allocations	50
High landslide delivery potential (HLDP)[c] stream	CRW Reserve allocations MRW Volume Replacement, and Flexible Extensive allocations	200
	All other MRW allocations in the Lower Millicoma subwatershed	120
	All Other MRW allocations	50
XNFB[d] stream	All allocations	0

[a] Stream types are those defined in the OSU Modeled Stream Network (2020) and are defined based on fish presence, perenniality, and susceptibility to landslide-associated debris flows that deliver wood and sediment to fish-bearing streams.
[b] Measured as the horizontal distance from each side of the channel migration zone.
[c] High landslide delivery potential (HLDP) streams are defined as non-fish-bearing streams with high likelihood of delivering wood to fish-bearing streams.
[d] Non-fish-bearing non-perennial streams that are not HLDP streams.
CRW = conservation research watersheds
MRW = management research watersheds

[11] Non-fish-bearing streams with high likelihood of delivering wood to fish-bearing streams.

[12] Non-fish-bearing non-perennial streams that are not HLDP streams.

Harvest Timing and Methods

Timing and Amount of Harvest

Timber sales from all treatments will not exceed 1,000 acres per year based on a 4-year rolling average of contracted sales. Of the 1,000-acre cap, no more than 480 acres per year will be from clearcut harvest as part of intensive treatments.

Separate from the limits above, up to 300 additional acres per year of restoration thinnings may be allowed during the first two decades of the permit term. Up to 200 additional acres per year of restoration thinnings may be allowed during the third decade of the permit term. These additional treatments would only occur with concurrence from the Services, and consultation with the HCP Implementation and Adaptive Management Committee (HCP Section 7.2.4, *Implementation and Adaptive Management Committee*). Additional information on the timing and amount of harvest in the permit area is provided in HCP Section 3.4.1, *Projected Timing and Amount of Harvest*.

Harvest Methods

Harvest methods that would be implemented in the land allocations and associated treatment types described above include felling, bucking, yarding or skidding, processing, loading of logs, and hauling. *Felling* is cutting down trees. *Bucking* is cutting felled trees in the field into predetermined log lengths. *Yarding* or *skidding* is moving logs from where they are felled to a landing or road using cable systems, ground-based equipment, helicopters, or other means. Cable yarding uses wire ropes to move logs to a landing. Ground-based yarding uses tracked or rubber-tired tractors (skidders) to skid logs to a landing. *Processing* includes removing limbs and bucking them into logs. *Loading* is moving logs from the landing area to a truck for transport, and *hauling* is transporting logs to mills on trucks. HCP Section 3.4.3, *Harvest Methods*, provides additional detail.

Harvest Environmental Protections

During harvest, strategies such as restricting the use of ground equipment, techniques to minimize gouging and soil displacement during cable and ground equipment operations, use of systems to minimize disturbance to existing duff, litter, and woody debris, and live and dead tree retention would be implemented to protect soils from compaction and avoid water ponding and erosion.

Supporting Management Activities

Supporting management activities are activities conducted as a part of harvest regimes (e.g., tree planting, landing construction, precommercial thinning and pruning, slash removal), those required for infrastructure construction and maintenance (e.g., mechanical vegetation control [in accordance with Oregon FPA restrictions in OAR 629-615-0000], heavy equipment use, hazard tree removal) and those necessary for research or restoration projects (e.g., small fixed-wing aircraft or helicopter use, tree climbing, tree felling). Prescribed fire, including single or multiple controlled burns that incorporate Indigenous Knowledge, may be used to manage fuels and increase or maintain suitable conditions for species of cultural value to local tribal communities. Prescribed burns would follow Oregon FPA requirements (OAR 629-615-0300). Use of prescribed fire would also include controlled burning of slash piles following harvest and broadcast burning of harvest units for site preparation prior to planting, where appropriate to achieve research objectives. Prescribed burns would not be allowed in RCAs.

Supporting Infrastructure

Supporting infrastructure needed to support stand-level treatments, research, and supporting management activities includes roads and related facilities, quarries, and communication sites/lookouts.

Road system management would include construction, use, maintenance, daylighting, and vacating of roads and related facilities, including landings and drainage structures such as bridges and culverts. This covered activity also includes maintenance of water developments used for firefighting or for filling water trucks. These activities would be performed in accordance with restrictions in the Oregon FPA rules listed in HCP Section 3.6.1, *Road System Construction and Management*, and other applicable statutes. The list does not include the Forest Road Inventory and Assessment (629-625-0900) or State-led Abandoned Roads Inventory (629-625-0910) rules. Conservation Measure 3 (Section 2.1.2.4, *Conservation Strategy*) is intended to address the issues targeted by these two road management rules.

The HCP caps the construction of new permanent roads in the permit area to 40 miles during the permit term, at a rate of up to 1 mile per year. The HCP caps the construction of temporary roads, including spur roads, to 2 miles per year. Any new temporary roads, including spurs, not vacated within 5 years of construction would count towards the limit on permanent road construction. Over the permit term, up to 50 culverts or bridges are expected to be installed or upgraded, at a rate of no more than three per year. Any new, replaced, or upgraded stream crossings will be designed to meet current NMFS and Oregon Department of Fish and Wildlife (ODFW) passage criteria to maintain upstream and downstream fish passage.

The HCP allows the construction of up to two new quarries, which would serve as sources of rock slope protection material, in the permit area during the permit term. The quarries would only be sited in the MRW, outside of Reserves and RCAs.

The HCP also allows for the maintenance of two existing communication sites and one lookout in the permit area, which would consist primarily of periodic vegetation removal to maintain 500-foot firebreaks around these sites.

Potential Research Projects

This covered activity includes active research that would occur as part of stand-level treatments described above. Active research includes physical manipulation of the landscape or resources that may result in altering habitat for covered species and direct contact with the covered species. Types of potential short- and long-term research projects that could occur in the permit area are described in OSU's research proposal (HCP Appendix C).

Indigenous Cultural Use of Cedar Trees

This covered activity includes removal or selective use of individual cedar trees over 65 years of age (as of 2020) over the course of the permit term for Indigenous cultural practice (e.g., canoe building, providing material for plank houses and stakes for ceremonies, basket weaving, or other cultural practices specified by an Indigenous entity's application to the Permittee). Cedar tree use and removal would not be permitted for commercial sale. Up to 80 trees could be removed from RCAs over the course of the permit term. Additional individual trees from outside RCAs could also be used if consistent with the criteria described in the HCP, including sustainability and forest structure objectives for cedar, location in areas where tree removal is already required for safety, salvage, or as part of planned treatments. This activity would be permitted by DSL based on an application from an eligible entity (Tribal governments or related Indigenous entities with ancestral connections to the permit area) demonstrating compliance with the HCP.

Conservation Strategy and HCP Implementation Activities

Conservation strategy and HCP implementation activities (Section 2.1.2.4, *Conservation Strategy*) that have potential to result in take of one or more of the covered species are also covered activities. Most of these activities are the same as the covered activities described above, including:

- Riparian restoration and stream enhancement
- Road restoration and network reduction
- Research on the covered species
- Habitat enhancement for northern spotted owl and marbled murrelet

Activities in this category that are not the same as covered activities described previously include:

- Survey and monitoring requirements
- Barred owl management and research

2.1.2.3 Covered Species

The covered species include the Oregon coast coho, northern spotted owl, and marbled murrelet. Table 2-4 lists the covered species and their state and federal listing statuses. Complete descriptions of the covered species are provided in HCP Chapter 2, *Environmental Setting*. A brief description of these species is provided in EIS Section 3.5, *Fish and Wildlife*.

Table 2-4. Covered Species

Species	Status[a]		Federal Jurisdiction
	State	Federal	
Fish			
Oregon Coast coho (*Oncorhynchus kisutch*)	--	FT	NMFS
Birds			
Northern spotted owl (*Strix occidentalis*)	ST	FT	FWS
Marbled murrelet (*Brachyramphus marmoratus*)	SE	FT	FWS

[a] SE = State-listed as endangered; ST = state-listed as threatened; FT = federally listed as threatened
NMFS = National Marine Fisheries Service; FWS = U.S. Fish and Wildlife Service

2.1.2.4 Conservation Strategy

The HCP conservation strategy includes biological goals and objectives for each covered species which broadly describe desired future conditions and how they would be achieved. It also includes conservation measures, actions that the Permittee would implement to avoid, minimize, and mitigate (or offset) impacts on covered species from covered activities such that the impact of the taking is minimized and mitigated to the maximum extent practicable, as required under ESA Section 10(a)(2)(A) and the Services' implementing regulations. Lastly, it includes conditions that the Permittee would apply to covered activities to avoid and minimize potential effects on covered species.

Conservation Measures

Conservation Measure 1, Targeted Restoration and Stream Enhancement

This conservation measure would include restoration and stream enhancement projects, focusing on key restoration actions identified in the *Elliott State Forest Watershed Analysis* (BioSystems et al. 2003), *Final ESA Recovery Plan for Oregon Coho Salmon* (NMFS 2016), and local watershed plans, along with other opportunistic projects when there is a need. Instream wood placement and gravel augmentation projects would be targeted at fish-bearing streams within or adjacent to all harvest operations when the stream is below the desired level of wood.

As described in Section 2.1.2.2, *Covered Activities*, restoration thinning would be permitted in RCAs that are 65 years or less in age as of 2020. The rationale for vegetation management in RCAs is described in HCP Section 3.3.7, *Riparian Conservation Areas*, and HCP Appendix A, *Active Management of Riparian Conservation Areas*. RCA restoration thinning would occur consistent with the standards described under *Riparian Conservation Areas,* in Section 2.1.2.2, *Covered Activities*. An initial assessment of RCA thinning inside the ELZ (0 to 35 feet) will occur on up to 160 acres of RCAs along fish-bearing and non-fish-bearing streams prior to thinning in other ELZs. These projects would be monitored and evaluated to determine if outcomes are enhancing the ecological function of RCAs while minimizing adverse effects on coho.

The following vegetation management actions would be applied:

- All trees cut in the first 50 feet of any RCA would be left on the ground, tipped toward the stream, or placed into the stream.
- Outside of 50 feet, up to 20% of the volume of cut logs (consisting of the largest cut trees) would be left on the ground, felled towards the stream channel, or placed in the stream channel. Trees that are byproducts of restoration thinning treatments (i.e., those not left on the ground or tipped toward or felled into streams) may be sold to offset the cost of treatments.

This conservation measure may also include beaver restoration projects (e.g., installation of a beaver dam analog, beaver habitat enhancement). The Permittee would coordinate this work with regional partners, ODFW, FWS, and NMFS to ensure beaver management actions fit into the larger context of salmonid recovery and statewide beaver management principles.

Conservation Measure 2, Expanded Riparian Conservation Areas on Select Management Research Watershed Streams

This conservation measure includes expanded RCAs in the following locations in the MRW. These RCAs are included in Table 2-3 along with those defined as part of the RCA covered activity and are measured as the horizontal distance from each side of the channel migration zones.

- Along the Lower Millicoma River from its entry into the southwest portion of the permit area through the confluence with Elk Creek: 200 feet along the fish-bearing mainstem and 120 feet on HLDP streams and any fish-bearing tributaries to the mainstem.
- In Volume Replacement and Flexible Extensive allocations: 200 feet on fish-bearing, HLDP, and perennial non-fish-bearing streams.

Conservation Measure 3, Reduce Density and Negative Impacts of the Forest Road Network in the Permit Area

This conservation measure includes a commitment to decrease the current road density in the permit area through road vacating in 10-year increments over the permit term.

It includes a commitment to a formal road assessment in the first 12 years of the permit term to identify the degree of hydrologic connectivity of the road network in the permit area that would, along with monitoring, guide decisions on where to prioritize road vacating and other improvements (e.g., culvert removal). This study would also inform the tracking of road density throughout the permit term.

Conservation Measure 4, Barred Owl Management and Research

This conservation measure would include collaboration with FWS and other federal and state management agencies to develop a research approach that will integrate with the HCP's other monitoring and data collection commitments for the northern spotted owl. Management will remove barred owl in amounts intended to facilitate improved conditions for northern spotted owl. This strategy will be developed in the first 16 months of the permit term and implementation started the following year. Monitoring will be developed in collaboration with FWS to assess the effectiveness of barred owl management.

Conservation Measure 5, Harvest and Thinning Adjacent to Occupied Marbled Murrelet Habitat

This conservation measure prescribes buffers and exceptions to buffers for restoration thinning in CRW and MRW Reserves and any treatment in the MRW outside of Reserves that is proposed to occur in modeled potential marbled murrelet habitat that is adjacent to designated occupied habitat.

Conditions on Covered Activities

The following conditions would also apply to covered activities throughout the permit term.

- **Condition 1, Seasonal Restrictions around Northern Spotted Owl Nest Sites:** This condition includes seasonal restrictions on forest management activities within specified distances of northern spotted owl nest sites, including the 22 historic activity centers and new nest sites found in the permit area during the permit term.
- **Condition 2, Retention of Northern Spotted Owl Nesting Core Areas:** This condition specifies that there would be no harvest (i.e., no modification or treatment) in a 100-acre

nesting core area surrounding at least 22 historic activity centers, made up of the highest-quality contiguous habitat. This nesting core area does not have to be circular in shape, but habitat will be contiguous with the nest site. For the 22 historic activity centers, the area required for protection could be shifted from the current mapping of nest sites based on occupancy field data, in coordination with FWS and per the provisions of HCP Section 7.6, *Modifications to the HCP*. This condition will initially apply to the 22 historic activity centers but DSL, in coordination with FWS and per the provisions of HCP Section 7.6, could choose to replace protection of an inactive historic activity center with protection of an active, newly discovered activity center.

- **Condition 3, Retention of Northern Spotted Owl Core Use Areas:** This condition requires that, per the guidance in the revised Recovery Plan (FWS 2011) for northern spotted owl, at least 50% (more than 251 acres) of the highest-quality contiguous habitat in the 502-acre core use areas around the 22 historic activity centers will be retained as nesting, roosting, and foraging habitat[13] at all times. The 502 acres do not need to be in a circle but will consist of the best contiguous habitat, and the edge of the core use area will be no less than 300 feet from the nest location. The location of nesting, roosting, and foraging habitat within core use areas may change, as long as the target continues to be met. As described under Condition 2, this standard will initially apply to the 22 historic northern spotted owl core activity centers, with the potential to shift the area of protection for historic activity centers based on new occupancy data or replace protection of an inactive historic activity center with protection of an active, newly discovered activity center.
- **Condition 4, Retention of Habitat in Northern Spotted Owl Home Ranges:** This condition requires that, per the guidance in the revised Recovery Plan for northern spotted owl (FWS 2011), at least 40% of the northern spotted owl home range (a 1.5-mile buffer around the nest site) is maintained as the highest-quality nesting, roosting, and foraging habitat around at least 22 historic activity centers. This is equivalent to 1,809 acres of nesting, roosting, and foraging habitat in each home range. As described under Condition 2, this standard will initially apply to the 22 historic core activity centers, with the potential to shift the area of protection for historic activity centers based on new occupancy data or replace protection of an inactive historic activity center with protection of an active, newly discovered activity center.
- **Condition 5, Maintenance of Northern Spotted Owl Dispersal Landscape:** This condition requires that at least 40% of the MRW is retained as dispersal habitat, per the standards set forth in Thomas et al. (1990), which are met when at least 50% of trees are at least 11 inches in diameter at breast height with at least 40% canopy cover.
- **Condition 6, Seasonal Restrictions in Marbled Murrelet Occupied Habitat:** This condition includes seasonal restrictions on forest management activities in and near designated occupied marbled murrelet habitat.
- **Condition 7, Survey Requirements for Modeled Potential Marbled Murrelet Habitat:** This condition lays out a process for surveying modeled potential marbled murrelet stands (HCP Figure 2-13) for marbled murrelet presence ahead of any proposed treatment. Through desktop review, field assessment, and surveys, the Permittee would determine if marbled murrelets are

[13] In the HCP, this includes highly suitable, suitable, and marginal nesting and roosting habitat as defined in Davis et al. (2016). However, during HCP implementation, the definition of nesting, roosting, and foraging habitat will be based on the most up-to-date scientific information and regulatory standards.

present in a given stand. If marbled murrelets are present, contiguous habitat would be retained and the treatments would be reallocated to areas not occupied by the species.

- **Condition 8, Limits on Harvest and Designation Changes in Occupied and Modeled Potential Marbled Murrelet Habitat:** This condition prohibits treatments in modeled potential marbled murrelet habitat unless it is determined unoccupied through the process in Condition 7. Any changes to an occupied stand designation will be handled in accordance with HCP Section 7.6*, Modifications to the HCP*.
- **Condition 9, Maintaining Aggregate Amount of Marbled Murrelet Occupied Habitat Over Time:** This condition requires no temporal loss of the aggregate number of acres of designated occupied marbled murrelet habitat or habitat suitability index (HSI)-weighted acres[14] as a result of harvest treatments in the permit area. This condition also requires preserving potential marbled murrelet habitat across the permit area by maintaining an area-weighted mean marbled murrelet HSI value. At a minimum, acres of habitat suitable for marbled murrelet occupancy would not fall below 2022 forest conditions at any point during the permit term.
- **Condition 10, Management on Steep Slopes:** This condition specifies that intensive harvest would avoid unstable slopes identified by the Slope Stability Analysis tool (TerrainWorks 2021) unless they were found to be suitable for harvest via field survey. For extensive and restoration thinning treatments, field surveys and retention commitments would be applied to reduce risks related to treatments on unstable slopes. New road construction (temporary and permanent) would be located in stable locations (e.g., ridge tops, stable benches, flats) and cable or tethered logging systems (i.e., non-ground disturbing methods) would primarily be used on slopes greater than 40%. Additionally, treatments in stands 65 years old or younger as of 2020 would be focused on previously logged stands, where construction of new roads would be minimal.
- **Condition 11, Road Construction and Management:** This condition includes road design standards to ensure hydrologic disconnection from streams and operational standards to reduce erosion and stream sedimentation from construction and maintenance. This condition also specifies that culvert removal and replacement would meet NMFS and ODFW fish passage criteria.

2.1.2.5 Monitoring and Adaptive Management

The proposed action would include a monitoring and adaptive management program (HCP Chapter 6, *Monitoring and Adaptive Management*). The program is intended to ensure compliance with the HCP, assess the status of covered species habitat, and evaluate the effects of management actions such that the conservation strategy, including the biological goals and objectives, is achieved.

The program includes monitoring for aquatic and riparian habitat quantity and quality, monitoring for terrestrial habitat, and species-specific monitoring for northern spotted owl and marbled murrelet. HCP Chapter 6, *Monitoring and Adaptive Management*, outlines the adaptive management process and describes potential triggers for identifying a need for adaptive management actions. Broadly, adaptive management may be required if existing practices underachieve the biological goals and objectives or if more efficient or effective practices could be implemented to achieve the biological goals and objectives.

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[14] A habitat suitability index (HSI) provides a quantifiable measure of the suitability of individual forest stands in the permit area as potential marbled murrelet nesting habitat, and provides a means of evaluating edge effects caused by timber harvest to this habitat (HCP Appendix D, *Marbled Murrelet Habitat Suitability Index Approach*).

2.1.3 Alternative 3: Increased Conservation

Under Alternative 3, the HCP would include the same permit and plan area, covered species, permit term, and monitoring and adaptive management program as the proposed action. The HCP's covered activities and conservation strategy would be modified in the following ways.

All known occupied and modeled potential existing marbled murrelet habitat, northern spotted owl core use areas, and stands over 80 years old as of 2020 in areas available for extensive treatments would be allocated to Reserves. Northern spotted owl habitat requirements and the conservation strategy's conditions for northern spotted owls (Conditions 1 through 5) would apply to any future northern spotted owl activity centers.

RCAs in the MRW would be modified as described below (Table 2-5).

- 100-foot RCAs on fish-bearing streams under the proposed action would be expanded to 120 feet.
- 50-foot RCAs on perennial non-fish-bearing streams and HLDP streams under the proposed action would be expanded to 120 feet.
- Non-fish bearing, non-perennial, non-HLDP streams that are second order or greater, which have no RCA under the proposed action, would receive 35-foot RCAs.

Table 2-5. Riparian Conservation Areas by Stream Type and Adjacent Allocation, Alternative 3

Stream Type[a]	Adjacent Allocation	Width (feet)[b]
Fish-Bearing (FB)	CRW Reserves MRW Volume Replacement, Flexible Extensive, Lower Millicoma River mainstem	200
	All Other MRW Allocations	120
Perennial Non-Fish-Bearing (PNFB)	CRW Reserves MRW Volume Replacement, and Flexible Extensive	200
	All Other MRW Allocations	120
High Landslide Delivery Potential (HLDP)[c]	CRW Reserves MRW Volume Replacement, and Flexible Extensive	200
	All Other MRW Allocations	120
XNFB[d]	CRW and MRW, 2nd order streams and higher	35
	CRW and MRW, 1st order streams	0

[a] Stream types are those defined in the OSU Modeled Stream Network (2020) and are defined based on fish presence, perenniality, and susceptibility to landslide-associated debris flows that deliver wood and sediment to fish-bearing streams.
[b] Measured as the horizontal distance from each side of the channel migration zone.
[c] Non-fish-bearing streams with high likelihood of delivering wood to fish-bearing streams.
[d] Non-fish-bearing non-perennial streams that do not have high likelihood of delivering wood to fish-bearing streams.
CRW = conservation research watershed MRW = management research watershed

In addition to the proposed action's requirement of limiting restoration thinning in RCAs to stands less than 65 years old as of 2020, restoration thinning in RCAs would be prohibited on slopes greater than 65% and would be limited to removing a maximum of 5% of existing shading.[15]

Conservation Measure 3 would be modified to specify that, in order to count as a road removed from the permanent road network, roads must be fully vacated (i.e., road infrastructure must be removed from the landscape and the area restored to natural conditions). Fully vacating a road may require some or all of the following measures, which go beyond those defined in the FPA and referenced in HCP Section 3.6.1.5, *Road Vacating*:

- Reshape the channel and streambanks at the site of removed stream crossings to pass expected flows without scouring or ponding, minimize potential for undercutting or slumping of streambanks, and maintain continuation of channel dimensions and longitudinal profile through the crossing site.
- Restore or replace the streambed materials to a particle size distribution suitable for the site.
- Restore floodplain function.
- Reestablish stable slope contours and surface and subsurface hydrologic pathways.
- Recontour and stabilize cut slopes and fill material and sidecast material to natural slopes.
- Implement suitable measures, including scarifying and de-compacting compacted surfaces, to promote infiltration of runoff and intercepted flow and desired vegetation growth on the road prism and other compacted areas.
- Use suitable measures in compliance with local direction to prevent and control invasive species, including covering disturbed areas with native seed and lopped and scattered branches and trees from side slopes.
- Barricade the road.

Table 2-6 presents the area that would be available for each treatment type in each allocation and the area where no treatment would be allowed.

[15] The amount of trees removed from a particular stream segment would depend on site conditions contributing to shade, such as aspect, topography, density and tree height.

Table 2-6. Area Available for Each Treatment Type in Each Allocation in the Permit Area, Alternative 3

Treatment	Allocation	Acres
Clearcut Harvest[a]	Intensive	8,410
	MRW Flexible	4,982
	Total	**13,392**
Variable Density Harvest	Extensive	7,123
	Flexible Extensive	674
	Flexible	24
	Volume Replacement	763
	Total	**8,584**
Restoration Thinning Only	CRW and MRW Reserves	10,447
	CRW and MRW RCAs	1,200
	Total	**11,647**
No Treatment	CRW and MRW Reserves	29,178
	CRW and MRW RCAs	20,482
	Flexible	24
	Total	**49,684**
Grand Total		**83,306**

[a] As described in Chapter 3, *Affected Environment and Environmental Consequences*, rotation ages in intensive treatments would differ in Intensive and Flexible allocations.

2.1.4 Alternative 4: Increased Harvest

Under Alternative 4, the HCP would include the same permit and plan area, covered activities, covered species, permit term, and monitoring and adaptive management program as the proposed action but the covered activities and conservation strategy would be modified as described below.

The areas in the CRW and MRW Reserves that are located outside of designated occupied and modeled potential marbled murrelet habitat would be reallocated as follows. Stands 65 years of age or younger as of 2020 would be reallocated to Intensive allocations, and stands over 65 years of age as of 2020 would be reallocated to Extensive allocations. RCAs in the CRW would be modified to be the same width as RCAs in the MRW (Table 2-7). Additionally, Alternative 4 would not include Conservation Measure 2, which expands RCAs on certain streams, or the requirement in Conservation Measure 3 to reduce the overall density of the road network in the permit area. Alternative 4 would also not include Condition 10, which limits management on steep slopes.

Table 2-7. Riparian Conservation Areas by Stream Type, Alternative 4

Stream Type[a]	Area	Buffer Distance[b] (Horizontal Distance)
Fish-bearing (FB) streams	All	100 feet
Non-fish-bearing, perennial (PNFB) streams and high landslide delivery potential (HLDP[c]) streams	All	50 feet
XNFB[d] streams	All	0 feet

[a] Stream types are those defined in the OSU Modeled Stream Network (2020) and are defined based on fish presence, perenniality, and susceptibility to landslide-associated debris flows that deliver wood and sediment to fish-bearing streams.
[b] Measured as the horizontal distance from each side of the channel migration zone.
[c] Non-fish-bearing streams with high likelihood of delivering wood to fish-bearing streams.
[d] Non-fish-bearing non-perennial streams that do not have high likelihood of delivering wood to fish-bearing streams.

Table 2-8 presents the area that would be available for each treatment type within each allocation and the area where no treatment would be allowed.

Table 2-8. Area Available for Each Treatment Type in each Allocation in the Permit Area, Alternative 4

Treatment	Allocation	Acres
Clearcut Harvest[a]	Intensive	21,852
	Flexible	6,015
	Total	**27,867**
Variable Density Harvest	Extensive	11,524
	Volume Replacement	1,138
	Flexible Extensive	985
	Flexible	830
	Total	**14,477**
Restoration Thinning Only[b]	CRW and MRW Reserves	80
	CRW and MRW RCAs	3,389
	Total	**3,469**
No Treatment	CRW and MRW Reserves	29,978
	CRW and MRW RCAs	5,269
	Flexible	2,245
	Total	**37,492**
Grand Total		**83,306**

[a] As described in Chapter 3, *Affected Environment and Environmental Consequences*, rotation ages in intensive treatments would differ in Intensive and Flexible allocations.
[b] These acreages represent the total area in Reserve and RCA allocations that would be eligible for thinning. However, as described in the operations standards for these allocations in the text below, an additional limit on thinning treatments in RCAs would apply. Restoration thinning could occur on up to 1,200 acres in RCAs.

2.2 Alternatives Considered but Eliminated from Detailed Study

In addition to analyzing the proposed action and no action alternative, FWS is required to evaluate reasonable alternatives as defined by the Council on Environmental Quality regulations. For alternatives that the agency eliminated from detailed study, FWS must briefly discuss in the EIS the reasons they were eliminated (40 Code of Federal Regulations [CFR] 1502.14; 40 CFR 1508.1(z)). Alternatives submitted during scoping are summarized in Chapter 5, *Summary of Submitted Alternatives, Information, and Analyses.* Comments received during scoping are summarized in Appendix 1-B, *Scoping*. The full contents of all scoping comments are available on Regulations.gov at https://www.regulations.gov/document/FWS-R1-ES-2022-0029-0001.

The following alternatives were considered but dismissed from detailed analysis for the reasons summarized below.

- **Limit Forest Management in Covered Species Habitat.** This alternative would be the same as the proposed action, but would limit forest management in the following ways as compared to the HCP:
  - No restoration thinning in RCAs.
  - No harvest in 23 northern spotted owl home ranges (1.5-mile radius from nest site).
  - No harvest in known occupied and modeled potential existing marbled murrelet habitat.
  - No restoration thinning in CRW and MRW reserves.

  This alternative was eliminated from detailed study because it would not meet the purpose and need to respond to the applicant's ITP applications to cover a research and management program as described in the HCP. The ability to study how species respond to a variety of forest management conditions would be greatly reduced if harvest does not occur in some covered species habitat. In addition, this alternative is similar to Alternative 3, which includes increased conservation measures, and would not meaningfully add to the range of alternatives analyzed.
- **Increased Harvest Options.** This alternative would be the same as Alternative 4 except that it would also reallocate extensive treatment areas that are less than 65 years of age as of 2020 to allow intensive forest management prescriptions, described in Section 2.1.2.2, *Covered Activities*. This alternative was eliminated from detailed study because it would not meet the purpose and need to respond to the applicant's ITP applications to cover a research and management program as described in the HCP. This alternative would eliminate the extensive allocations, reducing the variety of forest structure attainable to only two trajectories, old growth or intensive harvest. Limiting research to these two trajectories would eliminate the ability to undertake research on a dynamically managed complex forest. This would reduce the potential value of such research for improving conservation management of the covered species in such environments. Finally, this alternative was similar to Alternative 4 and would not meaningfully add to the range of alternatives analyzed.
- **Shorter Permit Term.** This alternative would be the same as the proposed action, but the ITP term would be 40 years instead of 80 years. This alternative was eliminated from detailed study because it would not meet the purpose and need to fulfill the Services' conservation obligations under the ESA, since the HCP would not be expected to show adequate conservation benefits in

a 40-year timeframe to achieve mitigation goals. Similarly, because the alternative would not allow adequate time for older forest structure to develop, it would not provide for research benefits addressing conservation needs for the covered species.

- **Reduced Covered Species.** This alternative would be the same as the proposed action but would either only cover Oregon coast coho or only cover northern spotted owl and marbled murrelet. This alternative was eliminated from detailed study because it would not meet the purpose and need, as it does not fully respond to the applicant's request for ITP coverage for the species likely to be incidentally taken and included in the proposed HCP. It is the applicant's responsibility to decide whether to request incidental take coverage for a particular species, but all ESA-listed species that would potentially be taken through the covered activities should be included, or the Services may not be able to issue the ITPs. Additionally, it would not be technically or economically feasible for the applicant to avoid take of a more limited set of covered species while implementing the proposed forest management activities.
- **Additional Covered Species.** This alternative would be the same as the proposed action but would include coverage of non-listed salamanders and/or the coastal marten. This alternative was eliminated from detailed study because it would not meet the purpose and need to respond to the applicant's request because the applicant did not seek incidental take coverage for these species (see discussion in HCP Section 1.4.4, *Covered Species*, for screening conducted by the applicant to determine the covered species). It is the applicant's responsibility to decide whether to request incidental take coverage for a particular species. Despite some survey effort, no coastal marten have been detected in the ESRF for many decades. The latest predicted distribution model did not predict the species in this area (Moriarty et al. 2021). In addition, there is a paucity of information on non-listed salamanders from which to develop and meaningfully analyze an alternative that includes non-listed salamanders.
- **ODF's 2017 HCP.** This alternative would cover the same species as the proposed action but would modify the covered activities and conservation strategy to follow ODF's 2017 HCP. This alternative was eliminated from detailed study because it would not meet the purpose and need to respond to the applicant's ITP applications. The 2017 conservation framework was designed for the ESRF to be managed by ODF, which is no longer proposed. The framework is inconsistent with the current research forest design and goals of ESRF to have active harvest in a research setting. The 2017 conservation framework also served as the starting point for the current proposed HCP. Additional conservation measures and conditions have since been added to meet permit issuance criteria and research forest goals. Furthermore, this alternative would not meaningfully broaden the range of reasonable alternatives considered because it would consist of a combination of elements analyzed in other alternatives.
- **Carbon Sequestration and Research.** Under this alternative, DSL would apply for ITPs from the Services for the same species but for different covered activities that involve managing the forest primarily for carbon storage. This alternative was eliminated from detailed study because it would not meet the purpose and need to respond to the applicant's ITP applications; this alternative would require the applicant to completely change the proposed covered activities. Eliminating this alternative from detailed study does not preclude DSL from considering carbon storage in the future. Additionally, there is not enough information provided on managing the forest for carbon to analyze it in detail.

After the Draft EIS was published, the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians sought government-to-government consultation with FWS. Based on those discussions, FWS developed an alternative description that would focus management of the permit area on the development of more early seral stage habitat, and more open areas/meadowlands. FWS then evaluated whether the alternative would meet purpose and need and otherwise be within the reasonable range of alternatives, as discussed below:

- **Early Seral Stewardship.** Similar to the proposed action, the alternative would include achieving a desired mix of habitats (including forest seral stages) across the landscape. It would be distinct from the proposed action, however, in that land allocations would not be prescriptive in terms of the locations of the habitat types over time or the management mechanisms used to achieve the mix of habitats. The focus would be more on monitoring and adaptive management to ensure that the landscape is trending towards the desired mix of habitats through time. Target habitat types would include late successional habitat, harvestable timber areas, complex early seral habitat, non-forest, and open forest habitat—with a comparatively greater emphasis on complex early seral and non-forest (e.g., large meadow, prairie) habitats in support of a variety of wildlife and plant species of Tribal importance. Management in older stands would promote trees valuable to late-successional associated wildlife. This alternative was eliminated from detailed study because it would not meet the purpose and need to respond to the applicant's ITP applications. In addition, based on FWS's current understanding of the best available science as to the conservation needs of the northern spotted owl and marbled murrelet, the conservation need is for the protection and development of more complex, contiguous late-successional forest habitat, not less. As a result, this alternative would not meet the purpose and need and would not be a reasonable alternative to consider.

Chapter 3
Affected Environment and Environmental Consequences

3.1 Introduction

This chapter presents the existing conditions and potential environmental effects of the proposed action and alternatives.

3.1.1 Scope of Analysis

The remaining sections of this chapter present the comparative analysis of effects of the proposed action and alternatives on the following resources: geology and soils (Section 3.2), water resources (Section 3.3), vegetation (Section 3.4), fish and wildlife (Section 3.5), air quality (Section 3.6), climate change (Section 3.7), recreation and visual resources (Section 3.8), cultural resources (Section 3.9), tribal resources (Section 3.10), socioeconomics (Section 3.11), and environmental justice (Section 3.12). Appendix 3.1-A, *Regulatory Environment*, presents the regulatory context for each resource.

Each resource section consists of a description of the study area, methods, affected environment, and the potential environmental consequences (i.e., impacts) of the proposed action and alternatives on the resources. The affected environment sections describe the existing environmental conditions and reasonably foreseeable changes to those conditions. The environmental consequences sections describe the potential direct and indirect impacts of the proposed action and alternatives and the significance of those impacts. In considering the significance of potential effects, the analysis addresses the degree and duration of beneficial and adverse effects and whether any effects would violate federal, state, tribal, or local law protecting the environment. Effects on short-term use of the environment and long-term productivity of the forest are addressed as part of the environmental consequences in this chapter. Cumulative impacts are described in Chapter 4, *Cumulative Effects*.

Measures intended to minimize and mitigate the impact of the potential taking of covered species to the maximum extent practicable are incorporated into the proposed action, as required under ESA Section 10(a)(2)(B)(ii) as a condition of incidental take permit issuance. Alternative 3 includes additional measures to further reduce impacts on covered species. The analysis of effects in Chapter 3, *Affected Environment and Environmental Consequences*, considers these measures as well as additional protections that may be required in compliance with existing laws, policies, and regulations presented in Appendix 3.1-A, *Regulatory Environment*. The analysis also considers best management practices that may be implemented to mitigate or reduce adverse effects on other resource areas, where applicable and in accordance with existing regulatory requirements.

3.1.2 Study Areas and Analysis Period

Study areas are defined for each resource based on the area where implementation of covered activities in the permit area could affect the resource and include areas outside the permit area or plan area in some cases. Although the permit area could change over time based on land exchanges, these changes would require an HCP amendment (HCP Chapter 7, Section 7.6.2, *Permit Amendments*) and could require additional NEPA analysis depending on the change. The analysis period is 80 years to reflect the length of the proposed permit term.

3.1.3 Approach to Analysis

The primary driver of effects under the proposed action and alternatives is timber harvest. Differences in restrictions on location, timing, and intensity of harvest drive the differences in effects on resources. While the specific timing of harvest and thinning treatments at a given location is not known under any of the alternatives, the analysis used information about restrictions on where treatments can and cannot occur, the intensity of treatments where allowed, and the amount of harvest by treatment type during specific time periods to understand differences in large-scale effects of harvest. Treatments were grouped by level of intensity in the following categories: restoration thinning, variable density harvest, and clearcut harvest. Although specific treatments within these categories differ under the alternatives in some cases, as described in the subsections below, the comparison of acreages assigned within these broader categories (Table 3.1-1) is helpful to understanding the general differences in total area treated and level of intensity of treatment. Figure 3.1-1 shows the layout of areas available by treatment type across the permit area.[1]

Table 3.1-1. Approximate Acreage of Treatment Types under the Proposed Action and Alternatives[a]

Treatment Type	No Action[b]	Proposed Action	Alternative 3	Alternative 4
No treatment	49,069	43,660	49,684	37,492
Restoration thinning	1,385[c]	10,402	11,647	3,469
Variable density harvest	1,955	13,433[d]	8,584[d]	14,477[d]
Clearcut harvest	30,882	15,810	13,392	27,867

[a] Minor differences in the sum of acreages are due to small errors in spatial data across alternatives.

[b] Actual treatment and no-treatment acreage under the no action alternative would depend on the results of species occupancy surveys.

[c] For purposes of analysis, all acres under 65 years within RMAs were assumed eligible for restoration thinning; actual acreage would vary depending on what restoration projects within RMAs DSL proposed and the eligibility of those projects with Oregon FPA requirements for alternative practices and would be determined on a project-by-project basis.

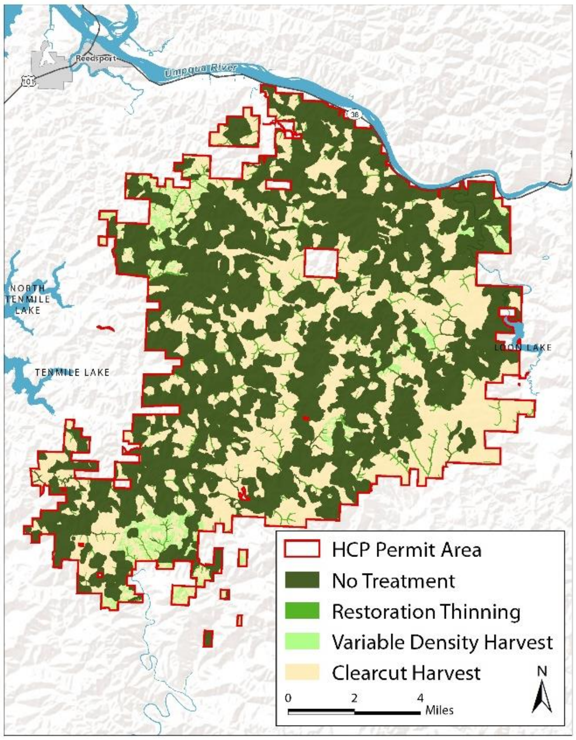
[d] Value includes Volume Replacement allocations, which would only be available if areas within Extensive allocations were determined to be unharvestable due to marbled murrelet occupancy.

The sections below describe the areas available for different treatment types under the alternatives. These treatment types are described in more detail in Chapter 2, *Proposed Action and Alternatives*. The specific differences in treatments under the alternatives are considered in the impact discussions in the remaining sections of this chapter.

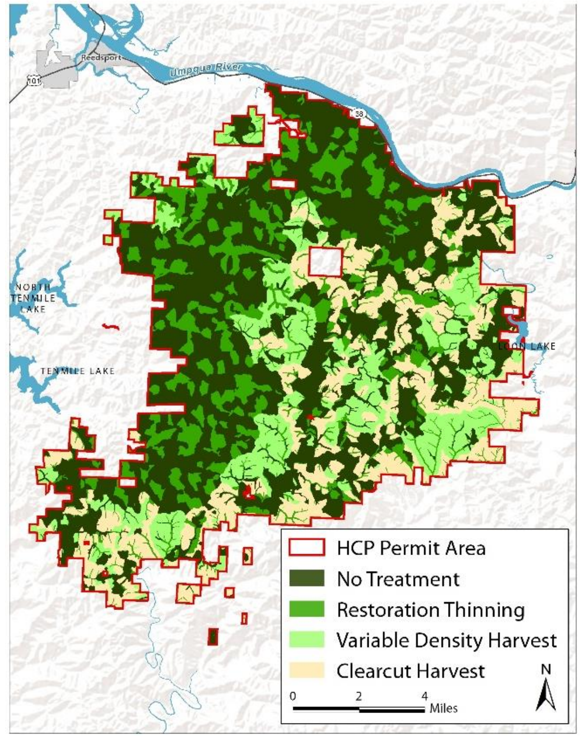
[1] Salvage harvest conducted in response to disturbance events is not included in the estimates provided in Table 3.1-1 and shown in Figure 3.1-1. Restrictions on salvage harvest under the proposed action and alternatives are described in Chapter 2, *Proposed Action and Alternatives*.

Figure 3.1-1. Areas Available for Treatment

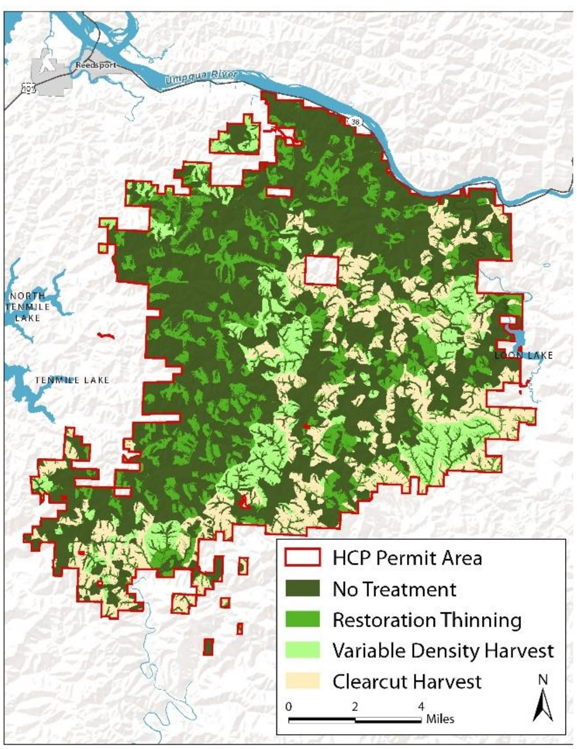
No Action Alternative[a]



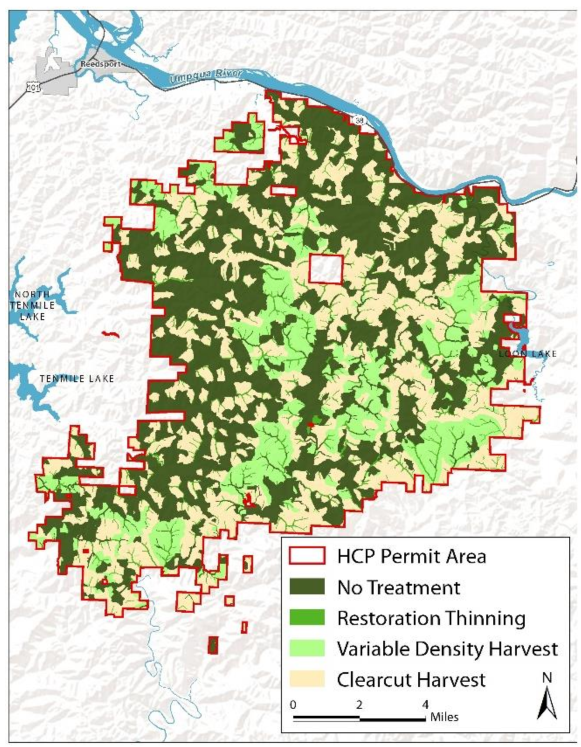
Proposed Action[b]



Alternative 3[b]



Alternative 4



[a] Actual treatment and no-treatment acreage under the no action alternative would depend on the results of species occupancy surveys; some acreage shown as no treatment could become available for harvest and some acreage shown as available for harvest could become unavailable if determined to be occupied or adjacent to occupied. For purposes of analysis, all acres under 65 years within RMAs were assumed eligible for restoration thinning; actual acreage would vary depending on restoration projects proposed in RMAs and the eligibility of those projects with Oregon FPA requirements for alternative practices.

[b] All RCAs under 65 years of age and outside of occupied marbled murrelet habitat are shown as available for restoration thinning (5,919 acres). However, only 1,200 acres of RCAs could be thinned.

3.1.3.1 No Treatment

- **No action:** No-treatment areas would include occupied marbled murrelet habitat and a 100-meter (328-foot) buffer around occupied habitat,[2] nesting core area for occupied northern spotted owl nest sites,[3] riparian management areas (RMAs) that are not subject to restoration,[4] and Designated Debris Flow Traversal Areas and Slope Retention Areas.
- **Proposed action and action alternatives:** No-treatment areas would include areas in conservation research watershed (CRW) and management research watershed (MRW) Reserves and riparian conservation areas (RCAs) that are over 65 years of age as of 2020 or are not dense plantation stands, stands and individual trees in any land allocation that are older than 152 years of age as of 2020,[5] and a 100-acre nesting core area around each northern spotted owl nest site delineated to include the best contiguous habitat while maintaining a minimum distance of 300 feet between the nest tree and the edge of the nesting core area (HCP Chapter 5, *Conservation Strategy*, Condition 2).[6] Under Alternative 3, no-treatment areas would also include RCAs on slopes 65% or greater.

3.1.3.2 Restoration Thinning

- **No action:** Restoration thinning could occur in RMAs. There is no commitment to implementing restoration treatments such as thinning in RMAs, but activities intended to promote ecological restoration would be permitted in these areas.[4]

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[2] In addition to designated occupied marbled murrelet habitat and buffer, any other marbled murrelet habitat determined to be occupied based on surveys as well as the surrounding buffer would also be unavailable for treatment. For purposes of analysis, the no-harvest rule was applied to all modeled potential marbled murrelet habitat, as defined in Betts et al. (2020). Actual no-harvest acreage would depend on the results of occupancy surveys, with some acreage of modeled potential habitat becoming available for harvest and some acreage outside of the modeled potential habitat becoming unavailable for harvest to provide buffer for habitat determined to be occupied.

[3] For purposes of analysis, it was assumed that the 22 existing occupied northern spotted owl nest sites remain occupied. Actual restrictions on harvest related to northern spotted owls could change over the analysis period if existing sites become unoccupied or new sites become occupied.

[4] Although restoration treatment would be allowed in RMAs under the no action alternative, the future extent and timing of any such activities are unknown. For purposes of analysis, areas over 65 years old as of 2020 were assumed to be not available for restoration.

[5] This is intended to preserve trees that predate the 1868 Coos Bay fire, which burned approximately 90% of the plan area.

[6] The analysis assumes that, to the extent feasible, these nesting core areas would be designated in Reserves and RCAs.

- **Proposed action and action alternatives:** Dense plantation stands in MRW and CRW Reserves and RCAs aged 65 years or younger as of 2020 would be available for restoration thinning. Under Alternative 3, restoration thinning in RCAs would be further limited to slopes less than 65%.

3.1.3.3 Variable Density Harvest

- **No action alternative:** Variable density harvest areas would include areas protected for northern spotted owl suitable habitat requirements beyond the suitable habitat in the no-treatment areas, where 60% crown cover must be maintained in 50% of the core use area and 40% of the home range. These areas were mapped to approximate acreage (Table 3.1-1) and geographic location (Figure 3.1-1), but actual acreage and layout would likely vary.[7]
- **Proposed action and action alternatives:** Variable density harvest areas would include areas available for extensive treatment. This includes Extensive, Volume Replacement, and Flexible Extensive allocations, and stands in Flexible allocations over 65 years of age (as of 2020) that are not otherwise off limits to harvest.

3.1.3.4 Clearcut Harvest

- **No action alternative:** Stands in areas outside of those described above would be available for clearcut harvest. For purposes of analysis, a 60-year rotation age was assumed.
- **Proposed action and action alternatives:** Clearcut harvest would occur in stands aged 60 years or younger in Intensive allocations and in stands aged 50 years or younger in Flexible allocations.

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[7] These areas of protection were identified by determining the amount of suitable habitat in the core use areas and home ranges protected in no-harvest or restoration thinning areas, as well as areas protected as suitable habitat under other ownership outside of the permit area. In owl circles where these restrictions did meet suitable habitat protection requirements, additional suitable habitat within the permit area was assumed protected for purposes of this analysis. When identifying additional suitable habitat, the core use area and habitat connectivity were prioritized.

3.2 Geology and Soils

3.2.1 Methods

The study area for geology and soils includes lands and waters where the proposed action and alternatives could directly or indirectly cause erosion, landslide, and stream geomorphology effects. The study area for landslide risk consists of the permit area. The study area for soil erosion and changes to stream geomorphology consists of the subwatersheds overlapping the permit area.[1]

This analysis evaluates the potential for forest management activities under the proposed action and alternatives to result in erosion and soil destabilization, and to increase the likelihood of landslides[2] and associated events. It considers how differences in restrictions on management practices would affect the potential for adverse effects (e.g., stream channel scour and delivery of fine sediment to streams, which lead to stream channel simplification) and beneficial effects (e.g., large wood recruitment and coarse sediment delivery to streams, which lead to more complex stream channel morphology).

3.2.2 Affected Environment

3.2.2.1 Soils

Soils and soil characteristics in the permit area vary, depending on area. The soils in the permit area are composed of several different types: approximately 83% of the forest soils are residual soils that have formed in place and not been transported, approximately 16% are alluvial soils found in valley bottoms, and the remaining 1% includes agricultural land, rock outcroppings, lakes, ponds, and rivers (DSL and ODF 2011). On steeper slopes, away from channels and colluvial basins, soil depth typically varies from 1 to 3 feet. These soils tend to be gravel and sand dominated, contain less silt and clay-sized particles than other locations, and are usually well drained (DSL and ODF 2011:2-45). In colluvial pockets where soil or debris has been deposited by gravity or mass wasting events, soil depth typically varies from 3 to 8 feet. These soils are poorly sorted, contain more silt and clay than other soils on steep slopes, and are often relatively poorly drained (DSL and ODF 2011). Along streams, deposits from water sources, or alluvial deposits, are common. These deposits are typically well-sorted sands, gravels, or coarse silts; drainage characteristics are highly variable. Clays are uncommon (DSL and ODF 2011).

Soils in 50% of the permit area consist of components that have erosion hazard ratings of severe or very severe following activities that expose the soil surface in undeveloped (off-road/off-trail) areas. In those areas, substantial erosion is expected from activities such as harvest, trimming, or fire management, and erosion control measures are advised, though the erosion control measures may be costly (Appendix 3.2, *Geology and Soils Technical Supplement*, Table 1). Soils in 78% of the permit

[1] These are the same subwatersheds that overlap with the broader plan area.

[2] This analysis does not consider deep-seated landslide. Some forest management activities can initiate a deep-seated landslide, in particular those that make large-scale modifications to topography, including quarrying, aggregate stockpiling, placement of large fill, and construction of large road cuts, especially at the base along the toe of the landslide. However, shallow-rapid landslide and associated debris torrent are the predominant ground failure characteristics that shape the landscape.

area consist of components with a severe erosion hazard rating for road and trail uses, meaning that significant erosion would be expected, roads or trails would require frequent maintenance, and costly erosion control measures would be necessary (Appendix 3.2, Table 1).

Soils in 77% of the permit area consist of components that are poorly suited for use as log landings and roads, which would likely result in soil loss and require erosion control measures (Appendix 3.2, Table 2). The effectiveness of best management practices to reduce erosion resulting from forest road management is mixed (Cristan et al. 2016:144–147). Some studies conducted in western Oregon (e.g., Beschta and Jackson 2008) have found that best management practices for forest road management can reduce sediment production, while others (e.g., Stednick 2008a, 2008b) found they do not.

3.2.2.2 Shallow-Rapid Landslide

Conditions in the permit area are favorable to the initiation of shallow-rapid landslides (subsequently referred to as landslides), namely bedrock with low porosity, high precipitation rates, steep slopes, and coarse soils on steep slopes. Landslides in the permit area are frequently associated with debris flow and debris torrent[3] (Appendix 3.2). Landslides and these associated events are the predominant landform-altering agent in the Oregon Coast Range (HCP Section 2.1.7, *Mass-Wasting Processes and Stream Channels*). Approximately 91% of the permit area has high or very high susceptibility to landslides (Appendix 3.2, Table 3).

As discussed in HCP Appendix A, *Active Management of Riparian Conservation Areas*, rates of landslides and debris flows have increased as a result of forestry activities in heavily logged watersheds with extensive road networks in the Oregon Coast Range (Goetz et al. 2015:1311). The Oregon Forest Practices Act (Oregon FPA) was enacted and amended to reduce these effects of forestry practices (ODF 2021). Most landslides associated with roads in the Oregon Coast Range have been assessed as larger in volume than landslides not associated with roads by a factor of four (Robison et al. 1999:v). In the permit area, approximately 27% of roads are located mid-slope (more than 330 feet from ridgelines and more than 200 feet from streams), which tend to dominate the production of sediment during storm events (Wemple et al. 2001). Approximately 58% of roads are on ridgelines, and the remaining 15% are in low-slope or stream-adjacent areas (Appendix 3.2, Table 4).

Road construction disrupts subsurface drainage; water that would ordinarily flow through the soil can instead emerge to the surface, concentrating in flows and increasing the likelihood of landslides and quantity of sediment transported (Heiken n.d.). Use of heavy equipment, timber processing, and hauling compact the soil, increasing potential for runoff, which increases the likelihood of landslides.

Nearly one-third of the 499 miles of road in the permit area were constructed following a major storm in 1962 that blew down an estimated 100 million board feet of timber (DSL and ODF 2011:1-5 to 1-6). These roads were constructed using an old practice, now prohibited by the Oregon FPA, of leaving excavated materials downslope of the excavated road prism. These materials on an oversteepened slope are particularly susceptible to failure (ODF 2011:2-16, 2-47). Subsequent road maintenance has focused on preventing failures associated with these previous practices. However,

[3] In this analysis, a *debris flow* is a fast-moving landslide. It generally is triggered by heavy precipitation or rapid snowmelt, and consists of wet soil, trees, boulders, and smaller debris. A *debris torrent* is a debris flow that has entered a stream channel.

forestry roads, even with compliance with the Oregon FPA requirements, increase the likelihood of landslides.

Landslides have both onsite and offsite effects (DSL and ODF 2011:2-46). Onsite effects generally occur at the landslide initiation site, where the soil has often been completely removed. Offsite effects include changes to riparian vegetation, stream channel morphology, and streambed materials through debris flow and debris torrent (discussed in more detail in Section 3.2.2.3, *Stream Geomorphology*). In the short term, landslides and related effects are destructive; they remove soil, trees, and habitat and potentially kill organisms (Conservation Coalition and Working Forest Coalition 2022:29). However, in the longer term, these natural processes can create and maintain productive habitat for aquatic organisms (Benda and Miller in prep.:2).

3.2.2.3 Stream Geomorphology

Stream geomorphology describes stream systems, including physical shape, water and sediment transport processes, and the landforms that the streams create and alter. It encompasses processes that create, alter, and maintain structure across whole watersheds (Independent Multidisciplinary Science Team 1999:11). These processes shape aquatic habitat, discussed further in Section 3.5, *Fish and Wildlife*.

Landslides that become debris torrents generally initiate in steep landscapes or adjacent to stream channels, including in inner gorge regions (areas next to a stream where the adjacent slope is significantly steeper than the gradient of the surrounding hillsides). Even landslides that begin as relatively small slides can mobilize large volumes of material through scour and move up to thousands of feet once they enter a stream (Robison et al. 1999:58). The wood and water content, as well as stream channel geometry, affect how far debris torrents travel in stream channels (Robison et al. 1999:107; Benda et al. 2004:3-4).

Results of a debris torrent can cause changes in the stream channel that can persist over thousands of years. These include changes to stream hydrology and geomorphology through sediment deposition, as well as rapid movement of high loads of debris through the stream channel (Geertsema et al. 2009:589–593; Burnett and Miller 2007:239; Robison et al. 1999:v–vi; Lyons and Beschta 1983:463). Sediment deposition can reshape stream channels, increase the width of stream channels, lead to gravel bars that become vegetated, and even dam streams and rivers. Movement of debris through the stream channel can scour streambeds down to bedrock.

Over decades to centuries, debris torrents can result in benefits, such as creation of complex geomorphic structures through deposition of large wood and coarse gravels and boulders (Benda and Miller in prep.:2; Geertsema et al. 2009:593–598; Miller and Scurlock 2018:2; Burnett and Miller 2007:239; May and Gresswell 2003:1352–1353). However, the potential for debris torrents to create high-quality habitat depends on the ratio of delivered wood to sediment.

Forestry activities, including harvest and road system management, can affect the amount of wood delivered to streams. As discussed in HCP Appendix A, thinning can reduce the potential amount of wood that can be delivered to streams when the wood is removed from the harvest site. However, thinning when the wood is not removed from the harvest site and the downed trees are directly introduced to adjacent streams is beneficial for wood recruitment (Benda et al. 2016:821).

The stream-adjacent riparian forest is important to stream channel morphology, providing root strength that maintains desirable channel characteristics and organic material inputs (e.g., large wood) that support a complex channel morphology (Gregory et al. 1991; Forest Ecosystem Management Team 1993; Meehan 1996), as described in HCP Section 2.1.7, *Mass-Wasting Process and Stream Channels*. Reeves et al. (2003) studied the sources of large wood in Cummins Creek, a fourth-order watershed in the Oregon Coast Range; they found that 46% of the estimated volume of wood originated from upstream sources delivered by landslides or debris flows more than 300 feet from the channel. The remainder of the wood originated in streamside sources immediately adjacent to the channel.

When trees are left in a riparian buffer, if a debris flow should encounter the buffer, trees in the buffer can be carried to the stream and deposited there, where they can trap sediment and contribute to more complex channel morphology (Pacific Northwest Research Station 2008:2). Riparian forests throughout western Oregon were often harvested to the edge of streams, prior to the advent of current management practices, as discussed in HCP Appendix A. Accordingly, there is a historical deficit of large wood in streams in western Oregon forests, but updated management practices under the Oregon FPA are intended to improve this condition.

3.2.3 Environmental Consequences

3.2.3.1 Soil Erosion

Alternative 1: No Action

Forest management activities under the no action alternative that involve soil disruption, such as vegetation removal, compaction, and earth moving, would increase erosion rates in the permit area. More intensive harvest treatments, especially clearcut harvest, and permanent or temporary road construction, especially when conducted on steep slopes, would cause the greatest amount of erosion. Removing vegetation leaves the newly exposed soil susceptible to erosion from water. Erosion strips the topsoil, affecting soil productivity; changes local topography, creating rills and gullies that can concentrate water runoff which leads to intensified water erosion; increases frequency of landslide by lubricating the soil and increasing its weight through changes in direction and quantity of water runoff; worsens stream water quality through delivery of sediment; and changes the hydrologic connectivity of watersheds (Curran et al. 2005). Harvest activities can increase turbidity and sedimentation in streams by increasing gully erosion of channels (Reid et al. 2010). Depending on hill slope, soil type, and vegetation mix, riparian buffers have been found to be effective at mitigating sediment from entering streams from hillslope surface erosion (Hawes and Smith 2005; Lakel et al. 2010; Sweeney and Newbold 2014; Rashin et al. 2016). Based on these studies, a buffer width of 50 feet would be sufficient to prevent most sediment from harvest operations from reaching the stream channel, unless water is concentrated by skid trails or yarding paths.

The Oregon FPA prohibits harvest in riparian management areas (RMAs) (Table 2-1) but allows some exceptions to achieve ecological objectives (OAR 629-643-0000 [3] and [5], 629-643-0100, 629-643-0105, 629-643-0130, 629-643-0135, 629-643-0150, 629-643-0200, 629-643-0300, 629-643-0400). Harvest activities in RMAs would be limited to those allowed in other rules, such as for road construction and temporary stream crossings (OAR 629-625-0000 through 629-625-0920) or stream improvement (OAR 629-643-0200), and thinnings or salvage that facilitate reforestation or fire resiliency (OAR 629-610-0070). Equipment limitation zones (ELZs) would be applied to all seasonal streams and beyond the end of RMAs on small, perennial, non-fish-bearing streams that are tributaries to fish-bearing streams. Steep slopes rules (OAR 629-630-0900 through 629-630-0925) would retain trees in designated areas identified by the slopes model described in OAR 629-630-0900. Slope retention areas and designated debris flow traversal areas are included as part of the no treatment areas (Table 3.1-1) under the no action alternative for this analysis.

RMAs, ELZs, and steep slope protections would reduce sediment delivery to streams that results from soil erosion caused by harvest activities and associated equipment use. Adherence to the Oregon FPA requirement to replant clearcut areas within 2 years of harvest (OAR 629-610-0040) would further minimize risk of delivery of fine sediment after the plants are established. This requirement states that planted stands of trees must be established within 6 years of completion of a harvest operation.

Limited restoration treatments allowed in RMAs would cause sediment delivery to streams, if and where they occur. The effects of these treatments on surface erosion would likely be short-term and diminish as shrubs and other understory vegetation recover. Erosion risk would be highest in RMAs where harvest activities are required to facilitate road crossings.

In addition to harvest and restoration treatments, road management, including construction, use, maintenance, and vacating, can increase erosion. The Oregon FPA includes rules for road location, design, and standards (OAR 629-625). These rules cover the timing of road construction and use, road surfaces, stabilizing techniques such as mulching and seeding, road drainage, road maintenance, hydrologic disconnection of roads from streams, removal of fish passage barriers, and construction in critical locations such as high landslide hazard locations, steep or unstable slopes, and in RMAs. The Oregon FPA also includes the Forest Road Inventory and Assessment (FRIA) process (OAR 629-625-0900), which requires landowners to bring roads into compliance with standards intended to decrease the risk of soil erosion related to road use, and a State-led Abandoned Road Inventory (OAR 629-625-0910) to identify and bring abandoned roads into compliance to reduce the potential of erosion and mass wasting risk from these unused roads. Both inventory processes culminate in the prioritization of high-risk locations for addressing erosion hazards due to roads. The no action alternative does not include a defined limit on new road construction, but DSL anticipates that the need to expand the permanent road network would be minimal, and would likely vacate existing roads through the FRIA process.

Alternative 2: Proposed Action

Under the proposed action, the reduced area available for more intensive harvest treatments (clearcut and variable density) compared to the no action alternative (Table 3.1-1) would result in reduced erosion from these activities. The riparian conservation areas (RCAs) along streams, where no clearcut or variable density harvest would occur, would be wider and applied to more stream miles than the RMAs prescribed under the no action alternative, resulting in greater protection of streams from fine sediment delivery. Similarly, ELZs under the proposed action would be wider[4] and applied to more stream miles than those under the no action alternative. Salvage harvest would be more restricted than under the no action alternative, reducing the potential for erosion in riparian areas. Restoration thinning allowed in RCAs would contribute to sediment delivery to streams, but

[4] RCAs and ELZs would be measured horizontally (rather than along the slope of the stream bank, as under the no action alternative). Due to the typical steepness of the landscape within the permit area, this results in a larger buffer than a slope-parallel buffer of the same width.

would be limited to a 1,200-acre area over the permit term, which is comparable to the area assumed available for similar restoration activities under the no action alternative.

Similar to the no action alternative, the proposed action would limit harvest on steep slopes. Per HCP Condition 10, *Management on Steep Slopes*, clearcut harvest would avoid slopes identified to be unstable based on the Slope Stability Analysis tool and field survey. Steep or unstable slopes identified by the Slope Stability Analysis tool are excluded from clearcut treatment areas (Table 3.1-1) under the proposed action.

All road system management, including construction, use, maintenance, and vacating of roads and related facilities would be performed in accordance with HCP Section 3.6.1, *Road System Construction and Management,* HCP Conservation Measure 3, *Reduce Density of the Forest Road Network in the Permit Area,* and HCP Condition 11, *Road Construction and Management*. HCP Section 3.6.1 indicates that all road construction, maintenance, and vacating will be performed in accordance with restrictions placed by the Oregon FPA and other applicable statutes, except in instances where alternative practices are described in the HCP conservation strategy (Chapter 5). One such alternative practice is HCP Conservation Measure 3, which includes a formal road assessment that will inventory existing roads to identify those that present a risk to the permit area's aquatic system and seek to implement modifications that prioritize vacating segments that pose the highest risks to aquatic resources. This assessment and project prioritization process would be an alternative practice to the FRIA process described under the no action alternative and would result in comparable erosion risk reduction.

HCP Condition 11 includes more restrictive standards for road management compared to the Oregon FPA standards assumed under the no action alternative. New road construction would reflect additional road design measures that would mitigate risks of soil erosion more than the no action alternative. New permanent road construction would be limited to 40 miles over the permit term and Conservation Measure 3 includes a commitment to reduce road density in 10-year increments over the permit term. These additional requirements would reduce erosion from road use and maintenance more than road construction and maintenance rules under the no action alternative.

Overall, erosion risks as a result of both harvest activities and road system management under the proposed action would be less than under the no action alternative.

Alternative 3: Increased Conservation

Under Alternative 3, effects of covered activities on soil erosion would be similar to the proposed action but would be further reduced as described below.

Less area would be available for more intensive harvest treatments (clearcut and variable density) than under all other alternatives (Table 3.1-1). RCAs would be wider than the RMAs prescribed under the no action alternative and the RCAs prescribed under the proposed action. Restoration thinning in RCAs would be subject to the same 1200-acre cap as the proposed action, but further limited on slopes greater than 65% in RCAs. This additional restriction would result in the greatest protection of streams from fine sediment delivery due to harvest treatments of all alternatives.

Alternative 3 would include additional requirements under Conservation Measure 3 for fully vacating permanent roads beyond what is included under the proposed action and no action alternative. These additional required measures, including pulling back sidecast material and recontouring to natural hillslopes and removing all stream crossing structures, would further decrease the likelihood of erosion risks from road management compared to all other alternatives.

Accordingly, erosion risks as a result of both harvest activities on unstable slopes and road system management under Alternative 3 would be less than under the proposed action or no action alternative.

Alternative 4: Increased Harvest

Under Alternative 4, the area available for more intensive treatments (clearcut and variable density) would be the greatest (Table 3.1-1) of all the alternatives. Accordingly, erosion risk from harvest activities would also be greatest. RCAs would be the narrowest under this alternative, resulting in lower protection of streams from fine sediment delivery than all other alternatives.

Because Alternative 4 would eliminate the requirement in Conservation Measure 3 to reduce the overall density of the road network in the permit area, the potential for erosion due to road construction and management would be similar to the no action alternative.

3.2.3.2 Shallow-Rapid Landslide

Alternative 1: No Action

As stated in Section 3.2.2.2, *Shallow-Rapid Landslide,* approximately 91% of the permit area has high or very high susceptibility to landslide. Although the influence of forest management activities on landslides and associated effects has been reduced since enactment of the Oregon FPA, forest management activities, especially clearcut harvest and forest road construction, still increase the likelihood of landslides and associated effects (Rice 1977:278–281; Swanson et al. 1987:15; BOF 2001:vi; Benda and Miller in prep.:5; Cover et al. 2010:1596).

All harvest and thinning involves destabilizing events and has the potential to trigger landslides, depending on the intensity (Burton et al. 2016:247) and location of the activity. Tree removal and root decomposition remove the vegetative structure that holds soil in place, making recently harvested areas more susceptible to landslides until roots re-establish (BOF 2001:46-47). Loss of mature trees can lead to increased water in the soil, making it more susceptible to landslides. Both the length of time that areas experience reduced forest cover and the extent of lands with reduced forest cover influence landslide susceptibility (BOF 2001:46). Clearcut harvest creates the greatest increase in likelihood of landslide because it removes the most forest cover and can increase time needed for reestablishment of overall stand age.

The Oregon FPA requires the State Forester to review written plans that evaluate public safety risk from forestry activities in high landslide hazard locations. High landslide hazard locations, as defined in the Oregon FPA, include headwalls typically located at the head of stream channels, any slopes steeper than 80%, or field conditions where the hazard is equivalent to either. Depending upon the determination of public safety exposure from shallow-rapid landslide and the severity of risk, different Oregon FPA shallow rapidly moving landslide rules would apply (OAR 629-623-000 through OAR 629-623-0800). Harvest would be prohibited in high landslide hazard locations with substantial public safety risk and limited in locations with intermediate or low public safety risk.

In addition to the restrictions related to public safety, OAR 629-630-0500 prohibits construction of skid roads, operation of ground-based equipment, and deep or extensive ground disturbance in high landslide hazard locations. Steep slopes rules (OAR 629-630-0900 through 629-630-0925) require retention of trees in designated areas identified by the slopes model described in OAR 629-630-0900, maintaining more stable root conditions in high-risk areas. Limitation of equipment use and harvest activities that destabilize topsoil in high landslide hazard locations would reduce the likelihood of landslides from forestry management activities.

Ground-disturbing activities related to road system management have potential to increase the likelihood of landslides and associated events because of the steep terrain and soil conditions. Road use would also contribute to increased likelihood of landslides, especially use of roads built before the Oregon FPA.

As described in Section 3.2.3.1, *Soil Erosion*, all road management would be performed in accordance with conditions of the Oregon FPA. The Oregon FPA rules contain landslide risk minimization measures that include avoiding road construction in high landslide hazard areas (OAR 629-625-0200) and prohibiting water diversion to steep or hazardous slopes (OAR 629-625-0600). The Oregon FPA's FRIA process would minimize the potential for road management activities to increase the likelihood of a landslide by requiring landowners to bring existing roads into compliance and vacating other priority roads.

Construction of quarries, if near a landslide initiation site, could increase the likelihood of landslides and related events through use of explosives and bulldozers. Standard practices, including slope stability evaluation of potential quarry sites and removal of overlying soil, as well as compliance with the Oregon FPA,[5] would reduce the likelihood of landslides and related events.

Timber harvest, particularly clearcut harvest, and other forestry management activities, including road development, maintenance, and abandonment, under the no action alternative would increase the likelihood of shallow-rapid landslides and associated events (i.e., debris flow and debris torrent) (DSL and ODF 2011:2-47, 4-40; Swanson et al. 1987:15).

Alternative 2: Proposed Action

Proposed action harvest and other forest management activities would have the same type of effects as described under no action alternative, but the timing and intensity of these activities and associated effects would differ.

Under the proposed action, clearcut harvest, as well as combined clearcut and variable density harvest, would occur on a much smaller portion of the permit area than under the no action alternative (Table 3.1-1). Per HCP Condition 10, clearcut harvest would be avoided on unstable slopes. In addition, the proposed action balances acres of clearcut harvest with acres of Reserves within a subwatershed. Logging equipment will be limited on slopes greater than 40%. These additional management actions would reduce the likelihood of inducing landslides from forestry activities compared to the no action alternative.

All road management would be performed in accordance with HCP Section 3.6.1 and in accordance with the additional conservation measure and condition discussed in Section 3.2.3.1, *Soil Erosion*. Additionally, under the proposed action, HCP Condition 10 stipulates that new road construction

[5] The Oregon FPA requires that development, use, and abandonment of rock pits or quarries on forestland and used for forest management must be conducted using practices that maintain stable slopes and protect water quality. Further, quarry operators must stabilize banks, headwalls, and other quarry surfaces to prevent shallow-rapid landslides, associated debris torrents, and delivery of fine sediment to streams.

will be located in stable locations (ridge tops, stable benches, or flats). These additional requirements—additional design and location restrictions and a commitment to decreased road density—would further reduce likelihood of landslides more than road construction and maintenance rules under the no action alternative.

Impacts of quarry development and the standard procedures and Oregon FPA requirements to reduce effects would be the same as the no action alternative; however, limiting the construction of new quarries to two sites outside of Reserves or RCAs could reduce the potential for quarries to increase the likelihood of landslide.

Overall, the potential to induce landslide under the proposed action would be less than under the no action alternative.

Alternative 3: Increased Conservation

Under Alternative 3, clearcut harvest, as well as combined clearcut and variable density harvest, would occur on the smallest area of all alternatives (Table 3.1-1), and the associated potential to trigger landslide would be lowest. Stricter requirements for fully vacating roads under Alternative 3 compared to the no action alternative and proposed action would result in the lowest potential for road use and maintenance to induce landslides compared to all other alternatives.

Overall, Alternative 3 would have the lowest potential to induce landslide.

Alternative 4: Increased Harvest

Under Alternative 4, the area available for clearcut would be less than under the no action alternative, but the combined area available for clearcut and variable density harvest would be much greater (Table 3.1-1) than under all other alternatives. Because it has the largest area available for intensive harvest activities, Alternative 4 would have the greatest potential to induce landslide from those activities. Alternative 4 would eliminate the requirement in Conservation Measure 3 to reduce the overall density of the road network in the permit area. The potential to induce landslide due to road construction and management would be similar to the no action alternative because of required compliance with the Oregon FPA but no additional road restrictions.

Overall, Alternative 4 would have the greatest potential to induce landslide of all alternatives.

3.2.3.3 Stream Geomorphology

Alternative 1: No Action

As described in Sections 3.2.3.1, *Soil Erosion*, and 3.2.3.2, *Shallow-Rapid Landslide*, intensive harvest treatments result in the most erosion and potential to induce landslide and cause landslide-related effects on streams. As described in Section 3.2.2.3, *Stream Geomorphology,* landslides that become a debris flow would transport wood and sediment downhill, potentially encountering and entering a stream and becoming a debris torrent. The increased flow, sediment load, and volume of large wood can scour stream channels and deliver fine sediment to streams,[6] which adversely affect stream geomorphology through simplification. However, these debris torrents can also lead to large wood

[6] Impacts related to changes in water quality due to sediment delivery are discussed in Section 3.3.3.4, *Water Quality*, in Section 3.3, *Water Resources*.

recruitment and coarse sediment delivery to streams, which ultimately create more complex stream geomorphology.

Timber harvest, especially clearcut harvest, reduces the amount of wood available for delivery to streams, limiting the potential for landslides and related events to benefit stream geomorphology. However, RMAs and steep slope protections described in Section 3.2.3.1, *Soil Erosion*, would support recruitment of large wood and regulate fine sediment delivery to streams in case of landslides and related events. Wood recruitment to streams is projected to increase over the analysis period as trees in these protected areas mature.

Restoration thinning allowed in RMAs would temporarily increase the potential for erosion and sediment delivery to streams but would improve riparian and aquatic functions over time as thinned trees grow faster and increase the rate at which key wood pieces (large diameter) are available to the channel.

Alternative 2: Proposed Action

As described in Section 3.2.3.1, *Soil Erosion*, the reduced area available for more intensive harvest treatments compared to the no action alternative would result in reduced erosion from these activities. As described in Section 3.2.3.2, *Shallow-Rapid Landslide*, reduced potential to induce landslide compared to the no action alternative would result in a corresponding reduction in landslide-related effects on streams. The increased riparian and steep slope protections described above would increase large wood recruitment and better regulate sediment delivery to streams in the event of debris flow compared to the no action alternative. Effects of restoration thinning in RCAs would be similar to the no action alternative.

Overall, the proposed action would improve filtering of fine sediment and accretion of gravel substrate and increase large woody material important for habitat function compared to the no action alternative.

Alternative 3: Increased Conservation

As described in Sections 3.2.3.1, *Soil Erosion*, and 3.2.3.2, *Shallow-Rapid Landslide*, Alternative 3 would have the least area available for more intensive harvest treatments, which would result in the least erosion from these activities and the least potential to induce landslide and cause landslide-related effects on streams. With the greatest riparian and steep slope protections, Alternative 3 would result in the greatest increase in large wood recruitment and best regulation of sediment delivery to streams in the event of debris flow.

Alternative 4: Increased Harvest

As described in Sections 3.2.3.1, *Soil Erosion*, and 3.2.3.2, *Shallow-Rapid Landslide*, Alternative 4 would have the greatest area available for more intensive harvest treatments, which would result in the greatest amount of erosion from these activities and the greatest potential to induce landslide and cause landslide-related effects on streams. Alternative 4 would have the lowest riparian and steep slope protections, resulting in the lowest increase in large wood recruitment and least regulation of sediment delivery to streams in the event of debris flow. Overall, Alternative 4 would contribute the least potential for large wood recruitment and lowest protections against fine sediment delivery to streams of all alternatives.

3.3 Water Resources

3.3.1 Methods

The study area for water resources consists of waters that could be affected (directly and indirectly) under the proposed action and alternatives. For surface water and water quality this includes the permit area and the subwatersheds (hydrologic unit code [HUC] 12) overlapping the permit area.[1] The study area includes 13 subwatersheds distributed across 2 surface water subbasins (HUC 8): the Coos and Umpqua (USGS 2021a). Table 3.3-1 shows the acreage distribution of study area and permit area across the subbasins and watersheds. Appendix 3.3, *Water Resources Technical Supplement*, Table 13 shows the percent area of each subwatershed by allowable harvest type (e.g., clearcut, variable density, and restoration thin) for each alternative. Figure 3.3-1 illustrates the distribution of the permit area across the study area. Because hydrologic effects may be more localized, this analysis also utilizes the Oregon State University (OSU) experimental subwatersheds to analyze the location and extent of local effects. The experimental subwatersheds cover the permit area only, while the HUC 12 subwatersheds include downstream areas. At both the subwatershed and experimental subwatershed scales, this report analyzes effects on water yield, peak flows, channel condition, and low flows.

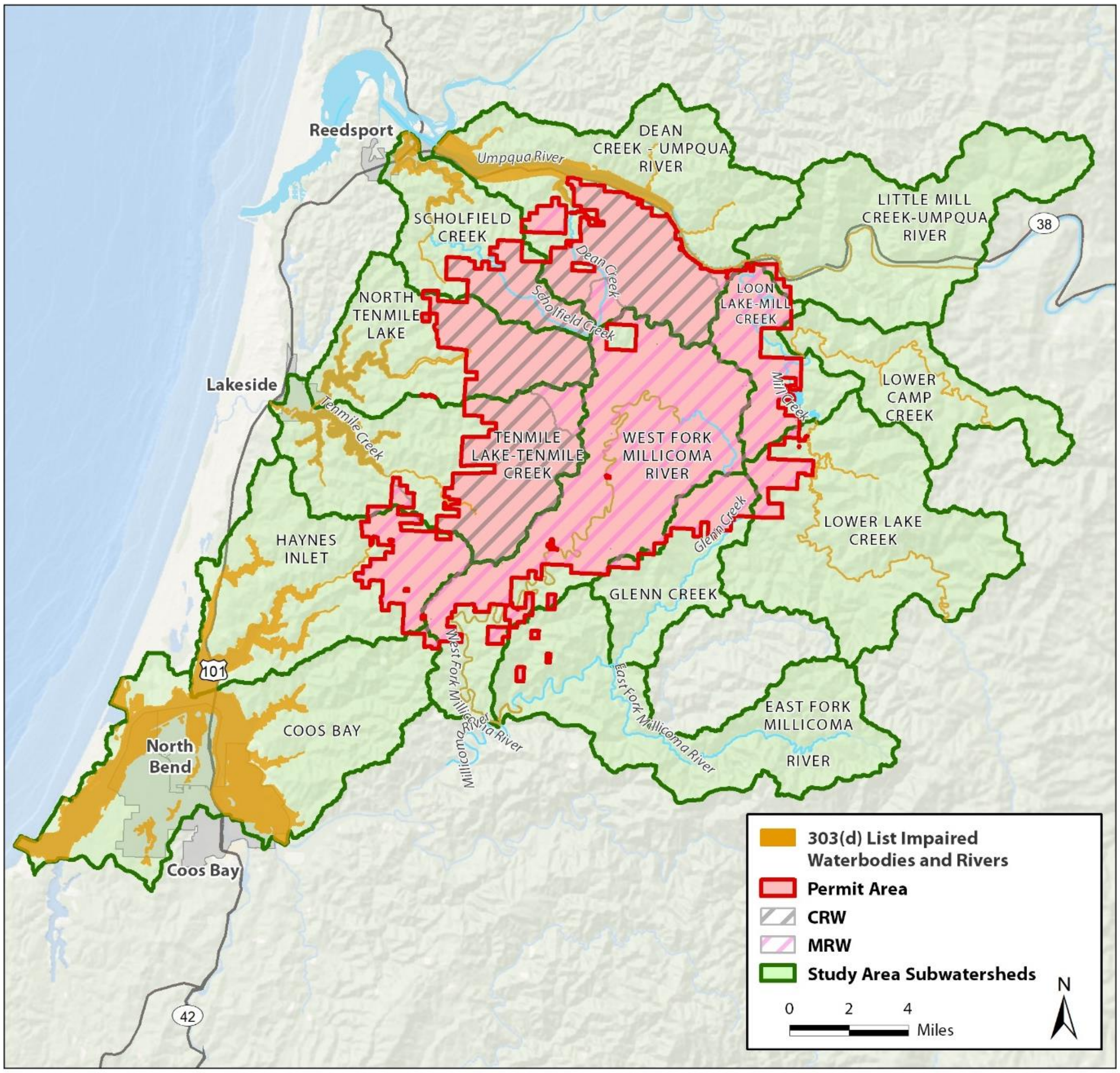
Table 3.3-1. Distribution of Permit Area and Study Area across Subbasins and Watersheds

Subbasin (HUC 8)	Watershed (HUC 10)	Subwatershed (HUC 12)	Study Area (Subwatershed acres)	Permit Area (acres)	% of HUC 12 Area
Coos Bay	Coos Bay-Frontal Pacific Ocean	Haynes Inlet	26,406	5,281	20%
		Coos Bay	38,666	177	0.5%
	Millicoma River	East Fork Millicoma River	27,599	183	1%
		Glenn Creek	11,289	2,932	26%
		West Fork Millicoma River	34,963	28,080	80%
	Tenmile Creek-Frontal Pacific Ocean	North Tenmile Lake	18,669	7,450	40%
		Tenmile Lake-Tenmile Creek	26,770	12,463	47%
Umpqua River	Middle Umpqua	Little Mill Creek-Umpqua River	26,770	226	1%
	Mill Creek	Loon Lake-Mill Creek	9,859	6,881	70%
		Lower Camp Creek	13,483	39	0.3%
		Lower Lake Creek	32,328	1,845	6%
	Lower Umpqua River	Dean Creek-Umpqua River	36,339	12,950	36%
		Scholfield Creek	14,195	4,785	34%

Source: USGS 2021a

[1] The study area encompasses the portions of the plan area that are outside of the permit area.

Figure 3.3-1. Distribution of Study Area across the Permit Area



For groundwater, the study area includes the regional groundwater system. The flood hazard study area includes areas prone to flooding within the subwatersheds (HUC 12) that overlap with the permit area.

The analysis evaluated all covered activities with potential to affect water resources through changes in surface water (i.e., annual water yield, peak and low flows, drainage patterns, and water quality); groundwater supply, recharge, upwelling, and quality; and flood hazard (i.e., floodwater storage, conveyance, erosion, sedimentation of floodplains). Evaluation of these changes was based on review of scientific literature and relevant studies pertaining to general effects of forestry and infrastructure activities on water resources as summarized in Appendix 3.3 (*Analysis Methods* section), projected areas available by harvest type (Table 3.1-1), projected forest age class distribution, and analysis results in Section 3.2, *Geology and Soils*, Section 3.4, *Vegetation*, and Section 3.7, *Climate Change*.

The analysis of effects related to water yield, peak and low flows, and channel condition was based, in part, on how forest cover and evapotranspiration would change over the analysis period. Changes in forest cover and evapotranspiration were estimated based on existing stand age class and harvest rules described in Chapter 2, *Proposed Action and Alternatives*. Appendix 3.3 describes how the treatment rules were translated for the analysis. Appendix 3.3, Tables 14 through 18 present the percent area of age classes of interest across subwatersheds. The analysis of effects on peak flows qualitatively considered various additional factors, including road and stream network density, depth to bedrock, stream slope, and soil infiltration rate. Effects of new roads, prescribed burning, quarries, and water withdrawals were analyzed qualitatively.

3.3.2 Affected Environment

3.3.2.1 Surface Water

Surface Water Hydrology

Table 3.3-2 summarizes the waterbodies and streams in the study area. Waterbodies in the study area include lakes, ponds, reservoirs, inlets, bays, and estuaries. Section 3.4.2.4, *Wetland Vegetation*, describes wetlands in the permit area. Most of the waterbody acreage in the Coos subbasin portion of the study area is Coos Bay (15,730 acres).

Table 3.3-2. Waterbodies and Streams in the Study Area

Subbasin	Study Area Waterbodies (acres)	Study Area Streams (miles)
Coos	19,004	1,407
Umpqua	2,001	680

Source: USGS 2021a

Almost all precipitation in western Oregon falls in winter when human water demand is at its lowest. Based on nearby weather station data, the average annual precipitation ranges from approximately 60 to 70 inches, with maximum on record reached in 1996 at approximately 95 inches (NOAA 2022a, 2022b). Most of the snowfall in Oregon occurs above 3,000 feet (Cooper 2005). In the study area, the maximum elevation is 2,100 feet (USGS 2021b); therefore, snowfall is rare.

Most of the study area is made up of soils that have a moderate to low infiltration rate and high runoff potential (NRCS 2019). In the coastal range watersheds, soil permeability and soil storage capacity are governing factors of peak flows (Cooper 2005). In all parts of the study area, rainfall intensity is a major factor governing peak flows. With climate change, expected increased rainfall intensity will result in increased peak flows across the study area (Dalton and Fleishman 2021; Easterling et al. 2017; Cooper 2005). Appendix 3.3 describes the factors driving peak flows across the study area, statistics of physiographic characteristics, and hydrologic soil distribution across the study area. Rain-dominated areas likely will also experience a decrease in summer low flows with climate change (OCCRI 2020; Liebowitz et al. 2014). Section 3.7 and Section 3.4 discuss projected changes to vegetation with climate change.

Surface Water Quality

The Oregon Department of Environmental Quality (ODEQ) has identified 13 beneficial uses of waters of the state: fish and aquatic life, water contact recreation, fishing, public and private domestic water supply, industrial water supply, boating, irrigation, livestock watering, aesthetic quality, wildlife and hunting, hydropower, and commercial navigation and transportation. All tributaries to the Umpqua Rivers and to the estuaries in the Coos Subbasin are designated for all beneficial uses other than commercial navigation and transportation (ODEQ 2003a, 2003b).

OAR 340-041-0300 sets water quality standards for the South Coast Basin, and OAR 340-041-0320 sets water quality standards for the Umpqua Basin. In the permit area, 1.2 miles of stream in the Coos Bay Watershed are classified as Core Cold Water Habitat, which have a stream temperature standard of 16 degrees Celsius (°C) (ODEQ 2021). The rest of the permit area streams are classified as Salmon and Trout Rearing beneficial use, meaning the 7-day-average maximum temperature standard is 18°C.

There are water quality impairments in all subwatersheds, except for Haynes Inlet and East Fork Millicoma River (ODEQ 2022a). For most subwatersheds, the most extensive cause of water quality impairment in the study area rivers and streams is temperature. The exceptions are Scholfield Creek, which contains rivers and streams almost equally impaired by sediment and biocriteria and not by temperature, and Tenmile Lake–Tenmile Creek, which contains significantly higher miles impaired by dissolved oxygen and pH than temperature. The causes of impairments in study area rivers and streams are summarized in Table 3.3-3.

Table 3.3-3. Cause of River or Stream Impairment in the Study Area

River and Stream Impairment Cuase	Miles
Temperature–year-round	142.12
Dissolved oxygen–year-round	36.8
BioCriteria	34.41
Dissolved oxygen—spawning	31.8
Sedimentation	31.4
Fecal coliform	22.5
Flow modification	17.7
Methylmercury–human health toxics	17.7
Harmful algal blooms	17.7
pH	16.1
Iron (total)- Aquatic Life	9.1
Shellfish toxins	0.3

Stream and waterbody temperature will likely increase across the study area with climate change, as air temperatures increase and summer stream flows decrease (OCCRI 2020). Stream temperature is expected to increase by about 4 degrees Fahrenheit (°F) in most parts of Oregon by the 2080s (Dalton and Fleishman 2021). Stream temperature increases due to climate change are projected to be greatest in streams that are fed by surface water as opposed to groundwater (Dalton and Fleishman 2021).

Sediment is impairing 15 miles of rivers in North Tenmile Lake, Tenmile Lake–Tenmile Creek, and Scholfield Creek subwatersheds, as well as North Tenmile Lake itself, which spans North Tenmile Lake and Tenmile Lake–Tenmile Creek watersheds. Impaired uses include fish and aquatic life, fishing, and private and public water supply. ODEQ developed the Tenmile Lakes Watershed total maximum daily load (TMDL) to support water quality improvement. The Umpqua Basin also has a TMDL for bacteria, stream temperature, algae/aquatic weeds, dissolved oxygen, pH, and biocriteria. Westfork Millicoma River has been listed for temperature impairment since 2010. It does not yet have a TMDL but is expected to be part of the future Coos River temperature TMDL (Duggan pers. comm.). Appendix 3.3, Tables 7 and 8 list miles and acres of impaired uses and causes in the study area by basin.

Surface Water Supply

The study area overlaps with public water systems' surface water drinking water source areas (ODEQ 2019; ODEQ and OHA 2017 and 2018), including Eel Lake which supplies Lakeside Water District (12.6 acres in North Tenmile Lake subwatershed), Pony Creek which supplies Coos Bay North Bend Water Board (2,545 acres in Coos Bay subwatershed), and Umpqua River (2.6 acres in Lower Camp Creek subwatershed). However, none of these surface water drinking water source areas that feed public water systems are downstream of the permit area. Some waterbodies in the study area are classified by Oregon Department of Water Resources as domestic water supplies and livestock watering beneficial uses. Points of surface water diversion occur throughout the permit area and downstream, especially in Loon Lake–Mill Creek and West Fork Millicoma subwatersheds and along Johnson Creek which contributes to Tenmile Lake (OWRD 2024). The top contaminant risks statewide are managed forests, irrigated crops, livestock, above ground tanks, auto repair, wastewater treatment plants, and heavy recreation (ODEQ 2005). Details of impaired uses and impairment causes and their location are presented in Appendix 3.3, Tables 5 through 8. Demand for water is forecasted to stay constant in Coos County and increase only slightly in Douglas County (OWRD 2015, 2017).

3.3.2.2 Groundwater

Aquifers and Recharge Areas

None of the permit area overlaps with a major regional aquifer system or unconsolidated deposits, where groundwater use, recharge, and susceptibility to contamination is highest (USGS 2000). The minor aquifer in the study area is made up of pre-Miocene rocks (USGS 1994), which generally do not allow much recharge. However, there is substantial groundwater use outside of the major aquifer system and many streams depend on groundwater upwelling in dry summer months when flows are critically low (ODEQ and OHA 2017; USGS 1994). Groundwater drinking water source areas for public water systems are located inside the permit area in the Loon Lake–Mill Creek subwatershed and downstream of the permit area on the Millicoma and Umpqua Rivers. Appendix 3.3, Table 11 describes principal human groundwater use and well yields.

Groundwater Quality and Special Management Areas

ODEQ beneficial uses for groundwater are public and private drinking water, irrigation and livestock, and rural businesses. ODEQ has identified three special groundwater management areas where contaminant concentrations are elevated. The study area does not overlap with any of these management areas (ODEQ 2004:7) or with areas identified as potential groundwater quality concern (ODEQ and OHA 2017).

3.3.2.3 Flood Hazard

Federal Emergency Management Agency (FEMA) Special Flood Hazard Areas are summarized in Table 3.3-4. Although 26,575 acres are designated as floodplain, most of the permit area is not designated as floodplain. Of the area designated as floodplain having greater than 1% annual exceedance probability of flood (100-year recurrence interval), over half is located in the Coos Bay watershed downstream of the permit area. Of the roads in permit area floodplains with greater than 1% annual probability of flood (100-year recurrence interval), over half are located in the West Fork Millicoma River subwatershed. Infrastructure in the 100-year floodplain has a 26% chance of flooding in a 30-year period.

Table 3.3-4. FEMA Special Flood Hazard Areas in the Permit Area

Annual Exceedance Probability of Flood (Recurrence Interval)	Permit Area (acres)	Roads in Permit Area (miles)
0.2% (500 years)	7	0.6
1% (100 years)	395	3.5

Source: FEMA 2022

The Natural Resources Conservation Service (NRCS) soil survey also classifies soil flood frequency and other flood-related attributes; this survey sometimes covers areas outside of FEMA mapped areas. Based on a nationwide floodplain map using a composite of NRCS soil survey attributes (Sangwan and Merwade 2015), fewer acres are mapped as floodplain in the permit area—244 acres, less than 1% of any subwatershed—than FEMA.

3.3.3 Environmental Consequences

3.3.3.1 Water Supply

Alternative 1: No Action

Timber harvest, associated stand and road management activities, and prescribed burns would have the most extensive effects on water supply because they affect vegetation cover at the landscape scale. Other management activities would affect surface water but to a lesser and more localized extent.

Annual water yield, the annual average water discharged from an area, is a measure of water supply. Generally, reducing mature forest cover (e.g., through timber harvest and road construction) decreases evapotranspiration and increases annual yield, particularly in rain-dominated drainages (Goeking and Tarboton 2020; Moore and Wondzell 2005). Increases in water yield may not be detectable unless at least 20% of the catchment area is harvested (Institute for Natural Resources 2020). Clearcuts tend to produce higher water yields per percentage of catchment harvested than selective harvesting (similar to variable density harvest) (Moore and Wondzell 2005). Gradual patch cutting of 10% of the catchment every 6 years produced a modeled 33% increase in annual water yield that stabilized after 20 years (Du et al. 2015).

However, if fog drip is a significant hydrologic input, timber harvest and road construction may cause annual yield to decrease (Goeking and Tarboton 2020; Moore and Wondzell 2005). Fog drip may be a significant input in the study area on forested windward slopes and ridgetops and at edges of clearcuts on leeward and flat slopes (Winkler et al. 2010). On the Oregon coast, measurements of annual precipitation under forest canopy were 26% greater than measurements made in the open (Harr 1982).

Increased annual yield can benefit water users downstream, if they have the capacity to store higher wet-season peak flows for use during the dry season when water is in higher demand. As forest cover regrows or areas are reforested, annual yield decreases. Most changes in annual yield diminish over the first 15 years of regrowth (Moore and Wondzell 2005). Subsequent sections discuss decreases in low flows after 15 years. These decreases tend not to affect annual average water yield, because the vast proportion of precipitation occurs in the wet winter months when evapotranspiration is at its lowest. For this analysis, which uses stand age classes and updates age class in 10-year increments, the land area covered by stands aged less than 20 years on average is considered equivalent to clearcut area.

Salvage harvest may have a variable effect on annual yield, including more pronounced effects than timber harvest, because if left alone, stands may produce less water on an annual basis than living stands (Goeking and Tarboton 2020) and because burned soils can be more easily compacted by logging equipment, which reduces infiltration and increases runoff. The degree of effect would depend on the extent of the disturbance and associated salvage harvest, both of which are likely to increase over the analysis period due to climate change. Prescribed burns would increase annual yield by reducing younger vegetation that consumes more water than older vegetation. Although prescribed burns may reduce the likelihood of severe fire, which can severely affect water supply, this effects analysis only discusses the direct effects of prescribed burns. Under the no action alternative, salvage harvest in response to disturbance events and prescribed burns would be limited to those plans that avoid take and would be evaluated on a case-by-case basis. Salvage harvest would be limited in RMAs by riparian function targets set in OAR 629-635-0310 through 629-655-0000. Prescribed burns would be limited as described in OAR 629-615-0300, which requires written plans for prescribed burns near fish-bearing streams, wetlands, and estuaries specifying how detrimental effects would be reduced. OAR 629-615-0300 also requires protection of components such as live trees, snags, downed wood, and understory vegetation required to be retained by OAR 629-635-0310 through 629-650-0040.

Under the no action alternative, the change in forest cover due to timber harvest level would fluctuate throughout the analysis period based on which stands are reaching the rotation age. Across the subwatersheds, the maximum percent area of subwatersheds covered by trees aged less than 20 years due to timber harvest is summarized in Appendix 3.3, Table 14. As shown in this table, the extent of forest cover change is unlikely to exceed 20% of any subwatershed. The subwatershed closest to this threshold is the West Fork Millicoma (14%). Therefore, the effect on water supply from timber harvest alone is unlikely to be detectable at the subwatershed scale. Some areas would experience short-term increases in water yield at the local level, where harvest is occurring, or decrease if fog drip is significant.

Construction of new roads would result in permanent removal of vegetation, increased soil compaction, and interception and diversion of groundwater via road cuts and ditches, which can increase water yield, as would mechanical vegetation removal for road maintenance and quarry construction, though to a lesser degree. The existing permanent road network is well developed, but spur roads, yarding corridors, skid trails, and landings would be built intensively in areas subject to forest management activities, and there is no limit on road construction under the no action alternative. DSL may abandon or vacate roads when roads are no longer needed or to meet the requirements of the Oregon Forest Practices Act (FPA) Forest Road Inventory and Assessment (FRIA) process (OAR 629-625-0900). New road construction would affect a far smaller area than harvest activities and is unlikely to push any of the subwatersheds over the 20% area threshold.

Alternative 2: Proposed Action

The types of effects on water supply under the proposed action would be the same as described for the no action alternative. The estimated maximum percent area of subwatersheds covered by trees aged less than 20 years due to timber harvest is less than 20% for all subwatersheds. Across the subwatersheds, West Fork Millicoma River subwatershed would have the highest projected increase in this age class, at 19%, which is greater than the no action alternative (Appendix 3.3, Table 14). Nevertheless, increases to average annual water yield from timber harvest are unlikely to be detectable at the subwatershed scale. If fog drip is a significant factor, water yield may remain higher than the no action alternative in the conservation research watersheds (CRW) where less timber harvest would occur.

The commitment to decrease the road density in the permit area through road vacating in 10-year increments over the permit term (Conservation Measure 3) would reduce the potential for permanent effects from road activities compared to the no action alternative. Additionally, the permanent road network in the permit area would not expand by more than 40 miles over the permit term (with spur roads left in place after 5 years counting toward this limit). As described under the no action alternative, if forest cover and compaction effects from road-related activities combined with timber harvest effects in any subwatershed exceeded 20% of the subwatershed area, there would be an increase in water yield at the subwatershed scale. Subwatersheds just below the 20% equivalent clearcut area threshold, based on harvest alone, include West Fork Millicoma River (19%) and Loon Lake-Mill Creek (18%) subwatersheds.

Effects of other activities would be the same as described for the no action alternative.

Alternative 3: Increased Conservation

As under the no action alternative and proposed action, the estimated maximum percent area of subwatersheds covered by trees aged less than 20 years due to timber harvest is less than 20% of all subwatersheds and would therefore not be expected to increase average annual water yield at the subwatershed scale. Across the subwatersheds and time periods analyzed, West Fork Millicoma River subwatershed would have the highest projected increase in this age class, at 15%, which is greater than the no action alternative but less than the proposed action (Appendix 3.3, Table 14).

As under the proposed action, Conservation Measure 3 would reduce the potential for permanent effects from road activities compared to the no action alternative. As described under the no action alternative, if forest cover and road-related compaction effects combined with timber harvest effects exceeded 20% of the subwatershed area, water yield would increase at the subwatershed scale. The subwatershed nearest to the 20% equivalent clearcut area threshold, based on harvest alone, include West Fork Millicoma River (17%).

Effects of other activities would be the same as described for the no action alternative.

Alternative 4: Increased Harvest

Effects on water supply under Alternative 4 would be similar to the no action alternative, except increases in average annual water yield may be detectable at the subwatershed scale in West Fork Millicoma and Loon Lake Mill Creek subwatersheds. The estimated maximum percent area covered by trees aged less than 20 years due to timber harvest is projected to exceed 20% in West Fork Millicoma and is just below 20% in Loon Lake Mill Creek (Appendix 3.3, Table 14). These estimates are based on allowable harvest; actual harvest area will depend on the pace and scale of harvest project implementation.

Effects of road activities could be more adverse than the proposed action because there would be no commitment to decrease the road density in the permit area but potentially less adverse than the no action alternative because there would be a 40-mile cap on new roads. As described for the no action alternative, if forest cover and compaction effects from road-related activities combined with timber harvest effects exceeded 20% of the subwatershed area, there would be an increase in water yield at the subwatershed scale. The West Fork Millicoma subwatershed exceeds the 20% equivalent threshold, based on harvest alone, at 21.1%, and the Loon Lake–Mill Creek subwatershed is near the threshold at 19.8% (Appendix 3.3, Table 14).

As described under the other alternatives, if fog drip is a significant portion of precipitation, water yield may actually decrease due to increased harvest and road activities.

3.3.3.2 Peak Flows and Channel Condition

Alternative 1: No Action

Timber harvest, associated stand and road management activities, and prescribed burns would have the most extensive effects. Other management activities would have smaller, more localized effects.

Increases in peak flow can adversely affect channels by increasing channel erosion and sedimentation, which can increase sediment yield and drainage density. Appendix 3.3, Figures 1 and 2 depict the relationship between watershed conditions, management considerations, and percentage area harvested on peak flow. Appendix 3.3, Figure 3, shows the relationship between stream slope and likelihood of channel erosion.

The sensitivity of peak flows to changes in forest cover is related to a watershed's size, climate, drainage efficiency, and road density and connectivity. For large rain-dominant watersheds, the limit of detection for peak flow changes may be as high as 45% cover loss (Grant et al. 2008). The largest increases in peak flows occur in catchments subject to clearcuts (Institute for Natural Resources 2020).

Appendix 3.3, Table 14 shows the projected maximum percent area of each subwatershed covered by trees aged less than 20 years across 10-year intervals. Under the no action alternative, based on projected results, none of the subwatersheds show greater than 45% cover by this stand age, meaning harvest activities alone are not expected to increase peak flows at the subwatershed scale by more than the detectable limit. Salvage harvest is not included in these projections and can also adversely affect peak flows and channel condition by removing forest cover and decreasing infiltration by compacting sensitive burned soils.

At the local scale, peak flows would increase where stream reaches drain areas with substantial forest cover loss. Appendix 3.3, Table 15 identifies which subwatersheds contain experimental subwatersheds that may experience greater than 45% equivalent clearcut area and, therefore, increases in peak flows. Table 15 also shows the extent of these experimental subwatersheds as a percentage of the total subwatershed area. Actual changes in peak flows would depend on pace and scale of treatments, which are not capped under the no action alternative. Channel degradation caused by increased peak flows would be limited to movement of fine sediment; channel structure is not expected to change because the channels are steep and therefore average substrate size is large (Appendix 3.3, Figure 3 and Table 3).

Increases in road density and road-stream crossings can increase peak flows, while road vacating and abandonment can decrease peak flows, assuming abandoned roads revegetate and do not rut. The existing permanent road network is well developed, but spur roads, yarding corridors, skid trails, and landings would be built intensively in areas subject to forest management activities. As described in Section 3.3.3.1, *Water Supply*, the extent of the permanent road network is not limited under the no action alternative; therefore, the no action alternative could result in permanent increases to peak flows. Compliance with Oregon FPA rules governing road location, design, and standards, as described in Section 3.2.3.1, *Soil Erosion,* would improve drainage and reduce effects of roads on peak flows.

Timber harvest adjacent to streams reduces the quantity of large wood available for recruitment into streams, which can increase peak flow velocity and exacerbate channel erosion and sedimentation (Ryan et al. 2014; Dixon et al. 2016). The no action alternative would maintain forested stands adjacent to streams through riparian buffers (RMAs) and steep slope protections included in the Oregon FPA (Section 2.1.1, *Alternative 1: No Action*). These protections are projected to increase the recruitment of large wood to streams over the analysis period, as discussed in Section 3.2.3.3, *Stream Geomorphology*. This increased wood recruitment would increase stream channel roughness and decrease peak flow velocities and coarse sediment transport.

Prescribed burns can also adversely affect peak flows and channel condition through removal of forest cover. The effect would be lower than timber harvest on a per unit area basis, because prescribed burns leave overstory forest cover intact and do not cause increased soil compaction, and because new spur roads, yarding corridors, and skid trails are not required for prescribed burns.

Because changes in peak flows can cause increased channel erosion, which can impair water quality, compliance with the Clean Water Act (CWA) may result in limitations on the pace and scale of harvest. Individual projects, under all alternatives, must comply with the CWA, which includes complying with the antidegradation rule for nonimpaired streams and compliance with any water quality management and implementation plans that ODEQ approves to manage TMDLs on impaired streams. See Appendix 3.3 (*Regulations* section), for additional details.

Alternative 2: Proposed Action

As with the no action alternative, the projected increase in stands younger than 20 years under the proposed action would not exceed 45% in any subwatershed (Appendix 3.3, Table 14). Therefore, effects of harvest on peak flows are not expected to be detectable at the subwatershed level (Grant et al. 2008). The extent of local impacts is similar to the no action alternative in all subwatersheds, except in Loon Lake–Mill Creek where they are 5% less and West Fork Millicoma where they are 5% greater (Appendix 3.3, Table 15). This effect could be further reduced by annual harvest caps, as described in HCP Section 3.4.1, *Projected Timing and Amount of Harvest*. Like the no action alternative, peak flows are not expected to change channel structure because of the large size of substrate in the permit area channels.

The subwatersheds with the highest increase in harvestable area relative to the no action alternative are already among the highest in terms of road density and stream crossings. Road density ranges from 1.6 to 6.0% of each subwatershed (square feet of road per square foot of watershed area) (Appendix 3.3, Table 3). West Fork Millicoma River subwatershed has 1,482 stream crossings and a road density of approximately 3.4%. Glenn Creek has 403 stream crossings and 6.0% road density. The road network is already well developed in these subwatersheds and thus, may not require many additional new road miles to accommodate expanded harvest. Conversely, these watersheds are more susceptible to increased peak flows and deteriorating channel condition at the local scale, because they are already heavily roaded. Adverse effects of increases in the permanent road network on local peak flows and channel condition would be reduced by the commitment to decrease road density in the permit area through road vacating in 10-year increments over the permit term. Additionally, construction of new permanent roads in the permit area would not exceed 40 miles over the permit term (with spur roads left in place after 5 years counting toward this limit), which could reduce potential channel scour compared to the no action alternative.

Other factors would reduce the effects of peak flows on channel condition, such as increased large wood, as discussed in Section 3.2.3.3, *Stream Geomorphology*. Thinned trees would grow faster and, thus, increase the rate at which key wood pieces would be available to the channel.

All road construction, maintenance, and vacating would be performed in accordance with the Oregon FPA rules listed in HCP Section 3.6.1, *Road System Construction and Management*, and would follow the requirements included in Condition 11, which are intended to minimize impacts of road use and construction on channel condition. For example, Condition 11 requires that roads and landings be constructed at least 35 feet away from the edge of the aquatic zone, whenever possible; limits road development in RCAs to cases where other options are not operationally feasible; requires roads be outsloped at the stream approach; and requires underdrains be installed at areas where roads intercept groundwater. Condition 11 requires additional best management practices, and Conservation Measure 3 includes a road assessment to inform decisions on siting and vacating.

Use of prescribed burning and associated effects would the same as described under the no action alternative.

Alternative 3: Increased Conservation

As with the no action alternative and proposed action, the projected increase in stands aged less than 20 years would not exceed 45% in any subwatershed (Appendix 3.3, Table 14). Therefore, effects of harvest on peak flows are not expected to be detectable at the subwatershed level, but localized peak flow increases may increase fine sediment transport where stream reaches drain substantially harvested areas. The degree and duration of localized effects would be similar to the proposed action (Appendix 3.3, Table 15). Wider buffers may also provide additional wood recruitment, which could further reduce local effects on peak flows and channel condition. Effects of road management on peak flow and channel condition would be similar to the proposed action, but additional requirements for road vacating would further reduce effects. Overall, effects on peak flows and channel condition would be least under Alternative 3.

Alternative 4: Increased Harvest

As with the no action alternative and proposed action, the projected increase in stands aged less than 20 years would not exceed 45% in any subwatershed (Appendix 3.3, Table 14). Therefore, effects of harvest on peak flows are not expected to be detectable at the subwatershed level, but increased peak flows and fine sediment erosion is likely where stream reaches drain substantially harvested areas. Localized effects on peak flows and channel condition related to harvest activities under Alternative 4, based on equivalent clearcut area, would be the same or greater than under the no action alternative (Appendix 3.3, Table 15). Restricting increases in the permanent road network to 40 miles over the permit term (with spur roads left in place after 5 years counting toward this limit) could limit associated effects compared to the no action alternative.

3.3.3.3 Low Flows

Alternative 1: No Action

Tree and vegetation removal related to timber harvest, road management, and prescribed burns have the potential to cause the most extensive effects on low flows. Other management activities would have smaller, more localized effects. Decreases in summer low flows can adversely affect water supply, water quality, and fish habitat.Initially, timber harvest reduces evapotranspiration, which can improve low flows during approximately the first 5 to 15 years after harvest (Goeking and Tarboton 2020; Moore and Wondzell 2005). As the stands regrow, evapotranspiration increases, which can exacerbate low flows relative to pre-harvest conditions. For example, if trees are over approximately 100 years old at the time of harvest, the low flows in harvested catchments can drop below the initial low flow level from approximately 15 years until the trees age again to approximately 100 years (Segura et al. 2020; Coble et al. 2020; Perry and Jones 2017) (Appendix 3.3). Approximately 25% of the catchment must be harvested before effects on low flow are observable (Coble et al. 2020). The effects on low flows attenuate as catchment size increases and were not observed in studies of catchments larger than the study area subwatersheds (401 to 3,500 square km) (Coble et al. 2020).

Based on estimates summarized in Appendix 3.3, Tables 16 and 17, none of the subwatersheds would exceed the 25% area threshold for observable effects on low flows. At the local scale, based on the estimates in Appendix 3.3, Tables 18 and 19, no experimental subwatersheds would have adverse effects but several would have beneficial effects.

Prescribed burns could increase low flows by reducing understory vegetation. Because these burns are used for younger understory plants (Allen et al. 2019), the effect could reduce local negative effects of young trees on low flows. Water drafting associated with prescribed burns could have a temporary adverse effect on low flows.

Road construction and vacating could increase or decrease low flows by decreasing forest cover and transpiration, increasing drainage efficiency, and diverting groundwater from hillsides to streams. Water developments and drafting associated with road building would have an adverse effect on low flows. Quarries and facilities have the potential to draw down the water table and increase runoff, thereby reducing low flows.

Alternative 2: Proposed Action

Similar to the no action alternative, effects on low flows would not be observable at the subwatershed scale (Appendix 3.3, Tables 16 and 17). However, at the local scale, three experimental subwatersheds (accounting for 2% of the area of the Loon Lake-Mill Creek subwatershed) are projected to have adverse effects on low flows (Appendix 3.3, Table 18), while beneficial effects on low flows would generally be greater in extent and magnitude than the no action alternative (Appendix 3.3, Table 19). Annual caps on harvest (HCP Section 3.4.1, *Projected Timing and Amount of Harvest*) could reduce localized adverse effects on low flows. To be conservative, these caps were not accounted for in the analysis because it is unknown where the forest manager would apply the caps.

Stream enhancements under Conservation Measure 1 could also improve low flows by restoring surface–groundwater interaction and storage. Flows tend to be more sensitive to changes in vegetation in the riparian zone than in the rest of the watershed (Moore and Wondzell 2005; Segura et al. 2020). Expanded riparian buffers may reduce adverse effects on low flows. Increased large wood recruitment and placement potential compared to the no action alternative, as described for peak flows and channel condition, would reduce adverse effects on low flows. Prescribed burn would have the same effect as the no action alternative.

Alternative 3: Increased Conservation

Under Alternative 3, effects on low flows would not be observable at the subwatershed scale (Appendix 3.3, Tables 16 and 17). At the local scale, no experimental subwatersheds would have adverse effects but beneficial effects would be greater than the proposed action or no action alternative (Appendix 3.3, Table 17 and 19).

Potential benefits from stream enhancements under Conservation Measure 1 would be the same as described for the proposed action. Effects of prescribed fire would be same as other alternatives.

Alternative 4: Increased Harvest

Under Alternative 4, effects on low flows would not be observable at the subwatershed scale (Appendix 3.3, Tables 16 and 17). At the local scale, experimental subwatersheds accounting for 1% of the area of the Loon Lake-Mill Creek and Lower Creek subwatersheds are projected to have adverse effects on low flows (Appendix 3.3, Table 18), while fewer subwatersheds would experience local beneficial effects.

3.3.3.4 Water Quality

Alternative 1: No Action

Timber harvest, mechanical vegetation removal, road management activities, and prescribed burns would have the most extensive effects on water quality. These activities can adversely affect water quality by increasing stream temperature, sediment delivery, and herbicide concentration. Other management activities would have smaller, more localized effects.

Modeling based on data collected in western Oregon shows segments of streams that have less than a 120-foot-wide riparian buffer tend to experience increase in water temperature due to timber harvest (Leinenbach 2016, 2021). Studies have shown that increased stream temperature, ranging from 0.5 to 7°C, can persist for 150 to 3,000 feet downstream of a harvest unit where there are narrow or nonexistent riparian buffers (Bladon et al. 2018; Keith et al. 1998; MacDonald et al. 1998; Wilkerson et al. 2006; Zwieniecki and Newton 1999). Stream temperature tends to persist at larger magnitudes the larger the proportion of the catchment is underlain by less permeable aquifers (Bladon et al. 2018). Appendix 3.3, section *Analysis Methods*, contains additional details.

All riparian buffers (RMAs) under the no action alternative are less than 120 feet, resulting in adverse effects on water temperature in all streams, as described below.

- Large and medium fish-bearing streams, which have 110-foot buffers, would experience 0.1°C increase on average (0.3°C within the 95% confidence interval).
- Small fish-bearing streams, which have 100-foot buffers, would experience 0.2°C increase on average (0.4°C within a 95% confidence interval).
- Large and medium perennial non-fish-bearing streams, which have 75-foot buffers, would experience 0.5°C increase on average (0.8°C within the 95% confidence interval).
- Small perennial non-fish-bearing streams that are tributary to fish-bearing streams, which have a 50- to 75-foot buffer for a certain distance upstream of confluence, would experience up to 1.2°C increase on average (1.6°C within the 95% confidence interval), where buffered.
- Other small perennial non-fish-bearing streams that are in designated debris flow traversal areas, which have a 25-foot buffer, would experience a 1.7°C increase on average (2.3°C within the 95% confidence interval).
- Other small perennial non-fish-bearing and seasonal streams, which have no buffer, would experience a 2.0°C increase on average (3.0°C within the 95% confidence interval).

Appendix 3.3, Figure 4, depicts these relationships.

Oregon water quality standards prohibit activities from cumulatively increasing stream temperatures by more than 0.3°C where salmon, steelhead, or bullhead trout are present. In the study area, the Umpqua temperature TMDL further restricts temperature increases to 0.1°C (ODEQ 2006). ODEQ is required to develop TMDLs for all other temperature-impaired streams. ODEQ (2022a) expects the required temperature TMDL for West Fork Millicoma to be developed in 2030, at the earliest, and encourages landowners to maximize riparian buffers and promote establishment of vegetation that can maximize shade effectiveness in the meantime.

Direct temperature increases in fish-bearing streams are not likely to exceed the regulatory thresholds except in small streams in the Umpqua Basin. However, temperature increases in non-fish-bearing streams would have indirect effects on fish-bearing streams, which could result in exceedances of the ODEQ threshold in other basins.

For all alternatives, compliance with CWA and state regulations (e.g., CWA permitting processes, TMDL requirements, and ODEQ regulations) requires best management practices that are effective in protecting water quality that is meeting standards or complying with TMDL restoration plans that would reduce and avoid water quality effects. ODEQ (2022b) expects that implementation of recent updates to the Oregon FPA would substantially improve water quality and narrow additional water quality actions needed to meet water quality standards.

At the project level, adverse water quality effects would be limited through compliance with the OAR's Cold Water Protection and Antidegradation rules, the existing Umpqua Basin temperature

TMDL and Tenmile Lakes Watershed TMDL, and future Coos Sub-basin TMDL, where they apply. A detailed description of where the OAR and TMDLs apply and how ODEQ implements them is provided in Appendix 3.3 (*Regulations* section).

Restoration thinning and salvage harvest in buffers could reduce shade and increase stream temperature (Leinenbach 2016). Some streams would avoid adverse temperature effects due to site conditions, including streams shaded by hillslopes, streams fed by groundwater seeps, higher velocity and deeper streams, streams with step-pool morphology, and streams with a higher percent of large wood (Subehi et al. 2009; Danehy et al. 2004; Groom et al. 2011). Routine harvest, restoration thinning, and salvage can also adversely affect water quality by removing vegetation, disturbing soils, and increasing fine sediment delivery to streams through surface erosion, channel erosion, and landslides. Under the no action alternative, sediment delivery to streams would be reduced by RMAs, equipment limitation zones (ELZs), limits on salvage harvest, steep slope protections, and other general conditions of the Oregon FPA (629-615-0200, 629-623-0600, 629-630-0150, 629-630-0700, 629-630-0800, 629-630-0905, 629-630-0910, 629-630-0915, 629-635-0300, 629-643). Effects of the alternatives on sediment delivery to streams, debris torrents, and effects on stream geomorphology are discussed in Section 3.2, *Geology and Soils*.

As described in Section 3.3.3.2, *Peak Flows and Channel Condition*, and Section 3.2.3.3, *Stream Geomorphology*, the recruitment of large wood to streams is projected to increase over the analysis period from implementation of riparian buffers (RMAs) and steep slope protections. This increased wood recruitment would reduce the adverse effects of harvest on water quality, including water temperature, nutrients, and dissolved oxygen (Bisson et al. 1987; Gurnell et al. 2002).

Prescribed burns of slash piles on landings following harvest could be conducted throughout the study area, including RMAs, in accordance with OAR 629-615-0300. Depending on their extent and burn severity, prescribed burns in riparian areas can temporarily increase stream temperature, nutrients, sediment, and reduce dissolved oxygen (Ice et al. 2004; Stednick 2010); streams already impaired by these contaminants would be most vulnerable to this activity.

Harvest also has adverse effects on toxic chemical concentrations in streams through reforestation site preparation, increased potential for chemical spills, release treatment activities (which use pesticides or herbicides), and increased road construction and use (which can spread insects and weeds that are subsequently controlled by increased use of pesticides or herbicides). Herbicides can cause biological impairment of waterbodies if they occur in high enough concentrations; acute toxicity to fish and invertebrates is unlikely unless the herbicides are applied directly to waterbodies (EPA 2023). There is potential for herbicides to be transported to waterbodies, especially during aerial application. OAR 629-620-0400 requires operators to protect waters from application of herbicide and pesticide application, including aerial chemical application, by meeting protection measures. Currently no waterbodies are listed as impaired by herbicides in the study area. No aquatic life toxics are listed as impairment causes in the study area. Human health toxics listed as impairment causes in the study area are methylmercury, inorganic sources, and manganese (ODEQ 2022a). Herbicides could be a candidate cause of biocriteria impairment (EPA 2023). Waterbodies in subwatersheds with a higher percent area available for harvest would be more likely to be polluted by herbicides and pesticides. Herbicide and pesticide use would be highest in areas available for clearcut followed by areas available for variable density harvest. Appendix 3.3, Table 13 provides the percent area available for harvest by subwatershed.

Forest road failure and road maintenance activities can have adverse effects on water quality related to delivery of sediment to streams and waterbodies (Boston 2016; Kastridis 2020), increased temperature from vegetation removal, and increased toxic chemical concentrations from application of herbicides and pesticides for weed and pest control. Appendix 3.3, Table 9, summarizes the total miles of roads near water in the permit area for each subwatershed. Native surface roads on steeper slopes, with small culverts, no outsloping, and heavy use are more likely to contribute sediment to streams. Road maintenance decreases sediment delivery to streams from road failure and road drainage repair decreases adverse effects on water quality by addressing drainage issues. New road development and road use would likely increase sediment delivery to streams and indirectly increase pesticide or herbicide delivery to streams.

The Oregon FPA (OAR 629-625) requires road siting, design, and maintenance criteria and implementation of the FRIA process, which would reduce the impact of roads on sediment delivery to streams, as described in Section 3.2.3.1, *Soil Erosion*. Per OAR 629-625-0700, wet-weather road use would require durable surfacing to resist rutting or development of a mud layer that drains to streams. The rule requires operators to cease use of a road when its surface becomes rutted or covered in mud and is causing visible increase in turbidity to fish-bearing streams; salmon, steelhead, and bull trout streams; or domestic water use streams. In addition, ODEQ (2022b) requires mitigation of road operation and maintenance and reduction in sediment inputs attributed to legacy roads.

Abandoning or vacating roads identified as part of the FRIA or State-led Abandoned Road Inventory processes, as described in Section 3.2.3.1, would decrease the risk of water quality impacts related to road use. Vacating roads has a greater beneficial effect than abandoning roads, because it increases infiltration and vegetation and removes fill from flood-prone areas, whereas road abandoning slows drainage feature degradation by reducing traffic.

Quarries can increase turbidity, sedimentation, oil and grease, mineral concentration, and pH of surface water by permanently changing the drainage patterns in the local area, decreasing vegetative cover, increasing compaction, and exposing mineral soil. Areas most sensitive to potential effects are waters impaired by temperature, sediment, and naturally occurring minerals, such as iron and arsenic. Under the no action alternative, development of quarries in riparian areas would comply with OAR 629-625-0500, which requires that these facilities be developed and used in such a way that maintains stable slopes and protects water quality.

Alternative 2: Proposed Action

The types of effects on water quality under the proposed action would be the same as described for the no action alternative, and the same regulatory requirements for CWA and ODEQ compliance would apply.

Overall, increased riparian protections under the proposed action would reduce potential for adverse effects on temperature compared to the no action alternative. Proposed action buffers and direct temperature impacts compared to the no action alternative are summarized below by stream type.

- Impacts on fish-bearing streams would be reduced compared to the no action alternative. Most fish-bearing streams would have either a 120- or 200-foot buffer and would experience no temperature effects, on average. Fish-bearing streams in the MRW outside the Lower Millicoma

River would have 100-foot buffers and would experience similar effects as small perennial fish-bearing streams under the no action alternative.

- Impacts on perennial non-fish-bearing streams, including perennial HLDP streams, that receive 200- or 120-foot buffers would be reduced compared to the no action alternative (no impact expected). Where 50-foot buffers are applied on large and medium streams, effects would be greater than the no action alternative (because the buffers are approximately 15 feet narrower) and where they are applied on small streams, effects would be less than the no action alternative because buffers are applied to all small perennial non-fish-bearing streams (not just those feeding into fish streams), apply for the full length of perenniality (not just a specified distance from the fish confluence), and would be wider than streams protected under the no action alternative as debris flow tracts.
- Impacts on seasonal non-fish-bearing debris flow streams would be reduced compared to the no action alternative because they would receive a 50- to 200-foot buffer compared to an approximately 25-foot buffer under the no action alternative.

Direct temperature increases in fish-bearing streams are not expected to exceed the regulatory thresholds under the proposed action, and indirect effects on fish-bearing streams from adversely affected non-fish-bearing streams that feed into them would be reduced by the wider buffers on the receiving waters. Moreover, wider buffers on streams likely to deliver large wood to fish-bearing streams would reduce temperature effects compared to the no action alternative. Therefore, the proposed action is less likely to exceed the ODEQ thresholds.

Restoration thinning in RCAs is capped at 1,200 acres, which could reduce potential effects compared to the no action alternative. Conservation Measure 1 would reduce effects on stream temperature by requiring leaving downed wood across the stream, which can help with pool formation (Santelmann et al. 2022).

As with the no action alternative, adverse temperature effects may be reduced or avoided according to project pace and scale, as well as by site conditions, such as cold water sources, water velocity, water depth, aspect, and topographic shading.

Reduced potential to induce soil erosion and landslides under the proposed action, as discussed in Sections 3.2.3.1 and 3.2.3.2, *Shallow-Rapid Landslide*, would result in a corresponding reduction in surface and landslide-related delivery of fine sediment to streams compared to the no action alternative. Wider RCAs and ELZs and their application on more stream miles under the proposed action would better prevent surface erosion delivery to streams than the no action alternative. Use of the slope stability analysis tool and implementation of harvest plan modification on all steep slopes (Condition 10) and RCAs would reduce sediment delivery to streams from landslide processes.

Wider buffers around streams likely to deliver wood to fish-bearing streams (HLDP streams), which also protect more miles of streams than the no action alternative, could reduce adverse effects of peak flows on sedimentation caused by channel erosion and temperature by ensuring more large wood is available to be delivered to streams, which provides shade, traps coarse sediment, and promotes pool development. HLDP buffers may also reduce the amount of fine sediment delivered to the stream from surface erosion by increasing downed wood on hillslopes, which can trap fine sediment. Landslide monitoring required in the HCP's monitoring and adaptive management program (HCP, Section 6.3.5, *Landslide Monitoring*) would improve the ability of management to protect streams from excess fine sediment by providing essential data for adaptive management.

Under the proposed action, the combined area available for more intensive treatments where herbicide and pesticide use would be highest would be greater in half of the study area subwatersheds and lower in the other half than under the no action alternative (Appendix 3.3, Table 13). These activities would require water protection measures in compliance with Oregon FPA as described for the no action alternative.

Adverse effects of salvage harvest on water quality would be less under the proposed action relative to the no action alternative, because salvage harvest would be more restricted in RCAs.

As described in Section 3.2.3.1, roads would likely deliver less sediment to streams than the no action alternative. Like the no action alternative, all road construction, maintenance, and vacating would be performed in accordance with the Oregon FPA rules listed in HCP Section 3.6.1. HCP Condition 11, *Road Construction and Maintenance*, includes standards for road construction and maintenance with similar intent to the Oregon FPA requirements under the no action alternative. In addition, no more than 40 miles of new permanent road would be constructed over the permit term (with spur roads left in place after 5 years counting towards this limit), and road density would decrease by the end of the permit term through road vacating (Conservation Measure 3), which would reduce potential for erosion from road management activities compared to the no action alternative. Long-term turbidity monitoring data collection is required under HCP Section 6.3.1, *Turbidity Monitoring*, and would be used in conjunction with road monitoring data to support identification of road issues for prioritization for improvement or vacating.

Road use is expected to be lower under the proposed action because of the decreased amount of harvest; therefore, the associated adverse effects on sediment delivery and toxic chemical concentration, such as herbicides and pesticides, would likely be lower under the proposed action than the no action alternative. As under the no action, application would be in accordance with OAR 629-620-0400.

Effects of prescribed burning would be the same as the no action alternative. Effects of mechanical vegetation control would be the same as the no action alternative, because they are governed by Oregon FPA rules. Increased recruitment of large wood to streams compared to the no action alternative would reduce adverse effects on water quality. Under the proposed action, quarry siting and operations would be compliant with the Oregon FPA (OAR 629-625-0500) and other applicable statutes; in addition, quarries would not be sited in RCAs or Reserves. Restrictions on quarry siting and limits on road construction would reduce effects of quarries compared to the no action alternative.

In addition to compliance with CWA and state regulation, as described under the no action alternative, the proposed action includes a water temperature monitoring program (HCP Section 6.3.2, *Water Temperature Monitoring*) and requires adaptive management if results exceed allowable limits (HCP Section 6.5.2*, Adaptive Management Triggers*). These conditions could support ODEQ's assessments of how well temperature criteria are being met and increase accountability for compliance with the Antidegradation rules and TMDL plans that apply to the permit area compared to the no action alternative.

The reduced area of clearcut harvest, increased buffer widths, increased large wood recruitment to streams, and reduced road density, along with compliance with CWA requirements at the project level, would reduce adverse effects on water quality compared to the no action alternative.

Alternative 3: Increased Conservation

Effects on surface water quality under Alternative 3 would be similar to the proposed action, but increased riparian buffer widths on perennial, HLDP, and seasonal streams; increased restrictions on restoration thinning in riparian buffers on steep slopes; reduced clearcut and variable density harvest, associated road use, and subsequent need for herbicides or pesticides; and increased requirements for road vacating would result in reduced impacts on water quality compared to all alternatives.

Alternative 4: Increased Harvest

Effects on surface water quality, including temperature, sediment, and toxics, under Alternative 4 would be similar to or greater than under the no action alternative. Narrower buffers on large and medium fish-bearing and non-fishbearing streams would result in increased adverse effects on stream temperature in these streams compared to the no action alternative, though restrictions on salvage harvest within RCAs and the commitment to stream enhancement projects limit these effects. Increased harvest activity would result in increased surface and landslide-related delivery of fine sediment to streams compared to the no action alternative, though increased buffering of streams likely to deliver large wood could better regulate sediment delivery to streams. Without the reduced road density requirement included in the proposed action, the potential for erosion due to road construction and management would be similar to the no action alternative. Use of pesticides or herbicides related to harvest activities and associated effects on water quality are expected to be similar to the no action. As under the no action, application would be in accordance with OAR 629-620-0400.

3.3.3.5 Groundwater

Alternative 1: No Action

Timber harvest, prescribed burns, and mechanical vegetation removal temporarily increase groundwater recharge at the shallow level (Smerdon et al. 2009), which can increase upwelling (Waswa and Lorentz 2019). Riparian buffers (RMAs) and wood recruitment increase the potential for infiltration to groundwater in and around stream channels during flood events.

Management activities would indirectly increase the potential for fuel spills, transport of other toxic materials from equipment components, and use of pesticides or herbicides, which can infiltrate shallow groundwater. However, the study area is covered by lower infiltration soils and rocks that are less likely to allow contaminants to penetrate groundwater. The Chemical and Other Petroleum Product Rules and Water Protection Rules of the Oregon FPA (OAR 629) would further reduce effects on groundwater quality.

New road construction would decrease recharge by increasing compaction and decreasing roughness. New roads can also increase groundwater discharge, where road cuts intercept subsurface flow zones and redirect discharge to streams (Goeking and Tarboton 2020). Locations in the permit area where seeps and springs are more common are more susceptible to this effect. Catchments that are already heavily roaded, have steep slopes, and have shallower soils are more susceptible to decreases in recharge, because they are more efficient at draining any intercepted groundwater (Grant et al. 2008). Appendix 3.3, Table 3 provides details regarding road density, slopes, and depth to bedrock.

Road drainage repairs would increase recharge by distributing drainage across the hillside where it can recharge the shallow groundwater. Abandoning and vacating roads would increase infiltration by decreasing compaction and increasing cover and roughness on the road surface. Compliance with the Oregon FPA would require roads to be brought into compliance with the Oregon FPA through implementation of the FRIA process, improving drainage, and could include road abandonment and vacating, increasing recharge. Maintaining roads would increase shallow groundwater recharge by restoring proper drainage.

In and around quarries, recharge to groundwater decreases due to increased ground compaction and removal of soil. Quarries can encounter subsurface flow zones, altering subsurface pathways and rates. Quarries located in riparian areas, unconsolidated materials, and on steep hillsides near fault lines are most susceptible to this effect. Operation of these facilities involves heavy equipment fuel and oils that may be transported into groundwater and the development of these facilities in riparian areas would have an adverse effect on local groundwater recharge and quality.

Alternative 2: Proposed Action

The types of effects on groundwater and regulatory requirements to reduce those effects under the proposed action would be the same as described for the no action alternative, but the degree of effects would differ as described below.

In eight of the subwatersheds, the maximum equivalent clearcut area would be greater than under the no action alternative in at least one 10-year period, resulting in decreased groundwater recharge compared to the no action alternative. In the remaining subwatersheds, the maximum equivalent clearcut area would be less than the no action alternative, resulting in increased groundwater recharge, unless fog drip is a major factor (Appendix 3.3, Table 14).

As described above under water quality, areas of more intensive harvest where herbicide and pesticide use would be highest would be greater in half of the study area subwatersheds and lower in the other half compared to the no action alternative (Appendix 3.3, Table 14). As described under the no action alternative, study area soils and rocks limit potential infiltration of contaminants to groundwater, and compliance with Oregon FPA (OAR 629) would further reduce potential effects on groundwater quality.

Expanded riparian buffers (RCAs) and increased wood recruitment relative to the no action alternative would capture more runoff and increase beneficial effects on recharge and upwelling. Increased steep slope protections and monitoring requirements for steep slopes would reduce the potential for change in groundwater discharge and flow paths. The commitment to reduce road density in the permit area (Conservation Measure 3) would decrease effects of roads on groundwater compared to the no action alternative.

Alternative 3: Increased Conservation

Under Alternative 3, maximum equivalent clearcut area in any 10-year period would be less than the no action alternative in about half the subwatersheds. In these subwatersheds, the difference in maximum equivalent clearcut area is less than 3%. It would be less than the proposed action in all subwatersheds except North Tenmile (Appendix 3.3, Table 14). Therefore, groundwater rechargeand associated indirect adverse effects on groundwater quality, would decrease in most subwatersheds compared to both the no action alternative and proposed action, with a greater decrease compared to the no action alternative, unless fog drip is a major factor.

Expanded riparian buffers (RCAs) and increased wood recruitment would capture more runoff and increase beneficial effects on recharge and upwelling compared to the no action alternative and proposed action. Additional requirements for road vacating would further reduce adverse and increase beneficial road-related effects on groundwater compared to the no action alternative and proposed action.

Use of pesticides or herbicides related to harvest activities and associated effects on groundwater would be less than all other alternative because the combined area available for clearcut and variable density harvest would be lowest in all subwatersheds (Appendix 3.3, Table 13).

Alternative 4: Increased Harvest

Under Alternative 4, maximum equivalent clearcut area is greater than the no action alternative in all but one subwatershed—Lower Lake Creek—and greater than or equal to the proposed action in all subwatersheds (Appendix 3.3, Table 14). Therefore, groundwater recharge and associated indirect adverse effects on groundwater quality would increase in most subwatersheds compared to the other alternatives, with the greatest increase compared to the no action, unless fog drip is a major factor.

Riparian buffers (RCAs) and wood recruitment would be less than the no action alternative; and therefore, the ability for RCAs and large wood to capture and slow runoff, increase recharge, and increase upwelling by increasing channel complexity and connectivity to the floodplain would be less than all alternatives. Restrictions on road system management and associated potential for adverse effects would fall between the no action alternative and proposed action.

Use of pesticides or herbicides related to harvest activities and associated effects on groundwater would be greatest under Alternative 4 because the combined area available for clearcut and variable density harvest would be highest in all subwatersheds (Appendix 3.3, Table 13).

3.3.3.6 Flood Hazard

Alternative 1: No Action

By disturbing land and removing vegetation, timber harvest, salvage, and prescribed burns—and to a lesser extent, mechanical vegetation control—could affect floodplain functions, such as floodwater storage and conveyance capacity and erosion and sedimentation potential. Riparian buffers would likely cover most of the floodplains in the permit area, because valleys are generally steep and narrow, and RMAs are measured from the edge of the channel migration zone. Riparian buffers and steep slope protections, which would support large wood recruitment, would decrease flood velocities and control erosion. Oregon FPA rules protecting public safety would reduce the risk of debris flows reaching downstream infrastructure.

By compacting soils and adding fill in floodplains and floodways, construction of roads could interfere with the storage and passage of floodwater. A decrease in floodwater storage capacity may increase floodwater levels downstream. Road construction may also result in the redirection of floodwaters, potentially causing erosion in adjacent areas. The West Fork Millicoma subwatershed has the most miles of road in the FEMA special flood hazard areas; therefore, this subwatershed may be the most likely to experience effects from floodwaters.

Road maintenance, road drainage repair, and abandoning or vacating roads can reduce the adverse effects on flood hazards by improving drainage features and increasing infiltration and flood conveyance capacity, which can decrease velocities, scour, and flood surface elevation. Compliance with the Oregon FPA FRIA process would improve drainage through road abandonment and vacating. Compliance with the state and federal regulations governing development in floodplains would limit the effect of road system management on flood hazard.

Quarries built in floodplains would increase flood hazards by placing and removing fill in floodplains. State and federal floodplain regulations, which apply to all alternatives, such as OAR 141-085, Section 10 of the Rivers and Harbors Act, CWA, and executive orders, would reduce adverse effects.

Alternative 2: Proposed Action

Increased riparian buffers and large wood recruitment compared to no action would further decrease flood velocities and control erosion. In addition to Oregon FPA rules protecting public safety, which would reduce the risk of debris flows reaching downstream infrastructure, wider RCAs and increased steep slope protections would further reduce risk compared to the no action alternative. The landslide monitoring program (HCP Section 6.3.5, *Landslide Monitoring*) would provide information to enable managers to reduce the risk of landslide effects. Limiting permanent road construction could limit interference with the storage and passage of floodwater and associated effects on floodwater levels downstream and reduce erosion associated with roads. The commitment to decrease road density in 10-year increments over the permit term, informed by the road assessment in Conservation Measure 3, would likely reduce flood risk compared to the no action alternative.

Alternative 3: Increased Conservation

Effects on flood hazard under Alternative 3 would be similar to the proposed action, but further reduced because of the reduction in harvestable area, increased riparian buffer widths, and additional requirements for road vacating.

Alternative 4: Increased Harvest

Effects on flood hazard would be highest under Alternative 4 because it has the greatest area available for harvest, narrowest riparian buffers, and no commitment to reducing road network density.

3.4 Vegetation

3.4.1 Methods

The study area for vegetation consists of the permit area, where vegetative cover, wetlands, and special-status plant species could be affected (directly or indirectly) under the proposed action and alternatives.

Forest stand age projections were developed to understand how differences in harvest treatments and areas available for those treatments under the proposed action and alternatives would affect stand age over the analysis period (80 years). These projections applied rules related to rotation age, harvest timing, and amount of stand removed—based on the treatments presented in Section 3.1.3, *Approach to Analysis*, and the descriptions in Chapter 2, *Proposed Action and Alternatives*—to forest stand age data (OSU 2023). These rules are summarized in Appendix 3.4, *Vegetation Technical Supplement*.

Changes in forest structure were evaluated based on the stand age projections and the differences in management activities allowed under the alternatives (e.g., thinning, salvage harvest, prescribed burns). The potential for spread of invasive weeds in the permit area was assessed qualitatively based on anticipated differences in extent and timing of ground-disturbing activities under the alternatives. Effects on special-status plant and fungus species were evaluated by identifying documented species occurrences within and adjacent to the permit area and the species' potential habitat in areas of ground-disturbing activities under the alternatives. Finally, effects on wetlands were evaluated by overlaying mapped wetlands with the permit area and comparing the differences in management activities allowed under each alternative within and adjacent to wetlands.

3.4.2 Affected Environment

3.4.2.1 Forest Structure and Age

The permit area is currently dominated by conifer stands—where conifer species comprise at least 30% of the canopy cover in the stand—with a minority of hardwood stands largely found in riparian areas (DSL and ODF 2011:133). These hardwood stands (dominated by red alder and then big leaf maple) comprise roughly 28% of the canopy cover in the permit area (DSL and ODF 2011:82) with the remaining canopy cover dominated by conifer species, primarily Douglas-fir.

Current stand age distribution falls into three groups based on previous forest management activities and disturbance events.

- <u>Forest stands that are 65 years or younger</u>: These stands were part of the cycle between clearcutting and regrowth largely starting in 1955 to generate revenue under the Common School Fund. They primarily consist of densely planted Douglas-fir stands with some red alder, western hemlock, and western redcedar and limited to no understory (OSU 2020:49). Based on age and structure these would be considered early-seral to mid-seral[1] forests.

- Forest stands that are between 100 and 160 years old: These stands regenerated after natural disturbance events and partial harvest that removed about 30% of the total tree volume. They were thinned between 1957 and 1977 (OSU 2020:49). Overall, these stands are expected to reflect advanced forest structure whereby large trees are present, significant downed woody debris has begun to accumulate, and a diverse, vertically layered understory is present (DSL and ODF 2011:176). Over time disturbance events may create new openings for understory and tree seedling growth as well as large wood sliding from upslope into riparian areas resulting in late-seral forests.
- Forest stands that are between 80 and 230 years old: These stands include late-seral stands regenerated after the 1868 fire and subsequently left unmanaged and old growth stands that predate the 1868 fire. Approximately 71% of the unmanaged late-seral stands in the plan area are between 130 and 160 years old (OSU 2020:49). Old growth stands comprise multilayered canopies with large living trees, a number of snags or broken tops, and heavy accumulation of downed wood. Over time disturbance events would be expected to create new openings and potentially migrate large wood similar to what is described above.

In addition to forest management activities, disturbance events such as fires, windstorms, and landslides have historically shaped and will continue to shape the forest landscape in the permit area. The Coos Bay fire of 1868 burned 90% of the permit area. However, with current fire suppression throughout the permit area and the moist climate on the western slopes, wildfires have not been a major source of disturbance in the permit area (DSL and ODF 2011:2-24; OSU 2020:3-28). Severe windstorms are more common in the permit area, leveling large swaths of forest land leaving all organic matter in place (DSL and ODF 2011:2-25 to 2-26; Washington Department of Natural Resources 2017:17). Historically, salvage harvest after disturbance events was conducted prior to planting and no large conifers or fallen trees were maintained along riparian corridors, resulting in low levels of wood recruitment along stream channels and little to no standing dead or understory complexity (DSL and ODF 2011:4-38; Pacific Northwest Research Station 2007).

Tree mortality can arise from fungus such as laminated root rot (*Phellinus weirii*), as well as native pathogens and pests like Swiss needle cast and the Douglas-fir bark beetle (*Dendroctonus pseudotsugae*), respectively. These insects and diseases result in patches of dead or dying individual trees or groups of trees within the landscape. Though insects and diseases continue to affect some areas overall, the permit area does not appear to have had a major outbreak in recent history, with the Douglas-fir bark beetle being the most significant pest (DSL and ODF 2011:2-25 to 2-37).

As described in Section 3.7, *Climate Change*, climate change is expected to result in an extended growing season, which could increase vegetation growth rates. However, drought and prolonged heat waves could result in widespread vegetation mortality and could decrease growth in water limited areas. Disturbance events may also remove or damage vegetation. Major events, especially stand-replacing events, would reduce overall forest stand age and structural complexity in the permit area.

[1] Early-seral forest stands are generally between 0 and 30 years of age; mid-seral forests between 30 and 80 years of age, but can be as old as 120 years; late-seral forest stands are between 91 and 199 years; and old growth forests are 200 years and over. See Appendix 3.4, *Vegetation Technical Supplement*, for a more detailed discussion of seral forest structure.

3.4.2.2 Invasive Weeds

Invasive plant species affect the forest structure by outcompeting native species, reducing the biological diversity in the shrub and herbaceous layers. Three invasive plant species have been documented in the permit area. Tansy ragwort (*Senecio jacobaea*) is scattered throughout the permit area with isolated occurrences of Armenian blackberry (*Rubus armeniacus*) and butterfly bush (*Buddleja davidii*). Scotch broom (*Cytisus scoparius*) and other invasives immediately border the permit area, especially along the eastern border, on federal and privately owned land, and are an emerging problem (Oregon Department of Agriculture 2019; DSL and ODF 2011:101).

3.4.2.3 Special-Status Plant and Fungus Species

Three plant species and four fungus species with a conservation status of imperiled or critically imperiled have documented observations within 2 miles of the permit area (Oregon Biodiversity Information Center 2022). Of these, only one documented observation overlaps with the permit area and four have potential to occur in the permit area based on habitat type (Appendix 3.4, Table 2). None of the species are federal or state-listed threatened or endangered. Table 2 in Appendix 3.4 lists and describes the identified plants and fungi, their ranges, their known habitats, and their potential occurrence near or in the permit area.

3.4.2.4 Wetland Vegetation

Wetlands mapped as part of the FWS National Wetland Inventory comprise approximately 2.4% of the total permit area. Riverine systems are the most common wetland type (91% of total wetland acreage) in the permit area; freshwater forested/shrub wetlands are the second most common (5%) (Appendix 3.4, Table 4). Riverine systems include wetlands and deepwater habitats contained within a defined channel; freshwater forested/shrub wetlands are areas dominated by woody vegetation, including shrubs, saplings, or trees such as willows (Cowardin et al. 1979).

3.4.3 Environmental Consequences

3.4.3.1 Forest Age and Structure

Alternative 1: No Action

Under the no action alternative, timber harvest, thinning and tree selection, reforestation, salvage harvest, and prescribed burns would affect forest stand age and structure in the permit area.

As described in Section 2.1.1, *Alternative 1: No Action*, forest management activities would be restricted to avoid take of ESA-listed species. Section 3.1, *Introduction*, describes the areas available for different treatment types based on these restrictions. In no-treatment areas (49,069 acres or 59% of the permit area), forest stands which are primarily Douglas-fir would develop into late-seral and old growth stands with fully closed canopy and complex forest structures, such as snags and woody accumulation, over the analysis period. In areas limited to variable density harvest (1,955 acres of primarily Douglas-fir or 2.3% of the permit area) and restoration thinning (1,385 acres of mixed hardwood and Douglas-fir within riparian management areas [RMAs][2] or 1.7% of the permit area), forest stands would increase in age and structural complexity over the analysis period.

Clearcut harvest would be allowed outside of the areas described above (30,882 acres or 37% of the permit area). Based on the forest stand age projections, between 1 and 12% of forest stands would be clearcut during each 10-year interval of the analysis period. Stands clearcut in the first 20 years would range between approximately 60 and 200 years old; thereafter, it is expected that they would be harvested again in about 60 years. DSL would adhere to Oregon Forest Practices Act (Oregon FPA) retention standards of at least two trees per acre remaining after clearcut.

By the end of the analysis period, the permit area is projected to comprise 23% early-seral forest (stands 0–30 years), 16% mid-seral forest (stands 31–90 years), 18% late-seral forest (stands 91–200 years), and 43% old growth (stands over 200 years) (Figure 3.4-1; Appendix 3.4, Table 1). Over the analysis period, the no action alternative would result in a patchwork of clearcuts and younger replanted stands around the older Douglas-fir forest stands in areas where treatments are restricted to avoid take across the permit area.

In areas available for clearcut harvest, reforestation would occur following harvest. Thinning and tree selection would occur prior to clearcutting to allow certain trees to become larger to optimize timber production. For example, during hardwood release practices, red alders are removed to ensure conifer dominance. These practices tend to reduce understory biodiversity through spraying of herbicides, mechanical removal, or other activities destructive to vegetation.

Given the continued potential for disturbance events and the projected increased frequency, duration, and extent of certain disturbance events with climate change (e.g., fire) (Section 3.7, *Climate Change*), post-disturbance salvage harvest could substantially alter the structure described above by removing standing dead trees and reducing understory complexity (Pacific Northwest Research Station 2007). Stand-replacing events—where large areas of standing live trees are damaged or killed by wildfire, catastrophic windthrow, disease, or insects—would reduce stand age. Conversely, disturbance events, including fire and debris flows, could create gaps and patches in the forest canopy, likely resulting in a multilayered overstory, greater understory development, and increased plant diversity. Salvage harvest would be prohibited in habitat occupied by listed species. Outside of areas occupied by listed species, salvage harvest could occur in the permit area in accordance with OAR 629-610-0070 and the Water Protection Rules of the Oregon FPA (OAR 629-635-0310 through OAR 629-655-0000).

Prescribed burns of slash piles on landings following harvest could be conducted throughout the permit area, including RMAs, in accordance with OAR 629-615-0300. Other types of burns may be used infrequently, including broadcast burns for site preparation prior to planting and underburns for fuel reduction. Prescribed burns would result in nutrient release, fuels reduction, and decreased understory structure, but would not be expected to change stand age or dominant stand species. Best management practices would reduce impacts on long-term health of the understory.

[2] RMAs cover a total of 5,563 acres under the no action alternative. For purposes of analysis, RMA stands under 65 years were assumed eligible for restoration thinning. Actual acreage would vary depending on the extent of proposed restoration projects proposed in RMAs, listed species occupancy, and other eligibility under Oregon FPA, and would be determined on a project-by-project basis.

Vegetation management in RMAs, including restoration thinning, would only be allowed for the purposes of achieving ecological objectives (OAR 629-643-0000 [3] and [5]) per the limitations described in OAR 629-643-0400. There is no commitment under the no action alternative to conduct restoration treatment, but if these treatments were conducted, the health and function of treated areas would be expected to improve by reducing stand density and increasing plant diversity and canopy height.

Alternative 2: Proposed Action

Under the proposed action, the same type of forest management activities described under the no action alternative would affect forest stand age and structure in the permit area.

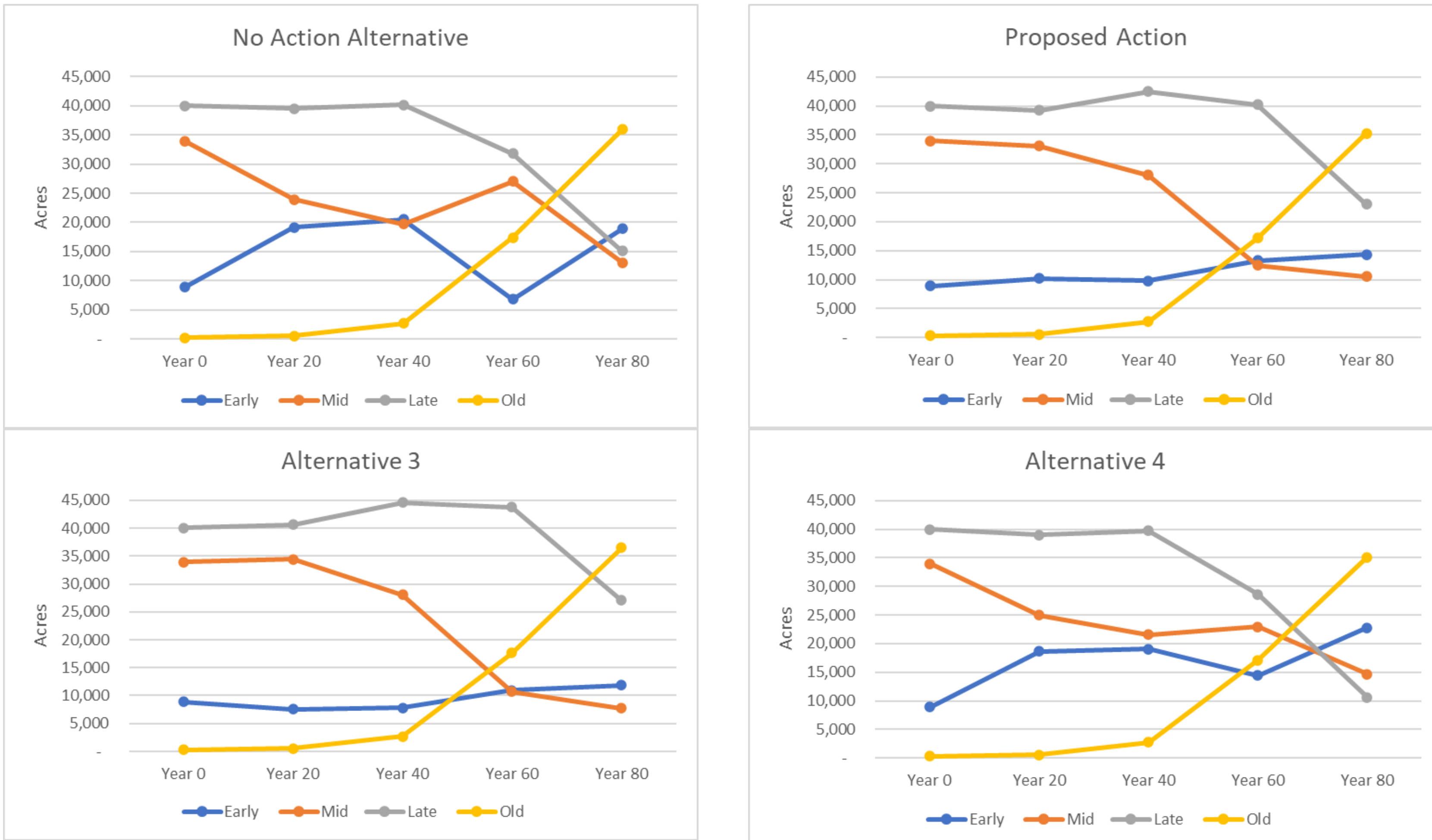
The acreage of forest stands in no-treatment areas that would develop into late-seral and old growth stands over the analysis period would be comparable to the no action alternative. More area would be available for variable density harvest (13,433 acres; 16% of the permit area) and restoration thinning (10,402 acres, 12% of the permit area) than under the no action alternative, resulting in more forest stands increasing in age and structural complexity over the analysis period than under the no action alternative.

Less area would be available for clearcut harvest (15,810 acres; 19% of the permit area) than under the no action alternative, and harvest would occur on an approximate 50- to 60-year rotation. Based on the forest stand age projections, between 3 and 6% of forest stands would be clearcut during each 10-year interval of the analysis period (compared to 1 and 12% under the no action alternative). Retention standards in clearcut areas would be the same as under the no action alternative. Reforestation following clearcut harvest would result in densely planted Douglas-fir stands, which would be thinned over time to optimize timber harvest similar to the no action alternative.

By the end of the analysis period, the permit area is projected to comprise 6% less early-seral forest, 3% less mid-seral forest, 10% more late-seral forest, and 1% less old growth than under the no action alternative (Figure 3.4-1; Appendix 3.4, Table 1).

Over the analysis period, the proposed action would result in smaller patches of clearcuts and younger replanted stands and larger, more contiguous sections of older Douglas-fir forest stands across the permit area. The conservation research watersheds (CRW) (40% of the permit area) and Reserve and riparian conservation area (RCA) allocations in the management research watersheds (MRW) would comprise connected corridors of late-seral to old growth forest with increased structural complexity and canopy coverage over a range of elevations. This range could increase forest resiliency when considering climate change and disturbance events, as some plant species may be able to migrate to cooler, higher elevations, if needed (Buttrick et al. 2015). In addition, the large blocks of connected late-seral to old growth forest in Reserves and RCAs would reduce fragmentation or forest border area, increasing resiliency to windthrow compared to the no action (Somerville 1980). This increase in older forests may also increase fire resiliency compared to the no action, because older forests with higher protected status are shown to burn less severely from mixed-severity fires and more frequent fires (Levine et al. 2022; Zald and Dunn 2018; Thompson et al. 2007).

Figure 3.4-1. Projected Seral Stages of Forest Stands in Permit Area Over the Analysis Period



The beneficial effects of restoration thinning to the health and function of stands in RCAs described under the no action alternative would be more certain to occur under the proposed action, because the proposed action includes a commitment to implementing these actions and adaptively managing them based on monitoring. The proposed action also includes restoration thinning in upland Reserves to enhance forest complexity and habitat, which would not occur under the no action alternative, representing a beneficial effect for these stands compared to the no action alternative.

Under the proposed action, salvage harvest in response to disturbance events would be restricted to controlling the spread of introduced insect or disease in Reserves and RCAs and would follow treatment standards in other allocations, whereas the no action alternative would primarily limit restrictions on salvage to stands occupied by listed species. Since the area protected in Reserves and RCAs under the proposed action is greater than the area assumed off limits to harvest due to occupancy by listed species, the potential for salvage harvest to alter forest structure post-disturbance would be reduced compared to the no action alternative.

Prescribed burns may be used to manage fuels and increase or maintain suitable conditions for species of cultural value to local tribal communities but would not be allowed in RCAs. These burns would follow the same Oregon FPA requirements and best management practices described under the no action alternative and would result in the same effects, where implemented.

Alternative 3: Increased Conservation

Alternative 3 would have the least area available for more intensive harvest treatments and would result in the greatest amount of late-seral and old growth stands and least amount of early and mid-seral stands by the end of the analysis period (Figure 3.4-1; Appendix 3.4, Table 1). Less area would be available for clearcut harvest under Alternative 3 than the proposed action (13,392 acres; 16%). Based on the forest stand age projections, between 2 and 5% of forest stands would be removed from clearcut over each 10-year interval (compared to 1 to 12% under the no action alternative and 3 to 6% under the proposed action).

Over the analysis period, Alternative 3 would result in the smallest patches of clearcuts and younger replanted stands and the largest blocks of contiguous, older Douglas-fir forest stands across the permit area of all alternatives. Benefits to forest resiliency would be greatest under this alternative.

Benefits to forest health and function of stands in RCAs from restoration thinning would be the same as the proposed action. Benefits in Reserves could be greater than under the proposed action given the increased area available for treatment.

With the same restrictions on salvage harvest in Reserve and RCA allocations as the proposed action and greater acreage in these allocations, the potential to alter forest structure post-disturbance would be less under Alternative 3 than under the proposed action.

With the same restrictions on prescribed burns in RCAs as the proposed action but greater area of RCAs, prescribed burns under Alternative 3 would most limited. These burns would follow the same Oregon FPA requirements and best management practices as the no action alternative and proposed action and would result in the same effects, where implemented.

Alternative 4: Increased Harvest

The area available for clearcut harvest under Alternative 4 (27,867 acres; 33%) would be greater than under the proposed action. Although the area available for clearcut harvest would be 4% less than under the no action alternative, the combined area available for clearcut and variable density harvest would be 10% greater. Alternative 4 would result in the least amount of late-seral and old growth stands and greatest amount of early and mid-seral stands by the end of the analysis period (Figure 3.4-1; Appendix 3.4, Table 1). Based on the forest stand age projections, between 3 and 11% of forest stands would be removed from clearcut over each 10-year interval (compared to 1 to 12% under the no action alternative, 3 to 6% under the proposed action, and 2 to 5% under Alternative 3).

Over the analysis period, Alternative 4 would result in the largest patches of clearcuts and younger replanted stands and the smallest sections of contiguous, older Douglas-fir forest stands across the permit area. Benefits to forest resiliency would be lowest under this alternative.

Benefits from restoration thinning would be greater than the no action alternative but less than proposed action based on the area available for this treatment under Alternative 4.

With the same restrictions on salvage harvest in Reserve and RCA allocations as the proposed action but less acreage in these allocations than the proposed action, and less acreage than assumed off limits to harvest due to occupancy by listed species under the no action alternative, the potential to alter forest structure post-disturbance under Alternative 4 would be greater than to the no action alternative.

With the same restrictions on prescribed burns in RCAs as the proposed action but smaller area of RCAs, prescribed burns under Alternative 4 would be more limited than the no action but less limited than the proposed action. These burns would follow the same Oregon FPA requirements and best management practices as described under the no action alternative and would result in the same effects, where implemented.

3.4.3.2 Spread of Invasive Weeds

Alternative 1: No Action

Activities that remove vegetation and cause ground disturbance would create the opportunity for spread of invasive weeds. Under the no action alternative, DSL would implement best management practices to reduce the spread of invasive weeds as required under the noxious weed law (ORS 569, OAR 603-052). These would likely include periodically washing seeds, plants, and mud from heavy equipment and agency vehicles and equipment; mechanical removal of invasive plants; and chemical spot treatment.

Of the harvest methods, clearcutting would remove the most vegetation and have the greatest disturbance per acre and therefore the greatest potential for invasive species to repopulate the disturbed area. Invasive species typically outcompete native species at newly clearcut sites. Variable density harvest would have similar effects to clearcutting but to a lesser extent. In areas subject to thinning only, ground disturbance from heavy equipment and staging areas would also create the opportunity for spread of invasive weeds but to a lesser extent than the above harvest methods.

Road construction and maintenance could act as potential corridors spreading invasive species by either creating or maintaining disturbed shoulders along which weeds could colonize. Under the no action alternative, road construction and maintenance would increase the opportunity for spread of invasive weeds, while abandonment and vacating, which could be implemented through the Forest Road Inventory and Assessment process, would reduce these effects.

Removal of vegetation as part of quarry construction and communication lookout site maintenance would also have the potential to introduce and spread invasive weeds, but to a lesser degree than harvest and road construction because the locations of these activities would be isolated and have much smaller footprints. Compliance with OAR 660-023-0180 would minimize effects of quarry development siting on high-quality vegetation reducing the potential for spread of invasive species into areas of high-quality vegetation.

Alternative 2: Proposed Action

The same activities described for the no action alternative would create the opportunity for spread of invasive weeds under the proposed action, and the same noxious weed laws and Oregon FPA rules would apply.

Clearcuts would affect almost 50% less area under the proposed action than the no action alternative, and the combined area available for clearcut and variable density harvest would also be less (11%). Because more intensive types of harvest pose the greatest risk of invasive species spread, the substantial decrease in area of clearcut and the overall decrease in combined area of clearcut and variable density harvest compared to the no action alternative would reduce risk of weed spread.

Road system management would have the same type of effects as described for the no action alternative, but the proposed action requirements under Conservation Measure 3 would reduce the potential for invasive weed spread compared to the no action alternative. These include a requirement to reduce the density of the road network in the permit area and restrictions on road construction and maintenance, including minimization of clearing and grubbing areas and reseeding disturbed areas.

Potential spread of invasive weeds from quarry construction, communication lookout site maintenance, and mechanical vegetation control would be similar to the no action alternative.

Alternative 3: Increased Conservation

Clearcuts would affect the least area under Alternative 3 of all alternatives. The combined area available for clearcut and variable density harvest would also be the least of all alternatives. Due to the decrease in area available for intensive harvest treatments, the risk of spreading invasive weeds from harvest and thinning activities would be lowest under Alternative 3.

The potential for road management and construction to spread invasive weeds would be similar to the proposed action. Potential for spread of invasive weeds from quarry construction, communication lookout site maintenance, and mechanical vegetation control would be similar to the no action alternative and proposed action.

Alternative 4: Increased Harvest

Although clearcutting would affect less area under Alternative 4 than the no action alternative, the combined area available for clearcut and variable density harvest would be greater than all other alternatives (Table 3.1-1). Therefore, Alternative 4 would have the greatest potential to spread invasive weeds from harvest and thinning activities.

Alternative 4 would not require a net reduction in road density, so the potential for road management activities to spread invasive weeds would be similar to the no action alternative. Potential for spread of invasive weeds from quarry construction, communication lookout site maintenance, and mechanical vegetation control would be the same as described for the no action alternative.

3.4.3.3 Special-Status Plant and Fungus Species

As noted in Section 3.4.2.3, *Special-Status Plant and Fungus Species*, there are no state or federal listed plant or fungus species likely to occur in the permit area. However, under all alternatives, forest management activities that cause ground disturbance, including harvest, thinning, and infrastructure (e.g., road) construction would have the potential to affect the four imperiled or critically imperiled plant and fungus species that may occur in the permit area through habitat removal and degradation. Of the four species, three fungi are associated with forested habitats—*Glomus pubescens*, *Hydropus marginellus,* and *Rickenella swartzii*—and have the greatest potential to be affected by harvest activities.

As noted in Section 3.4.3.2, *Spread of Invasive Weeds*, clearcutting would have the greatest disturbance per acre, followed by variable density harvest and restoration thinning. The area available for more intensive harvest would be greatest under Alternative 4, followed by the no action alternative, proposed action, and Alternative 3. In addition, potential effects on the imperiled or critically imperiled plant and fungus species in the permit area from increased spread of invasive weeds due to road construction would be similar to those discussed in Section 3.4.3.2. Based on this, Alternative 4 would have the greatest potential for effects, followed by the no action alternative, then the proposed action, and Alternative 3 would have the least potential for effects.

3.4.3.4 Wetland Vegetation

Alternative 1: No Action

Any wetland disturbance has the potential to reduce wetland function since vegetation helps reduce flow, improves water quality, and adds to habitat. Timber harvest is likely to occur in Douglas-fir stands, which are only occasionally found in wetlands and typically prefer drier, upland habitat (Lichvar et al. 2016). Harvest activities adjacent to wetlands could affect wetland vegetation or wetland function, due to soil erosion, compaction, or changes to hydrology.

Harvest activities in and near wetlands would occur in accordance with the Water Protection Rules of the Oregon FPA (OAR 629-635-0310 through 629-655-0000), which contain restrictions to protect wetland function and value in forest lands. RMAs would incorporate all stream-associated wetlands, which comprise at least 91% of mapped wetlands in the permit area (OAR 629-635-0310). A 100-foot RMA would be applied to all significant wetlands (non-stream-associated wetlands larger than 8 acres) (OAR 629-645-0000). Other wetlands, those not associated with streams or smaller than 8 acres, would not have RMAs, but forest management activities would be required to protect soil and vegetation within or along wetlands from disturbance that results in reduced water quality, hydrologic function, or soil productivity.

Outside of areas occupied by listed species, salvage harvest could occur in stream RMAs, including stream-associated wetlands, in accordance with OAR 629-610-0070 and the Water Protection Rules of the Oregon FPA (OAR 629-635-0310 through OAR 629-655-0000). Salvage harvest would be restricted in significant wetlands and their RMAs as described in OAR 629-645-0050. Salvage harvest in non-stream associated wetlands less than 8 acres would be restricted as described in OAR 629-655-000.

Prescribed burns could be conducted in RMAs in accordance with OAR 629-615-0300, which could result in the same effects described in Section 3.4.3.1, *Forest Age and Structure*. Best management practices would reduce impacts on long-term health of the stream-associated wetlands.

The Oregon FPA includes rules for road location, design, and standards (OAR 629-625) that cover construction in critical locations such as significant or other wetlands. Effects on wetland vegetation from road maintenance would be minimal, as less than 2% of existing roads are within 35 feet of streams and most wetlands in the permit area are classified as riverine.

Roads and quarries are unlikely to be constructed in existing wetlands because it would require converting wetlands to upland, which would require additional permitting and mitigation under Clean Water Act Section 404 to ensure no net loss of wetlands. Lookout communication sites are unlikely to be in wetlands, and therefore are unlikely to affect wetland vegetation, as wetlands are typically found in low-lying areas or depressions which are not compatible with lookout sites.

Alternative 2: Proposed Action

Under the proposed action, effects on wetlands from harvest activities would have the same effects as under the no action alternative, but would differ in extent.

Harvest activities in and near wetlands would occur in accordance with the prescribed allocation treatments and Oregon FPA rules. RCAs would likely encompass all stream-associated wetlands (91% of all mapped wetlands in the project area), where harvest would be limited to restoration thinning, which would have less indirect effects on wetlands than more intensive harvest allowed under the no action alternative. Harvest in non-stream-associated wetlands would follow the allocation treatments prescribed in the conservation strategy, but would need to comply with the Oregon FPA rules, similar to the no action alternative.

Under the proposed action, salvage harvest in response to disturbance events would be restricted in Reserves and RCAs and would follow treatment standards in other allocations, whereas the no action alternative would primarily limit restrictions on salvage to stands occupied by listed species. Since the area protected in Reserves and RCAs under the proposed action is greater than the area assumed off limits to harvest due to occupancy by listed species, the potential for salvage harvest to effect wetlands post-disturbance would be reduced compared to the no action alternative.

Prescribed burns would be prohibited in RCAs, decreasing the likelihood of effects on all stream-associated wetlands as compared to the no action alternative. Effects on non-stream associated wetlands outside of RCAs would be similar to those under the no action alternative.

The same minimal effects on wetlands would be expected from road, log landing, or quarry construction or lookout communication sites maintenance for the reasons described under the no action alternative.

Alternative 3: Increased Conservation

Under Alternative 3, effects on wetlands from harvest activities would have the same effects as under the proposed action, but would differ in extent.

Harvest activities in and near wetlands would be the same as under the proposed action, but RCAs would be wider, providing greater protections to stream-associated wetlands and resulting in fewer effects. Effects on non-stream-associated wetlands would be similar to the proposed action and no action alternative.

With the same restrictions on salvage harvest in Reserve and RCA allocations as the proposed action and greater acreage in these allocations, the potential to effect wetlands post-disturbance would be less under Alternative 3 than under the proposed action.

Prescribed burns would be prohibited in RCAs, which are the widest under Alternative 3, resulting in the lowest likelihood of effects on stream-associated wetlands compared to all other alternatives. Effects on non-stream associated wetlands would be similar to the proposed action and no action alternative.

The same minimal effects on wetlands would be expected from road, log landing, or quarry construction or lookout communication sites maintenance for the reasons described under the no action alternative.

Alternative 4: Increased Harvest

Under Alternative 4, effects on wetlands from harvest activities would have the same effects as under the proposed action, but would differ in extent.

Harvest activities in and near wetlands would be the same as under the proposed action, but RCAs would be narrower than under the proposed action and no action alternative, providing less protections to stream-associated wetlands and resulting in greater effects. Effects on non-stream-associated wetlands would be similar to the proposed action and no action alternative.

With the same restrictions on salvage harvest in Reserve and RCA allocations as the proposed action but less acreage in these allocations than both the proposed action and no action alternative, the potential to effect wetlands post-disturbance would be greater under Alternative 4.

Like the proposed action, prescribed burns would be prohibited in RCAs; however, since RCAs are narrower under Alternative 4 than the proposed action, effects on stream-associated wetlands from prescribed burns adjacent to RCAs would be greater. Effects on stream-associated wetlands would be less than under the no action alternative because the no action alternative does not prohibit prescribed burns in RMAs. Effects on non-stream associated wetlands would be similar to the proposed action and no action alternative.

The same minimal effects on wetlands would be expected from road, log landing, or quarry construction or lookout communication sites maintenance for the reasons described under the no action alternative.

3.5 Fish and Wildlife

3.5.1 Methods

The study area for fish and stream-dependent wildlife includes the streams and other waterbodies that could be affected (directly or indirectly) by forest management activities under the proposed action and alternatives. These include streams in the permit area and downstream of the permit area (the Umpqua River, Tenmile Creek and Lake, and streams leading to Coos Bay downstream of the permit area streams).

The study area for forest-dependent and wetland and riparian habitat-dependent wildlife consists of the areas where these resources could be affected directly and indirectly by the proposed action and alternatives. This includes the permit area, where forest management activities would occur, and a 1-mile buffer surrounding the permit area to encompass northern spotted owl home ranges extending beyond the permit area and potential effects extending beyond the immediate area of activities such as noise or habitat fragmentation.

For fish and other stream-dependent wildlife, the analysis considered effects on the covered species, as well as other federally listed species, Oregon Department of Fish and Wildlife (ODFW) state sensitive species, native species listed in the Oregon Biodiversity Center database, and species of recreational, cultural, or ecological significance with the potential to occur in the study area. The analysis of effects on these species considered differences in forest management activities and conservation actions related to stream and riparian habitat in the study area among alternatives. In some cases, spatial differences in activities within the study area were distinct and conclusions were drawn relative to watersheds. Sections 3.2, *Geology and Soils*, 3.3, *Water Resources*, 3.4, *Vegetation*, and 3.7, *Climate Change*, informed assessment of effects on fish and stream-dependent wildlife.

The analysis of effects on forest-dependent and wetland and riparian habitat-dependent wildlife relied primarily on the vegetation analysis described in Section 3.4, *Vegetation*, and existing literature correlating forest structure with habitat requirements, as described in Section 3.5.2, *Affected Environment*. Effects of forest management practices were assessed quantitatively by evaluating forest growth and stand age over time as described in Sections 3.1, *Introduction* and 3.4, *Vegetation*. Changes in retention of snags and downed wood/woody debris were assessed qualitatively based on descriptions of the policies and requirements under each alternative, in addition to literature on changes in snag and woody debris availability with forest succession and information in Section 3.4, *Vegetation*. Effects of road and quarry construction, management, and use were assessed qualitatively based on descriptions of the policies and requirements under each alternative. Visual and noise effects of covered activities on forest-dependent and wetland and riparian habitat-dependent wildlife were assessed qualitatively based on information related to the types and locations of covered activities and literature and knowledge related to their effects on wildlife.

3.5.2 Affected Environment

This section describes the species in the study area that are evaluated in the EIS and the habitats on which they depend. Federally listed species, candidate species, and designated critical habitats were identified through the FWS's IPaC map tool (FWS 2024), the National Oceanic and Atmospheric

Administration (NOAA) Fisheries' Species and Habitat Application (NOAA 2024a), and the NOAA Threatened and Endangered Species directory (NOAA 2024b). State-listed, sensitive, and conservation strategy species were obtained from Oregon Department of Fish and Wildlife (ODFW) websites (ODFW 2016, 2021, 2024).

Appendix 3.5-A, *Fish and Stream-Dependent Species Technical Supplement*, and Appendix 3.5-B, *Wildlife Technical Supplement*, describe the process for determining which species to consider for analysis in the EIS. Detailed descriptions of relevant life history and habitat needs and threats to covered species are provided in HCP Chapter 2, *Environmental Setting*.

3.5.2.1 Fish and Stream-Dependent Species

Fish and stream-dependent wildlife species occupy habitat throughout the study area, which ultimately lead to three drainages: the Umpqua River, Tenmile Lake and Creek, and the Coos River. Species rely on a variety of aquatic habitats depending on their unique life histories and habitat needs; therefore, instream habitat suitability for native species in the study area varies spatially based on a suite of environmental characteristics.

- Certain habitat types, substrate types, and flow characteristics are very important to different native aquatic species, including side channels, off-channel pools, in-channel pools, riffles, and calm glides.
- Water quality characteristics including temperature, contaminants, fine sediment, and dissolved oxygen levels can improve or degrade habitat for aquatic species.
- Riparian conditions in the study area influence flow conditions, temperature, sediment level, large wood contributions, and food input to streams.

Climate change may shift the timing of the flow regime (i.e., earlier floods), cause larger and flashier floods, lower summer low flows, increase stream temperatures, and increase sediment and wood input from increased landslides over the analysis term. Contributions of the riparian area to habitat, including shade and large wood, may be affected by increased fires. The community of organisms that interact with native species as co-inhabitants, predators and prey, competitors, or otherwise also affect their health and survival in the study area. Climate change is expected to increase invasive species and disease, causing additional challenges to native populations in the study area.

Table 3.5-1 lists the native fish and stream-dependent species potentially affected by the proposed action and alternatives and evaluated in the EIS, including the covered coho salmon (*Oncorhynchus kisutch*), special-status species, and species that are of ecological, cultural, and recreational interest. Each species has documented observations in the study area; known range or habitat use that encompasses the study area; or may be present but require surveys for confirmation. Brief descriptions of the listed species and a few endemic or federal species of concern habitat requirements are provided following Table 3.5-1.

Table 3.5-1. Fish and Stream-Dependent Wildlife Species Evaluated in the EIS

Common Name	Scientific Name	Status[a]	Basin-use and Habitat Needs[b]
COVERED SPECIES			
Fish			
Oregon Coast coho salmon	*Oncorhynchus kisutch*	Federal threatened Designated critical habitat State endangered Oregon Conservation Strategy species	Spawning habitat throughout plan area; some rearing habitat in HUC12's Scholfield Creek, Loon Lake-Mill Creek (Umpqua); Tenmile Lake-Tenmile Creek (Tenmile Lake and Creek); West Fork Millicoma (Coos). Streams with clean gravel, complex habitat, and cool temperatures.
NONCOVERED SPECIES			
Fish			
Eulachon	*Thaleichthys pacificus*	Federal threatened Designated critical habitat Oregon Conservation Strategy species	Critical habitat for spawning, incubation and migration in mainstem Umpqua River adjacent to plan area, Umpqua basin. Clean gravel needed for spawning and freshet flows to flush larvae to the estuary and ocean.
Oregon Coast steelhead	*Oncorhynchus mykiss*	State sensitive Oregon Conservation Strategy species	Winter steelhead: spawning and rearing across plan area; Summer steelhead: migration in Umpqua River mainstem adjacent to plan area, Umpqua basin. Gravel-bottomed, fast-flowing, well-oxygenated rivers and streams.
Oregon Coast Chinook salmon	*Oncorhynchus tshawytscha*	State sensitive Oregon Conservation Strategy species	Spring-run Chinook: rearing and migration in Umpqua River adjacent to plan area, Umpqua basin; Fall-run Chinook: spawning and rearing across plan area; Streams with clean gravel, complex habitat, and cool temperatures for spawning and rearing. Spring-run require cool, deep resting holes for holding over summer.
Pacific coast chum	*Oncorhynchus keta*	State sensitive Oregon Conservation Strategy species	Coos Basin (Spawning and rearing in lower West and East Fork Millicoma River downstream from plan area). Stream gravel bars with upwelling flow and side channels near tidewaters for spawning.
Coastal cutthroat trout	*Oncorhynchus clarki*	State sensitive Oregon Conservation Strategy species	Throughout plan area. Large woody debris, instream structures, clean gravel, and vegetation important. Juveniles prefer side channels, backwaters, or pools for rearing.

Common Name	Scientific Name	Status[a]	Basin-use and Habitat Needs[b]
Umpqua chub	*Oregonichthys kalawatseti*	State sensitive Oregon Conservation Strategy species	Umpqua Basin. Off-channel habitat (low flow, silty organic substrate, abundant vegetation, and cover).
Pacific lamprey	*Entosphenus tridentatus*	Federal species of concern State sensitive Oregon Conservation Strategy species	Throughout plan area. Requires fine gravel beds for spawning and fine sediment for larvae.
Oregon western brook lamprey	*Lampetra richardsoni*	State sensitive Oregon Conservation Strategy species	Throughout plan area. Requires fine gravel beds for spawning and fine sediment for larvae.
Western river lamprey	*Lampetra ayresi*	State sensitive Oregon Conservation Strategy species	Could be throughout plan area. Requires fine gravel beds for spawning and fine sediment for larvae.
Millicoma dace	*Rhinichthys cataractae*	Federal species of concern State sensitive Oregon Conservation Strategy species	Coos Basin (found only in the Coos and Millicoma Rivers/ endemic to this river system). Cool, swift streams. Cobbles and gravel for rearing and spawning.
Sculpin (coast range, reticulated, riffle, prickly)	Family *Cottidae*	None	Could be throughout plan area. Various habitat preferences.
Dace (speckled, Umpqua)	*Rhinichthys* (spp.)	None	Umpqua dace in Umpqua Basin. Speckled dace in Coos basin. Found in a variety of flow types including lentic and lotic.
Additional native fish (redside shiner, largescale sucker, threespine stickleback, rainbow trout)	*Richardsonius balteatus, Catastomus macrocheilus, Gasterosteus aculeatus, Oncorhynchus mykiss*	None Oregon Conservation Strategy species (rainbow trout)	Various habitat requirements.
AMPHIBIANS			
Coastal tailed frog	*Ascaphus truei*	Federal species of concern State sensitive Oregon Conservation Strategy species	Cold, clear, fast-flowing streams within forested areas. Adults need streambanks, logs, headwater springs, and gravelly seeps for foraging and hiding, and small boulders in streams for egg-laying. Tadpoles require permanent streams with moss- and sediment-free cobble and boulder substrate.

Common Name	Scientific Name	Status[a]	Basin-use and Habitat Needs[b]
Southern torrent salamander	*Rhyacotriton variegatus*	State sensitive Oregon Conservation Strategy species	Cold mountain streams, spring heads, and seeps. They prefer loose gravel stream beds and are often associated with high-gradient streams.
Pacific giant salamander	*Dicamptodon tenebrosus*	None	Cold mountain streams and lakes. Also utilize terrestrial refuge sites such as decaying wood, burrows, or under rocks
Rough-skinned newt	*Taricha granulosa*	None	Breeding habitats include ponds, wetlands, lakes, road ditches and slow-moving creeks.
INVERTEBRATES			
Floater mussels	*Anodonta* (spp.)	Oregon Conservation Strategy species	Sand and silt substrates in lower gradient streams and off-channel habitat.
Western ridged mussel	*Gonidea angulata*	Federal species of concern; Oregon Conservation Strategy species	Sand, gravel or cobble substrate and clean, cool flowing water.
Western pearlshell	*Margaritifera falcata*	None	Sand, gravel or cobble substrate and clean, cool flowing water.

[a] Status definitions:

- Designated critical habitat: A species for which critical habitat has been designated under the ESA (FWS 2024, NOAA 2024a, NOAA 2024b).
- Federal threatened: A species listed as threatened by FWS under the ESA (FWS 2024, NOAA 2024a, NOAA 2024b).
- Federal species of concern: A species under review for listing under the ESA.
- State endangered: A species listed as endangered on the Oregon Threatened and Endangered Species List (ODFW 2024).
- State threatened: A species listed as threatened on the Oregon Threatened and Endangered Species List (ODFW 2024).
- State sensitive: A species listed as an Oregon Sensitive Species. *Sensitive* refers to wildlife species, subspecies, or populations that are facing one or more threats to their populations, habitat quantity, or habitat quality or that are subject to a decline in number of sufficient magnitude such that they may become eligible for listing on the state Threatened and Endangered Species List (ODFW 2021).
- Oregon Conservation Strategy species: A species having small or declining populations, is at-risk, and/or is of management concern in Oregon (ODFW 2016).
- None: no special status but addressed in the EIS due to its ecological importance.

[b] If basin is not specified, species is potentially present in any of the three basins (Umpqua, Tenmile Lake and Creek, and Coos) within the plan area.

Oregon Coast coho salmon are federally listed as threatened and state listed as endangered and have spawning and rearing areas throughout the study area. Coho populations require passage to spawning areas, cool stream temperatures, complex habitat including deep pools and large wood, and off-channel or slow-water habitats including floodplains, beaver ponds, or even connected lakes. Coho in the study area belong in three distinct populations: the Lower Umpqua, Tenmile, and Coos. 3.5-2 identifies the independent populations that occur within each subwatershed in the permit area. All three individual populations were considered both persistent and sustainable (viable) according to the most recent NOAA evaluation (NOAA et al. 2022), and continued conservation of these populations would prevent decline and contribute to the persistence of the overall species. The biggest threats to each population include insufficient stream complexity, inadequate riparian conditions on timber lands, poor water quality, loss of beaver pond habitat, and fish passage barriers (NOAA et al. 2022). Additional details on coho population statue and habitat are discussed in HCP Chapter 2, *Environmental Setting*.

Additional salmonid species within or adjacent to the permit area include Oregon Coast steelhead, Oregon Coast Chinook salmon, Pacific coast chum, and coastal cutthroat trout. All of these species are designated as state sensitive in Oregon. Fall Chinook salmon, winter steelhead, and cutthroat trout are found throughout the permit area and chum are found primarily in the Coos River basin (Kavanagh et al. 2005), and summer steelhead and spring Chinook use the adjacent Umpqua River for migration and rearing. All prefer increased habitat complexity such as large wood, pools and riffles, and off-channel areas; cool, well-oxygenated water; and need gravels in their spawning areas.

Federally threatened eulachon have historically occurred in Tenmile Creek and Coos River, and permit area tributaries flow into the Umpqua River, which contains critical habitat for eulachon. Eulachon spend less time in freshwater than salmonids and are most sensitive to disturbance during spawning (Schweigert et al. 2012). Eulachon could utilize the Lower Umpqua and Coos Rivers during the analysis period but are unlikely to migrate into streams that occur directly within the permit area because these streams exist upstream of the tidally influenced areas that eulachon prefer.

Umpqua chub (state sensitive) are endemic to the Umpqua basin and have distribution in the northern and eastern portions of the study area. They require off-channel habitat with low flows, abundant vegetation, and cover (ODFW 2016).

Three state-sensitive species of lamprey—Pacific lamprey, Oregon western brook lamprey, and western river lamprey—are found in the study area; Pacific lamprey is a federal species of concern. They require fine gravel for spawning and developing larvae burrow into fine sediment substrate and have special requirements including specific temperature regimes (ODFW 2016). Pacific lamprey and western river lamprey are anadromous, while Oregon western brook lamprey is entirely freshwater, spending its life as a filter feeder.

A number of sculpin species may be found in the permit area. Sculpins prefer shallower, cool waters with a rapid to moderate current, and may be found from glides and riffles in mainstem rivers to headwater creeks or springs. Sculpin species may differ from each other in habitat preference, including types of substrate, flow, and temperature.

Speckled dace are found in the Coos River basin and Umpqua dace in the Umpqua River basin. They are found in a variety of flow types. Many native non-game fish species are understudied in the study area, including dace, sculpins, and other species.

Millicoma dace, a state sensitive species and federal species of concern, are endemic to the Coos River drainage, and have been found to be most abundant in the West Fork Millicoma including parts of the study area. These dace require swift water habitat with sufficient habitat complexity including cobble and boulder substrate. This type of habitat has been reduced from historical levels in the basin, primarily due to scour and channelization (Scheerer et al. 2017).

Stream-dependent wildlife discussed in this EIS include four amphibian species and three mussel species. Coastal tailed frogs, a state sensitive species and a federal species of concern, require fast-flowing, cool water in forested areas. They need both instream and riparian habitat complexity, including seeps and springs, logs, and clean hard rock stream substrate (ODFW 2016). Southern torrent salamanders, a state sensitive species, live in high-gradient streams near springs and seeps. They are sensitive to flow changes and prefer loose gravel and cool, clear water (ODFW 2016). Pacific giant salamanders are large salamanders endemic to the Pacific Northwest, and prefer forested, clear mountain streams, with some adults spending part of their life terrestrially. Rough skinned newts hide their eggs within aquatic vegetation and their breeding habitats range from roadside ditches to slow moving creeks and off-channel habitats such as wetlands and ponds.

Floater mussels may be found in the permit area, and may live up to about 15 years, becoming mature at 4 to 5 years of age. While floater mussels may be found in flowing water, they are often found among silty or sandy substrate in still or minimally moving water such as back channels, sloughs, ponds, lakes, or ditches.

Western ridged mussels may be found in the permit area, and can live up to about 30 years old, reaching maturity around age 7. They may be found individually or in aggregated beds and live in flowing freshwater streams and rivers, generally in habitats less than 10 feet in depth. Western ridged mussels require perennial water flow, and cool, well-oxygenated water. Western ridged mussel was petitioned for listing under the ESA in 2020 and this petition is under review.

Western pearlshell mussels may be found in the permit area and are the longest lived of the western U.S. mussel species; living individuals have been found over 100 years old with an average lifespan of 60 to 70 years. They can persist as scattered individuals or as dense beds of up to hundreds of mussels. As filter feeders they help improve water quality, and their dense beds can also help to stabilize river substrate and provide better habitat for fish and macroinvertebrates.

3.5.2.2 Forest-Dependent Species

Table 3.5-2 lists the forest-dependent special-status wildlife species that may be affected by the proposed action and alternatives. Forest-dependent species potentially affected and addressed in this EIS include two covered species (northern spotted owl and marbled murrelet) and the sensitive species identified as forest dependent in Table 3.5-2, and other forest-dependent wildlife of cultural or recreational importance. Species of recreational and cultural importance include deer and elk. Each species has documented observations in the study area; known range or habitat use encompasses the study area; or may possibly be present now or over the analysis period, but require additional surveys. The table also indicates the type of forest habitat each species is most likely to inhabit.

Table 3.5-2. Forest-Dependent Wildlife Species Evaluated in the EIS

Common Name	Scientific Name	Status [a]	Forest Type and Special Habitat Needs
Clouded salamander	*Aneides ferreus*	State sensitive	Early to mid-successional mature conifer forest habitats but also recent clearcuts; requires moist woody debris or rock crevices
Marbled murrelet	*Brachyramphus marmoratus*	Federal threatened Designated critical habitat State endangered	Late-successional conifer forest with specific nest tree characteristics, including large branches sufficient to support nest platforms; forest fragmentation may increase risk due to predation

Common Name	Scientific Name	Status [a]	Forest Type and Special Habitat Needs
Northern spotted owl	*Strix occidentalis caurina*	Federal threatened Designated critical habitat State threatened	Structurally complex late-successional conifer forest; forest fragmentation may affect occupancy
Evening grosbeak	*Coccothraustes vespertinus*	Bird of conservation concern	Second-growth conifer and mixed conifer-deciduous forest
Olive-sided flycatcher	*Contopus cooperi*	Bird of conservation concern State sensitive	Open mature conifer forest; riparian areas, forest openings, and forest edges
Rufous hummingbird	*Selasphorus rufus*	Bird of conservation concern	Early-successional forest and forest edges (also Wetlands: Wet meadows)
Migratory birds	Multiple	Protections under Migratory Bird Treaty Act	Multiple
California myotis	*Myotis californicus*	State sensitive	Variety of forest types; limited by snag availability
Fringed myotis	*Myotis thysanodes*	State sensitive	Variety of forest habitat with snags and boulders
Long-legged myotis	*Myotis volans*	State sensitive	Mid- to late-successional conifer near drainages
Hoary bat	*Lasiurus cinereus*	State sensitive	Late-successional conifer forest
Silver-haired bat	*Lasionycteris noctivagans*	State sensitive	Late-successional conifer forest near drainages
Red tree vole	*Arborimus longicaudus*	State sensitive	Late-successional conifer forest; forest fragmentation may affect occupancy
Coastal marten[b]	*Martes caurina humboldtensis*	Federal threatened State sensitive	Late-successional conifer forest; low survival in fragmented forests
Fisher[c]	*Pekania pennanti*	State sensitive	Late-successional forests and riparian corridors with moderate to dense canopy cover and diverse struct
Columbian black-tailed deer	*Odocoileus hemionus columbianus*	None	Variety of forest types and open areas
Roosevelt elk	*Cervus elaphus roosevelti*	None	Mix of dense forest cover and open areas

[a] Status: Definitions:

- Designated critical habitat: A species for which critical habitat has been designated under the ESA (FWS 2024).
- Federal threatened: A species listed as threatened by FWS under the ESA (FWS 2024).
- State endangered: A species listed as endangered on the Oregon Threatened and Endangered Species List (ODFW 2024).
- State threatened: A species listed as threatened on the Oregon Threatened and Endangered Species List (ODFW 2024).
- State sensitive: A species listed as an Oregon Sensitive Species. *Sensitive* refers to wildlife species, subspecies, or populations that are facing one or more threats to their populations, habitat quantity, or habitat quality or that are subject to a decline in number of sufficient magnitude such that they may become eligible for listing on the state Threatened and Endangered Species List (ODFW 2021).

- Bird of conservation concern: A species listed on the FWS Birds of Conservation Concern list (FWS 2021). These species warrant special attention in the study area per IPaC report (FWS 2024).
- None: no special status but addressed in the EIS due to its ecological importance.

[b] Despite some survey effort, no coastal martens (a subspecies of Pacific marten and sometimes called Humboldt marten) have been detected in the permit area in many decades. The latest predicted distribution model did not predict the species in this area (Moriarty et al. 2022). However, the nearest marten population is less than 12 kilometers from the plan area and given the analysis period, this species is included because it may occur in the study area over the analysis period.
[c] Fishers have not been detected in the permit area in recent years, despite some recent survey efforts, and the nearest range is more than 50 kilometers from the plan area, but the species could potentially occupy the study area over the analysis period.

Section 3.4, *Vegetation*, describes forest vegetation present in the permit area. The associations of forest-dependent species with forest stand age stages may be broad or specific, but these species tend to be limited in their distribution, survival, and reproductive success by the presence of specific forest elements such as snag and coarse woody debris availability, multilayered tree canopy, presence of trees with structural elements useful for wildlife species, and understory floristic and structural diversity.

Forests managed for timber production tend to have a simplified structure compared to natural forests because of the emphasis on producing a fully stocked crop of one or two tree species; therefore, they lack some of these elements. Even if left to regenerate naturally after timber harvest, many stands do not have adequate deadwood to meet the habitat requirements of many wildlife species. Noncrop trees and other competing vegetation have traditionally been removed from managed timber stands. Shorter rotations may not allow trees enough time to develop features such as large limbs and cavities that are used by wildlife species.

Although many wildlife species, such as northern spotted owl and cavity-nesting birds, may be associated with older conifer forests, most forest-associated species can occur with great regularity throughout all stages of forest development when suitable understory cover, legacy trees, dead and downed trees, live trees with suitable structural elements, and floristic diversity are present. Deer and elk use all forest stages for various needs. They occupy early-seral stages of the forest for forage and use older (late-seral and old growth) forests for hiding and concealment cover (Kie et al. 2008).

3.5.2.3 Wetland- and Riparian-Dependent Species

Many wildlife species in the study area are dependent on ponds, lakes, freshwater marshes, seeps, springs, wet meadows, and riparian habitat. Riparian- and wetlands-dependent species potentially affected by the proposed action and alternatives include the sensitive species identified as riparian- and wetlands-dependent in Table 3.5-3, and other, more common riparian-dependent wildlife.

Table 3.5-3. Wetland- and Riparian-Dependent Wildlife Species Evaluated in the EIS

Common Name	Scientific Name	Status [a]	Forest and Riparian Habitat and Special Habitat Needs
Coastal tailed frog	*Ascaphus truei*	State sensitive	Highly aquatic species; cold, well-shaded streams typical of old growth habitats
Northern red-legged frog	*Rana aurora*	State sensitive	Slow moving aquatic habitats and adjacent riparian, wetland, and upland forest habitats
Southern torrent salamander	*Rhyacotriton variegatus*	State sensitive	Headwater streams and riparian areas
Northwestern pond turtle	*Actinemys marmorata*	Federal threatened (proposed) State sensitive	Riparian and wetlands (aquatic)
Rufous hummingbird	*Selasphorus rufus*	Bird of conservation concern	Wetlands (wet meadows) And early successional forests
Migratory birds	multiple	Protections under Migratory Bird Treaty Act	Multiple
American beaver	*Castor canadensis*	none	Riparian and wetlands
Ringtail[b]	*Bassariscus astutus*	State sensitive	Late-successional forest with large-diameter snags and logs; riparian areas

[a] Status definitions:

- State sensitive: A species listed as an Oregon Sensitive Species. Sensitive refers to wildlife species, subspecies, or populations that are facing one or more threats to their populations, habitat quantity, or habitat quality or that are subject to a decline in number of sufficient magnitude such that they may become eligible for listing on the state Threatened and Endangered Species List (ODFW 2021).
- Federal threatened (proposed): Refers to species likely to become endangered within the foreseeable future throughout all or a significant portion of their range. FWS has proposed a draft rule to list the species as threatened. If the final determination is to list the species, the changed circumstances provision in HCP Section 7.8.2.1, *New Species Listed or Designation/Revision of Critical Habitat*, will apply.
- Protections under Migratory Bird Treaty Act: The Migratory Bird Treaty Act makes it unlawful to pursue, hunt, take, capture, kill, or sell species listed as receiving protections under this act.
- None: These species have no special status designation but were addressed in the EIS because of their ecological importance.

[b] Ringtail species' range is within the study area. Although they have not been detected in the permit area, the species is secretive and often difficult to detect if present, and therefore has the potential to occupy the study area over the analysis period.

Species such as the northwestern pond turtle and southern torrent salamander require both aquatic habitat and associated riparian habitat. Riparian habitat for wildlife addressed in this section consists primarily of deciduous vegetation near the streams' edge.[1] Riparian habitat typically supports a higher biodiversity of terrestrial species than surrounding areas. An estimated 53% of wildlife species in Oregon and Washington use riparian habitat, even though these habitats cover only an estimated 1 to 2% of the landscape (Kauffman et al. 2001:365). This high biodiversity can be

[1] Riparian vegetation described in Section 3.4, *Vegetation*, addresses a wider swath on either side of the stream that includes evergreen vegetation. The vegetation described as riparian in this section consists of freshwater forested/shrub wetland.

attributed to various factors including input of organic matter from water flows; disturbance from flooding, landslides, and debris flows that result in varied habitat composition and structure; diverse geomorphology; and high productivity due to deep soils and availability of water and nutrients (Kauffman et al. 2001:362). Northwestern pond turtles use this habitat surrounding their aquatic habitat for nesting and overwintering (Thomson et al. 2016:300). The proximity of the nest site to aquatic habitat depends on the availability of suitable nesting habitat adjacent to the occupied aquatic habitat (Jennings and Hayes 1994:101). Females usually select nest sites within 328 feet of aquatic habitat, although nests have been found 1,640 feet from a waterbody (Thomson et al. 2016:299). Additionally, American beavers (*Castor canadensis*) occur in riparian habitats and play important roles in creating suitable habitat conditions for salmon, various amphibians, and small mammals, and mitigating climate change effects on ponds along streams (Pollock et al. 2004; Stevens et al. 2007; Hood and Bayley 2008).

3.5.3 Environmental Consequences

3.5.3.1 Coho Salmon

Alternative 1: No Action

Under the no action alternative, forest management activities including timber harvest, thinning, vegetation management, prescribed burns, road system management, and quarry construction may affect all three Oregon coast coho salmon distinct population units occurring in the study area (Lower Umpqua, Tenmile, and Coos).

Harvest, thinning, road and quarry construction, salvage, prescribed burns, and other forest management activities may increase fine sediment delivery to fish-bearing streams under the no action alternative, as discussed in Section 3.2, *Geology and Soils*. Increased fine sediment has been shown to have a wide array of indirect and direct effects on freshwater fish, including coho, such as reduced or changed food resources, stress elevation, disrupted gas exchange, and physical entrapment of emerging individuals (Kemp et al. 2011). Where sediment enters spawning gravel in fish-bearing reaches, it decreases survival of eggs to fry emergence, and coho have been shown to be one of the most susceptible species to this effect (Jensen et al. 2009). Turbidity associated with increased fine sediment also can decrease growth of coho by inhibiting feeding, and juvenile coho avoid areas with high turbidity (Kemp et al. 2011). Increased coarse sediment from debris flows can cause excessive streambed scour, habitat burial, and fish mortality or injury in the short-term. Compliance with the Oregon Forest Practices Act (Oregon FPA) under the no action alternative (described in Section 3.2), including riparian management areas (RMAs) and steep slope protections, would reduce the effects of coarse sediment deposition on coho habitat across all independent population watersheds.

Anticipated effects of the no action alternative on instream conditions, particularly large wood contributions from forest management activities, are discussed in Section 3.2.3.3, *Stream Geomorphology*, and Section 3.3.3.2, *Peak Flows and Channel Conditions*. Wood contribution to streams, especially large wood and large wood structures, increases habitat complexity, changes flow to produce pools and backwaters, and encourages healthy macroinvertebrate communities, all of which benefit coho. Large wood addition in an Oregon coastal stream was shown to significantly increase coho survival (Johnson et al. 2005), and higher coho abundance has been associated with large pools often formed by or containing large wood (Gonzalez et al. 2017). Under the no action alternative, salvage harvest and prescribed burns allowed within RMAs under the no action alternative could reduce the availability of downed wood contributions to streams, but limitations on these activities within RMAs by the Water Protection Rules of the Oregon FPA (OAR 629-635-0310 through OAR 629-655-0000) would reduce adverse effects on the aquatic system and coho habitat. Wood recruitment to streams is projected to increase overall during the analysis period due to restrictions on harvest in RMAs and steep slope protections.

Anticipated effects of forest management activities on peak and low flows are discussed in Section 3.3.3.2, *Peak Flows and Channel Condition*, and Section 3.3.3.3, *Low Flows*, respectively. Coho are more vulnerable to scouring (peak) flows than some other salmonids because they are more likely to have portions of their population spawn in higher gradient, confined channels where scour has greater effects (Sloat et al. 2018). Conversely, coho have been shown to have increased survival with increased volume of water, with habitat connectivity as an important driver of population productivity (Obedzinski et al. 2018). Modeling work conducted by Ohlberger et al. (2018) demonstrated that coho productivity was significantly lowered due to decreased summer low flows in western Washington coast streams.

As discussed in Sections 3.3.3.2 and 3.3.3.3, effects of harvest activities under the no action alternative on both peak and low flows are expected to be undetectable at the subwatershed scale for all three independent coho populations. At the local scale, peak flows would increase where stream reaches drain areas with substantial forest cover loss, which may adversely affect channel structure (Reid et al. 2010) and subsequently affect coho. Under the no action alternative, subwatersheds that contain all three independent populations would experience localized increases in peak flows in some areas (Appendix 3.3, *Water Resources Technical Supplement*, Table 15). Increased large wood recruitment to streams over the analysis period would likely reduce the effects of peak flows on channel conditions and delivery of fine sediment to coho habitat, as discussed in Sections 3.2.3.3 and 3.3.3.2. RMAs would limit the effects of transpiration on low flows by allowing riparian stands to age out of the vigorously growing age class that transpires more (stands aged approximately 15 to 100 years) by the end of the analysis period (Section 3.3.3.3, Appendix 3.3). At the local scale, increases in flows during low flow periods would be expected in limited areas within the Coos and Lower Umpqua population subwatersheds (Appendix 3.3, Table 19), which could improve coho productivity in those localized areas.

Poor water quality, including high water temperature, low dissolved oxygen, and contaminants, threaten coho populations and compromise instream habitat. Coho are more susceptible to pollutants, disease (Cairns et al. 2005), or other challenges when water temperatures exceed established water temperature criteria. Effects at the individual level can cascade up to affect entire coho population productivity and abundance. All RMAs under the no action alternative are less than 120 feet, resulting in adverse effects on water temperature in all streams. Based on the temperature analysis in Section 3.3.3.4, *Water Quality*, adverse effects on coho from increased water temperatures would be greatest in small fish-bearing streams in the Umpqua basin and immediately downstream of confluences with all non-fish-bearing streams, which have narrow or no required riparian buffers, across all independent population watersheds. Restoration thinning, salvage harvest, and prescribed burns could contribute to effects on water temperatures, but restrictions on these activities within RMAs would reduce adverse effects of stream temperature increases on coho (Section 3.3.3.4). Anticipated increases in large wood recruitment would also reduce adverse effects on water quality and improve instream habitat for coho through pool formation.

Any chemical applications, including herbicide and pesticide applications, would be administered in accordance with OAR 629-620-0400. Chemical applications have the potential to harm coho populations in the study area.

Road construction may have negative impacts on coho by increasing impervious surfaces (and thus runoff and peak flows) and by increasing fine and coarse sediment inputs to streams, which would have the same effects described above for sediment increase due to harvest. Existing roads built across stream networks have the potential to decrease or limit fish passage, negatively affecting populations. Three blocked culverts and two partially blocked culverts have been identified in the permit area (HCP Section 2.5.2.1 *Rangewide Status*, Table 2-8), with most overlapping the Coos population subwatershed. Under the no action alternative, road management would adhere to the Oregon FPA forest road construction and maintenance rules (OAR 629-625-0000 through OAR 629-625-0920), which stipulate that roads will be designed, constructed, improved, maintained, or vacated to ensure passage for covered species during all mobile life-history stages. Fish passage barrier projects could be identified as part of the Forest Road Inventory and Assessment process, but there is no commitment to remove or mitigate existing fish passage barriers in the permit area during the analysis period.

Alternative 2: Proposed Action

Under the proposed action, management in the permit area would be based on the overarching research and conservation strategy described in the HCP and summarized in Section 2.1.2, *Alternative 2: Proposed Action,* of this EIS. This includes minimization and mitigation of take through meeting biological goals and objectives and implementing conservation measures and conditions on covered activities (HCP Section 5.2, *Biological Goals and Objectives*, HCP Section 5.3, *Avoidance and Minimization Measures Integrated into the Covered Activities*, HCP Section 5.4, *Conservation Measures*, and HCP Section 5.5, *Conditions on Covered Activities*). Research conducted in the permit area is expected to benefit conservation of coho through adaptive management and by applying principles learned in the permit area to other basins outside of the permit area (HCP Section 5.6, *Beneficial and Net Effects*, and HCP Chapter 6, *Monitoring and Adaptive Management*). The type of effects of forest management activities on coho would be the same for the proposed action as described for the no action alternative, but would vary in degree, location, and extent.

Under the proposed action, adverse effects in the Lower Umpqua and Tenmile population subwatersheds from sediment delivery to streams would be less than the no action alternative due to less area available for more intensive harvest treatments, wider riparian conservation areas (RCAs), commitment to instream wood placement projects, increased steep slope protections, increased salvage restrictions in RCAs, and more restrictive road management standards as explained in Section 3.2, *Geology and Soils*, and Section 3.3.3.4, *Water Quality*. In the Coos population subwatersheds, the area available for more intensive harvest treatments and RCA widths would be similar to the no action alternative, but commitment to instream wood placement projects, increased steep slope protections, increased salvage restrictions in RCAs, and more restrictive road management standards would reduce adverse effects compared to the no action alternative.

As with the no action alternative, effects of harvest activities on peak and low flows would be undetectable at the subwatershed scale for all three independent coho populations (Section 3.3.3.2, and Section 3.3.3.3). Local effects from peak flows on coho would be greater in some areas within the Coos population subwatershed and less in some areas of the Lower Umpqua population subwatershed, but overall similar to the no action alternative across most of the study area

(Appendix 3.3, Table 15). Annual harvest caps and increased large wood recruitment across all population subwatersheds could reduce local effects of increased peak flows on channel conditions and coho habitat, as discussed in Sections 3.2.3.3 and 3.3.3.2.

At the local scale, effects on low flows would be similar to the no action alternative in the Coos population subwatershed. Increases in flows during low flow periods would be greater than under the no action alternative in some areas within the Tenmile and Lower Umpqua population subwatersheds (Appendix 3.3, Table 19). Annual harvest caps and stream enhancements prescribed under Conservation Measure 1 could reduce any adverse local effects on low flows from harvest activities. Prohibition of salvage harvests in RCAs would also decrease adverse local effects on low flows compared to the no action alternative.

Under the proposed action, no adverse effect from increased water temperatures are expected for the Tenmile independent population watersheds because RCAs on all stream types would be 200 feet or wider (Section 3.3.3.4, *Water Quality*). In the Coos population subwatersheds, RCAs on fish-bearing streams in the West Fork Millicoma subwatershed (which is almost entirely within the permit area) would be 120 or 200 feet,. In other subwatersheds used by the Coos populations (all of which are partially within the permit area), buffers would be similar on fish-bearing streams, narrower on large and medium perennial non-fish-bearing, and more protective on small non-fish-bearing streams than the no action alternative. Overall protections in these Coos population subwatersheds would be similar on a subwatershed scale, but localized effects would likely differ, as described in Section 3.3.3.4. Effects on the Lower Umpqua population subwatersheds would be similar to described for the Coos population subwatershed. RCAs in the Schofield and Dean Creek–Umpqua River subwatersheds would be 200 feet (or 120 feet in the East Hakki Ridge parcel), so no adverse effects from increased temperature would occur. In other subwatersheds used by the Lower Umpqua populations, protections would be similar on a subwatershed scale, but localized effects would likely differ (Section 3.3.3.4). Greater restrictions on salvage harvest within RCAs and increased large wood recruitment and stream enhancement commitments would better mitigate temperature effects under the proposed action. Restoration thinning in RCAs could have short-term, adverse effects on water temperature as described under the no action alternative. The cap on acres of restoration thinning and requirement to test the effect on a smaller initial area under the proposed action could better minimize effects compared to the no action.

As under the no action, chemical application would be administered in accordance with OAR 629-620-0400. Under the proposed action, the combined area available for more intensive treatments, where herbicide and pesticide use and related effects on coho would be highest, would be greater in half of the study area subwatersheds and lower in the other half than under the no action alternative (Appendix 3.3, Table 13).

The proposed action commitment to upgrade or remove artificial barriers to improve access for coho salmon to habitat over the course of the permit term would reduce adverse effects on coho from existing fish barriers compared to the no action alternative. Effects from road construction and maintenance would be less than under the no action alternative due to more restrictive management standards, a commitment to reduce road density over the permit term, and a prioritization process to vacate road segments that pose the highest risks to aquatic systems (Section 3.2.3.1, *Soil Erosion*, HCP Section 3.6.1, *Road System Construction and Management*, HCP Conservation Measure 3, *Reduce Density and Negative Impacts of the Forest Road Network in the Permit Area*, and HCP Condition 11, *Road Construction and Management*).

The proposed action includes a commitment to implementing restoration thinnings in RCAs to improve ecological function, to study effects on coho salmon and their habitats, to place large wood within streams, and to cap harvest within riparian areas, which would all benefit individual coho populations. The proposed action also commits to restoration thinning in key locations within RCAs, which could foster beaver activity and habitat that would be beneficial to coho. The no action alternative does not include these commitments.

The proposed action as a whole was designed to support scientific research, creating the potential to inform understanding of effects of forestry on the health of coho populations both in the study area and statewide.

In addition, the proposed action has a commitment of a monitoring and adaptive management program, which would assist in tracking progress of habitat for coho populations in the watersheds in response to management and allow adjusted management actions in response to results. Some key monitoring elements in the HCP relevant to coho include fish surveys associated with research (HCP Section 6.2.1 *Compliance Monitoring*); turbidity monitoring upstream and downstream of a subset of new roads where they cross streams, RCAs, or equipment limitation zones; year-round water temperature monitoring across the permit area; and annual instream habitat monitoring (HCP Section 6.3, *Aquatic and Riparian Monitoring*). The proposed action also includes provisions for responding to changed circumstances (HCP Section 7.8, *Changed and Unforeseen Circumstances*), including management of new aquatic invasive plant infestations and measures to address potential changes in water temperature and flow from climate change, that would not be required under the no action alternative.

Overall, adverse effects under the proposed action would be reduced compared to the no action across all independent population watersheds.

Alternative 3: Increased Conservation

Effects on coho under Alternative 3 would be similar to the proposed action, but beneficial effects would increase and adverse effects would decrease.

Adverse effects across all individual population subwatersheds from sediment delivery to streams would be less than the proposed action and no action alternative due to less area available for more intensive harvest treatments, wider RCAs, and additional steep slope protections (Section 3.2.3.1 and Section 3.3.3.4). Adverse effects from restoration thinning in RCAs would be the same as under the proposed action.

As with the no action alternative and proposed action, effects of harvest activities on peak and low flows would be undetectable at the subwatershed scale for all three independent coho populations (Sections 3.3.3.2 and 3.3.3.3).

Local effects on peak flows would similar to the proposed action across all independent population subwatersheds. As compared to the no action alternative, local effects on peak flows would be lower in Lower Umpqua population watershed and greater in the Coos population subwatershed. Large wood recruitment would be greatest across all population subwatersheds than all other alternatives and would reduce the effects of increased peak flows on channel conditions and coho habitat, as discussed in Sections 3.2.3.3 and 3.3.3.2.

At the local scale, beneficial effects on low flows would be greater than under the proposed action in some areas in all three independent population subwatersheds. Beneficial effects on low flows from minimization and conservation measures would be the same as described for the proposed action.

Under Alternative 3, effects on coho from increased water temperatures would be less than under the proposed action (and all other alternatives) across all independent population watersheds due to the wider RCAs (Section 3.3.3.4). Increased large wood recruitment and application of restrictions on salvage harvest to wider RCAs would better mitigate temperature effects.

As under the no action, chemical application would be administered in accordance with OAR 629-620-0400. Use of pesticides or herbicides related to harvest activities and associated effects on coho would be less than all other alternative because the combined area available for clearcut and variable density harvest would be lowest in all subwatersheds (Appendix 3.3, Table 13).

Effects from existing fish barriers would be the same as under the proposed action.

Effects from road construction and maintenance would be less than under the proposed action (and all other alternatives) due to additional requirements under Conservation Measure 3 for fully vacating permanent roads, which would decrease flashiness of flows due to decreased impermeable surfaces and potentially improve passage compared to the proposed action and no action.

Overall, Alternative 3 would have the least adverse effects and most beneficial effects on coho throughout the permit area compared to all other alternatives.

Alternative 4: Increased Harvest

Effects on coho under Alternative 4 would be similar to the no action alternative, but most adverse effects would be greater.

Adverse effects across all individual population subwatersheds from sediment delivery to streams would be greater than all other alternatives due to the greatest area available for more intensive harvest treatments, narrower RCAs, and reduced steep slope protections (Section 3.2.3.1 and Section 3.3.3.4).

As with all other alternatives, effects of harvest activities on peak and low flows would be undetectable at the subwatershed scale for all three independent coho populations (Section 3.3.3.2, and Section 3.3.3.3).

Local effects on peak flows would be similar to the proposed action in the Coos and Tenmile population subwatersheds. As compared to the no action alternative, local effects on peak flows would be greater in some areas in the Lower Umpqua and Coos population subwatersheds. Large wood recruitment would be lowest across all population subwatersheds in all alternatives, and would provide the least reduction in effects of increased peak flows on channel conditions and coho habitat (Sections 3.2.3.3 and 3.3.3.2).

At the local scale, beneficial effects on low flows would be less than under the proposed action and no action alternative in the Coos and Lower Umpqua independent population subwatersheds. Beneficial effects in the Tenmile population subwatershed would be similar to the proposed action. Beneficial effects on low flows from minimization and conservation measures would be the same as described for the proposed action.

Adverse effects on coho from increased water temperatures would be similar to or greater than under the no action alternative due to narrower RCAs and reduced steep slope protections (Section 3.3.3.4), though restrictions on salvage harvest within RCAs and the commitment to stream enhancement projects could better mitigate these effects.

As under the no action, chemical application would be administered in accordance with OAR 629-620-0400. Use of pesticides or herbicides related to harvest activities and associated effects on coho would be greatest under Alternative 4 because the combined area available for clearcut and variable density harvest would be highest in all subwatersheds (Appendix 3.3, Table 13).

Effects from existing fish barriers would be the same as the proposed action. Effects from road construction and maintenance would be similar to the no action alternative due to the elimination of Conservation Measure 3 to reduce road density.

Overall, Alternative 4 would have the greatest adverse effects on coho of all alternatives and beneficial effects similar to the no action alternative.

3.5.3.2 Noncovered Fish Species

Alternative 1: No Action

Effects on noncovered fish species would be the same as coho but would vary in intensity and extent.

Eulachon are negatively affected by noise impacts, alteration of flow, passage barriers, and fine sediment or other water quality issues (Schweigert et al. 2012). Eulachon would be affected by many of the same activities as coho and would be most vulnerable to disturbance during their spawning period. Since eulachon typically spawn in the lower reaches of larger rivers which are tidally influenced (Lewis et al. 2002), they are unlikely to spawn within the permit area, which is upstream of areas with tidal influence. Since effects on peak flows, low flows, and water quality would be undetectable at a watershed scale—as discussed in Sections 3.3.3.2, 3.3.3.3, and 3.3.3.4—effects on downstream eulachon habitat outside of the permit area are expected to be minimal.

Umpqua chub could be especially affected by reduced riparian areas or harvest in riparian areas due to their requirements for moderate or no flow habitats associated with off-channel areas and habitat with extensive cover and vegetation; areas with smaller buffer widths (less than 120 feet) that are near management activities may provide less shade and a less intact riparian system under the no action alternative.

Lamprey in the study area could be especially affected by sediment pulses or landslides that may occur as a result of forest management activities under the no action alternative, due to the developing larvae burrowing in substrate. Larval development is affected by temperature regimes (ODFW 2016), so changes to the stream temperature due to management activities could negatively affect lamprey. Lamprey would also be affected by impaired water quality (high temperatures and sedimentation) and reduced flows (ODFW 2020) in the same manner as coho, described in Section 3.5.3.1, *Coho Salmon*. Other effects would be similar to those described for coho.

Effects of the no action alternative on Millicoma dace would be similar to those on coho. Millicoma dace rely on swift-flowing riffle habitat and are especially sensitive to reductions in low flows. As discussed in Section 3.3.3.3, low flows would increase in the West Fork Millicoma subwatershed due to a net gain in stands over 100 years old throughout the analysis period, which benefits Millicoma dace in the long term.

Effects on Oregon Coast Chinook salmon, Oregon Coast steelhead, coastal cutthroat trout, and other native non-game fish would be similar to those described for coho under the no action alternative but would vary based on distribution in the permit area and species-specific life histories.

- Oregon Coast fall-run Chinook salmon have distribution throughout the permit area, though they are more common in larger streams and rivers and not found in higher-gradient and smaller streams that coho use for spawning and rearing. The majority of fall-run Chinook habitat in the permit area is in the West Fork Millicoma River. Fall-run Chinook salmon spend less time as juveniles as well as less time as holding adults in fresh water than many salmonids, so are less exposed to river conditions; thus, while experiencing similar effects to coho these effects would be lessened and less related to activities occurring in and surrounding steeper headwater streams.
- Oregon Coast spring-run Chinook salmon are not found within the permit area, but occur immediately downstream of northern permit area streams that flow into the Umpqua River. Effects on spring-run Chinook would be similar to but less than effects on fall-run Chinook.
- Oregon coast winter steelhead and coastal cutthroat trout have a similar distribution to coho in the permit area but reach further into some smaller headwater streams. Juvenile steelhead may spend a year or two in fresh water before migrating to the ocean. Steelhead and coastal cutthroat trout would experience greater adverse effects than coho due to their occupancy of higher-gradient habitats and an increased number of non-fish-bearing streams with lesser protections flowing into these areas. Steelhead and cutthroat trout may be more susceptible to effects of landslides and fine sediment input than coho due to their distribution in higher-gradient habitats.

Alternative 2: Proposed Action

Effects on eulachon under the proposed action would be similar to those described for coho, but lessened due to the majority of spawning habitat outside of the permit area. Reduced adverse effects on stream temperatures under the proposed action would especially benefit eulachon because they spawn at cooler temperatures (Lewis et al. 2002).

Effects on Umpqua chub would be similar to those described for coho, especially the Lower Umpqua independent population. Umpqua chub would experience beneficial effects from the proposed action as compared to no action due to greater riparian protections.

Effects on lamprey would be similar to those described for coho under the proposed action.

Effects on Millicoma dace would be reduce compared to the no action alternative on the subwatershed and local scales because although harvest levels would be similar in the West Fork Millicoma watershed, riparian protections would be greater.

Effects on Oregon Coast Chinook, Oregon Coast steelhead, Pacific Coast chum, coastal cutthroat trout, and other native fish in the study area would be similar to those described for coho under the proposed action.

Alternative 3: Increased Conservation

Effects on noncovered fish species under Alternative 3 would be the similar to those described for coho under Alternative 3; decreased harvest throughout the permit area and increased riparian protections would increase benefits to noncovered fish species compared to both the no action alternative and the proposed action. Low flows would be greater in the West Fork Millicoma compared to the no action alternative and proposed action, resulting in greater benefits to Millicoma dace, fall-run Chinook, and all species in this basin.

Alternative 4: Increased Harvest

Effects on noncovered fish species under Alternative 4 would be similar to those described for coho under Alternative 4. Adverse effects on all species would be greater than under the no action alternative.

3.5.3.3 Noncovered Stream-Dependent Wildlife Species

Alternative 1: No Action

Many effects on noncovered stream-dependent wildlife species would be similar to those described for fish above, especially for stream-dependent wildlife that co-exist with fish—freshwater mussels, and some amphibians and other invertebrates. Freshwater mussels are more vulnerable to many disturbances than fish due to their inability to migrate to more suitable habitat and are especially affected by changes in flow regimes (scouring flood flows or lower low flows) and by fine sediment pulses and chemicals. The no action alternative would adversely affect non-fish species that reside in headwater and fishless streams due to limited riparian protections in many headwater and fishless areas. Many amphibians are more successful in these areas due to less competition with fish or predation by fish.

Coastal tailed frogs would experience adverse effects from loss of habitat complexity and disturbance in riparian areas due to thinning activities or harvest, especially in non-fish-bearing streams with less riparian protection and would be sensitive to changes in stream temperatures due to forest management activities. Coastal tailed frogs would experience decreased resilience as a population overall due to loss of habitat connection (Wahbe 2003). Southern torrent salamanders primarily rely on humid, cool, and stable headwater habitats (ODFW 2016) and would experience adverse effects from direct loss of suitable habitat due to stream impacts especially in non-fish-bearing streams. Loss of forest cover due to harvest, and decreased habitat connectivity due to road building, would be detrimental to southern torrent salamanders (Emel et al. 2019) and other stream-dependent amphibians.

Alternative 2: Proposed Action

Under the proposed action, effects on noncovered stream-dependent wildlife species in the study area would be the same as described for coho due to the reduced area available for more intensive harvest, increased riparian and steep slope protections, increased wood recruitment and placement, and reduced road density compared to the no action alternative. Adverse effects on coastal tailed frogs related to stream temperature and loss of habitat connection would be less than under the no action alternative overall. At the local scale, loss of habitat connection could increase compared to the no action on some non-fish-bearing streams in some watersheds in the MRW where RCAs are narrower than the no action. Adverse effects on noncovered stream-dependent wildlife that are more successful in non-fish-bearing streams (i.e., some amphibians) would decrease in watersheds where RCAs on these streams are wider than the no action and increase where they are narrower.

Alternative 3: Increased Conservation

Effects of Alternative 3 on stream-dependent wildlife species would be the same as described for coho under Alternative 3, with decreased adverse effects as compared to both the no action alternative and proposed action. In addition, for stream-dependent species that use riparian and upland habitat, increased restrictions on riparian thinning under Alternative 3 would reduce trampling of amphibians and riparian habitat and the expanded commitments for road management activities would reduce barriers to overland migration for amphibians.

Alternative 4: Increased Harvest

Effects of Alternative 4 on stream-dependent wildlife species would be the same as described for coho under Alternative 4, with adverse effects greater than under the no action alternative.

3.5.3.4 Covered Forest-Dependent Species

Northern Spotted Owl

Alternative 1: No Action

Removal or modification of forest habitat through timber harvest would be the primary driver affecting northern spotted owl under the no action alternative. Other activities that would affect the species include construction and use of supporting infrastructure (e.g., roads and quarries), salvage harvest, prescribed burns, and herbicide and pesticide use, all of which could remove or degrade northern spotted owl habitat or prey base. Maintenance of communications facilities and lookout sites would have negligible effects on the species' habitat because these facilities are already developed and would not result in habitat removal. In addition to forest habitat loss and modification, behavioral disturbance due to noise and human presence (e.g., along roads) would be a primary mechanism affecting spotted owls.

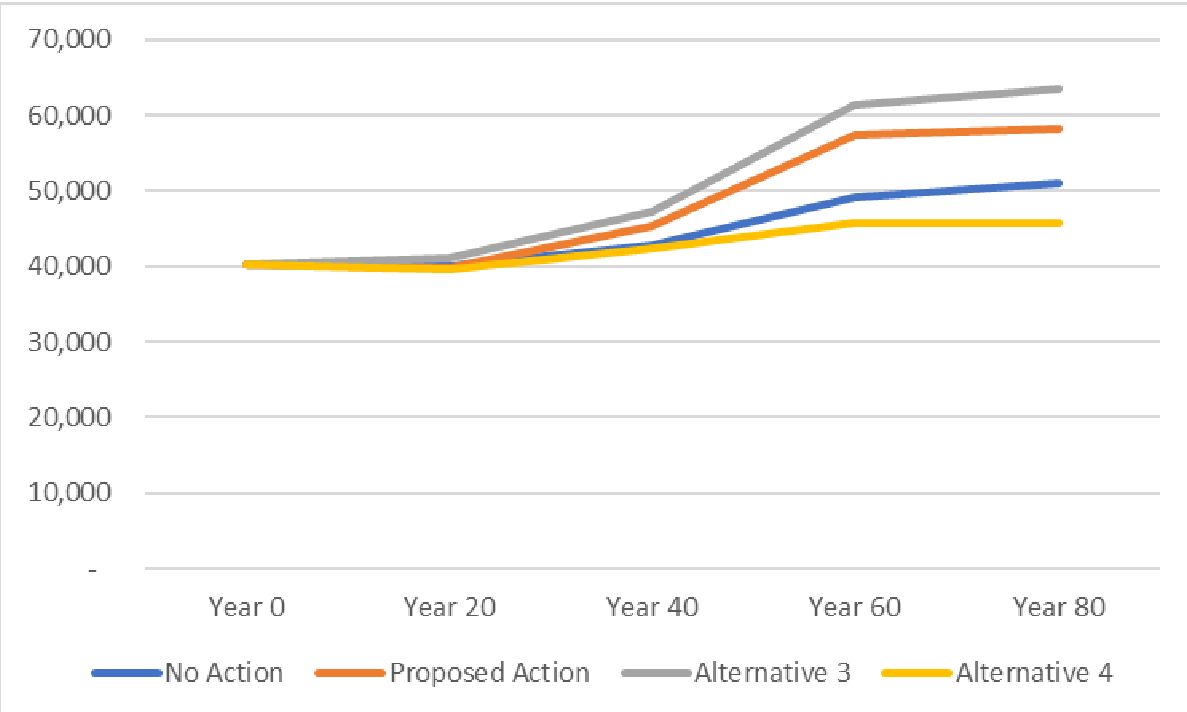
Under the no action alternative, take of northern spotted owl would not be authorized. DSL would manage the permit area for timber production and would use the standards of protection described in Section 2.1.1, *Alternative 1: No Action*, to avoid incidental take.

Although there would be no commitment to increase northern spotted owl habitat under the no action alternative, the species' habitat is projected to increase over the analysis period through the take avoidance strategy. Forest stands in areas designated as no treatment (Figure 3.1-1) to avoid take of ESA-listed species are mostly mid-seral and older and would continue to age over the analysis period. Based on the forest stand age projections described in Section 3.4, *Vegetation*, combined northern spotted owl nesting, roosting, and foraging habitat, as represented by late-seral and old growth stands, in the permit area would decrease slightly during the first 20 years, then increase throughout the remainder of the analysis period for a net increase of 10,834 acres (27%). Table 3.5-4 and Figure 3.5-1 show combined acres of late-seral and old growth stands at 20-year increments over the analysis period.

Table 3.5-4. Combined Late-Seral and Old Growth Stands (Acres) by Alternative

Alternative	Year 0	Year 20	Year 40	Year 60	Year 80	Increase over Analysis Period
No Action	40,281	40,066	42,863	49,245	51,115	10,834
Proposed Action	40,287	39,802	45,264	57,372	58,322	18,035
Alternative 3	40,287	41,148	47,271	61,448	63,532	23,246
Alternative 4	40,287	39,531	42,453	45,705	45,691	5,405

Figure 3.5-1. Projected Combined Late-Seral and Old Growth Stands (Acres) by Alternative Over the Analysis Period



Outside of areas where harvest would be restricted to avoid take of ESA-listed species, the forest would be managed for sustained timber production and would not develop beyond the mid-seral stage. Therefore, they would not provide suitable habitat for northern spotted owl nesting, roosting, or foraging.

The projected increase in combined late-seral and old growth habitat assumes that the 22 northern spotted owl activity centers considered currently occupied would remain occupied over the analysis period. If northern spotted owl occupancy in the study area continues to decline over time due to competition with barred owls or other factors unrelated to habitat availability (Franklin et al. 2021), unoccupied areas could be removed from protection, resulting in less protected habitat. This could reduce the late-seral and old growth projections described above; however, based on stand age projections that were developed assuming no owl protections, the reduction would only be up to 2% over the analysis period. Estimated reductions are small because habitat protected to avoid take of marbled murrelet would also be suitable habitat for northern spotted owl.

As shown in Figure 3.5-2, projected northern spotted owl habitat (late-seral and old growth stands) at year 80 of the analysis period is highly fragmented across the permit area, reducing not only the total amount of nesting, roosting, and foraging habitat, but increasing risk of exposure of northern spotted owls to indirect effects of harvest activities adjacent to intact habitat (e.g., noise, human disturbance).

Construction of supporting infrastructure such as roads and quarries could also result in habitat removal in addition to the habitat loss from harvest. Additionally, increased access to occupied habitat provided by roads could result in disturbance of northern spotted owl feeding, breeding, and sheltering behavior as a result of noise and human presence and introduction of invasive plant species (Section 3.4.3.2, *Spread of Invasive Weeds*) that could reduce habitat quality.

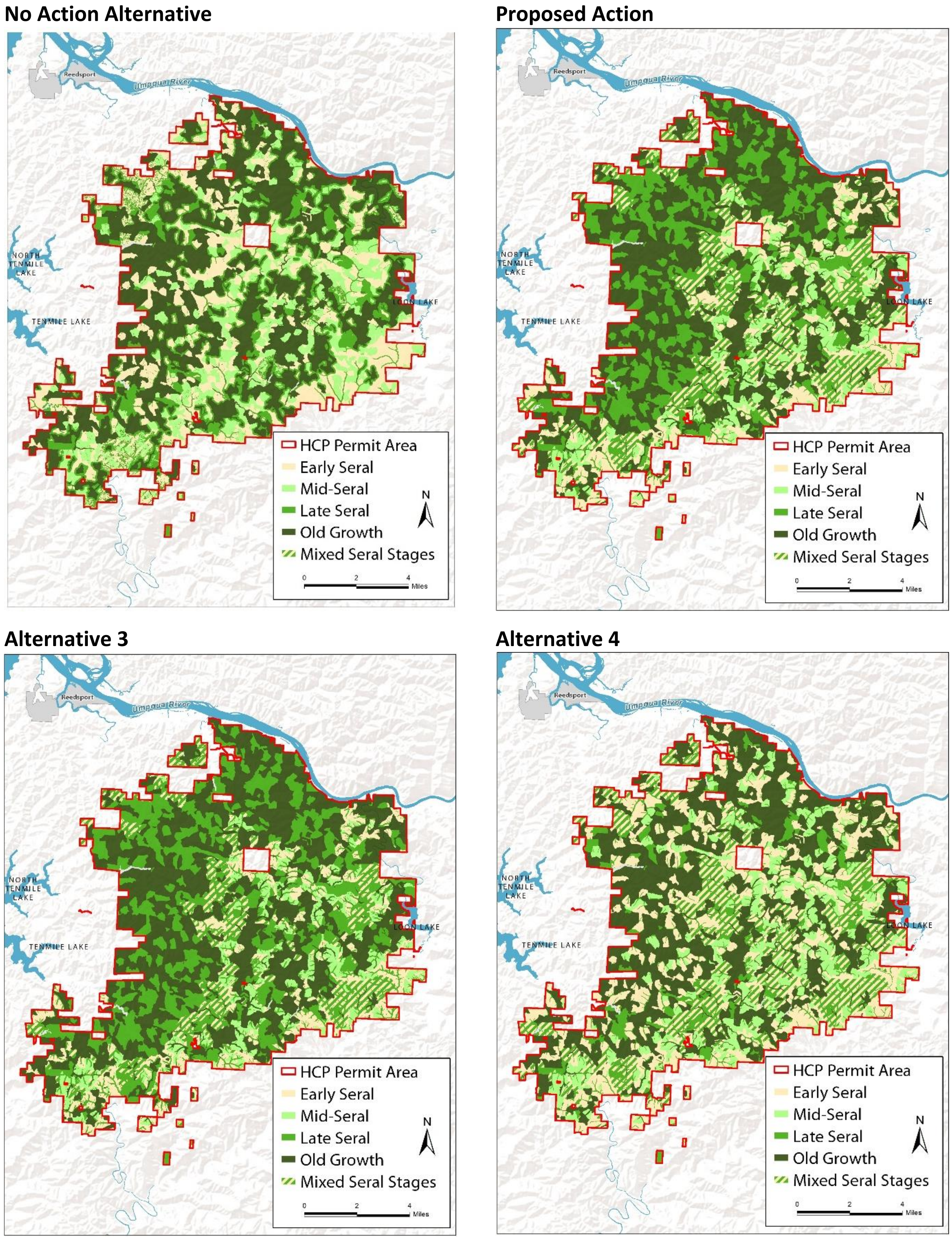
Prescribed burns would follow Oregon FPA requirements and best management practices and would be required to avoid take of northern spotted owl. Because prescribed burns would primarily occur on landings following harvest or in areas for replanting, they would not occur in late-seral or old growth forest that provides habitat for northern spotted owl.

Use of herbicides and pesticides could indirectly affect northern spotted owls by reducing prey base. However, herbicide use is not expected to adversely affect necessary structural habitat components for spotted owls. All use would be required to follow restrictions under the Oregon FPA and to avoid take of northern spotted owls; therefore, effects on the species are expected to be minimal.

Disturbance events such as wildfire, windstorms, forest pests, and diseases will likely affect the availability, quality, and spatial distribution of spotted owl habitat in unpredictable ways over the analysis period. DSL would need to shift harvest locations in response to large disturbance events such as fires or storms if spotted owl distribution shifts because of disturbance. Since only occupied habitat would be protected, areas could continue to be logged if spotted owls or marbled murrelets do not occupy them following disturbance and would not likely mature into spotted owl habitat in the future. DSL would have the ability to implement salvage harvest following natural disturbances, with no requirement to restore the habitat, potentially impeding the ability of damaged sites to provide legacy elements useful to spotted owls. This may lead to a decrease in the likelihood of occupation by the species and the long-term species persistence.

Monitoring of the spotted owl population would be limited to required occupancy surveys prior to timber harvest. There would be no provisions for habitat monitoring or adaptive management under the no action alternative. Adequate habitat patch size, habitat connectivity, and dispersal habitat to support viable populations for northern spotted owls would not be assured. Connectivity between habitat patches may be ultimately limited to riparian corridors, as these may be the only areas with continuous corridors of intact habitat. Under the no action alternative, DSL would have no commitment to respond to competition from barred owl populations.

Figure 3.5-2. Projected Distribution of Stands at Each Seral Stage at End of Analysis Period



Source: Forest stand age projections described in Section 3.4, *Vegetation*.

Alternative 2: Proposed Action

The mechanisms affecting northern spotted owl under the proposed action would be the same as described for the no action alternative, but FWS would issue authorization for incidental take of this species for the permit term. Management in the permit area would be subject to the overarching research and conservation strategy of the HCP (Section 2.1.2, *Alternative 2: Proposed Action*), which would minimize and mitigate take through meeting the HCP's biological goals and objectives (HCP Section 5.2, *Biological Goals and Objectives*) and implementing the HCP's conservation measures (HCP Section 5.4, *Conservation Measures*) and conditions on covered activities (HCP Section 5.5, *Conditions on Covered Activities*). Furthermore, research conducted in association with the proposed action is expected to benefit conservation of the species as a whole, beyond the study area, as the results of research may be applied to other areas where barred owls threaten northern spotted owls throughout the species' range.

Under the proposed action, forest management would conform to the covered activities described in HCP Chapter 3, *Covered Activities*, and summarized in Section 2.1.2.2, *Covered Activities*, of this EIS. The HCP's stay-ahead provision (HCP Chapter 7, *Implementation and Assurances*) requires the permittee to replace northern spotted owl habitat lost to harvest with at least as much habitat of equivalent or better quality grown over the permit term within the conservation research watershed (CRW) and the management research watershed (MRW) Reserves. As stated in HCP Objective 1.1, 27,000 acres of northern spotted owl nesting/roosting habitat and 11,000 acres of northern spotted owl foraging habitat would be retained and enhanced for the species. Furthermore, as stated in HCP Objective 1.2, the amount of nesting, roosting, and foraging habitat in the permit area would be increased by 14,000 acres by the end of the permit term.

Like under the no action alternative, based on the forest stand age projections described in Section 3.4, *Vegetation*, the combined amount of northern spotted owl nesting, roosting, and foraging habitat, as represented by late-seral and old growth stands, would decrease slightly during the first 20-year period, then increase through the remainder of the analysis period (Table 3.5-4 and Figure 3.5-1). However, net habitat increases over the analysis period are projected to be much greater under the proposed action, 18,035 acres (45%) compared to 10,834 acres (27%) under the no action alternative. Moreover, the proposed action includes a commitment to increase northern spotted owl habitat by at least 14,000 acres by the end of the permit term, while the no action alternative includes no commitment to increase habitat for this species.

Initially, HCP Condition 3 (Habitat Retention in Northern Spotted Owl Core Use Areas) would be applied to the core use areas around the 22 northern spotted owl historic activity centers shown in HCP Figure 2-7. These existing activity centers are distributed across the CRW and MRW. If new spotted owl activity centers are identified in the future, DSL, in coordination with FWS, could choose to remove protections from an inactive historic activity center within the MRW in favor of the active. newly discovered activity center. This "swapping" of nest sites would maintain protections on at least 22 core use areas. The potential loss would be similar to the no action alternative where inactive sites are no longer protected.

While habitat increases alone would not necessarily result in increase in spotted owl populations due to many factors, including barred owl competition, the CRW and MRW areas are projected to collectively increase the capacity of the study area to support northern spotted owl territories and provide important demographic support for the Coast Range population.

As shown in Figure 3.5-2, the CRW would provide a large, contiguous area of late-seral and old growth forest at year 80, compared with widespread clearcut areas resulting in scattered patches of early-seral state forest patches under the no action alternative. In the MRW, clearcut harvest would be limited in extent compared to the no action alternative with early- and mid-seral forest primarily occurring in the southeastern portion of the study area, with large areas of intact habitat consolidated in the west and north. These differences would result in less northern spotted owl habitat fragmentation and a greater amount of total nesting, foraging, and dispersal habitat compared to the no action alternative. Reduced fragmentation would result in reduced risk of exposure of northern spotted owls to indirect effects of harvest activities adjacent to intact habitat (e.g., noise and human disturbance).

Road system management and development of quarries could also result in habitat removal, increased access to occupied habitat, increased noise in habitat adjacent to roads and quarries, and increased spread of invasive species, similar to the no action alternative. However, the HCP commitment to reduce road density in 10-year increments over the permit term (Conservation Measure 3) would result in fewer impacts related to these activities compared to the no action alternative.

Prescribed burns may be used in specified conditions to accomplish research objectives but would not be allowed in RCAs. These burns would follow the same Oregon FPA requirements and best management practices as described under the no action alternative and would result in the same effects where implemented, although prescribed burns would not be expected to adversely affect northern spotted owl habitat since they would be designed to ensure HCP biological objectives for the species are met.

Use of herbicides and pesticides is expected to be reduced under the proposed action because of the reduced amount of more intensive harvest, especially clearcut, and reduced road density and use compared to the no action alternative. As described for the no action alternative, these activities would be required to comply with Oregon FPA and because they are not covered activities would need to avoid take under the ESA.

As under the no action alternative, unpredictable events such as wildfire, windthrow, and forest pest/disease outbreaks, which may increase in frequency and intensity with climate change, may affect availability and suitability of northern spotted owl habitat. Although individuals may move across the landscape to respond to altered habitat, the locations of protected areas would not change under the proposed action based on species occurrence as they would for the no action alternative, except for minor temporary shifts under changed circumstances. The set designation of protected area locations could be a disadvantage for the species because protected areas would not shift to adapt to changing environmental conditions. The focus on fixed habitat conservation areas under the proposed action would have benefits, however, in that prohibition of salvage harvest in Reserves and RCAs in response to these events would provide opportunities for habitat to recover. The requirement for salvage harvest in other allocations to be consistent with the treatment standards for that allocation and to consider the biological legacy characteristics of stands prior to disturbance when conducting salvage in other allocations would provide additional opportunities for habitat restoration following disturbance. Additionally, under the proposed action, the adaptive management program (HCP Chapter 6, *Monitoring and Adaptive Management*) and changed circumstances provisions (HCP Section 7.8, *Changed and Unforeseen Circumstances*) would be used to respond to these changes in a manner that aligns with achievement of the HCP's biological goals and objectives for northern spotted owl and other covered species.

Compared to the no action alternative, the HCP's conservation strategy would provide a greater measure of certainty that northern spotted owl habitat will be maintained for the species' conservation needs, particularly in relation to meeting the HCP's biological goal of retaining and enhancing existing northern spotted owl nesting, roosting, and foraging habitat and increasing the availability of these habitat types in the permit area. Monitoring programs would inform understanding of habitat and species abundance and distribution trends and confirm compliance with the conditions of the HCP (or indicate whether changes are needed). Research would be conducted to assess appropriate actions for reducing effects of barred owls on spotted owl populations, and research would be integrated into HCP monitoring and data collection to inform the approach for removal of barred owls, the timing and extent of which would be determined in part by experimental design (Conservation Measure 4). The adaptive management process would facilitate incorporation of new scientific information about listed species and advances in forest management techniques and facilitate adjustment of conservation measures to improve implementation of the conservation strategy.

Alternative 3: Increased Conservation

Effects on northern spotted owl under Alternative 3 would be similar to the proposed action but would result in more habitat for the species at each 20-year period. Net habitat increases over the analysis period are projected to be 23,246 acres (58%) under Alternative 3, compared to 18,035 acres (45%) under the proposed action and 10,834 acres (27%) under the no action alternative (Table 3.5-4 and Figure 3.5-1). As shown in Figure 3.5-2, the CRW would provide the same large, contiguous area of late-seral and old growth forest at year 80 as the proposed action, but Alternative 3 would have more late-seral and old growth stands with greater connectivity in the MRW. Increased areas of Reserves and RCAs would reduce the areas where salvage harvest could be implemented in response to disturbance events compared to the proposed action, increasing the potential for habitat to recover after disturbance.

Alternative 4: Increased Harvest

Habitat increases under Alternative 4 would be similar to the no action during the first 40 years of the analysis period but would drop off during the last 40 years. Net habitat increases over the analysis period are projected to be 5,405 acres (13%) under Alternative 4, compared to 18,035 acres (45%) under the proposed action and 10,834 acres (27%) under the no action alternative (Table 3.5-4 and Figure 3.5-1). As shown in Figure 3.5-2, late-seral and old growth stands would be scattered throughout the permit area similar to the no action alternative but in smaller patches, resulting in increased habitat fragmentation and risk of exposure to adjacent noise and human disturbance.

Restrictions on road system management and associated potential for adverse effects would be similar to the no action alternative. Impacts of quarries would be similar to the no action alternative. As under the proposed action, salvage harvest would be prohibited in Reserves and RCAs; however, these areas would be reduced under Alternative 4, which would decrease opportunities for habitat recovery compared to the proposed action.

Marbled Murrelet

Alternative 1: No Action

The mechanisms affecting marbled murrelets under the no action alternative are similar to those described for the northern spotted owl. Under the no action alternative, take of marbled murrelet would not be authorized, and the permittee would use the standards, which include all provisions set forth in the Survival Guidelines for Marbled Murrelet (OAR 635-100-0137) described in Section 2.1.1, *Alternative 1: No Action*, which require state agencies to designate and protect occupied sites and associated buffers to avoid incidental take.

As described for northern spotted owl, although there would be no commitment to increase marbled murrelet habitat under the no action alternative, forest stands in areas where harvest would be restricted to avoid take would continue to age. Based on the forest stand age projections presented in Section 3.4, *Vegetation*, the combined amount of late-seral and old growth stands (which provide marbled murrelet habitat) in the permit area would decrease slightly during the first 20 years, then increase throughout the remainder of the analysis period for a net increase of 10,834 acres (27%) (Table 3.5-4 and Figure 3.5-1). However, if owls decline in the study area, these habitat projections could be up to 2% less.

Forest stands in areas designated as no-treatment or restoration thinning only (Figure 3.1-1) would develop characteristics over time that are suited to nesting, including large-diameter trees with appropriate platform branches. As shown in Figure 3.5-2, projected marbled murrelet habitat (late-seral and old growth stands) at year 80 of the analysis period would be highly fragmented across the permit area, reducing not only the total amount of nesting, foraging, and dispersal habitat, but increasing risk of exposure of marbled murrelets to indirect effects of harvest activities adjacent to intact habitat (e.g., noise, human disturbance).

As described for northern spotted owl, habitat that is not avoided (e.g., confirmed unoccupied) would be available for harvest, with clearcutting the primary method. Assuming harvest rotation cycles of approximately 60 years, these unprotected areas would likely not develop necessary habitat elements to support the species.

Construction and use of supporting infrastructure such as roads and quarries would have the same effects on marbled murrelet as those described under the no action alternative for northern spotted owl.

Prescribed burns would follow Oregon FPA requirements and best management practices and would avoid take of marbled murrelet. Because prescribed burns would primarily occur on landings following harvest or in areas for replanting, they would not occur in late-seral or old growth forest that provides habitat for marbled murrelet.

As described for northern spotted owls, use of herbicide and pesticides would be required to follow restrictions under the Oregon FPA and avoid take of marbled murrelets under the ESA; therefore, effects on the species are expected to be minimal.

Disturbance events would affect the marbled murrelet over the analysis period as described under the no action alternative for spotted owl. DSL would need to shift harvest locations in response to large disturbance events such as fires or storms if spotted owl distribution shifts because of disturbance. Since only occupied habitat would be protected, areas could continue to be logged if spotted owls or marbled murrelets do not occupy them following disturbance and would not likely mature into marbled murrelet habitat in the future. DSL would have the ability to implement salvage following natural disturbances, with no requirement to restore the habitat, potentially impeding the ability of damaged sites to provide legacy elements useful to marbled murrelets. This may lead to a decrease in the likelihood of occupation by the species and the long-term species persistence.

Monitoring of the marbled murrelet population would be limited to required occupancy surveys prior to conducting timber harvest, but there would be no monitoring requirements over the entire permit area, and no provisions for adaptive management under the no action alternative. There would be no assurance of retaining adequate habitat connectivity, leading to increases in habitat fragmentation and greater amounts of forest/clearing edge. These changes would increase edge effects, including increasing rates of nest predation by corvids. Although incidental take of marbled murrelets would be avoided, the no action alternative would not contribute to recovery of the species because it would not reduce habitat fragmentation and edge effects such as increased nest predation.

Alternative 2: Proposed Action

The mechanisms affecting marbled murrelets under the proposed action would be the same as described for the no action alternative, but FWS would issue authorization for incidental take over the permit term. Management in the permit area would be subject to the overarching research and conservation strategy of the HCP (summarized in Section 2.1.2, *Alternative 2: Proposed Action*), which would minimize and mitigate take through meeting the HCP's biological goals and objectives (HCP Section 5.2) and implementing the HCP's conservation measures (HCP Section 5.4) and conditions on covered activities (HCP Section 5.5). In addition, research conducted in association with the proposed action is expected to provide information that will help benefit the conservation of the species as a whole.

Take under the HCP may result from edge effects. Harvest treatments adjacent to marbled murrelet nesting habitat could create a hard edge that would subject any nesting murrelets to increased risk of nest site predation and could alter habitat through microclimate effects. This effect would occur at the affected site for several years until regeneration occurs to create a softer edge and less direct access to nesting stands for predators. Conservation Measure 5, however, includes a commitment and procedures for establishing buffers to limit the creation of new hard edges, minimizing edge effects on the species. HCP Objective 2.3 requires maintenance of an area-weighted habitat suitability index of 0.25 across the permit area, and limits reduction of habitat suitability due to edge effects to 7.2% throughout the permit term. This ensures that the net marbled murrelet habitat value across the permit area does not drop below the net marbled murrelet habitat value at the beginning of the permit term, and that the percent of marbled murrelet habitat negatively affected by harvest-related edge effects does not exceed the percent of edge present at the beginning of the permit term.

HCP Objective 2.1 requires retention and enhancement of 17,000 acres of marbled murrelet habitat meeting the definition of occupied habitat, and HCP Objective 2.2 requires marbled murrelet nesting habitat in the permit area to increase by 13,000 acres. The HCP's research design and treatments, together with conservation measures and conditions on covered activities (HCP Chapter 5, *Conservation Strategy*), are projected to result in a net increase in marbled murrelet habitat over the permit term through habitat maintenance, enhancement, and expansion. The stay-ahead provision in HCP Chapter 7, *Implementation and Assurances,* requires the permittee to replace marbled murrelet habitat lost to harvest with at least as much habitat of equivalent or better quality grown over the permit term within Reserves.

Like the no action alternative, based on the forest stand age projections described in Section 3.4, *Vegetation*, the combined amount of marbled murrelet habitat, as represented by late-seral and old growth stands, would decrease slightly during the first 20-year period, then increase through the remainder of the analysis period (Table 3.5-4 and Figure 3.5-1). However, net habitat increases over the analysis period are projected to be much greater under the proposed action, 18,035 acres (45%) compared to 10,834 acres (27%) under the no action alternative. Moreover, the proposed action includes a commitment to increase marbled murrelet habitat by at least 13,000 acres by the end of the permit term, while the no action alternative includes no commitment to increase habitat for this species.

Increases in habitat are expected to support colonization and increase of the nesting marbled murrelet population over time. Habitat increases would also improve the value of existing habitat by reducing edge effects through the creation of larger blocks of nesting habitat as a factor of expanding habitat over time as described for northern spotted owl and illustrated in Figure 3.5-2.

As shown in Figure 3.5-2, the CRW would provide a large, contiguous area of late-seral and old growth forest at year 80, compared with widespread clearcut areas resulting in scattered patches of early-seral forest under the no action alternative. In the MRW, clearcut harvest would be limited in extent compared to the no action alternative with early- and mid-seral forest primarily occurring in the southeastern portion of the study area, with large areas of intact habitat consolidated in the west and north. These differences would result in less habitat fragmentation compared to the no action alternative, which would reduce risk of exposure of marbled murrelets to indirect effects of harvest activities adjacent to intact habitat (e.g., noise and human disturbance).

Impacts of construction and use of supporting infrastructure such as roads and quarries would be reduced compared to the no action as described under the proposed action for spotted owl.

Prescribed burns would follow the same Oregon FPA requirements and best management practices as described under the no action alternative and would result in the same effects where implemented, although prescribed burns would not be expected to adversely affect marbled murrelet habitat since such burns would be designed to ensure HCP biological objectives for the species are met.

Use of herbicides and pesticides is expected to be reduced under the proposed action as described for the northern spotted owl. As under the no action, these activities would be required to comply with Oregon FPA and, because they are not covered activities, to avoid take under the ESA; therefore effects on the species are expected to be minimal.

Similar to the no action alternative, disturbance events such as wildfire, windthrow, and forest pest/disease outbreaks, which may increase in frequency and intensity with climate change, may affect availability and suitability of study area forests for marbled murrelets. Although individuals may move across the landscape to respond to altered habitat, the locations of protected areas would not change under the proposed action based on species occurrence as they would for the no action alternative, except for minor temporary shifts under changed circumstances. The set designation of protected area locations could be a disadvantage for the species because protected areas would not shift to adapt to changing environmental conditions. The focus on fixed protected areas under the proposed action would have benefits, however, in that prohibition of salvage harvest in Reserves and RCAs and retention standards in areas available for extensive treatments would provide opportunities for habitat to recover. Additionally, under the proposed action, the adaptive management program and changed circumstances provisions would be used to respond to these changes, with the overarching goal of meeting the HCP's biological goals and objectives for marbled murrelet and other covered species.

Compared to the no action alternative, the proposed action's conservation strategy would provide a greater measure of certainty that marbled murrelet habitat would be maintained for the conservation needs of the species, particularly in relation to meeting the HCP's biological goal of increasing occupied and potentially occupied marbled murrelet habitat in the permit area. Monitoring programs would inform understanding of habitat and species abundance and distribution trends and confirm compliance with the conditions of the HCP (or indicate whether changes are needed). Moreover, the research programs considered in the HCP (HCP Appendix C) and the adaptive management process would facilitate incorporation of new scientific information about listed species and advances in forest management techniques, and facilitate adjustment of conservation measures to improve implementation of the conservation strategy.

Alternative 3: Increased Conservation

Effects on marbled murrelet under Alternative 3 would be similar to the proposed action but would result in more habitat for the species at each 20-year period. Net habitat increases over the analysis period are projected to be 23,246 acres (58%) under Alternative 3, compared to 18,035 acres (45%) under the proposed action and 10,834 acres (27%) under the no action alternative (Table 3.5-4 and Figure 3.5-1). As shown in Figure 3.5-2, the CRW would provide the same large, contiguous area of late-seral and old growth forest at year 80 as the proposed action, but Alternative 3 would have more late-seral and old growth stands with greater connectivity in the MRW. Increased areas of reserve and RCAs would reduce the areas where salvage harvest could be implemented in response to disturbance events compared to the proposed action, increasing the potential for habitat to recover after disturbance.

Alternative 4: Increased Harvest

Habitat increases under Alternative 4 would be similar to the no action during the first 40 years of the analysis period but would drop off during the last 40 years. Net habitat increases over the analysis period are projected to be 5,405 acres (13%) under Alternative 4, compared to 18,035 acres (45%) under the proposed action and 10,834 acres (27%) under the no action alternative (Table 3.5-4 and Figure 3.5-1). As shown in Figure 3.5-2, late-seral and old growth stands would be scattered throughout the permit area similar to the no action alternative but in smaller patches, resulting in increased habitat fragmentation and associated risk of exposure to adjacent noise and human disturbance.

Edge effects described under the proposed action would also occur under Alternative 4, which could increase predation risk and alter habitat through microclimate effects for nesting murrelets compared to the no action alternative. Restrictions on road system management and associated potential for adverse effects would be similar to the no action alternative. Impacts of quarries would be similar to the proposed action and no action alternative. As under the proposed action, salvage harvest would be prohibited in in Reserves and RCAs; however, these areas would be under Alternative 4, which would decrease opportunities for habitat recovery compared to the proposed action.

3.5.3.5 Noncovered Forest-Dependent Wildlife Species

Alternative 1: No Action

The mechanisms that affect noncovered forest-dependent wildlife species would be the same as described for northern spotted owl, except that there would not be take avoidance requirements for the nonlisted species. Protections under the Migratory Bird Treaty Act (MBTA) for migratory birds would apply; DSL will continue to implement best management practices to avoid and minimize impacts to migratory birds. For species that inhabit late-seral and old growth forests, including special-status species listed for these seral stages in Table 3.5-2 and migratory birds dependent on these seral stages, the effects of forest protection and structural change in areas designated as no-treatment or restoration thinning only would be similar to those described for the northern spotted owl because they have similar habitat requirements. Forest stands in these areas would continue to age.

Based on forest stand age projections, described in Section 3.4, *Vegetation*, the amount of combined late-seral and old growth stands in the permit area is projected to decrease slightly during the first 20 years, then increase throughout the remainder of the analysis period for a net increase of 27% (Table 3.5-4 and Figure 3.5-1). If northern spotted owls decline in the study area, these projections could be reduced by up to 2%. However, there would be no commitments under this alternative to increase these habitats.

As shown in Figure 3.5-2, projected late-seral and old growth stands at year 80 of the analysis period would be highly fragmented across the permit area. Forest stands in these areas would develop characteristics over time that are suited to nesting, including large-diameter trees with appropriate platform branches.

Changes in early- to mid-seral forest could affect special-status species associated with these seral stages as listed in Table 3.5-2, and migratory birds associated with these seral stages. As depicted in Figure 3.4-1 and Table 1 in Appendix 3.4, *Vegetation Technical Supplement*, the no action alternative is projected to result in a fluctuating increases and decreases in early- and mid-seral stage forest, over the analysis period, with early-seral habitat ranging between 8 and 23% of the permit area and mid-seral stage forest ranging between 16 and 41%.

Structural changes that decrease availability of snags and coarse woody debris, reduce understory diversity, and reduce canopy structural complexity may be more important than stand age. This is because most of the forest-associated species have the ability to use a range of forest stand ages as long as specific structural elements are present. For example, clearcut harvest would decrease availability of coarse woody debris, adversely affecting clouded salamanders.

Fragmentation of forested blocks would result from forest management under the no action alternative. Some species could benefit from increased access to openings, such as rufous hummingbird, olive-sided flycatcher, and hoary bat, provided adjacent forest habitat provides specific structural elements such as snag trees.

Where clearcut harvest occurs, removal of late-seral, multilevel forest structure would reduce hiding and concealment cover but increase patches of foraging habitat for deer and elk.

Because of the lack of take avoidance requirements for the nonlisted wildlife species, noise and visual disturbances as well as removal of occupied habitat during timber harvest and road and quarry construction, use, and management could disrupt feeding, breeding, and foraging behavior or cause injury or death of these species.

As described for northern spotted owl, prescribed burns would not occur in late-seral or old growth forest; therefore, they are not expected to affect noncovered species dependent on these habitat types. Because prescribed burns create or maintain openings and new growth, they would be beneficial for species dependent on early seral forest and forest openings.

Use of herbicides and pesticides could indirectly affect forest dependent wildlife by reducing prey base and causing injury or mortality to some species. All use would be required to follow restrictions under the Oregon FPA and to avoid take of listed species; therefore, effects on other forest-dependent wildlife are expected to be minimized.

Disturbance events may also affect habitat for noncovered forest-dependent species over the analysis period as described under the no action alternative for spotted owl. Restricting salvage only in areas occupied by listed species after disturbance and having no requirement to restore remaining habitat would limit the potential for affected stands to mature into habitat for these species. This would reduce the likelihood of occupation by the species dependent on late-seral or old growth forest, and these species' long-term persistence. This may, however, benefit species dependent on early-seral forests and forest openings.

Alternative 2: Proposed Action

The mechanisms that affect other noncovered forest-dependent wildlife species would be the same as described for the no action alternative. Protections under the MBTA would be the same as under the no action alternative.

The management goals and objectives developed to minimize and mitigate incidental take of the covered forest-dependent species would provide benefits to other noncovered species that occupy similar late-seral and old growth forest habitats. Based on forest stand age projections, described in Section 3.4, *Vegetation*, the combined projected availability of late-seral and old growth habitat would be greater than under the no action alternative, with associated increases in the structural elements as described in Section 3.5.3.4, *Covered Forest-Dependent Species*. Moreover, the proposed action includes a commitment to increase these habitats, while the no action alternative includes no such commitment.

This increase in late-seral and old growth habitat under the proposed action would increase the capacity for wildlife that depend on these seral stages to expand into new areas under the proposed action. As described above for northern spotted owl and marbled murrelet (and shown in Figure 3.5-2), the proposed action would also provide larger, more contiguous habitat areas than under the no action alternative, providing increased ability for dispersal and decreased risk of exposure to disturbances such as noise and human activity associated with timber harvest activities. This increase in densely vegetated areas that are less fragmented would increase hiding and concealment opportunities for deer and elk.

Similar to the no action alternative, where harvest occurs, the proposed action would have adverse effects due to habitat removal and potential adverse effects of noise and human disturbance. Habitat for species dependent on early-seral forest, including deer and elk foraging habitat, is projected to increase throughout the analysis period (from 11 to 17%), but less on average than under the no action alternative (Table 1 in Appendix 3.4).

Similar to the no action alternative, without conservation measures for the nonlisted wildlife species under the proposed action, noise and visual disturbances as well as removal of occupied habitat during timber harvest and road and quarry construction, use, and management could disrupt feeding, breeding, and foraging behavior or cause injury or death of these species. Because harvest activities would be reduced compared to the no action, associated adverse effects would also be less. Reduced harvest under the proposed action compared to the no action would result in reduced beneficial effects on the sensitive species that use forest edge and clearcut openings, as described under the no action.

Prescribed burns may be used in specified conditions to accomplish research objectives but would not be allowed in RCAs. These burns would follow the same Oregon FPA requirements and best management practices as described under the no action alternative and would result in the same effects on noncovered forest-dependent species where implemented.

Use of herbicides and pesticides is expected to be reduced under the proposed action as described for the northern spotted owl. As under the no action, these activities would be required to comply with Oregon FPA and to avoid take of listed species under the ESA; therefore, effects on other forest-dependent wildlife are expected to be minimized.

As described under the no action alternative, disturbance events may also affect habitat for noncovered forest-dependent species over the analysis period. Prohibition of salvage harvest in Reserves and RCAs in response to these events under the proposed action would provide opportunities for habitat to recover. Salvage operations in areas available for extensive treatments under the proposed action would consider the biological legacy of the stand prior to the disturbance event, providing additional opportunities for habitat restoration following disturbances. Additionally, under the proposed action, the adaptive management program (HCP Chapter 7, *Implementation and Assurances*) would be used to respond to these changes in a manner that aligns with achievement of the HCP's biological goals and objectives for northern spotted owl and other covered species, thus benefiting noncovered species with similar habitat needs.

Alternative 3: Increased Conservation

Habitat for wildlife species dependent on late-seral and old growth forest and connectivity of that habitat would be greatest under Alternative 3 as described for northern spotted owl (Table 3.5-4 and Figures 3.5-1 and 3.5-2). Habitats for wildlife species dependent on early-seral forests are projected to be least among alternatives over the analysis period (Table 1 in Appendix 3.4). Increased areas of Reserves and RCAs would reduce the areas where salvage harvest could be implemented in response to disturbance events compared to the proposed action, increasing the potential for habitat to recover after disturbance. With the lowest area available for harvest among the alternatives, Alternative 3 would cause the least disruption of feeding, breeding, and foraging behavior from noise and visual disturbances and least potential for injury or death from removal of occupied habitat. It would also have the least beneficial effects on the sensitive species that use forest edge and clearcut openings as described under the no action.

Alternative 4: Increased Harvest

Habitat for wildlife species dependent on late-seral and old growth forest and connectivity of that habitat would be least under Alternative 4 as described above for northern spotted owl (Table 3.5-4 and Figures 3.5-1 and 3.5-2). Habitat for species dependent on early-seral forest is projected to increase most among the alternatives over the analysis period. With the greatest area available for harvest among the alternatives, Alternative 4 would cause the most disruption of feeding, breeding, and foraging behavior from noise and visual disturbances and greatest potential for injury or death from removal of occupied habitat. It would also have the greatest beneficial effects on the sensitive species that use forest edge and openings as described under the no action alternative.

3.5.3.6 Noncovered Wildlife Species Dependent on Wetlands and Riparian Habitat

Alternative 1: No Action

Trees for timber harvest are only occasionally found in riparian habitat (i.e., freshwater forested/shrub wetland) and wetlands; therefore, timber harvest is unlikely to occur in these habitats. Harvest activities adjacent to wetlands could affect wetland vegetation or function due to soil erosion, compaction, or changes to hydrology.

Effects of forest management, road construction and use, quarry construction and use, and prescribed burns on wetland and riparian habitat in the permit area are described in Section 3.4.3.4, *Wetland Vegetation*. These effects would be minimized through compliance with the Water Protection Rules of the Oregon FPA (OAR 629-635-0310 through OAR 629-655-0000).

Species potentially affected, including migratory birds and the federally proposed threatened northwestern pond turtle, are listed in Table 3.5-2. Riparian-associated species such as northwestern pond turtle and northern red-legged frog would be afforded some protection by harvest restrictions within RMAs as stated in the Oregon FPA. Vegetation removal could occur in non-stream associated wetlands smaller than 8 acres located outside of RMAs. Applicable take avoidance measures under the MBTA would apply to nesting migratory birds. Amphibians could be killed or injured during harvest operations and adversely affected by habitat loss. Bat species that typically forage along watercourses and over wetlands could be adversely affected if vegetation removal occurs outside of RMAs. Prescribed burns allowed in RMAs or smaller non-stream-associated wetlands could injure or kill wildlife in these areas.

Use of herbicides and pesticides could indirectly affect wetland-dependent wildlife by reducing prey base and causing injury or mortality to some species. Compliance with restrictions under the Oregon FPA would be expected to minimize effects.

Alternative 2: Proposed Action

Wider RCAs under the proposed action than the no action alternative would better protect upland habitat adjacent to streams for northwestern pond turtle and species that are limited to the vicinity of aquatic habitat. Protections under the MBTA would be the same as under the no action alternative. Prescribed burns would be prohibited in RCAs, resulting in less effects on stream-associated wetlands and riparian habitats than under the no action alternative.

Use of herbicides and pesticides is expected to be reduced under the proposed action as described for the northern spotted owl. As under the no action, these activities would be required to comply with Oregon FPA and to avoid take of listed species under the ESA; therefore, effects on noncovered wetland-dependent wildlife are expected to be minimized.

Conservation Measure 1, *Targeted Restoration and Stream Enhancement*, could include creation or re-creation of beaver habitat, which would result in benefits to beavers and other wildlife species dependent on using riparian habitat under the proposed action. Northwestern pond turtle and northern red-legged frogs would benefit from this measure as their aquatic and riparian habitat would be enhanced and restored. There would be no similar commitments under the no action.

Alternative 3: Increased Conservation

Alternative 3 has wider RCAs than the proposed action and no action alternative, resulting in the greatest protection of upland habitat adjacent to streams for northwestern pond turtle and species that are limited to the vicinity of aquatic habitat. Protections under the MBTA would be the same as under the no action alternative and proposed action. The extent of effects from prescribed burns would be less than under proposed action and the no action alternative. Effects of pesticide use and beneficial effects of habitat restoration from Conservation Measure 1 would be the same as under the proposed action.

Alternative 4: Increased Harvest

Alternative 4 has narrower RCAs than the proposed action and no action alternative, resulting in the lowest protection of upland habitat adjacent to streams for northwestern pond turtle and species that are limited to the vicinity of the aquatic habitat. Protections under the MBTA would be the same as all other alternatives. The extent of effects from prescribed burns would be greater than under the proposed action but less than under the no action. Effects of pesticide use and benefits of habitat restoration from Conservation Measure 1 would be the same as under the proposed action and Alternative 3.

3.6 Air Quality

3.6.1 Methods

The study area for air quality consists of the permit area and areas within 5 miles where air quality could be affected by the proposed action and alternatives, which includes the plan area.

3.6.2 Affected Environment

The U.S. Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS) for six air pollutants determined to be criteria pollutants (commonly emitted air contaminants that affect human health), including carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter 10 and 2.5 microns or less in diameter (PM10 and PM2.5), and sulfur dioxide (EPA 2022a:1-3). Air quality is determined by measuring ground-level ambient (outdoor) air pollutant concentrations over certain time periods.

EPA designates geographic regions as nonattainment areas when measured concentrations of these air pollutants exceed the NAAQS for specific pollutants and time periods, and as attainment areas when pollutant levels are less than the NAAQS. EPA designates former nonattainment areas that have reduced pollutant levels below the NAAQS as maintenance areas. There are no air quality nonattainment or maintenance areas in the study area (EPA 2022b:1).

Some pollutants, specifically particles emitted by fires, can affect air quality by contributing to regional haze and reduced visibility. The Clean Air Act lists other pollutants known as hazardous air pollutants, which are pollutants known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. The Oregon Department of Environmental Quality (ODEQ) Air Quality Division implements EPA's air quality regulations, including the NAAQS. ODEQ has delegated smoke management responsibilities to the Oregon Department of Forestry (ODF). The state's smoke management rules (OAR 629-048-0001 through 629-048-0500) require dispersion, dilution, and avoidance techniques to minimize smoke impacts on mandatory Class 1 areas,[1] designated air quality nonattainment and maintenance areas, and Smoke Sensitive Areas.[2] There are no mandatory Class 1 areas or Smoke Sensitive Areas in the study area (ODF 2020:4). The nearest Class 1 area is the Kalmiopsis Wilderness 62 miles to the south and the closest Smoke Sensitive Area is the Coos Bay/North Bend 12 miles to the southwest.

3.6.3 Environmental Consequences

Air quality impacts under the proposed action and alternatives would be driven by equipment exhaust from timber harvest activities, thinning, reforestation, and road system management. Differences in emissions under the alternatives would be approximately proportional to board feet harvested and miles of road constructed and maintained. Annual average board feet harvested and associated criteria pollutant emissions are projected to be greatest under Alternative 4 and the no

[1] Mandatory Class 1 areas are areas, such as designated Wilderness Areas, identified under the Clean Air Act as requiring the highest level of protection.

[2] A Smoke Sensitive Area is an area that has the highest level of protection under the Oregon Smoke Management Plan due to a history of smoke incidents, its population density, or from a legal protection related to visibility.

action alternative followed by the proposed action and Alternative 3. Under the proposed action and Alternatives 3 and 4, construction of new permanent roads would be limited to 1 mile in any given year, which could reduce emissions compared to the no action alternative, which does not have a limit. Also, the commitment to reduce road density in the permit area under the proposed action and Alternative 3 would reduce emissions from road maintenance activities compared to the no action alternative and Alternative 4. The remaining covered activities would have no or negligible differences in the degree of activity among alternatives.

Under all alternatives, forest management activities would use vehicles and equipment that emit air pollutants, including criteria pollutants and hazardous air pollutants from engine exhaust and fugitive particulate matter (dust) from travel on roadways and disturbed earth surfaces. Effects would tend to be localized and specific to the conditions and equipment in use within a localized area.

Under all alternatives, vehicle and equipment use typically would be short term and intermittent at any one location, depending on the work schedule and the specific equipment in use. Continued compliance with ODEQ requirements for fugitive emissions (OAR 340-208-0210) would ensure that dust emissions are suppressed with watering. Ongoing maintenance of vehicles and equipment would keep equipment emissions in compliance with their emission certification standards. Therefore, these activities are not likely to cause a violation of ambient air quality standards or have an adverse effect on long-term air quality in the study area.

Use of prescribed burning would cause emissions through the combustion of biomass. They have the potential to emit air pollution at sufficient levels to measurably affect temporary air quality within the study area. Because prescribed burns are intentionally kept small and controlled and do not affect the overstory, they would not have the potential to reach any smoke-sensitive areas. Compliance with required prescribed burning regulations under the state's smoke management rules (OAR 629-048-0001 through 629-048-0500) would ensure that smoke emissions from prescribed burns do not violate ambient air quality standards or impair visibility within or outside of the study area, consistent with the EPA Regional Haze Rule (40 Code of Federal Regulations Parts 51 and 52) and Oregon's Visibility Protection Plan (OAR 340-200-040) for Class 1 Areas.

3.7 Climate Change

3.7.1 Methods

The study area for climate change consists of two areas: (1) the central Oregon coastal region where effects of climate change on environmental resources could overlap with effects of the proposed action and alternatives, and (2) the regional and global climate that the proposed action and alternatives would affect through greenhouse gas (GHG) emissions and carbon storage.

Climate change is analyzed based on the Council on Environmental Quality's (CEQ) 2023 interim guidance that recommends agencies address climate change impacts by considering (1) the potential effects of the proposed action on climate change as indicated by changes in GHG emissions, and (2) the effects of climate change on a proposed action and its environmental impacts (88 *Federal Register* 1196).[1] Most significantly, the 2023 interim guidance recommends that the social cost of GHG emissions be included in the analysis to provide a more accessible metric for decision makers.

Section 3.7.2.1, *Climate Change,* presents the anticipated effects of climate change on environmental resources in the central Oregon coastal region, based on general circulation models and published assessments. These climate change effects are also acknowledged as part of the changing environmental baseline in the affected environment descriptions in Sections 3.3, *Water Resources*, 3.4, *Vegetation*, 3.5, *Fish and Wildlife*, and 3.8, *Recreation and Visual Resources*, consistent with 40 CFR 1502.15. The potential for the incremental effects of the proposed action and alternatives to result in cumulative effects on these environmental resources when combined with the effects of climate change is discussed in Chapter 4, *Cumulative Effects.*

Section 3.7.3, *Environmental Consequences*, describes GHG emissions and carbon sequestration under the proposed action and alternatives. Carbon sequestration was estimated using standing tree age projections, described in Appendix 3.4, *Vegetation Technical Supplement*, at 20-year intervals (2025, 2045, 2065, 2085, and 2105) over the analysis period. The number of acres of stand age were converted to metric tons of carbon stored based on carbon density by stand age as reported in Christensen et al. (2019:76). An average rate of carbon storage was calculated based on the age projection. In addition, carbon released from forestry operations (harvesting) and road construction, described below, was then subtracted to estimate annual average storage. The difference between the annual average storage and the storage at Year 0 is reported as the annual average change in carbon sequestration. GHG emissions were calculated from forest operations using the following approach.

- Estimated average annual harvest volume was based on projected acreage of equivalent clearcut harvest from the stand age projections (not including thinning) and million board feet (MMBF) per acre based on Newton (2023).
- The highest modeled GHG emissions rates from forestry operations in the Oregon Coast Range (Sonne 2006:9) were used to conservatively estimate the GHG emissions rate by using the

[1] CEQ issued the interim guidance to assist agencies in analyzing GHG and climate change effects under NEPA. CEQ issued the guidance as interim guidance so that agencies could make use of it immediately while CEQ seeks public comment on the guidance. CEQ intends to either revise the guidance in response to public comments or finalize the interim guidance (88 *Federal Register* 1196).

conversion factor emission rate of 108 metric tons (MT) of carbon dioxide equivalent (CO_2e) per MMBF harvested[2,3] includes emissions from precommercial thinning, commercial thinning, herbicide, fertilization, and transport to mill.

Road system management would result in GHG emissions from equipment use and vehicle activity. Because estimates for equipment use and vehicle activity were not readily available, this analysis calculates GHG emissions from road construction using the following approach:

- Fuel consumption related to construction of 40 miles of new permanent roads over the analysis period assuming no more than 2 new miles of permanent roads each year under all alternatives.
- Fuel consumption rate of 588 gallons of diesel fuel per mile of road constructed, based on a U.S. Forest Service study (Loeffler et al. 2009:5) assuming road slopes of less than 50%.[4]
- The GHG emissions factors (carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O] per gallon) for diesel fuel mobile equipment recommended by the most recent U.S. Environmental Protection Agency guidance (EPA 2021:2-3). The emissions factor was converted to CO_2e per gallon using the 100-year global warming potential values from the *Intergovernmental Panel on Climate Change Sixth Assessment Report* (IPCC 2022:44), yielding an emissions factor of 23 pounds CO_2e per gallon.

3.7.2 Affected Environment

3.7.2.1 Climate Change

Mean annual temperatures in Oregon have risen 2.5 degrees Fahrenheit (°F) since the beginning of the twentieth century and temperatures in the 1990s and 2000s were higher than any other historical period. 2015 was the warmest year since 1895 and Oregon experienced a multitude of drought impacts; 2014 was the third warmest. The periods 2005–2009 and 2015–2020 saw the highest number of extremely hot days. Winter warming is also occurring, as evidenced by a below-average occurrence in the frequency of very cold nights since 1990 and the number of freezing days near or below average since 1995, in addition to 2000–2004 having the lowest multiyear value (Frankson et al. 2022). Wintertime warming across the northern United States has been greater than summertime warming (Vose et al. 2017), though the data for southern Oregon show fairly uniform historical warming across all seasons with the exception of spring, which shows the least warming (Halofsky et al. 2022).

Although the Pacific Northwest has among the least amount of projected future temperature change in the United States, climate change will continue to affect the study area through the analysis period (Vose et al. 2017). Climate models project continued warming this century, though there is a large

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[2] The study's GHG inventory boundary, which accounts for the emissions within the permit area, excluded emissions associated with production at sawmills and construction of facilities and equipment.

[3] The emissions factors used in the study to model emissions from offroad equipment and vehicles are based on year 2006 and prior engines. Vehicle and equipment engine emissions factors improve over time due to improvements in emissions control technologies and more stringent regulations. Therefore, use of this study is conservative in that it results in an overestimate of emissions expected during the future analysis years.

[4] Fuel consumption estimates are based on historical vehicle and equipment engines with less fuel-efficient engines than would be generally expected over the future years of the analysis period. Use of these values is, therefore, conservative in that it overestimates fuel consumption and, thus, GHG emissions.

range of projected temperature increases using both high (RCP8.5) and low (RCP4.5) emissions scenarios. By the 2050s, models suggest Oregon may experience little change in average daily temperature to as much as temperatures 5°F higher. It is highly likely that by the end of the century Oregon will experience warming of at least 5°F if not warming exceeding 8°F (Vose et al. 2017; Dalton and Fleishman 2021). Downscaled modeling for the end of the century under the low (RCP4.5) emissions scenario (RCP4.5) shows the largest increases in temperature occurring in the summertime. Under the high emissions scenario (RCP8.5), the largest increases are projected for the summer and fall seasons (https://climate.northwestknowledge.net/MACA). Below 5,900 feet, the growing season could become year-round as freeze events become a rare occurrence. Even at the highest elevations, the length of the growing season, which is indicative of warming, could increase to nearly 9 months as winter low temperatures continue to increase (Halofsky et al. 2022).

Areas west of the Cascades currently experience large variations in seasonal rainfall amounts and also see large annual variations. Since 1895, no trend in annual precipitation has been detected. While uncertain, models suggest that winter precipitation will increase, with more falling as rain as opposed to snow, and summer precipitation will decrease. Higher temperatures will result in more precipitation falling as rain at high elevations as the snow line rises, a substantial decline in mountain snowpack, earlier snow melt, and decreases in summer streamflow as a result (Frankson et al. 2022). Snowpack throughout Oregon, especially on the west slope of the Cascade Range at low to intermediate elevations, has been accumulating more slowly, reaching lower peak values, and melting earlier. These trends are likely to continue, and even accelerate, as temperature increases (Dalton and Fleishman 2021). Cascade spring snowpack declined 23% between 1930 and 2007 (Stoelinga et al. 2010). Mote et al. (2018) documented further declines in spring snowpack through 2016. As a harbinger, the unusually low western U.S. snowpack of 2015 may become the norm. By mid-century snow water equivalent is projected to be 41% lower, snow cover reduced by 22%, and snowfall 11% lower than the 1901–1960 baseline under the high emissions scenario (RCP8.5). By the end of the century the projections are snow water equivalent 90% lower, snow cover reduced by 73%, and snowfall 50% lower (Wehner et al. 2017).

Oregon has not experienced an upward trend in the frequency of extreme precipitation events. The number of 2-inch or higher precipitation events has been highly variable since 1900 and mostly below normal since 2000. The last three decades have seen 5-year periods with both the highest (1995–1999) and lowest (2000–2004) frequency of extreme precipitation events (Frankson et al. 2022). Much of the precipitation along the U.S. west coast is delivered by “atmospheric rivers.” These events play a beneficial role in building up snowpack but are also the source of the majority of floods in the region.

Under the high emissions scenario (RCP8.5) the number of extreme events (exceeding a 5-year return period) more than doubles over the historical average by the end of the twenty-first century. Under the lower emissions scenario (RCP4.5), climate models show more limited increases in frequency. There is strong evidence, both from the observed record and modeling studies, that increased water vapor resulting from higher temperatures is the primary cause of the increases. Atmospheric rivers, especially along the west coast of the United States, are projected to increase in number and water vapor transport and experience landfall at lower latitudes by the end of the twenty-first century (Easterling et al. 2017).

Anticipated streamflow changes include higher winter peak flow events associated with increased rain and rain-on-snow in mid to higher elevations that may yield increased flooding, and overall declines in summer baseflows (Reilly et al. 2018; Halofsky et al. 2022). One study found that seasonal extreme runoff will increase seasonally west of the Cascades with the highest extremes during winter and fall (Najafi and Moradkhani 2015). Higher winter precipitation in conjunction with higher winter peak flow events will increase soil moisture, increase landslide risk, and potentially degrade aquatic habitat.

Climatic warming is already causing reduced summer low flows and streamflow timing has shifted earlier at many sites (Dalton et al. 2017:18–19). The 2015 drought generated very low streamflows and elevated stream water temperatures is a preview of what might be expected with continuing warming (Dalton et al. 2017:13). Distribution and abundance of coldwater fish species are expected to decrease as reduced streamflow and higher water temperature reduce suitable habitat. Increasing temperature and changes in the amount and timing of precipitation and runoff will also affect water quality, water availability, soils, and vegetation (Halofsky et al. 2022).

While the Oregon Coast Range is typically associated with infrequent but severe fire events, recent research shows that the study area's fire history comprises a more frequent, mixed-severity fire regime (OSU 2023:Appendix J). Archival photographs also support this research (Beck pers. comm. 2024). Climate change is expected to increase dryness of forest fuels, which will increase vulnerability of forests to wildfire even in cool and wet areas. Estimated expansion in area burned by the 2080s based on a 2.2°F increase in temperature and projected precipitation changes in western Oregon is quadruple the average annual area burned from 1916 to 2007 (Mote et al. 2014). If future larger, more severe and more frequent wildfire patterns manifest as expected, previously denser, moist forests may begin resembling their drier, lower-elevation mixed-conifer and hardwood counterparts in structure and composition (Sheehan et al. 2019; Busby et al. 2020).

While fire may be seen as the driver of these future changes, climate is projected to be the proximate cause due to water deficits. Soil water deficits will occur as a result of longer, hotter growing seasons and will increase tree stress, vulnerability to insects and disease, and fuel flammability. Through the resultant tree mortality and vegetation change, vegetation shifts are likely through the twenty-first century regardless of fire regime changes (Sheehan et al. 2019). Resilience of existing forest will be negatively affected by climate change directly and also indirectly from greater risk of erosion from floods on fire-scarred landscapes and by invasive species. Vegetation change may lead to altered structure and function of ecosystems and will alter wildlife habitat, with both beneficial and adverse effects depending on animal species and ecosystem. Animal species with a narrow range of preferred habitats (e.g., riparian, old forest) will be the most vulnerable to more disturbance and large-scale shifts in flora (Halofsky et al. 2022).

As noted, higher air temperature will produce loss of soil moisture and cause changes in the abundance and distribution of vegetation species, with drought-tolerant species being more competitive. Riparian areas may be increasingly sensitive to lower summer streamflows and higher evapotranspiration, decreasing the extent of the riparian zone and altering plant community composition. Drier conditions and more frequent fire in riparian areas may favor conifers over species typically associated with riparian areas (e.g., deciduous hardwoods). The amount of early-seral forest is expected to increase as fire frequency increases (Halofsky et al. 2022). Plant species distributions are likely to shift northward and upward in elevation with warming temperatures assuming there is sufficient soil moisture to support them.

3.7.2.2 Greenhouse Gas Emissions and Carbon Sequestration

GHGs include CO_2, CH_4, N_2O, water vapor, and ozone, all of which occur in the natural environment. Human activities contribute to additional GHG emissions in the atmosphere from activities such as fossil-fuel combustion and the use of industrial gases (e.g., sulfur hexafluoride). The Intergovernmental Panel on Climate Change (IPCC) has confirmed that this buildup of GHGs in the atmosphere is changing Earth's energy balance and causing the atmosphere and oceans to warm, in turn affecting precipitation patterns, cloud cover, ocean currents, ocean acidification, polar snowfall, and decrease in ice accumulation, leading to sea-level rise (IPCC 2022).

A carbon pool (or storage) is a system that has the capacity to both take in and release carbon. Transfer of carbon from the atmosphere to any other carbon pool is called *carbon sequestration*. Sequestration occurs in forests when plants photosynthesize CO_2 and convert it to carbon in plant biomass and soil. Live vegetation and the forest floor/soils typically accumulate carbon, while dead vegetation emits carbon into the atmosphere through cellular respiration and decomposition. The absolute quantity of carbon that has been sequestered and stored within the forest ecosystem at a specified time is called forest carbon stock. Estimated existing carbon stock in standing trees in the permit area is approximately 16 million MT CO_2e. A carbon pool is deemed a carbon sink if, during a given time interval, more atmospheric carbon flows into it than flows out of it.

3.7.3 Environmental Consequences

3.7.3.1 Effects of the Proposed Action and Alternatives on Climate Change

Under the proposed action and alternatives, forest management activities would result in GHG emissions related to vehicle and equipment use and prescribed burns, while forest stands, vegetation, and soils would sequester carbon from the atmosphere and store carbon in the permit area. The amount of GHG emissions would vary under the proposed action and alternatives depending on the level of forest management activities. Similarly, the amount of carbon flowing into (sequestered) or out of (emitted) the carbon pool and stored in trees, vegetation, and soils would vary depending on the amount of timber harvest, thinning, and soil disturbance, with timber harvest being the primary driver.

Table 3.7-1 shows projected change in average annual carbon sequestration from standing trees compared to existing conditions and average annual GHG emissions from quantified covered activities under the proposed action and alternatives. The proposed action and Alternative 3 would result in a net increase in carbon sequestered from the atmosphere, with Alternative 3 sequestering almost twice as much as the proposed action. Under the no action alternative and Alternative 4, average annual carbon sequestration from standing trees would decrease compared to existing conditions and emissions from the other quantified activities would add to this reduction, resulting in a net increase in carbon emissions. Alternative 4 carbon release is almost twice as much as the no action. Covered activities that were not quantified (i.e., prescribed burns and vehicle and equipment exhaust from use, maintenance, abandonment, and decommissioning of supporting infrastructure) would subtract from the carbon pool under all alternatives; however, emissions from these activities would be negligible in scale relative to the quantified net sequestration.

Table 3.7-1. Estimated Average Annual Change in Net Carbon Sequestration and Estimated Average Annual Emissions (MT CO_2e) from Modeled Activities [a,b]

Covered Activity	No Action	Proposed Action	Alternative 3	Alternative 4
Carbon Sequestration	-211,752	398,357	726,600	-454,337
Forestry Operations Emissions	-2,603	-1,656	-1,469	-2,662
Road Construction Emissions	-<0.1	-<0.1	-<0.1	-<0.1
Net Carbon Sequestration [c]	**-214,244**	**396,701**	**725,131**	**-456,999**

[a] Emissions from quantified covered activities are presented as negative values (i.e., subtracting from the carbon pool); carbon sequestration is presented as positive values (i.e., adding to the carbon pool).

[b] Only modeled activities were quantified. Non-quantified covered activities include quarries, prescribed burns, road system management and drainage maintenance. All non-quantified covered activities emit GHGs and, therefore, would subtract from the carbon pool.

[c] Net only includes the quantified covered activities. Positive values denote a carbon sink; negative values denote a carbon source.

3.8 Recreation and Visual Resources

3.8.1 Methods

The study area for recreation covers southwestern Oregon, specifically Coos, Curry, Douglas, Jackson, Josephine, and Lane Counties (Figure 3.8-1). This geography captures the supply of recreation in the permit area and the plan area and other forestlands adjacent to these areas, including developed recreation sites and areas used for dispersed recreation (i.e., any area where recreation is an allowable use, but dedicated infrastructure is not present). Southwestern Oregon also captures where most people who recreate in the permit area and plan area come from, and the supply of recreation sites on public and private lands that are substitutes for or complements to recreation resources in the permit area.

The study area for visual resources consists of areas with views of the permit area and plan area, which includes areas within 0.5 mile of the permit area and plan area. Visual resources are all objects (artificial and natural, moving and stationary) and features (e.g., landforms, waterbodies) visible on a landscape.

This analysis identifies how forest management practices along with their effects on forest characteristics would affect the supply of recreation infrastructure and lands attractive to dispersed recreation, demand for recreation activities, and the value of recreation in the study area under the proposed action and alternatives.

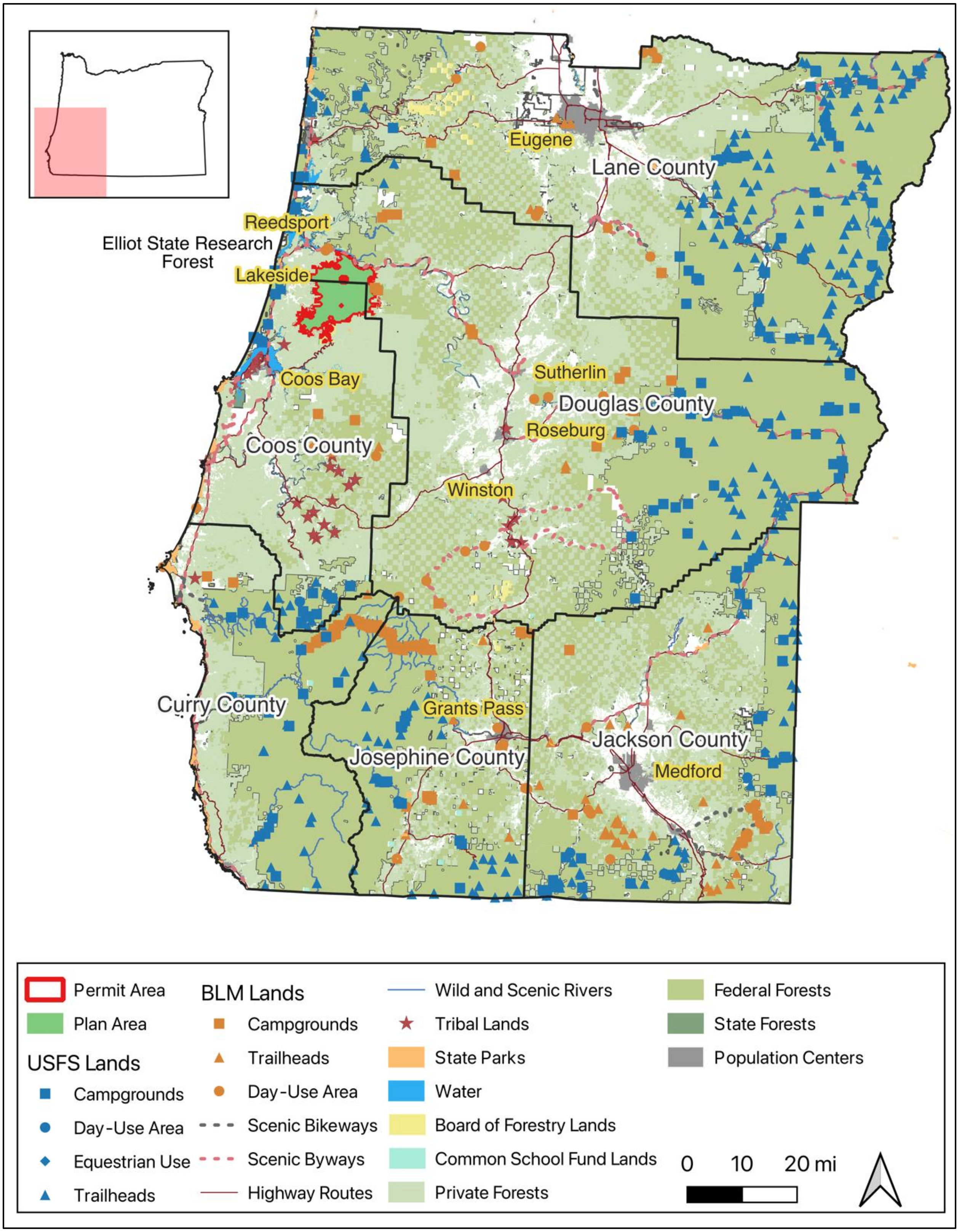
This analysis also evaluates potential effects on visual resources from alteration of existing terrain, vegetative cover, and other natural or built features; alteration of the overall visual quality of a site or the region; introduction of incompatible visual elements; elimination of visual resources; and obstruction or permanent reduction of visually important features. The analysis considers changes to recreation experiences described in this section and to waterways and vegetation, described in Sections 3.3, *Water Resources*, and 3.4, *Vegetation*, respectively.

3.8.2 Affected Environment

3.8.2.1 Recreation

The permit area and plan area do not contain any developed recreation facilities. DSL has not invested in and does not manage recreation infrastructure like campsites, maintained trails with trailheads and signage, or restroom facilities in the permit area (DSL n.d.). However, the permit area and plan area are open to the public and may be used for dispersed recreation wherever people can access the land. Dispersed recreation activities that occur in the permit area and plan area include camping, hiking, fishing, off-highway vehicle (OHV) use, forest product harvest and collection, and hunting. DSL does not regulate the recreational use of the permit area with the exception of the requirement to obtain a DSL firewood collection permit. Permits restrict firewood collection to downed trees and roadside debris within 10 feet of road shoulders and landings, or within 25 feet of recent clearcut units. Debris must be kept out of streams, roads, and ditch lines. DSL issues approximately 15 to 20 firewood collection permits annually.

Figure 3.8-1. Recreation Facilities in the Study Area



At least four dispersed camping areas are frequently used by visitors to the permit area and plan area (Figure 3.8-2). Other dispersed camping sites, like an RV camping area at the intersection of roads 2300 and 8000, also exist in the permit area. Multiple decommissioned roads in the forest now serve as hiking trails. Visitors may hike to attractions such as the Jerry Phillips Reserve, Elkhorn Ranch Homestead, or Cougar Pass Lookout (Figure 3.8-2). Visitors may travel along the Umpqua Scenic Byway that runs along the northern boundary of the permit area and plan area. People fish in the West Fork of the Millicoma River (Kronsberg et al. 2018). According to the 2011 Forest Management Plan, people frequently hunted for deer and elk in the permit area and plan area (DSL and ODF 2011). Hunting and trapping occur less now with fewer open stands in the absence of timber harvests (Kronsberg et al. 2018).

The permit area also borders public and private recreation sites, particularly on the eastern border. There are popular day-use sites like the Loon Lake Recreation Area, Bureau of Land Management (BLM) campgrounds, and private campgrounds along the eastern border of the permit area (Figure 3.8-2).

DSL does not collect data on dispersed recreation use. While people engage in dispersed recreation activities throughout the permit area and plan area, they generally follow and stay close to roads. Dispersed recreation use is more limited in remote, more densely forested areas.

Future Trends in Demand

Demand for outdoor recreation is increasing overall nationally including participation in activities such as hiking, trail running, mountain biking, and skiing (Outdoor Foundation 2021:6, 21–22). In addition to these activities, registrations for OHVs have increased in Oregon suggesting increasing interest and participation in OHV use on public forestlands (Lindberg and Bertone-Riggs 2015:2–4). Other recreation activities, such as hunting, fishing, and wildlife watching have been declining nationally and in Oregon (Outdoor Foundation 2021:21–22; ODFW 2020:3).

Recreation Use Value and Spending

Recreation use of the permit area and plan area lands generates economic benefits in two ways: (1) people—especially those traveling from outside the study area—spend money in local communities that supports employment and income (White 2017:1); and (2) people receive value from their experience in excess of what they spend to participate. The latter value is called consumer surplus and reflects the range of benefits one might enjoy from engaging in outdoor recreation such as the inherent value placed on aesthetic beauty or the enjoyment of a wilderness experience (Rosenberger 2018:4).

Per-trip spending and consumer surplus vary by activity.[1] Spending on things like gas, food, and supplies ranges from about $13 to $33 (in 2020 dollars) per person per trip on average, with backpacking at the low end and hunting at the high end.[2] Consumer surplus—the additional value people enjoy from their experience beyond what they spend—ranges from about $26 to $144 (in 2020 dollars) per trip on average, with backpacking at the low end and mountain biking and nonmotorized boating at the high end (Rosenberger 2018; White 2017).

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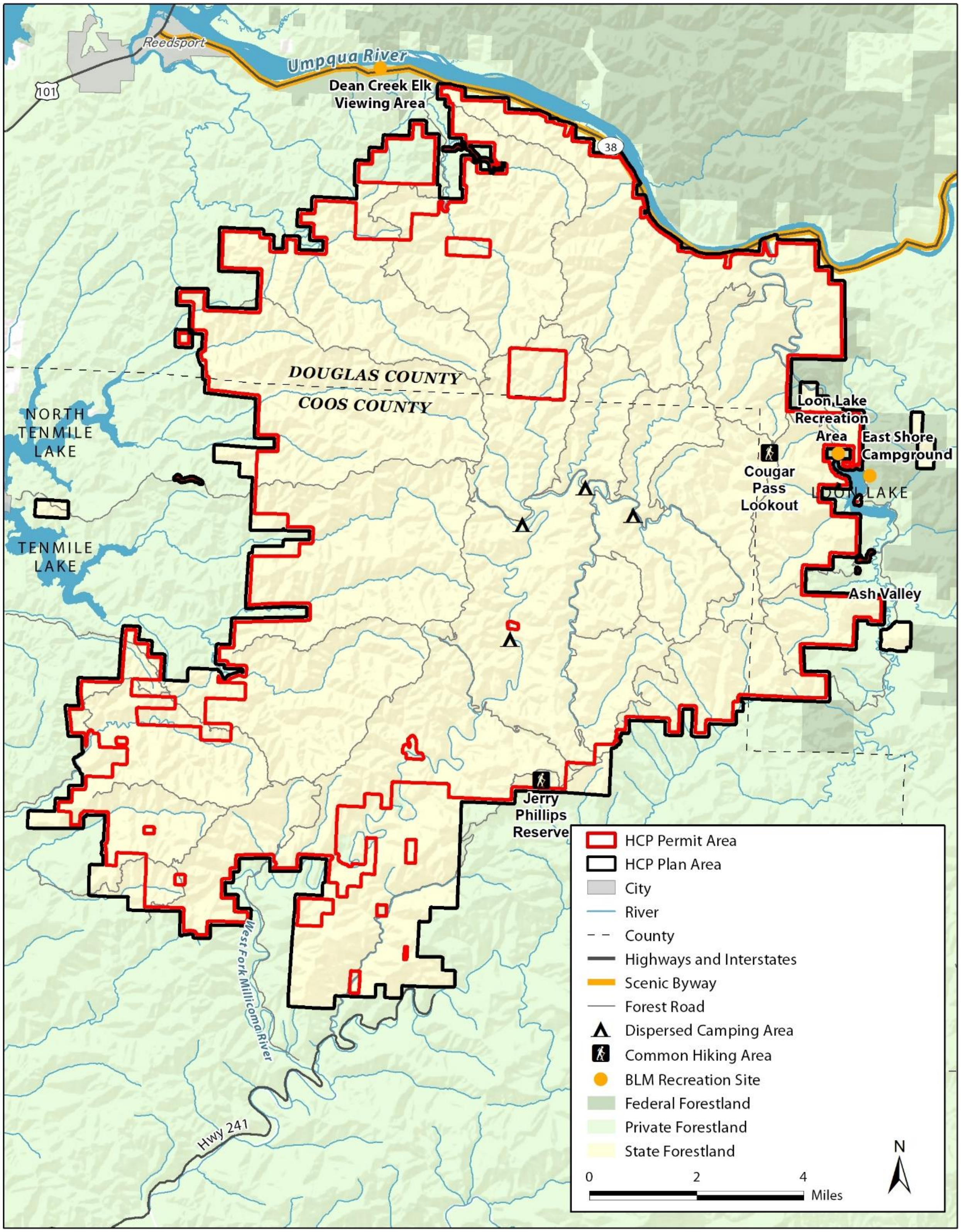
[1] Spending and consumer surplus amounts are sensitive to the prices of goods and services and can fluctuate over time.

[2] 2014 and 2018 dollar values inflated to values of $1.09 and $1.03 in 2020 using the CPI Inflation Calculator.

Figure 3.8-2. Recreation in and around the Permit and Plan Area



Note: This map is not an exhaustive depiction of all public and private sites used for designated and dispersed recreation in and around the permit area.

Forest composition can affect the consumer surplus value people derive from their experience. Some users, particularly those who engage in hiking, camping, backpacking, and wildlife viewing, tend to favor (i.e., more highly value) old growth forests or forests with fewer signs of visible disturbance from timber harvest activities (Shelby et al. 2005; Kearney et al. 2010; Boxall and Macnab 2000). Hunters may experience relatively less loss in value from timber harvest disturbance than these other types of users because hunting success is higher where forests are less dense or cleared (Boxall and Macnab 2000).

3.8.2.2 Visual Resources

Visual Character

The study area's visual landscape comprises mountains within the Coast Range that are covered predominantly with Douglas-fir forests, with red alder and bigleaf maple hardwood stands being located on lower slopes and along stream corridors. There is a complex network of rivers and streams that wind through the steep terrain to create corridors and narrow canyons, in addition to ponds, lakes, and emergent wetlands. Terrain, evergreen forests, and waterways are the primary features associated with the study area. The visual landscape of forests in the study area range from dense forested terrain with little views to the forest floor to areas where forest management activities are more apparent in the landscape and canopies have undergone clearcutting or thinning for timber harvest and where terrain, tree stumps, slash, and skid trails can be seen. Other areas have been reforested through natural regeneration that was followed by seeding and plantings and may primarily consist of saplings or even-aged stands, or they may include a mix of mature trees interspersed with saplings. Therefore, views associated with the forest are dynamic.

Natural events, such as wildfires, extreme storms (e.g., heavy rains, wind, ice, snow), and invasive species and disease, can also result in large-scale visual changes to a forest landscape. A major fire has not occurred in the study area since 1868, and insects and disease are not severe in the study area, resulting in large areas of undisturbed forest. However, blow down and landslides from storms have affected the forest's visual landscape, more recently, as described in HCP Chapter 2, *Environmental Setting*. Historical and more recent events contribute to areas of the forest with healthy, dense stands; large areas with landscape scars from blown down trees and landslides; and areas of forest in the process of recovering. As described in Section 3.7, *Climate Change*, climate change can contribute to slowly changing the visual landscape of the forest not only through severe weather events, but by changing climatic conditions, making forests more compatible for growing different species. This results in a slowly evolving landscape with changing species composition and densities.

This dynamic landscape provides high-quality scenic views, which have been the subject of federal and state actions to create state forests, scenic designations, and natural areas that protect large areas of land (Figure 3.8-1). The study area includes the state-designated Umpqua River Scenic Byway (State Route 38), which travels along the northern border of the permit area and can be seen on Figure 3.8-2 (Oregon Tourism Commission and Oregon Department of Transportation 2018). Natural areas that protect large areas of land within the study area include Bureau of Land Management lands associated with the Coos Bay District and various state and county parks that abut or are within 0.5 mile of the permit area. There are no All-American Roads, National Scenic Byways, Federal Wild and Scenic River segments, designated state scenic waterways, or state scenic bikeways in the study area (FHWA 2022; Oregon State Parks 2019; Oregon Wild 2022; FWS 2022). Although the River Democracy Act of 2021 seeks to designate an additional 4,700 miles of rivers throughout Oregon as Federal Wild and Scenic Rivers, none of these occur in the study area (Oregon Wild 2021). Because no federal- or state-designated Wild and Scenic Rivers occur in the study area, these resources would not be affected by the proposed action or alternatives and are not addressed further.

Recreation facilities in the permit area are limited, as described in Section 3.8.2.1, *Recreation.* As shown on Figure 3.8-2, there are also a limited number of public recreation facilities in the visual resources study area, such as dispersed camping areas and day-use areas that provide views to the permit area. Loon Lake, which borders the eastern permit boundary, provides the largest recreational area with the most direct views of the permit area. Views of the permit area are also provided by both paved and unpaved roadways that traverse ridgelines and travel along the numerous waterways in the permit area. Elevated vantage points offer panoramic scenic vista views and include views over the natural landscape toward the many ridgelines, mountain slopes, and valleys. Waterways, where present, contribute to these scenic views. In the state forests, there are no residential areas that provide views of the permit area. Mostly low-density residential areas border forest lands and have limited views of the permit area. The residential areas with the most direct views of the permit area include those surrounding Loon Lake and in the Ash Valley.

Affected Viewers

Affected viewers are defined by their relationship to the study area, visual preferences, and sensitivity to changes. Visual preferences define the study area's visual quality, which serves as the baseline for determining the nature and magnitude of visual impacts. A project can affect two overarching groups of viewers: neighbors, who have views *of* an affected area from adjacent areas, and users, who have views *from within* an affected area. Neighbors include residential, recreational, commercial, and agricultural viewers and roadway travelers with views of the permit area. Users primarily include recreational viewers, workers harvesting forest resources, and roadway travelers within the permit area. Visual sensitivity for neighbors and users ranges from moderate to high based on having shorter- or longer-term views and vested interest in the affected lands. Residents and recreationists tend to have longer-term views and more of a vested interest in views and, therefore, higher visual sensitivity than roadway travelers and workers who tend to have shorter-term views and a less-vested interest in views (FHWA 2015:5-6–5-10).

3.8.3 Environmental Consequences

3.8.3.1 Supply of Recreation

Alternative 1: No Action

Changes to the road network over time would affect access to dispersed recreation sites in the permit area. Any existing roads that remain operational would facilitate recreation access (both motorized and non-motorized). Depending on timing and location, harvest activities may temporarily restrict access for recreation. Because the existing road network is well built out, future increases in the permanent road network are expected to be minimal. If the permanent road network is expanded to facilitate forest management activities, it could expand access, particularly for dispersed recreation, if the new roads are left open to the public.

There are no current formal plans to develop and actively manage recreation infrastructure such as campgrounds in the permit area and plan area. Future development of recreation infrastructure may occur subject to forest management practices and budget constraints. Any future restrictions on dispersed recreation activities for forest management purposes would reduce recreation opportunities available to visitors relative to existing conditions. Seasonal restrictions that limit when heavy construction activities may occur around northern spotted owl and marbled murrelet habitat in the species' respective nesting seasons could restrict the development and maintenance of any future recreation facilities. Appropriate planning efforts to focus construction activities during other times of the year would mitigate any adverse impacts on development of new recreation infrastructure. Delayed maintenance could temporarily reduce access to future developed recreation sites during the early part of the summer season, although use in early summer is less intense relative to the latter part of summer.

Alternative 2: Proposed Action

Similar to the no action alternative, under the proposed action, any existing roads that remain operational would facilitate recreation access and though increases in the permanent road network are expected to be minimal, any expansion could increase recreation access where and when left open to the public. The proposed action limit on construction of new permanent roads in the permit area to 40 miles (with temporary and spur roads left in place after 5 years counting toward this cap) and the commitment to reducing road density in the permit area through road vacating in 10-year increments could reduce operational roads used for recreation access compared to the no action alternative. As described for the no action alternative, harvest activities may temporarily restrict access to recreation sites, mostly in areas subject to clearcut harvest or variable density harvest.

Development of recreation infrastructure is not a covered activity under the proposed action; however, guiding principles outlined in the Elliott State Research Forest Proposal suggest the potential for promotion of diverse recreational opportunities in the permit area and plan area (HCP Appendix C, *Proposal—Elliott State Research Forest*: 11–12). Forest management practices and budget constraints could limit the future supply of dispersed recreation under the proposed action, similar to the no action alternative. Similar to the no action alternative, seasonal restrictions around northern spotted owl and marbled murrelet habitat in the species' respective nesting seasons (Conservation Conditions 1 and 6) could restrict the development and maintenance of future recreation facilities. However, appropriate planning of development and maintenance activities are likely to reduce adverse impacts on recreation.

Alternative 3: Increased Conservation

Effects on the supply of recreation under Alternative 3 would be the same as described for the proposed action.

Alternative 4: Increased Timber Harvest

Effects on the supply of recreation under Alternative 4 would be between the proposed action and the no action alternative because expansion of the permanent road network would be capped but there would be no commitment to reduce road density.

3.8.3.2 Quality or Value of Recreation

Alternative 1: No Action

Changes in forest structure and composition during the analysis period would affect how and where people enjoy dispersed recreation in the permit area and plan area. Changes in forest composition and species habitat could also affect wildlife-dependent recreational activities like wildlife watching and hunting. Restrictions on timber harvest in the visually sensitive corridor along the Umpqua River Scenic Byway would maintain the existing quality of recreation related to scenic routes.

Road management under the no action alternative, including road closures and road construction, has the potential to affect the quality of recreation. While roads provide access, they also create disturbance, which has the potential to reduce the quality of non-motorized forms of recreation (e.g., hiking, fishing, hunting). Road closures could increase the value of non-motorized recreation while road construction could decrease the value, but the effect would depend on the timing and location of the activities, along with the recreation preferences of visitors.

Harvest patterns under the no action alternative would result in fluctuating areas of early- and mid-seral forest, a declining area of late-seral forest, and an increasing area of old growth forest over the analysis period (Figure 3.4-1). The relative combined amount of late-seral and old growth forest would generally increase over the analysis period. The presence of late-seral and old growth forest and associated complex understory development over the analysis period would continue to support the value of recreation for hiking, backpacking, and wildlife watching. As described in Section 3.5, *Fish and Wildlife*, habitat for covered terrestrial species, which consists primarily of late-seral and old growth habitat, would generally increase over time. Adverse impacts on species through potential habitat loss and fragmentation would have a limited impact on recreation since encounters with covered terrestrial species are already rare. However, when encounters occur, they may be highly valuable—especially when people know what they are looking at—because of their rarity.

A variety of habitat types would be available to support wildlife populations valuable for hunting (deer and elk) under the no action alternative (Section 3.5). Localized changes in habitat types could have both beneficial and adverse effects on these populations. Where harvests occur, the presence of early-seral stands would provide desirable conditions for hunting. Forest management activities would have adverse effects on habitat for fish species in the study area through increased sediment delivery, reduction of available wood for delivery to streams, increases in peak flows, and increases in water temperature (Section 3.5). Where forest management activities result in a decline in habitat quality, participation in, and the value of, recreational fishing in the permit area and plan area could be adversely affected. Compliance with regulations discussed in Section 3.5, including the Oregon FPA, would reduce but not eliminate adverse effects. As described in Section 3.3, *Water Resources*, forest management activities could also reduce water quality in the study area by increasing sediment and toxic chemical concentrations. Compliance with CWA and state regulations would avoid or minimize these effects. Overall, this would have a minimal effect on the quality of water-based recreation.

As forest structure changes over time, the location, use, and value of recreation activities could shift over time and across the permit area and plan area. For example, the four dispersed camping areas identified in the permit area lie in areas designated as no-treatment to avoid take of list species that would mature into older forests, increasing the value of recreation for campers who prefer older stands. Jerry Phillips Reserve and Cougar Pass Lookout lie within the home range of the northern spotted owl; harvest in this area would be limited by suitable habitat retention requirements (Section 2.1.1, *Alternative 1: No Action*), which would maintain the recreational value for hikers, assuming the associated nest site remains occupied by the species. Recreation at popular sites east of the permit area such as Loon Lake Recreation Area and BLM campgrounds would not experience effects related to views of the permit area because the adjacent lands are in areas off-limits to harvest due to species occupancy. Overall, levels of recreation activity throughout the permit area and plan area would be more heavily influenced by factors other than forest management, including demographic changes and availability of substitute recreation resources.

Alternative 2: Proposed Action

Like the no action alternative, all types of forest would be available for any recreation allowed across the permit area and plan area, but the spatial distribution of forest types and therefore suitability to different recreation activities would change over time compared to the no action alternative.

If total operational roads in the permit area decrease compared to the no action alternative, based on the proposed action's limit on new miles of permanent road and the requirement to reduce road density in the permit area, the proposed action could marginally decrease road-related disturbance and potentially increase the quality of recreation for people engaged in non-motorized recreation.

The combined amount of late-seral and old growth forests with complex understory development would be greater over the analysis period under the proposed action (Figure 3.4-1) than the no action alternative. If the existing dispersed recreational use of the permit area and plan area is allowed over the analysis period, on average, this would increase the value of hiking, backpacking, and wildlife watching. As described in Section 3.5, *Fish and Wildlife*, the area and connectivity of habitat for covered terrestrial species would increase compared to the no action. As under the no action, impacts on recreation would be limited.

As described under the no action, a variety of habitat types would be available to support wildlife populations valuable for hunting (deer and elk). Localized changes in habitat types would differ from the no action, with increased combined late seral and old growth forest increasing hiding and concealment habitat and decreased early seral forest decreasing foraging habitat. Decreased clearcuts would reduce the early seral stands and openings valued by hunters compared to the no action.

As described in Section 3.5, under the proposed action, the reduced area available for more intensive harvest types; annual harvest caps; and implementation of the conversation strategy, including increased riparian and steep slope protections, more restrictive road management standards, instream restoration actions, implementation of coho research, and monitoring and adaptive management would result in increased beneficial effects and decreased adverse effects on fish compared to the no action alternative, which could improve the quality and value of recreational fishing. As described in Section 3.3, the proposed action's increased buffers and recruitment of large wood would reduce adverse effects on water quality compared to the no action alternative but would have minimal effect on water-based recreation.

Beneficial effects on views from camping areas and the Cougar Pass lookout, in the permit area, described in Section 3.8.3.3, *Vegetation Patterns—Visual Resources*, could increase the quality of users' recreational experience compared to the no action alternative. Where views are not protected by terrain or existing trees, adverse effects on views from Loon Lake related to variable density harvest along the permit area boundary adjacent to the lake could decrease the quality of users' recreational experience compared to the no action alternative.

Similar to the no action alternative, localized changes in forest structure would shift recreation use geographically as visitors shift where they recreate based on their preferences, but overall changes in recreation would depend on other factors like demographic shifts and trends in recreation preferences.

Alternative 3: Increased Conservation

The reduced area available for more intensive harvest and increased riparian and steep slope protections and road management requirements under Alternative 3 would reduce adverse effects on water quality and fish habitat and increase beneficial effects compared to all alternatives, as described in Sections 3.3 and 3.5. Depending on the localized effects, this could improve the recreation experience for users downstream engaged in water-based recreation and fishing compared to the proposed action and no action alternative.

Overall effects on hunting would be similar to the proposed action, though changes in the different habitat types would vary.

Effects of operational roads on non-motorized recreation would be similar to the proposed action.

Alternative 4: Increased Timber Harvest

Effects on water quality and fish habitat compared to Alternative 4 would be similar to or greater than the no action alternative, as described in Sections 3.3 and 3.5. Depending on the localized effects, this could worsen the recreation experience for users downstream engaged in water-based recreation and fishing compared to the proposed action and no action alternative.

Overall effects on hunting would be similar to the no action alternative, though changes in the different habitat types would vary.

Effects of operational roads on non-motorized recreation would be between the no action and proposed action.

3.8.3.3 Vegetation Patterns—Visual Resources

Alternative 1: No Action

As described in Section 3.4, *Vegetation,* forest management activities (e.g., timber harvest, thinning, reforestation, salvage harvest, prescribed burns) would result in a patchwork of clearcuts and younger replanted stands around the older Douglas-fir forest stands in no-treatment areas across the ESRF under the no action alternative (Figure 3.1-1). In addition, the frequency of disturbance events is projected to increase which, coupled with salvage harvest, would create larger areas that have sparse tree cover or are clearcut.

Viewers are accustomed to seeing where past forest management practices are scattered throughout the landscape, including areas of clearcut and thinning. Under the no action alternative, the permit area would largely comprise no-treatment areas and clearcut harvest areas. Therefore, there would be distinct areas where the forest canopy remains intact, creating areas of connectivity, or has been cleared, leaving areas that are more open. At the permit area scale, visual changes to the landscape would result in a gradual shift in forest structure as areas of clearcut become more prevalent. However, reforestation would occur in clearcut areas so that there would be less variation in stand age over time. Although forested landscapes are dynamic by nature, clearcut harvest would result in a high degree of localized visual changes. This would adversely affect visual resources by creating larger areas of forest that have been visibly disturbed and cleared. Clearcut areas would also create a forest that is more open and sunnier due to the removal of mature trees that provide a greater amount of shade than young trees. Clearcut areas have the potential to create opportunities for vista views where roadways or trails cross through the clearcut and provide an elevated vantage point with views over the surrounding landscape. However, the foreground of these views may be degraded by the visual disturbance of the ground-plane and stumps left behind from clearcuts.

Visual changes within the permit area also have the potential to affect views from Loon Lake, which is a key recreational area located outside of, but directly adjacent to, the permit area, and BLM campgrounds. The portions of the permit area visible to recreationists on Loon Lake, visitors to the resorts and campgrounds, and residences along the lake are in areas off-limits to harvest due to species occupancy. Assuming these areas remain occupied by the covered species over the analysis period, the stands would continue to age and there would be no adverse effect on views for these users. Portions of the permit area visible to residents of the rural development and users of open space lands in Ash Valley would be available for clearcut under the no action alternative. These areas overlap with lands that have already been clearcut within the past 10 to 50 years. Therefore, such forest practices and visual conditions are a part of the existing visual environment in this portion of the permit area.

Alternative 2: Proposed Action

Under the proposed action, the combined area available for more intensive harvest types (clearcut and variable density harvest) would be less than under the no action, and a greater percentage of that area is variable density harvest, which results in a lower degree of visual changes than clearcut (Table 3.1-1, Figure 3.1-1). Moreover, the area available for post-disturbance salvage would be reduced compared to the no action alternative. This would result in the retention of larger areas of older forest stands with greater connectivity, especially in the western and northern portions of the permit area (the CRW), which would be beneficial for visual resources and views in the permit area (including from camping areas, the Cougar Pass lookout, and roadways). Restoration thinning, which could occur in more of the permit area than under the no action alternative, would aid in providing more natural patterns of forest structure, including clearings in the forest. Also, the increase in older trees compared to the no action alternative (Figure 3.4-1 and Appendix 3.4, *Vegetation Technical Supplement*, Table 1), would result in views that transition from more open and sunnier to more closed and shaded.

Under the proposed action, views from outside of the permit area would be similar to the no action for some viewers and more adverse for others. Some portions of the permit area visible to recreationists and residences on Loon Lake would be available for variable density harvest, which would result in visual changes in forest structure in these areas. While some views of these areas would be obscured by terrain and existing trees, and standards for harvest rotation and retention would reduce the degree of visual changes compared to a clearcut, views of these areas would be degraded compared to the no action alternative. Similar to the no action alternative, portions of the permit area visible from Ash Valley would be available for clearcut harvest, though some would be limited to variable density harvest. Therefore, visual changes in these areas and potential effects on views from Ash Valley would be similar to those described for the no action alternative.

Alternative 3: Increased Conservation

Effects of Alternative 3 on visual resources would be the same as described for the proposed action, except that further reduced area available for clearcut harvest (Table 3.1-1, Figure 3.1-1) and post-disturbance salvage would result in the retention of even larger areas of older forest stands with greater connectivity, which would be beneficial for visual resources compared to the proposed action and no action alternative.

Alternative 4: Increased Timber Harvest

Effects of Alternative 4 on visual resources related to area available for clearcut harvest (Table 3.1-1, Figure 3.1-1) and post-disturbance salvage and the extent of older forest stands and connectivity would be similar to the no action alternative.

3.8.3.4 Visual Access

The primary change in visual access would result from any expansion or reduction in the permanent road network. As described in Section 3.8.3.1, *Supply of Recreation*, construction of permanent roads is expected to be minimal under all alternatives. Given the size of the permit area, the anticipated change in the road network under any alternative would not result in a notable change to visual access, especially given the terrain and vegetation associated with the forest that would greatly limit views of new roadways. In addition, new roadways would be built off of existing routes, so they would likely be seen as a visual extension of the existing roadway system. Therefore, new roadways are not likely to degrade the visual character or quality of the forest. However, new roadways would create the opportunity for potential new access to areas with high visual quality, which would be seen as beneficial to recreational viewers.

3.8.3.5 Scenic Byways Views

As identified in Section 3.8.2.2, *Visual Resources*, the Umpqua River Scenic Byway is the only scenic byway in that study area that travels along the northern border of the permit area. Oregon State law establishes visually sensitive corridors along scenic byways and a 150-foot buffer from the outermost edge of both sides of the highway (ORS 527.620.18). Special rules apply to timber harvest in this corridor to retain scenic buffers while maintaining motorist safety (ORS 527.755). Forestlands near visually sensitive scenic byways would be managed in the same manner under all alternatives. Therefore, it is not anticipated that any of the alternatives would substantially alter or degrade views associated with the scenic byway.

3.9 Cultural Resources

3.9.1 Methods

For purposes of this analysis, *cultural resources* are defined as archaeological resources, buildings, structures, districts, objects, and traditionally important places on the landscape. These resources may be historic properties as defined in 36 Code of Federal Regulations (CFR) Part 800, listed on a state or local historic register, or identified as being important to a particular group through consultation. Section 3.10, *Tribal Resources*, further considers effects on other resources of cultural importance, such as traditionally important plants and animals.

The study area for cultural resources in this document is the permit area. The study area covers several climatic and geological zones ancestrally used by numerous bands and tribes in the region. Many descendants of these groups are affiliated with federally recognized tribes. As the lead federal agency, FWS sought consultation with the following tribes: Cow Creek Band of Umpqua Tribe of Indians; Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians; Confederated Tribes of Grand Ronde; Coquille Indian Tribe; and Confederated Tribes of Siletz Indians. For more information, see Section 3.10, Appendix 3.10, *Tribal Resources Technical Supplement,* and Appendix 3.9, *Cultural Resources Technical Supplement*.

This analysis evaluates potential effects of the proposed action and alternatives on cultural resources in the study area by considering the locations of known or potential precontact and historic archaeological sites and built resources relative to the type and extent of management activities that would be implemented under the proposed action and alternatives. The evaluation also considers the existing regulations, policies, and procedures in place to mitigate effects.

3.9.2 National Historic Preservation Act

Compliance with Section 106 of the NHPA, as amended, is required by law for all federal undertakings. In this case, the federal undertaking is the Services' proposed issuance of incidental take permits for the covered activities. Section 106 requires federal agencies to consider the effects of the undertaking when there is potential to affect a historic property—a district, site, building, structure, or object—that is listed in, or eligible for listing in, the National Register of Historic Places (NRHP). Section 106 contains specific consultation requirements with certain parties such as the State Historic Preservation Officer (SHPO), affected tribes, and individuals and organizations with a demonstrated interest in the undertaking.

The Services have agreed that FWS will serve as lead federal agency for the Section 106 undertaking. In letters dated August 16, 2022, FWS initiated consultation under Section 106 with the SHPO and Tribal Historic Preservation Officers (THPOs) for five tribes. In those letters, FWS described the undertaking, defined the area of potential effects (APE), summarized the historic property identification effort, and submitted a determination of no adverse effect under 36 CFR 800.5(b).

3.9.3 Affected Environment

This section describes known and expected cultural resources in the study area. To provide further context about the cultural setting of the study area, Appendix 3.9, *Cultural Resources Technical Supplement*, provides an overview of the study area's geographic, precontact, ethnographic, and historical contexts.

3.9.3.1 Cultural Resources Identification

DSL performed a cultural resources analysis of the permit area in the mid-2010s. That effort, detailed in the *Cultural Resource Inventory of the Elliott State Forest* (Curtis et al. 2016) used the same method and rigor as would be employed in a Section 106 cultural resources identification study. The report was submitted to the Oregon SHPO.

Curtis et al. (2016) conducted the following cultural resources identification tasks for the permit area.

- Searched archives for previously recorded cultural resources sites and surveys, as well as background information on archaeology, ethnography, history, and environment of the permit area.
- Created a geographic information system (GIS) database of known historic period and pre-contact sites and surveys.
- Conducted field verification of a sample of previously recorded sites.
- Contacted, consulted, and interviewed state, federal, tribal, and SHPO, archaeologists, and other historians.
- Developed a suitability model that identifies settings with a high probability for the presence of cultural resources.
- Planned and implemented archaeological field survey and shovel probing.
- Prepared a cultural resources overview and survey report (Curtis et al. 2016).

Curtis et al. (2016) and other studies pertinent to the permit area including cultural resources overviews (Beckham and Minor 1980; Beckham et al. 1982), ethnographies, (e.g., Zenk 1990), and planning documents (e.g., DSL and ODF 2011) are summarized in Appendix 3.9, *Cultural Resources Technical Supplement*. In summary, cultural resources identification for the permit area demonstrates that the permit area has very few known cultural resources and low potential for the presence of undiscovered historic properties.

3.9.3.2 Existing Data Review: Sites and Surveys in and near the Study Area

The review of the Oregon Archaeological Records Remote Access database identified 12 previous cultural resources surveys in the permit area (Appendix 3.9, Table 1). Apart from the Curtis et al. (2016) study discussed below, the surveys collectively covered about 60 acres and identified one cultural resources site, a historic period septic tank.

3.9.3.3 Curtis et al. (2016) Cultural Resources Overview, Model, and Field Survey of the Permit Area

Curtis et al. (2016) conducted a cultural resources overview, site sensitivity model, and archaeological field survey of the permit area. This effort identified the following sites.

- 32 undocumented historic-period sites (mostly homesteads and logging facilities) reported by Phillips (1997) and Stepp (1998).
- 36 Native American allotment parcels connected to the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians.
- Several historic-period sites, roads, and trails marked on GLO maps, 1924 and 1946 Siuslaw National Forest maps, plat maps, and mid-twentieth century Metsker maps.
- No previously recorded pre-contact Native American archaeological sites within or immediately adjacent to the Elliott State Research Forest and permit area.

After background research and consultation with SHPO and tribes, Curtis et al. (2016) concluded that slope and elevation were the most useful environmental factors that define areas with a high probability for cultural resources in the permit area. Two factors were particularly important: slopes of less than 10% and places with proximity to novel landscape features such as waterfalls, lakes, and trails. Curtis et al. (2016) developed a sophisticated GIS model that identified site probabilities across the permit area. After deleting places less than 0.25 acre in size, the model mapped only 762 acres among the 83,458-acre permit area with a high potential for the presence of cultural resources sites.

Curtis et al. (2016) mounted a field survey of the high probability acres in the permit area. Given time limitations, access constraints, and agency priorities, the survey covered 452 of the 762 acres of high probability area. In addition, Curtis et al. (2016) attempted to relocate 15 previously reported (Phillips 1997; Stepp 1998), but undocumented, cultural resources sites in the permit area (Appendix 3.9, *Cultural Resources Technical Supplement*, Table 2). The Curtis et al. (2016) field survey and relocation effort resulted in the documentation of four historic-period cultural resources sites in the permit area (Appendix 3.9, Table 3). No pre-contact archaeological sites have been identified in the permit area.

In their conclusion, Curtis et al. (2016) attribute the dearth of cultural resources sites in the permit area to the permit area's extremely steep, inaccessible terrain and the considerable challenges of finding cultural material in the only places likely to contain cultural sites, the relatively flat terrain associated with stream corridors. Climate, geomorphology, and recent land-use history make the stream corridors of the permit area an unlikely place to harbor, preserve, or reveal cultural resources sites.

3.9.3.4 Summary, Expectations for Cultural Resources

Potential cultural resources in the permit area include those associated with Native American use and settlement and historic-period homesteading, transportation, and logging. Review of existing information indicates that the permit area is unlikely to contain a large number of Native American or recent historic-period cultural resources. This is because (1) the natural setting of the permit area was not particularly conducive to Native American settlement, (2) the permit area lacks relatively flat ground and geologically stable landforms—settings that are more conducive to containing and preserving pre-contact and historic-period cultural resources, and (3) recent land-use history (commercial logging) has likely masked or erased archaeological evidence of Native American settlement or use, if such sites were present.

3.9.4 Environmental Consequences

DSL's forest management activities under all alternatives, including the no action alternative, would cause ground disturbance or changes to the setting and would have the potential to affect cultural resources. These potential effects on cultural and historic resources would be similar under all alternatives. Although the precise location and timing of the activities may differ depending on the alternative, DSL would follow the applicable federal and state regulations and DSL policies and practices described in this section.

In its existing plans and programs, DSL acknowledges its role as a steward of public lands and its obligation to cooperate with local governments, tribal governments, and state and federal agencies to protect built environment, archaeological, and cultural resources within its jurisdiction (DSL 2006, 2012). DSL's cultural resources protections applicable to the permit area are described in the ESRF Forest Management Plan (DSL 2024) excerpted below.

- Preserve and protect archeological sites, or archeological objects in accordance with state law (ORS 97.740 to 97.760; 358.905 to 358.955; and 390.235).
- Conserve historic artifacts, and real property of historic significance in accordance with state law, in consultation with the Secretary of State and the State Historic Preservation Office (SHPO) (ORS 358.640 and 358.653). Protect additional cultural resource sites that are determined by the ODF to have special educational or interpretive value.
- Protect additional cultural resource sites that are determined to have educational or interpretive value through consultation with the Research Director (PI), ESRFA Executive Director and Tribal Nations, other relevant partners, and agencies.
- Contract with licensed archaeologists for cultural resource surveys prior to any groundbreaking activities with a determined need. This ensures that any historic or prehistoric resource is located prior to activities occurring in that location. When a resource is located, the ESRF will work with Tribal partners and coordinate with agencies to take steps that ensure sites of cultural significance are not compromised as a result of active forest management.

Because of the recent cultural resources overview of the permit area (Curtis et al. 2016), locations that may contain cultural resources are known and mapped and can be reviewed in advance of any DSL activity that has potential to affect historic properties if present.

Potential effects on cultural resources from forest management activities under the proposed action and alternatives would be similar to under the no action alternative. In addition, DSL would follow applicable regulations, policies, and procedures under all alternatives. For these reasons, the proposed action and alternatives would not result in effects on cultural resources that differ from those that would occur under the no action alternative.

3.10 Tribal Resources

Western Oregon has long been inhabited by Native American peoples. This section identifies the five tribes in western Oregon potentially affected by the proposed action and alternatives and their ancestral and current relationships to the region.

The Services recognize the sovereign status of tribal governments and offer pre-decisional government-to-government consultation at the earliest practicable time. The Services recognize that each federally recognized tribe is unique and sovereign and may have different treaties and other agreements with the United States (FWS 2016; NMFS 2013). FWS, on behalf of the Services, has sought and continues to seek involvement of the tribes to gain understanding of the tribes' perspective on potential impacts of the proposed action and alternatives and tribal management of the resources that may be affected.

As the lead federal agency under NEPA and for consultation under the National Historic Preservation Act (Section 3.9, *Cultural Resources*), FWS offered consultation with five potentially affected tribes on behalf of itself and NMFS as a cooperating agency. At the Tribe's request, FWS engaged in consultation with the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians regarding the proposed action and its effects on tribal resources and interests.

3.10.1 Methods

The study area for tribal resources includes the area where natural resources that tribal members traditionally accessed, currently access, or may access in the future could be affected by activities in the permit area under the proposed action and alternatives (see the study areas for Section 3.4, *Vegetation*, and Section 3.5, *Fish and Wildlife*). In addition, the study area includes southwestern Oregon to account for effects on tribes related to timber harvest and availability of forest products (see the study area in Section 3.11, *Socioeconomics*).

The following tribes access resources or have traditional territories, reservations, and/or trust lands in the study area: the Confederated Tribes of the Grand Ronde Community of Oregon; Confederated Tribes of Siletz Indians of Oregon; Coquille Indian Tribe; Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians; and the Cow Creek Band of Umpqua Tribe of Indians.

The description of the affected environment for tribal resources was based on a review of information about the tribes and their ancestral, current, and future use of resources in the study area that could be affected by the proposed action and alternatives. The analysis describes effects of the proposed action and alternatives on resources relevant to the tribes.

Consultation is conducted in accordance with Executive Order 13175, U.S. Fish and Wildlife Service Native American Policy (January 20, 2016), Department of Commerce Administrative Order 218-8, National Oceanic and Atmospheric Administration (NOAA) Procedures for Government-to-Government Consultation with Federally Recognized Indian Tribes and Alaska Native Corporations (November 13, 2013), and NOAA Administrative Order 218-8A, Policy on Government-to-Government Consultation with Federally Recognized Indian Tribal Governments (June 27, 2023) described in Appendix 3.1-A, *Regulatory Environment*.

3.10.2 Affected Environment

3.10.2.1 Tribal Coordination

FWS contacted five tribes associated with the study area on March 29, 2022, to invite them to engage as cooperating agencies in the NEPA process and provide a point of contact to request information on government-to-government consultation. These tribes are listed in Table 3.10-1 along with the location of their trust lands.

Table 3.10-1. Overview of Tribes Contacted by FWS

	Location Trust Lands	
Tribe	**Region**	**Counties**
Confederated Tribes of the Grand Ronde Community of Oregon	Western Oregon	Yamhill and Polk Counties
Confederated Tribes of Siletz Indians of Oregon	Western Oregon	Lincoln County
Coquille Indian Tribe	Western Oregon	Coos County
Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians	Western Oregon	Lane, Douglas, and Coos Counties
Cow Creek Band of Umpqua Tribe of Indians	Western Oregon	Douglas County

Coordination and information sharing with the tribes included but was not limited to the following.

- Communication with Colin Beck, Forestry Manager with Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians (June 6 and 14, 2022) for background information regarding the use of natural resources in the permit area.
- In letters dated August 16, 2022, FWS initiated consultation under Section 106 with the SHPO and Tribal Historic Preservation Officers for five tribes.
- In response to a letter to FWS and DSL, dated April 20, 2023, from Brad Kneaper, Chair of Tribal Council for Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians, requesting the agencies work directly with tribes on the development of the Draft HCP, FWS coordinated with the Tribe's Director of Forest Management on May 2, 2023, to hear their concerns and answer questions and provided follow-up information via email on May 4, 2023.
- FWS received a letter, dated January 31, 2024, from the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians expressing concerns about the HCP, and requesting government-to-government consultation with FWS. FWS engaged in government-to-government consultation with the Tribe and coordinated further with Tribal staff to discuss concerns and share information. As a result of the consultation, FWS developed and considered a new alternative to the proposed action. This alternative is discussed in Chapter 2, *Proposed Action and Alternatives*. Although the alternative was ultimately dismissed from detailed analysis in this Final EIS for the reasons noted, FWS will continue to coordinate and consult with the Tribe regarding its interests and concerns.

3.10.2.2 Northwest Indian Treaties and Federally Recognized Tribes

This section is an overview of history of the tribes associated with the study area since Euro-American contact. This section is included to provide an understanding of the significance of access to public lands such as the permit area by tribal members to maintain traditional cultural practices, harvest fish and wildlife, and gather plants. The tribal organizations in the study area include bands, tribes, and confederations of tribes. The term *tribe* is used generally when referencing a federally recognized tribal entity, though many of the Oregon tribes are a confederation of multiple bands and tribes with, in some cases, different backgrounds and differing uses of cultural and natural resources in the study area. Appendix 3.10, *Tribal Resources Technical Supplement*, provides additional details on each tribe, including its organization, federal recognition, ratified and unratified treaties, ceded lands, treaty reserved rights, case law, federal trust doctrine, and use of study area resources.

In 1855, Washington Territorial Governor Isaac Stevens, representing the United States, negotiated treaties with many Indian tribes living in the Pacific Northwest, including those with ancestral ties to large portions of the study area. Accordingly, these treaties secured both reserved lands on which to live and reserved off-reservation rights for access and subsistence, comprising the collection of fish, wildlife, plants, and forage for their horses. The U.S. Senate ratified several of these treaties but in the case of the five tribes identified in Table 3.10-1 treaties were not ratified, tribal traditional lands were ceded to the government without compensation, and the tribes were not provided with tribal reservations (Zucker et al. 1983). Furthermore, passage of the Western Oregon Termination Act (Public Law 83-588) in 1954 terminated federal recognition and reservation lands granted through executive order to the five tribes west of the Cascade Range listed in Table 3.10-1.

Federal recognition was not restored until the 1970s and 1980s. Since then, all the western Oregon tribes have programs to restore their land base through federal actions (e.g., Western Oregon Tribal Fairness Act, Public Law 115-103) and land purchases. The tribes are using their expanded land base to reestablish tribal management of these lands for cultural and economic uses. Some of these lands are forestlands managed for forest resources for the benefit of members and the tribe's economic wellbeing. However, despite a growing land base, the management and access of public lands (federal and Oregon state) for fishing, hunting, gathering of cultural plants, and cultural practices remains important to the tribes. Several tribes have consent decrees with the State of Oregon and the United States that define tribal hunting, fishing, trapping, and animal gathering rights on federal and state lands. The consent decrees are implemented through tribal ordinances to provide members' access to cultural hunting and fishing in portions of their ancestral lands.

3.10.2.3 Tribe Access and Use of Natural Resources

Tribal members from the five tribal entities associated with the study area are closely associated with the natural resources of the region and the permit area (Curtis et al. 2016). The ethnographic and archaeological records document the long and intensive association of Native Americans with this part of western Oregon and the permit area; see Appendix 3.10, *Tribal Resources Technical Supplement*.

The tribes' traditional cultures are closely tied to abundant populations of fish and wildlife. Tribal members hunt for deer and elk and fish for salmon, steelhead, cutthroat trout, and Pacific lamprey. Plants are an important source of food and materials for the making of traditional goods (Long et al. 2018; Phillips 2016). In addition to gathering berries such as huckleberries, native blackberries, and salmonberries, other culturally important plants are gathered for basketry and carving such as hazel, red cedar, ash, beargrass, and maple. These plants are gathered to maintain traditional practices and to celebrate and share traditional crafts and skills in museums, galleries, and educational environments. Tribal members are teaching new generations traditional woodworking skills to continue the traditional construction of canoes from cedar trees and the making of other traditional wooden goods for personal use and sharing of traditional crafts and skills (Coquille Indian Tribe 2022; Beck pers. comm.).

Many traditional plants grow in disturbed areas. The five tribal entities associated with the study area traditionally used fire to promote growth of selected plant species (Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians no date; Phillips 2016). Plants that occur in disturbed areas are huckleberry, native blackberry, salmonberry, hazel, and beargrass. Fire was also used to maintain open nonforested meadows for elk grazing habitat (Beck pers. comm.).

The tribes also look to the forest for resources that support commercial activity. The tribes with trust forestlands manage their lands for economic value in addition to cultural value (Beck pers. comm.; Coquille Indian Tribe 2019). Tribal forestlands are not presently large enough to support a timber industry absent harvest on non-tribal forestlands. The non-tribal forest industry includes services necessary to manage tribal lands, a market for timber from tribal lands, and a work force to support timber harvest (Beck pers. comm.). The economic value of tribal forestlands is dependent on a thriving timber industry supported by public and private forests, including the permit area. Finally, tribal members work in the timber industry supported by public and private forestlands, including the permit area.

3.10.3 Environmental Consequences

This section describes potential effects of the proposed action and alternatives on resources relevant to the tribes by highlighting and building on the analysis of impacts described in Section 3.3, *Water Resources*, Section 3.4, *Vegetation*, and Section 3.5, *Fish and Wildlife.* This section includes a focus on distinct considerations associated with tribal resources and access, tribal sovereign self-governance, and tribal lands.

3.10.3.1 Fish and Wildlife Species

Alternative 1: No Action

As described in Section 3.5, *Fish and Wildlife*, under the no action alternative, forest management activities would have adverse effects on habitat for fish species in the study area through increased sediment delivery, increases in peak flows, and increases in water temperature, while compliance with regulations would reduce but not eliminate adverse effects. The intensity of harvest activities would vary across the permit area as illustrated in Figure 3.1-1 in response to restrictions assumed for avoiding take of listed species. The effects of management activities described for coho salmon in Section 3.5 would generally apply to other fish species of cultural value to the tribes such as Chinook salmon, steelhead trout, and cutthroat trout, but would vary geographically based on species occurrence in the study area. Species occupying higher-gradient habitats and headwaters such as steelhead trout and cutthroat trout may experience greater adverse effects due to an increased number of non-fish-bearing streams with lesser protections flowing into these areas and may be more susceptible to effects of landslides and fine sediment input. Resident cutthroat and rainbow trout and steelhead trout in higher-gradient headwater streams may experience greater negative effects from forest management activities than those described in Section 3.5 for coho salmon.

Riparian protections under the no action alternative may also provide less relative protection for non-salmonid species of cultural value to the tribes, such as Pacific lamprey. As discussed in Section 3.5, lamprey would be especially affected by sediment pulses or landslides and warmer stream temperatures that may occur as a result of forest management activities.

As described in Section 3.8, *Recreation and Visual Resources*, a variety of habitat types would be available to support wildlife populations valuable for hunting (deer and elk) (Section 3.5). Localized changes in habitat types could have both beneficial and adverse effects on these populations. Where harvests occur, the presence of early-seral stands would provide desirable conditions for hunting.

Forest roads on state lands provide important access for tribal members to hunting areas, fishing sites, and places for the gathering of plants in the permit area and may be used to access tribal forestlands that may be acquired in the future. Existing roads in the permit area that facilitate access to recreational areas may also provide access to areas accessed by tribal members for hunting and fishing. Depending on timing and location, harvest activities may temporarily restrict access to portions of the forest. Because the existing road network is fully developed, expansion of the permanent road network over the analysis period is expected to be minimal. Any expansion of the existing road network to facilitate timber harvests and forest management activities could expand tribal access to fishing and hunting resources.

Alternative 2: Proposed Action

The types of effects on fish and wildlife species important to tribes and tribal access to these resources under the proposed action would be the same as described for the no action alternative but the degree of effects would vary.

As described in Section 3.5, *Fish and Wildlife*, under the proposed action, the reduced area available for more intensive harvest types; annual harvest caps; and implementation of the conversation strategy, including increased riparian and steep slope protections, more restrictive road management standards, instream restoration actions, implementation of coho research, and monitoring and adaptive management would result in increased beneficial effects and decreased adverse effects on all independent populations of coho as well as other fish species of value to the tribes compared to the no action alternative.

As described under the no action, a variety of habitat types would be available to support wildlife populations valuable for hunting (deer and elk). Localized changes in habitat types would differ from the no action, with increased combined late seral and old growth forest increasing hiding and concealment habitat and decreased early seral forest decreasing foraging habitat. Decreased clearcuts would reduce the early seral stands and openings valued by hunters compared to the no action. The integration of Indigenous Knowledge and collaboration with the tribes to maintain or increase the amount of open forage habitats for deer and elk, including the use of prescribed burning, thinning practices, and native plantings, would benefit these species and reduce the loss of open habitats over the analysis period, improving hunting opportunities.

Under the proposed action, like the no action alternative, existing roads that remain operational and new roads constructed in the permit area could provide access to areas used by tribal members for hunting and fishing. The proposed action limit on construction of new permanent roads in the permit area to 40 miles and the commitment to reducing road density in the permit area could reduce public access compared to the no action alternative. As such, the proposed action could adversely affect tribal access compared to the no action alternative.

Alternative 3: Increased Conservation

Alternative 3 would decrease harvest throughout the permit area and increase riparian protections compared to the proposed action, which would result in increased beneficial effects and reduced adverse effects on fish species of value to tribal members compared to all other alternatives.

Overall effects on hunting would be similar to the proposed action, though changes in the different habitat types would vary. Incorporation of Indigenous Knowledge by the tribes as described for the proposed action would benefit deer and elk under Alternative 3.

Effects on tribal access would be the same as under the proposed action.

Alternative 4: Increased Harvest

As described in Section 3.5.3.1, Alternative 4 would have the greatest adverse effects on coho of all alternatives and beneficial effects similar to the no action alternative (less than under the proposed action and Alternative 3).

Overall effects on hunting would be similar to the no action alternative, though changes in the different habitat types would vary. Incorporation of Indigenous Knowledge by the tribes, described under the proposed action, would benefit deer and elk under Alternative 4.

Effects on tribal access would be less than under the proposed action because there would be no commitment to reduce road density in the permit area under Alternative 4. The cap on new permanent road miles could reduce access compared to the no action alternative.

3.10.3.2 Availability of or Access to Plants

Alternative 1: No Action

As described in Section 3.4, *Vegetation*, timber harvest would be the primary driver of changes in forest structure and type, which would affect the availability of plants accessed by the tribes. Over the analysis period, clearcut harvest would occur outside of the areas where harvest would be restricted to avoid take of listed species throughout the permit area (Figure 3.1-1). Clearcut harvest and related ground-disturbing activities would disturb understory plants of value to tribal members and result in a patchwork of clearcuts and younger replanted stands that would be less diverse and would likely support fewer plant species of value to tribal members. Areas occupied by listed species and thus excluded from harvest would experience an increase in understory structure complexity as these areas transition to late-seral and old growth forests over the analysis period. Over time, gaps would develop in the canopy as a result of natural disturbance or timber harvest. These gaps would create opportunities for horizontal growth plants (e.g., vine maple, salal, huckleberries, and beargrass) and vertical growth plants (e.g., western hemlock and Sitka spruce seedlings), increasing availability of these plant species and other species used by tribes that are dependent on late-seral forest.

As described in Section 3.4.3.4, *Wetland Vegetation*, although timber harvest is unlikely to occur in wetlands, harvest activities adjacent to wetlands could affect wetland vegetation or function. Most wetlands would be within RMAs; for wetlands that do not have RMAs, the Oregon FPA requires forest management activities to protect soil and vegetation within or along wetlands from disturbance that results in reduced water quality, hydrologic function, or soil productivity. These protections would minimize the potential for effects on wetland plant species of cultural importance (e.g., cattails, sedges, and willows used for baskets). More protective and wider riparian management areas compared to historical practices would support increased opportunities for riparian-dependent plants used by tribes (e.g., salmonberry, thimbleberry) over the analysis period.

As described for fish and wildlife species valued by tribes, any expansion of the existing road network to facilitate timber harvests and forest management activities could expand tribal access to plant resources over the analysis period.

Alternative 2: Proposed Action

The reduced area of clearcut harvest, increased areas of variable density harvest and restoration thinning compared to the no action alternative, and the use of prescribed burns to increase or maintain suitable conditions for species of value to tribes would result in a more diverse and connected forest landscape. This has the potential to result in a greater variety of plant species of value to tribal members than the no action alternative. For example, huckleberry (*Vaccinium* spp.) fields are often persistent in early successional communities created and sustained by periodic disturbance such as fire or tree removal. More area in variable density harvest and the use of prescribed burns to develop and sustain nonforested and open forested patches would promote plant species of value compared to the no action alternative.

The integration of Indigenous Knowledge and inclusion of Flexible allocations that allow for exploration of different approaches to promoting plant communities of cultural significance to the tribes would also likely improve the variety of plant species of value to tribal members compared to the no action alternative.

The inclusion of indigenous cultural use of cedar trees as a covered activity under the proposed action for canoe building, material for housing or ceremonial space building, and weaving would provide a commitment and process thereby improving access to this culturally significant resource compared to the no action alternative.

As under the no action, compliance with the Oregon FPA protections for wetlands would minimize effects of harvest activities within or adjacent to wetlands. Under the proposed action, increased restrictions on salvage harvest and prescribed burns would decrease the potential for such effects compared to the no action alternative.

As described for fish and wildlife species valued by tribes, the proposed action could adversely affect tribal access compared to the no action alternative.

Alternative 3: Increased Conservation

Alternative 3 would have the least area available for clearcut harvest and the least associated adverse effects on plant species important to tribes. It would have the most area designated as no treatment, providing the most benefit to plant species dependent on older undisturbed forests (e.g., fungi, mosses) that are important to the tribes. The combined area available for variable density harvest and restoration thinning would be greatest under this alternative, providing the greatest associated benefits to plant communities that prefer open forest areas and the greatest opportunities to integrate Indigenous Knowledge, explore different approaches to promoting plant communities of cultural significance to the tribes. Alternative 3 also includes indigenous cultural use of cedar trees, as described for the proposed action, which would also benefit availability of and access to plants of tribal importance.

Compliance with the Oregon FPA protections for wetlands would also minimize effects of harvest activities within or adjacent to wetlands under Alternative 3 and increased application of restrictions on salvage harvest and prescribed burns compared to the proposed action would decrease the potential for such effects compared to all other alternatives.

Effects on tribal access would be the same as under the proposed action.

Alternative 4: Increased Harvest

Alternative 4 would have the most area available for clearcut harvest and therefore ground disturbance and associated adverse effects. It would have the least area designated as no treatment, providing the least benefit to plant species dependent on older undisturbed forests (e.g., fungi, mosses). It would have the second greatest combined area available for restoration thinning and variable density harvest, similar to Alternative 3, and therefore similar associated benefits. Alternative 4 also includes indigenous cultural use of cedar trees, as described for the proposed action, which would also benefit availability of and access to plants of tribal importance.

Compliance with the Oregon FPA protections for wetlands would also minimize effects of harvest activities within or adjacent to wetlands under Alternative 4, but with decreased restrictions on salvage harvest and prescribed burns compared to the proposed action, potential effects would be between the proposed action and no action alternative. Effects on tribal access would be less than under the proposed action because there would be no commitment to reduce road density in the permit area under Alternative 4. The cap on new permanent road miles could reduce access compared to the no action alternative.

3.10.3.3 Timber Harvest and Available Forest Products

Section 3.11, *Socioeconomics*, describes the economic effects of potential changes in timber harvest and availability of other forest products in permit area. In addition to direct jobs and labor income in the logging and milling industries, timber harvest in the permit area supports non-forestry jobs, labor income, value added, and output through indirect and induced effects. Economic activity also arises from collection of other forest products (e.g., moss, evergreen boughs, mushrooms) for commercial and non-commercial purposes. Some of this economic activity could contribute to employment and income for tribal groups. The distribution of employment impacts on tribal groups specifically (like other specific groups) depends on contractual relationships over space and time and cannot necessarily be inferred from aggregate economic effects. See Section 3.11 for more detail on economic effects under the proposed action and alternatives.

3.11 Socioeconomics

3.11.1 Methods

The proposed action and alternatives would affect socioeconomic resources in several different ways, which would occur at several geographic scales, each reflected by a different study area. The study areas capture the geography where impacts are likely to occur and where populations that are likely to experience impacts reside.

- **Income and employment**: The study area for impacts on income and employment is the regional economy, defined as southwestern Oregon, made up of Coos, Curry, Douglas, Jackson, Josephine, and Lane Counties. This area is sufficiently large to capture the flow of harvest and the economic relationships between rural and urban areas that surround the permit area. Data are provided at the county level, the smallest geography relevant for this analysis.
- **Government revenue**: The study area for impacts on government revenue is the state of Oregon, which is where timber harvest revenue and tax revenue would flow.
- **Value of ecosystem services**: The study area for assessing impacts on the supply of ecosystem services is the same as the study area for Sections 3.3, *Water Resource,* 3.4, *Vegetation*, 3.5, *Fish and Wildlife*, and 3.7, *Climate Change*. The study area for assessing impacts on the demand for and value of these services is southwestern Oregon. The analysis recognizes that demand for ecosystem services could also come from outside this study area, but the southwestern Oregon geography likely captures most of the impacts.

Each of the analyses assesses the degree of the effects of the proposed action and alternatives in terms of direction, magnitude, timing, duration, and populations affected.

- **Income and employment**: The analysis qualitatively evaluates impacts on income and employment from changes in timber harvest activities, recreation activity, collection of special forest products, and other economic activity (i.e., forest management, research and education activities) in the permit area over the 80-year analysis period. The analysis relies on harvest volumes estimated based on projected acreage of equivalent clearcut harvest from the stand age projections (not including thinning) and million board feet per acre based on Newton (2023). The analysis uses a qualitative analysis approach to facilitate comparison across alternatives of economic impacts of timber harvest activities and economic impacts of non-timber harvest activities that are difficult to quantify. For both types of impacts, data are not readily available to support quantification at a level that adds value to understanding the tradeoffs among alternatives. A qualitative analysis is sufficient to support an analysis of tradeoffs among alternatives.
- **Government revenue:** The analysis qualitatively estimates impacts on government revenue using estimated acreages available for harvest treatment types (Table 3.1-1) and regulatory guidance dictating revenue distribution at the state level. The analysis uses a qualitative approach because a quantitative approach would require data on forest harvest revenues, as well as revenues from other income-generating activities (e.g., guided fishing, collection of special forest products) that are not available. A qualitative analysis is sufficient to support an analysis of tradeoffs among alternatives.

- **Value of ecosystem services:** Ecosystem services are the goods (e.g., firewood, mushrooms) and services (e.g., clean water, carbon sequestration, spiritual meaning) the ecosystem provides that people value. This analysis qualitatively assesses impacts on the value of ecosystem services by identifying how changes in the availability and quality of these services would affect their value, and whether the proposed action and alternatives are likely to affect demand for any ecosystem good or service.

3.11.2 Affected Environment

This section provides an overview of existing socioeconomic conditions in the study area, together with projected population and demographic trends over the 80-year analysis period.

3.11.2.1 Population

Population in the study area of southwestern Oregon was approximately 900,000 in 2020, an increase of 8% compared to 2010 (Table 3.11-1). It is expected to grow to 1.1 million by 2060 (U.S. Census Bureau 2010, 2022; Portland State University 2021). Lane, Douglas, and Jackson Counties make up over 80% of the study area population as of 2020 (U.S. Census Bureau 2022). Between 2020 and 2060 the population is expected to grow in every county except Coos, with Jackson County expected to grow the most (Portland State University 2021).

Table 3.11-1. Current and Future Population Estimates in the Study Area

Geography	Population (2020)	Population (2010)	Percent Change (2010–2020)	Forecasted (2060)	Forecasted Percent Change (2020–2060)
Coos County	64,929	63,043	3%	60,974	-6%
Curry County	23,446	22,364	5%	25,397	8%
Douglas County	111,201	107,667	3%	136,327	23%
Jackson County	223,259	203,206	10%	304,414	36%
Josephine County	88,090	82,713	7%	106,073	20%
Lane County	382,971	351,715	9%	460,218	20%
Total	**893,896**	**830,708**	**8%**	**1,093,403**	**22%**

Source: U.S. Census Bureau 2010, 2022; Portland State University 2021

The largest communities nearest the permit area are Reedsport (in Douglas County) to the north and west, connected to the study area by State Route (SR) 38 and Coos Bay-North Bend (in Coos County) to the south and west, connected to the study area by SR 241. The communities are directly connected by U.S. Highway 101 along the coast. Reedsport's population in 2020 was about 4,300. The population of Coos Bay-North Bend was about 26,000 residents in 2020.

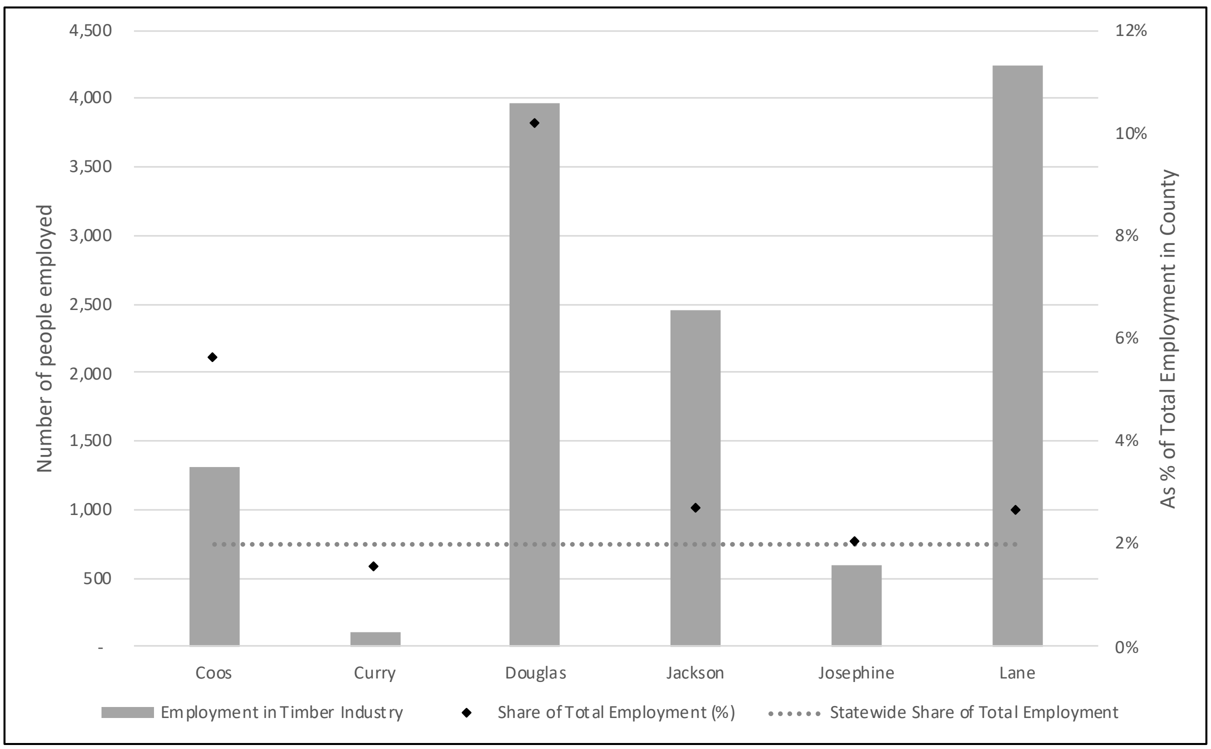
3.11.2.2 Income and Employment

Employment in Oregon grew to 2.6 million people in 2019, a 20% increase from 2010, and unemployment was low at 3.7% (U.S. Bureau of Economic Analysis 2021a, 2021b; U.S. Bureau of Labor Statistics 2021). All six counties in the study area had a higher unemployment rate than

Oregon and a lower median household income[1] than the statewide median of approximately $63,000 in 2019 (U.S. Bureau of Labor Statistics 2021; U.S. Census Bureau 2021). The COVID-19 pandemic resulted in an economic downturn that increased unemployment in Oregon. Employment in Oregon fell by 6% between 2019 and 2020 and unemployment ranged between 7.7 and 8.7% in the study area counties (U.S. Bureau of Economic Analysis 2022; U.S. Bureau of Labor Statistics 2022a, 2022b). Between 2020 and 2022, employment rates in Oregon grew and reverted to 2019 levels (Oregon Department of Administrative Services, and Office of Economic Analysis 2022).

Employment in timber and related industries (i.e., forestry and logging, wood products manufacturing, and paper manufacturing industries) is higher in Coos, Douglas, Jackson, and Lane Counties compared to the 2% statewide share as Figure 3.11-1 shows (Daniels and Wendel 2020). For Oregon workers, the average weekly wages for timber-industry employees, approximately $1,127 per week in 2019, are higher than the average weekly wages in other industries (Daniels and Wendel 2020). The COVID-19 pandemic and economic recovery had a minimal effect on employment in the forest and logging sectors in Oregon. State economists expect employment in the industry to decline by 2% over the next decade (Rooney 2021).

Figure 3.11-1. Employment in Forestry, Logging, and Wood Products Manufacturing Sector in Study Area (2019)



Source: Daniels and Wendel 2020

[1] *Median household income* captures the income level in a region where half of the households earn more while the other half earn less.

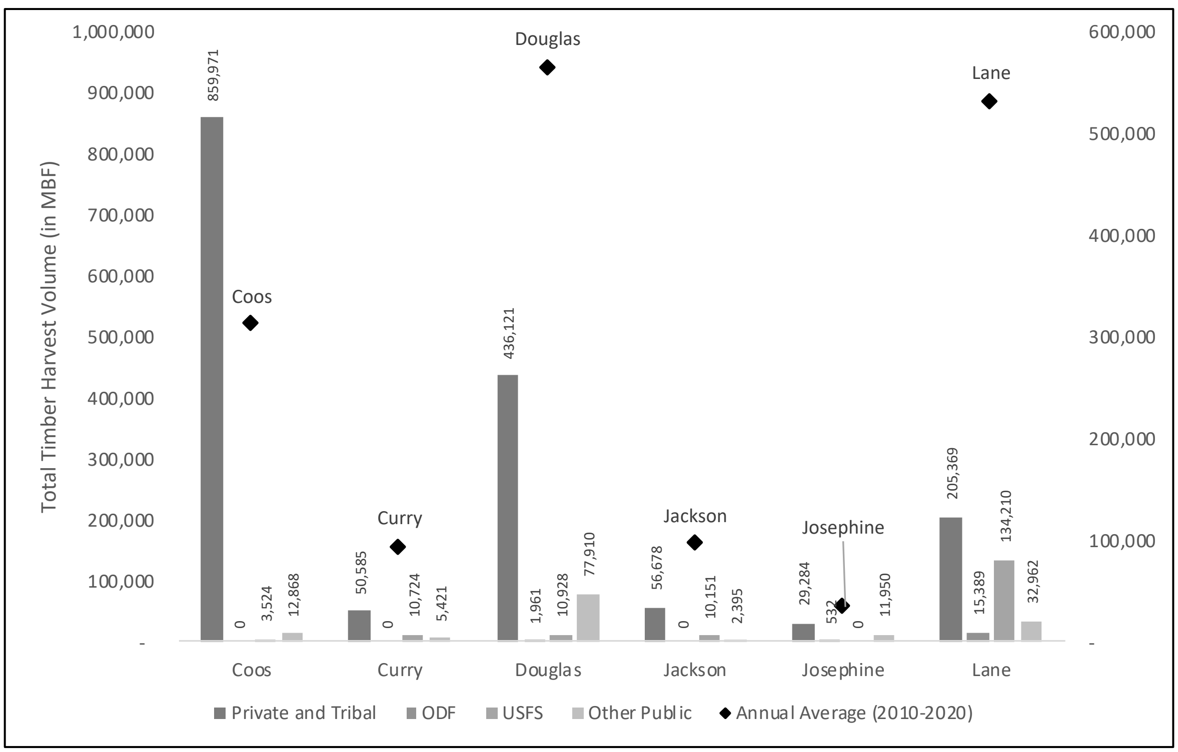
3.11.2.3 Timber Harvest

Harvest Volume

In 2020, Oregon's timber industry harvested 3,624,737 thousand board feet (MBF) of timber from federal, state, county, and private forestlands, a 12% increase from timber harvests in 2010 (University of Montana 2022). About 54% of that harvest in 2020 was in the study area, where harvest increased 52% overall compared to 2010. Timber harvests declined in Jackson and Lane Counties between 2010 and 2020 but increased in the remaining four study area counties. Coos and Douglas Counties accounted for the greatest volume of timber harvest in the study area, and most of that harvest occurred on private and tribal lands. Figure 3.11-2 shows the amount of timber harvested from forestland by ownership in southwestern Oregon in 2020.

Most of the timber harvested in Oregon is processed in Oregon. Some timber flows to adjoining states for processing (Simmons and Marcille 2020:11); from the study area the primary out-of-state destination is California. In 2017, approximately 166 primary forest product facilities like sawmills and plywood and veneer facilities operated in Oregon, 68 of which were in the study area (Simmons and Marcille 2020:3). Between 2018 and 2020, timber harvested in Coos and Douglas Counties was primarily processed in Benton, Coos, Douglas, and Lane Counties (ODF 2021).

Figure 3.11-2. Timber Harvest Volumes from Forestlands in Southwestern Oregon (2020, in MBF)



Source: University of Montana 2022

Harvest Value

Over the last 10 years, the average inflation-adjusted price for delivered logs of high-grade timber in Oregon was approximately $577 per MBF (in 2019 dollars). Wood processing mills pay a range of prices for delivered logs based on the species, grade of logs, and region where the timber sale occurs. According to Forest2Market data on delivered log prices, 10-year average prices can range between $419 and $1,076 per MBF depending on species and grade. Low-value species and grades can sell for as low as $110 per MBF. Prices of delivered logs fluctuate over time as well. After real log prices declined following the Great Recession in 2008, prices remained depressed throughout the last decade (Oregon Forest Resources Institute 2019:19). In early 2021, lumber prices hit record highs, normalized to near historical average levels mid-year and rose again in November 2021 (NASDAQ 2022). Although log prices also increased because of increasing lumber prices in some areas, the impact on prices of delivered logs was more muted (Giardinelli 2021).

3.11.2.4 Government Revenue

Common School Fund

Lands within the permit area became Common School Fund (CSF) lands in 1927. In 1955, the State began actively managing these lands, with harvest revenue contributing to the CSF, which was established in 1859 to provide funding to schools in Oregon (DSL 2022). The CSF also receives revenue from leases, property sales, gifts, and returns on investment of the fund (ORS 327.405). Until 2017, ODF managed the CSF lands in the permit area on behalf of DSL, and DSL paid for the associated operating and management expenses (ODF 2019). Since 2017, DSL has managed the land within the permit area, including the sale of standing timber.

Although the permit area supplied timber revenue to the CSF in the past, it has not been a substantial contributor to the fund in recent years. The permit area generated approximately $400 million in revenue for the CSF over the decades (DSL 2014). ODF harvested between 30 and 80 million board feet of timber from the permit area annually between the 1960s and the 1980s, but annual revenue contributions from harvests have declined since the 1990s (DSL 2014). Since 2017, the permit area has not generated timber revenue for the CSF due to uncertainty around future ownership and management plans. Table 3.11-2 presents revenues generated from sale of standing timber from CSF lands in the permit area between 2015 and 2021.

Table 3.11-2. Timber Revenue from Common School Fund Lands in Permit Area between 2015 and 2021

Time Period	Timber Revenue
FY 2015	$3,592,162
FY 2016	$3,416,945
FY 2017	$2,691,137
FY 2018	$0
FY 2019	$0
FY 2020	$0
FY 2021	$0

Source: DSL 2020a

The average annual distribution from statewide CSF lands to the CSF between 2016 and 2020 was $3.3 million. School districts in Oregon receive revenue from the CSF twice a year and the amount distributed to each district depends on the number of students enrolled in the district (Legislative Revenue Office 2020:5; DSL 2020b). School districts receive up to 3.5% of the CSF annually (DSL 2020b).

Forest Products Harvest Tax

Harvests from both public and private forestlands are subject to the Forest Products Harvest Tax. The tax is applied to the volume of timber harvested by each taxpayer in a calendar year (ORS 321.015). The first 25 MBF of the total quantity of timber harvested by each taxpayer is exempt from the tax every calendar year (Oregon Department of Revenue Research Section 2020:376). In 2022, timber purchasers pay approximately $4.92 dollars for every MBF of non-exempt timber harvested in that year (Oregon Department of Revenue 2022). Between 2019 and 2021, the Oregon Department of Revenue forecasted Forest Products Harvest Tax revenue at approximately $29.5 million (in 2021 dollars) (Oregon Department of Revenue 2022). Since the permit area did not generate timber harvests between 2019 and 2021, it did not contribute to this revenue.

The tax has five components that fund various state programs. Of the approximately $4.92 per MBF, 13% is dedicated to the Oregon Forest Land Protection Fund, ODF's fund used to fight large fires in Oregon (ORS 321.015). A component (42%) of the tax funds ODF's administration of the Oregon Forest Practices Act on private and non-federal forests. Two components (together 22%) fund forestry research and education at the Oregon State University (OSU) College of Forestry. The final component (23%) funds the Oregon Forest Resources Institute. While the tax rate for the fire protection fund remains constant, the legislature periodically adjusts the rates for the other four components (Oregon Department of Revenue Research Section 2020:375).

Other State Taxes

Oregon applies a fuel tax on gasoline and diesel, which affects machinery and vehicles used to harvest and process timber along with other forest management activities. The weight-mile tax applies to vehicles over 26,000 pounds that are involved in commercial operations on public roads in Oregon, such as trucks used to transport timber. Haulers of logs and certain other timber-related commodities can opt to pay a flat-mileage tax in lieu of the weight-mile tax. Oregon and some cities and counties levy a lodging tax, which would apply to timber-harvest workers who stay in transient accommodations while on a job. The personal income generated by the forest management activities and timber supply chain is subject to personal income tax, while the corporate profits generated by logging and timber processing companies are subject to the corporate income tax and the corporate activity tax. The corporate activity tax is levied only on taxpayers with more than $1 million of taxable commercial activity in Oregon.

3.11.2.5 Value of Ecosystem Services

Ecosystem services refer to the types of benefits that ecosystems provide to people. Forest ecosystems produce many ecosystem services that people value, including food and fiber from plants and wildlife, a setting for recreation and spiritual experience, clean water, and flood control. Table 3.11-3 presents a summary of the types of ecosystem services the permit area forests provide across four broad categories: provisioning, regulating, cultural, and supporting services.

Table 3.11-3. Ecosystem Services in the Permit Area

Type of Service	Definition	Examples in Permit Area
Provisioning	The "products" obtained from ecosystems	Food Habitat for sensitive species Fresh water
Regulating	Benefits obtained from the regulation of ecosystem processes	Flood regulation Climate regulation Water purification
Cultural	Nonmaterial benefits obtained from ecosystems	Recreational Visual/aesthetic Spiritual Heritage Educational
Supporting	Services necessary to produce all other ecosystem services	Nutrient cycling Biodiversity Soil formation

Source: Created by ECONorthwest based on Millennium Ecosystem Assessment 2005. See also De Groot et al. 2002.

Some services are valued as an endpoint (e.g., flood regulation, avoided flood damage) while others represent necessary intermediate processes in the production of a good or service that people ultimately care about (e.g., soil formation that leads to plant growth and food production). This analysis focuses on five categories of goods and services that forests in the permit area produce and people value: special forest products (plants used for food and materials) and hunting and fishing; climate regulation through carbon sequestration; water quality regulation; habitat for sensitive species; and cultural, educational, and research services. Impacts on recreational services in the permit area are discussed in Section 3.8, *Recreation and Visual Resources*.

Value of Special Forest Products, Hunting, and Fishing

Tribes have gathered resources from forests in the permit area from ancestral to contemporary times to consume and transform into goods for personal use and trade. This relationship persists to this day for tribes and other people. Collection of special forest products can generate employment and income, strengthen social ties, contribute to households' daily diet, provide an economic safety net when participation in formal economic activity is difficult, and is frequently a major contributor to the rural lifestyle value (McLain et al. 2008).

Collection of special forest products can occur throughout the permit area for commercial, recreational, and subsistence use. Mushrooms, sword fern, salal, red huckleberry, and firewood are a few examples of special forest products that may be collected from the permit area. Except for firewood collection, special forest product collection is largely informal (i.e., non-permitted activity for which DSL has no official record). Permits restrict firewood collection to downed trees and roadside debris within 10 feet of road shoulders and landings, or within 25 feet of recent clearcut units. Debris must be kept out of streams, roads, and ditch lines. DSL issues approximately 15 to 20 firewood collection permits annually. DSL also has a single grazing lease on 43 acres of the permit area that are used in conjunction with adjacent private lands and have been used to facilitate winter habitat for elk (Miltenberger pers. comm.).

Forest structure influences the kinds of special forest products that may be available for collection. Salal, a shrub used for florist greenery, is found in early-seral to old growth forests and can increase after timber harvest or thinning (Tirmenstein 1990). Mushrooms and fungi are found in all forest ecosystems but are most commonly associated with late-seral and old growth forests and may decrease with timber harvest (Dreisbach 2002). Moss is more productive in mid- and late-seral forests, while huckleberries are most productive in mid-seral forests (Simonin 2000).

Fishing and hunting are also important activities in the permit area. Meat from wildlife can be an important source of low-cost protein for households, particularly in rural areas with limited access to affordable groceries. ODFW regulates these activities through rules that apply throughout the state, including in the permit area. DSL does not have special regulations on fishing and hunting in the permit area.

Value of Climate Regulation

Trees and soils in the permit area are important carbon sinks for the region. Trees sequester carbon in their aboveground woody material and in their roots throughout their life cycle. Soils contain decomposing plant and animal life that store carbon, particularly in cooler climates where decomposition rates are low (Melillo and Gribkoff 2021). Forest disturbance (both human-caused and natural) can lead to the release of stored carbon (Binkley and Fisher 2019). Release of greenhouse gases like carbon dioxide (CO_2) contributes to climate change and leads to adverse health outcomes, increased risks of natural disasters such as floods, lost agricultural productivity, and other (largely adverse) economic outcomes for local, national, and international populations. The U.S. Environmental Protection Agency (EPA) released a new estimate based on updated methodology that suggests that the social value of an additional metric ton (MT) of CO_2 sequestration will increase from $190 in 2020 to $410 by 2080 (in 2020 dollars, using a 2% discount rate) (EPA 2023). Like most forests, the permit area's contribution to carbon sequestration varies over time and space with variation in tree species composition, stand age, and stand density.

Value of Water Quality Regulation

Forestlands play an important role in maintaining the health of watersheds and water quality by holding soils and preventing erosion. Poor water quality can reduce the value of fishing, boating, and other instream uses of the waterway. It also creates costs for water users, such as irrigators and municipal water systems. Sedimentation and runoff can affect the costs for water treatment and distribution, especially in drinking water source areas. For example, Warziniack et al. (2017) show that every 1% increase in turbidity leads to a 0.19% increase in water treatment costs. Keeler et al. (2012) emphasize that the benefits associated with water quality also extend well beyond treatment costs to include water-related recreation values and health impacts.

The study area overlaps with public water systems' surface water drinking water source areas such as Eel Lake (in the North Tenmile subwatershed), Pony Creek (in the Coos Bay subwatershed), and Umpqua River (in Lower Camp Creek subwatershed) (Section 3.3, *Water Resources*). However, none of these surface water drinking water source areas that feed public water systems are downstream of the permit area. The permit area contains points of surface water diversion and overlaps with some waterbodies that are classified as domestic water supplies.

Safe Drinking Water Act of 1974 and EPA's primary and secondary National Drinking Water Regulations establish maximum levels on over 90 drinking water contaminants to prevent adverse human health impacts from water contamination. Impairments to waterbodies in the study area include human health toxics like methylmercury, inorganic sources, and manganese (Section 3.3, *Water Resources*). Currently no waterbodies are impaired by herbicides (Section 3.3). Demand for water for municipal, industrial, and agricultural use is expected to remain constant in Coos County and increase only slightly in Douglas County over the analysis period (Section 3.3).

Value of Threatened and Endangered Species Habitat Protection

People value the continued existence of threatened and endangered species—even species that they have never or will never see or interact with. People can place a substantial value on protecting these species today and for future generations. For example, researchers have found that households would be willing to pay $104 per year to protect salmon and steelhead and $83 per year to preserve endangered owl populations (Richardson and Loomis 2009, converted to 2019 dollars). These values are not necessarily indicative of the value associated with specific management activities. Actions that result in substantial reductions in risk of extinction would likely be most valuable to households. Overall, this area of economic research demonstrates that people are willing to pay for actions where the primary or only outcome is to protect threatened and endangered species.

Value of Cultural, Tribal, Educational, and Research Services

Permit area forests provide several types of value related to cultural services, including aesthetic, spiritual, heritage, and educational value. Recreation is another cultural service discussed separately in Section 3.8, *Recreation and Visual Resources*. Numerous tribal groups have ancestral lands that overlap with the permit area, which have shaped their culture, spiritual experiences, and quality of life. Section 3.10, *Tribal Resources*, provides information about the potentially affected tribes and their ancestral, current, and future use of resources such as ceremonial hunting and fishing in the study area. Cultural resources, which have value for tribes and others, are located throughout the permit area (Section 3.9, *Cultural Resources*). The permit area forests are an important contributor to the maintenance of rural lifestyles, economies, and the general sense of open space. The aesthetic value of the permit area may contribute to property values and is an important component of the value of recreation experience (Section 3.8).

Permit area forests provide education benefits to all who visit and interact with them. Forests serve as a setting to engage curiosity and enrich personal experience. These cultural values are often intangible and can be difficult or inappropriate to quantify in monetary terms but are fundamental to sustaining healthy communities and economies. In addition to personal enrichment and employment, forestry research and education also help improve the value of commodity and non-commodity outputs and services that forests provide (National Research Council 2002:22). Better monitoring and research of various forest management practices can help forestry professionals increase forests' value for stakeholders in sustainable ways (National Research Council 2002:22).

3.11.3 Environmental Consequences

3.11.3.1 Income and Employment Levels

Alternative 1: No Action

Harvest-Related Activities: Under the no action alternative, clearcut harvest, variable density harvest, and restoration thinning would produce timber and contribute to jobs and income in the study area. Approximately 41% of the forest would be available for treatment, mostly clearcut harvest (Table 3.1-1). Harvest under the no action alternative is estimated to generate approximately 1.8 million MBF (thousand board feet) of timber over the analysis period.

Harvest activities in the permit area would generate direct, indirect, and induced jobs and income in the study area. Timber harvests would generate direct jobs and income in the forestry, logging, and milling industries, supporting timber companies and mills located in southwestern Oregon. The purchase of intermediate goods and services and the eventual spending of the direct wages earned through harvest activities would also generate indirect and induced jobs and income in the communities throughout the study area and more broadly throughout Oregon and California.

Other Activities that Support Economic Activity: The forest in the permit area would continue to support employment and income directly associated with non-harvest forest management activities (e.g., species surveys), special forest product collection for commercial use, and any guided recreation (including hunting and fishing) that may occur in or adjacent to the forest. Changes in forest composition over the analysis period may vary the supply of special forest products such that any short-term decreases in supply could decrease associated commercial income. The grazing lease in the permit area, which generates $2,400 annually for DSL, would continue to support agricultural production in the Umpqua Valley. Non-commercial use of the forest for recreation and subsistence collection, hunting, and fishing would support jobs and income as visitors from outside of the study area spend money in local communities. Informal use of the forest for research and education would continue, generating economic activity from participants traveling to the forest from outside the study area. The value people receive from participating in these activities is discussed in Section 3.11.3.3, *Value of Ecosystem Services*.

Alternative 2: Proposed Action

Harvest-Related Activities: As under the no action alternative, clearcut harvests, variable density harvests, and restoration thinning would produce timber and contribute to jobs and income in the study area. Approximately 47% of the forest would be available for treatment (6% more than the no action), with less acreage in clearcut harvest and more acreage in variable density harvest and restoration thinning (Table 3.1-1). The proposed action would produce less timber volume than the no action alternative because greater acreage would be dedicated to less productive harvest activities like restoration thinning and variable density harvests than clearcuts. Harvest under the proposed action is estimated to generate approximately 1.2 million MBF (thousand board feet) of timber over the analysis period, 6 million MBF less than the no action alternative.

Lower volumes of timber harvests would generate less revenue and support fewer direct, indirect, and induced jobs and less labor income, especially after the first 20 years of the analysis period when most restoration thinning would occur. Mills that process smaller-diameter timber would benefit more than mills that process larger logs because harvest activities would produce smaller-diameter timber on average throughout the analysis period.

Other Activities that Support Economic Activity: The proposed action would support more jobs and labor income through research and educational programs conducted in the permit area than the no action alternative. The permit area would be managed based on a research platform described in OSU's research proposal (HCP Appendix C). The different treatment types would create a landscape that would facilitate long-term studies essential to understanding long-lived forests by researchers. The forest has the potential to draw grant funding for research from outside the study area. Grant funding would create new income by drawing new academics and researchers and support staff to the study area. Presence of top-tier researchers and research opportunities could also draw high-quality recruits to local educational institutions, increasing the labor supply in the study area (Agrawal et al. 2014:20). Influx of visitors associated with research and education to the study area would increase spending on lodging and food in communities nearest to the permit area (Reedsport and North Bend-Coos Bay), supporting more jobs and labor income in the study area relative to the no action alternative (OSU 2021:13).

Under the proposed action, the forest in the permit area would continue to support employment and income directly in the same categories as the no action alternative. The grazing lease in the permit area would continue to support agricultural production in the Umpqua Valley. Guiding Principles outlined in the Elliott State Research Forest Proposal (HCP Appendix C) suggest the potential for expansion in recreation and education activities in ways that would directly support local employment. Specifically, the proposal identifies that “local staff who work in the community” would manage recreational programming and any future recreational program would “leverage partnerships within the local community.” Where and when prescribed burning, thinning, and native plantings are undertaken by tribal members, the proposed action could contribute to jobs and labor income for tribal members. Formal recreation and educational programming would likely expand visitation levels, increasing spending in local communities. The value people receive from participating in these activities is discussed in Section 3.11.3.3, *Value of Ecosystem Services*. To the extent that potential reductions in the road network in the permit area result in decreased visitation from outside the region, the proposed action would decrease jobs and income associated with recreation relative to the no action (Section 3.8, *Recreation and Visual Resources*). The permit area would continue to support income and employment through hunting, fishing, and collection of special forest products.

Alternative 3: Increased Conservation

Harvest-Related Activities: Approximately 40% of the forest would be available for treatment (1% and 7% less than the no action and proposed action, respectively), with the least acreage in clearcut harvest and variable density and restoration thinning between the no action and proposed action (Table 3.1-1). Alternative 3 would produce the least timber volume over the analysis period: 1.1 million MBF (0.7 million and 0.1 million more than the no action and proposed action, respectively). Harvest-related direct, indirect, and induced jobs and labor income would be lowest under Alternative 3, especially after the first 20 years of the analysis period when most restoration thinning would be conducted.

Other Activities that Support Economic Activity: Under Alternative 3, jobs and labor income associated with research and educational programs would be the same as the proposed action, greater than the no action. Alternative 3 would also support similar levels of jobs and labor income as the no action and proposed action through grazing and recreation in the permit area.

Alternative 4: Increased Timber Harvest

Harvest-Related Activities: Approximately 56% of the forest would be available for treatment (15% and 9% more than the no action and proposed action, respectively), with the acreage in clearcut and restoration thinning between the no action and proposed action and highest acreage in variable density (Table 3.1-1). Alternative 4 would produce the most timber volume over the analysis period: 2 million MBF (0.2 million and 0.8 million more than the no action and proposed action, respectively). Harvest-related direct, indirect, and induced jobs and labor income would be greatest under Alternative 4.

Other Activities that Support Economic Activity: Jobs and labor income associated with research and educational programs under Alternative 4 would be similar to the proposed action, greater than the no action. Alternative 4 would also support similar levels of jobs and labor income as the no action and proposed action through grazing and recreation occurring in the permit area.

3.11.3.2 Government Revenue

Alternative 1: No Action

Common School Fund. Under the no action alternative, revenues from sale of standing timber in the harvest areas would be available for appropriation by the Oregon legislature, with the current default providing for revenues to be credited to the CSF over the analysis period. Revenues would fluctuate as the forest matures and the volume of timber of harvestable age (over 60 years) changes. These fluctuations would likely be similar in scale to historical fluctuations in revenue from the permit area prior to the last 5 years (when revenue has declined to $0). DSL would manage changes in this revenue stream alongside the portfolio of other sources of revenue the CSF receives as outlined in Section 3.11.2, *Affected Environment* (DSL 2020a).

Forest Products Harvest Tax. Under the no action alternative, the State would levee a Forest Products Harvest Tax annually on the volume of timber harvested from the permit area over the analysis period and would distribute revenue to beneficiaries according to legislatively established formulas.

Other State Taxes. Fuel consumption and transportation related to forest management, timber harvest, and processing activities would generate state fuel tax and weight-mile tax revenues. Harvest-related employment and forest-related overnight visitation would contribute to lodging taxes. Income generated through forest management, harvest, visitor spending, and associated supply-chain relationships would contribute to personal income tax, corporate income tax, and commercial activity tax collections.

Alternative 2: Proposed Action

Common School Fund. Under the proposed action, the harvest in the permit area would not generate any revenue for the CSF through timber harvests.

Forest Products Harvest Tax. Timber harvests under the proposed action would produce revenue through the Forest Products Harvest Tax over the analysis period. Lower volumes of timber harvested due to less acreage available for more intensive harvest is likely to decrease the amount of tax revenue generated annually and distributed to beneficiaries relative to the no action alternative.

Other State Taxes. Forest management activities and other economic activities linked to the permit area that consume fuel, provide lodging, and generate income would generate tax revenue for state and local governments. Despite the lower timber harvest volumes under the proposed action, the permit area's contributions to overall state and local tax collections are unlikely to measurably differ from the no action given the permit area's relatively small contributions to economic activity in the region when compared to other economic activities.

Alternative 3: Increased Conservation

Effects on the CSF and other state taxes under Alternative 3 would be similar to those described for the proposed action. The permit area would not generate any revenue for the CSF, and differences in levels of economic activities between Alternative 3 and the proposed action are unlikely to produce measurable impacts on other state taxes, given the permit area's relatively small contributions to economic activity in the region when compared to other economic activities.

Similar to the proposed action and the no action, timber harvests under Alternative 3 would produce revenue through the Forest Products Harvest Tax over the analysis period. Lower volumes of timber harvested due to less acreage available for more intensive harvest compared to the proposed action and the no action would likely to decrease the amount of tax revenue generated annually and distributed to beneficiaries relative to the proposed action and the no action alternative.

Alternative 4: Increased Timber Harvest

Effects on the CSF and other state taxes under Alternative 4 would be similar to those described for the proposed action. The permit area would not generate any revenue for the CSF, and differences in levels of economic activities between Alternative 4 and the proposed action are unlikely to produce measurable impacts on other state taxes, relative to overall state tax collections and fluctuations in economic conditions.

Similar to the proposed action and the no action, timber harvests under Alternative 4 would produce revenue through the Forest Products Harvest Tax over the analysis period. Timber harvest volumes that are greater than the other alternatives, would likely result in tax revenue greater than the other alternatives that is generated annually and distributed to beneficiaries.

3.11.3.3 Value of Ecosystem Services

Alternative 1: No Action

Value of Special Forest Product Collection, Hunting, and Fishing

Under the no action alternative, all forest types and associated special forest products would continue to be available, but the supply and distribution relative to existing conditions would shift as forest age and structure shift. Harvest patterns would result in fluctuating areas of early- and mid-seral forest, a declining area of late-seral forest, and an increasing area of old growth forest over the analysis period, which could increase or decrease the abundance of mushrooms, fungi, moss, and berries. Timber harvest sites would continue to provide opportunities for firewood collection, although access may change over the analysis period. Increases in availability and abundance of special forest products could increase the value people derive from the study area. Decreases in the availability and abundance of products could translate into lost income for commercial users or higher travel costs to substitute collection sites for all users, including those who collect for subsistence or recreation.

Any new permanent roads developed for forest management purposes under the no action alternative would expand access to collect special forest products where maintained and open to public access. However, expansion is expected to be minimal, because the existing permanent road network is densely built out.

As described in Section 3.5, *Fish and Wildlife*, under the no action alternative, forest management activities would have adverse effects on habitat for fish species in the study area through increased sediment delivery, reduction of available wood for delivery to streams, increases in peak flows, and increases in water temperature. Where forest management activities result in a decline in habitat quality, the value of subsistence and commercial fishing in the permit area could be adversely affected if they reduce the availability of fish or increase the effort required for fishing (Section 3.5). As described in Section 3.8, *Recreation and Visual Resources*, a variety of habitat types would be available to support wildlife populations valuable for hunting (deer and elk) (Section 3.5). Localized changes in habitat types could have both beneficial and adverse effects on these populations. Where harvests occur, the presence of early-seral stands would provide desirable conditions for hunting.

Value of Climate Regulation

Based on modeling projections, average annual carbon sequestration from standing trees would decrease under the no action alternative compared to existing conditions and emissions from the other quantified activities would add to this reduction. Net carbon sequestration is projected to decrease by 214,244 MT carbon dioxide equivalent (CO_2e) per year over the analysis period (Section 3.7, *Climate Change*). This represents a social value of approximately -$34 million per year (in 2020 dollars) on average over the analysis period.[2]

Value of Surface Water Quality Regulation

Under the no action alternative, harvest activities and road construction and use would degrade local surface water quality by increasing toxic chemical concentrations in streams, while reforestation and road abandonment and vacating would improve water quality locally (Section 3.3, *Water Resources*). Runoff of contaminants would be higher in areas with clearcut harvests and higher road density and use. Compliance with regulations described in Section 3.3, including OAR 629-625-0000 through 629-625-0920, would reduce the potential for contamination of waters.

Although the permit area is upstream of domestic water supplies, it is not upstream of any public water systems. Therefore, no effects on public water systems are anticipated. However, private surface water intakes could occur downstream of the permit area and thereby be subject to water quality effects described in Section 3.3. Where and when water quality is adversely affected, additional treatment of water may be necessary, increasing the cost of drinking water for downstream users.

Declines in value of water-based recreation are not likely based on expected level of water quality changes.

Value of Threatened and Endangered Species Habitat Protection

As described in Section 3.5, *Fish and Wildlife*, forest management activities under the no action alternative would have adverse effects on coho habitat in the study area through increases in sediment delivery, peak flows, and water temperature. Compliance with regulations described in Section 3.5 would reduce but not eliminate adverse effects. These adverse effects on coho habitat could diminish the economic well-being of people who care about their survival if it affects overall species population health. Avoidance of harvest in areas occupied by covered terrestrial species and modeled increases in terrestrial habitat would benefit these species. Loss of complex forest structure outside occupied areas, increases in habitat fragmentation, and lack of long-term

[2] Though the EPA report does not provide estimates for the social cost of carbon in emissions years after 2080, we applied the 2080 emissions year value of $410 per MT CO_2 for the for the period 2080–2105.

monitoring and adaptive management would adversely affect these species and the economic well-being of people who value their continued survival (Section 3.5).

Value of Cultural, Tribal, Educational, and Research Services

To the extent people use these forest settings to satisfy spiritual, tribal, and cultural values, the permit area would continue to support these values. Most forest visitors tend to prefer old growth forests that look natural and unmanaged (Shelby et al. 2005; Kearney et al. 2010). The permit area would continue to provide value to such visitors as the combined levels of late-seral and old growth forests would generally increase over the analysis period.

Under the no action alternative, the availability of plant species valued by tribes would fluctuate based on the timing and location of harvest (Section 3.10, *Tribal Resources*). Effects on fishing and hunting are described above under *Value of Special Forest Product Collection, Hunting, and Fishing*. Potential impacts on cultural and tribal resources are described in Section 3.9, *Cultural Resources*, and Section 3.10.

The permit area would continue to create value for local educational institutions and students who use the permit area for small-scale research and educational activities.

Changes in surface water and visual quality have the potential to affect property values in areas adjacent to the permit area. Portions of the permit area that are visible to residences on Loon Lake and in Ash Valley would continue to experience harvest levels similar to levels in the past, reducing any potential impact on property values. Although no effects on public water systems are anticipated, private surface water intakes could occur downstream of the permit area and thereby be subject to water quality effects. Where and when water quality is adversely affected, additional treatment of water may be necessary, increasing the cost of drinking water for downstream users and potentially affecting property values for the affected residences.

Alternative 2: Proposed Action

Value of Special Forest Products, Hunting, and Fishing

Continued availability of all types of forest structures over the analysis period would result in similar availability and abundance of special forest products under the proposed action as under the no action alternative. Taken together, increased area of old growth and late-seral forest, decreased area of early- and mid-seral forest, and greater limits on salvage harvests and the use of prescribed burns could increase the variety of plant species like mushrooms, moss, salal, and berries relative to the no action alternative. Decreased timber harvest would reduce opportunities for firewood collection. The proposed action commitment to reduce the density of the road network in the permit area in 10-year increments over the analysis period would reduce access to collect special forest products relative to the no action alternative.

Decreases in harvest, increased road vacating, and increased riparian and aquatic protections would decrease adverse effects on fish and stream-dependent wildlife compared to the no action (Section 3.5, *Fish and Wildlife*). Where improvements in habitat quality occur, the value of subsistence and commercial fishing in the permit area could increase if it increases the availability of fish or decreases the effort required for fishing. As described under the no action alternative, a variety of habitat types would be available to support wildlife populations valuable for hunting (deer and elk). Localized changes in habitat types would differ from the no action, with increased combined late-seral and old growth forest increasing hiding and concealment habitat and decreased early-seral forest decreasing foraging habitat. Decreased clearcuts would reduce the early-seral stands and openings valued by hunters compared to the no action.

Value of Climate Regulation

Net carbon sequestration under the proposed action is projected to increase an average of 396,701 MT CO_2e per year over the analysis period (Section 3.7, *Climate Change*). This represents an estimated social value of approximately $63 million per year (in 2020 dollars), an approximately $97 million annual increase over the no action alternative.

Value of Surface Water Quality Regulation

The reduced area of clearcut harvest, increased buffer widths, increased large wood recruitment to streams, and reduced road density, along with compliance with Clean Water Act requirements at the project level, would reduce adverse effects on water quality compared to the no action alternative across the permit area. Where and when water quality is adversely affected, downstream users of private surface water intakes may experience treatment costs for drinking water. Water quality effects are not expected to affect the value of water-based recreation.

Value of Threatened and Endangered Species Habitat Protection

The reduced amount of more intensive harvest, annual harvest caps, and implementation of the conversation strategy under the proposed action would increase beneficial effects and decrease adverse effects on coho compared to the no action alternative (Section 3.5, *Fish and Wildlife*). Increased projected suitable habitat and habitat connectivity for covered terrestrial species and commitments to increased suitable habitat, a monitoring and adaptive management program, and research on effects of barred owl management under the proposed action would improve outcomes for these species compared to the no action alternative (Section 3.5). The resulting impact on the economic well-being of people who care about ongoing species existence would be greater relative to the no action alternative.

Value of Cultural, Tribal, Educational, and Research Services

Projected greater increase in combined old growth and late-seral forests would result in beneficial effects on value for forest visitors with a preference for these forest types compared to the no action alternative. The reduced area of clearcut harvest and increased areas of variable density harvest and restoration thinning compared to the no action alternative, along with the use of prescribed burns to maintain suitable conditions for species of cultural value to local tribal communities, would result in a more diverse and connected landscape under the proposed action and would provide a greater variety of plant species for tribal use (Section 3.10, *Tribal Resources*). Effects on fishing and hunting are described above under *Value of Special Forest Product Collection, Hunting, and Fishing*. The integration of Indigenous Knowledge and collaboration with the tribes to maintain or increase the amount of open forage habitats for deer and elk would reduce the loss of open habitats over the analysis period (Section 3.10). There are no differences in impacts on cultural resources and their uses between the proposed action and the no action (Section 3.9, *Cultural Resources*).

As a research forest, the permit area would create greater opportunities for research and educational programs under the proposed action relative to the no action alternative. Research on forest management activities that balance forest resource extraction with conservation would contribute to sustainable forest management in the future, particularly in the face of growing disturbances and climate change impacts. Advancements in such practices would generate value for stakeholders that rely on working forests and stakeholders that value conservation. Informal use of the forest as a study area or site for educational programming would create value for students and academic institutions.

The proposed action would open portions of the permit area visible to residences along Loon Lake to variable density harvest. Where views are not protected by terrain or existing trees, adverse effects on the viewshed could adversely affect property values of those residences.

Although adverse effects on water quality under the proposed action would be less than under the no action alternative across the permit area, where and when water quality is adversely affected, downstream users may experience treatment costs for drinking water, which could affect property values for the affected residences.

Alternative 3: Increased Conservation

Net carbon sequestration is projected to increase by 725,131 MT CO_2e per year on average over the analysis period (Section 3.7, *Climate Change*). This represents an estimated social value of approximately $115 million per year (in 2020 dollars) (an approximately $52 million and $149 million average annual increase in value compared to the proposed action and no action alternative, respectively). Expanded RCAs would improve habitat connectivity and benefit riparian species compared to the proposed action and no action, increasing value for people who value habitat and species conservation. Increased aquatic protection would likely reduce adverse effects on water quality compared to all alternatives across the permit area. Where and when water quality is adversely affected, downstream users of private surface water intakes may experience treatment costs for drinking water. Water quality effects are not expected to affect the value of water-based recreation. Other ecosystem service values, such as special forest product collection, are unlikely to meaningfully differ from the proposed action. The potential for effects on property values in areas adjacent to the permit area would be the same as described for the proposed action.

Alternative 4: Increased Timber Harvest

Net carbon sequestration is projected to decrease by 456,999 MT CO_2e per year on average over the analysis period (Section 3.7, *Climate Change*). This represents a social value of approximately -$72 million (in 2020 dollars) per year (an approximately $135 million and $38 million average annual decrease in value compared to the proposed action and no action alternative, respectively). Adverse effects on fish and wildlife and value for people who value habitat and species conservation would be similar the no action, greater than the proposed action. Effects on water quality would be similar to or greater than the no action alternative across the permit area. Where and when water quality is adversely affected, downstream users of private surface water intakes may experience treatment costs for drinking water. Water quality effects are not expected to affect the value of water-based recreation. The potential for effects on property values in areas adjacent to the permit area would be the same as described for the proposed action. Other ecosystem service values, such as special forest product collection, are unlikely to meaningfully differ from the no action alternative.

3.12 Environmental Justice

3.12.1 Methods

The study area for environmental justice (EJ) impacts includes all counties in southwestern Oregon. These counties overlap with the permit area and the plan area, are part of the regional economy that processes timber harvested in the permit area and interact with the ecosystem services produced by the permit area (Figure 3.12-1). The EJ study area also encompasses the study area defined for tribal resources in Section 3.10, *Tribal Resources*. This multilevel study area aligns with the intent of Executive Order (EO) 14008, EO 12898, and regulatory guidance (Federal Interagency Working Group on Environmental Justice and NEPA Committee 2016) that emphasizes investigating all pathways of potential impact and exposure to identify vulnerable populations (e.g., minority and low-income communities, pregnant women, elderly, groups with high asthma rates) that may experience potential disproportionately high and adverse impacts.

EO 12898 requires identification of impacts from federal actions on low-income and minority communities residing in the United States. To identify these populations, this analysis used demographic and income data from the U.S. Census Bureau's 2016–2020 American Community Survey (ACS).[1] *Low income* is defined using the Census household poverty threshold. Geographies where the proportion of low-income or minority populations is "meaningfully greater" than the underlying geography (e.g., the county or state that contains the geography) are included in the EJ analysis. EPA's EJScreen tool was used to identify areas that EPA has mapped where high shares of minority and/or low-income populations overlap with poor environmental conditions and may be vulnerable to disproportionate and adverse environmental impacts.

An EJ impact occurs when an adverse impact disproportionately affects a relevant population. The first part of this analysis identifies the relevant populations evaluated for EJ impacts in the study area. The second part screens the adverse impacts identified throughout this EIS for disproportionate harm to such populations, either because the impact is concentrated in a particular geography or on a resource that such populations depend on and hold value for. The EJ analysis also identifies effects that are disproportionately beneficial to affected minority and low-income populations.

3.12.2 Affected Environment

3.12.2.1 Environmental Justice Counties and Census Tracts

Minority and Low-Income Counties

Minority groups make up 25% of Oregon's population (2016–2020 ACS data). Compared to the state of Oregon, the share of the minority population is lower in all counties in the study area (Table 3.12-1). Nationally, the workforce in the forestry sector is predominantly non-Hispanic white, with

[1] Since 2016–2020 ACS data for census block groups has large margins of error, census tracts were chosen as the smallest geography for identifying populations to be included in the EJ analysis.

Hispanic and Latino workers the second largest ethnic group employed in the sector (U.S. Bureau of Labor Statistics 2021).

About 12% of Oregon's population reported annual household income lower than the Census poverty threshold. In the study area, all six counties have a higher share of the population below this threshold compared to the state: Coos (16%), Curry (13%), Douglas (13%), Jackson (14%), Josephine (16%), and Lane (17%) (Table 3.12-1). These counties are shown in Figure 3.12-1.

Minority and Low-Income Census Tracts

There are 223 census tracts within the study area, of which 134 (60%) meet the criteria, either for minority population, low-income status, or both indicators. One tract in Jackson County has a minority population above 50%. An additional 89 tracts were lower than 50% but had higher shares of minority populations than their respective counties. Compared to county populations with annual household income lower than the Census poverty threshold, 96 census tracts meet the EJ criteria for low-income populations. About 39% of the identified tracts—52 tracts—meet EJ criteria for both minority and low-income populations (Table 3.12-2). Tracts in Figure 3.12-1 that meet EJ criteria for minority populations are shown with dots. Tracts that meet EJ criteria for low-income populations are shown with diagonal lines. The dots and diagonal lines overlap for tracts that meet both minority and low-income criteria. The U.S. Census Bureau derives demographic data at the tract level statistically, and these estimated data are somewhat uncertain. However, inclusion of all tracts meeting threshold criteria in this analysis represents a conservative approach.

Table 3.12-1. Summary of Minority and Low-Income Populations in the Study Area

Geography	Total Population	Minority		Low-Income	
		Population	Percentage	Population	Percentage
Oregon	4,176,346	1,047,852	25%	506,558	12.36%
Coos County [a]	64,175	9,823	15.31%	10,184	16.14%
Curry County [a]	22,889	3,275	14.31%	2,941	12.95%
Douglas County [a]	110,015	13,937	12.67%	14,124	13.01%
Jackson County [a]	218,781	43,696	19.97%	29,652	13.70%
Josephine County [a]	87,097	12,404	14.24%	13,715	16.00%
Lane County [a]	377,749	70,435	18.65%	63,585	17.18%
Selected EJ Counties	880,706	153,570	17.44%	134,201	15.24%
Selected EJ Census Tracts	542,694	114,555	21.11%	102,229	18.84%

Sources: U.S. Census Bureau 2022a, 2022b

[a] (Grayed cell) Counties with percentage of low-income population greater than Oregon's.

Table 3.12-2. Counties and Census Tracts with Populations Analyzed for Environmental Justice Impacts

Geographies	Number of Geographies			
	Minority Only	Low-Income Only	Both	Total
Counties	0	5	0	5
Census Tracts	38	44	52	134

Environmental Justice Indexes

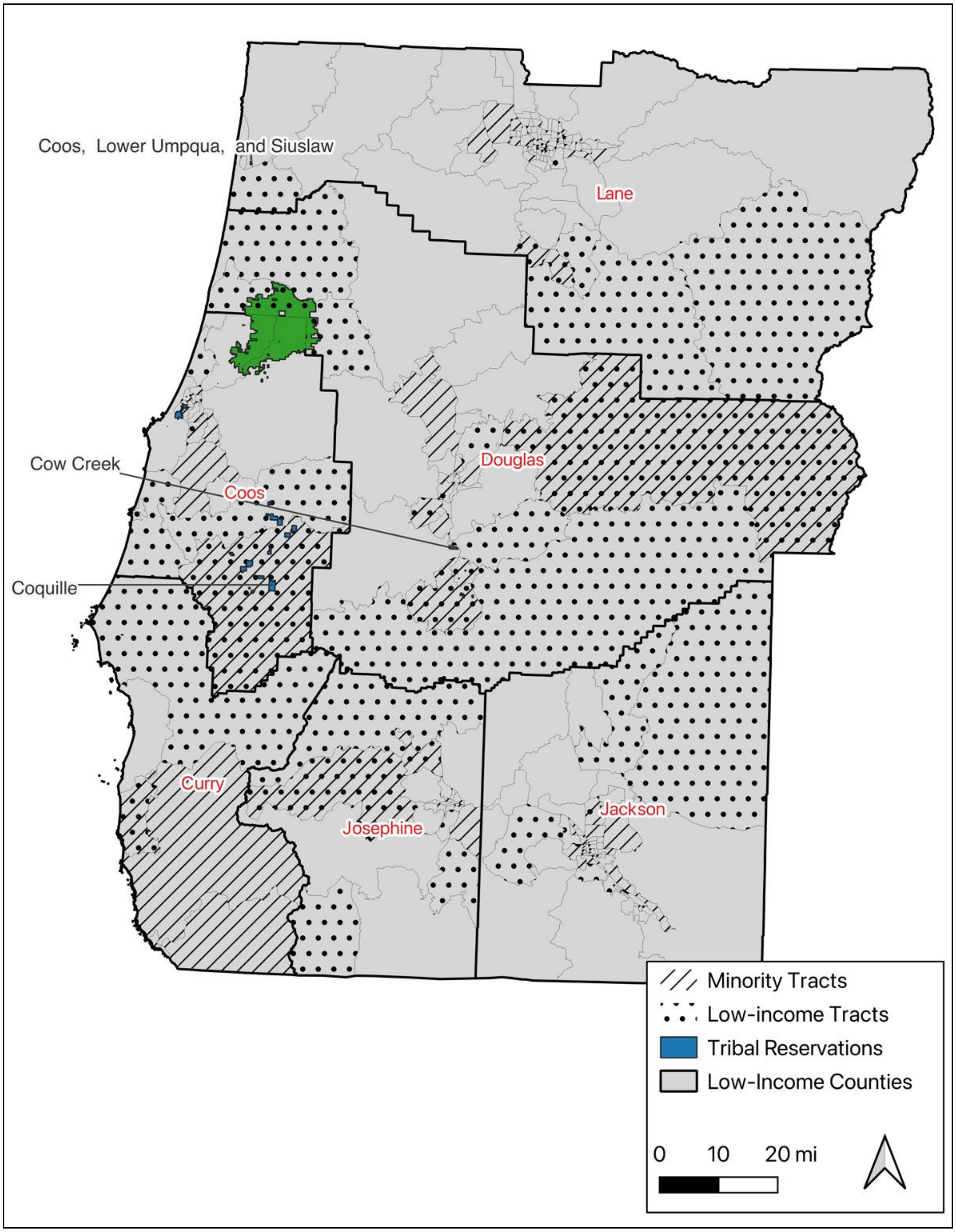
The U.S. Environmental Protection Agency's (EPA's) EJScreen is an EJ screening and mapping tool that presents data on 12 Environmental Justice Indexes (EJ Indexes) for census tracts and block groups. EJScreen combines data on demographics and environmental indicators for census geographies such that areas with high values for an EJ Index indicate large numbers of minority and/or low-income residents with higher environmental indicators (EPA 2022a). As a result, these areas correlate but do not overlap perfectly with areas where low-income and/or minority populations live in higher shares. According to the EPA, an area of potential EJ concern is an area where one or more of the 12 EJ Indexes is at or above the 80th percentile in the nation and/or state (EPA 2022b). In the study area, Lane, Jackson, and Josephine Counties were the only counties with census tracts that met the 80th percentile threshold relative to Oregon. Within these counties, 15 to 23 census tracts out of a total of 194 tracts met the 80th percentile threshold relative to Oregon (Table 3.12-3).

Table 3.12-3. Number of Census Tracts with an Environmental Justice Index at or above the 80th percentile relative to Oregon

EJ Index	Lane County	Jackson County	Josephine County	Total
Lead Paint	13	9	1	23
Diesel Particulate Matter (2017)	13	9	1	23
Air Toxics Cancer Risk (2017)	13	9	1	23
Air Toxics Respiratory Hazard Index (2017)	13	9	1	23
Traffic Proximity	13	9	1	23
Wastewater Discharge	12	2	1	15
Superfund Proximity	12	9	1	22
Risk Management Plan Facility Proximity	13	9	0	22
Hazardous Waste Proximity	13	9	1	23
Ozone	13	9	1	23
Particulate Matter 2.5	13	9	1	23
Underground Storage Tanks	13	9	1	23

Note: Josephine County has 22, Jackson County has 52, and Lane County has 92 total census tracts. The other counties in the study area do not have census tracts that meet EPA's criteria.
Source: EPA 2021.

Figure 3.12-1. Counties and Census Tracts with Populations Analyzed for Environmental Justice Impacts



3.12.2.2 Tribal Nations

Table 3.12-4 summarizes the low-income populations in tribes that could be affected under the proposed action and alternatives.

Table 3.12-4. Summary of Low-Income Populations in Potentially Affected Tribes

Tribal Area	Geography	Total Population	Percentage below Poverty Level
Confederated Tribes of Siletz Indians Reservation and Off-Reservation Trust Land	Lincoln County	720	30.6%
Confederated Tribes of the Grand Ronde Community of Oregon	Polk, Yamhill Counties	632	42.6%
Coquille Indian Tribe Reservation	Coos County	473	31.1%
Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians; Reservation and Off-Reservation Trust Land	Coos, Curry, Lane Counties	99	14.0%
Cow Creek Band of Umpqua Tribe of Indians Reservation and Off-Reservation Trust Land	Douglas County	192	18.6%

Source: U.S. Census Bureau 2022c.

3.12.3 Environmental Consequences

3.12.3.1 Alternative 1: No Action

The impact analysis for air quality (Section 3.6, *Air Quality*) did not identify any adverse impacts under the no action alternative. As a result, there are no adverse impacts associated with this resource that could have a disproportionate effect on the populations evaluated for EJ impacts identified in the study area. Adverse impacts on geology and soils, water resources, vegetation, fish and wildlife, climate change, visual resources, and cultural and tribal resources on low-income, minority, and tribal populations in the study area are analyzed through their impacts on recreation and socioeconomic resources in the study area.

Recreation

Under the no action alternative, the permit area would continue to support dispersed recreational activities over the analysis period (Section 3.8, *Recreation and Visual Resources*). If recreational facilities are developed in the future, seasonal restrictions near northern spotted owl and marbled murrelet habitat may delay maintenance of the facilities, resulting in temporary adverse impacts on the supply of recreation in the permit area (Section 3.8). These adverse impacts on accessing future developed recreation sites in the permit area could result in disproportionate EJ impacts. The 2019–2023 Statewide Comprehensive Outdoor Recreation Plan for Oregon conducted a survey of Oregon residents and found low-income respondents' lack of transportation options and distance to parks presented barriers for accessing outdoor recreation (OPRD 2019). Since lower-income communities are less likely to travel farther distances to access other recreational facilities due to constraints on transportation and financial resources, the no action alternative could result in disproportionately high and adverse impacts on low-income and minority populations that are located in the study area (Lamborn et al. 2017).

Adverse impacts on habitat quality of most fish species could adversely affect recreational fishing in the study area over the analysis period (Section 3.8). Since recreational fishing—distinct from its subsistence purpose described under *Value of Ecosystem Services*—does not draw a disproportionate share of minority and low-income participants in Oregon, the impacts on low-income and minority populations would not be disproportionately high and adverse (OPRD 2019). A variety of habitat types would be available to support wildlife populations valuable for hunting (deer and elk) for commercial and subsistence use (Section 3.5, *Fish and Wildlife*). Localized changes in habitat types could have both beneficial and adverse effects on these populations. Where harvests occur, the presence of early-seral stands would provide desirable conditions for hunting.

Cultural Resources

Under the no action alternative, forest management activities have the potential to affect cultural resources through ground disturbance or changes in setting (Section 3.9, *Cultural Resources*). Potential effects on cultural and historic resources would be similar under all alternatives. Although the precise location and timing of the activities may differ depending on the alternative, DSL would consistently follow the applicable federal and state regulations and DSL policies and practices described in Section 3.9. Potential cultural resource impacts on populations included in the EJ analysis would depend on the resources affected and the extent to which these communities engage with that resource.

Socioeconomic Resources

Income and Employment

Under the no action alternative, timber harvest in the permit area would support employment and labor income over the analysis period. Compared to existing conditions over the last 5 years where harvest largely stopped, harvest from the permit area and associated income and employment would increase under the no action alternative. This could represent a beneficial impact on low-income communities in the study area by providing jobs and labor income, depending on the geographic flow of timber from the permit area and its relative share in the timber industry as described in this section.

Harvest levels and associated income and employment are expected to fluctuate over time as forest stands mature and the acreage of stands of harvestable age changes. Harvests from state lands in total make up a relatively small proportion of harvest in the counties in the study area, with harvests from the permit area comprising only a portion of harvests from state lands (Section 3.11, *Socioeconomics*). Timber contracts may employ crews from within or beyond the study area. Logs harvested from the permit area have the potential to disperse throughout mills in the study area and outside the study area. Thus, beneficial and adverse impacts arising from harvest fluctuations are unlikely to concentrate in any single community, timber company, or mill.

Fluctuations in timber harvest in the permit area are unlikely to create substantial adverse impacts on tribal members employed in the industry and timber available for tribal enterprises (Section 3.11). Although increases and decreases in timber could lead to changes in direct and indirect employment and income in the study area, the permit area only makes up a small share of forestlands that supply timber to the timber industry in the study area. In the long run, disproportionate impacts arising from changes in employment and income for populations included in the EJ analysis are less clear and would depend on supply of timber from other forestlands. Over the analysis period, the economy will adjust to shifting trends in harvest in the study area in ways that could either increase or decrease EJ impacts, depending on underlying economic conditions.

Value of Ecosystem Services

The no action alternative would produce both beneficial and adverse disproportionate impacts for populations included in the EJ analysis from changes in forest structure that influence the supply of ecosystem goods and services.

Harvest patterns would result in fluctuating areas of early- and mid-seral forest, a declining area of late-seral forest, and an increasing area of old growth forest over the analysis period, which could increase or decrease the abundance of certain special forest products such as mushrooms, fungi, moss, and berries. Where late-seral forests are removed, the supply of materials important for cultural and spiritual value to tribes, including medicinal and basketry materials, may also decrease. However, plants of value to tribes would be expected to grow back in gaps created by harvest/disturbance over time (Section 3.10, *Tribal Resources*).

Effects on hunting are described above under *Recreation* and apply to both recreational and subsistence hunting. To the extent that adverse impacts on habitat quality for fish would decrease the availability of fish or increase the effort required for fishing, it would represent a disproportionate effect on some populations, especially tribal populations and some rural low-income residents that disproportionately rely on subsistence resources and ways of life (Section 3.11, *Socioeconomics*).

Varying levels of harvest over the analysis period provide opportunities for firewood collections for personal and commercial use, although supply may change over the analysis period (Section 3.11).

These products are harvested for subsistence, cultural tradition, and as sources of supplemental income for local lower-income communities and tribes (Section 3.11; OFRI 2021). While timber harvest may adversely affect supply of these products in localized areas, shifting patterns of forest composition would generally ensure a continued supply of nontimber forest products throughout the permit area. However, shifting distributional patterns could reduce access for some populations, producing disproportionate adverse impacts for those most dependent on the resource and least able to adapt to changes and increased travel costs. Adverse impacts would be particularly high for Grande Ronde, Siletz, Coos, Lower Umpqua and Siuslaw, Coquille, and Cow Creek Tribes in the Coast Range (Section 3.10, *Tribal Resources*), given that some of these resources have cultural value specific to place and tradition that is not necessarily substituted by resources from elsewhere or other types of resources.

Under the no action alternative, the location and timing of harvest may affect water quality and private surface water diversions downstream of the permit area, potentially increasing costs of drinking water for affected users. This could result in disproportionate and adverse effects for affected populations with limited financial resources by increasing their household cost burden or resulting in adverse health impacts.

Climate change is expected to substantially shift historic patterns in temperature, precipitation, snowpack, streamflow, and wildfires in the study area (Section 3.7, *Climate Change*). The socioeconomic costs of climate change through effects on economic production, natural resources, and overall quality of life is expected to be disproportionate and adverse for populations included in the EJ analysis with fewer resources for climate change adaptation and mitigation. Under the no action alternative, average annual carbon sequestration from standing trees would decrease compared to existing conditions and emissions from the other quantified activities would add to this reduction. Although decreases in carbon sequestration would contribute to ongoing climate change, in the long run, disproportionate impacts arising from climate change for populations included in the EJ analysis would depend on a variety of factors contributing at a larger scale than the permit area.

3.12.3.2 Alternative 2: Proposed Action

Impacts on low-income, minority, and tribal populations under the proposed action related to geology and soils, air quality, and cultural resources would be the same as described for the no action alternative. This section analyzes whether adverse impacts on recreation and socioeconomic resources could result in disproportionate impacts for populations included in the EJ analysis.

Recreation

Similar to the no action, a variety of habitat types would be available to support wildlife populations valuable for hunting (deer and elk), though localized changes in habitat types would vary. Decreased clearcuts would reduce early-seral openings valued by hunters compared to the no action. Users may travel to other regions in the permit area or to other parks to access younger forests to maintain their enjoyment of hunting; however, this travel is likely to generate additional costs and higher disproportionate impacts on populations with financial limitations to absorb increased costs.

Low-income and minority communities tend to participate less in outdoor recreation than higher-income and non-Hispanic white communities in Oregon (OPRD 2019), potentially a reflection of existing barriers faced by low-income and minority communities such as lack of transportation options, limited financial resources, and fear of racial discrimination. The additional travel costs of accessing early- to mid-seral stands would exacerbate existing financial inequality and deepen the gap in participation in outdoor recreation in Oregon.

Socioeconomic Resources

Income and Employment

Timber harvests and associated employment would decrease over the analysis period under the proposed action compared to the no action alternative (Section 3.11, *Socioeconomics*). However, jobs and income associated with restoration thinning and recreation, research, and educational programs would increase in the study area. Collaboration with tribes to implement indigenous practices like prescribed burning, thinning, and native plantings could contribute to jobs and income for tribal members. In the long run, disproportionate impacts arising from changes in employment and income for populations included in the EJ analysis are not clear and would depend on the geographic flow of resources from the permit area and the overall supply of timber in the study area. Changes in the underlying economic conditions in the study area over the analysis period such as shifting shares of industries in the regional economy and changing demographic composition through migration to and from the study area could either increase or decrease adverse EJ impacts.

Value of Ecosystem Services

Increased late-seral and old growth forests and decreased early- and mid-seral forests compared to the no action, greater limits on salvage harvests in Reserves and riparian conservation areas, and prescribed burns would increase the variety of plant species like mushrooms, moss, salal, and berries relative to the no action alternative for tribes and other communities who rely on these products for subsistence and other purposes (Section 3.10, *Tribal Resources*, Section 3.11, *Socioeconomics*). On the other hand, the proposed action's commitment to reduce the density of the road network in the permit area in 10-year increments over the permit term could reduce access to collect special forest products relative to the no action alternative, disproportionately affecting populations included in the EJ analysis.

Effects on hunting under the proposed action are described above under *Recreation* and apply to both recreational and subsistence hunting. As described in Section 3.11, decreased adverse effects on fish and stream-dependent wildlife compared to the no action (Section 3.5, *Fish and Wildlife*) could increase the value of subsistence and commercial fishing in the permit area if it increases the availability of fish or decreases the effort required for fishing. This could represent a beneficial effect on communities that depend on these resources compared to the no action.

Projected decreases in harvest compared to the no action alternative would decrease the availability of firewood for collection and species/resources associated with early-seral stands, disproportionately affecting populations included in the EJ analysis.

The proposed action would open portions of the permit area visible to residences along Loon Lake to variable density harvest. Where views are not protected by terrain or existing trees, adverse effects on the viewshed could adversely affect property values of those residences. This could result in disproportionate and adverse effects for affected populations with limited financial resources by increasing their household cost burden.

The proposed action would reduce adverse effects on water quality compared to the no action alternative. Where and when adverse effects on water quality occur, they may affect private surface water diversions downstream of the permit area, potentially increasing costs of drinking water for affected users. This could result in disproportionate and adverse effects for affected populations with limited financial resources by increasing their household cost burden or resulting in adverse health impacts.

Under the proposed action, carbon sequestration would be higher by approximately 610,945 metric tons carbon dioxide equivalent per year over the analysis period compared to the no action alternative. In the long run, disproportionate impacts arising from climate change for low-income, minority, and tribal populations would depend on a variety of factors at a larger scale than the permit area.

3.12.3.3 Alternative 3: Increased Conservation

Impacts on populations included in the EJ analysis under Alternative 3 related to geology and soils, air quality, and cultural resources would be the same as described for the no action alternative. Impacts on populations from effects on climate change, recreation, and socioeconomics would be the same as described for the proposed action with a few exceptions. Decreased clearcut areas would reduce early-seral openings valued by hunters compared to the proposed action and no action, potentially increasing the level of effort required by low-income, minority, or tribal populations to hunt for subsistence.

Reduced adverse effects and increased beneficial effects on fish and stream-dependent wildlife compared to all other alternatives would potentially increase the opportunity and success of subsistence and commercial fishing, which populations included in the EJ analysis disproportionately benefit from in the permit area (Section 3.11, *Socioeconomics*). Alternative 3 would reduce adverse effects on water quality compared to the proposed action and the no action alternative. Where and when adverse effects on water quality occur, it may affect private surface water diversions downstream of the permit area, potentially increasing costs of drinking water for affected users. This could result in disproportionate and adverse effects for populations with limited financial resources by increasing their household cost burden or resulting in adverse health impacts.

3.12.3.4 Alternative 4: Increased Timber Harvest

Impacts on low-income, minority, and tribal populations under Alternative 4 related to geology and soils, air quality, aesthetics and recreation, cultural resources, ecosystem services, and GHG emissions and carbon storage would be the same as described for the no action alternative.

Chapter 4
Cumulative Effects

4.1 Introduction

This chapter presents the analysis of potential cumulative effects of the proposed action and alternatives on the human environment. The Council on Environmental Quality (CEQ) NEPA Regulations provide the following definition: "cumulative effects, which are the effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 Code of Federal Regulations [CFR] 1508.1(g)(3)).

4.2 Past, Present, and Reasonably Foreseeable Actions and Trends

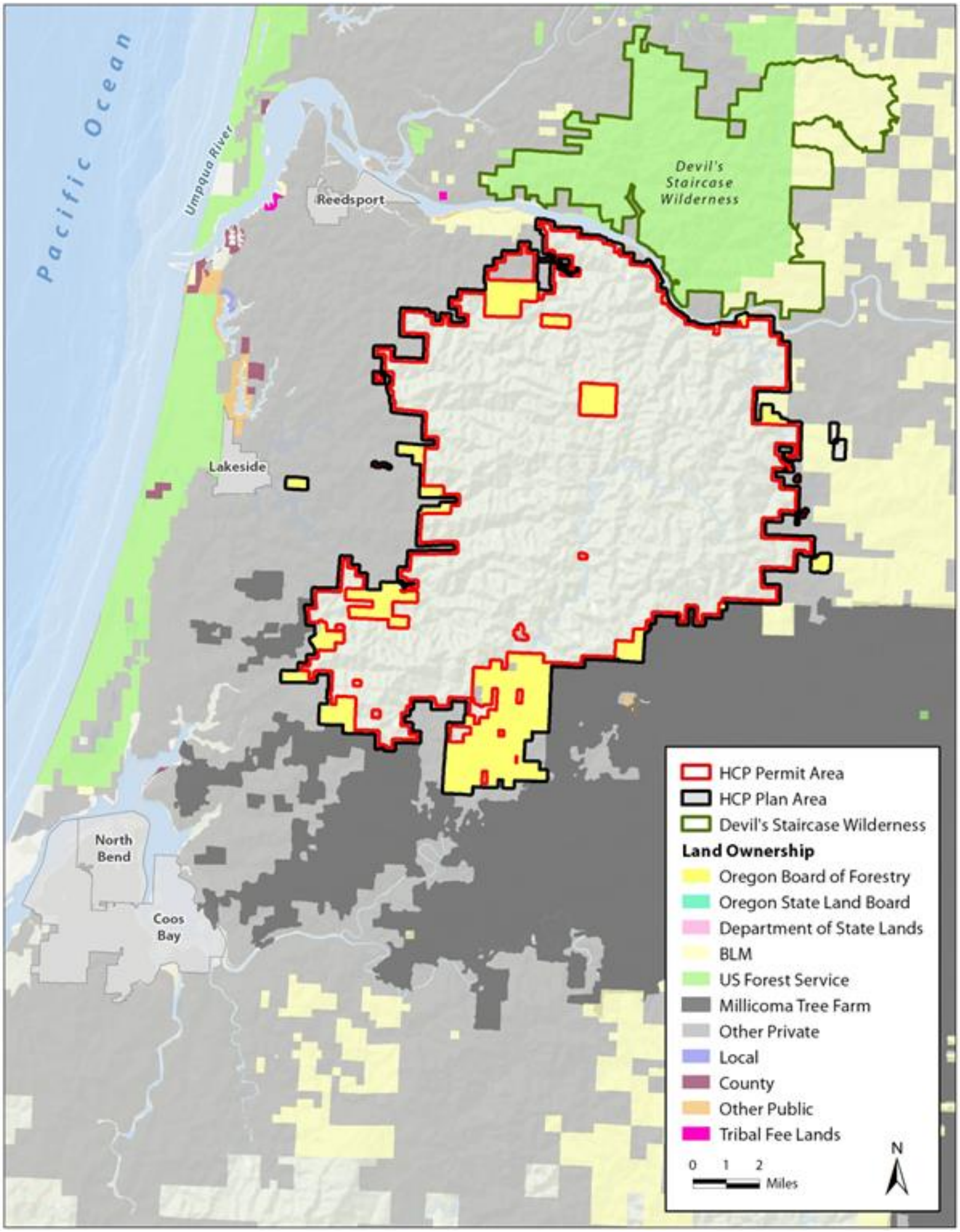
The cumulative analysis considers those past, present, and reasonably foreseeable actions and trends, the effects of which, when added to the incremental impact of the proposed action and alternatives on the human environment, inform the assessment of cumulative effects in the study area. The study area considered in this analysis is the same for each resource as defined in Chapter 3, *Affected Environment and Environmental Consequences*.

The past, present, and reasonably foreseeable actions considered in this analysis and described below include forest management of the permit area and adjacent forestland, including under incidental take permits (ITPs) for the covered species; barred owl management; the North Umpqua River Hydroelectric Project; resource protection, enhancement, and restoration activities; climate change and disturbance events; land and agricultural development; and recreational use.

4.2.1 Forest Management

Forestland surrounds the entirety of the permit area. In some cases (e.g., ODF-managed forestlands and private inholdings), parcels of forestland are surrounded by the permit area and can only be accessed through roads and easements in the permit area (Figure 4-1). Forestland adjacent to the permit area has a variety of uses including, but not limited to, timber production, road system management, vegetation management, management for habitat conditions, fire management, water development, recreational use, conservation, and grazing. Most activities would be similar to covered activities under the proposed action, described in Section 2.1.2.2, *Covered Activities*. These types of management activities have occurred in the past, are currently occurring, and are expected to continue throughout the analysis period.

Figure 4-1. Land Ownership Adjacent to the Permit Area



Prior to state management, the majority of the permit area was managed by the U.S. Forest Service (USFS) and the rest by private landowners. The area transferred to state ownership in 1930 as part of an agreement to consolidate scattered Common School Fund Lands within federal forests into a contiguous block of state forest to be managed by the Oregon Department of Forestry (ODF) (DSL and ODF 2011). From 1930 to 2017 (87 years), the Elliott State Research Forest (ESRF) was managed by ODF on behalf of the State Land Board and under contract to DSL. In 2017, the State Land Board terminated the management contract with ODF for the ESRF. Currently, the ESRF is managed by DSL. Section 3.4.2.1, *Forest Structure and Age*, describes how past forest management has influenced current forest structure and age in the permit area.

Surrounding the permit area, forest management has primarily included management for commercial timber harvest since the early to mid-twentieth century. Beginning in the 1930s, demand for commercial timber harvest in western Oregon increased and more land began to be managed as plantation-style forests.

At present, the primary land managers adjacent to the permit area include USFS to the north, Bureau of Land Management (BLM) to the north and east, the Oregon Board of Forestry (BOF) to the south and west, and private landowners to the east, south, and west.

Federal lands contain young forest as well as much of the late-successional forest remaining in coastal Oregon. Much of the other federal land adjacent to the permit area has been managed for conservation pursuant to the Northwest Forest Plan[1] since its adoption in 1994 (USFS and BLM 1994a, 1994b); this includes the implementation of Resource Management Plans (RMPs) for BLM lands (BLM 2016a, 2016b) and Land Management Plans (LMPs) for USFS lands. The Northwest Forest Plan and associated RMPs and LMPs allocate areas of the forest for various purposes, including timber harvest, conservation, and recreation. Management and conservation under these plans include a combination of land allocations, standards and guidelines or management direction, and associated review procedures. These plans also establish allowable timber sale quantities in areas available for timber harvest. They outline conservation strategies for a wide range of terrestrial and aquatic species, including those covered under the Elliott State Research Forest HCP.

Until 2016, approximately 1.3 million acres of BLM lands in western Oregon were managed under the Northwest Forest Plan; since 2016, the lands have been managed under the Northwestern and Coastal Oregon RMP, which has similar land allocations as the Northwest Forest Plan (BLM 2016b). Of the BLM-managed areas bordering the ESRF, the vast majority consist of late-successional reserve areas and riparian reserve areas, which are managed primarily for conservation value. There are limited areas managed for low-intensity timber harvest and one block located adjacent to the southeastern side of the ESRF managed for moderate-intensity commercial timber harvest.

The Devil's Staircase Wilderness, established in 2019 and managed by USFS and BLM, is directly north of the ESRF separated by State Highway 38, the Umpqua River, and some private lands. This area is part of the National Wilderness Preservation System and many management activities (e.g., timber harvest) are prohibited. The Devil's Staircase Wilderness was formerly managed under the Northwest Forest Plan and associated RMPs and LMPs.

[1] The Northwest Forest Plan policy and direction is derived from two key documents, the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* and *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl.*

On adjacent non-federal forestland, forest management activities under other active or planned ITPs and HCPs may result in overlapping impacts with the proposed action and alternatives evaluated in this EIS. Per ESA, ITPs are supported by HCPs that are required to implement conservation strategies that demonstrate that they will, to the maximum extent practicable, minimize and mitigate the impacts of the incidental taking, and that such taking will not appreciably reduce the likelihood of survival and recovery of the species.

BOF lands adjacent to the ESRF are managed by ODF under the 2010 Northwest Oregon Forest Management Plan (FMP), which guides management practices for lands managed by ODF. BOF lands are divided into districts, each of which have individual implementation plans that provide district-level direction for implementing forest management activities in accordance with the FMP. These lands have a mix of older and recently harvested forests. The Western Oregon State Forests (WOSF) HCP (ODF 2022) and a companion FMP are in development and will replace the 2010 Northwest Oregon FMP (ODF 2010). The applicant (ODF) prepared the WOSF HCP in support of their request for ITPs that would authorize incidental take coverage for 17 terrestrial and aquatic species for their forest and recreation management activities across 639,489 acres of BOF-owned and managed lands in western Oregon. The draft WOSF HCP and EIS were issued for public comment on March 18, 2022.[2] Under this HCP, some of the adjacent BOF land would be managed for timber harvest, but other areas would be designated as habitat conservation areas (HCAs), which would be protected for habitat value and would not undergo clearcut timber harvest. The WOSF HCP's conservation strategy includes best management practices to minimize effects on covered species and designates riparian conservation areas (RCAs) for aquatic species and HCAs for terrestrial species that would be managed for the benefit of covered species. Additional conservation actions would create operational and design standards for roads, equipment use, and the timing of activities; standards for the retention of important habitat features on the landscape outside of HCAs and RCAs; and seasonal restrictions to minimize effects on known sites of covered species.

Most private lands are maintained as commercial timberlands dominated by plantations composed of relatively young, uniform Douglas-fir forest, subject to clearcut harvest (which is generally on a 40- to 60-year rotation). Private and non-federal lands must be managed in accordance with the Oregon Forest Practices Act and associated Forest Practice Administrative Rules. As outlined in OAR Chapter 629, the Forest Practice Administrative Rules address requirements for numerous forest management activities, including clearcut harvest, road design and construction, leave trees, chemical use, and habitat protection for certain fish and wildlife species. Some of the private forestlands adjacent to the southeast portion of the plan and permit areas are currently managed under the Weyerhaeuser-Millicoma Tree Farm HCP, which is a single-species HCP for northern spotted owl that covers 209,000 acres of privately owned forests managed for commercial timber harvest. The permittee for the ITP and the implementation of the HCP is the Weyerhaeuser Company. This HCP does not include any conservation actions or credits for lands in the Elliott State Research Forest HCP permit area, but the 1.5-mile radius home ranges of three northern spotted owl activity centers in the southern portion of the Elliott State Research Forest HCP permit area overlap with the Millicoma Tree Farm. The Weyerhaeuser Company is held to the HCP's landscape-level standards in these areas. The HCP requires the maintenance of at least 40% of the forested area as roosting and foraging habitat suitable for dispersing northern spotted owls, at least 80% of the forested area as dispersal habitat with gaps less than 0.5 mile, at least 90% of the forested area

[2] Project updates are available on the NMFS website at the following link: https://www.fisheries.noaa.gov/action/western-oregon-state-forests-habitat-conservation-plan.

as dispersal habitat with gaps less than 1 mile, and at least 99% of the forested area as dispersal habitat with gaps less than 3 miles. The ITP for this HCP is in effect until 2045.

The Oregon Private Forests HCP is in development based on the agreements contained in the 2022 Oregon Private Forest Accord report and adopted into Oregon state law in Senate Bill 1501. This HCP would provide the applicant (ODF) incidental take coverage across approximately 10 million acres of state-managed and private forestlands for several amphibian and fish species, including coho salmon, over 25 and 50 years, respectively. The HCP's conservation strategy would include the designation of riparian management areas for the protection of water quality, hydrologic functions, and fish and wildlife habitat; restrictions on timber harvest on steep slopes; strategies for prioritizing and implementing road improvement projects; and measures for beaver and amphibian conservation.[3] The HCP is currently in development, and an EIS is anticipated to be prepared by the Services.[4]

4.2.2 Barred Owl Management

Barred owls were first recorded in Oregon in the 1970s and have since spread to forests throughout much of the state. They area significant threat to the northern spotted owl due to competition for resources and habitat. They are slightly larger and more aggressive than northern spotted owls and compete for the same habitat. Barred owls are now present in forests of the Cascades, Coast Range, Blue, Wallowa, Strawberry and Klamath mountains and are expected to continue increasing in density in the permit area during the analysis period.

There are ongoing survey efforts tracking the prevalence of barred owl in northern spotted owl habitat in western Oregon. Survey data collected between 1990 and 2020 on federal lands in the Coast Range study area (located north of the permit area) and between 1985 and 2020 in the Tyee Density study area (located to the southeast of the permit area) shows that barred owl presence has steadily increased in the region (FWS 2020b, 2021).

FWS began implementation of its Barred Owl Removal Experiment in 2013 to investigate the effect of barred owl removal on spotted owl population dynamics. This experiment was outlined in the 2011 Northern Spotted Owl Recovery Plan (FWS 2011) as Recovery Action 29 and included study areas in Washington, Oregon, and California consisting of federal lands occupied by both northern spotted owl and barred owl. The study areas closest to the permit area are the Oregon Coast Range study area in western Oregon north of the ESRF, and the Klamath-Union/Myrtle study area in southwestern Oregon south of the ESRF. The experiment concluded in 2020 and its results led FWS to develop a management strategy to reduce barred owl populations in Washington, Oregon, and California. This strategy, finalized in 2024, includes three approaches to barred owl management: removal of barred owls from known northern spotted owl sites, prioritizing recently occupied sites; removal of barred owls from targeted Focal Management Areas within larger General Management Areas; and removal of barred owls from Special Designated Areas to support location-specific needs (89 FR 72881).

[3] While the HCP based on the Oregon Private Forest Accord report is still in development, Oregon Senate Bill 1501 specifies that the HCP must be consistent with updates to the Oregon Forest Practices Act (Oregon Revised Statute 527 and Oregon Administrative Rules Chapter 629) adopted in February 2024.

[4] Project updates can be found on the ODF website at the following link: https://www.oregon.gov/odf/Pages/private-forest-accord.aspx.

Outside of federal lands, ODF and the Weyerhaeuser Company have Safe Harbor Agreements for northern spotted owls. These agreements associated with the FWS initial experiment allowed FWS access to their lands for barred owl management. They provide ODF and the Weyerhaeuser Company incidental take coverage for northern spotted owls for take from forest management at sites that become newly occupied by northern spotted owl during the permit term. FWS' barred owl management experiment on ODF and Weyerhaeuser Company lands has concluded, but their incidental take permits are valid until 2029 and 2026, respectively, for timber sales authorized prior to August 31, 2026.

4.2.3 North Umpqua River Hydroelectric Project

The North Umpqua Hydroelectric Project is located on the North Umpqua River in Douglas County, which runs along the northern boundary of the permit area. PacificCorp holds a 35-year license with the Federal Energy Regulatory Commission (FERC) to operate the 194-megawatt project through October 31, 2038 (FERC 2022). The project is located primarily within the Umpqua National Forest on lands administered by USFS and BLM. Initially constructed between 1947 and 1956, the project's facilities include eight hydroelectric developments, each consisting of a dam, waterway (canals and flumes), penstock,[5] and powerhouse. The project includes a total of 37.3 miles of waterways (e.g., canals, flumes, penstock, tunnels). The developments use water primarily from the North Umpqua River and two of its major tributaries, Clearwater River and Fish Creek, to generate electricity (PacificCorp 2022).

The project includes a mitigation requirement that funds projects to mitigate impacts on water, habitat, and soil. Potential mitigation projects include tributary enhancement, riparian restoration, road decommissioning, and other measures to benefit aquatic and terrestrial species and habitats.

4.2.4 Resource Protection, Enhancement, and Restoration Activities

Species protection and habitat protection or restoration efforts within or adjacent to the permit area (e.g., federal, state, or tribal species recovery plans, barred owl management projects, other invasive species removal efforts) may have overlapping effects with the proposed action and alternatives to the extent that such projects contribute to maintaining and improving habitat for the covered species.

Areas adjacent to the permit area that have been or would be managed by other agencies for habitat conservation during the ESRF HCP permit term include late successional reserves in lands managed by the BLM and USFS and RCAs and HCAs on BOF lands.[6]

4.2.5 Climate Change and Disturbance Events

See Section 3.7.2.1, *Climate Change*, for a discussion of past, present, and reasonably foreseeable effects of climate change on environmental resources in the study area. Section 3.4.2.1, *Forest*

[5] A *penstock* is a sluice or gate for regulating a flow.

[6] Management of HCAs and RCAs for listed species habitat would occur pending ITP issuance for the Western Oregon State Forests HCP.

Structure and Age, describes how disturbance events have influenced current forest structure and age in the permit area.

4.2.6 Land and Agricultural Development

Past and present urban development in Coos and Douglas Counties comprises residential, commercial, industrial, and recreational uses. The largest cities (by population) in these counties are Roseburg, Coos Bay, and North Bend. The population of Coos County increased by 3% between 2010 and 2020, from 63,043 to 64,929. The population of Douglas County increased by 3.3% between 2010 and 2020, from 107,667 to 111,201 (U.S. Census Bureau 2021). By 2070, the estimated population of Coos County is expected to reach 66,949 (Chen et al. 2022a), representing a 3.1% increase from 2020. By 2070, the estimated population of Douglas County is expected to reach 119,193 (Chen et al. 2022b), representing a 7.2% increase from 2020.

Approximately 40% of the population in these counties lives outside of designated urban growth boundaries. Projections show that the share of the population living outside of urban growth boundaries will decrease over time to approximately a third of the county populations by 2072. At present, there are small parcels zoned for residential use in the unincorporated community of Ash in Douglas County along the northeastern side of the ESRF.

There is also past and potential future agricultural development in Coos and Douglas Counties, including parcels zoned for exclusive farm use (EFU). In Douglas County, the EFU parcels closest to the permit area are zoned specifically for grazing and related activities. In Coos County, EFU parcels receive a general EFU zoning designation; the zoning code does not assign a specific type of farm use. The State of Oregon has maintained a strong policy to protect agricultural land across the state (ORS 215.243). Oregon's Statewide Planning Program has carried out this policy over the years and has effectively slowed the loss of farmland in Oregon, especially those lands formally designated as EFU. It is anticipated that the State of Oregon would continue to carry out this policy; however, the conversion of rural land (i.e., land not designated EFU) to other land uses could continue to occur in the future.

At present, there are parcels zoned for agricultural use in Coos and Douglas Counties that lie adjacent to the ESRF. In Douglas County, adjacent agricultural zoning designations include "Farm Forest" and "Farm Use – Grazing" (Douglas County 2021). In Coos County, the primary adjacent agricultural zoning designation is "Exclusive Farm Use" (Coos County 2019).

4.2.7 Recreational Use

The permit area is open to the public and used for dispersed recreation activities such as camping, hiking, fishing, off-highway vehicle (OHV) use, forest product harvest and collection including firewood cutting, and hunting. The permit area also borders other public and private recreation sites like the Loon Lake Recreation Area, BLM campgrounds, and private campgrounds along the eastern border. Recreational uses on adjacent forestland are similar to those described in Section 3.8, *Recreation and Visual Resources.*

Although DSL has not developed recreational infrastructure in the permit area in the past and does not plan to develop recreational infrastructure in the future, dispersed recreation will likely continue in the area under the proposed action and alternatives. Demand for outdoor recreation is increasing overall nationally, including participation in activities such as hiking, trail running, mountain biking, and skiing (Outdoor Foundation 2021: 6, 21–22). In addition to these activities, registrations for OHVs have increased in Oregon, suggesting increasing interest and participation in OHV use on public forestlands (Lindberg and Bertone-Riggs 2015:2–4). Other recreation activities, such as hunting, fishing, and wildlife watching have been declining nationally and in Oregon (Outdoor Foundation 2021:21-22; ODFW 2020:3).

DSL can issue permits for firewood collection in the permit area. Permits restrict collection to down trees and roadside debris within 10 feet of road shoulders and landings, or within 25 feet of recent clearcut units. Debris must be kept out of streams, roads, and ditch lines.

4.2.8 Carbon Market

DSL has indicated in its forest management plan that it may enter into a voluntary carbon market if it is determined that this aligns with research objectives and the mission of the forest, does not conflict with other research, and can be accomplished in a way that maximizes scientific and educational outcomes (DSL 2024). Any commitments through the carbon market would have to be consistent with the HCP. Any associated processes needed with a carbon market will be assessed when DSL determines its approach.

4.3 Cumulative Effects

The cumulative effects analysis takes a qualitative approach because effects from the proposed action and alternatives when added to the effects of past, present, and reasonably foreseeable actions may occur over different timeframes, cover different footprints, or occur over different locations within the study area, making quantification of impacts infeasible. The sections below discuss the cumulative effects for each resource evaluated in Chapter 3, *Affected Environment and Environmental Consequences.*

The effects of climate change on the proposed action and alternatives are discussed as applicable in the affected environment sections of Chapter 3. The cumulative analysis of climate change (Section 4.3.6, *Climate Change*) explains how the proposed action and alternatives contribute to ongoing climate change trends. The cumulative analyses of other resources describe the potential effects of climate change on each resource that overlap with the effects of the proposed action and alternatives. The potential enrollment of the permit area into a voluntary carbon market is reasonably foreseeable as part of DSL's forest management plan, although specific details about commitments for that market and effects on resources are not available. For the purposes of this analysis, DSL's entrance into a carbon market is assumed to result in some additional forest growth, likely to fall somewhere between projected forest growth outcomes described under the proposed action and Alternative 3.

4.3.1 Geology and Soils

The cumulative impacts on geology and soils from the actions discussed above, combined with those impacts occurring under the proposed action and alternatives, include erosion, likelihood of landslide, and changes in stream geomorphology.

Climate change and disturbance events will result in increased erosion and likelihood of landslide and associated events in areas of steep slopes, especially where the soil has been disturbed, such as through forestry activities. Higher temperatures are projected to increase the frequency and severity of wildfire (Frankson et al. 2022:4), which increases frequency of landslide and associated events by increasing precipitation runoff (USGS 2017). Increased runoff will decrease slope stability through erosion, lubrication of sediments on steep slopes, and increased weight of materials on slopes.

Surrounding land uses, including forest management, land development, and agricultural development, would also cause erosion by increasing runoff through removing vegetation and expanding compacted and impervious surfaces. The North Umpqua River Hydroelectric Project may result in increased erosion from canal failure or other infrastructure vulnerabilities. Increased recreational visitation and use of the permit area in the future, particularly OHV use, could remove topsoil and accelerate rates of erosion.

Where these past, present, and reasonably foreseeable actions increase erosion and likelihood of landslide and associated events, they would also increase sedimentation in streams and related effects on stream geomorphology. To the extent that conservation-focused forest management or other restoration projects protect riparian areas or restrict harvest on steep or unstable slopes, the likelihood of landslide and related effects, such as adverse effects on stream geomorphology, would be reduced.

The incremental effects of the proposed action and alternatives, when added to the effects described above, would result in a cumulative effect on geology and soils, both adverse and beneficial as described above. The potential for adverse cumulative effects is greatest under Alternative 4 due to the increased area available for clearcut and variable density harvest treatments. The potential for beneficial cumulative effects is greatest under Alternative 3 due to the increase in conservation measures.

4.3.2 Water Resources

The cumulative impacts on water resources from the actions discussed above, combined with those impacts occurring under the proposed action and alternatives, include changes in water yield, peak flows, low flows, water quality, groundwater, and flood hazard.

More frequent, more intense, and larger wildfires with climate change may increase water yield. Timber harvest and road construction on adjacent forestlands would generally increase water yield for the first 10–15 years following timber harvest and then decrease water yield as trees begin to regrow. Where adjacent forest management is focused on conservation, rather than commercial timber harvest, adverse effects on water yield would be reduced or avoided. Land or agricultural development may decrease water yield through increasing water demand or diversion. Where riparian protections apply to surrounding land management, these adverse effects would be reduced. Collectively, these actions would have mixed effects on water yield across the study area.

Climate change and disturbance events (e.g., storms, wildfire, incidence of insect and disease) and surrounding land uses, including forest management and land or agricultural development, will increase peak flows and related effects, including channel erosion, decreased water quality, decreased groundwater levels, and increased flood hazard. Where adjacent land management protects existing vegetation and where riparian protections apply, increased peak flows and related adverse effects would be reduced. The North Umpqua River Hydroelectric Project could have mixed effects on peak flows and related effects.

Prolonged drought seasons with climate change and surrounding land uses, including forest management and land or agricultural development, will decrease summer low flows, further increasing stream temperature and decreasing dissolved oxygen. Where riparian protections apply, adverse effects on low flows would be reduced. The North Umpqua River Hydroelectric Project could have mixed effects on low flows and related effects because the project affects water sources and water quality in the area, but also has mitigation measures built into its requirements for operation.

Climate change, surrounding land uses, including forest management and land or agricultural development, and the North Umpqua River Hydroelectric Project would result in decreased water quality by increasing sedimentation in streams, increasing debris flows, increasing stream temperatures, and decreasing dissolved oxygen. To the extent that adjacent land management, including conservation-focused forest management, and other restoration projects protect riparian areas, adverse effects of forest management on water quality could be reduced or avoided.

Climate change and surrounding land uses, including forest management and land or agricultural development, may decrease groundwater levels, degrade groundwater quality, and increase flood hazard. Where regulatory requirements limiting effects and riparian protections apply to surrounding land management, adverse effects on groundwater levels, groundwater quality, and flood hazard would be reduced.

Dispersed recreational use, especially OHV use, can increase soil compaction and hydrologic connectivity from recreational areas, such as trails and campsites, to streams. This can result in increased runoff and degraded water quality by increasing sediment delivery to streams. Dispersed campsites can increase fecal bacteria and solid waste to streams.

The incremental effects of the proposed action and alternatives, when added to the effects described above, would result in a cumulative effect on water resources, both adverse and beneficial as described above. Generally, the no action alternative and Alternative 4 would have the greatest potential for adverse effects on water resources because of the greater area of clearcut and variable density harvest and Alternative 3 would have the greatest potential for beneficial effects on water resources because of the smaller area of these treatment types, but the degree of localized effects would vary across alternatives depending on the timing and location of activity, primarily timber harvest.

4.3.3 Vegetation

The cumulative impacts on vegetation from the actions discussed above, combined with those impacts occurring under the proposed action and alternatives, include changes in forest age and structure, spread of invasive plant species, effects on special-status plant species, and effects on wetland vegetation.

Climate change is forecasted to decrease freezing temperatures and extend the growing season. However, it is also forecasted to cause more variable precipitation and increase annual temperatures, limiting annual snowpack, result in drought and prolonged heat waves, and increase frequency, intensity, and duration of disturbance events such as wildfires and invasive pathogens and pests. These trends will decrease vegetation growth in water-limited areas, reduce or alter riparian vegetation, and potentially result in vegetation mortality throughout western Oregon. All of these changes would affect forest age and type in the study area. The incremental effects of the proposed action and alternatives on forest age and type, when added to the effects described above, would result in a cumulative effect on vegetation in the study area. While forest management may have no effect on fire severity in the case of extreme fire events (Reilly et al. 2022:11), for mixed severity fires and more frequent fires, which may affect the permit area more as a result of climate change, older forests with higher protected status are shown to burn less severely (Levine et al. 2022; Zald and Dunn 2018; Thompson et al. 2007). The proposed action and Alternative 3 would have the greatest amount of combined late-seral and old-growth forests, which may increase resiliency of the permit area to these types of fire regimes compared to the no action alternative and Alternative 4.

Surrounding forest management and restoration activities would have similar effects as described for the proposed action and alternatives on the spread of invasive plant species, special-status plant species, and wetland vegetation and would generally be more adverse in areas managed for more intensive forms of timber harvest and less adverse in areas managed for conservation or restricted from timber harvest. Other surrounding land uses, including land or agricultural development, could remove forestland, having an adverse effect on special-status plant species and increasing potential for the spread of invasive species. Land or agricultural development could also result in conversion of wetlands.

The incremental effects of the proposed action and alternatives on the spread of invasive plant species, special-status plants and wetland vegetation, when added to the effects described above, would result in a cumulative effect that could be adverse or beneficial. The potential for adverse cumulative effects is greatest under the no action alternative and Alternative 4 due to the increased area available for clearcut and variable density harvest. The potential for beneficial cumulative effects is greatest under Alternative 3 due to increased conservation and restrictions on harvest.

4.3.4 Fish and Wildlife

4.3.4.1 Fish and Stream-Dependent Species

The cumulative impacts on fish and stream-dependent species from the actions discussed above, combined with those impacts occurring under the proposed action and alternatives, include effects on habitat quality and quantity.

Climate change will affect aquatic habitat, fish, and stream-dependent species in the permit area in numerous ways. Oregon coast coho are evaluated as having both high sensitivity and high exposure to climate change effects (Crozier et al. 2019), putting them at high risk for climate effects. Their spatially complex lifecycles, along with other anadromous fish, expose them at both the individual and population level to a larger suite of habitat changes from climate change than many species.

According to Isaak et al. (2017), stream temperatures on average across the American west have increased at rate of 0.17°C per decade since the 1970s, and are predicted to continue to warm in the future. Increased stream temperatures have harmful effects on aquatic species, including coho. Cool stream temperatures are especially important to coho during egg incubation and young, rearing life stages; and warmer temperatures in lower reaches of river basins will increase importance of cool-water refuge and cooler headwaters in watersheds over time. Increasing stream temperatures also have a negative impact on dissolved oxygen levels (Crozier and Siegel 2023), which cause decreased habitat quality and poorer growth for fish including coho. Climate change is also predicted to cause changes to flow regimes in watersheds, often causing lower summer low flows and more dramatic and intense flooding in late winter and spring. In the rain-dominated coastal river systems of the permit area, stream runoff closely follows precipitation (Pazdral 2021); and reduced summer precipitation and heavier and quicker winter precipitation will decrease habitat quality (Crozier and Siegel 2023). Intensified winter and spring floods will increase bed scour, causing harm to coho redds as well as increasing fine sediment and turbidity, reducing habitat quality for coho and other stream-dependent species. Low summer flows will further increase stream temperatures, reduce available habitat, and potentially restrict habitat access to what historically were cooler water areas of watersheds; crowding of coho could increase, increasing competition for resources, and coho growth and behavior could be affected (Crozier and Siegel 2023).

Coho and other anadromous fish populations of the permit area will also be affected by climate-induced changes to the nearshore and marine environments. These changes could include ocean acidification, hypoxia, warmer temperatures, and shifts in the food web which could all have negative impacts on coho populations from the permit area (Crozier and Siegel 2023).

Other fish and stream-dependent species will experience negative impacts from climate change due to many of the same habitat changes described above for coho. Headwater amphibians are sensitive to temperature changes just as coho are, and flows may become so low in some headwaters that their usual habitat is lost. These amphibians may be forced into downstream habitat and experience more competition as well as predation from fish in these areas. Disturbance events could adversely affect aquatic habitat quality by increasing sedimentation and decreasing large wood availability and food falling from riparian sources (e.g., insect larvae). Forest management for timber harvest adjacent to the plan area could result in decreased aquatic habitat quality by increasing stream temperature, creating lower low flows, and decreasing water quality. Agricultural development could reduce aquatic habitat quality by decreasing water availability. Land development could decrease aquatic habitat quality by increasing flashiness of high flows and floods entering streams. Both land and agricultural development could decrease water quality by increasing fine sediment and introducing nutrients, waste, and chemicals to streams.

As described in Section 4.3.2, *Water Resources*, dispersed recreational use can increase runoff and degraded water quality by increasing sediment delivery to streams and dispersed campsites can increase fecal bacteria and solid waste to streams. This could result in decreased habitat quality for fish and stream-dependent wildlife.

The North Umpqua River Hydroelectric Project may also contribute to reduced habitat quality for fish and stream-dependent wildlife due to changes in passage, connectivity, flow regime, in-stream habitat composition, and temperature, although mitigation requirements would help offset these effects.

Riparian protections applied through surrounding land management and restoration actions in streams and riparian areas adjacent to the project area would be expected to have long-term, beneficial effects on habitat for fish and stream-dependent wildlife, which could partially offset some of the adverse effects from climate change and adjacent land use.

The incremental effects of the proposed action and alternatives, when added to the effects described above, would result in a cumulative effect on fish and stream-dependent species, both adverse and beneficial. The potential for adverse cumulative effects on fish and stream-dependent species would be greatest under the no action alternative and Alternative 4 due to the area available for clearcut and variable density harvest and the more limited riparian protections under these alternatives. The potential for beneficial cumulative effects on fish and stream-dependent species would be greater under the proposed action (especially in the conservation research watersheds) than under the no action and Alternative 4, because there would be less area available for clearcut and variable density harvest, greater riparian protections, and additional commitments to restoration, such as large wood placement. The potential for beneficial cumulative effects would be greatest under Alternative 3, which includes the least amount of area available for clearcut and variable density harvest and provides the broadest riparian protections and additional commitments to restoration. Localized effects of the proposed action and alternatives would vary based on the layout of areas available for different harvest types. All alternatives would have the potential for both adverse and beneficial effects on fish and stream-dependent species.

4.3.4.2 Forest-Dependent Species

The cumulative impacts on wildlife species from the actions discussed above, combined with those impacts occurring under the proposed action and alternatives, include effects on habitat quality, quantity, and connectivity.

Northern Spotted Owl

Habitat loss (including fragmentation) from surrounding forest management (specifically timber harvest) and climate change and disturbance events (e.g., wildfire and insect and forest disease outbreaks) is a primary past and present factor leading to the decline of northern spotted owls (FWS 2020a) and is likely to continue to adversely affect northern spotted owls. Current studies indicate that barred owls are a recent stressor that adversely affect northern spotted owls through competition for critical resources. Recreational use of the permit area and surrounding lands may result in northern spotted owl habitat loss and degradation and disturbance of nest sites from noise and human activities. The rate of decline of northern spotted owl populations since 2011, particularly in Washington and Oregon (FWS 2020a), has increased the species' extinction risk.

Restoration projects and habitat protections provided by other HCPs would improve habitat conditions for the northern spotted owl by protecting, enhancing, and restoring habitat. Barred owl management would result in beneficial effects on northern spotted owls by reducing competition for critical resources in those habitats and others across its range.

The incremental effects of the proposed action and alternatives, when added to the effects described above, would result in a cumulative effect on northern spotted owl, both adverse and beneficial. The potential for adverse cumulative effects on northern spotted owl would be the greatest under the no action alternative and Alternative 4 due to the greater area available for clearcut and variable density harvest and subsequent increases in habitat loss and fragmentation. There is no commitment to respond to competition from barred owl populations under the no action alternative, increasing the potential for adverse cumulative effects on northern spotted owl. The potential for adverse cumulative effects on the northern spotted owl would be less under Alternative 3 and the proposed action because there would be more protected habitat and less area available for clearcut and variable density harvest, resulting in greater habitat quality and connectivity across the permit area. The potential for adverse cumulative effects related to the amount of northern spotted owl habitat would be least under Alternative 3.

Marbled Murrelet

Habitat loss (including fragmentation) from surrounding forest management (specifically timber harvest) and climate change and disturbance events (e.g., wildfire and insect and forest disease outbreaks) threaten marbled murrelet populations. Offshore climate change effects are likely resulting in diminished prey availability and quality (less nutrient-dense prey fish). Recreational use of the permit area and surrounding lands may result in marbled murrelet habitat loss and degradation and disturbance of nest sites from noise and human activities. Recreational use could also increase corvid densities around campgrounds, which could increase predation of marbled murrelets (Machowicz et al. 2022: 73–75). Conversely, restoration projects and habitat protections provided by other HCPs could improve marbled murrelet habitat conditions by protecting, enhancing, and restoring habitat.

The incremental effects of the proposed action and alternatives, when added to the effects described above, would result in a cumulative effect on marbled murrelet, both adverse and beneficial. The potential for adverse cumulative effects on marbled murrelet would be greatest under the no action alternative and Alternative 4 due to the greater area available for clearcut and variable density harvest, and subsequent increases in habitat loss and fragmentation. The potential for adverse cumulative effects on marbled murrelet would be less under Alternative 3 and the proposed action because there would be more protected habitat and less area available for clearcut and variable density harvest, resulting in greater habitat quality and connectivity across the permit area. The potential for adverse cumulative effects related to the amount of marbled murrelet habitat would be the least under Alternative 3.

Noncovered Forest-Dependent Species

Surrounding forest management, recreational activities, and climate change would result in similar adverse and beneficial cumulative impacts as described above for northern spotted owl and marbled murrelet. The incremental effects of the proposed action and alternatives, when added to the effects described above, would result in a cumulative effect on noncovered forest-dependent species, both adverse and beneficial, depending on the species' habitat needs and the location within the permit area.

4.3.4.3 Noncovered Wildlife Species Dependent on Wetlands and Riparian Habitat

Prolonged drought with climate change will result in loss or degradation of wetland and riparian areas. Forest management does not generally remove wetland and riparian habitat (as defined in Section 3.5.2.3, *Wetland- and Riparian-Dependent Species*, for wildlife species, consisting primarily of willows and other deciduous vegetation at the water's edge)[7] as harvest activities do not focus in these habitat types due to regulatory requirements. However, harvest-related ground disturbance adjacent to wetlands or riparian habitat could result in temporary loss and degradation of these habitat types due to soil erosion, compaction, or changes to hydrology, adversely affecting species dependent on them. Land and agricultural development result in widespread loss of wetland and riparian habitats. Recreational use may result in wetland and riparian habitat degradation and disturbance of wildlife behaviors from noise and human activities. Restoration projects and habitat protection provided by other HCPs could improve habitat conditions by protecting, enhancing, and restoring wetlands and riparian habitat.

[7] Riparian vegetation described in Section 3.4, *Vegetation*, addresses a wider swath on either side of the stream that includes evergreen vegetation. The vegetation described as riparian in this section consists of freshwater forested/shrub wetland.

The incremental effects of the proposed action and alternatives, when added to the effects described above, would result in an adverse or beneficial cumulative effect on noncovered wildlife species dependent on wetlands and riparian habitat. The potential for cumulative beneficial effects from stream restoration would be greatest under Alternative 3. Potential cumulative impacts related to non-stream-associated wetland loss would be similar across all alternatives. Potential cumulative impacts on stream-associated wetlands and riparian habitat would be greatest under Alternative 4.

4.3.5 Air Quality

The cumulative impacts on air quality from the actions discussed above, combined with those impacts occurring under the proposed action and alternatives, include increased emissions.

Surrounding land use, including forest management activities, land development, and agricultural development, would create fugitive dust and require heavy equipment use that would emit criteria pollutants, volatile organic compounds, and hazardous air pollutants. However, these impacts would be reduced through compliance with state and federal laws and regulations and policies, similar to the proposed action and alternatives.

Wildfires also emit criteria pollutants, volatile organic compounds, and hazardous air pollutants.

The incremental effects of the proposed action and alternatives, when added to the effects described above, would result in a negligible adverse cumulative effect on air quality.

4.3.6 Climate Change

Climate change is inherently cumulative because greenhouse gas emissions from past, present, and reasonably foreseeable actions cumulatively contribute to climate change. Section 3.7.3.1, *Effects of the Proposed Action and Alternatives on Climate Change*, describes the incremental effects of the proposed action and alternatives on climate change through GHG emissions and carbon sequestration. As described in Section 3.7.3.1, the amount of carbon sequestered under the proposed action and Alternative 3 would be above the amount of carbon released to the atmosphere, with Alternative 3 sequestering almost twice as much as the proposed action. Under the no action alternative and Alternative 4, average annual carbon sequestration from standing trees would decrease compared to existing conditions and emissions from the other quantified activities would add to this reduction. Alternative 4 carbon release is almost twice as much as the no action alternative. Under all alternatives, the net emissions released from the covered activities would result in a negligible cumulative effect on climate change.

4.3.7 Recreation and Visual Resources

4.3.7.1 Recreation

The cumulative impacts on recreation from the actions discussed above, combined with those impacts occurring under the proposed action and alternatives, include changes in the quality and value of recreational experiences and in the supply of recreation.

Disturbance events and surrounding land use, including forest management, the potential development of recreational infrastructure, and land or agricultural development, could result in adverse effects on visual resources, habitat, and water resources within the study area. Where adjacent land management restricts forested land from harvest, beneficial effects on these resources could occur. These effects, both in the plan area and in southwestern Oregon, could shift where people prefer to recreate, changing the demand for recreation in certain areas. These changes could either increase or decrease the quality of recreational experiences and the value people place on them.

Disturbance events and surrounding land use, including forest management, land development, or agricultural development, could temporarily reduce access to developed sites and dispersed recreation, reducing the supply of recreation activity in the study area.

The incremental effects of the proposed action and alternatives, when added to the effects described above, would result in a cumulative effect on recreation that could be either adverse or beneficial depending on the timing and location of activity, primarily timber harvest.

4.3.7.2 Visual Resources

The cumulative impacts on visual resources from the actions discussed above, combined with those impacts occurring under the proposed action and alternatives, include changes to visual character and quality and visual access.

Disturbance events and adjacent forest management activities (including recreational use of these areas) could cause large-scale visual changes, landscape scarring, and changes to forest structure that would degrade visual quality. These actions could also result in reduced visual access. The North Umpqua River Hydroelectric Project includes industrial features in the otherwise forested landscape, which reduces overall visual quality.

Declines in rural populations, which are interspersed with forestlands bordering the permit area, may result in the conversion of some developed lands to agricultural or forested lands or the restoration of those lands to another type of habitat, increasing the visual prominence of these landscapes within the study area. Restoration projects and habitat protections from adjacent forest management, including conservation included in other HCPs, could retain areas of undisturbed forest and provide more natural patterns of forest structure, including increasing the presence of older trees, which would have beneficial impacts on visual character and quality. The North Umpqua River Hydroelectric Project includes restoration and enhancement projects that could improve the visual quality by diversifying views within and adjacent to the study area.

The incremental effects of the proposed action and alternatives, when added to the effects described above, could result in a cumulative effect on visual resources that could be either adverse or beneficial. The potential for adverse cumulative effects on visual resources is greatest under the no action alternative and Alternative 4 due to the increased area available for clearcut and variable density harvest. The potential for beneficial cumulative effects would be greatest under the proposed action and Alternative 3, which include the least clearcut and variable density harvest.

4.3.8 Cultural Resources

The cumulative impacts on cultural resources from the actions discussed above, combined with those impacts occurring under the proposed action and alternatives, include adverse impacts on archaeological resources due to ground-disturbing activities. Unlike the proposed action and alternatives, the actions considered in this cumulative analysis may have the potential to affect built environment resources due to either ground-disturbing activities or visual intrusions.

Forest management activities; land development; agricultural development; and resource protection, enhancement, and restoration activities have the potential to adversely affect cultural resources through ground disturbance, demolition of built environment resources, visual intrusions, and increased potential for unauthorized artifact collecting. However, cumulative effects on cultural resources are expected to be minimized through compliance with state and federal laws and regulations that protect cultural resources as well as adherence to policies, procedures, and best practices.

The incremental effects of the proposed action and alternatives, when added to the effects described above, could result in an adverse cumulative effect on cultural resources.

4.3.9 Tribal Resources

The cumulative impacts on tribal resources from the actions discussed above, combined with those impacts occurring under the proposed action and alternatives, include changes in access to fish, wildlife, and plants valued by tribal members and changes in socioeconomic impacts on tribal members.

Disturbance events and surrounding land use, including forest management and land or agricultural development, could result in changes to vegetation, water resources, and habitat in the study area. These effects could result in the loss of habitat and decreased habitat quality for fish, wildlife, and vegetation valued by tribal members. These actions could also reduce access to portions of the permit area used by tribal members for hunting and fishing. Beneficial effects on these same resources valued by tribal members could occur where surrounding land management includes conservation-focused forest management, restoration projects that protect riparian areas, or timber harvest restrictions.

Population changes from development and changes in land use within the study area could increase or decrease demand for access to fish and wildlife by nontribal members in the permit area, which could have beneficial or adverse impacts on access to these resources by tribal members. Cumulative impacts on socioeconomics (Section 4.3.10, *Socioeconomics*) related to available forest products or timber harvest could either increase or decrease employment and income for tribal groups.

The incremental effects of the proposed action and alternatives, when added to the effects described above, would result in a cumulative effect on tribal resources, both adverse and beneficial as described above.

4.3.10 Socioeconomics

The cumulative impacts on socioeconomics from the actions described above, combined with those impacts occurring under the proposed action and alternatives, include changes to income and employment, government revenue, and the value of ecosystem services.

Forest management resulting in increased timber harvest and other surrounding land use, including land and agricultural development, have the potential to increase labor income and employment in the study area by creating or maintaining timber-related jobs and income that positively affect the local or regional economies. Climate change, disturbance events, and forest management activities resulting in decreased timber harvest, restoration activities, and the implementation of other HCPs have the potential to decrease labor income and employment in the study area by decreasing timber-related jobs or income which could negatively affect local or regional economies.

Forest management resulting in increased timber harvest and other surrounding land use, including land and agricultural development, have the potential to increase government revenue in the study area by contributing to the Common School Fund, Forest Products Harvest Tax, or other state tax revenue. Climate change and disturbance events, forest management resulting in decreased timber harvest, restoration activities, and the implementation of other HCPs have the potential to decrease government revenue in the study area by decreasing harvest volumes and eliminating or reducing contributions to the Common School Fund, Forest Products Harvest Tax, or other state tax revenue.

Climate change and disturbance events, forest management resulting in increased timber harvest, and other surrounding land use, including land and agricultural development, have the potential to decrease the value of ecosystem services in the study area. Forest management resulting in decreased timber harvest, barred owl management, restoration activities, and the implementation of HCPs have the potential to increase the value of ecosystem services in the study area.

The incremental effects of the proposed action and alternatives, when added to the effects described above, would result in a cumulative effect on socioeconomics, both adverse and beneficial. The potential for beneficial cumulative effects on employment and income and government revenue is greatest under the no action alternative and Alternative 4 due to the increased area available for clearcut and variable density harvest. The potential for beneficial cumulative effects on the value of ecosystem services is greatest under the proposed action and Alternative 3, which provide increased conservation relative to the no action alternative and Alternative 4.

4.3.11 Environmental Justice

The cumulative impacts on environmental justice (EJ) from the actions discussed above, combined with those impacts occurring under the proposed action and alternatives, include socioeconomic impacts on identified low-income and minority populations related to employment and income and changes in the supply of ecosystem goods and services that such populations rely upon.

Climate change and disturbance events and adjacent forest management and restoration activities have the potential to reduce timber harvests in the permit area, which would have an adverse effect on income and employment that could result in disproportionately high and adverse impacts on EJ. Population changes from development and changes in land use could increase or decrease economic activity and opportunities for employment and income generation. Decreases in income and employment could have disproportionately adverse impacts for affected populations.

Climate change and disturbance events, forest management, restoration activities, and the implementation of HCPs have the potential to reduce timber harvests in the permit area and associated government revenue, which could result in disproportionately high and adverse impacts on populations considered under EJ principles. Population changes from development and changes in land use could increase or decrease demand for government services that such populations rely on, which could have beneficial or adverse impacts on EJ.

Forest management and associated habitat conservation activities on lands adjacent to the plan area and within the study area could change the supply of ecosystem goods and services that low-income and minority populations rely on. This could increase or decrease such populations’ reliance on the supply of goods and services within the plan area and their importance, depending on the comparative effects elsewhere. Population changes from development and changes in land use could increase or decrease demand for ecosystem goods and services that these communities rely on, which could have beneficial or adverse impacts.

The incremental effects of the proposed action and alternatives, when added to the effects described above, would result in a cumulative effect on communities evaluated under EJ, both adverse and beneficial.

Chapter 5
Summary of Submitted Alternatives, Information, and Analyses

This chapter summarizes the alternatives, information, and analyses submitted by state, tribal, and local governments and other public commenters during the scoping process FWS invited public comments on this summary of submitted alternatives, information, and analyses during the public review period of the Draft EIS (40 Code of Federal Regulations 1502.17). Comments received during scoping are summarized in Appendix 1-B, *Scoping*. Comments received during the public comment period on the Draft EIS are summarized in Appendix 1-C. The full contents of all public comments are available on Regulations.gov at https://www.regulations.gov/document/FWS-R1-ES-2022-0029-0001.

Comments received during scoping included the following suggestions on alternatives.

No Action Alternative: Analyze a no action alternative that includes no commercial timber harvest.

Action Alternatives: Scoping comments included the following modifications or additions to the proposed action for inclusion in action alternatives considered in the EIS.

- Shorten the permit term
- Modify the permit area to:
    - Include the East Hakki Ridge parcel
    - Align the Elliott State Research Forest HCP with the Western Oregon State Forests HCP
- Include provisions for adding additional covered species protections during the permit term
- Modify the covered activities to:
    - Increase timber harvest
    - Decrease timber harvest
    - Restrict road construction
    - Increase road decommissioning
    - Increase protections for steep slopes
    - Increase width of riparian buffers and restrict activity in riparian buffers
- Modify the research proposal to:
    - Conduct regeneration harvest–focused research
    - Identify reserves as no-take areas
    - Integrate restoration work into the HCP and research design and fully engage the restoration community with options to integrate local watershed plans and assessments
- Modify the conservation strategy to:

- Strengthen northern spotted owl conservation measures in all northern spotted owl activity centers
- Restrict all harvest in older forests
- Ensure that there is no net loss of northern spotted owl habitat
- Include barred owl management
- Limit marbled murrelet research and implement monitoring protocols and adaptive management to minimize observable negative impacts
- Include additional minimization measures for marbled murrelet impacts
- Increase riparian buffers and reduce steep slope logging to minimize risk to coho salmon critical spawning areas
- Strengthen fish passage barrier removal requirements
- Increase protections for beavers and beaver habitat

The following supplemental information (i.e., supplemental materials or references) was submitted during scoping for consideration by the lead and cooperating agencies in developing the EIS. These materials are available to review on Regulations.gov at Docket ID FWS-R1-ES-2022-0029-0001.

- Reports *Habitat Selection and Breeding Success in a Forest-Nesting Alcid, the Marbled Murrelet, in Two Landscapes with Different Degrees of Forest Fragmentation* (2006) and *Influence of Landscape Pattern on Breeding Distribution and Success in a Threatened Alcid the Marbled Murrelet: Model Transferability and Management Implications* (2007), both prepared by Zharikov et al., providing information on the relationship between marbled murrelets and logging.
- Research paper entitled *Mass Failures and Other Processes of Sediment Production in Pacific Northwest Forest Landscapes* (1987) prepared by Swanson et al. presenting the results that landslides and road surfaces are dominant sources of increased sediment production.
- Report entitled *Range-Wide Declines of Northern Spotted Owl Populations in the Pacific Northwest: A Meta-Analysis* (2021) prepared by Franklin et al. assessing population trends of northern spotted owl and presenting information on northern spotted owl population decline, including its causes.

The following analyses were submitted during scoping for consideration by the lead and cooperating agencies in developing the EIS. These materials are available to review on Regulations.gov at Docket ID FWS-R1-ES-2022-0029-0001.

- Report entitled *Strategic Action Plan for Coho Salmon Recovery in The Coos Basin* (2022) prepared by the Coos Basin Coho Partnership presenting the results of an independent basin-wide analysis, including modeling, of habitat in the Elliot State Research Forest. The paper identifies actions to protect and restore essential functions of the forest.

Chapter 6
Other Topics Required by NEPA

Per Council on Environmental Quality regulations (40 CFR 1502.16(a)(2–4; 9)), this EIS must discuss any adverse environmental effects that cannot be avoided should the proposal be implemented; the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity; any irreversible or irretrievable commitments of resources that would be involved in the proposal should it be implemented; and means to mitigate adverse environmental impacts if not fully covered under 40 CFR 1502.14(e).

The adverse effects associated with the proposed action and alternatives are described in the *Environmental Consequences* sections in Chapter 3, *Affected Environment and Environmental Consequences*. Forest management activities are regulated by numerous state regulations to avoid, reduce, or mitigate for potentially significant adverse impacts. Unavoidable adverse effects under the proposed action and alternatives, including the no action alternative, would include those described for geology and soils (Section 3.2), water resources (Section 3.3), vegetation (Section 3.4), fish and wildlife (Section 3.5), climate change[1] (Section 3.7), recreation and visual resources (Section 3.8), tribal resources (Section 3.10), socioeconomics (Section 3.11), and environmental justice (Section 3.12).

Forest management activities under all alternatives would involve short-term use of the environment. Impacts of this use are described in the environmental consequences sections of Chapter 3. Impacts on the long-term productivity of the environment, the ability of the forest to continue providing environmental resources (e.g., timber harvest, species habitat, and recreation, research, and educational opportunities) are also described in the Chapter 3 environmental consequences sections.

Irreversible commitments are decisions affecting nonrenewable resources or commitments that cannot be reversed. Some forest management activities would represent irreversible commitments of resources under all alternatives. The term *irreversible* describes the loss of future options and applies to the impacts of using nonrenewable resources or resources that are renewable only over a long period of time. For example, road construction is considered an irreversible action because of the long time needed for a road to revert to its preconstruction condition. Roads also require an irreversible commitment of materials such as the use of fossil fuels, rock, and gravel. Similarly, harvest of late-successional and old-growth[2] forest is considered an irreversible action because of the long time needed for the forest to reestablish the structural complexity inherent to these stands.

Irretrievable commitments of resources refer to the long-term or permanent loss of a resource such as destruction of a cultural resource site, loss of soil productivity, or extinction of a species. These types of impacts under the proposed action and alternatives would be avoided and minimized to the extent possible. Although mortality of individual animals during covered activities could occur, part of the purpose of the HCP is to ensure these losses would not result in permanent changes at the population level and would not significantly alter ecosystem structure or population dynamics.

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[1] Only no action alternative and Alternative 4.

[2] Old-growth stands would not be harvested under the proposed action or action alternatives.

Minimization and mitigation measures to offset impacts on covered species from covered activities are built into each action alternative. The analysis in Chapter 3 also considers best management practices that may be implemented to mitigate or reduce adverse effects on all resource areas, where applicable and in accordance with existing regulatory requirements. Nothing in this EIS is intended to limit the mitigation authorities of other agencies, should additional mitigation responsibilities be identified while planning, permitting, or carrying out individual activities.

Chapter 7
List of Preparers

Name and Organization/Entity	Project Role and Qualification
Shauna Everett, FWS	Oregon Field Office; Wildlife Biologist; MS, Wildlife and Fisheries Ecology; 22 years of experience
Kim Garner, FWS[1]	Oregon Field Office; Forest Resources Division Manager; BS, Natural Resource Management; 15 years of experience
Mike Blow, FWS[2]	Oregon Field Office; Forest Resources Division Manager; BS, Biology; 34 years of experience
Kate Freund, FWS	Pacific Regional Office; Conservation Planning Branch Manager; MEM, Environmental Management; 15 years of experience
Amy Defreese, FWS	Pacific Regional Office; Biologist; ME, Water Resources Planning; 20 years of experience
Anan Raymond, FWS[1]	Pacific Regional Office; Regional Archaeologist and Historic Preservation Officer; MA, Anthropology; 40 years of experience[1]
Gary Rule, NMFS[2]	WCR Protected Resources Division, MS Environmental Management, 23 years experience
Jeff Young, NMFS[2]	Oregon Washington Coastal Office, BS Fishery Biology, 18 years experience
Kate Wells, NMFS[1]	Oregon Washington Coastal Office; Willamette/(Interim) OR Coast Branch Chief; MS, Environmental Management; 15 years of experience
Kelly Burnett, NMFS[1]	Reviewer; PhD and MS, Fisheries Science; 35 years of experience
Hova Woods, ICF	Project Director; MPA, Environmental Policy & Science, BS, Finance; 22 years of experience
Deborah Bartley, ICF	Project Manager; BA, Political Science; 24 years of experience
Lydia Dadd, ICF	Deputy Project Manager; BS, Environmental Studies; 5 years of experience
Emma Brenneman, ICF	GIS; MS, Geography; BA, Environmental Geography; 6 years of experience
Jimmy Kaplan, ICF	GIS; BA, Geology; 5 years of experience
Brad Stein, ICF	GIS; BS, International Affairs; 24 years of experience
Diana Roberts, ICF[1]	Geology and Soils; MA, Linguistics; 16 years of experience
Maggie Poyant, ICF[2]	Geology and Soils and Vegetation; BS, Environmental Science; 10 years of experience
Jennifer McAdoo, ICF	Water Resources; MS, Earth Resources and Environmental Engineering; 13 years of experience
Ingrid Kimball, ICF[1]	Vegetation; MS, Earth Resources and Environmental Engineering; 11 years of experience
Edward Carr, ICF	Greenhouse Gas Emissions; MS, Atmospheric Science; 35 years of experience
Greg Blair, ICF	Tribal Resources; MS, Fisheries; 32 years of experience
Jennifer Stock, ICF	Aesthetics; BLA, Bachelor of Landscape Architecture; 24 years of experience
Tait Elder, ICF[1]	Cultural Resources; MA, Archaeology; 17 years of experience

Name and Organization/Entity	Project Role and Qualification
Corey Lentz, ICF[1]	Cultural Resources; MS, Historic Preservation; 4 years of experience
Wendy Gordon, ICF[1]	Climate Change; Ph.D., Earth System Science; 26 years of experience
Laura McMullen, ICF	Fish; Ph.D., Zoology; 14 years of experience
Ellen Berryman, ICF	Wildlife; MS, Biology; 38 years of experience
Kristen Lundstrom	Editing; BA, English; 17 years of experience
Christine McCrory	Editing; M.Phil., European Literature; 22 years of experience
Anthony Ha	Publications; BA, English; 18 years of experience
Kara Kong	Public Outreach; BA, Political Science; 15 years of experience
Sarah Reich, ECO-Northwest	Socioeconomics, Environmental Justice (EJ), and Recreation lead; MA, Urban and Environmental Policy and Planning; 16 years of experience
Shivangi Jain, ECO-Northwest	Socioeconomics, EJ, Recreation Analyst; MA, Public Policy, Environmental Management; 3 year of experience
Joel Ainsworth, ECO-Northwest	Socioeconomics Senior Advisor; MS, Applied Economics; 12 years of experience
Richard Haynes	Socioeconomics Senior Advisor; Ph.D., Forest Economics; 54 years of experience

1 Preparer involved with Draft EIS.

2 Preparer involved with Final EIS.

Appendix 1-A
Glossary

Carbon pool (or storage)*:* A system that has the capacity to both take in and release carbon.

Carbon sequestration: The transfer of carbon from the atmosphere to any other carbon pool.

Carbon sink: A carbon pool if, during a given time interval, more atmospheric carbon flows into it than flows out of it.

Clearcut harvest: A type of timber harvest that removes nearly trees in a stand.

Commercial thinning: Thinning that occurs between clearcut harvests to maintain stand densities at levels that provide vigorous tree growth and maintain high wood production.

Cultural resources: Archaeological resources, buildings, structures, districts, objects, and traditionally important places on the landscape.

Debris flow**:** A fast-moving landslide, generally triggered by heavy precipitation or rapid snowmelt, and consisting of wet soil, trees, boulders, and smaller debris.

Debris torrent: A debris flow that has entered a stream channel, particularly one that is flowing, which results in the landslide materials mixing with water.

Ecosystem services: The types of benefits that ecosystems provide to people. Forest ecosystems produce many ecosystem services that people value, including food and fiber from plants and wildlife, a setting for recreation and spiritual experience, clean water, and flood control.

Equipment limitation zone (ELZ): Area extending on either side of streams in which measures are applied to limit equipment use and minimize ground disturbance and associated impacts on Oregon coast coho.

Evapotranspiration: The process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants.

Fog drip: Water that falls to the ground when fog droplets stick to objects like trees and leaves, merge into larger drops, and then fall.

Groundwater recharge: A hydrologic process where water moves downward from surface water to groundwater.

Habitat conservation plan (HCP): A plan developed to meet specific requirements identified in Section 10(a)(2)(A) of the federal Endangered Species Act and its implementing regulations, which, among other requirements, must specify the impacts that are likely to result from the taking, the measures the permit applicant will undertake to minimize and mitigate such impacts, and the funding that will be available to implement such measures.

Incidental take: Take of any federally listed wildlife species that is incidental to, but not the purpose of, otherwise lawful activities.

Incidental take permit: An incidental take permit (ITP) is a federal exemption to the take prohibition of Section 9 of the Endangered Species Act; an ITP is issued by the U.S. Fish and Wildlife

Service or the National Marine Fisheries Service pursuant to Section 10(a)(1)(B) of the federal Endangered Species Act. An ITP is also referred to as a Section 10 Permit or Section 10(a)(1)(B) Permit.

Intermittent stream: Streams that have surface flow for only part of the year; also referred to as non-perennial streams.

Low flows: Also known as baseflow, the flow of water in a stream during prolonged dry weather.

Mass wasting: Includes landslides, debris flows, and related movements of rock and soil.

National Environmental Policy Act (NEPA): NEPA was signed into law in 1969. NEPA requires all federal agencies to consider and analyze all significant environmental impacts of any action proposed by those agencies; to inform and involve the public in the agency's decision-making process; and to consider the environmental impacts in the agency's decision-making process.

Peak flows: The highest point of an environmental flow (e.g., as in water in a stream).

Permit area: The area in which an ITP applies; encompasses the Elliott State Research Forest.

Permit term: The duration for which a requested ITP is valid.

Plan area: Encompasses the Elliott State Research Forest, adjacent Board of Forestry lands managed by the Oregon Department of Forestry, and several adjacent, privately owned parcels.

Prescribed burn: Planned fire used to achieve specific forest management objectives. Also called controlled burn.

Restoration thinning: Treatments intended to alter stands towards more complex forest structure and reduce stand density to restore ecological function

Riparian area: Land directly influenced by permanent water.

Riparian buffers *(see riparian conservation area and riparian management area)****:*** Protective corridors alongside streams in which disturbance is limited for the purpose of protecting riparian function.

Riparian conservation area: Under the proposed action and alternatives, protective corridors of prescribed widths (measured horizontally) alongside specified stream classes where timber harvest and other site-disturbing activities are restricted or prohibited.

Riparian management area: Under the no action alternative, protective corridors of prescribed widths (measured along the slope) alongside specified stream classes where timber harvest and other site-disturbing activities are restricted or prohibited.

Salvage harvest: The utilization of standing or down trees that are dead, dying, or deteriorating, often following a disturbance such as fire or extreme storm, before the timber values are lost.

Seasonal stream: A stream with surface flow only part of the year. In the Oregon Forest Practices Act, defined as a stream that normally does not have summer surface flow after July 15.

Seral stages: Developmental stages that succeed each other as an ecosystem changes over time; specifically, the stages of ecological succession as a forest develops. Early-seral forest stands are generally between 0 and 30 years of age; mid-seral forests are between 30 and 80 years of age, but can be as old as 120 years; late-seral forest stands are between 91 and 199 years; and old growth forests are 200 years and over.

Shallow-rapid landslide: Landslides typically initiated by intense rainfall or rapid snowmelt, occurring within the forest rooting zone (generally less than 10 feet deep).

Stream geomorphology: Describes stream systems, including physical shape, water and sediment transport processes, and the landforms that the streams create and alter. Encompasses processes that create, alter, and maintain structure across whole watersheds.

Take: To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (Section 3(18) of the federal Endangered Species Act). Federal regulations provide the same taking prohibitions for threatened wildlife species (50 Code of Federal Regulations 17.31(a)).

Total Maximum Daily Load (TMDL): A numerical value that determines the maximum amount of a pollutant that can enter a body of water while still meeting water quality standards.

Tribal resources: Natural resources that tribal members traditionally accessed, currently access, or may access in the future.

Upwelling: Where warmer surface water is pushed away from an area, allowing colder deep water to rise up and replace it.

Water yield: Annual average water discharged from an area; a measure of water supply.

Variable density harvest or variable density regeneration harvest: Treatments where a portion of the stand is converted into openings to promote new stand establishment. Could include dispersed (i.e., distribution of harvest and leave trees) or aggregated (i.e., patches of harvest and leave trees) retention.

Wetland: As defined in Oregon's Forest Practice Rules in Oregon Administrative Rules 629-24-101 (77), wetlands are "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

Introduction

Scoping is an early and open process for determining the scope of the issues for analysis in an environmental impact statement (EIS), including identifying the significant issues and eliminating non-significant issues from further study (40 Code of Federal Regulations [CFR] 1501.9). Through this process, the public, organizations, and agencies assist in the development of the EIS by identifying important issues and alternatives to the proposed action that should be considered in the EIS. This report describes the public noticing and engagement efforts undertaken by the U.S. Fish and Wildlife Service (FWS) during the scoping period and summarizes comments received during the scoping period. The full text of comments received during scoping are available at the following web address: https://www.regulations.gov/document/FWS-R1-ES-2022-0029-0001/comment.

EIS Chapter 5, *Summary of Submitted Alternatives, Information, and Analyses,* summarizes the alternatives, information, and analyses submitted by state, tribal, and local governments and other public commenters during the scoping process for consideration by the lead and cooperating agencies in developing the EIS (40 CFR 1502.17).

Public Notices and Distribution of Notices

Notice of Intent

The Notice of Intent (NOI) was posted to the FWS website and published in the *Federal Register* (FR) on May 5, 2022 (https://www.federalregister.gov/documents/2022/05/05/2022-09671/notice-of-intent-to-prepare-an-environmental-impact-statement-for-the-elliott-state-research-forest). The NOI provides background information on the proposed federal action, the habitat conservation plan (HCP), and the federal Endangered Species Act and National Environmental Policy Act (NEPA) processes, as well as information on how to participate in the EIS scoping process. The NOI is available on the FWS website at https://www.fws.gov/project/elliott-state-research-forest-habitat-conservation-plan. Additionally, the Oregon Department of State Lands (DSL) posted the NOI on its project website: https://www.oregon.gov/dsl/Land/Pages/Elliott.aspx

Email Notifications

FWS distributed notice by email to interested parties on May 3 and 4, 2022, in advance of the publication of the NOI in the FR. The email notice announced the opportunity to provide comments on the scope of the EIS and included a brief description of the proposed action, a link to the FWS website, information on the virtual public meeting, and instructions on submitting comments. The email notifications were sent to representatives of federal, state, and local governments; elected officials; tribes; nongovernmental organizations; environmental organizations; businesses; and others who have expressed interest in the HCP and NEPA processes.

Additionally, DSL distributed two email notices about the NOI and the virtual public meeting on May 4 and June 2, 2022, to its stakeholders.

Media Notifications

FWS distributed a public scoping news release to the media announcing the availability of the NOI, the opportunity to attend a virtual public meeting, and explained how provide comments on May 4, 2022. The media release was made available to the public online at: https://www.fws.gov/press-release/2022-05/input-requested-elliott-state-research-forest-proposed-hcp. FWS posted a link to this press release via Twitter (@USFWSPacific) on May 4, 2022.

U.S. Fish and Wildlife Service Website

Prior to the virtual public meeting, the FWS website provided a summary of the proposed action, information on how to join the virtual public meeting, information about how to provide comments and a link to www.Regulations.gov, a link to the FR notice, the public scoping news release, and links to general information on habitat conservation plans and the NEPA process. Following the virtual public meeting, a link to a closed-captioned recording of the virtual public meeting was posted on the FWS website https://www.fws.gov/project/elliott-state-research-forest-habitat-conservation-plan.

Virtual Public Scoping Meeting

FWS held one virtual public scoping meeting on May 16, 2022, from 6 to 8 p.m. The meeting was held using Zoom as the webinar platform and included a presentation by FWS, a presentation by DSL, and a question-and-answer session. The purpose of the meeting was to provide information to the public about the NEPA process and the proposed action (DSL's proposed HCP), and to allow participants to ask questions about the NEPA process and proposed HCP.

Jennifer Piggott, facilitator with ICF, a third-party contractor, opened the meeting and provided an overview of the agenda, basic functions of how to participate on the virtual meeting platform, and how to turn on closed captioning and join by phone if needed. Shauna Everett, FWS project lead, described the project background, the meeting purpose, and the federal agency's proposed action. She also introduced the NEPA process and the purpose of scoping. Geoffrey Huntington, HCP project manager for DSL, provided a presentation on the proposed HCP, which included an overview of the HCP process, the proposed covered species, covered activities, conservation strategy, and ongoing stakeholder engagement led by DSL as part of the HCP development. Deborah Bartley, EIS project manager with ICF, described the public scoping process, the purpose of scoping, how to provide scoping comments, and the next steps in the NEPA process.

Following the presentations, FWS provided meeting participants the opportunity to ask clarifying questions. The virtual public meeting was attended by 11 individual stakeholders and 10 questions were asked. All questions were answered live during the webinar by members of the presentation team.

During the virtual public meeting, FWS did not solicit, collect, or record oral public comments. Participants were provided detailed explanations on how to submit written comments online via www.Regulations.gov or via mail to FWS headquarters. Participants were reminded that all comments are treated equally regardless of submission method.

Summary of Public Scoping Comments Received

During the scoping period a total of 70 comments were received: 1 from a federal agency, 1 from a county, 9 from nongovernmental organizations and businesses, and 59 from members of the public. As noted above, copies of all comments are available online at: https://www.regulations.gov/document/FWS-R1-ES-2022-0029-0001/comment. Additionally, Chapter 5 of this EIS provides a summary of the alternatives, information, and analyses submitted by state, tribal, and local governments and other public commenters during scoping.

Below is a summary of all comments received, by topic.

HCP

Commenters requested the following modifications or additions to the HCP.

- General
    - Include research on the impacts of logging on species and their associated habitat
    - Provide information on effects of the HCP to carbon storage and sequestration
- Covered species
    - Include other listed species or species that could be listed during the permit term as covered species (e.g., coastal marten)
    - Address effects on coastal marten and include a no-take protocol for coastal marten
- Covered activities
    - Provide additional definition of thinning activities included in the HCP
    - Consider research needs for regenerative timber harvest and log volume
- Conservation strategy
    - Northern spotted owl
        - Protect all northern spotted owl activity centers
        - Maintain all existing habitat within activity centers that do not meet habitat thresholds (i.e., maintaining 50% suitable habitat in core use areas and 40% suitable habitat in home ranges)
        - Include barred owl management
        - Include strategies to improve habitat conditions in all research allocations
        - Include strategies to protect newly discovered northern spotted owl nesting sites
    - Marbled murrelet
        - Use existing marbled murrelet survey data to update the HCP's habitat layers
        - Require surveys prior to harvest in marbled murrelet habitat

        - Identify replacement habitat prior to harvest in marbled murrelet habitat
        - Require retention of at least 80% of the basal area in a logging unit when harvesting in occupied marbled murrelet habitat
        - Require protection of areas that develop into marbled murrelet habitat during the research project
    - Oregon coast coho
        - Modify the methodology for identifying steep slope protections to better protect coho habitat and stream function
- Effects analysis
    - Provide more detail regarding anticipated take of covered species and associated protection and mitigation
    - Include additional analysis on the importance of streams in the Elliott State Research Forest to the Coos Basin coho population and on the role of habitat in the plan area in the context of anticipated climate change
- Monitoring and implementation
    - Modify the marbled murrelet monitoring strategy to include evaluation of the impacts of occupancy, nesting success, and nest predation rates in the affected occupied habitat and adjacent occupied habitat and control study areas
    - Create a team of northern spotted owl experts to advise on northern spotted owl habitat management throughout the permit term

General Support or Opposition

Multiple commenters expressed support for the HCP, stating that they believe the HCP would represent an improvement from existing forest management practices and provide improved protections for older forests, and species and their habitat.

Other commenters expressed opposition to the HCP, including the following specific concerns: level of protection for species; preservation of the forest does not go far enough; the HCP should not allow for any take; opposition to removing old-growth trees; opposition to building roads; and overall concern that the HCP will repeat mistakes made in prior HCPs.

NEPA Process

Commenters requested that the NEPA process include a 60-day public comment period for the Draft EIS.

Approach to EIS Analysis

Commenters made the following suggestions regarding the approach to the EIS analysis.

- Consider cumulative effects of the HCP on all applicable resource areas.
- Include a discussion of a monitoring program designed to assess implementation of the HCP over time and measure its effectiveness in achieving its conservation goals.

Purpose and Need

A commenter suggested that FWS include effective conservation and recovery of the covered species in its purpose and need statement.

Alternatives

Commenters suggested that the following alternatives or elements of alternatives be analyzed in the EIS.

No Action Alternative

- Analyze a no action alternative that includes no commercial timber harvest.

Action Alternatives

Scoping comments included the following modifications or additions to the proposed action for inclusion in action alternatives considered in the EIS.

- Modifications to Permit Term
  - Shorten the permit term to accommodate uncertainty in climate change and species impacts
- Modified Permit Area
  - Integrate the East Hakki Ridge parcel into the permit area
  - Align the Western Oregon State Forests HCP with the Elliott State Research Forest HCP to maximize habitat continuity
- Modified Covered Species
  - Include provisions for adding additional species protections, such as for the coastal marten, during the permit term
- Modified Covered Activities
  - Timber Harvest
    - Further restrict timber harvest in older stands (i.e., stands over 65 or 80)
    - Set a target for annual harvest of 40 million board feet to maintain forest growth
    - Increase timber harvest to alleviate effects of high inflation, reduction in timber availability due to wildfires, and lack of affordable housing
    - Prohibit hardwood conversion treatments in reserves
    - Manage the conservation research watersheds (CRW) as a carbon reserve
  - Road System Management
    - Place additional restrictions on road building
    - Create a more aggressive road decommissioning plan to improve aquatic and riparian health
    - Remove or relocate roads within 100 feet of fish-bearing streams to outside of RCAs

    - Complete an inventory and assessment of hydrological impacts from roads and commit to reducing roads within the CRW
  - Steep Slopes
    - Increase erosion protections for steep slopes
    - Increase protection for steep slopes and landslide initiation areas in research management watersheds
    - Reduce steep slope logging to reduce probable harm to coho salmon in critical spawning areas (i.e., Palouse Creek)
    - Expand prohibition of harvest on steep slopes
  - Riparian Buffers
    - Increase protection for riparian buffers on perennial and intermittent steams in research management areas
    - Expand riparian buffers on perennial non-fish-bearing and seasonal streams
    - Restrict thinning in riparian and adjacent conservation areas
  - Research:
    - Allow OSU flexibility to manage the forest during its research to evaluate the impacts of forest management on endangered species and other resources
    - Conduct regeneration harvest-focused research
    - Identify reserves as no-take areas
    - Integrate restoration work into the HCP and research design and fully engage the restoration community with options to integrate local watershed plans and assessments
- Modified Conservation Strategy
  - Strengthen protections for northern spotted owl, coastal coho, and marbled murrelet
  - Modify northern spotted owl conservation strategy by:
    - Strengthening northern spotted owl conservation measures
    - Restricting all harvest in older forests
    - Protecting all northern spotted owl activity centers and allowing no take of northern spotted owl
    - Require the FWS thresholds for protection of northern spotted owl core areas and home ranges and ensure that there is no net loss of northern spotted owl habitat
    - Controlling barred owls to reduce competition with northern spotted owl
  - Modify marbled murrelet conservation strategy by:
    - Limiting marbled murrelet research acreage and instead implementing monitoring protocols and adaptive management to minimize observable negative impacts
    - Adding minimization measures for marbled murrelet impacts:

        - ○ Assessing the project areas according to FWS standard monitoring protocols, ensuring sufficient funds for this effort
        - ○ Limiting harvest in marbled murrelet habitat to 500 acres, unless it is demonstrated that harvest will benefit marbled murrelets
        - ○ Restricting marbled murrelet research project to a one-time-only effort within the permit term
        - ○ Creating and maintaining a buffer around any occupied tree(s)
        - ○ Requiring the identification of replacement marbled murrelet habitat prior to management in existing marbled murrelet habitat
        - ○ Restricting any timber harvest in marbled murrelet habitat
    - ○ Modify aquatic conservation strategy by:
        - – Increasing riparian buffers and reducing steep slope logging to minimize risk to coho salmon critical spawning areas
        - – Strengthening fish passage barrier removal requirements:
            - ○ Proactively removing or replacing known impassible and partial barriers to coho migration
            - ○ Modifying timeline for removal of fish barriers to be more aggressive
            - ○ Requiring removal of all fish passage barriers
    - ○ Modify beaver habitat management strategies by:
        - – Limiting thinning of shade trees along streamline and increasing beaver protections
        - – Prohibiting hunting and trapping in the permit area
        - – Surveying for beaver dams, maintained and in disrepair, to identify potential habitat
        - – Promoting beaver dispersal with beaver dam analogs
        - – Partnering with beaver relocation groups
        - – Facilitating beaver relocations to appropriate vacant sites in the permit area

Environmental Resource Areas

Water Resources

Commenters made the following suggestions on the water resources analysis.

- Evaluate cumulative effects related to water quality and aquatic life.
- Include information on acreages and channel lengths, habitat types, values, and function of waters for all affected waters, including the nature of impacts and potential pollutants likely to affect those waters.
- Include waterbodies potentially affected by the project that are listed on the State of Oregon U.S. Environmental Protection Agency-approved 303(d) list and describe how the project would meet Clean Water Act (CWA) antidegradation provisions.

- Include existing restoration and enhancement efforts for the potentially affected waters and how the project would coordinate with these ongoing efforts, including any mitigation or compensatory mitigation that would be required under the CWA.
- Analyze whether the project would result in discharge of dredged or fill materials into surface waters and permit requirements associated with the activity, along with a description of the permit application processes and recommended measures to protect aquatic resources.
- Include a discussion of floodplain impacts and actions to minimize these impacts.
- Explain how the Services' actions are maintaining spatial temperature patterns important to the recovery of protected species.

Vegetation

Commenters made the following suggestions on the vegetation analysis.

- Compile a list of indigenous herbaceous plant species of Coos County and include an analysis of effects on these plant species.
- Analyze the effects of herbicide use on vegetation.
- Study the effects of regenerative harvest on terrestrial species habitat and recovery.

Aquatic Species

Commenters made the following suggestions on the aquatic species analysis.

- Explain the importance of stream temperatures and their effects on covered aquatic species, with ample consideration to climate change and explanation of how the Services' actions are maintaining spatial temperature patterns important to the recovery of protected species.
- Analyze the effects of HCP's proposed riparian buffers, riparian thinning strategy, sedimentation, water quality and stream temperatures, fish migration barriers, road networks, and beaver management activities, in relation to coast coho salmon survival and recovery to evaluate if the proposed measures proposed in the draft HCP are sufficient.
- Assess the impacts of herbicide use in vegetation management and associated runoff on juvenile salmonid streams.

Terrestrial Species

Commenters made the following suggestions on the analysis of terrestrial species in the EIS.

- Analyze the effects of the HCP's proposed thinning strategy for terrestrial species (e.g., effects of creating snags instead of felling thinned trees).
- Analyze the effect of hardwood removal treatments on habitat quality.

Greenhouse Gases and Air Quality

A commenter recommended that the EIS include a discussion of ambient air conditions (baseline and existing), national ambient air quality standards, criteria pollutant nonattainment areas in the plan area, an estimation of criteria pollutant emissions and a discussion of timeframe and identification of applicable mitigation measures if needed. A commenter requested that the EIS analyze effects on carbon storage, including an analysis of how different timber harvest and thinning intensities would affect carbon storage.

Climate Change

A commenter recommended the EIS include a discussion of reasonably foreseeable effects that changes in climate may have on the proposed project, and what impacts the proposed project would have on climate change consequences, to better inform the development of climate resiliency measures for the project.

Recreation

Commenters made the following suggestions for the recreation analysis:

- Consider forms of recreation in the project area as a take due to their impacts on respective species and habitat; increase monitoring to reduce these impacts.
- Conduct more timber harvest and use revenue to fund recreation and research expenses.

Cultural Resources

A commenter suggested that the EIS should discuss how adverse effects on the physical integrity, accessibility, or use of cultural resources and/or archaeological sites, including traditional cultural properties, would be minimized throughout the project area. The commenter encourages FWS to append any Memoranda of Agreement to the EIS, after redacting specific information about these sites that is sensitive and protected under the National Historic Preservation Act (NHPA). The commenter also recommends providing a summary of consultation with state and federal agencies on potential effects on NHPA resources and developing a Cultural Resource Management Plan.

Tribal Resources

Commenters made the following suggestions regarding the tribal resources analysis:

- Incorporate input from tribes on HCP development and summarize tribal consultation in the EIS, including issues raised during the consultations and how those issues were addressed.
- Disclose any impacts on tribal, cultural, or other treaty resources.
- Conduct tribal consultation and describe the process and outcomes of tribal coordination in the EIS.
- Identify whether any potentially affected sacred sites exist in the project area and discuss how the EIS would ensure the proposed action would avoid, or mitigate, impacts on the physical integrity, accessibility, or use of sacred sites.

Socioeconomics

Commenters suggested that the EIS utilize portions of forest for logging to reduce log and lumber prices, reduce inflation in the lumber market, and increase available housing.

Environmental Justice

A commenter made the following suggestions regarding the environmental justice analysis.

- Incorporate the Executive Order 13985 definition of equity.
- Use the U.S. Environmental Protection Agency’s EJSCREEN tool to identify potentially affected environmental justice communities and discuss information for the block group(s) which contains the proposed action(s) in a 1-mile radius around those areas.
- When assessing large geographic areas, consider the individual block groups within the project area.
- Consider additional information in an environmental justice analysis to supplement EJSCREEN outputs.
- Apply methods from "Environmental Justice Interagency Working Group Promising Practices for EJ Methodologies in NEPA Reviews" report, or the Promising Practices Report, to this project.
- Characterize project site(s) with specific information or data related to environmental justice concerns.
- Describe potential environmental justice concerns for all environmental justice indexes at or above the 80th percentile in the state and/or nation.
- Describe block groups which contain the proposed action.
- Describe individual block groups within the project area in addition to an area-wide assessment.
- Supplement data with county-level reports and local knowledge.
- If communities with environmental justice characteristics exist in the project area, the EIS should discuss whether these communities would be potentially affected by individual or cumulative actions of the proposed project and address whether alternatives would cause any disproportionate adverse impacts.
- Describe in the EIS measures taken by FWS to address any disproportionate impacts on environmental justice communities and identify potential mitigation measures.
- Clearly identify a monitoring and adaptive management plan to ensure mitigation is effective and successful.

Appendix 1-C
Responses to Comments on the Draft EIS

Introduction

The Oregon Department of State Lands (DSL) prepared the Elliott State Research Forest Habitat Conservation Plan (HCP) to support its applications for incidental take permits (ITPs) from the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) (collectively, the Services). The ITPs would authorize take of three threatened or endangered species resulting from forest management and research activities on the Elliott State Research Forest in accordance with the requirements of the federal Endangered Species Act (ESA). The proposed issuance of an ITP supported by the HCP is a federal action under the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321 et seq.). This environmental impact statement (EIS) was prepared to comply with the Services' NEPA requirements under the Council on Environmental Quality's current regulations (40 CFR 1500–1508, May 2022). FWS is the federal lead agency responsible for preparing the EIS and NMFS, Oregon Department of Forestry (ODF), and Oregon Department of Fish and Wildlife (ODFW) are cooperating agencies.

During the process of reviewing and responding to comments on the Draft EIS and HCP, revisions and clarifications were made to the Final EIS and HCP. These changes are explicitly referenced in the responses in this appendix.

This appendix presents the following.

- A summary of the public review process.
- A description of the general approach to responding to comments.
- An index of comments received on the Draft EIS and HCP.
- Responses to comments received on the Draft EIS and HCP.

Copies of comment letters submitted to the Services are not included in this appendix but can be viewed as follows.

- Visit https://www.regulations.gov.
- Enter Docket ID: FWS-R1-ES-2022-0029 into the home page search bar.
- Select the Notice of Availability of Draft Environmental Impact Statement for the Elliot State Research Forest Habitat Conservation Plan.
- Select "View Posted Comments" to locate individual letters submitted. All comment letters have been entered by the commenter's name.

Summary of the Public Review Process

On November 18, 2022, FWS published a Notice of Availability (NOA) in the *Federal Register* (FR) announcing a request for public comment on the Draft EIS and HCP and the FWS' receipt of ITP applications (87 FR 69291). The NOA established a 45-day public review and comment period and provided details on how to submit comments and information about a virtual public meeting. In response to public requests, FWS granted a 7-day extension (87 FR 77877) to the review and comment period, increasing the public review and comment period to 52 days. The comment period closed on January 10, 2023. FWS held a virtual public meeting on December 13, 2022. The meeting included a presentation on the Draft EIS and HCP, how to provide comments via www.Regulations.gov, and next steps in the NEPA process. Following the presentation, FWS took questions from attendees. Formal comments were not taken at the public meeting. The presentation portion of the meeting is available online at https://www.fws.gov/project/elliott-state-research-forest-habitat-conservation-plan.

Individual letters and form letters (letters based on a standard template) were received as part of the public comment process. FWS received 66 individual letters and 104 copies of 1 form letter.

Approach to Responding to Comments Received

All comment letters (including any attachments) were reviewed and considered in the development of the Final EIS according to the following process.

- Each comment letter was assigned a unique ID based on its document number from Regulations.gov.
- Each letter was then reviewed and each comment substantively related to the Draft EIS or HCP was coded by topic to allow grouping of similar comments.[1]
- Each comment or group of comments on a topic was then summarized and a responsive provided.
- As appropriate, corrections, additions, updates, or other changes were made in the Final EIS and HCP in response to comments.

The responses to comments provided in this appendix and the updates in the Final EIS represent FWS's best effort to review and consider the substantive comments, suggestions, and information provided by the commenters carefully and objectively. NMFS also reviewed and provided input on responses to comments. At the request of FWS, DSL provided input on responses to comments on the contents of the HCP. In addition, DSL considered the comments received on the HCP in the development of the Final HCP.

Per 40 CFR 1503.4, "an agency preparing a final environmental impact statement shall consider substantive comments timely submitted during the public comment period." As such, this appendix includes responses to substantive comments received on the Draft EIS and HCP. Nonsubstantive comments not specifically responded to in this appendix include statements of general support or opposition to the HCP or EIS, general statements of concern related to the effects of forest management not specific to the HCP or EIS, and statements about projects or activities that are outside the scope of the EIS and HCP.

[1] Of the form letters received, one master letter was identified on which all other form letters were based; the contents of this master form letter were individually coded. If unique content was identified in individual submissions of the form letter, the unique content was coded separately from the standard form letter content.

Indices of Commenters

The following tables list the comment letters received by commenter type: federal agencies (Table 1), state agencies (Table 2), local agencies and governments (Table 3), organizations and businesses (Table 4), general public (Table 5), and form letter copies or form letters with unique content (Table 6). For each comment letter, the tables provide the unique ID, commenter name, and organization name, if applicable. Each individual letter was assigned a unique letter number corresponding to the last two or three digits of the comment's document ID from Regulations.gov.

Table 1. Federal Agencies

ID Number	Commenter Name	Organization Name
79	Rebecca Chu	U.S. Environmental Protection Agency

Table 2. State Agencies

ID Number	Commenter Name	Organization Name
167	Rod Krahmer	Oregon Department of Fish and Wildlife

Table 3. Local Agencies and Governments

ID Number	Commenter Name	Organization Name
144	Tom Kress	Douglass County Board of Commissioners

Table 4. Organizations and Businesses

ID Number	Commenter Name	Organization Name
88	Darlene Chirman	Great Old Broads for Wilderness
145	Cristina Hubbard	Forest Web of Cottage Grove
165	Mike Totey	Oregon Hunters Association
166	Darcy Grahek	Stillwater Natives Nursery
168	Dominic M. Carollo	Douglas Timber Operators
184	Reed Wilson	Benton Forest Coalition
207	Josh Laughlin	Cascadia Wildlands
210	Ann Vileisis	Klamiopsis Audubon Society
224	Haley Lutz	Coos Watershed Association
241	Anne-Marie Oliver	Oregon Institute for Creative Research
242	Lindsay Adrean	American Bird Conservancy
243	Bob Sallinger	Audubon Society of Portland
244	Janice Reid	Umpqua Watersheds
245	Kyle Williams	Oregon Forest Industries Council
246	Teresa Bird and Maria Farinacci	Coast Range Forest Watch
247	Douglas Pollock	Friends of OSU Old Growth

Table 5. General Public

ID Number	First Name	ID Number	First Name
76	Jean Publiee	134	Bruce Barbarasch
77	Andrea Pellicani	142	Carol Oliver
78	Kim Kittredge	146	Judy Ringenson
82	Jean Publiee	149	Raymond Valinoti
83	Barb Shamet	155	David Stone
84	Barbara Shamet	172	Lawrence Basch
85	Sherri Merritt	176	Derek Benedict
86	Anonymous	177	Derek Benedict
89	Sarah Lovald	178	Andrea Burke
90	Jill Riebesehl	192	Lloyd Vivola
91	Cristy Murray	193	Cynthia Shoffitt Schnee
94	Kathy Bowman	195	Linore Blackstone
98	Patrick Olmstead	196	Greg Jacob
99	Amy Brooks	198	Paula Sauvageau
101	Natalie Ranker	199	Jan Nelson
105	Barbara Shamet	201	Rick Silverman
107	Leslie Recio	203	Linda Hartling
109	Anonymous	204	Anonymous
113	Taylor Frederick	215	Karen Boulton
120	Linda R	219	Mickie Harshman
123	Anonymous	226	Anonymous
128	Teresa Mcgrath	232	Ron Wallace
129	Kathryn Sheibley	233	John Swetnam
130	Alyssa Burge	234	Nic Tarter
132	Kristina Good	240	Hallie Campbell

Table 6. Form Letter Copies and Form Letters with Unique Content

ID Number	Commenter Name	ID Number	Commenter Name
87	Dianne Ensign	110	Jackson Reed
91	Cristy Murray	111	Linda Rentfrow
92	Matthew Morrissey	112	Alex Prentiss
93	Emily Platt	114	Suzanne Moulton
95	Hillary Tiefer	115	Rebecca Crosby
96	Jeff Johnson	116	Kimber Nelson
97	Tammy Spencer	117	Mary Hayden
100	Richard Hinkle	118	Linda Zook
102	Laura Donohue	119	Karen Berry
103	Patrick Donohue	121	William Farris
104	Nora Sherwood	122	Ann Tiedeman
106	Beverlie Woodsong	124	Andrea Pellicani
108	Anonymous	125	Alan Barti

ID Number	Commenter Name
126	Elisa Perry
127	Erin Law
131	Ashley Lema
133	Robyn Bluemmel
135	Ruby MCconnell
136	Deb Holder
137	Richard Emery
138	Mary Rose Navarro
139	Anonymous
140	John Altshuler
141	Ken Goldsmith
143	Sarah Risser
147	Joan Kleban
148	Jessy Shrive
150	Rita Frost
151	Dawn Albanese
152	Anonymous
153	Anna Brewer
154	Nora Lyman
156	Stu Lip
157	Stephen Oder
158	Constance Huff
159	Gerald Hallead
160	Mark Van Ryzin
161	Tracy Ouellette
162	Virgene Link-New
163	A Buckley
164	Arianne Jacques
166	Darcy Grahek
169	Diane Schauer
170	Benton Elliot
171	Lynn Herring
173	Haley Riley
174	Chris Dodge
175	Dylan Plummer
177	Derek Benedict
179	Andrea Burke
180	Christine Perala Gardiner
181	Anonymous
182	Debra Higbee

ID Number	Commenter Name
183	Nora Polk
185	Veronika Trishyna
186	Philip Ratcliff
187	Travis Allen
188	J S
189	Caroline Sévilla
190	Elizabeth Dix
191	Diane Bilderback
194	Jill Punches
197	Vicky Medley
200	Julie Spilker
202	Marguery Lee Zucker
205	Sarah Swanson
206	Rachel Day
208	Allison Anholt
209	Cameron Cox
211	Nancy Brown
212	Ali Jones
213	Jeanette Schuster
214	Emily Pinkowitz
216	Hillary Dearborn
217	Marie Wakefield
218	Bobbee Murr
220	Eric Smith
221	Candace Larson
222	Neena Petersen
223	Candace Lynn Sweeney
225	Diane Rios
227	Matthew Hushbeck
228	Carol Yarbrough
229	Adele Dawson
230	Rheama Koonce
231	Elieen Stark
235	Jessica Saxton
236	Bristol Ozturgut
237	Scott Carpenter
238	Chris Rauber
239	Carol Valentine
244	Janice Reid

Comments on the HCP

1 Scope of the HCP

HCP 1.1 Communication with Adjacent Property Owners

One commenter requested that there be targeted public outreach to communities near Elliott State Forest about how management activities may affect their drinking water, stream flows, and other critical values.

Commenter(s)

78

Response

Before any on-the-ground activity occurs, biennial operations planning (containing proposed timber harvest treatments, habitat work, and research on the forest) will be publicly noticed, with opportunities for public comment and engagement with DSL and the Implementation and Adaptive Management Committee. The HCP was developed to avoid, minimize and mitigate impacts pursuant to Section 10 of the ESA. DSL's Forest Management Plan for the permit area provided another opportunity for public engagement around these concerns. The above efforts include public outreach and noticing. Interested parties can join the Elliott State Research Forest email-mailing list on DSL's website.

HCP 1.2 Outreach to Rural Communities

One commenter stated that a new HCP should be developed that considers the interests of rural communities.

Commenter(s)

144

Response

In addition to the formal public comment process on the Draft EIS and HCP, DSL hosted public informational meetings during development of the HCP for the counties, tribes, public, stakeholders, and consultants to share feedback, provide information regarding HCP development, and explore ideas for improvement. Follow-up meetings with these entities were also scheduled upon request to further discuss the information presented during the public information meetings and provide more detail on the components of the HCP. In addition, counties were members of the Advisory Committee that crafted the research forest design that was advanced into the HCP development process.

HCP 1.3 Outreach to Tribes

One commenter stated that DSL should:

- Provide more avenues of communication for tribal members looking to harvest or use culturally important plant species.

- Incorporate and prioritize research projects on tribally important resources or practices in coordination with tribal members and staff.
- Consider culturally important plants, fungi, and sites in all covered activities.
- Comply with cultural resource protection laws.

Commenter(s)

246

Response

The Implementation and Adaptive Management Committee (Final HCP Section 7.2.5, *Implementation and Adaptive Management Committee*) will include tribes connected to the permit area geography. Their addition to the committee, along with the measures described below, provide avenues for continued tribal communication.

Final HCP Section 3.3.1, *Conservation Reserve Watersheds and Management Reserve Watersheds Reserve Allocations,* has been updated to acknowledge that treatments in these allocations would include compatible cultural practices. Final HCP Section 3.5, *Supporting Management Activities*, states that "[prescribed burning would] incorporate Indigenous Knowledge to manage fuels and increase or maintain suitable conditions for species of cultural value to local tribal communities." Final HCP Section 3.8, *Indigenous Cultural Use of Cedar Trees,* has been updated to include indigenous practices as a covered activity. The inclusion of indigenous cultural use of cedar trees specifically allows for tribal harvest and use of cedar trees for canoe building, providing material for plank houses and stakes for ceremonies, basket weaving, or other cultural practices.

The HCP is DSL's proposal for offsetting take of species listed under the ESA. DSL's Forest Management Plan (2024) establishes principles for working with Tribal Nations, Indigenous Knowledge holders, and other sanctioned individuals or entities. In addition, DSL can incorporate and prioritize research projects on tribally important resources or practices in coordination with tribal governments, members, and staff.

As described in EIS Section 3.9, *Cultural Resources*, DSL would comply with federal and state cultural resources laws and regulations. Final Section 3.9 has been updated to reflect cultural resource protections identified in the Forest Management Plan (DSL 2024) for the permit area.

HCP 1.4 Local Representation in Interagency Stakeholder Advisory Committee

One commenter suggested that the Interagency Stakeholder Advisory Committee should include the Coos Watershed Association.

Commenter(s)

224

Response

In the Final HCP, the interagency stakeholder advisory committee has been renamed the Implementation and Adaptive Management Committee.

The description in Final HCP Section 7.2.5, *Implementation and Adaptive Management Committee*, has been updated to state that subject matter experts not affiliated with local, state, or federal agencies will also be included in the committee. Such subject matter experts likely would include local practitioners with direct experience in the permit area and vicinity.

HCP 1.5 Makeup of the Interagency Stakeholder Advisory Committee

Two commenters suggested that the Implementation and Adaptive Management Committee include the ODFW and tribal representatives.

Commenter(s)

167, 246

Response

The composition of the Implementation and Adaptive Management Committee (Final HCP Section 7.2.5, *Implementation and Adaptive Management Committee*), has been clarified in the Final HCP and includes ODFW, tribal representation, and others. Additionally, the role of this committee has been expanded to address adaptive management decision-making more broadly, in addition to review of species-specific research.

HCP 1.6 Underlying Approach to HCP Management Strategy

Two commenters asserted that the HCP relies on an ineffective approach to forest management that does not address the primary causes of northern spotted owl decline, which the commenter states are barred owls and habitat loss from wildfire.

The commenter also states that the HCP's "preservation-centric" forest management strategy will increase wildfire risk.

Commenter(s)

144, 168

Response

HCPs are required to avoid, minimize, and mitigate incidental take of the covered species from the covered activities to the maximum extent practicable but are not specifically required to avoid impacts on the species resulting from other factors.

As described in HCP Chapter 2, *Environmental Setting*, the HCP was developed in the context of a complex environmental setting, including ongoing population declines of covered species and increasing risks and uncertainties due to climate change, large-scale fires, and invasive species, such as barred owls.

The applicant followed the strategies outlined in the HCP Handbook (FWS and NMFS 2016) to address these complexities and associated uncertainties by committing to a long-term monitoring and adaptive management program directly tied to the measurable biological goals and objectives defined in HCP Chapter 5, *Conservation Strategy*.

Regarding the invasive barred owl, the HCP acknowledges that current declines in northern spotted owl populations are believed to be primarily due to widespread expansion of the barred owl rather than habitat loss. However, as described in HCP Chapter 4, *Effects Analysis*, the primary source of take projected to occur from the covered activities is habitat loss and modification. Therefore, the HCP considers offsets to this take in kind with habitat protections and commitments to increase habitat over time.

As part of HCP Conservation Measure 4, *Barred Owl Management and Research*, the applicant commits to collaborate with FWS, as well as other federal and state management agencies, to design and implement a barred owl management and research approach in the permit area in support of federal management strategies for northern spotted owl recovery (Final HCP Section 5.4.4, *Conservation Measure 4, Barred Owl Management and Research*). The HCP's management approach will be designed, budgeted, and authorization sought under the Migratory Bird Treaty Act within 16 months of incidental take permit issuance and begin no later than the field season of the following year.

In addition, the permit area will provide research opportunities to determine effective strategies to offset stresses on northern spotted owls due to barred owls (the timing and extent of such research will be determined as part of the experimental design).

Regarding the effectiveness of the conservation strategy and the relationship to conservation and fire risks, research indicates that for extreme fire events (e.g., 2020 Labor Day fires), forest management may have no effect on fire severity (Reilly et al. 2022:11). For mixed severity fires and more frequent fires, which may affect the permit area over time as a result of climate change, older forests with higher protected status are shown to burn less severely even though they are generally identified as having the highest overall levels of biomass and fuel loading (Levine et al. 2022; Zald and Dunn 2018; Thompson et al. 2007).

HCP 1.7 Visual Resource Protection

One commenter requested that the HCP increase protections for visual resources and residents/businesses adjacent to the permit area.

Commenter(s)

207

Response

The applicant has prepared the HCP to address ESA Section 10 requirements. The applicant will be responsible for compliance with other federal, state, and local requirements, including any applicable regulations to protect visual resources, outside of the HCP. Effects on visual resources and adjacent land uses are considered in EIS Section 3.8, *Recreation and Visual Resources*.

HCP 1.8 Biochar Creation

One commenter suggested including biochar creation in the HCP's research plan as a form of long-term carbon sequestration.

Commenter(s)

88

Response

HCP Chapter 3, *Covered Activities*, establishes treatments that will be applied in the permit area but does not define individual research projects or every method that may be undertaken to advance the goals of the research. The covered activities in the HCP are defined to the extent necessary to estimate take. Creation of biochar from slash management could become one method or research topic in the future but is not explicitly detailed in the HCP. Types of potential short- and long-term research projects, questions, and collaborations that could occur in the permit area are described in

HCP Appendix C, *Proposal—Elliott State Research Forest* and is further detailed in the applicant's Forest Management Plan (DSL 2024).

HCP 1.9 Carbon Storage and Climate Change Focus

Commenters suggested that the riparian conservation areas (RCAs) and Reserves be managed for carbon storage as well as endangered species. Commenters also suggested that the HCP provide more information about climate change, commit to making management decisions that improve resilience to climate change, and include research to study forest health in the context of climate change.

Commenter(s)

77, 78, 88, 105, 145, 246

Response

As described in the HCP, the applicant's goal of advancing more sustainable forest management practices includes research into climate adaptation of forests and carbon sequestration. The applicant is responsible for defining proposed management and research goals for the conservation areas consistent with ESA Section 10 requirements. The applicant is addressing carbon sequestration and storage as part of the Forest Management Plan. As described in HCP Section 6.5.3, *Adaptive Management and Climate Change*, climate change research will be central to everything that occurs in the permit area, so adapting to new information that emerges from that research is part of the fabric of the research forest itself. In terms of adaptive management, climate change effects may be detected through monitoring results that will, in turn, trigger adaptive management responses. This includes effects that may act as stressors for the covered species, as well as those that present risks to the maintenance and enhancement of the quantity and quality of habitat.

HCP 1.10 Firewood Cutting

One commenter recommended that the HCP consider personal firewood cutting, which can remove riparian trees.

Commenter(s)

167

Response

As described in HCP Section 3.10, *Activities Not Covered*, firewood harvesting is not a covered activity under the HCP. Removal of material from state land without lawful authority is prohibited under ORS 273.241. DSL can issue permits for firewood collection on ESRF. Permits restrict collection to down trees and roadside debris within 10 feet of road shoulders and landings, or within 25 feet of recent clearcut units. Debris must be kept out of streams, roads, and ditchlines. Based on these limitations, the applicant determined this activity would not affect covered species in ways that would likely rise to the level of take. Since it is not a covered activity, any take of listed species associated with personal firewood cutting would be unlawful under ESA Section 9, and effects on the covered species from recreation activities are not analyzed in the HCP or EIS.

HCP 1.11 Herbicide Use

One commenter asserted that the HCP should not allow aerial spraying of herbicides. The commenter also stated that the HCP did not adequately address herbicide use impacts.

Commenter(s)

246

Response

As described in HCP Section 3.10, *Activities Not Covered*, use of pesticides, which include herbicides as defined, is not a covered activity under the HCP. Since it is not a covered activity, effects on the covered species from pesticide use are not analyzed in the HCP. Take of listed species associated with use of these products would be unlawful under ESA Section 9.

HCP 1.12 Recreational Activities

One commenter suggested that the HCP should recognize the potential for take from recreational activities (e.g., increased predator density from food waste left by human visitors) and include a plan for visitor education and garbage management in the permit area.

Commenter(s)

242

Response

As described in HCP Section 3.10, *Activities Not Covered*, recreational activities are not a covered activity under this HCP but are addressed in the applicant's Forest Management Plan (DSL 2024). The permit area is remote with no recreational facilities managed by the applicant. Since it is not a covered activity, effects on the covered species from recreation activities are not analyzed in the HCP. If, in the future, the applicant was to develop a recreation program, the applicant would need to comply with the ESA to avoid potential take associated with recreation or pursue an amendment to the HCP.

HCP 1.13 Approach for Listed Species and Species of Concern not Covered by the HCP

Two commenters stated that the HCP should require baseline monitoring to determine species presence and follow best management practices if present for federally listed species that are not covered by the HCP—coastal marten and eulachon—and for state species of concern, including Pacific lamprey and red tree vole.

Commenter(s)

184, 246

Response

The HCP is the applicant's plan to minimize and mitigate effects of take of the covered species. The applicant has not requested take coverage for the fish and wildlife species identified by the commenter, including those that are listed under the ESA. In addition, no other listed species likely to be taken through implementation of covered activities have been identified. Therefore, the HCP does not identify any measures for these species. See HCP Section 1.4.4, *Covered Species*, and Appendix B, *Species Considered for Coverage*, for details on the species selection criteria. Regarding coastal marten, which is listed as threatened under the ESA, coastal marten has not been detected in the permit area for many decades. Surveys conducted in the permit area in 2022 as part of a recent recovery permit annual report did not identify any coastal marten (Moriarty et al. 2022).

Regarding eulachon, the species range is outside of the permit area. Furthermore, the applicant determined that scientific data on the species' life history and habitat requirements were insufficient to adequately evaluate potential effects of covered activities on the species and to develop conservation measures to mitigate those impacts.

If a federally listed species is not covered by the HCP, take of that species would continue to be prohibited under ESA Section 9. If a new species is listed or listed species are found in the permit area, the Permittee will follow the process outlined in Final HCP Section 7.8.2.1, *New Species Listed or Designation/Revision of Critical Habitat*. Other sensitive species or species of concern (if they occur in the permit area) are addressed in the Forest Management Plan (DSL 2024).

HCP 1.14 Protection of Special Status Plant Species

Two commenters asserted that the applicant should be required to survey for and protect special-status plant and fungus species.

Commenter(s)

243, 246

Response

The HCP is the applicant's plan to minimize and mitigate effects of take of the covered species. There are no federally listed plant or fungus species in the plan area and the applicant has not requested take coverage for any special-status plant or fungus species. Therefore, the HCP does not identify any measures for these species. Other sensitive species or species of concern (if they occur in the permit area) are addressed in the Forest Management Plan (DSL 2024).

HCP 1.15 East Hakki Ridge

Two commenters requested that East Hakki Ridge be incorporated into the HCP's permit area.

Commenter(s)

207, 243

Response

The Final HCP has been updated to include East Hakki Ridge in the HCP permit area and the effects analysis. This includes updates to figures and tables throughout the document. The Final EIS has been updated to reflect the inclusion of East Hakki Ridge in the proposed action permit area.

HCP 1.16 Historical Impacts

One commenter stated that the HCP should be evaluated in the context of historical activity in the permit area, specifically referencing that previous harvest activity has adversely affected the species. The commenter states that the HCP should compensate for past impacts on the species and ensure that there is a significant net benefit to the species through the permit term.

Commenter(s)

243

Response

The HCP effects analysis (HCP Chapter 4, *Effects Analysis*) considers the context in which take would occur, which includes impacts of past management activities as well as the status of the covered species populations. In evaluating the sufficiency of the HCP in the context of the ITP issuance criteria, the Services consider the impact of the take in the context of the current condition of the covered species' populations, which may be based, in part, on past impacts, and may determine that the impact is greater for a covered species population that is already known to be in decline.

ESA Section 10 does not include a requirement that HCPs provide "a significant increased net benefit" for listed species or a requirement to offset past management activities. The Services must determine that the Section 10 issuance criteria have been met, which include minimizing and mitigating the impacts of take to the maximum extent practicable, and not appreciably reducing the likelihood of the survival and recovery of the species in the wild.

HCP 1.17 Compliance with Revised FPA

Multiple commenters expressed that the HCP should be required to comply with the Oregon Forest Practices Act (FPA), including the recently proposed revisions to the Oregon FPA through the Private Forest Accord (PFA) agreement. Specific requests include:

- Ensure that RCA widths and management comply with the minimum requirements of the Forest Practice Rules.
- Require equipment limitation zones (ELZs) on seasonal streams.
- Conduct road system management according to the revised Oregon FPA rules, including road abandonment and decommissioning according to the proposed Forest Roads Inventory and Analysis (FRIA) program to ensure that inactive or abandoned roads and culverts comply with the revised Oregon FPA rules.
- Require management on steep slopes to meet Oregon FPA requirements.
- Require protections along seeps and wetlands per the Oregon FPA.

Commenter(s)

79, 88, 89, 91, 101, 114, 134, 192, 196, 210, 243, 244, 246

Response

Final HCP Chapter 3, *Covered Activities*, and Chapter 5, *Conservation Strategy*, have been updated to identify operations and actions that will be managed in accordance with Oregon FPA rules. DSL will engage with the ODF to develop and adopt stewardship agreements and/or plans for alternative compliance where necessary for management actions that deviate from the Oregon FPA rules.

The bullets below summarize how management under the HCP would compare to Oregon FPA rules referenced by the commenters. The HCP's conservation measures and conditions along with the habitat protections and enhancements integrated into the covered activities and the adaptive management and mitigation program represent a holistic strategy for minimizing and mitigating effects on the covered species.

- RCA widths under the HCP would meet or exceed those of the Oregon FPA RMAs on all but a subset of large and medium perennial non-fish-bearing streams.
- The Final HCP has been updated to include the addition of 35-foot ELZs around all stream channels defined in the Oregon FPA. Operation of ground-based equipment will be prohibited in the ELZ. For thinning in RCAs outside of the ELZ, the use of ground-based equipment will be limited to slopes less than 40% or roughly 30% of the total RCA acres in the permit area. Both of these requirements are more protective than Oregon FPA requirements (OAR 629-630-0700(6)).
- The Final HCP has been updated to clarify that road construction, maintenance, and vacating would be performed in accordance with the Oregon FPA rules listed in Final HCP Section 3.6.1, *Road System Construction and Management*, and other applicable statutes. These exclude the Oregon FPA's FRIA process (OAR 629-625-0900) and the State-led Abandoned Roads Inventory (OAR 629-625-0910), for which the HCP proposes an alternative compliance approach. Final HCP Section 5.4.3, *Conservation Measure 3, Reduce Density and Negative Impacts of the Forest Road Network in the Permit Area*, includes a formal road assessment that will inventory existing roads to identify those that present a risk to the permit area's aquatic system and seek to implement modifications that prioritize vacating segments that pose the highest risks to aquatic resources. As described in Final EIS Section 3.2, *Geology and Soils*, this assessment and project prioritization process would result in comparable erosion risk reduction to the FRIA process. Under HCP Condition 11, new road construction would reflect additional road design measures that would mitigate risks of soil erosion beyond what is required under Oregon FPA. Conservation Measure 3 also includes a commitment to reduce road density in 10-year increments over the permit term, which would reduce erosion from road use and maintenance.
- Similar to Oregon FPA steep slope protections (OAR 629-630-0900), HCP Condition 10, *Management on Steep Slopes*, would limit harvest on steep slopes. Per Condition 10, intensive harvest would avoid unstable slopes identified by the Slope Stability Analysis tool (TerrainWorks 2021) unless they are found to be suitable for harvest via field survey. Extensive and restoration thinning treatments would use field surveys and retention commitments to reduce risks on unstable slope.
- The Water Protection Rules of the Oregon FPA related to wetlands and seeps would apply under the proposed action.

2 Existing Setting

HCP 2.1 Characterization of Adjacent Land Management

One commenter noted that the statement in HCP Section 2.2.2, *Land Ownership and Forest Cover*, that much of the federal land adjacent to the permit area is managed for conservation cited the Northwest Forest Plan and is therefore erroneous.

The commenter also stated that the HCP should not rely on assurances from any other public or private entities or assumptions about adjacent management.

Commenter(s)

244

Response

Final HCP Section 2.2.2, *Land Ownership and Forest Cover*, has been updated to add reference the 2016 BLM Resource Management Plans relevant to management of adjacent BLM lands. Much of federal land adjacent to the permit area is managed for conservation. Therefore, the statement has not been modified.

The HCP is the applicant's proposal to minimize and mitigate effects of take of the covered species from covered activities occurring in the permit area during the permit term. The permittee cannot depend on anticipated conservation occurring on lands outside of the permit area to meet the biological goals and objectives for the species that are defined in the HCP.

HCP 2.2 Marbled Murrelet Habitat Mapping

Multiple commenters stated that the HCP must ensure that all marbled murrelet habitat is adequately mapped. Commenters stated that the HCP should include buffers around all occupied marbled murrelet habitat, per FWS guidance. In addition, one commenter asserted that mapping of potential marbled murrelet habitat presented in the HCP appears to be flawed because it is inconsistent with the Pacific Seabird Group Protocol that recommends that where nesting behavior is confirmed, the entire contiguous stand of suitable habitat be designated as occupied.

Commenters requested that the Services require the HCP include these modifications to the marbled murrelet provisions.

Commenter(s)

089, 91, 94, 123, 134, 142, 192, 196, 210, 242, 243, 247

Response

The Final HCP was updated to reflect revised habitat mapping for marbled murrelet. Final HCP Section 2.4.2, *Population and Habitat Status*, and HCP Appendix D, *Marbled Murrelet Habitat Suitability Index Approach*, describe these revisions, which were applied through the Final HCP.

The Betts et al. (2020) marbled murrelet habitat model used in the Public Draft HCP employed a Maxtent modeling package that relies on known locations of marbled murrelet nesting activity to train the model to find similar habitat types in the study area. Following publication of the Public Draft HCP, more recent, higher-resolution LiDAR data from 2021 became available. This new information, coupled with an enhanced Betts/Yang model in 2023, was used to update the marbled murrelet habitat assumptions in the Final HCP. This updated habitat layer (Final HCP Figure 2-11) identifies approximately 4,300 additional acres of modeled potential murrelet habitat.

Through these updates, it was also determined that approximately 2,600 acres of the study area that were considered occupied habitat in the Public Draft HCP had undergone intensive harvesting between 2009 and 2020, making it unsuitable for marbled murrelet. These areas were removed from the designated occupied habitat layer.

Certain habitat features, such as narrow linear stands, sometimes referred to as stringers, and small patches/stands of older trees, initially identified by the model as mid- to high-suitability habitat, were reevaluated and found to be unsuitable. These features often included riparian stringers in recently harvested areas with minimal interior habitat and were removed from the modeled potential habitat layer.

In total, these revisions result in a net gain of approximately 1,700 acres of combined modeled potential and designated occupied marbled murrelet habitat in the permit area.

These revisions provide a more accurate representation of current habitat conditions in the permit area, particularly in areas that have been logged or exhibit significant edge effects. This improved layer allows for the precise implementation of associated avoidance and minimization measures.

Additionally, the Final HCP has been revised to include Conservation Measure 5, Harvest and Thinning Adjacent to Occupied Marbled Murrelet Habitat. This measure requires application of buffers maintained at 100% retention for harvest treatments in modeled potential habitat that is adjacent to designated occupied habitat.

Regarding the request that the Services require modifications to the marbled murrelet provisions in the HCP, the Services review the ITP applications submitted and base their decisions on the statutory and regulatory criteria of ESA.

HCP 2.3 Marbled Murrelet Population Trends

One commenter stated that the HCP should provide more information about marbled murrelet populations trends in Oregon and the importance of the Elliott State Forest for marbled murrelets.

Commenter(s)

243

Response

HCP Section 2.4.2.2, *Plan Area Status*, acknowledges that the Elliott State Forest has a relatively large population of nesting marbled murrelets, and that the area is considered important to the distribution of marbled murrelet on the Oregon Coast.

Additional information has been added to Final HCP Section 2.4, *Marbled Murrelet*, regarding sea population trends for marbled murrelet. It is not possible to directly identify marbled murrelet nesting trends in the permit area, because survey data are not a statistical sample and associated population estimate of murrelet nest sites, but rather a cumulative count of selective survey activity conducted over many years.

HCP 2.4 Coho Habitat Description

One commenter requested updates to the description of Oregon coast coho habitat, including updates to reflect more recent coho abundance data. The commenter also recommended identifying Joe Creek to be high-quality, but not high-quantity habitat.

Commenter(s)

167

Response

Final HCP Chapter 2, *Environmental Setting*, has been updated with the most recently published coho abundance data, including the suggested change to Joe Creek.

3 Covered Activities

HCP 3.1 Edge Effects on Marbled Murrelet

One commenter noted that the lack of buffers around occupied marbled murrelet sites could result in edge effects at nests near harvest treatments and suggested that there should be a "requirement for treatments to be staggered both in time and geographically" to reduce the amount of hard edges on the landscape at any one time.

Commenter(s)

242

Response

The Final HCP has been updated to include Conservation Measure 5, Harvest and Thinning Adjacent to Occupied Marbled Murrelet Habitat, which prescribes buffers and exceptions to buffers for restoration thinning in CRW and MRW Reserves and any treatment in the MRW outside of Reserves that is proposed to occur in modeled potential marbled murrelet habitat that is adjacent to designated occupied habitat.

Limits on the timing and amount of harvest allowed have been revised in Final HCP Section 3.4.1, *Projected Timing and Amount of Harvest*. Timber sale contracts from all sources would not exceed 1,000 acres per year based on a 4-year rolling average of contracted sales. These harvest limits would reduce the amount of hard edges on the landscape at any given time.

Additional retention standards for covered species, as described in HCP Section 5.5, *Conditions on Covered Activities*, will spatially limit harvests across the landscape where these covered species nest and forage.

HCP 3.2 Suggested Additional Restoration Thinning Parameters in Reserves

Two commenters stated that the range presented in the HCP for restoration thinning treatments in Reserves is too broad, and that removal on the higher end of that range (up to 80% of basal area) should not be considered restoration thinning. One commenter made the following suggestions

- Reduce the range of allowable thinning in reserves from 20–80% to 40–60%.
- Limit thinning in the CRW and MRW Reserves to the first 20 years of the permit term.
- Check HCP language related to timing of thinning in the Reserves for consistency.

Commenter(s)

207, 243

Response

As stated in HCP Section 3.4.2.2, *Thinning*, single-entry restoration thinning treatments in Reserves will be reflective of past conditions and designed to promote ecological processes that support conservation goals. In some cases where exceptionally dense plantation stands exist, re-entry and heavier thinning (i.e., up to 80% of pre-harvest stand density, not basal area, as the commenter notes) may be used to restore stands to past conditions that supported viable populations of the covered species.

- Reducing the range of allowable thinning as proposed by the commenter would reduce the ability to restore these former plantation stands to more complex older forests that support viable populations of the covered species. As stated in HCP Section 3.3.1, *Conservation Research Watersheds and Management Research Watersheds Reserve Allocations*, one of the standards for restoration thinning treatments in the CRW and MRW Reserves is that they be designed to result in higher-quality habitat ingrowth for covered species, greater overall native species diversity, and a greater range of habitat complexity and ecosystem services than maintaining the current trajectory of dense single-species plantations.

- As described in HCP Section 3.3.1, restoration thinning in CRW and MRW Reserves would consist mostly of single-entry thins during the first 20 years of the permit term. The Final HCP section has been updated with several limitations on thinning in Reserves: (1) Thinning in CRW Reserves would be limited to the first 30 years of the permit term, with a limit of 3,500 acres that can be treated during in the third decade of the permit term without approval by the Services; (2) Any plantation stand in the CRW or MRW Reserves that reaches 80 years old prior to thinning would only be thinned with concurrence from the Services and the relevant provisions outlined in Section 7.6*, Modifications to the HCP*, and Section 7.2.5, *Implementation and Adaptive Management Committee*.

- References to the timing of thinning and number of entries in CRW and MRW Reserves have been reviewed throughout the HCP to ensure consistency.

HCP 3.3 Clarify Effects from and Limitations on Riparian Thinning

One commenter expressed concern about the effects the HCP may have on achieving Oregon's Clean Water Act Water Quality Standards for temperature. Specifically, the commenter provided an analysis that proposed thinning in RCAs may cause stream temperatures to increase (between 0.5 and 1.0 degree Celsius [°C] for between 3 and 8.7 years) and recommended methods to guide the application of thinning based on shade loss thresholds and ensure retention of a minimum basal area that is protective of stream shading and temperature.

The commenter requested the following clarifications or additional information on the HCP's language about riparian thinning:

- Clarify whether the statement that "RCA thinning treatments will not exceed 80 square feet of conifer basal areas per acre" means that no more than 80 square feet per acre of basal area is removed from the treatment or that no less than 80 square feet per acre of basal area is retained following treatment.

- Describe the proportion of RCAs that could be subject to thinning harvest within the HCP area.

- Describe the distribution and timing of RCA thinning harvest actions (i.e., clustered along a few streams/watersheds or distributed throughout the project area).

- Describe the RCA thinning harvest targets to be implemented along the different stream types.

- Describe the size of trees in the RCA zone that will be thinned, as well as the tree size classes to be placed into the stream channel and how the use of these size classes will promote intended water quality and habitat goals.

- Describe the procedures and assessment methods for evaluating shading and temperature impacts from thinning in RCAs.

Finally, the commenter requested that the HCP's effects analysis cite existing literature explaining the relationship between riparian thinning, stream shading, and stream temperature.

Commenter(s)

79

Response

The analysis provided by the commenter in support of their concern about the potential effect of the HCP on achieving Oregon's Clean Water Act Water Quality Standards for temperature did not consider two important factors that would minimize effects of the HCP's proposed restoration thinning treatments in RCAs: topographic shading and limits on the amount and extent of restoration thinning treatments in RCAs, both across the permit area and on an annual basis.

Topography, in addition to riparian vegetation, regulates solar radiation input to small low-order streams (Johnson 2004; Moore et al. 2005; Caissie 2006) and can provide much of the shade required to regulate thermal conditions. The topography of the permit area is a significant source of stream shading: 64% of the permit area is dominated by slopes greater than 65%. Moreover, nearly half of MRW RCAs are on slopes greater than 65%, and 73% of CRW RCAs are on steep slopes (HCP Table 4-10). Therefore, a large proportion of RCAs in the permit area receive significant solar radiation regulation from the surrounding steep topography and are not influenced by vegetation. Studies, including the study cited by the commenter, have found that the magnitude of temperature increases on steep terrain is generally smaller (Groom et al. 2011), possibly due to a shorter water residence time and increased topographical shading. This may also be due to more frequent hyporheic exchange of water in streams with step-pool morphologies (Anderson et al. 2007).

The HCP limits on the amount and extent of thinning treatments in RCAs would also limit temperature effects. RCA thinning would only occur in previously harvested plantation stands that are younger than 65 years (as of 2020) (HCP Figure 2-6). This limits the area available for thinning to stands where trees are relatively young and dense. RCAs exist throughout the permit area and total 15,977 acres; of these, 5,919 acres are eligible for thinning based on their age. The Final HCP has been updated to include a cap on restoration thinning in these eligible RCAs, limiting restoration thinning in RCAs to a total of 1,200 acres over the permit term. Early in the permit term, up to 160 acres of restoration thinning in RCAs will occur in the MRW. Outcomes of these treatments will be monitored and evaluated (HCP Section 6.3.4, *Riparian Restoration Monitoring*) to ensure objectives are being achieved and adverse effects on covered species are minimized. The remaining 1,040 acres will be thinned applying knowledge gained from initial thinning. Given the limited extent of allowable restoration thinning in RCAs, these activities are unlikely to affect long, continuous stretches of streams, further reducing the risk of temperature increases.

Gaps in canopy cover can close within 3 years, although the amount of time is dependent on the level of thinning and can take longer to close completely (more than 8 years) (Chan et al. 2006; Yeung et al. 2017). Gaps in some areas may persist longer depending on local conditions. However, because of the limits on total thinning in RCAs, thinning in RCAs is unlikely to cause elevated temperatures to propagate very far downstream. Any elevated temperatures are expected to decline to ambient conditions a short distance downstream.

Based on the factors discussed above, the HCP's effects analysis projects that effects from the proposed riparian thinning would be locally limited and unlikely to increase stream temperatures to the degree suggested by the commenter (HCP Section 4.6, *Effects Analysis for Oregon Coast Coho*). Additionally, the permittee (DSL) would be required to adhere to the Clean Water Act in addition to the minimization and mitigation requirements included in the HCP.

The following bullets address the commenter's specific requests for clarification or additional information on the HCP's language about riparian thinning:

- Basal area requirement: Specific thinning treatments would depend on prior stand characteristics, but thinning would not fall below the minimum retention requirement. The minimum requirement in Final HCP Section 3.3.7, *Riparian Conservation Areas*, has been updated to a minimum retention requirement of no less than 40 square feet of conifer basal area per acre.
- Proportion of RCAs subject to thinning: Restoration thinning in RCAs would be limited to 1,200 acres over the permit term.
- Distribution and timing: In addition to the limit of 1,200 acres of total restoration thinning in RCAs, these treatments would only occur in the first 30 years of the permit term, with an initial assessment on up to 160 acres occurring in the first 5 to 7 years of the permit term.
- Thinning harvest targets by stream type: The current density of many stands is unknown; therefore, the HCP does not specifically identify where different thinning prescriptions would be implemented in the permit area.
- Size and class of trees thinned and placed in stream, respectively, and applicability to goals: HCP Section 5.4.1, *Conservation Measure 1, Targeted Restoration and Stream Enhancement*, in RCAs and explains criteria for the placement of cut trees towards and into streams. The largest cut trees would be felled toward or placed in the stream channel to provide the greatest ecological benefit to coho.
- Procedures and assessment methods for evaluating shading and temperature impacts: HCP Section 6.3.2, *Water Temperature Monitoring*, describes the HCP's long-term temperature monitoring program to track trends in water temperature across the permit area, climate, and research projects incorporating monitoring of stream temperature. This monitoring program will provide information on how management influences water temperature and inform future management decisions, which could include adjustments to harvest intensity or layouts.

Additional literature specific to the effects of riparian thinning on water temperature has been added to Final HCP Section 4.6, *Effects Analysis for Oregon Coast Coho*.

HCP 3.4 Suggested Limits on Thinning in RCAs

One commenter stated that the HCP does not restrict the amount of thinning allowed in RCAs and recommended that thinning in RCAs be limited to light thinning to minimize effects on stream shading and stream temperature.

Commenter(s)

88

Response

As stated in HCP Section 3.4.2.2, *Thinning*, restoration thinning treatments in RCAs would be limited to plantation stands replanted after harvest and 65 years or less in age as of 2020. In cases where exceptionally dense plantation stands exist, heavier thinning may be used to restore stands to past conditions that supported viable populations of the covered species. Restoration thinning in RCAs would not result in less than 40 square feet of conifer basal area per acre and would be limited to 1,200 acres over the permit term, equating to approximately 1% of the permit area.

Refer to response to comment HCP 3.3, *Clarify Effects from and Limitations on Riparian Thinning*, for a discussion of potential stream temperature effects from RCA thinning and a description of the HCP's temperature monitoring components.

HCP 3.5 Suggested Modification to RCA Widths

One commenter expressed concern that the stream buffers are narrower and the impacts on coho salmon are greater in the MRW than in the CRW. One commenter recommended that riparian buffers be expanded to a minimum of 120 feet wide (measured horizontally) to avoid stream temperature effects from harvest.

Commenter(s)

88, 167

Response

Effects associated with implementation of the covered activities and conservation strategy are described for Oregon Coast Coho in HCP Section 4.6, *Effects Analysis for Oregon Coast Coho*.

The conservation strategy is designed to offset take of covered species resulting from the covered activities. The differences in effects on coho in the MRW and CRW are accounted for in the conservation strategy, including expanded RCAs along the Lower Millicoma River (Conservation Measure 2) to provide additional protections to the Coos Independent population that occurs in the MRW. Additionally, fish-bearing and perennial non-fish-bearing (PNFB) streams in MRW Reserves, Volume Replacement, and Flexible Extensive (Big Creek) allocations will have 120-foot RCAs. While narrower 100-foot buffers occur along fish-bearing streams in other MRW allocations, they are still wide enough to minimize changes to processes that would degrade coho habitat (e.g., large wood, temperature, sediment). The combination of the RCA buffering strategy, stand-level treatments and allocations, and supporting infrastructure activities are analyzed in the effects analysis to demonstrate the amount of take expected to occur in each independent population in the permit area. While effects may vary between the three populations, the applicant has proposed the combination of the conservation strategy and the adaptive management program to meet the requirements in ESA Section 10. It is not a requirement of the ESA to ensure effects are uniform across the permit area but rather that the effects are adequately described and that the conservation strategy minimizes and mitigates take of the covered species to the extent practicable.

HCP 3.6 Effects of Opening Riparian Areas

One commenter questioned how opening riparian areas to an early-seral stage would benefit aquatic and riparian conditions and stated that mature shade-providing trees should not be removed from RCAs.

Commenter(s)

207

Response

Riparian restoration thinning would only occur in densely stocked plantation stands that are 65 years old or younger (as of 2020) to reduce stand densities, increase growth rates, and promote larger crowns, and more rapid development of large limbs. Existing mature stands would not be treated. For additional information on the effects of riparian restoration thinning on stream shading, see response to comment HCP 3.3, *Clarify Effects from and Limitations on Riparian Thinning*.

HCP 3.7 Goals of and Sideboards on Riparian Thinning

One commenter stated that the goals of riparian restoration thinning should be: (1) provide in-stream wood, (2) retain stream shading (maximum of 5–10% loss), and (3) move the stands toward species diversity of complex forest stands.

The commenter also recommended that RCA treatments include snag creation and focus on removal of smaller understory trees (especially at the top of bank) and retention of the largest trees to preserve stream shading.

Another commenter recommended that the HCP provide more clarity on research goals and intended desired conditions of restoration thinning in riparian areas and more detail and "sideboards" on these prescriptions.

Commenter(s)

88, 167

Response

As described in HCP Section 3.3.7, *Riparian Conservation Areas*, the goal of thinning in RCAs is to improve the ecological functions of streams and riparian forests. Per Final HCP Section 5.4.1.2, *Riparian Vegetation Management in Riparian Conservation Areas*, treatments in RCAs will be designed to reduce stand densities, increase residual tree growth rates, and promote larger crowns and more rapid development of large limbs. Existing mature stands in RCAs would not be treated. These goals are consistent with the goals suggested by the commenter to focus on thinning of understory trees and retention of larger trees. Refer to response to comment HCP 3.3, *Clarify Effects from and Limitations on Riparian Thinning*, regarding the effects of riparian restoration thinning on stream shading.

Regarding the suggestion to include snag creation in RCA treatments, the HCP does not explicitly require snag creation in RCAs, but the parameters of treatments in RCAs do not preclude snag creation.

The intended conditions and conservation outcomes in RCAs are described in HCP Section 3.3.7, *Riparian Conservation Areas*, and include moving established plantations to more productive forest conditions through natural succession, which may require thinning, as well as conserving (no-treatment) unmanaged mature forests as they move through natural succession. Sideboards for thinning in RCAs have been increased between the Public Draft HCP and Final HCP as described in Section 3.3.7.4, *Operational Standards for Restoration Thinning in Riparian Conservation Areas*. Refer to response to comment HCP 3.3, *Clarify Effects from and Limitations on Riparian Thinning*, for a detailed description of the limitations on thinning in RCAs.

HCP 3.8 Removal of Trees from Outer RCAs

One commenter requested that the purpose of commercially extracting logs in the outer part of the RCAs be clarified given the "objective of improving ecological conditions" and the deficit of dead trees in plantation stands. Another commenter stated that removal of trees in the outer zone should only be incidental to meeting HCP goals.

Commenter(s)

88, 207

Response

As stated in HCP Section 5.4.1, *Conservation Measure 1, Targeted Restoration and Stream Enhancement*, the sale of residual logs that are the byproduct of restoration thinning treatments in RCAs may occur to offset the cost of treatments. While this may occur, the applicant would still be required to meet the HCP's commitments to leaving trees on the ground or in streams (Final HCP Section 5.4.1.2, *Riparian Vegetation Management in Riparian Conservation Areas*). Additional detail on the goals of and sideboards/limitations on thinning in RCAs is provided in response to comment HCP 3.7, *Goals of and Sideboards on Riparian Thinning*.

HCP 3.9 Clarify Area Available for Riparian Restoration Thinning

One commenter requested additional information on the acreage and stream miles of RCAs available for restoration thinning in the CRW and MRW.

Commenter(s)

88

Response

The Final HCP has been updated to include Table 4-10, which shows the acreages potentially available for restoration thinning in the CRW and MRW RCAs. Based on the criteria in the HCP, 3,013 acres of CRW RCAs and 2,905 acres of MRW RCAs would be eligible for thinning. However, the Final HCP also includes a 1,200-acre limit on restoration thinning in RCAs throughout the permit term. This represents 7.5% of RCA acreage in the permit area that could receive restoration thinning treatments (HCP Section 3.3.7.4, *Operational Standards for Restoration Thinning in Riparian Conservation Areas*). The Final HCP also stipulates that in the first 5 to 7 years of the permit term, RCA restoration thinning be limited to up to 160 acres in the MRW, where outcomes will be monitored and evaluated (as described in Section 6.3.4, *Riparian Restoration Monitoring*) to ensure objectives are being achieved and adverse effects on covered species are minimized. Knowledge gained from these initial treatments will be applied on subsequent treatments in the remaining 1,040 acres to ensure the multiple resource objectives for riparian and aquatic habitats can be met. In addition, RCA stands older than 80 years (at the time of any considered thinning) are not eligible for thinning without prior discussion with and concurrence of the Services pursuant to Section 7.6, *Modifications to the HCP*.

HCP 3.10 Extensive Management

Several commenters raised concerns regarding the number of entries (partial harvests) allowed within Extensive allocations over the permit term and recommended that the HCP (a) limit harvest in these areas to only one entry, and (b) retain throughout the permit term any trees remaining after a retention cut within these areas.

Some commenters asserted that previous agreements made during HCP development included a limit of one entry in extensive stands.

One commenter stated that the statement in Draft HCP Section 4.4.1.4, *Habitat Effects, Extensive Treatments*: "Any treatments in forests older than 65 years (as of 2020) will include retention of at least 50 percent pre-harvest density to minimize effects" should be reflected throughout the rest of the HCP to ensure that extensive treatments not be used to functionally clearcut older stands over time.

Commenters expressed concern with the use of the term "regeneration harvest," stating that it is "inconsistent with the stated purpose of extensive harvest in OSU's research proposal as being an ecologically based variable retention harvest."

Commenter(s)

91, 207, 243, 244, 247

Response

The Final HCP has been updated to clarify the number and types of entries allowed in allocations available for extensive treatments.

As described in Final HCP Section 3.3.3, *Extensive Allocations*, only one entry would be allowed for variable retention regeneration harvest in any stand. Depending on stand age and conditions, up to three entries would be allowed for thinning treatments. This section also describes limits on treatments in portions of stands remaining after a variable retention regeneration harvest and clarifies that pre-harvest density retention limits are based on the condition of the stand at the start of the permit term, not at the time of entry.

Regarding the HCP's use of the term "regeneration harvest," as described in Final HCP Section 3.4.2.1, *Regeneration Harvest*, the intent of a regeneration harvest is to develop a new age cohort. In areas subject to extensive treatments, a new age cohort would be developed using variable retention regeneration harvest, which would retain between 20 and 80% of pre-harvest density. These treatments are intended to develop a stand with two or more distinct age classes and allow exploration of approaches to integrate ecological restoration with timber production.

HCP 3.11 Extensive Management Description

One commenter requested that additional details from Oregon State University's (OSU's) research proposal be added to the HCP's description of extensive management.

Commenter(s)

243

Response

Final HCP Section 3.2.1, *Overview of Research Platform and Relationship to Covered Activities*, has been updated to include additional description of how OSU's Research Proposal is incorporated into the HCP's covered activities. Final HCP Section 3.3.3, *Extensive Allocations*, has been updated to include additional explanation of the extensive treatment approach. This section of the HCP explains that the planning of extensive treatments will be based on landscape-scale patterns, underlying allocations, the location and arrangement of RCAs, and any related research objectives, also noting that examples of research concepts that may be associated with Extensive allocations are described in Appendices 2 and 3 of OSU's research proposal (HCP Appendix C, *Proposal: Elliott State Research Forest*).

HCP 3.12 Need for Marbled Murrelet Research Program

One commenter questioned whether the HCP's proposed marbled murrelet research will lead to meaningful results and suggested that the HCP focus on research designed to improve marbled murrelet habitat, rather than "research designed to test the boundaries of where detrimental impacts occur."

Commenter(s)

243

Response

The Final HCP has been updated to reflect the removal of the marbled murrelet experiment, which, as proposed in the Public Draft HCP, would have allowed up to 1,400 acres of extensive treatments in designated occupied and modeled potential marbled murrelet habitat.

HCP 3.13 Modify Research to Increase Management

One commenter asserted that the HCP limits the ability for OSU to conduct vital research on the effects of forest management on threatened species by placing older forests—where research would have the greatest benefit—into protected reserves.

Commenter(s)

168

Response

The stand-level treatments described in HCP Chapter 3, *Covered Activities*, including the Reserves, reflect the intention of managing the permit area as a research forest.

As described in Final HCP Chapter 3, the allocation of lands for operational consistency is a key element of the underlying research platform and HCP framework (Section 3.2.2, *Establishment of Conservation and Management Research Watersheds*). While some degree of management flexibility exists within the allocations, as described in this chapter, the allocations create certainty for researchers and the public by facilitating long-term studies essential to understanding long-lived forests.

The HCP's conservation strategy must minimize and mitigate impacts on covered species to the extent practicable to comply with ESA Section 10. The applicant has included protection and restoration of habitat in Reserves to mitigate impacts associated with covered activities across the permit area.

HCP 3.14 Scientific Validity of Research Plan

One commenter expressed specific concerns about the HCP's research design, including the commitment to a singular approach at the outset of a long-term plan; the use of whole watersheds as the treatment units; lack of control (i.e., untreated) units; and confounding treatments (changing more than one variable at a time).

Commenter(s)

247

Response

As described in HCP Section 3.2.1, *Overview of Research Platform and Relationship to Covered Activities*, the permit area will be managed in accordance with a framework based on the research platform described in the OSU research proposal for the Elliott State Research Forest (HCP Appendix C, *Proposal: Elliott State Research Forest*). This research proposal outlines allocations, harvest treatment types, and a research platform that takes a landscape-scale approach to long-term sustainable forestry research. A key element of the underlying research platform and HCP framework is the allocation of lands for operational consistency. While some degree of management flexibility exists within the allocations, as described in this chapter, these allocations will create an important level of certainty for researchers and the public by facilitating long-term studies essential to understanding long-lived forests. The OSU proposal includes a "triad" approach to management that would include Reserve, Extensive, and Intensive allocations, each of which would be subject to distinct treatments. Within the triad design, the experimental unit of measure is the 66 subwatersheds between 400 and 2,000 acres in size. These subwatersheds are designated in either the CRWs or MRWs.

Regarding comments on the statistical validity of the proposal, Appendix 10 of the Elliott State Research Forest Proposal (HCP Appendix C) includes an analysis conducted to ensure the research forest would have an adequate sample size/number of replicates to ensure statistically valid conclusions.

Regarding the comment about a lack of control variables, the CRW and MRW Reserves represent stand-level research treatment areas that will not be actively harvested and are primarily unlogged, naturally regenerated stands older than 65 years. Treatments in these stands will be limited to restoration thinning in plantation stands less than 65 years old (as of 2020) to set these stands on a trajectory to develop more complex forest conditions. The existing healthy functioning old or mature forests, which will not be thinned, can serve as benchmarks for research treatments and managed habitat.

HCP 3.15 Suggested Modifications to Research Allocations: Marbled Murrelet Habitat

One commenter requested that the HCP include more designated occupied habitat and modeled potential marbled murrelet habitat in reserves than the 84% and 90% proposed, respectively, particularly in the CRW. The commenter also suggested conducting surveys in portions of modeled potential habitat prior to treatment.

Commenter(s)

242

Response

The Final HCP has been updated to reflect modified habitat layers for marbled murrelet. See response to comment HCP 2.2, *Marbled Murrelet Habitat Mapping*, for details on the changes to the marbled murrelet habitat layer. As shown in HCP Table 4-6, this modified habitat layer, in combination with revisions to the HCP's proposed allocations, results in 100% of designated occupied habitat and 87% of modeled potential habitat being protected in Reserves.

Additionally, the HCP requires surveys in any modeled potential marbled murrelet habitat proposed for extensive treatments. If these areas are found to be occupied, the proposed treatment cannot occur in the occupied area (HCP Section 5.5.8, *Condition 7, Survey Requirements for Modeled Potential Marbled Murrelet Habitat*).

HCP 3.16 Suggested Sedimentation Reduction Requirements

One commenter recommended that the HCP:

- Clarify how many miles of roads would be added to the permit area under the HCP.
- Include a monitoring and evaluation plan to identify road-related risks that threaten water quality.
- Include an evaluation of potential excessive sediment sources and associated impacts from road activities.

Commenter(s)

79

Response

- HCP Section 3.6.1, *Road System Construction and Management*, commits to limiting construction of new permanent roads to no more than 40 miles over the course of the permit term.
- HCP Section 5.4.3, *Conservation Measure 3, Reduce Density and Negative Impacts of the Forest Road Network in the Permit Area*, describes the applicant's commitment to a formal road assessment in the first 12 years of the permit term. This assessment includes an inventory of the road networks to identify current and legacy roads that present a risk (e.g., sedimentation, landslide frequency, erosivity, habitat fragmentation) to the aquatic and riparian system and inform modifications to the road system, prioritizing segments that pose the highest risk to aquatic resources.
- HCP Section 6.3.1, *Turbidity Monitoring*, includes specific commitments to monitor sedimentation risks from road maintenance and construction. These data will be used in conjunction with the road monitoring data to determine if changes in fine sediment inputs associated with road activities are occurring.

HCP 3.17 Harvest Limits

Two commenters requested that the HCP's description of harvest plan and limits be updated to be consistent with the DSL errata sheet.

Commenter(s)

207, 243

Response

The errata sheet was prepared by DSL after release of the Draft EIS and HCP to document agreements reached in the stakeholder process. Changes to reflect these and subsequent agreements regarding harvest limits have been incorporated into Final HCP Chapter 3, *Covered Activities*.

HCP 3.18 Limit Harvest to Single-Entry

Two commenters suggested that harvest be limited to a single entry in a given stand.

Commenter(s)

94, 134

Response

More than one entry would be required in most stands available for intensive and extensive treatments to achieve the desired outcomes of the treatments. (HCP Section 3.3, *Stand-Level Treatments and Operations Standards, by Allocation*). For example, areas subject to intensive treatments may receive one or two thinnings to maintain stand densities at levels that provide vigorous tree growth and achieve high wood production. Areas subject to extensive treatments may receive up to three thinning treatments in addition to the single variable retention regeneration harvest; in some portion of these stands thinnings would aim for the same outcomes as in intensive treatments and in other portions thinnings would aim to transition even-aged Douglas-fir stands toward greater diversity in structural composition and species mix. Restoration thinning treatments would generally be single entry with limited additional entries in the CRW and RCAs as described in HCP Section 3.3 to meet restoration objectives.

HCP 3.19 Prohibit Clearcuts and Aerial Spraying of Herbicides

Multiple commenters requested that the HCP prohibit commercial logging (clearcuts), several specified the prohibitions should be in older forests. One commenter also requested the HCP prohibit aerial spraying of herbicides.

Commenter(s)

114, 160, 145, 185, 218, 219

Response

In developing an HCP, the applicant identifies and defines the activities for which it seeks incidental take coverage. The applicant has integrated its research design into the HCP, and intensive harvests are an essential element of its proposal, as described in HCP Chapter 3, *Covered Activities*. The HCP includes numerous operations standards (Chapter 3) and conservation measures (Chapter 5, *Conservation Strategy*) to avoid, minimize and mitigate the adverse effects identified in Chapter 4, *Effects Analysis*.

As described in HCP Section 3.3, *Stand-Level Treatments and Operations Standards, by Allocation*, clearcuts would only be implemented in former plantation stands under 65 years of age as of 2020.

Regarding the comment recommending the prohibition of aerial spraying of herbicides, HCP Section 3.10, *Activities Not Covered*, explains that pesticide application using either aerial or ground-based methods is not a covered activity under the HCP. The Permittee could apply pesticides in the permit area but because this activity is not covered by the HCP, DSL would do so in compliance with the ESA through take avoidance. DSL would also still be required to comply with other applicable regulations pertaining to chemical use.

HCP 3.20 Restrict Harvest of Trees Predating the 1868 Fire/Watershed Designation of Stands Predating the 1868 Fire

Several commenters suggested that trees predating the 1868 fire be protected from harvest and that these protections be clarified in the HCP.

One commenter requested the following:

- Require vegetative and disturbance buffers around these trees to prevent loss by windthrow and include these protections in the monitoring and reporting requirements.
- Require board review and approval prior to any removal of these trees for safety.

One commenter noted the importance of these older trees to carbon storage.

Commenter(s)

77, 83, 84, 114, 145, 246

Response

The Final HCP has been updated to clarify protections of trees predating the 1868 fire. As stated in Section 5.3, *Avoidance and Minimization Measures Integrated into the Covered Activities*, trees predating the 1868 stand replacement fire in the permit area will be protected from harvest. The only exception, described in HCP Section 3.3.3, *Extensive Allocations*, is on the rare occasion that a tree poses a safety issue. When this circumstance occurs, the Permittee is committed to the protection of the oldest forests and individual trees as part of further planning and project-level implementation. In addition, Section 5.5.12, *Condition 11: Road Construction and Management*, states that removal of trees older than 150 years old (in 2020) will be avoided.

Although the HCP does not require vegetative buffers around these trees, where they occur to a limited extent in harvest areas (i.e., a total of 122 acres occur in areas available for extensive treatments), the HCP requires that legacy features be retained. DSL will also be required to report on the removal of any trees that predate the 1868 fire, per HCP Section 6.2.1, *Compliance Monitoring*.

The HCP is the applicant's proposal for minimizing and mitigating take of the covered species to the maximum extent practicable, and outlines the strategies proposed to achieve this threshold. Protections for sensitive resources other than the covered species may be addressed in the applicant's companion Forest Management Plan.

EIS Section 3.7, *Climate Change*, compares carbon sequestration under the proposed action and alternatives.

HCP 3.21 Watershed Designation of Stands Predating the 1868 Fire

One commenter requested that the HCP explain where the 400 acres of forest predating the 1868 fires are located and requested that half of these stands be protected in the CRW and the rest in MRW Reserves.

Commenter(s)

242

Response

All stands over 180 years (as of 2025) are protected in Reserves or RCAs. Refer to response to comment HCP 3.20, *Restrict Harvest of Trees Predating the 1868 Fire/Watershed Designation of Stands Predating the 1868 Fire*, regarding protection of trees predating the 1868 fire.

HCP 3.22 Thinning for Fire Prevention

One commenter suggested the inclusion of thinning for fire prevention in stands that were cut 20 to 40 years ago.

Commenter(s)

185

Response

Thinning is proposed to occur in the permit area, as detailed in HCP Section 3.3, *Stand-Level Treatments and Operations Standards, by Allocation*, and Section 3.4, *Harvest Timing, Types, and Methods*.

HCP 3.23 Clarify Road Activities in Older Forest

One commenter expressed concern that new roads could pass through older forest stands and lead to habitat fragmentation and suggested that the HCP make clear that "new roads and other infrastructure should avoid impacting older forest habitat."

Commenter(s)

243

Response

New road construction would be limited to 40 miles over the permit term, an average of 0.5 mile per year (HCP Section 3.6.1.1, *Road Construction*). In addition, as described in updated HCP Section 5.4.3, *Conservation Measure 3, Reduce Density and Negative Impacts of the Forest Road Network in the Permit Area*, would minimize the potential for habitat removal and fragmentation due to road construction.

In addition, per HCP Section 5.5.12, *Condition 11: Road Construction and Management*, the applicant has committed to avoid removal of trees older than 150 years old (in 2020), or trees with structures known to be important to the covered species (e.g., potential murrelet nesting platforms, within retained northern spotted owl core areas). Seasonal restrictions would be implemented to protect covered bird species described in HCP Section 5.5.2, *Condition 1: Seasonal Restrictions Around Northern Spotted Owl Nest Sites*, and Section 5.5.7, *Condition 6: Seasonal Restrictions in Marbled Murrelet Occupied Habitat*.

HCP 3.24 Remove Cap on Road Construction

One commenter suggested that the HCP cap on road construction be removed to allow for critical access to fight forest fires.

Commenter(s)

245

Response

Given that the road network in the permit area is well developed, the applicant determined that 40 miles of permanent new road should be adequate to allow for effective access for necessary activities taking place in the forest, including fire management. Therefore, this is the amount of road construction for which the applicant is seeking incidental take coverage.

Should temporary roads need to be created to access fires, and are vacated within 5 years, they will not count against the 40-mile cap.

HCP 3.25 Road Project Outreach

One commenter recommended that outreach to agencies, watershed councils, and other partners be conducted prior to removal of stream crossings, when possible, to collaborate on large wood placement projects in nearby streams whenever possible.

Commenter(s)

167

Response

Final HCP Section 3.6.1.6, *Drainage Structures*, has been updated to explain that the location of barrier improvement(s) (which may include removal or upgrade of existing stream crossings) will be informed by the road assessment and determined in conjunction with the Services, watershed councils, and Implementation and Adaptive Management Committee (Section 7.2.5, *Implementation and Adaptive Management Committee*).

4 Effects Analysis

HCP 4.1 Importance of the Permit Area to the Oregon Coast Coho Evolutionarily Significant Unit

One commenter suggested the HCP reflect that the permit area plays an important role in coho production and has the potential to increase numbers of the Oregon Coast Coho Evolutionarily Significant Unit.

Commenter(s)

167

Response

Final HCP Section 4.6, *Effects Analysis for Oregon Coast Coho*, has been updated to explain how the permit area can serve as a significant component for recovery and conservation efforts for the three independent coho populations that it supports.

HCP 4.2 Downstream Effects

One commenter expressed concern that the HCP does not evaluate downstream effects in the Tenmile independent population (e.g., water temperature, sediment transport, nutrification/eutrophication), particularly at Tenmile Lake, that may influence nonnative fish production.

Commenter(s)

167

Response

HCP Section 4.6.2.1, *Tenmile*, has been updated to more fully describe the potential for the covered activities to affect factors that may influence nonnative fish production and thereby affect the coho Tenmile independent population.

HCP 4.3 In-Water Work Windows

One commenter suggested that additional context be added to the HCP on in-water work windows and yearling coho salmon rearing during the summer.

Commenter(s)

167

Response

Final HCP Section 4.6.1.3, *Effects on Individuals*, has been updated to reflect coho rearing during the summer in-water work window.

HCP 4.4 Landslide and Sedimentation Effects

One commenter expressed concern that the HCP does not adequately protect fish-bearing streams from sedimentation effects from landslides compared to the Oregon FPA and the increased conservation alternative analyzed in the EIS (Alternative 3). The commenter recommended that the HCP include the following:

- A monitoring and evaluation plan to identify impacts of increased sedimentation from landslides to fish-bearing streams.
- An evaluation of potential excessive sediment sources from landslide occurrences.

Commenter(s)

79

Response

The HCP would increase large wood recruitment and better regulate sediment delivery to streams in the event of debris flow compared to the Oregon FPA (Final EIS Section 3.2.3.3, *Stream Geomorphology*). This is based on the following:

- The reduced area available for more intensive harvest treatments would reduce the potential to induce landslide, which would result in a corresponding reduction in landslide-related effects on streams.

- Increased riparian and steep slope protections would increase large wood recruitment and better regulate sediment delivery to streams in the event of debris flow.

EIS Alternative 3 would further reduce potential to induce landslide and further increase large wood recruitment and improve regulation of sediment delivery to streams in the event of debris flow compared to the HCP.

HCP Section 6.3.5, *Landslide Monitoring*, describes the HCP's landslide monitoring program. This program includes monitoring and inventory of landslide activity throughout the permit area. The Final HCP has been updated to further describe the components of this program, including the evaluation of effectiveness of the conservation measures and conditions to achieve wood and sediment delivery objectives and reduce debris-flow runout path length to limit adverse effects on fish-bearing streams.

HCP 4.5 Watershed-Specific Impacts for Coho

One commenter asserted that the HCP should address impacts of increased management in the West Fork Millicoma watershed on the West Fork Millicoma coho populations, and that the HCP should be modified to reduce the number of clearcut acres in these watersheds.

Commenter(s)

246

Response

Effects on West Fork Millicoma coho populations are considered as part of the independent Coos population and Oregon Coast coho in HCP Section 4.6, *Effects Analysis for Oregon Coast Coho*. The importance of West Fork Millicoma to the Coos population is recognized in HCP Section 5.4.2, *Conservation Measure 2, Expanded Riparian Conservation Areas on Select Management Research Watershed Streams*, which provides expanded RCAs on the West Fork Millicoma and streams that deliver to the West Fork Millicoma and is intended to reduce potential negative impacts on temperature, sediment delivery, or loss of large wood, and hence decrease sources of potential take. RCAs on fish-bearing streams and a subset of non-fish-bearing streams promote the retention of ecological processes needed to support Oregon Coast coho.

HCP 4.6 Marbled Murrelet Buffers and Take Quantification

Two commenters stated that the HCP only quantified direct impacts on designated occupied and potential marbled murrelet habitat but failed to quantify (a) fragmentation and edge effects that will be created by adjacent Intensive and Extensive allocations, and (b) partial or indirect effects that may occur from any thinning or harvest within habitat, regardless of allocation. One commenter further asserted that the HCP appears to underestimate the quantity of take by only considering take within Intensive allocations while not considering take within Extensive allocations (with 80% basal area retention).

Commenter(s)

184, 243

Response

Final HCP Section 4.5, *Effects Analysis for Marbled Murrelet*, has been updated to quantify projected sources of take, including nest site disturbance, nest site destruction, disturbance and direct mortality, edge effects, and harvest. It also describes potential take from habitat that develops during the permit term (called ingrowth in the HCP), particularly from extensive treatments.

The Final HCP also includes Section 5.4.5, *Conservation Measure 5, Harvest and Thinning Adjacent to Occupied Marbled Murrelet Habitat*, which restricts treatments in certain areas to minimize edge effects adjacent to designated occupied habitat.

The Final HCP has also been updated to include a modeling methodology to quantify changes in the amount and quality of marbled murrelet habitat available in the permit area over the duration of the permit term (Final HCP Section 4.5.1.4, *Edge Effects*).

The Permittee developed the Habitat Suitability Index (HSI) model in coordination with the Service to provide a quantifiable measure of: (1) the habitat value of individual forest stands as potential marbled murrelet nesting habitat, (2) the total value of that habitat (expressed as "area-weighted HSI acres"), and (3) the reduction of this habitat value due to edge effects not minimized by Conservation Measure 5. The HSI model is described in the Final HCP in Appendix D, *Marbled Murrelet Habitat Suitability Index Approach*.

The Final HCP also includes Section 5.5.10, *Condition 9: Maintaining Aggregate Amount of Marbled Murrelet Occupied Habitat Over Time*, which specifies that a minimum HSI value must be maintained throughout the permit term so that habitat value does not drop below that present at the beginning of the permit term.

HCP 4.7 Habitat Commitments

Two commenters stated that the HCP should be required to meet the habitat estimates outlined in the HCP by the end of the permit term (14,000 acres of northern spotted owl habitat and 21,000 acres of marbled murrelet habitat).

Commenter(s)

207, 244

Response

The commenter cites the acreage targets in Objectives 1.2 and 2.2, which pertain to increases in habitat for northern spotted owl and marbled murrelet. The target for increased marbled murrelet has been updated in the Final HCP to reflect changes in the modeled habitat for the species and was revised to 13,000 acres of marbled murrelet nesting habitat by the end of the permit term. The target for increased northern spotted owl remains 14,000 acres. These are commitments in the HCP and will be tracked to assure they are met, per the "stay-ahead provisions" (HCP Section 7.4, *Stay-Ahead Provisions*) for northern spotted owl and marbled murrelet. These provisions require that mitigation outpaces habitat impacts.

HCP 4.8 Inclusion of Other Marbled Murrelet Science

Two commenters asserted that research presented in a Zharikov et al. (2007) study shows that murrelet nest sites are positively associated with fragmented forests and forest edges and, therefore, regeneration harvest can improve marbled murrelet nesting habitat and nest site density.

One commenter further asserted that the study disproves the premise upon which the management strategies are based, that marbled murrelets require an expanse of uniform old growth trees.

Commenter(s)

144, 168

Response

The body of science on marbled murrelet nesting success and landscape characteristics includes, in some cases, conflicting conclusions. The HCP relies on the Pacific Seabird Group's (PSG) most recent recommendations regarding forest management in and near marbled murrelet habitat (PSG 2024).

Zharikov et al. (2007) was evaluated and was ultimately not used in the HCP, as the results in this paper reflected a limited snapshot in time immediately following clearcuts. While the discussion provides some suggestions for why clearcuts may not immediately result in lower nest success the conclusions in this paper rely solely on observations of murrelet use in fragmented stands immediately following clearcuts and nest success at least 100 meters from a clearcut edge; there is no comparison to nest density prior to the fragmentation. In addition, the Elliott State Forest is already highly fragmented and therefore is not likely comparable to the study area used in Zharikov et al. As noted in Plissner et al. (2015), "Zharikov et al. (2007) found evidence for increased nest predation rates and predator abundance associated with some specific habitat characteristics associated with landscape fragmentation (including edges, amount of young forest, human habitation, and the presence of berry-producing plants), although interactions among variables limited assessment of general fragmentation effects on nest success."

5 Conservation Strategy

HCP 5.1 Require Beaver Conservation

Two commenters stated that the HCP should include restoration in riparian areas specifically for beaver habitat and suggested that a beaver study be included as a required conservation measure. One commenter also stated that trapping and hunting beaver should be prohibited in the permit area.

Commenter(s)

88, 167

Response

Beaver-related habitat management is incorporated into HCP Section 5.4.1, *Conservation Measure 1, Targeted Restoration and Stream Enhancement*. The ecological importance of beavers and their habitat modifications is well documented in scientific literature, particularly their creation of nursery/seasonal habitat for fish and beaver ponds acting as areas of sediment settlement. As described in HCP Section 5.4.1.3, *Beaver-Related Habitat Management*, beaver habitat projects that may be conducted through the HCP would be coordinated with regional partners, ODFW, and the Services to ensure beaver management actions fit into the larger context of salmonid recovery and statewide beaver management principles.

Prohibiting beaver trapping in the permit area is not a change that can currently be made by the applicant or the Services. Rather, it is a trapping regulation that would need to be changed by ODFW.

HCP 5.2 Commit versus Encourage Restoration Actions

Multiple commenters stated that HCP Conservation Measure 1 should commit to restoration actions, rather than encourage them.

Commenter(s)

167

Response

HCP Section 5.4.1, *Conservation Measure 1, Targeted Restoration and Stream Enhancement*, includes in-channel restoration, which commits to promoting aquatic habitat conditions that support the short- and long-term survival needs of Oregon Coast coho and other aquatic organisms. As described in Final HCP Section 5.4.1.1, *In-Channel Restoration*, instream wood placement would occur within or adjacent to all harvest operations when the stream is below the desired level of wood. There is also the potential for other restoration projects to occur opportunistically alongside harvest operations; such projects will be selected, designed, and implemented through coordination with ODFW and in cooperation with local watershed councils.

HCP Section 5.4.1.2, *Riparian Vegetation Management in Riparian Conservation Areas*, is a programmatic commitment DSL will follow when conducting restoration thinning in RCAs.

HCP 5.3 Conifer Conversion in RCAs

Multiple commenters expressed opposition to the HCP's inclusion of hardwood conversion practices, stating that hardwoods are integral to riparian function, and conifers are currently overrepresented in the permit area. Two commenters recommended planting native hardwoods and shrubs when planting or replanting along riparian corridors.

Commenter(s)

88, 167, 207, 246

Response

Final HCP Section 5.4.1.2, *Riparian Vegetation Management in Riparian Conservation Areas*, has been updated to clarify that treatments in RCAs will include planting, natural regeneration, or both within gaps and thinned areas to promote the regeneration of diverse vegetative communities (Puettmann and Tappeiner 2014). Hardwood conversion is not a goal of the HCP conservation strategy. The ecological importance of hardwoods in riparian areas is recognized in HCP Section 4.6.1.1, *Habitat Modification*, subsection *Large Wood Recruitment*.

As described in HCP Section 3.3.7, *Riparian Conservation Areas*, treatments in RCAs are intended to promote ecological function in streams and riparian areas by allowing thinning of trees in previously managed, plantation-like conifer stands that are 65 years old or less (as of 2020). Thinning in these dense conifer stands will create additional space to allow for natural succession of native shrubs and trees, including hardwoods.

HCP 5.4 Stream Enhancement Methods

One commenter noted the statement in HCP Section 5.4.1, *Conservation Measure 1, Targeted Restoration and Stream Enhancement*, that the use of engineered or constructed approaches to stream enhancement will be "minimized" and emphasized that even when projects intend to mimic natural conditions, hydraulic modeling and often engineering should be used in selecting wood size, designing structure configuration, and identifying anchor points and methods to ensure these structures are placed in a manner that is sustainable and provides intended benefits.

Commenter(s)

224

Response

The statement regarding minimizing use of engineered or constructed approaches to stream enhancement is referring to use of artificial materials such as cabling or "constructed habitat" such as new side channels. Natural materials (e.g., wood, gravels) found onsite will be used to the extent possible and large wood will be placed to influence and promote channel shaping processes. Wood placement projects will prioritize the use of materials that are large enough to be stable over a long period of time without artificial anchoring methods to maintain congruence with natural conditions and processes. As noted by the commenter, analytical and design tools such as hydraulic and sediment transport modeling can be critical to ensuring that restoration projects mimic the site's natural dynamics and geomorphology and will be used in the design process as necessary.

HCP 5.5 Use of Existing Stream Restoration Plans and Studies

Several commenters recommended that the HCP include stream enhancement actions from existing plans, including the Coos Basin Strategic Action Plan for Coho Salmon Recovery and the Coos Watershed Association's Millicoma Assessment.

Commenter(s)

167, 224, 246

Response

Final HCP Section 5.4.1, *Conservation Measure 1, Targeted Restoration and Stream Enhancement*, has been updated to state that during HCP implementation, DSL will focus on key restoration actions identified in local watershed plans as well as the Elliott State Forest Watershed Analysis Implementation Plan (Biosystems et al. 2003), and Final ESA Recovery Plan for Oregon Coho Salmon (NMFS 2016). Restoration projects will be selected, designed, and implemented in coordination with ODFW and in cooperation with local watershed councils.

HCP 5.6 Clarify Road Decommissioning Requirements

One commenter requested a specific road-reduction goal be included in Conservation Measure 3 for the benefit of aquatic and terrestrial species. One commenter also requested that the HCP include a commitment to implement projects that are a result of the hydrologic connection study included in Conservation Measure 3, apply the requirement in Conservation Measure 3 of no net increase in permanent new road miles to the entire permit area, and require road decommissioning as opposed to abandonment. This commenter also stated that these changes should be made to the proposed action in the Final EIS.

Commenter(s)

207

Response

Final HCP Section 5.4.3, *Conservation Action 3, Reduce Density and Negative Impacts of the Forest Road Network in the Permit Area*, has been updated to increase the commitment from "no net increase in new permanent roads in the CRW" to "reduce road density in the permit area." It has also been updated to specify that this will be accomplished through road vacating, not abandonment. The term decommissioning was replaced with vacating to align with the terminology and definition used in the Oregon FPA. Final HCP Section 5.4.3 also includes a requirement to use the road assessment and monitoring to identify roads that are contributing to the degradation of covered species habitat to inform decisions regarding vacating.

The Final EIS has been updated to reflect these changes to the HCP.

HCP 5.7 Clarify Road Proximity to Water

One commenter stated that proximity of roads to waterbodies was not consistent throughout the HCP.

Commenter(s)

167

Response

Final HCP Section 4.6.1.1, *Habitat Modification*, has been updated based on a new analysis of the roads system. The Final HCP has been thoroughly reviewed to ensure consistency regarding statements about road proximity to waterbodies. Final HCP Table 4-12 shows roads within 35 feet and 200 feet of streams (in riparian areas), roads within 330 feet of ridgelines (upper slope), roads more than 200 feet from streams and more than 300 feet from ridgelines (mid-slope), and roads less than 200 feet from a stream and less than 330 feet from a ridgeline (multiple zones). This approach was used to characterize the likelihood of effects from roads reaching the aquatic environment based on relevant literature.

HCP 5.8 Fish Passage Barrier Replacement

Multiple commenters requested that FWS require that the HCP commit to a specific number of fish-passage barrier improvements, with some commenters requesting a commitment to remove all barriers and some specifically requesting improvements to 12 impassable and 22 partial barriers (all of the partial and blocked barriers in the permit area). One commenter stated that upgrades should be conducted before they are needed to avoid infrastructure failures that can cause adverse sediment impacts on aquatic species.

Commenter(s)

88, 91, 192, 210, 218, 224, 243, 244

Response

The description of fish passage barrier removal has been moved in the Final HCP to Section 3.6.1.6, *Drainage Structures.*

The HCP is the applicant's proposal for how they will minimize and mitigate take of the covered species from the covered activities. As described in Final HCP Section 3.6.1.6, the location of barrier improvement(s) would be informed by the road study and determined in conjunction with the Services, watershed councils, and the Implementation and Adaptive Management Committee.

Final HCP Section 3.6.1.6 states that by the end of the permit term, there will be a net increase in accessible habitat/stream miles that were previously inaccessible due to human-induced barriers in the permit area, meaning impassable barriers will be addressed over the course of the permit term. Up to 50 culverts or bridges are expected to be repaired, replaced, or constructed during the permit term. Barriers will be identified through the road study and during stand treatments.

HCP 5.9 Fish Passage Design Standards

Two commenters recommended that the needs of lamprey, eulachon, and other aquatic species (e.g., amphibians) be considered when designing fish-passage barrier removal projects.

Commenter(s)

88, 167

Response

As described in HCP Section 3.6.1.6, *Drainage Structures*, and Section 5.5.12, *Condition 11: Road Construction and Management*, the applicant will design all new and replaced bridges and culverts to meet NMFS and ODFW fish-passage requirements. Adherence to ODFW requirements will ensure passage to noncovered aquatic species.

HCP 5.10 Road Inventory and Reporting Requirements

Several commenters requested that the HCP require evaluation of the road network by year 12 of the permit term. Additionally, the commenters requested that the results of this evaluation be released in a formal report to the Elliott State Research Forest Board of Directors and to the public and regulatory agencies.

The commenters requested every effort be taken to decrease the number of new roads and increase vacating of old roads, in addition to using the existing road network inventory as a first step to determine if more roads are needed, or if any upgrades to existing roads are needed to increase aquatic resource protection, in compliance with the Oregon FPA.

Another commenter requested that the HCP include the conditions for fully vacating roads identified in EIS Alternative 3, stating that DSL and OSU should not be "exempted" from these requirements. The commenter also recommended that USFWS and NMFS require DSL/OSU utilize the FRIA process to identify the highest-priority roads and commit to bringing these roads into compliance with the Oregon FPA.

In addition, one commenter requested the creation of a recreational trail map based on public input, and the conversion of legacy roads to trails for public enjoyment.

Commenter(s)

88, 224, 243

Response

As described in HCP Section 5.4.3, *Conservation Measure 3, Reduce Density and Negative Impacts of the Forest Road Network in the Permit Area*, a road assessment in the first 12 years of the permit term will identify the degree of hydrologic connectivity of current and legacy roads and their primary locations in the permit area. This assessment will inform decisions on road vacating. Following this roads assessment, road vacating projects will be identified and the associated planning efforts made available to the public. A road inventory will also be maintained throughout the permit term to identify current and legacy roads that present a risk (e.g., sedimentation, landslide frequency, erosivity, habitat fragmentation) to the aquatic and riparian system.

As stated in HCP Chapter 6, *Monitoring and Adaptive Management*, turbidity monitoring data will be collected and will inform the road inventory. This data will be provided during annual, 6-year summary, and 12-year comprehensive reporting requirements.

Refer to response to comment HCP 5.6, *Clarify Road Decommissioning Requirements*, regarding increases to commitments related to road density, vacating, and use of the roads assessment to inform needs in Final HCP Section 5.4.3.

Regarding the request to incorporate the additional requirements for full road vacating, as stated in HCP Section 3.6.1, *Road System Construction and Management,* all road maintenance, construction, and vacating will be done in compliance with the Oregon FPA (OAR 629).

Refer to the response to comment HCP 1.17, *Compliance with Revised FPA*, regarding the Final HCP's compliance with the Oregon FPA and its approach to assessing and inventorying existing roads and prioritizing vacating of segments that pose the highest risks to aquatic resources (HCP Section 5.4.3).

Regarding the request to convert legacy roads to trails, recreation is not a covered activity under the HCP, so trail development and management fall outside the bounds of the HCP.

HCP 5.11 Suggested Net Reduction in Permit Area Roads

Multiple commenters requested that the HCP require no net increase or a net reduction in roads across the permit area during the permit term. Two commenters requested that it be a substantial net reduction. Commenters also requested that the HCP specify a reduction in road network density, including a specific request to demonstrate road density reductions at 10-year increments throughout the permit term and include a "stay ahead provision" ensuring new road construction is offset by removal of existing roads.

Commenter(s)

77, 88, 89, 91, 94, 101, 134, 145, 192, 196, 210, 243, 244, 247

Response

Final HCP Section 5.4.3, *Conservation Measure 3, Reduce Density and Negative Impacts of the Forest Road Network in the Permit Area*, has been updated to commit to a reduction in the density of the forest road network in the permit area. Existing roads will be vacated in 10-year increments to reduce net density (relative to current density) by the end of the permit term. The first 10-year planning period will begin after completion of the required road assessment. The HCP commits to limiting construction of permanent new roads to no more than 40 miles over the permit term and to decrease the existing density of roads in the permit area by the end of the permit term.

The location and rate of road density decreases will be based on actions set forth in biennial forest plans consistent with the HCP, the Forest Management Plan, and 10-year planning projections reviewed and adopted by forest managers and the interagency stakeholder advisory committee. The results of these planning efforts will be made available to the public.

HCP 5.12 Additional Approvals for Research Plans

One commenter stated that the HCP must require that FWS approve all forestry research to confirm that research design has accurately assessed any changes in marbled murrelet and northern spotted owl occupancy prior to performing research.

Commenter(s)

192

Response

As described in HCP Section 3.2.1, *Overview of Research Platform and Relationship to Covered Activities,* the permit area will be managed in accordance with a framework based on the research platform described in the OSU research proposal for the Elliott State Research Forest (HCP Appendix C, *Proposal: Elliott State Research Forest*). By issuing an ITP, FWS would permit incidental take of the northern spotted owl and marbled murrelet resulting from the covered activities (DSL's forest management and research activities) in the permit area based on the implementation of the HCP's conservation strategy and monitoring and adaptative management program. The Services will not be expressly approving the applicant's research projects as they occur; however, the Services will be part of the Implementation and Adaptive Management Committee, described in HCP Section 7.2.5, *Implementation and Adaptive Management Committee*, that will participate in research and monitoring planning conversations as they pertain to the covered species and their habitat.

HCP 5.13 Take of Northern Spotted Owls

One commenter stated that with declining populations across the range of the northern spotted owl, permitting take of the species is unacceptable.

Commenter(s)

88

Response

ESA Section 10 provides a mechanism for nonfederal entities to pursue authorization for the incidental take of ESA-listed species. DSL is seeking authorization for the take of northern spotted owl from management of the Elliott State Research Forest pursuant to the HCP. Per the issuance criteria for ITPs, FWS must find that the taking will not appreciably reduce the likelihood of the survival and recovery of the owl. This evaluation is done through the ESA Section 7 process, which considers the current status of the species, including its population.

HCP 5.14 Ocean Conditions and Marbled Murrelet Surveys

One commenter recommended that the HCP require best available science on ocean conditions be used to determine when unfavorable ocean conditions may have affected inland marbled murrelet surveys.

Commenter(s)

242

Response

Final HCP Section 5.5.8, *Condition 7: Survey Requirements for Modeled Potential Marbled Murrelet Habitat*, has been updated to use the most recent PSG guidance (PSG 2024). The PSG 2024 survey protocol includes analysis of data from good and poor ocean years (2003–2014) and notes that "future work will hopefully provide more clarity and guidance for how to identify poor ocean years, what to do in those cases, and how soon the statistical analysis used in this [PSG 2024] protocol will need updating." Condition 7 states that all survey protocols will enable comparison of results across favorable and unfavorable ocean condition years. Any future protocol(s) accepted by FWS will also include this ability. The Elliott State Research Forest is ideally suited to evaluate the role of ocean conditions in nesting behavior and success.

HCP 5.15 Barred Owl Research and Management Commitments

One commenter stated that the HCP should actively advocate for barred owl removal efforts in the permit area and coordinate with monitoring impacts on northern spotted owl.

Commenter(s)

88

Response

As described in HCP Section 5.4.4, *Conservation Measure 4, Barred Owl Management and Research*, the applicant has committed to collaborate with FWS, as well as other federal and state management agencies to develop a barred owl management and research approach in the permit area in support of federal management strategies for northern spotted owl recovery. This conservation measure outlines the timeline DSL will follow to obtain the appropriate approvals for this management and research approach.

HCP 5.16 Permanent Protection of Habitat

One commenter recommended the HCP include permanent protections for endangered species habitat and native and mature old-growth forest habitat.

Commenter(s)

145

Response

HCPs are intended to develop a conservation program that would minimize and mitigate take of covered species to the maximum extent practicable over the course of the permit term and may include conservation commitments that extend after the permit term. As described in the HCP Handbook, land protection as mitigation needs to be permanent when the impacts of the covered activities are also permanent (FWS and NMFS 2016). However, timber harvest and stand management, the primary activities covered by this HCP, do not necessarily result in permanent habitat loss. If, after the permit term, the covered activities (timber harvest) cease, habitat for the covered species will naturally regrow. For this HCP, the conservation strategy is designed to offset the impacts of the taking from implementation of covered activities during the permit term only. If, at the end of the permit term, the Permittee would like to renew their ITP, the HCP reserves could be extended into the next permit term if they continue to adequately offset the impacts of the taking of the covered species.

HCP 5.17 Suggested Modifications to Condition 11

Two commenters suggested that the HCP's steep slope management strategy (Condition 11) be modified to prohibit restoration thinning in RCAs on slopes greater than 65% (consistent with EIS Alternative 3). Another commenter stated that Condition 11 should be updated to (consistent with DSL's errata sheet) protect a minimum of 30% of slopes above 65 degrees gradient in each of the coho independent populations in the permit area and commit to desktop review of harvest units using TerrainWorks Slope Stability Analysis tool or other tools as the best available science dictates to identify landslide-prone areas that could reach fish streams (consistent with DSL's 12-1-22 errata sheet).

Commenter(s)

88, 207

Response

Condition 11 in the Draft HCP has been renumbered and is Condition 10 in the Final HCP.

Final HCP Section 5.5.11, *Condition 10: Management on Steep Slopes*, has been updated based on additional coordination with NMFS. Condition 10 states that during harvest planning and layouts, intensive harvests will avoid slopes identified to be unstable by the Slope Stability Analysis tool (TerrainWorks 2021) unless field surveys reveal that areas are suitable for harvest.

Regarding the suggestion to prohibit restoration thinning in RCAs on slopes greater than 65%, Final HCP Section 3.3.7.4, *Operational Standards for Restoration Thinning in Riparian Conservation Areas*, has been updated to reduce risks associated with restoration thinning on steep slopes as follows.

- RCA thinning on slopes greater than 40% will be completed predominantly with hand felling methods.
- Ground-based equipment may be used on slopes less than 40%, but hand felling will be used whenever possible.

Condition 10 also notes that in extensive or restoration thinning treatments, field surveys and/or retention commitments can address concerns over areas identified as unstable by the Slope Stability Analysis Tool (Final HCP Section 5.5.11, Condition 10: Management on Steep Slopes).

Regarding the request to protect a minimum of 30% of slopes above 65 degrees gradient in each coho independent population and commit to desktop review of harvest units, Table 4-10, which was added to the Final HCP, shows steep slopes available for treatment in each independent population. As shown in this table, over 30% of steep slopes (>65%) in each independent population would be off limits to treatment.

HCP 5.18 Updated In-Water Work Guidelines

One commenter stated that the HCP should be updated to the newest citation for the Oregon Guidelines for timing of in-water work (ODFW 2022).

Commenter(s)

167

Response

Condition 12 in the Draft HCP has been renumbered to Condition 11 in the Final HCP. Final HCP Section 5.5.12, *Condition 11: Road Construction and Management*, has been updated to include the citation for in-water work timing.

HCP 5.19 Clarify Relationship to Adjacent Management

One commenter stated that the HCP should require full protection of spotted owl activity areas that are only partially contained in the permit area, even if it means taking on a disproportionate amount of the protection relative to adjacent landowners.

Commenter(s)

243

Response

The commenter is correct that the HCP proposes retention of habitat proportionate to the amount of the core use areas and home range in the permit area (HCP Sections 5.5.3 through 5.5.5). The requirements in Conditions 2 through 4 are consistent with the guidance provided in the Service's *Revised Recovery Plan for Northern Spotted Owl*. Furthermore, as part of their Forest Management Plan, DSL plans to collaborate with neighboring landowners regarding barred owl removal and operational planning to limit effects on northern spotted owl (DSL 2024).

The actual location of nest sites and habitat use is expected to be highly dynamic over the permit term, as forest conditions change due to growth, harvest, and disturbance. In response to barred owl removal, northern spotted owl abundance and distribution throughout the permit area and the region will also be dynamic over the permit term. DSL has also committed to retain historic sites even if unoccupied to allow for reestablishment of nesting pairs over the permit term, or to swap them for new sites that are found to be occupied, focusing on successful nest sites rather than the habitat (HCP Sections 5.5.3 to 5.5.5).

HCP 5.20 Northern Spotted Owl Listing Status

One commenter stated that conservation measures for northern spotted owl should meet the requirement of listing as endangered as this is likely to occur during the permit term.

Commenter(s)

88

Response

The northern spotted owl was granted the same protections as an endangered species at the time it was listed as a threatened species in 1990 (55 Federal Register 26114–26194). FWS has not issued any special ESA Section 4(d) rule that could have provided exceptions or other reduced protections, as allowed for threatened species.

HCP 5.21 Prohibit Habitat Loss in Northern Spotted Owl Core Habitat

Two commenters requested that the HCP allow no habitat loss within northern spotted owl core habitat.

Commenter(s)

77, 145

Response

As described in HCP Section 5.5.3, *Condition 2: Retention of Northern Spotted Owl Nesting Core Areas*, the applicant has committed to maintain a 100-acre nesting core area of the best contiguous habitat centered around the designated historical activity center for the 22 northern spotted owl activity centers identified in HCP Chapter 2, *Environmental Setting*. The commitment made in Condition 2 is for 100% retention in the nesting core area (i.e., no modification or treatment will occur in the 100-acre nesting core area).

As described in Section 5.5.4, *Condition 3: Retention of Northern Spotted Owl Core Use Areas,* the applicant has committed to maintaining at least 50% (at least 251 acres) of the 502-acre core use areas around these historically active northern spotted owl activity centers, comprised of the highest-quality contiguous habitat.

HCP 5.22 Acoustic Monitoring for Marbled Murrelet

One commenter stated that the Elliott Marbled Murrelet Working Group found acoustical monitoring for marbled murrelet to not to be a viable strategy at this time; therefore, the HCP must specifically commit to monitor the use of protocols recommended by FWS and PSG.

Commenter(s)

243

Response

As described in HCP Chapter 6*, Monitoring and Adaptive Management*, until it can be established that continuous acoustic recording device or other passive sampling accurately detects occupied areas, and until such protocols for such passive surveys are accepted by FWS, field surveys following standard FWS-accepted survey protocols (currently PSG 2024) will be used to verify acoustical surveys or to calibrate automated systems.

HCP 5.23 Marbled Murrelet Surveys: Minimum Patch Size Thresholds

Two commenters requested that the HCP require surveying remnant murrelet habitat of less than 5 acres within intensive and extensive treatment areas to ensure that all potential contiguous habitat is included.

Commenter(s)

243, 246

Response

The commenters refer to the survey requirements in Condition 7 for modeled potential marbled murrelet habitat, which exclude stands of 5 acres or less. These small, fragmented stands of non-contiguous habitat are not considered high-quality nesting habitat due to edge effects and the lack of multiple nest tree options. Marbled murrelets often use multiple trees in a stand throughout their life and do not nest in the same tree every year. However, because there is potential for marbled murrelets to use these stands, some level of take would occur.

HCP 5.24 More Safeguards for Marbled Murrelet Research

Multiple commenters recommended that no harvest intended to study marbled murrelet nesting be allowed in occupied habitat until the permittees submit a detailed and credible plan subject to FWS approval. Commenters suggested that to be approved, the HCP show specifically how permittees will measure the impacts of harvest, including effects on occupancy, nesting success, and predation rates in both the directly affected and surrounding occupied habitat.

Commenter(s)

77, 91, 145, 178, 207, 210, 244, 78, 243, 153, 246

Response

The Final HCP has been updated to reflect the removal of the marbled murrelet experiment, which, as proposed in the Public Draft HCP, would have allowed up to 1,400 acres of extensive treatments in designated occupied and modeled potential marbled murrelet habitat. The Final HCP does not propose any intensive or extensive treatments in designated occupied marbled murrelet habitat.

As described in HCP Chapter 6, *Monitoring and Adaptive Management*, the applicant has committed to monitor marbled murrelet nesting behavior to determine if use of the permit area changes in response to conservation measures. HCP Chapter 6 states that monitoring will include a sufficient number of sites and replication so that results will have enough statistical power to meaningfully inform future management decisions.

HCP 5.25 Level of Detail for Research Design

Several commenters requested that the HCP be more specific about the types of "research" allowed on the covered species to ensure that species will not be harmed. One commenter expressed specific concern about Reserves, stating that OSU's research plan did not provide detailed information about activities in Reserves and that the Service should exclude all Reserves from timber harvest.

Commenter(s)

77, 145, 247

Response

As described in HCP Section 3.2.1, *Overview of Research Platform and Relationship to Covered Activities,* the permit area will be managed in accordance with a framework based on the research platform described in OSU's research proposal for the Elliott State Research Forest (HCP Appendix C, *Proposal: Elliott State Research Forest*). HCP Chapter 3, *Covered Activities*, describes the proposed covered activities at a level of detail necessary to support the effects analysis for the covered species, while providing some degree of management flexibility. The treatments and associated operations standards (including tree retention standards) described in HCP Section 3.3, *Stand-Level Treatments and Operations Standards, by Allocation*, for each allocation will guide forest stand condition and future growth trajectories in those allocations. The covered activities would be subject to the conditions described in HCP Section 5.5, *Conditions on Covered Activities*, which include measures to avoid and minimize effects of the covered activities on northern spotted owl and marbled murrelet.

Regarding the request to exclude all Reserves from timber harvest, treatments in Reserves would be limited to restoration thinning. These treatments would only occur in a subset of CRW and MRW Reserves (i.e., plantation stands 65 years old or younger as of 2020). Refer to response to comment

EIS 1.6, *Consistency with HCP's Restoration Thinning Parameters*, for an explanation of the intent of restoration thinning in Reserves and the limits placed on these treatments.

HCP 5.26 Replacement Marbled Murrelet Habitat Criteria

One commenter recommended that replacement habitat to offset the loss of occupied marbled murrelet habitat losses from the covered activities should be identified prior to impacts, fully protected in reserves, and consist of newly occupied habitat (i.e., habitat that at the start of the permit term was either not suitable or was suitable but not occupied), and that the aggregate amount of occupied and modeled marbled murrelet habitat be maintained over time ahead of any losses.

Commenter(s)

243

Response

Refer to response to comment HCP 2.2, *Marbled Murrelet Habitat Mapping*, for details on the changes to the marbled murrelet habitat layer made in the Final HCP. As shown in Final HCP Table 4-6, this modified habitat layer, in combination with revisions to the HCP's proposed allocations, result in 100% of designated occupied habitat and 87% of modeled potential habitat being protected in Reserves. There are no extensive or intensive treatments proposed in designated occupied marbled murrelet habitat in the Final HCP. Up to 71 acres of designated occupied habitat could be eligible for restoration thinning, but only if determined to be unoccupied through the survey procedures included in HCP Section 5.5.8, *Condition 7: Survey Requirements for Modeled Potential Marbled Murrelet Habitat*.

HCP Section 7.4.2, *Marbled Murrelet Stay-Ahead Provisions*, requires that adequate marbled murrelet replacement habitat has been identified to replace any habitat lost due to covered activities, following the substantive and procedural commitments of Condition 9. The adequacy of replacement habitat will be determined through the processes specified under Condition 8, which details that changes in determinations of occupancy in designated occupied or modeled potential habitat will be coordinated with FWS. This Stay-Ahead provision will maintain habitat for marbled murrelet over the permit term, ensuring that habitat mitigation stays ahead of habitat impacts.

Final HCP Section 5.5.10, Condition 9, *Maintaining Aggregate Amount of Marbled Murrelet Occupied Habitat Over Time*, has been updated to require no temporal loss of the acres of designated occupied marbled murrelet habitat. This condition also specifies that there would be no decrease in HSI-weighted acres in the permit area, ensuring that the amount of potentially suitable habitat throughout the permit term does not decline.

6 Monitoring, Adaptive Management, and Cost and Funding

HCP 6.1 Funding Security

One commenter asserted that sufficient funding to conduct research on the effects of the proposed forest management on the covered species is not guaranteed and recommended the HCP include provisions to suspend or amend harvest practices if research is delayed.

Commenter(s)

242

Response

As stated in HCP Chapter 3, *Covered Activities*, the permit area will be managed based on a research platform framework identified by Oregon State University for the Elliott State Research Forest. This framework is designed as a research platform that takes a landscape approach to long-term sustainable forestry research. The covered activities, along with the monitoring approach described in HCP Chapter 6, *Monitoring and Adaptive Management*, will provide long-term data on the effects of the covered activities on the covered species. The flexibility of the HCP framework is intended to facilitate collaboration with research partners. The covered activities could occur in the absence of research projects described in HCP Sections 3.7, *Potential Research Projects*, 3.9.3, *Research on Oregon Coast Coho Salmon and Their Habitat*, and 3.9.4, *Research on Northern Spotted Owls, Marbled Murrelets, and Their Habitat*, but the underlying research platform is a central component of the HCP and would be implemented as described in HCP Chapter 3.

HCP Chapter 8, *Cost and Funding*, describes funding that will be available to implement conservation actions that minimize and mitigate impacts on covered species. In addition, the HCP includes triggers that may require modifications or changed activities, as identified in HCP Chapter 6 and HCP Section 7.8, *Changed and Unforeseen Circumstances.*

HCP 6.2 Make Financial Plan Available to the Public

One commenter suggested that an amended financial plan be circulated for public review.

Commenter(s)

78

Response

The Final HCP has been updated to reflect that the permit area will be managed by DSL, not OSU, as was assumed in the Draft HCP. Final HCP Chapter 8, *Cost and Funding*, has been updated to reflect the costs associated with DSL's implementation of the HCP.

HCP 6.3 Adaptive Management Process

One commenter recommended that a set process be established for adaptive management, including (a) reviewing existing adaptive management triggers, (b) identifying new triggers, and (c) developing responses regularly and making them available to the public as part of the annual report's 6-year check-ins and 12-year reviews.

Commenter(s)

242

Response

HCP Chapter 6, *Monitoring and Adaptive Management*, presents a process for applying triggers as needed during implementation, based on the planning context and results of monitoring and research. The HCP sets forth the applicant's commitment to defining and responding to adaptive management triggers over the permit term. Adaptive management triggers will undergo review by

DSL as they prepare reports and by the Services as they review those reports. Reports will be made public as described in HCP Section 7.2.6, *Public Engagement*. As described in HCP Section 6.5.2, *Adaptive Management Triggers*, triggers may undergo adjustment and will vary with the level of planning at which adaptive management is being considered, with major adjustments made at the forest management planning level and more minor adjustments made at the annual operating plan level.

Additional triggers may be identified as part of routine annual reporting, 6-year check-ins, or as part of the 12-year HCP comprehensive reviews (HCP Section 7.3, *Reporting*). Triggers may also be added in response to new science or emerging issues that influence biological outcomes in the permit area. The HCP allows for triggers to be added at any time during implementation—as approved by the Services—and will be set to provide a warning of trends in the wrong direction in enough time to make adjustments.

HCP 6.4 Northern Spotted Owl and Marbled Murrelet Habitat Tracking

One commenter asserted that it is important not to use the HCP adaptive management to informally change or reduce HCP protections and that changes should only be made if "they substantially increase protections delineated in the HCP or if outcomes are underperforming outcomes described in the HCP."

The commenter recommended that the HCP be updated as follows:

- Include provisions to periodically measure increases in marbled murrelet and northern spotted owl habitat to ensure that the state is on track to meet new habitat objectives by the end of the permit term.
- Add to the stay-ahead provision that if the state falls behind on its commitment to stay ahead on marbled murrelet occupied and modeled habitat, all harvest in stands older than 65 years ceases until the stay-ahead provision is achieved.

Commenter(s)

243

Response

The adaptive management process in HCPs is only used when triggered by monitoring indicating certain deficiencies or concerns with the ability of the conservation strategies to meet the biological goals and objectives. The intended outcome of the adaptive management program is the ability to make better management decisions based on increased understanding of management outcome.

However, conservation measures may be modified in response to research findings, if doing so would improve implementation of or remain consistent with achieving the HCP's biological goals and objectives. They do not need to substantially increase protection, but they must meet the biological goals and objectives.

As described in HCP Section 6.5, *Adaptive Management*, the Services will determine if any modification would require an amendment in accordance with Section 7.6.4, *Process Determination*. All cumulative adaptive management triggers or discussed changes will be tracked and reported annually (HCP Section 7.3.1, *Annual Reporting*).

Regarding the suggestion to periodically measure increases in marbled murrelet and northern spotted owl habitat, HCP Section 7.3.1 details annual reporting topics, which include progress towards meeting the HCP's biological goals and objectives, which focus on covered species habitat. In addition, HCP Section 7.4, *Stay-Ahead Provisions,* explains the underlying intent of the terrestrial and aquatic conservation strategy to improve habitat quality and quantity over time as the forest grows, with more acres of higher-quality habitat growing than will be lost to covered activities.

Regarding the suggestion to modify the stay-ahead provisions to require stopping harvest in stands over 65 years of age if the state falls behind its habitat commitments, the HCP has been updated to require no temporal loss of the aggregate number of acres of designated occupied habitat and HSI-weighted acres as a result of treatments in the permit area (HCP Section 5.5.10, *Condition 9: Maintaining Aggregate Amount of Marbled Murrelet Occupied Habitat Over Time*). In addition, Final HCP Section 7.4.2, *Marbled Murrelet Stay-Ahead Provisions,* has been updated to include annual tracking to determine compliance with this condition. Management adjustments will be determined in coordination with the Services to assure compliance with HCP commitments.

HCP 6.5 Marbled Murrelet Survey Protocols

One commenter asserted that the marbled murrelet monitoring component of the HCP was inadequate because it used improper methods and conflicted with accepted protocols. The commenter recommended that sites where zero detections are recorded in year 1 receive a second round of surveys in year 2.

Commenter(s)

242

Response

As stated in HCP Section 6.4.2, *Species Monitoring*, the applicant has committed to following FWS-accepted survey protocols. The current protocol requires that intensive surveys be conducted for at least 2 consecutive years to determine presence or probable absence to at least partially account for years where breeding effort is low. Additionally, the HCP requires FWS approval to modify protocols if needed to meet the needs of ongoing marbled murrelet research projects.

HCP 6.6 Reporting Requirements

One commenter stated that the annual reporting requirements for monitoring are unclear and that they should include (a) a description of the monitoring actions conducted, and (b) summaries of the surveys conducted and preliminary results so that issues can be reported at least on an annual basis rather than only reported in the 6-Year Summary Report or 12-year Comprehensive Review.

Commenter(s)

242

Response

As described in HCP Section 7.3.1, *Annual Reporting*, the required content of the annual monitoring reports includes "monitoring actions conducted in the reporting year" and "summary of surveys…in the reporting year…and survey results." Monitoring actions and survey results are to be reported annually, as requested by the commenter.

HCP 6.7 Road Monitoring

One commenter requested that the HCP include a provision to periodically measure decreases in road density at 10-year increments to ensure that a net reduction in overall road density is occurring throughout the permit term.

Commenter(s)

243

Response

Final HCP Section 5.4.3, *Conservation Measure 3, Reduce Density and Negative Impacts of the Forest Road Network in the Permit Area,* has been updated to reflect the commenter's request, now stating that "existing roads will be vacated in 10-year increments to reduce net density (relative to current density)".

HCP 6.8 Stream Monitoring

One commenter stated that the HCP should include temperature and shade monitoring as part of the adaptive management and monitoring program to ensure that shading and stream temperature are not affected by restoration thinning.

Commenter(s)

167

Response

HCP Section 6.3.2, *Water Temperature Monitoring*, describes a temperature monitoring program to track trends in water temperatures across the permit area for each coho independent population. The Final HCP was updated to include limits on the amount of restoration thinning that could occur in RCAs (Final HCP Section 3.3.7.3, *Operational Standards for Restoration Thinning in Riparian Conservation Areas*) and to include an initial assessment of RCA thinning in up to 160 acres of ELZs to determine if thinning is enhancing the long-term ecological function of RCAs while minimizing adverse effects on coho (HCP Section 5.4.1.2, *Riparian Vegetation Management in Riparian Conservation Areas*). As described in HCP Chapter 6, *Monitoring and Adaptive Management*, this 160-acre initial assessment may inform changes to the RCA thinning protocols. Following that initial assessment, up to 1,200 acres of restoration thinning could occur in RCAs. Half of this acreage would be limited to one entry and the other half to two entries during the permit term.

In addition, it is anticipated that water temperature monitoring may be collected as part of a research program. Any data collected would be shared with the Services through the HCP's annual reporting, 6-year summary reporting, and 12-year comprehensive reviews. If trends reported in the 6- and 12-year reports show management related temperature increases adaptive management actions will be implemented, if needed, as described in Section 6.5, *Adaptive Management*.

HCP 6.9 Monitoring to ensure reduction in fragmentation in both the CRW and MRW

One commenter asserted that monitoring should include a subwatershed-level analysis of terrestrial habitat to ensure that reduced fragmentation is achieved in both the CRW and MRW.

Commenter(s)

243

Response

The HCP's biological goals and objectives do not specifically target fragmentation. Because the HCP's monitoring program is designed to track progress towards the HCP's biological goals and objectives, it does not include specific requirements to track fragmentation.

However, because the CRW and MRW Reserves and RCAs will mature over the permit term, the degree of fragmentation in these areas will decline. Conservation Measure 3 also seeks to reduce fragmentation by requiring that the net road density is decreased over the permit term by vacating roads. Terrestrial habitat monitoring (HCP Section 6.4.1, *Habitat Monitoring*) will track this change in habitat. Specific to Conservation Measure 5, DSL will monitor the HSI-acres for marbled murrelet. HSI-acres provide a method to quantify the aggregate value of marbled murrelet habitat across the permit area and allow for an analysis of habitat quality that considers the role of edge effects (HCP Appendix D, *Marbled Murrelet Habitat Suitability Index Approach*).

HCP 6.10 Wood Recruitment Monitoring

One commenter suggested that the quantity of wood from RCA thinning placed in stream should be managed adaptively, based on monitoring. Depending on the needs of the stream and the channel complexity, placement should be able to increase or decrease (with at least 15 to 20% devoted to channel placement).

Commenter(s)

246

Response

Requirements for the volume of large wood placement in streams from RCAs have been updated to allow for placement of wood from RCAs to be more responsive to the needs of the stream and channel complexity (HCP Section 5.4.1, *Conservation Measure 1, Targeted Restoration and Stream Enhancement*). Instream restoration projects, including wood placement, would be planned according to the guidelines in Section 5.4.1.1, *In-Channel Restoration*. While 100% of the volume of trees cut within the first 50 feet of all RCAs will be left on the ground, tipped toward or placed into the stream, outside 50 feet, the volume would range from 0 to 20%.

Comments on the EIS

1. NEPA Process and Overarching Comments

EIS 1.1 Consideration of Rights of Way in Cumulative Analysis

One commenter recommended that the EIS be revised to consider the cumulative impact of new road rights-of-way granted to private landowners and the impact of road construction from right-of-way agreements exceeding the new road miles allowed under the HCP. The commenter provided an example of a right-of-way that was recently granted by DSL, and that cuts through the CRW, a northern spotted owl circle, marbled murrelet habitat, and forest older than 65 years.

Commenter(s)

207

Response

Any new roads constructed in the permit area by adjacent landowners via rights-of-way granted by the Permittee over the permit term would be required to comply with the HCP (Singleton pers. comm.). Because they would count toward the limits on new road miles in Conservation Measure 3 and would comply with all avoidance and minimization measures, they were considered in the Draft EIS analysis. Road use in existing and future easements is considered in the cumulative analysis of the effects of nearby forest management practices, including road system management. For clarity, Final EIS Section 4.2.1, *Forest Management*, has been revised to acknowledge that some adjacent forestland is surrounded by the permit area and can only be accessed through roads and easements in the permit area.

EIS 1.2 Effects of Climate Change on Proposed Action

One commenter recommended that the EIS include a discussion of the effects of climate change on the proposed action, stating that climate change could exacerbate the impacts of the project.

Commenter(s)

79

Response

EIS Chapter 4, *Cumulative Effects*, considers those past, present, and reasonably foreseeable actions and trends, the effects of which, when added to the incremental impact of the proposed action and alternatives on the human environment, inform the assessment of cumulative effects in the permit area. The cumulative analysis of climate change (EIS Section 4.3.6, *Climate Change*) explains how the proposed action and alternatives contribute to ongoing climate change trends. The cumulative impact analyses for each resource describe the potential effects of climate change that overlap with the effects of the proposed action and alternatives, such as increased erosion and likelihood of landslide resulting from both climate change and ground disturbance from the proposed action and alternatives. Additionally, the effects of climate change over the analysis period are incorporated into the affected environment for all resource sections in EIS Chapter 3, *Affected Environment and Environmental Consequences*.

EIS 1.3 Forest Growth Projections - Extensive

Two commenters stated that the EIS assumption of three entries in stands available for extensive treatments over the permit term conflicts with the HCP, which limits entries to a single time during the permit term.

These commenters also expressed concern about the EIS assumptions for stand age projections for extensive harvest treatments, stating that the forest growth projections appear to assume that areas are clearcut, citing the EIS language that "half of stands over 60 years but under 150 years (as of 2020) were returned to age 0 after harvest from three entries over the permit term.” (Draft EIS page 3.4-1), when the HCP does not propose clearcuts in extensive areas.

Commenter(s)

207, 243

Response

The HCP does not limit extensive treatments to a single entry during the permit term. Final HCP Section 3.3.3, *Extensive Allocations*, has been updated to clarify the number and types of entries that may occur in areas available for extensive treatments. Refer to response to comment HCP 3.10, *Extensive Management*, for a description of the Final HCP’s updated parameters on extensive treatments. The Final HCP clarifies that extensive treatments would include dispersed (i.e., distribution of harvest and leave trees) or aggregated (i.e., patches of harvest and leave trees) retention. The descriptions of extensive treatments in Final EIS Section 2.1.2.2, *Covered Activities*, and of forest growth projections in Final EIS Appendix 3.3, *Water Resources Technical Supplement*, and Appendix 3.4, *Vegetation Technical Supplement*, have been updated to reflect these revisions to the Final HCP.

The EIS forest growth projections are intended to present the area of eligible forest stands that would be removed as part of extensive treatments over 20-year increments. These projections are not intended to imply that large, contiguous areas would be harvested at the stand level, but instead to aggregate the disturbed/harvested area collectively in extensive stands over time.

EIS 1.4 Analysis of Extensive Treatment Entries

One commenter stated that the EIS did not analyze the impacts of the HCP allowing multiple entries in the same stands in areas available for extensive treatments (i.e., removing residual trees remaining after a retention cut).

Commenter(s)

207

Response

The Draft EIS considered the effects of multiple entries in areas available for extensive treatments. Assumptions for number of entries were factored into the forest stand age projections described in Draft EIS Sections 3.3, *Water Resources*, and 3.4, *Vegetation*. Forest stand age projection assumptions have been updated in the Final EIS to reflect revisions to HCP Section 3.3.3, *Extensive Allocations*. These assumptions have been moved to Appendix 3.3, *Water Resources Technical Supplement*, and Appendix 3.4, *Vegetation Technical Supplement*.

EIS 1.5 Forest Growth Projections - Intensive Assumptions

One commenter stated that the assumption used in the EIS forest stand age projections that stands aged 60 years and older would be clearcut in areas available for intensive treatments was incorrect, because the HCP limits intensive treatments to stands aged 65 years and younger.

Commenter(s)

207

Response

The commenter correctly states that the HCP limits clearcut harvest to stands age 65 and younger; however, as stated in Draft EIS Appendix 3.4, *Vegetation Technical Supplement*, this limit is tied to stand age as of 2020. Only stands aged 65 years and younger as of 2020 are available for intensive treatments. When harvested, these stands could be older than 65, but the EIS stand age projections assumed they would not be harvested before age 60 to reflect the commitment in HCP Section 3.3.2, *Intensive Allocations*.

EIS 1.6 Consistency with HCP's Restoration Thinning Parameters

One commenter expressed concern that there is a discrepancy between the HCP and EIS descriptions of restoration thinning parameters, specifically citing text on Draft EIS page 2-9 regarding whether restoration thinning in the CRW and MRW Reserves would be exclusively limited to the first 20 years of the permit term.

Commenter(s)

243

Response

The text the commenter is referring to in Draft EIS Section 2.1.2.2, *Covered Activities*, describes the HCP's limitations on restoration thinning. This accurately reflected Draft HCP Section 3.4.2.2. The Final HCP has been revised to include caps on the amount and timing of thinning in CRW and MRW Reserves (Final HCP Section 3.4.1, *Projected Timing and Amount of Harvest*). Final EIS Section 2.1.2.2 has been updated to reflect these changes.

EIS 1.7 Traditional Ecological Knowledge

One commenter suggested that the EIS should integrate Traditional Ecological Knowledge (TEK) into the NEPA analysis. The commenter notes that TEK can include the collection of local and traditional knowledge concerning the affected environment anticipated impacts from the project as well as traditional subsistence practices in the area. Specific recommendations for the use of TEK in the EIS included the collection of information for the affected environment to support understanding of how climate change has affected local environmental and subsistence resources.

The commenter suggested that additional studies and outreach could be conducted to identify concerns and potential impacts, including cumulative impacts.

Commenter(s)

79

Response

EIS Section 3.10, *Tribal Resources*, describes the HCP's incorporation of Indigenous Knowledge and collaboration with the tribes to maintain or increase the amount of open forage habitats for deer and elk by the tribes, including the use of fire, thinning practices, and native plantings (Final HCP Chapter 3, *Covered Activities*). In addition to analyzing the effects of TEK-based strategies integrated into the HCP, EIS Section 3.10 reflects TEK as defined by the commenter by describing and identifying impacts on the plant and fish and wildlife species that are known to have value to tribal members based on a review of information about the tribes and their ancestral, current, and future use of resources in the study area.

FWS reached out to tribes for government-to-government consultation on March 29, 2022, and consultation under National Historic Preservation Act Section 106 on August 17, 2022. Following the publication of the Draft EIS, at the Tribe's request, FWS consulted with the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians (CTCLUSI). Information provided to FWS by the CTCLUSI was reviewed and included in Final EIS Section 3.7, *Climate Change*.

EIS 1.8 Comment Period

One commenter stated that the comment period for the Draft EIS and HCP was too short and should have been at least 60 days long.

Commenter(s)

243

Response

FWS originally provided a 45-day comment period from November 18, 2022, to January 3, 2023, meeting the CEQ requirements (87 FR 69291). FWS then extended the comment period for an additional week, through January 10, 2023, for a total of 55 days (87 FR 77877).

To facilitate the public's review, FWS held a virtual public meeting on December 13, 2022, which included a presentation on the HCP and EIS. The PowerPoint presentation and a recording of the meeting were made available online at the following link: https://www.fws.gov/project/elliott-state-research-forest-habitat-conservation-plan.

EIS 1.9 Effects of Forest Management on Wildfire Risk

Two commenters stated the EIS errs by not considering how "preservation-centric forest management similar to the proposed action" has resulted in increased wildfire risk, and that the EIS should evaluate the impacts of the proposed action and alternatives on wildfire risk and resiliency, which the commenter ties to differences in fuel loading.

Commenter(s)

168, 243

Response

The commenters' assertion that preservation-focused management (i.e., management that protects large blocks of older forest stands from harvest) increases wildfire risk is not supported in recent literature. For extreme fire events (e.g., 2020 Labor Day fires), forest management may have no effect on fire severity (Reilly et al. 2022:11). For mixed severity fires and more frequent fires, which may affect the permit area as a result of climate change, older forests with higher protected status are shown to burn less severely even though they are generally identified as having the highest overall levels of biomass and fuel loading (Levine et al. 2022; Zald and Dunn 2018; Thompson et al. 2007).

EIS Chapter 3, *Affected Environment and Environmental Consequences*, and Chapter 4, *Cumulative Effects*, describe the effects of disturbance, including wildfire, on the environment. Final EIS Section 3.4, *Vegetation*, and Chapter 4 have been updated to include discussion of fire resiliency under the proposed action and alternatives.

2. Alternatives

EIS 2.1 Restoration Thinning Descriptions

One commenter stated that the description of restoration thinning in Draft EIS Chapter 2*, Proposed Action and Alternatives*, is inconsistent with the analysis assumption for these treatments in Draft EIS Section 3.3, *Water Resources*.

Commenter(s)

207

Response

Draft EIS Chapter 2, *Proposed Action and Alternatives*, correctly summarized the restoration treatments proposed in Reserves, including the 20 to 80% retention of pre-harvest density.

Because it is not possible to predict where heavier or lighter thinning would occur across the landscape, an assumption for average basal area was established for the equivalent clearcut projections for the water resources analysis in Draft EIS Section 3.3, *Water Resources*. To ensure that the EIS provides a conservative analysis, the assumption has been updated to removal of 50% of area instead of 25%.

EIS 2.2 No Action Alternative Assumptions

One commenter suggested that the harvest rotation assumed in the EIS forest growth projections for the no action alternative is incorrect, stating that harvest could occur in stands under 60 years of age.

Commenter(s)

207

Response

As described in Draft EIS Section 2.1.1, *Alternative 1: No Action*, in areas where harvest is not prohibited by take avoidance restrictions, the no action alternative assumes that DSL would harvest using clearcutting. While DSL could harvest stands younger than 60 years of age to maximize revenue, they could harvest stands older than 60 to optimize for volume. The 60-year rotation age was deemed reasonable for purposes of analysis because it is consistent with the assumption used for rotation age in Intensive allocations under the proposed action and because it represents a midpoint between these shorter and longer rotation options. Text describing assumptions related to forest growth projections in Final EIS have been updated to clarify that this is an analysis assumption, not a requirement, of the no action alternative (see Appendix 3.3, *Water Resources Technical Supplement*, and Appendix 3.4, *Vegetation Technical Supplement*).

EIS 2.3 Types of Covered Activities

One commenter stated that the EIS is mistaken in saying that the proposed action contains the same type of forest management activities described under the no action alternative, specifically pointing to the differences in the ages of trees eligible for harvest between the no action alternative and proposed action.

Commenter(s)

207

Response

The EIS correctly states that the "types" of activities (e.g., timber harvest, road system management) would be the same under the proposed action and no action alternative and then goes on to describe how restrictions on those activities would differ.

EIS 2.4 Clarify Proposed Action Description - Roads

One commenter requested clarification of miles of roads that would be added in the permit area under the proposed action.

Commenter(s)

79

Response

As described in EIS Section 2.1.2, *Proposed Action*, Supporting Infrastructure, the HCP caps new permanent road construction in the permit area to 40 miles over the course of the permit term. Temporary roads, including road spurs, that have not been vacated after 5 years will be considered part of the permanent road network and count toward the 40-mile cap. Conservation Measure 3 commits to decreasing the current road density in the permit area through road vacating in 10-year increments over the permit term.

EIS 2.5 Pre-1868 Tree Protections

One commenter stated that the HCP should commit to prohibiting, not just avoiding, removal of trees predating the 1868 fire and noted that this is how protection of these trees is described in the EIS.

Commenter(s)

207

Response

As stated in Final HCP Sections 3.3.2, *Intensive Allocations*, and 3.3.3, *Extensive Allocations*, no harvest of any tree that predates the 1868 fire would occur in the permit area, with limited exceptions in the event of safety issues in camp sites, logging operations, and other circumstances necessitating tree removal. Any trees predating 1868 requiring removal would be reported as part of the HCP's compliance monitoring (HCP Section 6.2.1, *Compliance Monitoring*).

Final EIS Section 2.1.2.2, *Covered Activities*, has been updated to indicate that there may be limited instances where pre-1868 trees are removed for safety. The potential removal of pre-1868 trees in these instances is not specifically included in the EIS analysis because it cannot be mapped or quantified and, given the limited potential for removal of these trees, would not change the outcomes of the EIS analysis.

EIS 2.6 Clarify Road Decommissioning Goals

One commenter stated that road decommissioning goals in the MRW and CRW should be more clearly defined in the EIS.

Commenter(s)

207

Response

EIS Chapter 2, *Proposed Action and Alternatives*, presents summarized descriptions of the conservation measures and conditions on covered activities included in HCP Chapter 5, *Conservation Strategy*. The HCP provides additional detail on the covered activities and conservation measures that pertain to road system management.

EIS 2.7 Modified Description of HCP Condition 9

One commenter suggested specific additions to the EIS description of HCP Condition 9, Maintaining Aggregate Amount of Marbled Murrelet Occupied and Modeled Habitat Over Time, to reflect more content from the HCP's full description.

Commenter(s)

243

Response

EIS Chapter 2, *Proposed Action and Alternatives*, presents summarized descriptions of the conservation measures and conditions included in HCP Chapter 5, *Conservation Strategy*. The specific text provided by the commenter has been updated in the Final HCP. Condition 9 is now titled “Maintaining Aggregate Amount of Marbled Murrelet Occupied Habitat Over Time” and specifies that there will be no temporal loss of the aggregate number of acres of designated occupied habitat or HSI-weighted acres as a result of harvest treatments in the permit area. The condition still requires that at least as many acres of designated occupied habitat proposed for harvest are replaced by new designated occupied habitat in the CRW or MRW Reserves that is first determined to be occupied during the permit term. This revised description of HCP Condition 9 is incorporated by reference into the proposed action as analyzed in the EIS.

EIS 2.8 Alternatives Sufficiency

Two commenters stated that by relying on the reserve strategy instead of addressing other limiting factors for the covered species (i.e., habitat loss from wildfires and invasive species, such as barred owls), the EIS alternatives place too many restrictions on timber harvest and do not represent an appropriate range of alternatives. The commenters state that the EIS should analyze an alternative that addresses those other factors and further increases timber harvest, and thereby addresses economic impacts on local communities of decades of depressed timber production in Oregon's state forests, instead of relying on the same strategies as the proposed HCP.

Commenter(s)

144, 168

Response

The EIS alternatives are intended to represent alternative means of implementing the proposed action (in this case, the proposed HCP) while remaining within the parameters of what meets the purpose and need and is technically and economically feasible, as defined by CEQ regulations. The stand-level treatments described in HCP Chapter 3, *Covered Activities*, are the primary activities for which the applicant is requesting take coverage. An alternative that eliminates these activities would not be responsive to the applicant's request for an ITP for the covered activities and, therefore, would not meet the purpose and need.

Regarding the commenters' suggestion that an alternative be included that allows for more harvest or more management flexibility, Alternative 4 analyzed a scenario that increased the area available for more intensive forms of timber harvest compared to the proposed action, while still allowing the applicant to conduct the proposed research. Alternative 4 eliminates Reserves outside of occupied and modeled potential marbled murrelet habitat and replaces those Reserves with intensive or extensive treatments based on stand age, reduces RCAs in the CRW, removes Conservation Measure 2, and removes the Conservation Measure 3 commitment to reducing road density in the permit area.

HCPs are required to avoid, minimize, and mitigate incidental take of the covered species from the covered activities to the maximum extent practicable but are not specifically required to avoid impacts on the species resulting from other factors. Regarding the commenters' assertion that the EIS alternatives do not address the leading causes of ESA-listed species decline (habitat loss from wildfires and invasive species), the proposed action and Alternatives 3 and 4 include a conservation measure for barred owl management (HCP Section 5.4.4, *Conservation Measure 4, Barred Owl Management and Research*), provisions for adaptive management in the context of climate change (HCP Section 6.5.3, *Adaptive Management and Climate Change*), and thresholds for addressing the effects of fire and invasive species in the context of changed circumstances (HCP Chapter 7, *Implementation and Assurances*). Additionally, see response to comment EIS 1.9, *Effects of Forest Management on Wildfire Risk*, regarding the relationship between forest management and wildfire risk.

In response to comments that the EIS should evaluate the lost economic opportunity associated with placing a substantial portion of the permit area in reserves and that it underestimates the value of actively managing the permit area, see response to comment EIS 10.1, *Economic Impacts of the Proposed Action*. EIS Section 3.11, *Socioeconomics*, concludes that lower projected harvest volumes under the proposed action compared to the no action alternative would result in adverse effects on timber-related revenue and support fewer direct, indirect, and induced jobs and less labor income related to timber harvest.

EIS 2.9 Timing of EIS Development

Two commenters asserted that the timing of EIS preparation (during drafting of the HCP) makes the process unlawful. The commenters state that the overlap in the timing of HCP and EIS development render the NEPA process arbitrary by committing the Services to "adopting the [proposed] action, making the action alternatives meaningless."

Commenter(s)

144, 168

Response

DSL began preparation of the HCP well before FWS' initiation of the NEPA process to evaluate it and DSL's application for an ITP. In 2019, per the direction of the State Land Board, DSL and OSU began development of the ESRF research proposal and the HCP. The research proposal was finalized in December 2020, following a public review period and State Land Board approval. HCP development included the ongoing participation of a stakeholder advisory committee representing conservation, timber, schools, recreation, and local government interests. At multiple points during HCP development, the State Land Board directed DSL and OSU to continue HCP preparation. The Draft HCP was released concurrently with the Draft EIS in November 2022. The timing of preparation of this EIS relative to HCP development follows the guidance in Chapter 2 of the Services' HCP Handbook.

Regarding the concern that "the agencies are already committed to adopting the proposed action, making the [EIS] alternatives meaningless," an HCP is the applicant's (in this case, DSL's) proposal. Since receipt of public comments on the Draft EIS and HCP, DSL has modified the HCP based on ongoing coordination with the Services, tribes, stakeholders, and issues raised in public comments. Ultimately, the Services' role is to issue, deny, or issue with conditions the ITPs requested by the applicant for their proposed HCP. The Services will not make a permit decision until the various analyses and determinations required under both NEPA and ESA are satisfied.

EIS 2.10 Alternatives' Consistency with Revised FPA

Two commenters raised questions about the proposed action and alternatives' compliance with the Oregon FPA. Both commenters requested that the EIS clarify which aspects of the proposed action and alternatives would conform with Oregon FPA requirements (including those anticipated with updates to the Oregon FPA).

One commenter stated that the EIS appears to be inconsistent with the HCP in areas where the HCP specifically references adherence to Oregon FPA requirements (i.e., harvest activities, road construction, maintenance, and abandonment).

Both commenters stated that the alternatives should comply with the revised Oregon FPA rules.

Commenter(s)

79, 207

Response

Under any alternative, DSL would be required to comply with the Oregon FPA. However, SB 1501, Section 14, recognizes that nonfederal lands that have their own HCP, and engage in forest practices in compliance with the HCP, are exempt from the provisions of ORS 527.610 to 527.770 or rules adopted thereunder that relate to protection of a species addressed in the agreement. Therefore, implementation of an HCP would serve as compliance with the Oregon FPA for purposes of provisions that relate to protection of the covered species. Clarifying text has been added to Final EIS Chapter 2, *Proposed Action and Alternatives*.

Refer to response to comment HCP 1.17, *Compliance with Revised FPA*, for additional information on the HCP's compliance with the revised Oregon FPA rules and descriptions of how the HCP provides protection in the specific areas raised by the commenters (i.e., riparian buffer widths and equipment restrictions along streams). Final HCP Section 3.1, *Introduction*, explains how DSL would address areas where the HCP and Oregon FPA rules differ through a stewardship agreement submitted to ODF for alternative Oregon FPA compliance. Regarding the comment that the EIS should clarify where the proposed action and alternatives commitments differ from current and anticipated updates to Oregon FPA requirements, EIS Chapter 2 describes the specific commitments under the proposed action and each action alternative. The resource analyses in EIS Chapter 3, *Affected Environment and Environmental Consequences*, call out the drivers for differences in impacts, including where the proposed action or action alternative commitments differ from the no action alternative, which assumes adherence to requirements of the Oregon FPA (current and anticipated updates).

3. Water Resources

EIS 3.1 Temperature Standards

One commenter expressed concern about the effects of covered activities on the Clean Water Act water quality standards including the temperature criteria and had the following specific comments.

- EIS Appendix 3.3, *Water Resources Technical Supplement*, suggests temperature-impaired streams are outside of the permit area, but at least one stream (West Fork Millicoma River) in the permit area is listed as impaired for temperature. ODEQ has indicated it will address the existing temperature impairments of the Millicoma River in its Coquille temperature Total Maximum Daily Load (TMDL), which it expects to release for public notice in 2023. Also, DSL/OSU may need to implement additional practices to meet these requirements.
- EIS Appendix 3.3's description of Oregon's Protecting Cold Waters rule is inconsistent with the commenter's understanding and should be confirmed with ODEQ to ensure it accurately describes its applicability, as well as the applicability of antidegradation provisions to the project.
- Discuss the need for maintaining cold headwater streams and the role they play in maintaining natural thermal regimes that are important to species protection.
- Explain how compliance with Protecting Cold Waters and antidegradation will occur at the project level to limit adverse temperature effects.

Commenter(s)

79

Response

- Final EIS Appendix 3.3, *Water Resources Technical Supplement*, has been revised to clarify that impaired lakes and reservoirs in the study area are outside of the permit area and that some of those in the Coos Bay subwatershed are downstream of the permit area and some are not. Per ODEQ, the West Fork Millicoma River is not covered by the Coquille River Subbasin Temperature TMDL and is planned for inclusion in a future Coos River Temperature TMDL (Duggan pers. comm.). The actions recommended to land managers by ODEQ are included in

Draft EIS Section 3.3, *Water Resources*; Final EIS Section 3.3 has been updated to include additional information on TMDLs.

- Final EIS Appendix 3.3 has been revised based on communication with ODEQ to more clearly articulate that the cold water criterion and temperature antidegradation rules apply to waters that are currently attaining the state temperature criteria, whereas TMDL load allocations and TMDL implementation plans apply to waters whose temperatures are already considered impaired and have an EPA-approved TMDL in place. Revisions have also been made to clarify that ODEQ approves TMDL implementation plans and participates in sufficiency reviews of the Oregon FPA to meet the antidegradation and cold water protection rules. Final EIS Section 3.3 includes an additional summary of the status of TMDLs applicable to waters in the study area.
- Final EIS Section 3.5, *Fish and Wildlife*, acknowledges the importance of cold water for fish and other stream-dependent species and the analysis of water temperature effects on fish considers inputs from higher-order streams that empty into fish-bearing streams.
- DSL will be required to comply with the Cold Water Protection and Antidegradation rules through compliance with the Oregon FPA water quality best management practices (OAR 629-635-0000 through 629-660-0060) or through alternative compliance measures under the HCP as described in response to comment HCP 1.17, *Compliance with Revised FPA*, and through compliance with TMDLs. Final EIS Section 3.3 was revised to clarify that the HCP requires stream temperature monitoring, not required under the no action alternative, which would support ODEQ's assessment of how well temperature criteria are being met and an adaptive management program to identify additional riparian protections to meet temperature criteria or TMDL load allocations.

EIS 3.2 Roads Effects on Surface Water

One commenter disagreed with the conclusion in EIS Section 3.3.3.2, *Peak Flows and Channel Condition*, that the proposed action would offset the effects of increases in new permanent roads by decommissioning an equal number of miles, because the proposed action does not include the additional requirements described in Alternative 3 to be considered fully vacated.

Commenter(s)

79

Response

Final EIS Section 3.3.3.2, *Peak Flows and Channel Condition*, has been updated to state that the effects of new road construction under the proposed action would be "mitigated" by an equal amount of road vacating (HCP Section 5.4.3, *Conservation Measure 3, Reduce Density and Negative Impacts of the Forest Road Network in the Permit Area*).

EIS 3.3 Causes of Impairment

One commenter pointed out that while the EIS states that the primary cause of impairment in the study area is temperature, the project area includes 15 miles of waters impaired by sediment.

Commenter(s)

79

Response

EIS Appendix 3.3, *Water Resources Technical Supplement*, summarizes the total length of study area rivers, streams, lakes, reservoirs, and other waterbodies in the study area subwatersheds by impairment cause, including sedimentation. Final EIS Section 3.3, *Water Resources*, was updated to replace the "primary" with "most extensive." Final EIS Section 3.3 now includes a summary table of river and stream impairment causes, which shows that temperature is the most extensive impairment cause (i.e., affects the greatest number of miles) for rivers and streams. Sedimentation is the fifth most extensive.

EIS 3.4 Downstream Impacts of Aerial Herbicide Application

One commenter stated that aerial application of herbicides can adversely affect resources downstream of the permit area and stated that these impacts should be analyzed in the EIS including environmental justice impacts.

Commenter(s)

246

Response

DSL has not requested take coverage for aerial or other application of herbicides in the proposed HCP. Although herbicide use is not a covered activity, its use as part of forest management is influenced by the amount and nature of timber harvest as well as road use. Therefore, the Draft EIS addressed the potential effects of herbicide use under all alternatives. Final EIS Section 3.3, *Water Resources*, has been revised to provide additional information on these relationships, the associated risks of herbicides in water resources, and the current waterbody impairments by toxins in the study area. The section also clarifies the regulations in place to prevent transport of herbicides into waters, including those applied by aerial operations, and the causal relationship between the herbicide application and changes to the herbicide concentrations in water.

Final EIS Section 3.12, *Environmental Justice*, describes the potential for adverse impacts on water resources to result in a disproportionate effect on the EJ populations identified in the study area.

EIS 3.5 Impacts on Wetlands

One commenter stated that EIS Section 3.3, *Water Resources*, did not adequately address how effects on wetlands, described in EIS Section 3.4, *Vegetation*, could carry over into effects on water quality and quantity.

Commenter(s)

167

Response

Final EIS Section 3.4, *Vegetation*, has been updated to reflect that effects on wetlands would be avoided through compliance with OAR 629-643, Water Protection Rules: Vegetation Along Streams, OAR 629-645 Water Protection Rules: Riparian Management Areas and Protection Measures for Significant Wetlands, and OAR 629-655, Water Protection Rules: Protection Measures for Other Wetlands, Seeps, and Springs. As described in Draft EIS Appendix 3.4, *Vegetation Technical Supplement*, and Final EIS Section 3.4, under OAR 629-643, OAR 629-645, and OAR 629-655, forest management activities within wetlands must protect soil and understory from any disturbance that results in "reduced water quality, hydraulic function, or soil productivity" or accelerates wetland conversion to upland. In wetlands larger than 0.25 acre, habitat features such as snags or downed trees must be retained in place unless deemed a fire hazard. Roads are unlikely to be constructed in wetlands because it would require converting wetlands to upland, which may require additional permitting and mitigation under state or federal rules.

EIS 3.6 Effects of Restoration Thinning on Shading and Flows

One commenter questioned the statement in Draft EIS Sections 3.3, *Water Resources*, and 3.5, *Fish and Wildlife,* that temperature effects from reduced shade would be offset by increased low flows from restoration thinning and recommended either supporting it with literature citations or removing it.

Commenter(s)

167

Response

Final EIS Sections 3.3, *Water Resources*, and 3.5, *Fish and Wildlife*, have been revised to delete this statement.

4. Vegetation

EIS 4.1 Impacts of Roads

One commenter stated that the EIS should consider effects of new roads, including increased noise for species, the spread of noxious weeds, and increased sedimentation to streams.

Commenter(s)

207

Response

The topics raised by the commenter are analyzed in the EIS.

- EIS Section 3.5, *Fish and Wildlife*, discusses impacts of noise on wildlife, including from road system management.
- EIS Section 3.3.3.4, *Water Quality*, discusses the effects of roads on stream sedimentation.
- EIS Section 3.4.3.2, *Spread of Invasive Weeds*, discusses effects related to the spread of noxious weeds, including the increased spread of weed species from new road system management.

EIS 4.2 Figure 3.4-1 Correction

One commenter noticed an error in EIS Section 3.4, *Vegetation*, Figure 3.4-1.

Commenter(s)

243

Response

The proposed action graph in EIS Figure 3.4-1 was incorrect. Final EIS Figure 3.4-1 has been updated to include the correct graph.

5. Fish

EIS 5.1 West Fork Millicoma Habitat

One commenter stated that the EIS analysis of effects on coho should better connect the increased harvest activity in specific watersheds, namely West Fork Millicoma and Loon Lake–Mill Creek, to effects on the coho populations that use these watersheds.

Commenter(s)

243

Response

Final EIS Section 3.5, *Fish and Wildlife*, has been updated to better reflect effects of harvest at the subwatershed scale to correspond to use by the independent coho populations.

EIS 5.2 Relationship between Beaver Habitat and Coho Populations

One commenter indicated that EIS Section 3.5, *Fish and Wildlife*, does not adequately consider how riparian management in key locations under the proposed action would produce an early-seral forest stage and foster beaver and beaver activity (i.e., dam building) that benefits fish species.

Commenter(s)

167

Response

EIS Section 3.5, *Fish and Wildlife*, acknowledges that Conservation Measure 1 would include in-channel restoration intended to improve aquatic and riparian habitat function, including the addition of large wood to streams. The HCP may include a beaver restoration project, which could benefit coho populations throughout the study area. However, because the HCP does not commit to beaver habitat restoration projects, the EIS does not analyze these activities specifically. The Final EIS section has been updated to include loss of beaver pond habitat as one of the biggest identified threats to coho.

EIS 5.3 No Action Alternative RMA Widths

One commenter recommended providing literature citations for the statement in Draft EIS Section 3.5, *Fish and Wildlife*, that riparian buffers less than 120 feet wide have been shown to result in increased stream temperatures associated with harvest.

Commenter(s)

167

Response

Final EIS Section 3.5.3.1, *Coho Salmon*, has been revised to refer to the discussion of stream temperature effects in EIS Section 3.3, *Water Resources*, which cites Leinenbach 2016 and Leinenbach 2021.

6. Wildlife

EIS 6.1 Coastal Marten

Two commenters noted that the EIS did not acknowledge federal status under the ESA for coastal marten. One commenter also stated that marten is likely to occur in the permit area due to the proximity of the nearest known population.

This commenter also asserted that the Final EIS should suggest survey protocols and protection measures to avoid take of marten.

Commenter(s)

167, 207

Response

Final EIS Section 3.5, *Fish and Wildlife*, has been revised to clarify that marten is federally listed as threatened under the ESA and that take prohibitions would apply to this species under the proposed action and alternatives.

No marten have been detected in the permit area for many decades. Per a recent recovery permit annual report for marten (Moriarty et al. 2022), the species was not found in the permit area during a 2022 survey.

No official FWS survey protocols have been adopted for marten. If marten are found and the Permittee wishes to undertake activities that are reasonably certain to cause take of marten, the Permittee would either be required to modify the HCP and seek a permit amendment to address the incidental take, or modify its activities to avoid take.

EIS 6.2 EIS vs HCP Habitat Estimates

Multiple commenters asserted that the HCP and EIS have different estimates of marbled murrelet and northern spotted owl habitat over the permit term, referencing the HCP's biological objectives, which state that there would be "21,000 acres of new suitable marbled murrelet nesting habitat by the end of the permit term and 14,000 acres of new nesting, roosting, and foraging habitat for northern spotted owl." From the EIS, commenters reference the estimated "10% increase in murrelet habitat and northern spotted owl habitat by the end of the analysis period." Commenters stated that the differences should be reconciled.

Commenter(s)

91, 142, 192, 196, 207, 210, 243, 247

Response

The 10% increase in northern spotted owl and marbled murrelet habitat (represented by late-seral and old growth stands) projected in the EIS under the proposed action is in comparison to the no action alternative, not the total projected increase from existing conditions. This estimate is based on the forest stand age projections described in EIS Section 3.4, *Vegetation*, which were developed to compare effects under the EIS alternatives. The stand age projections use stand age data to estimate suitable habitat for the covered species and reflect the net change in suitable habitat over the permit term. The updated forest stand age projections in the Final EIS (based on the Final HCP) estimate that marbled murrelet habitat at the end of the permit term is 12% higher than under the no action alternative.

In comparison, the estimated acreages provided in HCP Section 5.2, *Biological Goals and Objectives*, referenced by the commenter, represent the HCP's commitments to the development of new habitat that would be created over the permit term relative to existing conditions. This area primarily includes acres protected in the CRW, MRW Reserves, and RCAs that are not already suitable habitat for the species. These acreage commitments have been updated in the Final HCP and now include 14,000 acres of new suitable marbled murrelet nesting habitat and 13,000 acres of new nesting, roosting, and foraging habitat for northern spotted owl.

The EIS forest stand age projections do not include these commitments in the HCP biological objectives.

EIS 6.3 Impacts of Recreation Activities

One commenter stated that the EIS should address the effects of off-highway vehicle use and camping activity near marbled murrelet habitat.

Commenter(s)

207

Response

Recreation activity (including off-highway vehicles and camping) and infrastructure are not covered activities in the HCP (EIS proposed action). However, the EIS addresses how differences in restrictions on management activities and road access under the proposed action and alternatives could result in changes in the level of recreation activity (EIS Section 3.8.3.1, *Supply of Recreation*) and associated species disturbance (EIS Section, 3.5.3.4, *Covered Forest-Dependent Species*).

As described in EIS Section 3.8.3.1, under all alternatives, any existing roads that remain operational would facilitate recreation access and any increase in the permanent road network could increase access to recreation where and when accessible by the public. Under the proposed action and Alternative 3, road construction would not exceed 40 miles of permanent new roads over the course of the permit term and existing roads would be vacated in 10-year increments to reduce net density (relative to current density) by the end of the permit term. This requirement to decrease road density could reduce operational roads used for recreation access compared to the no action alternative.

EIS Section 3.5.3.4 acknowledges that increased access to occupied habitat provided by roads could result in disturbance of northern spotted owl feeding, breeding, and sheltering behavior as a result of noise and human presence, and states these impacts would also apply to marbled murrelet. As described in the section, under Proposed Action, the limits and requirements described above would reduce the potential for disturbance from recreational use of roads under the proposed action compared to the no action alternative.

Final EIS Chapter 4, *Cumulative Effects*, has been updated to include a description of past, present, and future recreation activity and potential cumulative effects of these activities.

EIS 6.4 Clarify Marbled Murrelet Impacts from Timber Harvest

One commenter stated that the EIS should include analysis of the effects of timber harvest adjacent to marbled murrelet habitat. The commenter also stated that the EIS analysis should include mapping of occupied and potentially occupied habitat and buffers.

Commenter(s)

207

Response

EIS Section 3.5.3.4, *Covered Forest-Dependent Species*, analyzes edge effects on marbled murrelet. As described in response to comment HCP 2.2, *Marbled Murrelet Habitat Mapping*, the Final HCP has been revised to include Conservation Measure 5, *Harvest and Thinning Adjacent to Occupied Marbled Murrelet Habitat*, which requires buffers for harvest treatments in modeled potential habitat adjacent to designated occupied habitat. Final EIS Section 3.5.3.4 has been revised to reflect the addition of this condition.

Regarding the suggestion to include mapping of occupied and potentially occupied habitat and buffers, HCP Chapter 2, *Environmental Setting*, describes the habitat modeling used to inform the HCP's effects analysis for marbled murrelet, with HCP Figure 2-13 showing the modeled potential and designated occupied habitat in the permit area.

EIS 6.5 Species Considered in EIS

Two commenters recommended inclusion of beavers in EIS Table 3.5-2, Forest-Dependent Wildlife Species Evaluated in the EIS.

Commenter(s)

167, 246

Response

American beaver is included in EIS Table 3.5-3, Wetland- and Riparian-Dependent Species, the ecological importance of this species is described in EIS Section 3.5.2.3, *Wetland- and Riparian-Dependent Species*, and effects on the species are described in EIS Section 3.5.3.6, *Noncovered Wildlife Species Dependent on Wetlands and Riparian Habitat*. Hence, it is unnecessary to include this species in EIS Table 3.5-2.

7. Air Quality

EIS 7.1 Effects from Chemical Control for Fugitive Emissions

One commenter stated that the EIS should clarify the use of chemical control for fugitive emissions and identify associated impacts on biological species and water quality.

Commenter(s)

79

Response

DSL does not plan to conduct chemical control for fugitive dust emissions; any dust abatement would use water control. Final EIS Section 3.6, *Air Quality*, has been revised to remove the reference to chemical control for fugitive dust emissions.

EIS 7.2 Effects of Prescribed Burns

One commenter recommended that FWS work with ODFW and ODEQ to develop burn plans for prescribed burning and provide in the Final EIS an overview of the smoke management program that would be followed to avoid potential ambient air quality exceedances and resulting onsite and offsite public health impacts.

Commenter(s)

79

Response

As discussed in Draft EIS Section 3.6, *Air Quality*, compliance with prescribed burning regulations under the Oregon Smoke Management Plan would ensure that smoke emissions from prescribed burns do not violate ambient air quality standards or impair visibility within or outside of the study area, consistent with the EPA Regional Haze Program and Oregon's Visibility Protection Plan. Therefore, DSL must comply with the State-level Smoke Management Plan. Final EIS Section 3.6 and Final EIS Appendix 3.1-A, *Regulatory Environment*, have been revised to include citations and references to the relevant federal and state air quality regulations.

8. Climate Change and Greenhouse Gas

EIS 8.1 Comparison to No-Harvest Strategy

Two commenters recommended that the EIS climate change analysis compare the alternatives to a no-harvest strategy to enable comparison of carbon sequestration to carbon storage if the forest was not harvested.

One commenter stated that the EIS did not compare the forest's total sequestration potential at varying levels of harvest.

Commenter(s)

88, 243

Response

The EIS does not compare carbon storage potential to that of a no-harvest strategy because none of the alternatives analyzed assume that no harvest would occur. A no-harvest strategy is not assumed under the no action alternative because it is not consistent with how the applicant would expect to manage the forest if ITPs are not issued.

To enable comparison of the effects of the proposed action and alternatives on carbon storage, EIS Section 3.7, *Climate Change*, Table 3.7-1 presents the estimated change in carbon sequestration and emissions from modeled activities under the proposed action and alternatives, each of which have different levels of projected harvest.

EIS 8.2 Clarify Sequestration Values

One commenter requested an explanation of why the estimated carbon sequestration values under Alternative 3 are 20,000 metric tons greater than under the proposed action.

Commenter(s)

243

Response

Carbon sequestration estimates for Alternative 3 are greater than the proposed action due to a smaller area available for clearcut and variable density harvest. This increased standing inventory results in more carbon sequestration, as shown in Table 3.7-1.

9. Aesthetics and Recreation

EIS 9.1 Analysis of visual and recreation resources

Several commenters requested a more detailed analysis of impacts of forestry activities on visual and recreation resources. Two commenters noted important viewsheds and recreational activities, in highly active watersheds, such as the Millicoma, Salander, Little Salander, and Loon Lake–Lake Mill Creek watersheds. One commenter noted visual effects on residents who pass through the permit area to access their homes and visual and drinking water supply effects on users of the popular Loon Lake recreation area and adjacent family homes and businesses.

Commenter(s)

91, 207, 243

Response

Final EIS Section 3.8, *Recreation and Visual Resources*, has been updated to provide more detail on impacts on the important viewsheds and recreational and residential uses in and adjacent to the permit area referenced by the commenters.

Impacts on water quality are discussed in EIS Section 3.3, *Water Resources*. Since there are no developed campgrounds in the permit area, there is no direct connection between supply of drinking water and recreation in the permit area and thus, effects of drinking water supplies are not included in EIS Section 3.8. Effects on drinking water supply of communities around the permit area are discussed in EIS Section 3.11, *Socioeconomics*.

EIS 9.2 Impact on Hunting

One commenter stated that the EIS does not acknowledge that a decrease in early seral stands under the proposed action, compared to the no action alternative, would adversely affect big game populations, and consequently, the quality and value of hunting in the permit area. The commenter disagreed with the analysis in Table 3.11-4 that the proposed action will have no impact on hunting relative to the no action alternative.

Commenter(s)

165

Response

EIS Section 3.8, *Recreation and Visual Resources*, has been revised to clarify that while the reduced area available for clearcut harvest compared to the no action alternative could reduce hunting opportunities, the increased area of connected older forest would increase and better connect hiding and concealment habitat for deer and elk and reduce edge effects. The integration of Indigenous Knowledge and collaboration with the tribes to maintain or increase the amount of open forage habitats for deer and elk would reduce the loss of open habitats over the analysis period. Table 3.11-4 in EIS Section 3.11, *Socioeconomics*, does not present effects on hunting in the permit area. Rather, it presents the potential for effects on economic activity such as local spending and supported employment associated with hunting and other non-market activities in the permit area (described in Section 3.8) to result in regional socioeconomic effects. It is expected that hunters would likely shift the location or timing of their trips within the study area to maintain the quality of their recreational experience. As a result, the expenditures associated with recreational hunting trips are not likely to measurably decrease in the study area and any shifts in participation and spending at the scale proposed in this project are unlikely to have an adverse impact on local economic activity. The actual impact on hunting would depend on the timing and location of hunting activities chosen by hunters over the analysis period, which may have more or less early seral habitat than under the no action alternative.

EIS 9.3 Recreation Sites in and around the Permit Area

One commenter stated that the Draft EIS mapping of recreational sites in and around the permit area omitted the BLM and private camping sites in Loon Lake on the east side of the permit area sites, such as the RV camping area at the intersection of 2300 and 8000.

Commenter(s)

207

Response

EIS Figure 3.8-2 does include the Loon Lake Recreation Area (labeled) and two BLM camping sites east of the permit area but does not include private camping sites around the permit area due to a lack of publicly available spatial data.

Final EIS Section 3.8.2.1, *Recreation*, has been updated to mention the existence of additional camping areas in and around the permit area beyond those depicted in EIS Figure 3.8-2, including the RV camping area at the intersection of 2300 and 8000. A note has also been added to EIS Figure 3.8-2 to recognize that not all public and private sites used for recreation are depicted on the map.

EIS 9.4 Impacts of Roads on Recreational Access

One commenter stated that the Draft EIS did not consider how road vacating would increase recreational access for quiet recreation like hiking and birdwatching.

Commenter(s)

207

Response

Final EIS Section 3.8.3.2, *Quality or Value of Recreation*, has been revised to discuss the impact of road management (new road development, closing, and vacating) on the quality of motorized and nonmotorized recreation. The discussion reflects that differences in road miles across the proposed action and alternatives are relatively minor, and the value generated or lost by the change in disturbance associated with developing, closing, or vacating a road depends heavily on the local context of a particular road.

Because recreational value is a function of both access and quality, roads can affect both in different ways. For example, road closure and vacating reduce access for motorized and nonmotorized recreation, but they also have the potential to increase quality for nonmotorized recreation by reducing road-related disturbance for people who are still able to access the area.

10. Socioeconomics & Environmental Justice

EIS 10.1 Economic Impacts of the Proposed Action

Two commenters stated that the Draft EIS does not adequately evaluate economic harms (including lack of affordable housing and other inflationary pressures) of the proposed action because it does not evaluate the lost economic opportunity associated with placing a substantial portion of the permit area in reserves and underestimates the value of actively managing the permit area.

One commenter stated that “the EIS miscalculated local communities’ needs for a reliable and sustainable supply of timber from the Elliott State Research Forest.”

Commenter(s)

144, 168

Response

The EIS estimates the value of actively managing the permit area under all alternatives. Under all alternatives, the applicant would actively manage the forest while complying with the ESA. Under the proposed action and action alternatives (Alternatives 3 and 4), the applicant would comply with the ESA through an approved HCP, while under the no action alternative, it is assumed the applicant would comply through a take avoidance strategy. Both the no action alternative and Alternative 4 consider increased timber harvest from what is projected under the proposed action.

The EIS does evaluate the change in economic opportunity associated with “placing a substantial portion of the permit area in reserves” because it compares the proposed action to the no action alternative, which does not include reserves but would restrict harvest activities in areas occupied by listed species.

EIS Section 3.11, *Socioeconomics*, also addresses the “indefinite lost economic opportunity that will occur under the preferred alternative” as it concludes that lower projected harvest volumes under the proposed action compared to the no action alternative would result in adverse effects on timber-related revenue and support fewer direct, indirect, and induced jobs and less labor income related to timber harvest. The prices of lumber and housing depend on various economic factors besides timber supply like capacity of mills, demand for lumber, and inflation. Therefore, impacts of the proposed action on end uses like housing and lumber have not been included in the EIS. Final EIS Section 3.11 has been modified to include this explanation.

In terms of local communities' needs for a reliable and sustainable supply of timber from the Elliott State Research Forest, most of Oregon's timber comes from private and federal forestlands with a small share harvested from ODF and other state lands. The permit area has historically contributed an even smaller share of the total timber harvests from state-owned forestlands in Oregon. Coupled with the dynamic nature of the timber economy, the absolute economic impact of timber from the permit area on the local economy of Douglas and Coos Counties is uncertain.

EIS 10.2 Analysis of Timber Exports from the Permit Area

One commenter disagreed with the assumption in the EIS that logs harvested in the permit area would not be exported and requested that log exports be considered in the socioeconomic analysis.

Commenter(s)

207

Response

The Elliott State Research Forest is a state-owned forestland. According to applicable state law, all unprocessed timber that originates from state lands is prohibited from export (ORS 629-031-0020). As such, the EIS does not include export activities in the socioeconomic analysis.

EIS 10.3 Cost of Road Maintenance

One commenter stated that the EIS analysis should consider the costs of maintaining 40 miles of new permanent roads under the proposed action.

Commenter(s)

207

Response

Final EIS Section 3.11, *Socioeconomics*, has been modified to include the effects of construction and maintenance of roads on income and employment in the study area.

Costs of building and maintaining roads that are used to access timber stands for harvest are borne by logging and milling companies and are, thus, reflected in the bids for the timber. Economic effects of these costs are already reflected in the analysis of effects on income and employment from timber harvest in the permit area in EIS Section 3.11.

Expenditures on roads built and maintained for activities like forest management and recreational access would support economic activity in the study area. These costs would be borne by the applicant, and a consideration of the effects of these costs on the finances of the applicant are outside the scope of this analysis. See HCP Chapter 8, *Cost and Funding*, for the estimated cost of implementation and the source of the funding.

EIS 10.4 Analysis of Impacts on Property Values near Loon Lake

One commenter stated that Draft EIS failed to adequately analyze impacts on property values in residential areas, particularly along the eastern border of the permit area near Loon Lake, which would result from impacts on views and drinking water.

Commenter(s)

207

Response

Final EIS Section 3.8, *Recreation and Visual Resources*, has been updated to provide a more location-specific understanding of potential effects, including views from residential areas around Loon Lake and in Ash Valley. Final EIS Section 3.11, *Socioeconomics*, has been updated to discuss potential impacts of views on property values for residences along Loon Lake and in Ash Valley.

Final EIS Section 3.11 has also been updated to reflect that although no effects on public water systems are anticipated, private surface water intakes could occur downstream of the permit area and be subject to water quality effects. Where and when water quality is adversely affected, additional treatment of water may be necessary, increasing the cost of drinking water for downstream users and potentially affecting property values for the affected residences.

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Appendix 3.1-A
Regulatory Environment

This appendix provides information on the regulatory context for the EIS resource analyses.

Geology and Soils

Law, Regulation, or Program	Description
State	
Forest Practice Administrative Rules (OAR 629, Division 623)	Establishes rules to reduce public exposure to safety risks from shallow, rapidly moving landslides and practices designed to reduce the occurrence, timing, or effects of shallow, rapidly moving landslides.
Forest Practice Administrative Rules (OAR 629, Division 625)	Establishes standards for road design, construction, and maintenance to prevent or minimize sediment transport and impacts to slope stability.
Forest Practice Administrative Rules (OAR 629, Division 630)	Establishes standards intended to reduce hillslope, landslide, and channel disturbance and erosion from harvest activities and prevents sediment and other contaminants from reaching streams.
Forest Practice Administrative Rules (OAR 629, Division 643)	Establishes standards for vegetation retention along streams.
Duties and Powers of Board (ORS 527.710(10))	Directs the Board of Forestry to adopt rules to reduce the risk of serious bodily injury or death caused by a rapidly moving landslide directly related to forest practices.

OAR = Oregon Administrative Rules; ORS = Oregon Revised Statute

Water Resources

Law, Regulation, or Program	Description
Federal	
Clean Water Act (33 USC 1251 et seq.)	Authorizes EPA to establish the basic structure for regulating discharges of pollutants into waters of the United States and regulates water quality standards for surface waters. Elements of the CWA specifically applicable to water resources include the following: • Section 303 of the CWA addresses the development of water quality standards and implementation plans for interstate waters by individual states; Section 303(d) includes requirement for states to identify and list waters where current water pollution control regulations and controls alone cannot meet the water quality standards set for those waters. • Section 401 of the CWA requires Water Quality Certification from the state for activities requiring a federal permit or license to discharge pollutants into a water of the United States. Certification attests the state has reasonable assurance the proposed activity will meet state water quality standards.

Law, Regulation, or Program	Description
	• Section 402 establishes the NPDES program, under which certain discharges of pollutants into waters of the United States are regulated. • Section 404 regulates the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands. Section 404 exempts certain forestry activities, including the maintenance of forest roads, from the permitting process for discharges of dredged or fill material in wetlands, streams, and/or other jurisdictional waters of the United States.
Coastal Zone Management Act (16 USC 1451)	Protects water quality in coastal areas through Section 6217, which requires states with a coastal zone management program to develop and implement a coastal nonpoint pollution control program.
Section 10, Rivers and Harbors Act of 1899 (33 USC 403)	Applies to activities that could affect navigable waters of the United States.
Flood Plain Management Criteria for Flood-Prone Areas (44 CFR 60.3(d)(3))	Requires FEMA to review any construction within a mapped floodway to ensure that the work will not increase flood levels. Any actions taken within a designated floodway area require a rise analysis, with review and approval by FEMA.
Executive Order 11988/13690, Floodplain Management	Requires federal agencies to avoid, to the extent possible, adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative (42 FR 26951). FEMA is responsible for enforcement.
State	
Administrative Rules Governing the Issuance and Enforcement of Removal-Fill Authorizations within Waters of Oregon Including Wetlands (OAR 141-085) and Oregon's Removal/Fill Law (ORS 196.795–990)	Governs removal and fill permits. Ensures the protection and the best use of Oregon's water resources for home, commercial, wildlife habitat, public navigation, fishing, and recreational uses.
Water Quality Standards: Beneficial Uses, Policies, and Criteria for Oregon (OAR 340-041)	Sets forth plans for managing water quality in the state, including standards for beneficial use designations, policies, and water quality criteria for attainment, antidegradation, and cold water protection.
Soil and Water Conservation; Agricultural Water Management (ORS 568.900 to 568.933) and Program and rules relating to water quality (ORS 561.191)	Serves as the Oregon Department of Agriculture authority for water quality.
Water Rights Act (ORS 537.010 et. seq.)	Provides that all water within the state belongs to the public and establishes state regulation of appropriation of water for beneficial use consistent with the act.
Pest Control; Forest Practices (ORS 527)	Requires forest operations to comply with Environmental Quality Commission rules and standards relating to water pollution control, the Department of State Lands on removal and fill programs, Oregon Health Authority on the Federal Safe Drinking Water Act, and Water Resources Department on water resource programs prior to adopting rules that establish standards for forest practices. 527.765 requires the Board of Forestry to adopt best management practices, and 527.770 protects

Law, Regulation, or Program	Description
	forest operators who comply with Board of Forestry best management practices from being found in violation of water quality standards.
Effluent Limitations (ORS 468B.030) and Implementation of Federal Water Pollution Control Act (468B.035)	Acknowledges that the State of Oregon is responsible for implementing the NPDES program under the CWA.
Ground Water Act of 1955 (ORS 537.505–537.795)	Provides for state regulation of groundwater.
Water Protection Rules of the Forest Practices Act (OAR 629, Divisions 635, 642, 645, 650, 655, 660)	Protects, maintains, and improves the functions and values of streams, lakes, wetlands, and riparian management areas.
Forest Practice Administrative Rules (OAR 629, Division 620)	Prevents and controls leaks and spills of chemicals, including pesticides, herbicides, and fungicides, fertilizers, and other petroleum products.
Forest Practice Administrative Rules (OAR 629, Division 625)	Reduces impacts of road construction and maintenance on water resources and flood hazard. The Oregon FPA does not apply to legacy roads (roads built and abandoned prior to passage of FPA and not in use post-FPA).
Forest Practice Administrative Rules (OAR 629, Division 630)	Establishes standards intended to reduce hillslope, landslide, and channel disturbance and erosion from harvest activities and prevents sediment and other contaminants from reaching streams.
Forest Practice Administrative Rules (OAR 629, Division 635)	Describes water protection rules, including riparian management areas and water quality protection measures.
Forest Practice Administrative Rules (OAR 629, Division 643)	Establishes standards for vegetation retention along streams.
Forest Practice Administrative Rules (OAR 629, Divisions 645–660)	Provides rules for protecting wetlands, lakes, seeps and springs, and natural obstructions.
Umpqua Basin TMDL	Provides surrogate measures to translate nonpoint source allocations for temperature to perennial and fish-bearing streams in the Umpqua Basin.
Tenmile Lakes Watershed TMDL	Sets 50% reduction in annual sediment load target relative to reference streams, within 25 years of TMDL publication in 2007.
Oregon Groundwater Quality Protection Act of 1989 (ORS 468B.150–190)	Sets a goal for Oregon to prevent contamination of Oregon's groundwater resource, to conserve and restore it, and to maintain quality for present and future uses. All state agencies' rules and programs are to be consistent with the goal. ODEQ is primarily responsible for implementation.
Water Distribution Rules (OAR 690, Division 250)	Guides the administration of Oregon water laws related to regulatory actions.

BMP = best management practice; CWA = Clean Water Act; ODEQ = Department of Environmental Quality; EPA = U.S Environmental Protection Agency; FEMA = Federal Emergency Management Agency; FR = Federal Register; NFIP = National Flood Insurance Program; NPDES = National Pollutant Discharge Elimination System; ORS = Oregon Revised Statute; OAR = Oregon Administrative Rules; TMDL = Total Maximum Daily Load

Vegetation

Law, Regulation, or Program	Description
Federal	
Clean Water Act (33 USC 1251 et seq.)	Authorizes EPA to establish the basic structure for regulating discharges of pollutants into the waters of the United States and regulates water quality standards for surface waters. Section 404 exempts certain forestry activities, including the maintenance of forest roads, from the permitting process for discharges of dredged or fill material in wetlands, streams and/or other jurisdictional waters of the United States. The CWA regulates many activities in surface waters, including vegetated components.
Endangered Species Act (16 USC 1531–1544)	The ESA of 1973, as amended, provides for the conservation of species listed as threatened or endangered and the habitat upon which they depend. Section 7 of the ESA requires federal agencies to consult with FWS and/or NMFS to ensure a federal action is not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of designated critical habitat.
State	
Administrative Rules Governing the Issuance and Enforcement of Removal-Fill Authorizations within Waters of Oregon Including Wetlands (OAR 141-085) and Oregon's Removal/Fill Law (ORS 196.795–990)	Governs removal and fill permits. Ensures the protection and the best use of Oregon's water resources for home, commercial, wildlife habitat, public navigation, fishing, and recreational uses.
Oregon Endangered Species Act Consultation (ORS 496.002–496.192)	Consultation with ODFW is required for activities on state lands, which may affect state-listed threatened and endangered species. Consultation is usually held in conjunction with federal Section 7 consultation under the ESA.
Removal-Fill Law (ORS 196.800–196.990)	Requires private landowners and public agencies planning to remove or fill material from a wetland or waterway to obtain a permit for such activities from the Oregon Department of State Lands.
Forest Practice Administrative Rules (OAR 629, Division 643)	Establishes standards for vegetation retention along streams and stream-associated wetlands and within riparian managements areas to protect habitat value and function during forest management operations.
Forest Practice Administrative Rules (OAR 629, Division 645)	Establishes protections for wetlands larger than eight acres, including significant wetlands on forestlands, through established requirements for live-tree, understory, snag, and down wood retention; soil and hydraulic function protection; and reforestation planning.
Forest Practice Administrative Rules (OAR 629, Division 655)	Establishes protections for wetlands, seeps, and springs not covered under other divisions of the Oregon FPA. Requires forest management activities protect these areas from any disturbance that results in reduced water quality, hydraulic function, or soil productivity, or accelerates wetland conversion to upland.

Law, Regulation, or Program	Description
Oregon Weed Control Policy (ORS 569)	Establishes noxious weed control boards, which designate certain plant species as noxious weeds. Authorizes the management, control, and/or elimination of noxious weed populations in the state.

CWA = Clean Water Act; EPA = U.S. Environmental Protection Agency; ESA = federal Endangered Species Act; Oregon FPA = Oregon Forest Practices Act; FWS = U.S. Fish and Wildlife Service; NMFS = National Marine Fisheries Service; OAR = Oregon Administrative Rules; ODFW = Oregon Department of Fish and Wildlife; ORS = Oregon Revised Statute; USC = United States Code

Fish and Stream-Dependent Wildlife

Law, Regulation, or Program	Description
Federal	
Endangered Species Act (ESA) (16 United States Code 531 et seq.)	Provides for the conservation of species listed as threatened or endangered and their critical habitat. Section 10 of the ESA provides for permitting of incidental take of listed species with an approved HCP.
Magnuson-Stevens Fishery and Conservation Management Act	Primary law governing marine fisheries management in U.S. federal waters, and provisions for essential fish habitat including freshwater for anadromous species.
State	
Oregon Sensitive Species Rule (OAR 635-100-0040)	Designates sensitive fish and wildlife species and focuses fish and wildlife conservation, management, research, and monitoring activities on identified sensitive species.
Oregon Endangered Species Act (ORS 496.002–496.192)	Triggers internal state consultations when activities taken by state agencies on state lands may affect state-listed threatened or endangered species.
Forest Practice Administrative Rules (OAR 629-630)	Establishes standards intended to reduce hillslope, landslide, and channel disturbance and erosion from harvest activities and prevents sediment and other contaminants from reaching streams.
Forest Practice Administrative Rules (OAR 629-643)	Establishes standards for vegetation retention along streams and wetlands and within riparian managements areas to protect habitat value and function during forest management operations.
Oregon Fish Passage Laws (ORS 509.580 to 509.910)	Requirements for fish passage and crossings as well as establishment of a Fish Passage Task Force.

ORS = Oregon Revised Statutes; OAR = Oregon Administrative Rules; HCP = Habitat Conservation Plan

Forest, Wetland, and Riparian–Dependent Wildlife

Law, Regulation, or Program	Description
Federal	
Endangered Species Act (16 USC 531 et seq.)	Provides for the conservation of species listed as threatened or endangered and their critical habitat. Section 10 of the Endangered Species Act provides for permitting of incidental take of listed species with an approved HCP.
Migratory Bird Treaty Act (16 USC 1361 et seq.)	Prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without

Law, Regulation, or Program	Description
	prior authorization by the Department of Interior U.S. Fish and Wildlife Service.
Bald and Golden Eagle Protection Act (16 USC 668-668d)	Prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald or golden eagles, The act defines *tak*e as to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."
State	
Administrative Rules Governing the Issuance and Enforcement of Removal-Fill Authorizations within Waters of Oregon Including Wetlands (OAR 141-085) and Oregon's Removal/Fill Law (ORS 196.795–990)	Governs removal and fill permits. Ensures the protection and the best use of Oregon's water resources for home, commercial, wildlife habitat, public navigation, fishing, and recreational uses.
Oregon Sensitive Species Rule (OAR 635-100-0040)	Designates sensitive fish and wildlife species and focuses fish and wildlife conservation, management, research, and monitoring activities on identified sensitive species.
Oregon Endangered Species Act (ORS 496.002–496.192)	Triggers internal state consultations when activities taken by state agencies on state lands may affect state-listed threatened or endangered species.
Survival Guidelines for Marbled Murrelet (OAR 635-100-0137)	Provides measures to minimize potential for unauthorized take of marbled murrelets. Guidelines are preempted by any more protective measures required by the federal Endangered Species Act.
Forest Practice Administrative Rules (OAR 629-665-0210)	Provides requirements for protection of wildlife habitat and interim requirements for timber operations near northern spotted owl nesting sites.

USC = United States Code; ORS = Oregon Revised Statutes; OAR = Oregon Administrative Rules; HCP = Habitat Conservation Plan

Air Quality

Law, Regulation, or Program	Description
Federal	
Clean Air Act and National Ambient Air Quality Standards (40 CFR 50, 53, and 58)	Establishes federal air quality standards, known as NAAQS, for six criteria pollutants and specifies future dates for achieving compliance. The CAA also mandates that the states submit and implement a State Implementation Plan for local areas not meeting those standards.
Regional Haze Rule (40 CFR 51 and 52)	Requires that states, in coordination with other responsible agencies, develop and implement air quality protection plans to reduce the pollution that causes visibility impairment in identified national parks and wilderness areas that are designated "Class I" areas.
State	
Visibility Protection Plan (OAR 340-200-040, Section 5.2)	Specifies Class I visibility protection areas in Oregon, none of which overlap with the air quality study area or are the immediate vicinity.

Law, Regulation, or Program	Description
Oregon Smoke Management Rules (OAR 629-048-0001 through 0500)	Establishes the procedures to be followed in administering the objectives of the Smoke Management Plan as well as the procedures to be followed in the administering prescribed burns. Includes measures to protect air quality, public health, and visibility and provides enforceable mechanisms to ensure the requirement of the Smoke Management Plan are met.
Requirements for Fugitive Emissions (OAR 340-208-0210)	Requires use of water or chemical for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land, unpaved roads, materials stockpiles, and other surface which can create airborne dust.
Oregon Department of Agriculture Pesticide Control definitions (ORS 603-057-0001) and requirements for aerial applications (ORS 603-057-0108)	Defines pesticide control actions that may be subject to Oregon state regulations. Requires that an individual hold a valid aerial pesticide applicator certificate, which is a type of license issued by the Oregon Department of Agriculture, in order to spray or otherwise apply a pesticide by aircraft.

CAA = Clean Air Act; NAAQS = national ambient air quality standards; OAR = Oregon Administrative Rules

Climate Change

Law, Regulation, or Program	Description
Federal	
Council on Environmental Quality, Executive Office of the President, Christina Goldfuss	Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. August 1, 2016. Per Executive Order 13990 and a subsequent Federal Register Notice (86 Federal Register 10252), CEQ will review, revise, and update the guidance; in the interim agencies should use the 2016 CEQ greenhouse gas guidance as appropriate and relevant.
Council on Environmental Quality, Executive Office of the President, Brenda Mallory (88 FR 5), January 9, 2023	This interim GHG guidance builds upon and updates CEQ's 2016 Final Guidance for Federal Departments and Agencies on Consideration of This interim guidance, Greenhouse Gas Emissions, and the Effects of Climate Change in National Environmental Policy Act Reviews, highlights best practices for analysis grounded in science and agency experience. The guidance explains how agencies should apply NEPA principles and existing best practices to their climate change analyses.

CEQ = Council on Environmental Quality

Visual Resources

Law, Regulation, or Program	Description
Federal	
National Scenic Byways (60 FR 96)	Designates roadways as National Scenic Byways or All-American Roads based on six criteria of scenic, historic, recreational, cultural, archaeological, and/or natural intrinsic qualities.
National Wild and Scenic Rivers Act (16 USC 1271–1287)	Establishes a National Wild and Scenic Rivers System for the protection of certain rivers as designated as wild, scenic, or recreational.
State	
Oregon Scenic Waterways Act (ORS 390.805–390.940; Oregon Wild 2022)	Designates state scenic rivers that are free-flowing, provides scenic quality as viewed from the river, and offers sustainable natural and recreation resources.
Oregon Scenic Byways and Bikeways (Oregon Tourism Commission and Oregon Department of Transportation 2018; Oregon State Parks 2019)	Designates scenic byways and bikeways that meet key criteria.

FR = Federal Register; ORS = Oregon Revised Statute; USC = United States Code

Recreation

Law, Regulation, or Program	Description
Federal	
National Wild and Scenic River Act (16 USC 1271 et seq.)	Preserves designated rivers with outstanding natural, cultural, and recreational values in free-flowing condition for enjoyment of present and future generations.
National Scenic Byways (86 FR 13337)	Designates roadways as National Scenic Byways or All-American Roads based on six criteria of scenic, historic, recreational, cultural, archaeological, and/or natural intrinsic qualities.
Applicable National Scenic Byway Corridor Management and Interpretive Plans	Establishes strategies for the management and protection of scenic corridors.
State	
Oregon Statewide Comprehensive Outdoor Recreation Plan	Provides guidance to federal, state, and local units of government, as well as the private sector, in delivering quality outdoor recreation opportunities to Oregonians and out-of-state visitors.
Oregon State Parks Master Plans	Provides planning guidance for management of resources and activities within individual state parks in Oregon.
Designated Scenic Waterways (ORS 390.826)	Designates specific lakes, rivers, segments of rivers and adjacent land as scenic waterways in Oregon.
Oregon Scenic Waterway Program (OAR 736-40)	Provides management guidance for activities within 0.25 mile of the bank of designated state scenic waterways. Rules specify protections and allowances for recreation activity within these corridors.
Oregon Statewide Recreation Trails Plan 2016–2025 (Oregon	Oregon's 10-year plan for recreation trail management, guiding the Recreation Trails Program and All-Terrain Vehicle funds. Provides

Law, Regulation, or Program	Description
Parks and Recreation Department 2016)	information and recommendations to private entities and local, state, and federal governments in making policy and planning decisions.
Oregon Scenic Byways and Bikeways (Oregon Tourism Commission and Oregon Department of Transportation 2018)	Designates scenic byways and bikeways that meet key criteria.

FR = Federal Register; OAR = Oregon Administrative Rules; ORS = Oregon Revised Statute; USC = United States Code

Cultural Resources

Law, Regulation, or Program	Description
Federal	
Indian Sacred Sites (Executive Order 13007)	Enacted in 1996, protects and preserves Indian religious practices, orders agencies managing federal lands to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, the agency is to maintain the confidentiality of sacred sites.
NHPA of 1966	As amended through 2000, authorizes the Secretary of the Interior to expand and maintain a National Register of Historic Places, establishes and defines the responsibilities of the State and Tribal Historic Preservation Officers and the Advisory Council of Historic Preservation, and pledges federal assistance to preservation efforts of state and local groups. Serves as the primary mandate governing projects under federal jurisdiction that might affect cultural resources. Section 106 of the NHPA, codified in 36 CFR 800, requires federal agencies to consider the effects of federal undertakings having the potential to affect any district, site, building, structure, or object that is listed in, or eligible for listing in, the NRHP. Under Section 106, the lead federal agency must provide an opportunity for the State Historic Preservation Officer, affected tribes, and other stakeholders to comment.
Protection of Historic Properties (36 CFR 800)	Contains the regulations for Section 106 of the NHPA. Outlines procedures for NHPA consultation related to historic properties.
State	
Conservation Easement (ORS 271.715–271.795)	Outlines the State of Oregon’s process for designating conservation easements and scenic preservation easements.
Indian Graves and Protected Objects (ORS 97.740–97.760)	Describes prohibited and permitted actions related to actions with the potential to encounter native Indian burial sites.
Administrative Rules for Archaeological Permits for Public and Private Lands (OAR 736-051-0000 through 0090)	Describes the requirements related to archaeological permits on public and private lands.
Archaeological Objects and Sites (ORS 358.905–358.961)	Outlines requirements related to the discovery of archaeological objects and sites located on public lands.

CFR = Code of Federal Regulations; NHPA = National Historic Preservation Act; OAR = Oregon Administrative Rules; ORS = Oregon Revised Statute; USC = United States Code

Tribal Resources

Law, Regulation, or Program	Description
Federal	
United States Constitution, Article II and Article VI (1787)	Authorizes the federal government to make treaties and regulate commerce with Indian tribes.
Treaty with the Kalapuya, etc. (1855), as restored by the Grand Ronde Restoration Act of 1983 (Public Law 98-165) and the Grand Ronde Reservation Act of 1988 (Public Law 100-425) (as amended)	The Treaty with the Kalapuya, etc., also known as the Kalapuya Treaty or the Treaty of Dayton, established federal recognition for bands of the Kalapuya tribe, the Molala tribe, the Clackamas, and several others in the Oregon Territory via treaty with the United States in 1855. Federal recognition was lost in 1954. The Grand Ronde Restoration Act of 1983 restored federal recognition but not reserved treaty rights of the Confederated Tribes of Grand Ronde.
Western Oregon Termination Act (Public Law 588, August 13, 1954)	Terminated federal supervision over the trust and restricted property of Indian bands and tribes located west of the Cascade Mountains in Oregon.
Siletz Indian Tribe Restoration Act (Public Law 95-195, November 1977)	Restores federal recognition of the Confederated Tribes of Siletz Indians of Oregon.
Cow Creek Band of Umpqua Tribe of Indians Recognition Act (Public Law 97–391, December 1982)	Restores federal recognition of the Cow Creek Band of Umpqua Tribe of Indians.
Grand Ronde Restoration Act (Public Law 98-165, November 1983)	Restores federal recognition of the Confederated Tribes of the Grand Ronde Community of Oregon.
Coos, Lower Umpqua, and Siuslaw Restoration Act (Public Law 98-481, October 1984)	Restores federal recognition of the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians.
Coquille Restoration Act (Public Law 101-42, June 1989)	Restores federal recognition of the Coquille Indian Tribe.
Executive Order 12875, Enhancing the Intergovernmental Partnership (1993)	Establishes regular and meaningful consultation and collaboration with state, local, and tribal governments.
Secretarial Order 3206 (1997)	Clarifies the responsibilities of the Department of the Interior and Department of Commerce to ensure that Indian tribes do not bear a disproportionate burden for the conservation of listed species.
Executive Order 13175, Consultation and Coordination with Indian Tribal Governments (65 FR 67249) (2000)	Charges federal departments and agencies with establishing regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, strengthening government-to-government relationships with Indian tribes, and reducing the imposition of unfunded mandates upon Indian tribes.
Presidential Memorandum, Tribal Consultation (2009)	Reaffirms EO 13175, Consultation and Coordination with Indian Tribal Governments (65 FR 67249) and charges executive departments and agencies with engaging in consultation and collaboration with tribal officials in the development of federal policies that have tribal implications.

Law, Regulation, or Program	Description
Secretarial Order 3317 (2011)	Updates, expands, and clarifies Department of Interior policies on consultation with tribes and provisions for conducting consultation in compliance with EO 13175.
Commerce Department Administrative Order (DAO 218-8) (2012)	Implements EO 13175, Consultation and Coordination with Indian Tribal Governments, and describes the actions to be followed by the Department of Commerce concerning tribal self-government, trust resources, treaty, and other rights.
Secretarial Order 3335 (2014)	Reaffirms the Federal Trust Responsibility to Federally Recognized Indian Tribes and Individual Indian Beneficiaries.
U.S. Fish and Wildlife Service Native American Policy (January 20, 2016)	Updates Native American policy providing a framework for government-to-government relationships, addressing the United States' and the Department of the Interior's trust responsibility to federally recognized tribes to protect, conserve, and use tribal reserved, treaty guaranteed, or statutorily identified resources.
Western Oregon Tribal Fairness Act (Public Law 115-103, January 2018)	Transfers federal land to the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians and Cow Creek Band of Umpqua Tribe of Indians. Amended the Coquille Restoration Act to remove the requirement that Department of Interior manage the land transferred to the Tribe.
NOAA Fisheries and National Ocean Service Guidance and Best Practices for Engaging and Incorporating Traditional Ecological Knowledge in Decision-Making (2019)	Provides guidance on the inclusion of traditional ecological knowledge in the line offices' environmental science, policy and decision-making process, to facilitate consultations as required by EO 13175, understand environmental justice concerns as directed by EO 12898, inform agency decision making, and build partnerships with indigenous people.
NOAA Procedures for Government-to-Government Consultation with Federally Recognized Tribal Governments (2021)	Provides guidance on obtaining meaningful and timely input from tribes into the NOAA decision-making process on policies that have tribal implications.
DOI/USDA Joint Secretarial Order 3403, Joint Secretarial Order on Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters (2021)	Establishes how DOI and USDA will fulfill their obligations to federally recognized Indian Tribes to ensure decisions by the departments relating to federal stewardship of federal lands, waters, and wildlife under their jurisdiction include the consideration of how to safeguard the interests of any Indian Tribes such decisions may affect, to make agreements with Indian Tribes to collaborate in the co-stewardship of federal lands and waters under the departments' jurisdiction, to support opportunities to consolidate tribal lands and empower stewardship of tribal land resources, and to complete a preliminary legal review of current land, water, and wildlife treaty responsibilities and authorities that can support co-stewardship and tribal stewardship.
NOAA Administrative Order (NOAA 218-8A) (2023)	This establishes NOAA policies on Government-to-Government Consultation with Federally Recognized Indian Tribal Government. This establishes a policy of regular and meaningful consultation and collaboration with tribal officials to address issues concerning Indian tribal self-government, tribal trust resources, and Indian tribal treaty and other rights.

Law, Regulation, or Program	Description
State	
Confederated Tribes of Siletz Indians v. State of Oregon, Civil No. 80-433 (D. Or. 1980).	Defines tribal hunting, fishing, trapping, and animal gathering rights of the Confederated Tribes of Siletz Indians via agreement among the State of Oregon, the United States of America and the Confederated Tribes of Siletz Indians.
Confederated Tribes of Grand Ronde Community of Oregon v. State of Oregon, Civil No. 86-1620, D. Or. 1987).	Defines tribal hunting, fishing, trapping, and animal gathering rights of the Confederated Tribes of Grand Ronde via agreement among the State of Oregon, the United States of America and the Confederated Tribes of the Grand Ronde Community of Oregon.
Executive Order EO-96-30; State/Tribal Government to Government relations, May 22, 1996	Establishes formal government-to-government relationships between Oregon's Indian tribes and the State of Oregon to establish a process that can assist in resolving potential conflicts, maximize key intergovernmental relations, and enhance an exchange of ideas and resources.
Relationship of State Agencies with Indian Tribes (ORS 182.162–182.168), 2019 Edition	Directs Oregon state agencies to develop and implement agency policies on relationship and cooperation with tribes.
Tribal	
The Confederated Tribes of the Grand Ronde Community of Oregon Fish and Wildlife Ordinance (2015)	Regulates hunting, fishing, and gathering rights of the Confederated Tribes of the Grand Ronde Community of Oregon, including hunting and fishing defined in the 1986 Consent Decree with the State of Oregon.
Cow Creek Band of Umpqua Tribe of Indians hunting rules and regulations (2019)	Regulates hunting, fishing, and gathering rights under the authority of the Cow Creek Band of Umpqua Tribe of Indians Tribal Board.
Confederated Tribes of Siletz Indians of Oregon Hunting, Fishing, and Gathering Ordinance (Siletz Tribal Code Section 7.001)	Regulates hunting, fishing, and gathering rights of Confederated Tribes of Siletz Indians of Oregon, including hunting and fishing defined in the 1980 Consent Decree with the State of Oregon.

EO = Executive Order; FR = *Federal Register*; NOAA = National Oceanic Atmospheric Administration; DOI = U.S. Department of the Interior; USDA = U.S. Department of Agriculture; ORS = Oregon Revised Statutes

Environmental Justice

Law, Regulation, or Program	Description
Federal	
EO 14008, Tackling the Climate Crisis at Home and Abroad (January 27, 2021)	Emphasizes the need to prioritize environmental justice in agency missions and address disproportionately high and adverse human health, environmental, climate-related and cumulative impacts on disadvantaged communities.
EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 16, 1994)	Requires agencies to identify and address disproportionate human health and environmental impacts on low-income and minority populations.

Law, Regulation, or Program	Description
Environmental Justice Guidance Under the National Environmental Policy Act (CEQ 1997)	CEQ has oversight of the federal government's compliance with EO 12898 and NEPA. CEQ, in consultation with EPA and affected agencies, developed this guidance to effectively address environmental justice concerns.
MOU on Environmental Justice and EO 12898 (2011)	This interagency MOU reaffirms the importance of EO 12898 and creates interagency processes to provide research and guidance on best practices for implementing environmental justice policies.
Promising Practices for environmental justice Methodologies in NEPA Reviews (Federal Interagency Working Group on Environmental Justice 2016)	Describes procedures and recommends specific methodologies to identify environmental justice populations based on racial/ethnic background and income levels.
Technical Guidance for Assessing Environmental Justice in Regulatory Analysis (EPA 2016)	This technical guidance, prepared by EPA with input from the EPA Science Advisory Board and public, recommends revised methods, best practices, and analytic principles to identify and assess threats to environmental justice populations.

CEQ = Council for Environmental Quality; EO = Executive Order; EPA = U.S. Environmental Protection Agency; MOU = memorandum of understanding

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Appendix 3.2
Geology and Soils Technical Supplement

This appendix describes existing conditions for geology and soils in the permit area that relate to soil erosion hazards, shallow-rapid landslides, and debris flows/debris torrents.

Soils

Soils vary considerably with their susceptibility to landslides and erosion depending on their composition, texture, depth, geomorphic position, and other qualities. The Natural Resources Conservation Service (NRCS) has mapped soils and identified characteristics of major and minor soil components in the permit area.

NRCS rates soil components for the potential risks associated with their occurrence in managed forest lands. The soil component ratings for erosional hazards contain both numerical and verbal interpretations that indicate the likelihood and intensity of the hazard risk, respectively (NRCS 2023a, 2023b). Tables 1 and 2 provide summaries of acreages within the permit area and their associated ratings for erosion hazard and suitability for various forest management uses.

Table 1 identifies the acreages within the permit area associated with each of the five rating categories for erosion hazard. The off-road/off-trail erosion hazard ratings indicate the likelihood of soil loss following activities that expose the soil surface—such as logging, fire, firebreak installation, and the use of any associated equipment—in undeveloped (off-road/off-trail) areas. The road/trail erosion hazard ratings indicate the likelihood of soil loss from the use of unsurfaced roads or trails. Slope and a soil erodibility factor are considered for both of these erosion hazard ratings. The content of rock fragments within a soil component is incorporated into the road/trail erosion hazard rating.

Approximately 42,000 acres of the permit area consist of soil components rated as severe or very severe for off-road/off-trail erosion risk. A high likelihood of erosion occurring from logging, restoration, maintenance, or other ground-disturbing activities would be anticipated in these areas. Over 65,000 acres consist of soil components rated as severe for road/trail erosion risk. This means that use of unsurfaced roads or trails in over 78% of the permit area would likely result in significant erosion and require costly erosion control measures.

Table 1. Soil Erosion Hazard in the Permit Area

	Off-Road and Off-Trail [a]		Road and Trail [b]	
Erosion Rating	**Acres**	**Percent (%)**	**Acres**	**Percent (%)**
Very Severe	9,445	11	N/A	N/A
Severe	32,388	39	65,028	78
Moderate	23,138	28	15	0.02
Slight	947	1	875	1
Not rated [c]	17,408	21	17,408	21
Total	83,326	100	83,326	100

Source: NRCS 2023a.

[a] For off-road/off-trail areas, a rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion control measures may be needed; *severe* indicates that erosion is very likely and that erosion control measures are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion control measures are costly and generally impractical (NRCS 2023b).

[b] For road/trail areas, a rating of *slight* indicates that little or no erosion is likely; *moderate* indicates that some erosion is likely, roads or trails may require occasional maintenance, and simple erosion-control measures are needed; and *severe* indicates that significant erosion is expected, roads or trails require frequent maintenance, and costly erosion control measures are needed. There is no *very severe* category for the road/trail erosion hazard rating (NRCS 2023b).

[c] NRCS does not spatially assign soil components within map units, and therefore the sum of all components within a map unit may not equate to full geographic coverage on a visual map. While NRCS identified 1,171 acres of soil components within the permit area as *not rated*, this analysis identified an additional 16,237 acres as *not rated* to adjust for the difference between the total acreage of all soil component ratings and the total acreage within the permit area.

N/A = not applicable

Table 2 identifies the acreages within the permit area associated with each of the four rating categories for soil suitability for roads and log landings. These ratings indicate the suitability of soil components to serve as a natural road surface or as a temporary location for storing or handling downed logs. The suitability ratings are based on multiple factors, including slope, plasticity index, sand and rock fragment contents, depth to a water table, ponding, flooding, and the hazard of soil slippage.

Approximately 64,000 acres of the permit area are rated as poorly suited for use as log landings or roads with a natural surface (e.g., not enhanced with gravel). This data correlates to a substantial hazard of soil loss due to log handling and storage and road construction and use in 77% of the permit area, which is further supported by the finding that 78% of the permit area is rated as severe for erosion hazard due to road use (Table 1).

Table 2. Soil Suitability for Roads and Log Landings in the Permit Area

	Log Landings [a]		Roads [a]	
Soil Suitability Rating	**Acres**	**Percent (%)**	**Acres**	**Percent (%)**
Well suited	0	0	0	0
Moderately suited	1,797	2	1,797	2
Poorly suited	64,121	77	64,121	77
Not rated [b]	17,408	21	17,408	21
Total	83,326	100	83,326	100

Source: NRCS 2023a.

[a] A rating of *slight* indicates that little or no erosion is likely; *moderate* indicates that some erosion is likely, roads or trails may require occasional maintenance, and simple erosion control measures are needed; and *severe* indicates that significant erosion is expected, roads or trails require frequent maintenance, and costly erosion control measures are needed. There is no *very severe* category for the road/trail erosion hazard rating (NRCS 2023b).

[b] NRCS does not spatially assign soil components within map units, and therefore the sum of all components within a map unit may not equate to full geographic coverage on a visual map. While NRCS dated identified 1171 acres of soil components within the permit area as *not rated*, this analysis identified an additional 16,237 acres as *not rated* to adjust for the difference between the total acreage of all soil component ratings and the total acreage within the permit area.

Shallow-Rapid Landslide

The geologic origin, topography, soils, and climate in the permit area represent conditions favorable to initiation of shallow-rapid landslides, namely bedrock with low porosity, high precipitation rates, steep slopes, and coarse soils on steep slopes (Liu et al. 2021:1).[1] Landslides in the permit area are frequently associated with debris flows and debris torrents (DSL and ODF 2011:2-25, 2-44, 2-46).

As described in HCP Chapter 2, *Environmental Setting*, the bedrock Tyee sandstone/siltstone formation underlies most of the permit area. Sandstone beds may be more than 50 feet thick, alternating with siltstones and mudstones up to several feet thick. The Tyee Formation in the permit area generally has low primary porosity, meaning that it does not hold much water. However, the formation is moderately jointed and fractured, which provides some space for groundwater (DSL and ODF 2011:2-43).

The climate in the permit area has a strong maritime influence from the nearby Pacific Ocean. As a result, rainfall is high. Rainfall varies from about 65 inches per year at lower elevations on the western edge of the forest to 115 inches per year on the high, interior ridges, to 90 inches per year on the eastern side of the permit area. Snowfall in the forest is normally light to moderate, both in amount and duration. There is no residual snowpack (DSL and ODF 2011:2-19).

The topography of the permit area is generally rugged and highly dissected with steep, narrow canyons, although the southeast part of the forest is less steep. Across the forest, slopes face in all directions, with no predominant aspect. Elevations range from near sea level to 2,100 feet above sea level. The major rivers and streams are in narrow valleys bordered by steep side slopes. The gradients on the side slopes commonly exceed 65%. The valley bottoms were formed by alluvial deposits and are gently sloping. Steep colluvial basins are common. The colluvial materials include soil and debris that have been moved downslope by gravity and biological activity (DSL and ODF 2011:2-43 to 2-44). The potential for destabilizing events, such as intense storms, seismic activity, road construction, or harvest practices, to increase the likelihood of landslides varies according to local conditions and is not evenly distributed across the landscape (Robison et al. 1999:44; Cover et al. 2010:1596–1597; Burnett and Miller 2007:2). Landslide initiation sites have physical characteristics (e.g., slope, soil type) that create higher potential for landslides. The highest frequency of landslides occurs on slopes of over 70 to 80%, depending on landform[2] and underlying soils and geology, especially the presence of thick, saturated soils (Robison et al. 1999:iii). Landslide frequency is moderate on slopes between 50 and 70%. Landslides occur within the forest rooting zone, generally less than 10 feet deep (Cohen and Schwarz 2017:452; Hairiah et al. 2020:256). Such landslides are typically initiated by intense rainfall or rapid snowmelt.

The Oregon Department of Geology and Mineral Industries mapped landslide areas in Oregon with the Statewide Landslide Information Database for Oregon (Oregon Department of Geology and Mineral Industries 2021a). Table 3 shows the acreage within and percentage of the permit area that

[1] This analysis does not consider deep-seated landslides. Some forest management activities can affect deep-seated landslides, in particular those that make large-scale modifications to topography, including quarrying, aggregate stockpiling, placement of large fill, and construction of large road cuts, especially at the base along the toe of the landslide. However, shallow-rapid landslides and associated debris torrents are the predominant ground failure characteristics that shape the landscape.

[2] *Landform* refers to the shape of the ground surface.

has low, moderate, high, and very high susceptibility to landslides. As shown in Table 3, up to 91% of the permit area has high or very high susceptibility to landslides.

Table 3. Susceptibility of the Permit Area to Landslides (acres and percent)

	Low		Moderate		High		Very High	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Permit area	90	<1	7,274	9	75,498	90	464	<1

Source: Oregon Department of Geology and Mineral Industries 2021a.

Erosion and Landslide Hazards Related to Roads

As described in HCP Chapter 5, *Conservation Strategy*, construction, maintenance, and use of forest roads are an integral part of actively managing state forest lands. Roads provide essential access for forest management activities, fire protection, a variety of recreational uses, and research. At the same time, roads can be a major source of disturbance, increasing the likelihood of landslides, erosion, and scouring and sedimentation in streams (Cristan et al. 2016:133; Guthrie 2001:273; Nunamaker et al. 2017:1; Benda and Miller in prep.:17). Road location mid-slope on steep slopes is a factor in increasing frequency of landslide (Sessions et al. 1987). Proper road system planning, design, construction, and maintenance can prevent or minimize these impacts.

Table 4 summarizes road miles in the permit area by their locations with respect to slope into the following categories: ridgeline, mid-slope, low-slope, or stream adjacent. Ridgeline roads are within 330 feet of ridgelines; these roads are generally well located to minimize fill failure and sediment transport beyond the road prism (Wemple et al. 2001). Roads characterized as mid-slope were more than 330 feet from ridgelines and more than 200 feet from streams. Wemple et al. (2001) observed that older mid-slope roads dominated the production of sediment during storm events and can pose significant risk to aquatic environments and the species inhabiting them. Total road miles within 200 feet and 35 feet of streams were also calculated. Low-slope roads, or within 200 feet of streams, are less likely to deliver sediments downslope, with the exception of roads that directly cross or are immediately adjacent to streams (Wemple et al. 2001). Roads within 35 feet of streams, which comprise 2% of roads within the permit area, represent the highest likelihood of sediment delivery (Rashin et al. 2006).

Table 4. Slope Classification of Existing Roads in the Permit Area (miles and percentage)

Road Location	Miles	Percent (%)
Ridgeline [a]	290	58
Mid-slope [b]	137	27
Low-slope [c]	63	13
Stream adjacent [d]	9	2
Total	**499**	**100**

Sources: USGS 2013; Oregon Department of Geology and Minerals 2021b; ODF 2015.

[a] Within 330 feet of a ridgeline.

[b] More than 330 feet from a ridgeline and more than 200 feet from a stream. This classification also includes 3.1 miles of roads within 330 feet of a ridgeline <u>and</u> *within* 200 feet of a stream.

[c] More than 35 feet but less than 200 feet from a stream.

[d] Within 35 feet of a stream.

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Appendix 3.3
Water Resources Technical Supplement

Affected Environment

Surface Water

Peak Flows

This section describes the relevant environmental conditions used in peak flow analysis methodologies, which support the assessment of the study area's sensitivity to peak flow changes as a consequence of certain covered activities. The main drivers of peak flow rates in the study area, summarized in Table 1, are based on a U.S. Geological Survey (USGS) statistical analysis of 15 watershed characteristics and 376 stream gages in western Oregon. According to this analysis, soil permeability and soil capacity play a significant role in governing peak flows in the Coastal Range. Soil capacity is the maximum volume of water a soil can hold; it is the product of its porosity and its depth. Soil permeability is the rate at which water can infiltrate the soil. Of these peak flow drivers, the covered activities can affect soil permeability and storage capacity as follows. Road building and operation of heavy machinery in harvest units can change soil porosity or storage capacity by compacting the soil. Removing vegetation cover and increasing runoff can change soil depth by increasing erosion. The other peak flow drivers are controlled by climate (precipitation and temperature) and geology (drainage area).

Table 1. Peak Flow Drivers by Hydrologic Zone

Hydrologic Zone	Factors Driving Peak Flows	Factors Sensitive to Climate Change
Zone 1: Coastal Range watersheds	• Drainage area • 24-hour, 2-year precipitation intensity • Soil permeability • Soil storage capacity • Mean maximum January temperature	• 24-hour, 2-year precipitation intensity • Mean maximum January temperature

Source: Cooper 2005:35

Annual peak flows may increase in the study area under climate change as 24-hour and 2-year precipitation intensity increases. Under climate change, precipitation intensity is expected to increase in western Oregon and extreme precipitation intensity events are expected to increase in frequency. By 2070, precipitation events that had a 20% annual exceedance probability up to 2011, may shift to the 50% return interval (Easterling et al. 2017:219). In other words, the 5-year event may become the 2-year event. The change in number of days below freezing is projected to decrease in all areas of western Oregon by 2050. Higher elevations are projected to lose 50 to 70 days of freezing temperatures (Vose et al. 2017:199).

The Natural Resources Conservation Service (NRCS) Curve Number method for estimating peak flow changes for smaller drainages depends on the amount of precipitation, degree of vegetative cover, and soil infiltration rate (NRCS 1986). Higher vegetative cover is inversely related to runoff. NRCS categorizes soil infiltration into hydrologic groups from high infiltration (A) to low infiltration (D). Percentages of the study area by hydrologic soil group and subwatershed are summarized in Table 2. Subwatersheds with higher proportions of lower infiltration soils are more susceptible to changes in peak flows. For example, Hayes Inlet has 90% Type D hydrologic soil, indicating high susceptibility to changes in peak flows due to reduction in vegetation cover.

Table 2. Percent of Study Area by Hydrologic Soil Group and Subwatershed

Subwatershed	A	A/D	B	C	C/D	D	No Data
Coos Bay	0	0	57	0	0	43	0
Dean Creek-Umpqua River	0	0	10	8	0	71	10
East Fork Millicoma River	0	0	61	0	0	39	0
Glenn Creek	0	0	62	16	0	22	0
Haynes Inlet	0	0	6	3	0	90	0
Little Mill Creek-Umpqua River	0	0	0	10	0	54	37
Loon Lake-Mill Creek	0	0	17	20	0	26	37
Lower Camp Creek	0	0	0	60	0	14	26
Lower Lake Creek	0	0	31	65	0	4	0
North Tenmile Lake	0	1	15	4	0	81	0
Scholfield Creek	4	0	11	61	0	25	0
Tenmile Lake-Tenmile Creek	0	0	21	0	0	79	0
West Fork Millicoma River	0	0	53	3	0	43	1

Source: NRCS 2019

The Grant et al. (2008) method for detecting change in peak flows from forest management activities includes an assessment of drainage efficiency. Higher stream and road density, along with shallower depth to bedrock and steeper slopes, and lower permeability bedrock, indicate increasing drainage efficiency. The more efficiently a watershed drains, the faster streamflow reaches peak flow and the larger those peak flows are. Watersheds with higher drainage efficiency are more susceptible to increases in peak flows caused by changes in vegetation cover and increases in soil compaction. Table 3 summarizes the average stream and road density, slope, depth to bedrock, and subwatershed area in the study area.

Table 3. Physiographic Characteristics of the Permit Area

Subwatershed	Stream Density (miles per acre)	Road Density (percent of subwatershed) [a]	Number of Water Crossings	Mean Stream Slope (%)	Mean Depth to Bedrock (inches)	Drainage Area (sq km)
Coos Bay	0.0001	3.9	10	24	30	0.72
Dean Creek-Umpqua River	0.0091	1.9	184	27	28	49.34
East Fork Millicoma River	0.0002	4.6	19	17	30	0.74
Glenn Creek	0.0069	6.0	403	18	30	11.88
Haynes Inlet	0.0052	1.7	47	24	33	21.38
Little Mill Creek-Umpqua River	0.0002	1.6	0	29	24	0.92
Loon Lake-Mill Creek	0.0193	3.2	478	25	27	27.85
Lower Camp Creek	0.0001	6.0	6	21	24	0.16
Lower Lake Creek	0.0014	5.3	183	18	34	7.48
North Tenmile Lake	0.0107	2.3	156	25	32	30.17
Scholfield Creek	0.0090	2.4	59	25	33	19.30
Tenmile Lake-Tenmile Creek	0.0117	2.4	238	26	36	50.45
West Fork Millicoma River	0.0192	3.4	1,482	22	30	113.65

[a] Assumed average disturbed road width of 40 feet.
Sources: ODF 2015; USGS 2018; NRCS 2019; OSU 2020

Surface Water Quality

Table 4 summarizes the extent of the impaired waters in the study area by subwatershed. Tables 5 through 8 summarize the impairment causes and impaired uses in the study area by subwatershed.

Table 4. Miles of Impaired Rivers/Coastlines, Streams, and Acres of Impaired Lakes, Reservoirs, and Other Waterbodies in the Study Area

Subwatershed	Rivers/Coastline (miles)	Streams (miles)	Lakes, Reservoirs, and Other Waterbodies (acres)
Coos Bay	1	8	10,010
Dean Creek-Umpqua River	15	3	1,253
East Fork Millicoma River	Not listed	Not listed	13
Glenn Creek	Not listed	Not listed	Not listed
Haynes Inlet	4	13	2,632
Little Mill Creek-Umpqua River	11	4	Not listed
Loon Lake-Mill Creek	0.01	Not listed	Not listed
Lower Camp Creek	15	Not listed	Not listed
Lower Lake Creek	24	Not listed	Not listed
North Tenmile Lake	6	10	827
Scholfield Creek	4	3	776
Tenmile Lake-Tenmile Creek	6	16	1,147
West Fork Millicoma River	31	21	8

Source: ODEQ 2022

All impaired lakes or reservoirs in the study area are outside of the permit area. In most cases, they are downstream of the permit area. However, Pony Creek, Upper Pony Creek Reservoir, and Lake Merritt fall within the study area watersheds but are not downstream of the permit area; those lakes contribute to Coos Bay from the south and would, therefore, be unaffected by runoff or infiltration from the proposed action and alternatives.

Table 5. Impairment Causes for Streams and Rivers[a] in the Study Area by Subwatershed

Subwatershed	River Impairment Cause	Miles
Coos Bay	Shellfish toxins	0.3
	Fecal coliform	0.7
	Temperature–year-round	8.3
Dean Creek-Umpqua River	Dissolved oxygen–spawning	3.7
	Temperature–year-round	2.7
	Methylmercury–human health toxics; harmful algal blooms; flow modification; fecal coliform; temperature–year-round	6.4
	BioCriteria	5.1
Haynes Inlet	Fecal coliform; temperature–year-round	4.1
	Temperature–year-round	12.7
Little Mill Creek-Umpqua River	Temperature–year-round	0.01
	Methylmercury–human health toxics; harmful algal blooms; flow modification; fecal coliform; temperature–year-round	11.3
	BioCriteria	4.4
Loon Lake-Mill Creek	Temperature–year-round	0.00
	Temperature–year-round; BioCriteria	0.01
Lower Camp Creek	Temperature–year-round	0.7
	Temperature–year-round; BioCriteria	14.2
Lower Lake Creek	Temperature–year-round	24.0
North Tenmile Lake	Temperature–year-round; dissolved oxygen–spawning; dissolved oxygen–year-round; sedimentation	6.1
	BioCriteria; dissolved oxygen–spawning; dissolved oxygen–year-round; pH; temperature–year-round	4.0
	Dissolved oxygen–spawning; dissolved oxygen–year-round; pH; sedimentation	4.7
	Dissolved oxygen–year-round	0.8
Scholfield Creek	Sedimentation	3.6
	BioCriteria	3.0
Tenmile Lake-Tenmile Creek	Temperature–year-round; dissolved oxygen–spawning; dissolved oxygen–year-round; sedimentation	5.0
	BioCriteria; dissolved oxygen–year-round; pH; sedimentation	3.7
	Dissolved oxygen–spawning; dissolved oxygen–year-round; sedimentation	8.3
	pH; dissolved oxygen–year-round	3.7
	Dissolved oxygen–year-round	0.5
West Fork Millicoma River	Temperature–year-round	42.6
	Iron (total)–aquatic life	9.1

Source: ODEQ 2022

[a] The Oregon Department of Environmental Quality defines *streams* as fourth-order streams or lower and *rivers* as fifth-order streams and higher. The uppermost channel in a drainage network, with no upstream tributaries, is a first-order stream. Second-order streams are formed below the confluence of two first-order streams, and so on. A second-order stream conjoining a first-order stream is still a second-order stream, and so on.

Table 6. Impairment Causes for Lakes, Reservoirs, and Other Waterbodies in the Study Area by Subwatershed and Waterbody

Subwatershed	Waterbody	Impairment Cause	Acres
Coos Bay	Coos Bay	E. coli, fecal coliform, dissolved oxygen–year-round, temperature–year-round, arsenic, inorganic–human health toxics	8,944
		E. coli, fecal coliform, temperature–year-round	333
		Fecal coliform	135
		Fecal coliform, temperature–year-round	434
	Lake Merritt[a]	Fecal coliform, temperature–year-round	27
	Pony Creek[a]	Fecal coliform, temperature–year-round	26
	Upper Pony Creek Reservoir[a]	Fecal coliform	111
Dean Creek-Umpqua River	Umpqua River	Fecal coliform	1,484
		Fecal coliform, temperature–year-round	1253
East Fork Millicoma River	Coos Bay	Fecal coliform, temperature–year-round	13
Haynes Inlet	Coos Bay	E. coli, fecal coliform, dissolved oxygen–year-round, temperature–year-round, arsenic, inorganic–human health toxics	1,424
		E. coli, fecal coliform, temperature–year-round	366
		Fecal coliform	424
		Fecal coliform, temperature–year-round	418
North Tenmile Lake	North Tenmile Lake	Chlorophyll:a, dissolved oxygen–year-round, methylmercury–human health toxics, harmful algal blooms, aquatic weeds, sedimentation	827
Scholfield Creek	Umpqua River	Fecal coliform, manganese–human health toxics	774
		Fecal coliform, temperature–year-round	2
Tenmile Lake-Tenmile Creek	North Tenmile Lake	Chlorophyll-a, dissolved oxygen–year-round, methylmercury–human health toxics, harmful algal blooms, aquatic weeds, sedimentation	2
	Tenmile Creek	Chlorophyll-a, dissolved oxygen–year-round, dissolved oxygen–spawn	7
	Tenmile Lake	Chlorophyll-a, dissolved oxygen–year-round, dissolved oxygen–spawn, methylmercury–human health toxics, harmful algal blooms	1,138
West Fork Millicoma River	Coos Bay	Fecal coliform, temperature–year-round	8

Source: ODEQ 2022

[a] Pony Creek, Upper Pony Creek Reservoir, and Lake Merritt are neither inside the permit area nor downstream; they contribute to Coos Bay from the south.

Table 7. Impaired Uses for Rivers in the Study Area by Subwatershed

Coos Bay	**Miles**
Fishing	18.1
Water contact recreation	0.7
Dean Creek–Umpqua River	
Fish and aquatic life	4.6
Fishing; private domestic water supply; public domestic water supply; water contact recreation; livestock watering; fish and aquatic life	31.3
Haynes Inlet	
Water contact recreation; fish and aquatic life	7.2
Little Mill Creek–Umpqua River	
Fish and aquatic life	4.7
Fishing; private domestic water supply; public domestic water supply; water contact recreation; livestock watering; fish and aquatic life	31.3
Loon Lake–Mill Creek	
Fish and aquatic life	37.7
Lower Camp Creek	
Fish and aquatic life	16.9
Lower Lake Creek	
Fish and aquatic life	46.7
North Tenmile Lake	
Fish and aquatic life	12.1
Scholfield Creek	
Fish and aquatic life	3.6
Tenmile Lake-Tenmile Creek	
Fish and aquatic life	11.4
West Fork Millicoma River	
Fish and aquatic life	60.9

Source: ODEQ 2020

Table 8. Impaired Uses for Lakes, Reservoirs, and Other Waterbodies in the Study Area by Subwatershed

Subwatershed	Lakes, Reservoirs, and Other Waterbody Impaired Use	Acres
Coos Bay	Fish and Aquatic Life; Fishing	434
	Fish and Aquatic Life; Water Contact Recreation; Fishing	8,944
	Fishing	135
	Water Contact Recreation	111
	Water Contact Recreation; Fish and Aquatic Life	54
	Water Contact Recreation; Fishing; Fish and Aquatic Life	333
Dean Creek-Umpqua River	Fish and Aquatic Life; Fishing	1,253
	Fishing	1,484
East Fork Millicoma River	Fish and Aquatic Life; Fishing	13
Haynes Inlet	Fish and Aquatic Life; Water Contact Recreation; Fishing	1,424
	Fishing	424
	Fishing; Fish and Aquatic Life	418
	Water Contact Recreation; Fishing; Fish and Aquatic Life	366
North Tenmile Lake	Fish and Aquatic Life; Aesthetic Quality; Fishing; Private Domestic Water Supply; Public Domestic Water Supply; Boating	827
Scholfield Creek	Fish and Aquatic Life; Fishing	2
	Fishing	774
Tenmile Lake-Tenmile Creek	Aesthetic Quality; Fish and Aquatic Life	7
	Fish and Aquatic Life; Aesthetic Quality; Fishing; Private Domestic Water Supply; Public Domestic Water Supply; Boating	2
	Fish and Aquatic Life; Aesthetic Quality; Fishing; Private Domestic Water Supply; Public Domestic Water Supply; Water Contact Recreation; Livestock Watering	1,139
West Fork Millicoma River	Fish and Aquatic Life; Fishing	8

Source: ODEQ 2022

Roads are a major contributor of sediment in timberlands, which adversely affects water quality. Roads also represent a permanent loss of riparian shade, when located near water resources, and change groundwater recharge and flow paths, which increases stream temperature. Table 9 summarizes the number of road miles within 50 feet and 150 feet of water.

Table 9. Miles of Road near Streams[1] in the Permit Area

HUC12 Name	Miles of Road within 50 feet of Water	Miles of Road within 150 feet of Water
Little Mill Creek–Umpqua River	0.0	0.0
Lower Lake Creek	5.5	13.1
Lower Camp Creek	0.3	0.5
Loon Lake–Mill Creek	15.5	31.5
Dean Creek–Umpqua River	6.1	20.3
Scholfield Creek	1.9	8.6
Glenn Creek	11.8	26.4
East Fork Millicoma River	0.6	1.3
West Fork Millicoma River	47.0	114.4
Haynes Inlet	1.7	7.7
Coos Bay	0.3	0.7
North Tenmile Lake	4.8	15.7
Tenmile Lake-Tenmile Creek	7.1	25.7
Total	**102.7**	**266.0**

Source: ODF 2015; Carlson and Miller 2021

Surface Water Supply

Because most precipitation falls in the winter months, which are outside of the growing season, surface water rights are fully allocated in late summer in almost all study area watersheds, whereas very small areas have fully allocated water rights during winter months (OWRD 2017). Coos and Douglas Counties are projected to experience near zero changes in agricultural and municipal water demand by 2050 (OWRD 2017).

Groundwater

Aquifers and Recharge Areas

Table 10 shows the recharge potential associated with the rock type and aquifer underlying the permit area. Table 11 describes the typical depth to water, well yield, and principal water use of principal aquifers by county. Table 12 summarizes the acres of groundwater drinking water source areas in the study area.

Table 10. Aquifer Names and Rock Types in the Study Area

Aquifer Name (USGS 2000)	Rock Types (USGS 1994)	Percentage of Permit Area	Recharge Potential
Other rocks	Pre-Miocene rocks	100	Low

Source: USGS 1994, 2000

[1] Based on OSU stream network, which includes 0 order streams

Table 11. Types of Aquifers Used for Water Supply and Types of Human Water Uses

Permit Area Counties	Principal Aquifer [a]	Typical Well Depth (feet below land surface)	Depth to Water (feet below land surface)	Range of Well Yields (gallons per minute)	Principal Water Use [b]
Curry	Ud	20–150	10–110	50–250	DC, A
Douglas	Ud, pM	80–120	<10–25	50–250	PS, DC, A, I

Source: USGS 1994

[a] Aquifer: Ud, unconsolidated deposits; pM, pre-Miocene rocks

[b] Water use: A, agricultural; I, industrial; DC, domestic and commercial; PS, public supply

Low groundwater–surface water interaction can exacerbate the effects of precipitation events and seasonal change, making streams more susceptible to higher peak flows and lower low flows (Moore and Wondzell 2005). Higher runoff and higher flow path diversion from road construction can adversely affect groundwater recharge to drinking water source areas.

Table 12. Acres of Groundwater Drinking Source Area in the Study Area

HUC 12 Subwatershed	Groundwater Drinking Water Source Area
Little Mill Creek-Umpqua River	36
Loon Lake-Mill Creek	252
Dean Creek-Umpqua River	126
West Fork Millicoma River	8
Haynes Inlet	207
Coos Bay	683

Source: ODEQ 2019

Regulations

The Oregon Department of Environmental Quality (ODEQ) implements the Clean Water Act by designating basin-specific criteria, including beneficial uses by basin and detailed beneficial fish usages (Oregon Administrative Rules [OAR] 340-041-0101 through OAR 340-041-0101), and setting corresponding biologically based water quality criteria for those uses applicable to all basins.

For waterbodies that are not under a total maximum daily load (TMDL), the OAR protects against unnecessary further degradation with the Antidegradation Rule (OAR 340-041-0004). Where water quality meets or exceeds standards for designated beneficial uses, that level of water quality must be maintained and protected unless an intergovernmental and public participation process allows it. There are exemptions to this rule. The most relevant exemptions to this project are the following.

- OAR 340-041-0004(5)(a): riparian restoration activities intended to restore geomorphology or riparian vegetation need not go under antidegradation review so long as ODEQ determines that there is a net ecological benefit to the restoration activity. Reasonable measures that are consistent with the restoration objectives for the waterbody must be used to minimize degradation.

- For stream temperature specifically, streams with temperatures colder than the criteria for their designated uses (OAR 340-041-0028 (4)) are protected under rules protecting cold water (OAR 340-041-0028 (11)). This rule limits stream temperature increase to no more than 0.3 degree Celsius (°C) cumulatively for all sources at the point of maximum impact where salmon, steelhead or bull trout are present, unless the location qualifies for an exception under the rule (OAR 340-041-0028 (11)(c)):

    The cold-water protection narrative criteria in subsection (a) do not apply if:

    (A) There are no threatened or endangered salmonids currently inhabiting the water body;

    (B) The water body has not been designated as critical habitat; and

    (C) The colder water is not necessary to ensure that downstream temperatures achieve and maintain compliance with the applicable temperature criteria.

Stream temperatures that exceed temperature criteria due to maximum air temperatures or low flows are not considered violations (OAR 340-041-0028 (12)(c) and (d)).

The Addendum to Antidegradation IMD Clarifying Procedures When Allowing a Lowering of Water Quality (ODEQ 2018) refers to the Oregon Forest Practices Act (OAR 629-635-0000 through 629-660-0060) for forestry operations, which include standards and best management practices for vegetation and ground disturbance during harvesting. Standards are quantitative, such as diameter at breast height for trees to retain, number of trees to retain per 1,000 linear feet, and distances from streams where activity is allowed. Best management practices are management approaches such as where to avoid ground-based harvesting. The Oregon Forest Practices Act may be reviewed for sufficiency in meeting state water quality criteria, including the cold-water protection and antidegradation rules, following the procedures described in the ODEQ-ODF Memorandum of Understanding (ODEQ 2021).

For streams listed as impaired in the biannual Integrated Report (ODEQ 2022), ODEQ develops TMDLs, which further specify and limit pollutant load allocations. The Umpqua Basin Temperature TMDL allows a cumulative 0.1°C increase at the points of maximum impact for all perennial and fish-bearing streams in the Umpqua Basin that are not otherwise simulated in the TMDL (ODEQ 2006). The Tenmile Lakes Watershed Water Quality Management Plan (ODEQ 2007) sets a 50% reduction in annual sediment load target relative to reference streams within 25 years of the TMDL's publication in 2007. ODEQ must approve all TMDL implementation plans and would consider whether the existing forest management plans and policies are sufficient (ODEQ 2021).

The Oregon Health Authority regulates public water systems in Oregon. Public water systems are defined as having four or more connections or serving more than 10 people for at least 60 days. As of 2017, there were 163 surface water public water systems and roughly 3,200 groundwater wells or springs that are not under direct influence of surface water.

Analysis Methods

The following information supports the water resource effects analysis. It provides details of effect mechanisms, effects thresholds, and discusses magnitude and duration estimates for water supply, peak flows, low flows, and water quality. The *Forest Stand Age Projections* section discusses the method for estimating the equivalent clearcut area.

Water Supply

In rain-dominated drainages, increases in water yield have ranged from 2 to 6 millimeters (mm) per percentage of basin harvested (Moore and Wondzell 2005; Brown et al. 2005). Increases in annual water yield can diminish rapidly in the first 3 to 10 years after forest cover regrows (Moore and Wondzell 2005), but smaller effects can persist from 10 to 30 years in rain-dominated drainages (Moore and Wondzell 2005).

The magnitude of change in water yield and the duration of the change depends on the aspect of the catchment (Brown et al. 2005; Goeking and Tarboton 2020), degree of soil compaction (Brown et al. 2005), characteristics of post-disturbance vegetation regrowth (Brown et al. 2005; Goeking and Tarboton 2020), and amount of water coming from fog drip (Moore and Wondzell 2005). Catchments with northern aspects had nearly three times the water yield increase as those with southern aspects (Brown et al. 2005). As the stand regenerates, transpiration may exceed preharvest levels for a period, thereby causing a decrease in water yield relative to the preharvest condition, especially if the recovering vegetation has high leaf area and high transpiration rates (Brown et al. 2005; Goeking and Tarboton 2020). Where fog drip is a significant water input, water yield can decrease in the first years after timber harvest, until the canopy regenerates (Moore and Wondzell 2005). As long as the stand does not undergo a permanent change in vegetation community or significant soil compaction, water yield is expected to return to its preharvest condition over time (Brown et al. 2005).

Peak Flows

This section provides additional detail on the thresholds for timber harvest effects on peak flows. Peak flows typically increase as a result of timber harvest and tend to occur earlier in disturbed areas than in nondisturbed areas, although there is some variability in peak flow response depending on severity and extent of disturbance, solar radiation, and post-disturbance vegetation recovery (Goeking and Tarboton 2020). In a set of coastal watersheds in the Pacific Northwest, peak flows increased by 13 to 40% following timber harvest. In most studies of coastal watersheds, the magnitude of changes to peak flow decreases with event magnitude (Moore and Wondzell 2005). This means that the larger the peak flow, the smaller the effect in coastal watersheds. In rain-dominated and transition regions, these effects are only detectable up to the 6-year storm (Grant et al. 2008) and are therefore not a concern for flood flows (Grant et al. 2008; Moore and Wondzell 2005). Elevated peak flows have been observed 20 to 30 years after harvest (Grant et al. 2008).

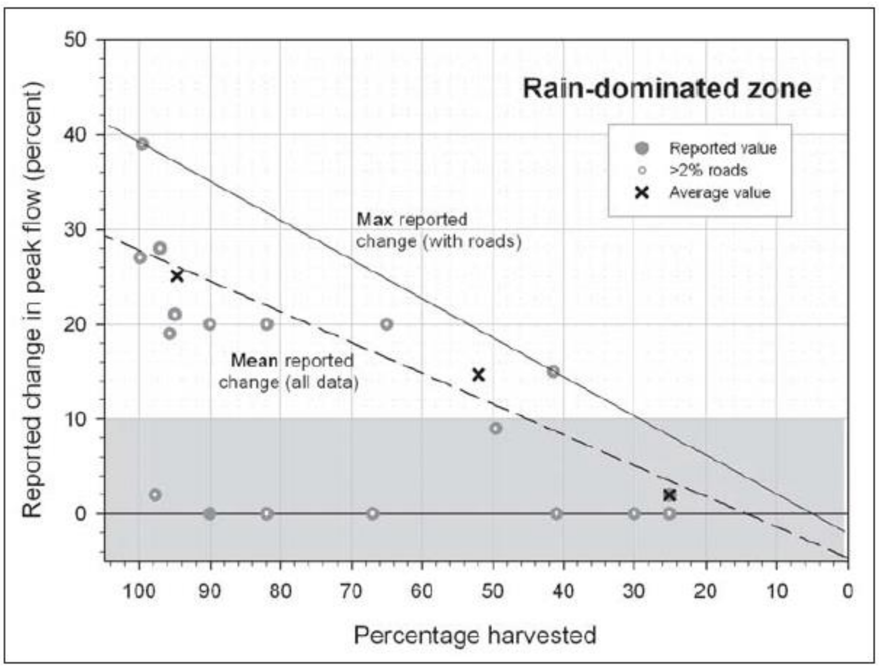
Figures 1 and 2 depict the relationship between watershed conditions, management considerations, and percentage area harvested on peak flow. Figure 1 depicts the relationship between factors other than forest cover removal. Based on these relationships, Dean Creek-Umpqua River, Glenn Creek, Loon Lake-Mill Creek, Lower Camp, North Tenmile, Tenmile Lake-Tenmile Creek, and West Fork Millicoma River subwatersheds may be more susceptible to increases in peak flows due to a combination of high road and stream density, road-stream connectivity, steep slopes, shallow depth to bedrock, and low soil infiltration (Grant et al. 2008). However, the range of increases to the peak flows up to the 6-year storm are unlikely to adversely affect channel condition in the permit area, because the average channel gradient suggests higher peak flows are required to initiate transport due to larger substrate size (Table 3 and Figure 3).

Figure 1. Conditions Affecting Peak Flow Increase

Likelihood of peak flow increase: High		Low	Potential considerations
High	Moderate	Low	Road density
All or most	Some	Few or none	Road connectivity
Fast	Moderate	Slow	Drainage efficiency
Large	Small	Thinned	Patch size
Absent	Narrow	Wide	Riparian buffers

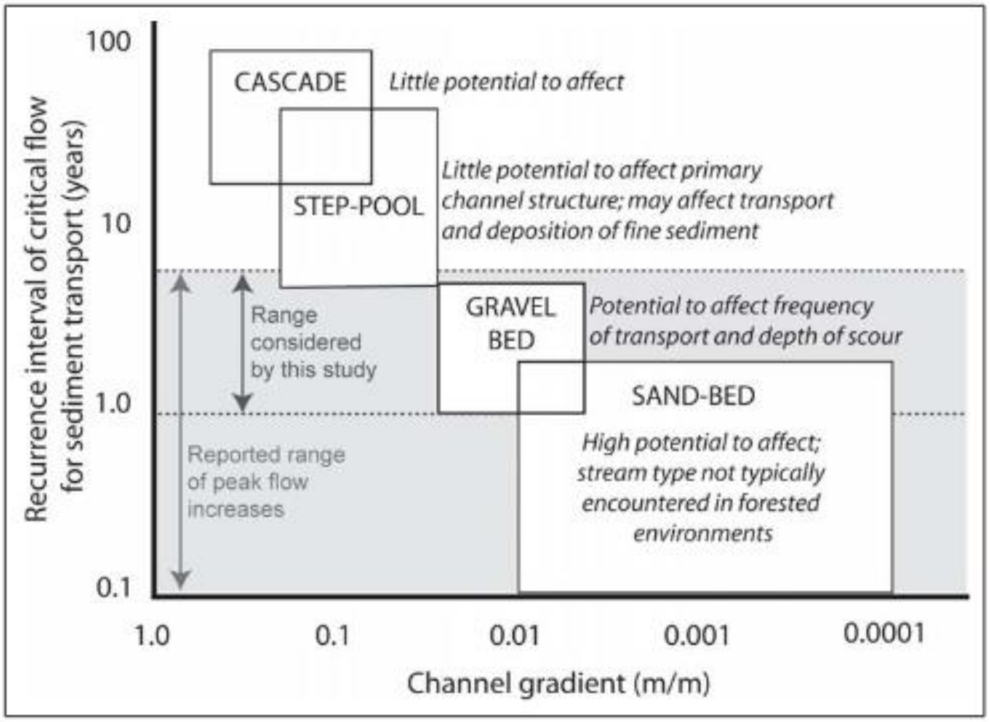
Source: Grant et al. 2008
Note: Considerations are listed from high to low likelihood of effect.

Figure 2. Peak Flow Response to Harvest in Rain-Dominated Areas



Source: Grant et al. 2008
Note: Gray shading indicates limit of detection.

Figure 3. Relationship between Channel Gradient and Recurrence Interval for Initiation of Bedload Sediment Transport



Source: Grant et al. 2008

Low Flows

Dry season low flows typically increase as a result of harvest in the immediate years following harvest (Goeking and Tarboton 2020; Moore and Wondzell 2005). However, multiple studies in western Oregon (Segura et al. 2020; Coble et al. 2020; Perry and Jones 2017) found that summer flows in basins with trees ages 25 to 45 years were 25 to 50% lower than basins with trees older than 100 years old. If a sufficient percentage of the watershed is cleared of these older growth trees, approximately 5 to 15 years after harvesting these trees, summer low flow levels can drop compared to initial conditions (Perry and Jones 2017; Gronsdahl et al. 2019; Moore et al. 2004, 2020; Segura et al. 2020). The paired basin studies in Douglas-fir-dominated Pacific Northwest forests reveal low flow deficits in basins where older stands underwent 25% patch cut to 100% clearcut (Coble et al. 2020; Perry and Jones 2017). To be conservative in the analysis, 25% of the catchment must be converted from 100-year-old or older trees to younger age classes before effects on low flow are considered observable (Coble et al. 2020).

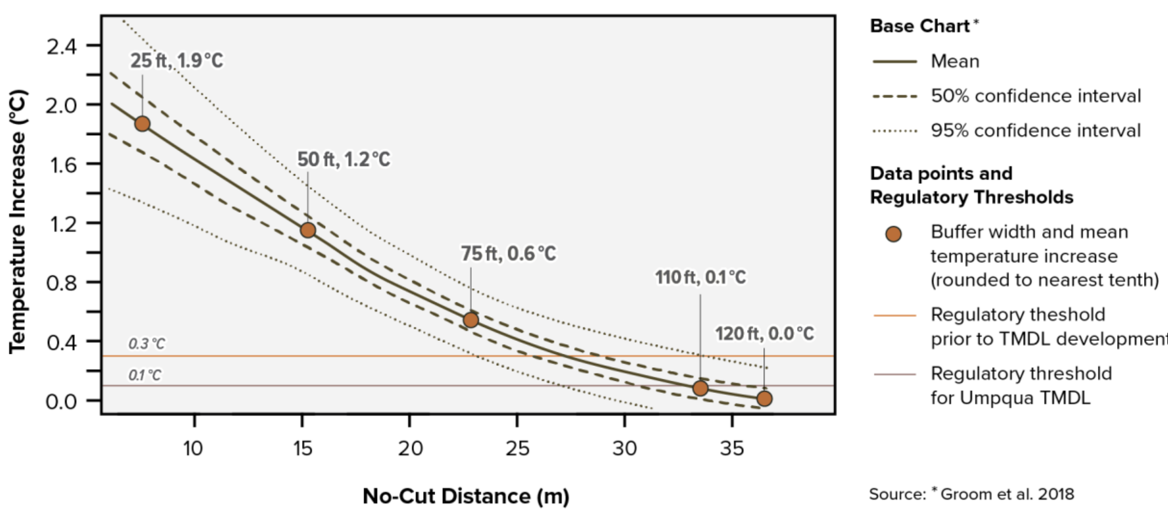
In addition to age, density, successional stage, and species composition may also affect low flows, where the older stands were also less dense (Segura et al. 2020). Based on these studies, it is theoretically possible that the percent area where restoration thinning takes place may cause an additional increase in low flows by reducing the density and number of younger trees. For the purposes of the analysis, only stand age and stand area were quantified.

Summer baseflows are more sensitive to increasing transpiration than winter flows in western Oregon because evapotranspiration is highest in summer and precipitation is at its lowest (Brown et al. 2005). Because almost all precipitation occurs during the winter, decreases in summer low flows are a concern for fish habitat, stream temperature, and surface water users who do not have sufficient capacity to store winter flows (Perry and Jones 2017).

Water Quality

The riparian buffer width needed to maintain shading takes place within about 150 to 200 feet for old growth conifers in the Pacific Northwest (Moore et al. 2005). Groom et al. (2011a) reported that 68 to 75% of post-harvest shade in western Oregon streams were accounted for by increased basal area, tree height, and downed large wood within 100 feet of the stream (Groom et al. 2011b). Yonce et al. (2021) found that effects on stream shade approached zero after 177 feet. As shown in Figure 4, Groom et al. (2018) found that buffers had to be at least 110 feet wide to meet the regulatory limit of 0.3°C increase for streams that do not have a TMDL and do not meet the exception to the Cold-Water Protection rule, within a 95% confidence interval (Leinenbach 2021) (blue lines are author's emphasis). Streams with 120-foot-wide buffers had zero temperature effect on average, and their 50% confidence interval met the 0.1°C regulatory limit under the Umpqua temperature TMDL.

Figure 4. Stream Temperature Response to Various Slope Distance Riparian Width Conditions Relative to Regulatory Thresholds



Note: The base chart is from Groom et al. 2018. Data points for mean temperature increase at each the buffer width (in feet) discussed in Section 3.3 and regulatory thresholds were added.

Although riparian buffers protect water temperature warming from timber harvest, they are unlikely to fully compensate for the additional effects of climate change on water temperature (Yonce et al. 2021). Further protecting and restoring diverse tree age class, large wood recruitment, stream enhancement, and restricting soil disturbance in aquatic and riparian areas may mitigate the effects of climate change on surface water temperature (Yonce et al. 2021; Groom et al. 2011b). Large wood mitigates the effect of timber harvest on water temperature by increasing shade and improving hyporheic exchange with groundwater. Large wood also creates pools, which tend to stay cooler, provides additional shading to streams, and aids conifer establishment in the riparian area (Groom et al. 2011b; Naiman et al. 2002).

Lakel et al. (2010) support the common recommendation for stream management zone widths of 50 feet, in which partial timber harvest may occur. However, they found that sediment trapped within the stream management zone was not significantly different across treatment widths ranging from 25 to 100 feet wide. The Rashin et al. (2006) study suggests that buffers or equipment limitation zones of 30 feet would be sufficient to protect against most sediment delivery. They state that sediment more than 30 feet from the channel is unlikely to be delivered unless it is routed via concentrated drainage, which can be caused by channels, cable-yarding, and skidder trails. A 30-foot buffer is more susceptible to windthrow, and so the long-term effectiveness would be less than a wider buffer.

Forest Stand Age Projections

Forest cover by stand age was projected in 10-year increments by applying rules related to rotation age, harvest and thinning timing, and amount of stand removed—based on the treatments presented in Section 3.1.3, *Approach to Analysis*, and the descriptions in Chapter 2, *Proposed Action and Alternatives*—to age data from the existing stand-level inventory (OSU 2023). The extent of the change in cover by age class over time indicates the magnitude and extent of effects on water yield, peak flow, channel condition, and low flows. Stand age changed based on treatment and allocation type as follows.

- **Clearcut.** Under the no action alternative, where stand age reached age 20 and age 40, 50% of stand area was reset to 0 years old to represent precommercial and commercial thinning. When stand age reached the rotation age of 60, 100% of the stand area was reset to 0 years old. Under the action alternatives, the same rules were followed for Intensive allocations. For Flexible Intensive allocations, 100% of the stand area was reset to 0 when the stand reached the rotation age of 50 years old.

- **Variable density thinning.** Under the no action alternative, stands were treated the same as clearcut except only 50% of the stand area was reset to 0 years old at age 60. Under the action alternatives, in non-plantation stands, the rotation age was extended to 100 years old, and 10% of the area occupied by older trees was included in the area covered by the 50% commercial thin 40 years later. In plantation stands, 80% of the stand age was reset to 0 years old at a rotation age of 100 years old. The 20% of the area retained consisted of 10% area that had been replanted after thinning and 10% that had been retained during thinning.

- **Restoration thinning.** Under the no action alternative, 50% of stand area was reset to 0 years old. Under the action alternatives, in RCAs, 50% of the stand area was reset to 0 years up to 1,200 acres in the first 30 years of the permit term. According to the HCP restrictions, 780 acres were reset to 0 years old in the conservation research watershed RCAs, while 420 acres were in the management research watershed RCAs. To be conservative, the 1,200 acres were taken from the subwatersheds with the highest amount of stand area under 20 years old.

Table 13 presents the percent area of each subwatershed available by each treatment type under the proposed action and alternatives. The following section describes the impact on water resources.

Table 13. Approximate Percent Area of Subwatersheds Available[a] for Each Treatment Type under the Proposed Action and Alternatives

Subwatershed Name	Alternative	No Harvest	Restoration Thinning	Variable Density Harvest	Clearcut Harvest	Percent of Watershed in Permit Area[b]
Coos Bay	No Action	0.1%	0.0%	0.1%	0.3%	0.5%
Coos Bay	Proposed Action	0.0%	0.0%	0.0%	0.4%	0.5%
Coos Bay	Alternative 3	0.1%	0.0%	0.0%	0.4%	0.5%
Coos Bay	Alternative 4	0.0%	0.0%	0.0%	0.4%	0.5%
Dean Creek-Umpqua River	No Action	25.9%	0.5%	0.0%	9.3%	35.6%
Dean Creek-Umpqua River	Proposed Action	24.2%	8.4%	2.3%	0.7%	35.6%
Dean Creek-Umpqua River	Alternative 3	27.3%	6.1%	1.6%	0.6%	35.6%
Dean Creek-Umpqua River	Alternative 4	22.7%	1.1%	2.4%	9.5%	35.6%
East Fork Millicoma River	No Action	0.3%	0.0%	0.1%	0.3%	0.7%
East Fork Millicoma River	Proposed Action	0.3%	0.0%	0.0%	0.3%	0.7%
East Fork Millicoma River	Alternative 3	0.3%	0.1%	0.0%	0.3%	0.7%
East Fork Millicoma River	Alternative 4	0.3%	0.0%	0.0%	0.3%	0.7%
Glenn Creek	No Action	6.3%	1.1%	0.0%	18.6%	26.0%
Glenn Creek	Proposed Action	3.8%	2.9%	12.4%	6.9%	26.0%
Glenn Creek	Alternative 3	5.7%	3.0%	11.0%	6.2%	26.0%
Glenn Creek	Alternative 4	3.7%	1.7%	12.6%	7.9%	26.0%
Haynes Inlet	No Action	12.3%	0.2%	0.2%	7.3%	20.0%
Haynes Inlet	Proposed Action	9.5%	1.6%	3.8%	5.1%	20.0%
Haynes Inlet	Alternative 3	12.4%	1.2%	1.9%	4.5%	20.0%
Haynes Inlet	Alternative 4	8.8%	0.6%	4.6%	6.1%	20.0%
Little Mill Creek-Umpqua River	No Action	0.6%	0.0%	0.1%	0.1%	0.8%
Little Mill Creek-Umpqua River	Proposed Action	0.5%	0.0%	0.0%	0.4%	0.8%
Little Mill Creek-Umpqua River	Alternative 3	0.5%	0.0%	0.0%	0.3%	0.8%
Little Mill Creek-Umpqua River	Alternative 4	0.5%	0.0%	0.0%	0.4%	0.8%
Loon Lake-Mill Creek	No Action	45.4%	0.6%	1.2%	22.6%	69.8%
Loon Lake-Mill Creek	Proposed Action	32.3%	5.0%	12.9%	19.6%	69.8%
Loon Lake-Mill Creek	Alternative 3	40.6%	9.6%	5.4%	14.2%	69.8%
Loon Lake-Mill Creek	Alternative 4	31.8%	2.7%	13.4%	22.0%	69.8%

Subwatershed Name	Alternative	No Harvest	Restoration Thinning	Variable Density Harvest	Clearcut Harvest	Percent of Watershed in Permit Area[b]
Lower Camp Creek	No Action	0.1%	0.0%	0.1%	0.1%	0.3%
Lower Camp Creek	Proposed Action	0.0%	0.0%	0.0%	0.3%	0.3%
Lower Camp Creek	Alternative 3	0.0%	0.2%	0.0%	0.1%	0.3%
Lower Camp Creek	Alternative 4	0.0%	0.0%	0.0%	0.3%	0.3%
Lower Lake Creek	No Action	0.2%	0.3%	0.0%	5.2%	5.7%
Lower Lake Creek	Proposed Action	0.1%	0.4%	1.3%	3.9%	5.7%
Lower Lake Creek	Alternative 3	0.5%	0.6%	1.1%	3.4%	5.7%
Lower Lake Creek	Alternative 4	0.0%	0.4%	1.3%	4.0%	5.7%
North Tenmile Lake	No Action	27.4%	0.4%	1.1%	11.0%	39.9%
North Tenmile Lake	Proposed Action	24.9%	10.5%	4.5%	0.0%	39.9%
North Tenmile Lake	Alternative 3	28.3%	7.8%	3.8%	0.0%	39.9%
North Tenmile Lake	Alternative 4	24.7%	1.4%	5.5%	8.3%	39.9%
Scholfield Creek	No Action	19.8%	1.0%	2.4%	10.5%	33.7%
Scholfield Creek	Proposed Action	16.4%	11.9%	5.3%	0.0%	33.7%
Scholfield Creek	Alternative 3	20.3%	9.2%	4.2%	0.0%	33.7%
Scholfield Creek	Alternative 4	15.3%	1.7%	6.5%	10.2%	33.7%
Tenmile Lake-Tenmile Creek	No Action	32.6%	0.5%	0.0%	13.4%	46.6%
Tenmile Lake-Tenmile Creek	Proposed Action	28.5%	13.9%	2.3%	1.9%	46.6%
Tenmile Lake-Tenmile Creek	Alternative 3	32.7%	10.7%	1.4%	1.8%	46.6%
Tenmile Lake-Tenmile Creek	Alternative 4	28.2%	1.7%	2.3%	14.4%	46.6%
West Fork Millicoma River	No Action	40.7%	1.5%	3.2%	34.9%	80.3%
West Fork Millicoma River	Proposed Action	26.3%	9.5%	17.9%	26.6%	80.3%
West Fork Millicoma River	Alternative 3	35.9%	11.1%	10.5%	22.8%	80.3%
West Fork Millicoma River	Alternative 4	25.3%	3.9%	19.1%	32.0%	80.3%

[a] Area available for restoration thinning in RCAs under the action alternatives is capped at 1,200 acres. The location of those acres is unknown. Therefore the cap is not reflected in the table of above. The ECA analysis made the conservative assumption that RCA restoration thinning would occur in subwatersheds that are expected to have the highest overall ECA.

[b] Constituents may not sum to total exactly due to rounding errors.

Environmental Consequences

The following sections provide additional information on effects on water resources from the proposed action and alternatives.

Water Yield and Peak Flows

Table 14 presents the estimated maximum HUC 12 subwatershed equivalent clearcut area (represented by trees aged less than 20 years old), based on 10-year intervals, over the permit term under each alternative. This age class corresponds to elevated average annual water yield and increased peak flows for subwatersheds with over 20% (Stednick and Troendle 2016) and 45% (Grant et al. 2008) in the age class, respectively. As shown in Table 14, none of the subwatersheds exceed the peak flow threshold. Only Westfork Millcoma, under Alternative 4, would exceed the water yield threshold.

Table 14. Approximate Maximum Percent Area Where Average Tree Age Would Be 20 Years Old or Younger

HUC 12	No Action	Proposed Action	Alternative 3	Alternative 4
Coos Bay	0.2%	0.3%	0.3%	0.3%
Dean Creek-Umpqua River	4.8%	3.0%	2.6%	6.1%
East Fork Millicoma River	0.2%	0.2%	0.2%	0.2%
Glenn Creek	9.9%	9.6%	8.5%	10.0%
Haynes Inlet	3.2%	4.8%	3.2%	4.8%
Little Mill Creek-Umpqua River	0.2%	0.4%	0.3%	0.4%
Loon Lake-Mill Creek	12.1%	18.4%	12.2%	19.8%
Lower Camp Creek	0.2%	0.3%	0.2%	0.3%
Lower Lake Creek	3.4%	2.9%	2.6%	3.1%
North Tenmile Lake	8.0%	3.5%	4.2%	7.6%
Scholfield Creek	7.3%	3.4%	4.6%	8.7%
Tenmile Lake-Tenmile Creek	7.5%	6.0%	3.9%	8.7%
West Fork Millicoma River	14.4%	19.1%	14.5%	21.1%

Most forest hydrology research is conducted by comparing basins that are more similar in scale to the 400- to 2,000-acre experimental subwatersheds defined in the Oregon State University research proposal (HCP Appendix C, *Proposal: Elliott State Research Forest*). At this local scale, effects are more detectable. Table 15 shows the percentage of HUC 12 subwatershed covered by experimental subwatersheds exceeding 45% clearcut equivalent during at least one 10-year period of the permit term. This indicates local detectable effect on peak flows and potential channel erosion. Actual changes to peak flows and channel erosion would depend on the pace and scale of treatments and the permeability of underlying bedrock, stream channel slope, and size of stream channel sediment, as described in the previous section, *Analysis Methods*.

Table 15. Percentage of Subwatersheds Covered by Experimental Subwatersheds where Maximum Percent Area of Trees Age less than 20 Years Old on Average Would be at Least 45%

HUC 12	No Action	Proposed Action	Alternative 3	Alternative 4
Coos Bay	0	<1%	<1%	<1%
Dean Creek-Umpqua River	0	0	<1%	<1%
East Fork Millicoma River	<1%	<1%	0	<1%
Glenn Creek	4%	4%	5%	5%
Haynes Inlet	<1%	0	<1%	<1%
Little Mill Creek-Umpqua River	0	0	0	0
Loon Lake-Mill Creek	7%	2%	1%	12%
Lower Camp Creek	0	0	0	0
Lower Lake Creek	3%	4%	2%	3%
North Tenmile Lake	<1%	0	0	0
Scholfield Creek	<1%	0	0	0
Tenmile Lake-Tenmile Creek	0	1%	<1%	1%
West Fork Millicoma River	2%	7%	5%	8%

Low Flows

Table 16 shows the percent area of each subwatershed where trees over 100 years old at the start of the permit term may be harvested during the permit term, representing potential adverse effects on low flows. Table 17 shows the net change in trees over 100 years old in each subwatershed: the percent area of harvested 100-year-old or older stands is subtracted from the percent area of stands allowed to mature to 100 years or older. Positive numbers in Table 17 indicate that the area of stands left to grow older (over 100 years) is greater than the area where older stands were harvested and where regenerated stands are vigorously growing. This means that any deficit in low flows caused by the harvesting of these older stands (Table 16) may be offset by the conversion of other stands to that age class at the subwatershed scale over the permit term. Both Table 16 and 17 are shown, because although the growth of older trees may offset effects of harvest of older trees over the permit term there could still be adverse effects for a period of time. Both Tables 16 and 17 show these changes at thesubwatershed scale is less than the detectable limit (25% of the subwatershed) under all alternatives. Moreover, while the loss in older stand area ranges from 0% to 3.1% depending on subwatershed and alternative (Table 16), the net change in older stands is positive for all subwatersheds and alternatives (Table 17).

Tables 18 and 19 explore the potential extent of more localized low flow effects by analyzing the experimental subwatersheds. Table 18 summarizes the extent of experimental subwatersheds with net *losses* of older growth trees greater than 25% experimental subwatershed area by the end of the permit term. Table 19 summarizes the extent of net *gains* of older growth trees greater than 25% experimental subwatershed area by the end of the permit term. These experimental subwatershed areas were summed and divided by the subwatershed area to indicate the total extent of area contributing to adverse or beneficial impacts on low flows. For example, in Table 18, under the proposed action, three experimental subwatersheds in the Loon Lake-Mill Creek subwatershed would experience a net loss of greater than 25% of 100-year-old tree area by the end of the permit term when compared to the beginning of the permit term. These three experimental subwatersheds are very small, amounting to 2% of the subwatershed. Similarly, in Table 19, under the proposed action, four experimental subwatersheds in the Scholfield Creek subwatershed would experience a net gain of greater than 25% of their older growth tree area. These four experimental subwatersheds are larger and amount to 26% of the Scholfield subwatershed.

Table 16. Percent Subwatershed Area to Be Harvested Where Initial Stand Age Is Over 100 Years Old

HUC 12	No Action	Proposed Action	Alt 3	Alt 4
Coos Bay	0	0	0	0
Dean Creek-Umpqua River	0	0.3%	0	0.3%
East Fork Millicoma River	0	0	0	0
Glenn Creek	0.2%	0	0	0.1%
Haynes Inlet	0.6%	1.0%	0	1.3%
Little Mill Creek-Umpqua River	0	0	0	0
Loon Lake-Mill Creek	0.6%	2.6%	0	2.9%
Lower Camp Creek	0	0	0	0
Lower Lake Creek	0	0	0	0
North Tenmile Lake	0.2%	0.2%	0	0.2%
Scholfield Creek	0.1%	0	0	0
Tenmile Lake-Tenmile Creek	0	0.4%	0	0.4%
West Fork Millicoma River	1.2%	2.5%	0	3.1%

Table 17. Balance of Percent Subwatershed Area of Harvested 100-Year or Older Stands and Stands that Mature to 100 Years or More[a]

HUC 12	No Action	Proposed Action	Alt 3	Alt 4
Coos Bay	0.1%	0	0.1%	0
Dean Creek-Umpqua River	2.9%	7.1%	7.7%	1.1%
East Fork Millicoma River	0.1%	0	0.4%	0.3%
Glenn Creek	3.0%	3.9%	5.7%	3.3%
Haynes Inlet	2.5%	1.7%	3.6%	0.8%
Little Mill Creek-Umpqua River	0.2%	0	0	0
Loon Lake-Mill Creek	9.4%	2.8%	11.1%	1.0%
Lower Camp Creek	0.1%	0	0.1%	0
Lower Lake Creek	0.3%	0.8%	1.3%	0.7%
North Tenmile Lake	3.8%	8.2%	8.9%	2.5%
Scholfield Creek	6.2%	10.1%	10.0%	1.5%
Tenmile Lake-Tenmile Creek	4.2%	6.9%	9.5%	0.7%
West Fork Millicoma River	11.4%	6.8%	14.5%	2.9%

[a] Positive numbers indicate a potential net beneficial effect (increase in low flows). Negative numbers indicate a potential net adverse effect (lower low flows).

Table 18. Percent Area of Subwatershed Covered by Experimental Subwatersheds where Net Change of Trees Older than 100 years old is a Loss greater than 25% Experimental Subwatershed Area[a]

HUC 12	No Action	Proposed Action	Alt 3	Alt 4
Coos Bay	0	0	0	0
Dean Creek-Umpqua River	0	0	0	0
East Fork Millicoma River	0	0	0	0
Glenn Creek	0	0	0	0
Haynes Inlet	0	0	0	0
Little Mill Creek-Umpqua River	0	0	0	0
Loon Lake-Mill Creek	0	-2%	0	-1%
Lower Camp Creek	0	0	0	0
Lower Lake Creek	0	0	0	-1%
North Tenmile Lake	0	0	0	0
Scholfield Creek	0	0	0	0
Tenmile Lake-Tenmile Creek	0	0	0	0
West Fork Millicoma River	0	0	0	0

Table 19. Percent Area of Subwatershed Covered by Experimental Subwatersheds where Net Change of Trees Older than 100 years old is a Gain greater than 25% Experimental Subwatershed Area[a]

HUC 12	No Action	Proposed Action	Alt 3	Alt 4
Coos Bay	0	0	0	0
Dean Creek-Umpqua River	<1%	10%	10%	0
East Fork Millicoma River	<1%	0	<1%	<1%
Glenn Creek	<1%	0	13%	0
Haynes Inlet	1.2%	1%	7%	0
Little Mill Creek-Umpqua River	0	0	0	0
Loon Lake-Mill Creek	2%	0	17%	0
Lower Camp Creek	0	0	0	0
Lower Lake Creek	0	1%	1%	1%
North Tenmile Lake	0	6%	6%	6%
Scholfield Creek	5%	26%	26%	0
Tenmile Lake-Tenmile Creek	0	<1%	3%	0
West Fork Millicoma River	4%	3%	16%	<1%

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Appendix 3.4
Vegetation Technical Supplement

This technical supplement discusses forest structure; provides details on special-status plant species documentation, habitat requirements, and likelihood of occurrence; and describes current wetland regulations for forest practices under state and federal law.

Forest Structure

This section describes general forest structure by seral forest stage and old-growth forests based on Carey (2007) unless otherwise noted.

Early-Seral Stage

Early-seral forest stands are young forests, between 0 and 30 years of age, where the overstory has been removed through either harvest or natural disturbance. Early-seral stands have varying biodiversity and structural complexity and generally fall into ecosystem reorganization and competitive exclusion. Ecosystem reorganization occurs following natural disturbance or harvest and, in managed forests, consists of a period of revegetation. Stands in this phase may consist mostly of a few dominant species (e.g., if the stand is managed for harvest) or have a more diverse blend of species (e.g., if a stand is being managed to promote habitat characteristics). Simple early-seral forests have little legacy structure (large trees, snags, and downed wood), low tree species diversity, and little shrub or herbaceous vegetation. Complex early-seral forests have greater retention of remnant overstory trees and snags, a regenerating tree cohort with multiple native species at low to moderate density, and moderate to abundant shrub and herbaceous vegetation.

The competitive exclusion phase occurs after ecosystem reorganization and consists of competition between vegetation species for light, water, and nutrients. Stands in this phase have more canopy closure and may lack understory species and shorter trees. Dominant and codominant trees may self-thin, with surviving trees being able to maintain relatively healthy crown ratios.[1] Where self-thinning does not occur, overstory trees may become tall and spindly, with poor crown and height-to-diameter ratios. Complex structure in the competitive exclusion phase is limited due to resource competition. Over time, openings around legacy structures or brushy patches help maintain understory shrubs and herbaceous vegetation. Young tree species with different growth rates and shade tolerance allow canopy diversification, and legacy structures contribute to structural complexity.

Mid-Seral Stage

Mid-seral forest stands are generally 30 to 80 years old, but can be as old as 120 years, depending on disturbance history and stand density. They vary in structural diversity and their development is influenced by small-scale natural disturbance events. Stages in mid-seral stand development include biomass accumulation, understory reinitiation, and understory development.

[1] The *crown ratio* is the percent of total tree height that supports live foliage.

The biomass accumulation phase includes the development of woody biomass within relatively young mid-seral stands. Simple mid-seral stands in the biomass accumulation phase have canopy closure and limited understory vegetation. Complex mid-seral stands have reduced diversity compared to the competitive exclusion stage, but generally maintain dominant tree species diversity, and legacy structures provide openings for understory vegetation.

In the understory reinitiation and development phases, a mid-seral stand begins to develop understory plant cover. Simple stands in this phase contain an overstory of uniformly spaced codominant trees with little species diversity. Complex stands in understory reinitiation contain overstory canopy heterogeneity, legacy components that contribute to patchiness, species competition in the midstory, and little vertical layering. Simple stands in understory development have more gaps in the canopy and more understory species than simple stands in understory reinitiation. Complex stands in understory development can have varying degrees of canopy closure and a varied understory. These stands have begun to have vertical canopy layering and structure that supports nesting and roosting.

Late-Seral Stage

In the Pacific Northwest, late-seral Douglas-fir stands are generally between 80 and 200 years of age (Spies and Franklin 1991). Structural characteristics vary among late-seral stands depending on previous management and natural disturbance. Large trees are present, downed wood has begun to accumulate, and a diverse, vertically layered understory has emerged. Stands are more likely to comprise a mix of tree species as both shade and shade intolerant tree species are established. Natural tree thinning occurs from competition for nutrients and space or as seedlings are shaded out. Understory reinitiation expands, compared to mid-seral forests, as the overstory ages out, creating gaps in the canopy for regrowth of the understory (Powell 1996). Late-seral Douglas-fir stands are typically less dense with larger-diameter trees at a variety of heights. More large logs are present as legacy trees or large snags fall to the forest floor (Spies and Franklin 1991). As late-seral stands develop, natural and management-related disturbances create new openings for understory and tree seeding and move large wood from upslope to riparian areas.

Old Growth Forests

In the Pacific Northwest, old growth stands are 200 years or older (Franklin and Spies 1991). Typical characteristics of old growth include moderate to high canopy closure; a patchy, multilayered, multispecies canopy with trees of several age classes, dominated by large overstory trees with a high incidence of large living trees, some with broken tops and other indications of old and decaying wood; numerous large snags; and heavy accumulations of downed wood (Carey 2007; Spies and Franklin 1991). The incidence of complex features such as broken tops or snags with natural cavities are three times more likely to be present in old growth Douglas-fir stands when compared to early or mid-seral Douglas-fir stands. In addition, shade-tolerant seedling species are more present in the understory (Spies and Franklin 1991). Coastal Douglas-fir stands are known to be especially long lived with subclimax stands aged between 350 and 700 years old. If left undisturbed, these stands give way to more shade-tolerant coniferous species such as western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata*), and Pacific silver fir (*Abies amabilis*) over time, though it may take up to 1,000 years for Douglas-fir stands to be fully replaced (Uchytil 1991).

Seral Forest Stage by Alternative

Forest stand age projections were developed to understand how differences in harvest treatments and areas available for those treatments under the proposed action and alternatives would affect stand age over the analysis period (80 years). These projections applied rules related to rotation age, harvest timing, and amount of stand removed—based on the treatments presented in Section 3.1.3, *Approach to Analysis*, and the descriptions in Chapter 2, *Proposed Action and Alternatives*—to age data from the existing stand-level inventory (OSU 2023). These rules are summarized below.

- In no-treatment areas and areas available for only restoration thinning, stands were allowed to grow forward throughout the analysis period under all alternatives.
- In areas available for clearcut harvest:
  - Under the no action alternative, stands were harvested (returned to age 0) when they reached 60 years.
  - Under the proposed action and action alternatives, stands were harvested when they reached 50 years if in a Flexible allocation or when they reached 60 years if in an Intensive allocation.
- In areas available for variable density harvest:
  - Under the no action alternative, 50% of stands were harvested on a 60-year rotation.
  - Under the proposed action and action alternatives:
    - In stands that were over 65 years as of 2020, 50% of the stand was harvested on a 100-year rotation.
    - In stands that were 65 years or younger as of 2020, 80% of the stand was harvested on a 100-year rotation.

The stand age projections do not reflect future climate change, disturbance events, or post-disturbance forest management. Projected effects of climate change on stand age are described based on Section 3.7, *Climate Change*.

Table 1 presents the total acreages by seral stage in the permit area as anticipated under the proposed action and alternatives over the duration of the proposed permit term. It also presents the percent difference in total acreages by seral stage between the no action alternative and the other alternatives.

Special-Status Plant and Fungus Species Tables

Table 2 lists the names of special-status plants and fungus with known observances within 2 miles of the permit area. Table 2 also contains these species' habitat, range, and potential to occur within the permit area.

Table 1. Projected Seral Stages of Forest Stands in the Permit Area Over the Analysis Period for the Proposed Action and Alternatives

		Extent of Seral Forest (Analysis period)														
		Year 0			Year 20			Year 40			Year 60			Year 80		
Seral Stage	Alternative	Acres	% of Permit Area [a]	% Change from No Action	Acres	% of Permit Area	% Change from No Action	Acres	% of Permit Area	% Change from No Action	Acres	% of Permit Area	% Change from No Action	Acres	% of Permit Area	% Change from No Action
Early-seral	No Action	8,891	11%	–	19,146	23%	–	20,509	25%	–	6,851	8%	–	18,895	23%	–
	Proposed Action	8,892	11%	–	10,192	12%	-11%	9,796	12%	-13%	13,251	16%	8%	14,307	17%	-6%
	Alternative 3	8,892	11%	–	7,541	9%	-14%	7,778	9%	-16%	10,944	13%	5%	11,838	14%	-9%
	Alternative 4	8,892	11%	–	18,633	22%	-1%	19,071	23%	-2%	14,463	17%	9%	22,769	27%	4%
Mid-seral	No Action	33,939	41%	–	23,897	29%	–	19,738	24%	–	27,014	32%	–	13,100	16%	–
	Proposed Action	33,947	41%	–	33,131	40%	11%	28,065	34%	10%	12,503	15%	-17%	10,497	13%	-3%
	Alternative 3	33,947	41%	–	34,437	41%	12%	28,077	34%	10%	10,733	13%	-19%	7,755	9%	-7%
	Alternative 4	33,947	41%	–	24,962	30%	1%	21,602	26%	2%	22,957	28%	-4%	14,665	18%	2%
Late-seral	No Action	40,013	48%	–	39,544	48%	–	40,187	48%	–	31,814	38%	–	15,143	18%	–
	Proposed Action	40,020	48%	–	39,271	47%	-1%	42,542	51%	3%	40,216	48%	10%	23,040	28%	10%
	Alternative 3	40,020	48%	–	40,616	49%	1%	44,549	54%	6%	43,794	53%	15%	27,032	33%	15%
	Alternative 4	40,020	48%	–	38,999	47%	-1%	39,732	48%	0%	28,606	34%	-4%	10,574	13%	-5%
Old growth	No Action	268	0%	–	523	1%	–	2,676	3%	–	17,431	21%	–	35,972	43%	–
	Proposed Action	267	0%	–	532	1%	0%	2,722	3%	0%	17,156	21%	0%	35,282	42%	-1%
	Alternative 3	267	0%	–	532	1%	0%	2,722	3%	0%	17,654	21%	0%	36,500	44%	1%
	Alternative 4	267	0%	–	532	1%	0%	2,720	3%	0%	17,099	21%	0%	35,118	42%	-1%

[a] The total permit area acreages vary slightly across the individual alternatives due to insignificant data errors. To account for this slight difference, the percent area of each seral stage in each alternative is based on the average total permit area acreage (83,121 acres) across all alternatives.

Table 2. Elevation, Habitat, and Geographic Range of Listed Threatened, Endangered, and Species of Concern Plants and Fungus Known to Occur or Potentially Occur in the Coast Region of Counties in the Permit Area

Common Name	Scientific Name	Conservation Status	Habitat	Geographic Range	Occurrence Relative to Permit Area
Fungus	*Glomus pubescens*	S1	Occurs in mixed stands on decaying wood.	Coast Range in Coos and Douglas Counties.	Documented in Douglas County north of the permit area. May occur in permit area based on habitat type.
Whorled marsh pennywort	*Hydrocotyle verticillata*	S1	Occurs in marshes, shores of rivers and lakes, or wetland forests.	Widespread across southern America, extending north to Oregon, Missouri, and New York	Documented in a small portion of the western boundary of permit area. May occur in wetlands in permit area.
Fungus	*Hydropus marginellus*	S2	Occurs in coniferous forests and is associated with Douglas-firs, western redcedars, and big leaf maples.	Ranges from Humboldt County, California to Whatcom County, Washington	Documented in Douglas County east of the permit area. May occur in permit area based on habitat type.
Fungus	*Phaeocollybia lilacifolia*	S1S2	Occurs in old growth and mature forests, especially spruce, true fir species, and western redcedar	Northern California and coastal Washington as well as scattered sites along the Cascade Range	Documented in Douglas County east of the permit area. Only occurs in a few isolated pockets in Oregon. Unlikely to occur in the permit area based on forest age and structure.
Henderson's sidalcea	*Sidalcea hendersonii*	S1	Occurs in coastal tideland and marshes.	Range from Douglas County, Oregon north to British Columbia.	Documented in Coos and Douglas Counties. Does not occur in permit area based on habitat type.
Fungus	*Rickenella swartzii*	S2	Occurs in temperate forests and associated with mosses under hardwoods.	Range from Northern California to northern Washington	Documented in Douglas County east of the permit area. May occur in permit area based on habitat type.
Water-pimpernel	*Samolus parviflorus*	SNR	Occurs in marshes, estuaries, or brackish areas.	Southern British Columbia to California. Pacific Northwest range limited to intertidal areas.	Documented in Douglas County north of the permit area. Does not occur in the permit area based on habitat type.

S1 = State critically imperiled, S2 = State imperiled, S3 = State rare, SNR = State not ranked

Source: ORBIC 2022; Castellano et al. 2003; Chambers 2012; CNPS 2022; Goldenberg 2017; Helliwell 2011; Kirkpatrick et al. 2012; NatureServe 2022; ODA 2014; Oregon Flora 2019; PFAF 2010; Preston and Lincoln 2012; Titus 1995; Washington Department of Natural Resources 2013a, 2013b, 2013c

Wetlands

Table 3 identifies the total acres of wetlands found in the permit area by classification as mapped in the National Wetland Inventory.

Table 3. Acres of Wetlands by Type in Permit Area

Wetland Classification	Acreage	Percent of Total Wetlands
Riverine	1,953	91%
Lake	1	0.1%
Freshwater Pond	7	0.9%
Freshwater Emergent	71	3%
Freshwater Forested/Shrub	114	5%
Total	**2,146**	**100%**

Source: FWS 2020

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Appendix 3.5-A
Fish Technical Supplement

This appendix discusses the approach and results of screening fish and stream-dependent wildlife species that occur in the study area to determine which special-status fish and stream-dependent wildlife species may be affected under the proposed action and alternatives. Native species not of special status, but ecologically or culturally important, were also considered.

Various designations are used by federal and state agencies to indicate the status of species that are of special concern. Federally listed wildlife species, candidate species, and designated critical habitats under the Endangered Species Act (ESA) that may occur in the study area were identified through the U.S. Fish and Wildlife Service (FWS) Information for Planning and Consultation (IPaC) map tool (FWS 2024). IPaC identifies occurrences of listed species, critical habitat, migratory birds, and other natural resources under FWS jurisdiction that may be affected by the proposed action and alternatives. The National Oceanic and Atmospheric Administration (NOAA) Fisheries' Species and Habitat Application (NOAA 2024a) and the NOAA Threatened and Endangered Species directory (NOAA 2024b) were also consulted to identify fish species under NOAA jurisdiction in the project area.

The state of Oregon also separately maintains a list of threatened and endangered native wildlife species under Oregon Revised Statutes (ORS) 496.171-496.192 (ODFW 2024) and a sensitive species list (ODFW 2021). The Oregon Conservation Strategy (ODFW 2016) and the Oregon Explorer Wildlife Viewer (Institute for Natural Resources 2022) provided information on distribution, life history, habitat use, and threats for special status vertebrate and invertebrate species that are known to occur in the Coast Range ecoregion.

Additional information on special status species was obtained from the Oregon Biodiversity Information Center (2022), NatureServe Explorer Pro (2022), and published literature for vertebrate and invertebrate taxa. Species that have not been documented in the study area or adjacent similar habitats in Douglas and Coos Counties were assumed to not occur in the study area and are not otherwise analyzed in the environmental impact statement (EIS).

Special-status species that were identified as potentially occurring in the Coast Range ecoregion, in which the study area is located, were screened according to the following two criteria.

- Is the species likely to occur in the study area?
- Does this species have the potential to be affected by the proposed action?

Species that met both criteria are addressed in the EIS. These species are listed in Table 3.5-1 in EIS Section 3.5, *Fish and Wildlife*, along with their regulatory status, basin use, and habitat needs.

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Appendix 3.5-B
Wildlife Technical Supplement

This appendix discusses the approach and results of screening wildlife species that occur in the study area to determine which special-status wildlife species may be affected under the proposed action and alternatives.

Various designations are used by federal and state agencies to indicate the status of species that are of special concern. U.S. Fish and Wildlife Service (FWS) considers effects of proposed action and alternatives on federally listed wildlife species, candidate species, and designated critical habitats protected under the Endangered Species Act (ESA) and recognizes birds protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act as those that warrant special attention. Protected species that may occur in the study area were identified through the FWS Information for Planning and Consultation (IPaC) map tool (FWS 2024). IPaC identifies occurrences of listed species, critical habitat, migratory birds, and other natural resources under FWS jurisdiction.

The state of Oregon recognizes sensitive species and conservation strategy species that have declining populations, are at-risk, or are of management concern. The state of Oregon maintains a list of threatened and endangered native wildlife species under Oregon Revised Statutes (ORS) 496.171-496.192 (ODFW 2024) and a sensitive species list (ODFW 2021). The Oregon Conservation Strategy (ODFW 2016) and the Oregon Explorer Wildlife Viewer (Institute for Natural Resources 2022) provided information on distribution, life history, habitat use, and threats for special status vertebrate and invertebrate species that are known to occur in the Coast Range. Additional information on special status species was obtained from the Oregon Biodiversity Information Center (2022), eBird (2022) for birds, AmphibiaWeb (2022) for amphibians, NatureServe Explorer Pro (2022) and VertNet (2022) for other vertebrate species, and published literature for vertebrate and invertebrate taxa. Species that have not been documented in the study area or adjacent similar habitats in Douglas and Coos Counties were assumed to not occur in the study area and are not otherwise analyzed in the environmental impact statement (EIS). Association with forested habitats was determined by referring to online databases and published literature. For most species, this review used the online databases listed above, and wildlife–habitat relationships described in Olson et al. (2001).

About 191 wildlife species are associated with forest and riparian habitats of the Oregon Coast Range (Martin 1998; Johnson and O'Neil 2001; Veseley and McComb 2003; Cushman and McGarrigal 2003; Olson and Rugger 2007; Institute for Natural Resources 2022), although only a fraction of these are special-status species. A number of bird and amphibian species were detected in the study area during field surveys performed for the Elliott State Forest Watershed Analysis Report (Biosystems et al. 2003). Forest species include those that have an obligate relationship with forest habitats for all or part of their life history, as well as other more generalist species that occur in the forest matrix but also occur in other nonforest types. Species that are addressed in the EIS have a strong primary relationship with forest habitats such that forest modifications as planned under the proposed action would have the potential to affect the occurrence, habitat, and abundance of the species.

Special-status species that were identified as potentially occurring in the Coast Range ecoregion, in which the study area is located, were screened according to the following two criteria.

- Does the species occur or have the potential to occur in the study area over the analysis period?
- Is there potential for the species to be affected by the proposed action?

Species that met both criteria are addressed in the EIS. These species are listed in Tables 3.5-2 and 3.5-3 in EIS Section 3.5, *Fish and Wildlife*, along with their regulatory status and habitat needs.

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Cultural Setting Context Statement

Geographic Context

Climate

Located near the Pacific Ocean with elevations up to 2,100 feet A.S.L., the Elliott State Forest has a mild maritime climate, moderate temperature fluctuations, abundant rainfall of 65 to 115 inches per year, and summer fog. Consequently, vegetation is thick. Conifers, including Douglas-fir, western hemlock, western red cedar, Sitka spruce, and grand fir dominate. Hardwoods, including red alder and big-leaf maple, line the streams and occur along roads (DSL and ODF 2011). The understory is choked with hazel, elderberry, salmonberry, willow, ash ocean spray, vine maple, nettle, ferns, and mosses, as well as invasive scotch broom and Himalayan blackberry. In all but the driest summer months the flat ground near the streams is saturated. That, along with the dense tangle of underbrush, makes travel difficult and cultural sites, if present, difficult to find.

Dense vegetation can hide cultural sites and bury them in leaf litter. Constant plant growth and reproduction will churn and upset the integrity of the soil matrix containing cultural material. And, the perpetually moist environment quickly decomposes organic material, including cultural material. In summary, the wet climate and dense vegetation of the permit area makes it difficult to find culture resources sites, and if present, the sites decompose quickly.

Geomorphology

The topography of the permit area is typical of the Coast Range: mountainous and steep. The flanks of highly dissected ridgelines drop into tight V-shaped canyons that are drained by swift narrow streams. The gradients on the side slopes of the mountains often exceed 65%. Only 4,480 acres of the permit area have slopes that are less than 20%. And only 1,200 acres contain slopes with a steepness of 10% or less. Almost all of the relatively flat topography in the permit area coincides with stream corridors, beyond which the slope gradient makes the landscape largely inaccessible (Curtis et al. 2016).

While they are relatively flat, the stream corridors in the permit area are especially subject to mass wasting, including landslides and debris flows. The Tyee geologic formation, composed of thick, minimally fractured beds of weakly cemented sandstone, underlies the surface of the permit area. The shallow, low porosity soils cannot absorb the abundant rainfall. The saturated soils will slide down the slopes of the permit area as rapidly moving debris flows. The debris flows concentrate and converge in stream corridors as “debris torrents.” Thus, the only flat places in the permit area—stream corridors—commonly sustain dramatic episodes of landform alteration from landslides and debris torrents (DSL and ODF 2011). Any potential cultural resources along stream corridors are likely altered, if not erased, by erosion, sedimentation, and mass wasting.

Precontact Context

Archaeological evidence for the human habitation of western Oregon dates back at least 11,500 years (Davis et al. 2011). The early evidence of humans in this region is limited, likely at least in part because habitation and use sites along the coast were inundated by eustatic sea-level rise and other geological processes following the end of the Pleistocene epoch (McLaren et al. 2019). However, early Paleolithic sites in the Northern Great Basin area of eastern Oregon and Cooper's Ferry, Idaho suggest that the larger region has been occupied for more than 16,000 years (Smith et al. 2019; Jenkins et al. 2012). Numerous sites in western Oregon have contained projectile points characteristic of the Paleo-Indian culture, which was thought to have prioritized hunting large mammals (Connolly 1994). As climatic change at the end of the Pleistocene saw western Oregon become warmer and drier, people in the region turned to broad-spectrum hunting, fishing, and plant gathering in what became known as the Archaic era. By 8,000 years before present, archaeological evidence shows that people could be found across western Oregon, primarily living along the lower Columbia River, in the river valleys, and around coastal estuaries. Around 3,000 years before present, the mobile, broad-spectrum resource gathering and foraging pattern was largely replaced by a more sedentary, collector strategy with a heavy emphasis on riverine and streamside resources (Cox 2016). By 2,000 years before present, the collector pattern was widespread and pit house villages were established at fishing sites along inland rivers, while plank house villages were built along the coast (Byram 2006; Pullen 1996). Plant food processing tools such as mortars, metates, and pestles indicate the significance of plant food resources, while projectiles, scrapers, and a variety of flaked stone tools show a continued emphasis on hunting upland mammals. This pattern continued to persist into the historic past and is characteristic of the ethnographic lifeways of the diverse groups living in western Oregon at the time of historic contact.

Ethnographic Context

For thousands of years the Indigenous people of the southern Oregon Coast (Siletz, Umpqua Tribes, Coos, Siuslaw, and Coquille) have lived, raised families, and gathered resources in and around the permit area. Curtis et al. (2016) blends information from Beckham and Minor (1980), Beckham et al. (1982), Zenk (1990), Phillips (1997), and others, and presents a summary of Native American archaeology, ethnography, and history in and near the permit area.

The permit area occurs within the traditional territory of the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians and their ancestors, particularly the Lower Umpqua Kalawatset (who spoke a dialect of Siuslaw) and Hanis-speaking Coos. The Coos, Lower Umpqua, and Siuslaw lived in dozens of large autonomous villages on the coast, in ocean bays, and along estuaries of Siuslaw, Umpqua, Coos and Coquille Rivers outside the permit area. From these permanent villages the people traveled in the summer to the uplands, such as those within the permit area, for eel fishing, deer and elk hunting, camas harvesting, and berry picking. Most of these visits were temporary and designed to provision the villages on the coast.

Within the permit area, Hanis Coos territory includes the watershed of the West Fork of the Millicoma River (Stepp 1998). A historic-period Coos village occurred at the mouth of Marlowe Creek on the East Fork of the Millicoma River immediately south of the permit area boundary (Youst 1992; Mahaffy 1965 in Curtis et al. 2016:95).

In the permit area, Lower Umpqua territory spanned the Umpqua River to the north, the Scholfield Creek watershed to the west, and Mill Creek and Lost Lake in the east (Stepp 1998). According to

Winterbotham (1994), two historic-period Lower Umpqua villages may have been located in the permit area (Curtis et al. 2016:95). Early twentieth century Indian allotments were in the permit area and appeared to be steep, heavily forested parcels and generally not practical for residential use (Curtis et al. 2016).

Curtis et al. (2016) explain that compared to the lower reaches of the principal Coast Range rivers, the steep, dense, and wet forests of the permit area were not heavily settled by the Coos, Umpqua, and Siuslaw Indians and their ancestors. The Elliot State Forest does not offer many good places that were suitable for a large settlement or other activities that would leave an archaeological trace, such as camps, villages, or sizable hunting and gathering stations. Nevertheless, the place offered a bountiful array of resources that the Indians used for food, clothing, medicine, and tools. It is clear the people accessed these resources, particularly in the summer. Curtis et al. (2016) provide a detailed ethnobotany of the principal plants in the permit area still used by the indigenous people of the southern Oregon Coast Range.

Historic Context

In the late nineteenth and early twentieth centuries, logging activities left an enduring mark on the landscape of western Oregon. The state's first lumber mills were established in the Willamette Valley in the 1830s and 1840s. The California Gold Rush, which began in the late 1840s, created a large demand for timber in the western United States. A national demand for the state's timber emerged after the completion of the Northern Pacific transcontinental railroad, which arrived in Portland in 1883. At this same time, the timberlands in Michigan, Minnesota, and Wisconsin were rapidly diminishing. In the twentieth century, logging activity extended into new parts of the state, due to new railroads and, somewhat later, the development of logging trucks. The state's wood products market nearly collapsed during the Great Depression but returned at the outset of World War II. The postwar logging industry has been marked by increasingly mechanized logging practices, the consolidation of forestland in a smaller number of hands, and new environmental protections. As a result, logging continues to play a role in the state's economy, but it is an industry that operates on a sharply reduced labor base and one that has declined in economic importance over the years (Robbins 2021).

The Oregon Department of State Lands (DSL) is the administrative agency of the State Land Board (SLB), which was established by the Oregon Constitution in 1859 and is composed of the Governor, Secretary of State, and State Treasurer. The Oregon Admission Act of 1859 included a provision granting Oregon 3.4 million acres of federally owned land, approximately 6% of the state's total land area, to finance public education through its management or sale, which formed the basis of the state's Common School Fund (CSF) for K–12 education. DSL was established in 1967 as the operational staff of the SLB, taking on all the SLB's responsibilities except those related to general policy making and reviews. Though only approximate 737,000 acres of that original acreage remains under the administration of DSL, the agency continues to manage state land and other resources dedicated to the CSF (DSL 2022a).

Elliott State Forest

The first Euro-American forays into the permit area occurred in the early 1900s (Curtis et al. 2016). These ventures entailed small scale logging, grazing, and reuse of Native American travel corridors. Elliott State Forest was established in 1930 as Oregon's first state forest, most of which comprised Common School Fund land (DSL 2022b). SLB began actively managing the Elliott State Forest in

1955, with timber harvest revenue contributed to the CFS and used to cover the cost of forest management (DSL 2022b).

The Civilian Conservation Corps (CCC) set up a timber management program in the permit area in the 1930s, but the local CCC operation center, Camp Walker, was located just outside, and northeast, of the permit area boundary (Curtis et al. 2016). CCC as well as other early and mid-twentieth century settlement and logging operations would have left potential cultural resources in the permit area such as camps, homesteads, roads, landings, and associated artifacts.

Commercial logging in the permit area began in earnest in the 1950s, and over 50% of the permit area has been clearcut since then (OSU 2021). In combination with earlier timber harvests and catastrophic wildfires, the entire Elliott State Forest and permit area is composed of timber stands and associated land surfaces that are less than 150 years old. In other words, the permit area contains very few acres of unharvested, undisturbed landscapes that contain old-growth forest (OSU 2020). Modern timber harvest operations tend to disturb if not erase the archaeological remains of earlier homesteads, logging camps, and other historic-period and Native American archaeological sites.

In 2022, the Oregon Legislature passed Senate Bill 1546, which designated Elliott State Forest as a publicly owned state research forest and established the Elliot State Research Forest Advisory Committee, an independent public agency responsible for managing the forest (DSL 2022b).

Recent Land Disturbances

The study area has sustained significant disturbances from fire, wind, and timber harvest in the recent historic period era. Ninety percent of the permit area was completely burned in 1868 by the Coos Bay Fire leaving few residual living trees (Phillips 1997:7; DSL and ODF 2011:1-4). The Columbus Day storm of 1962 blew down 100 million board feet of timber in the permit area. Most of it was salvaged by commercial loggers in the following 3 years (Phillips 1997).

Individual and small timber harvests occurred throughout the permit area in the early 1900s. Commercial-scale logging commenced with fervor after 1955. Since then 50% of the Elliott State Forest has been clearcut. Thus, about 50% of the permit area contains forest stands under 65 years of age and have regenerated after a clearcut. Foresters have managed and thinned these stands into Douglas-fir plantations. The other 50% of the permit area contains forest stands older than about 65 years but younger than 150 years. These stands have regenerated naturally, mostly after localized landslides and following the catastrophic Coos Bay Fire in 1868 (DSL and ODF 2011).

The permit area contains 550 miles of logging roads. The majority of the roads follow ridgelines that, along with streams, offer the only relatively flat and somewhat open terrain in the permit area. If pre-contact cultural sites or trails were ever present on ridgelines in the permit area, they may have been disturbed or altered by road building (DSL and ODF 2011).

Fires, windstorms, and commercial logging can alter cultural resource sites that occur within their footprint. Clearcuts and road building will have direct impacts on any cultural resources that lie within their path. Clearcuts and road building also contribute to soil instability, exacerbating the natural tendency of permit area soils to slide down-hill and into streams. The resulting debris torrents can dramatically erode or aggrade the relatively flat stream corridors and damage or erase any associated cultural resources sites.

Cultural Resources Records Search Tables

Table 1. Previously Conducted Archaeological Investigations

Investigation Type/NADB #	Author/Date	Title	Cultural Resources in Plan Area
Survey Report; #00191	Dow Beckham and Ross 1976	*Units 3 & 4 Cultural Resources Based Upon a Literature Search*	None
Survey Report; #05543	Pullen 1983	*Loon Lake Hydro-Electric Project*	None
Survey Report; #17296	Connolly 2000	*Charlette Creek-Luder Creek Passing Lane Section, Umpqua Highway (OR38), Douglas County*	None
Survey Report; #18638	Tasa and Bland 2003	*Archaeological Resource Evaluation of Area 3, Oregon State Parks, 2001/2002 Surveys*	None
Survey Report; #20061	Bourdeau 2005	*West Fork Millicoma Substrate Retention III Project*	None
Survey Report; #20098	Baxter 2005	*Report of the Subsurface Archaeological Reconnaissance of Charlotte Creek-Luder Creek Fish Passage, between MP 10.67-11.79, Hwy 38*	None
Survey Report; #24096	Castronuevo 2010	*Brandy Bar Landing Inc. Channel Dredging*	None
Survey Report; #24772	Jones and MacClyment 2011	*Cultural Resource Survey Elkton Fiber Optic Project*	None
Survey Report; #25729	Butler et al. 2013	*Cultural Resources Inventory Report for the NW Natural Mid-Willamette Feeder Pipeline Project, Phase IIIA Segment, Polk and Benton Counties, Oregon*	Three precontact resources (Null Trinomial)
Survey Report; #28417	Curtis et al. 2016	*A Cultural Resource Inventory of the Elliott State Forest*	35CS 00310 35DO 01513 35DO 01514
Survey Report; #28829	Baxter 2017	*Pedestrian Survey of the OR38 Charlotte Creek Quarry Expansion, Douglas County*	None
Survey Report; #28847	O'Neill and Knowles 2017	*Cultural Resources Inventory of Nine Culverts in the OR38/US101 Small and Large Culvert Upgrade Project, Douglas and Coos Counties*	35DO 01549

Table 2. Cultural Resources Sites with no Archaeological Evidence (Curtis et al. 2016)

Type	Description
Historic	A pioneer and Coos Tribal cemetery. Confederated Tribes of Coos has older documentation of the cemetery
Historic	Pheasant Cabin
Historic	Old Mutt and Nellie Allen House
Historic	Family Homestead
Historic	Jack and Jean Cornell's Homestead
Historic	Sukurski - Lane - Chard Homestead The only evidence of the site was a bamboo grove.
Historic	McCullouch Homestead
Historic	Trail Butte Lookout
Historic	School Teachers Cabin
Historic	Pioneer Home and Sawmill
Historic	An Indian Family Home
Historic	Charles Seistreem Cabin
Pre-contact	Indian site identified per SHPO map, Winterbotham (1994, and Curtis et al. (2016). Likely outside and north of the study area.
Pre-contact	"Indian Trail?" identified per SHPO map, GLO map
Pre-contact	Coos village (Youst 1992:215) Outside of the study area. Not surveyed.

The cultural resources sites presented in Table 2 are reported to occur in the study area by Phillips (1997) and Stepp (1998). Curtis et al. (2016) attempted to locate them. In each case intensive field survey of reported and potential locations of the sites failed to locate cultural material or other tangible cultural evidence of them. There are no site records for these possible sites.

Table 3. Previously Documented Cultural Resources Sites in the Study Area

Trinomial Site Number	Site Type	Description	Site Record?	In Study Area?	Reference
35CS 310	Historic	Vaughan Sawmill Complex, refuse scatter, wigwam burner.	Yes	Yes	Curtis et al. 2016
35DO 1513	Historic	Leach Homestead, structural remains and refuse scatter.	Yes	Yes	Curtis et al. 2016
35DO 1514	Historic	Big Creek Road segment	Yes	Yes	Curtis et al. 2016
35DO 1549	Historic	Brick septic tank, determined not eligible to the NRHP	Yes	Yes	O'Neill and Knowles 2017
None	Historic	Eleven machine-cut nails	Yes	Yes	Curtis et al. 2016

NRHP = National Register of Historic Places

All sites presented in Table 3 except 35DO1549 remain unevaluated for eligibility for listing in the National Register of Historic Places.

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Appendix 3.10
Tribal Resources Technical Supplement

Terms and Definitions

The following provides terms and definitions used in this environmental impact statement (EIS) related to the tribes and federal trust responsibilities.

Ceded lands: Treaty tribal-ceded lands are lands formerly occupied by tribes and later ceded to the United States by treaty, whether or not ratified by the United States Senate. Some claims of sovereignty and loss of ceded lands made by tribes remain unawarded, requiring their recognition as a federally recognized Indian tribe to address these claims.

Federal recognition**:** The U.S. Department of the Interior Office of Federal Acknowledgement sets up a process and review for unrecognized Indian tribes and communities to gain federal recognition. It is important for a tribe to be recognized as eligible for the special programs and services provided by the United States to Indians because of the former agreements the tribes made with the federal government under treaties and established case law. Tribes can achieve federal recognition status through treaties, acts of Congress, presidential executive orders or other federal administrative actions, or federal court decisions. This status is automatically conferred on members of treaty tribes but does not automatically designate Indian communities whose treaties were not ratified by Congress, that were not treaty signers, or who lost their lands and social-cultural identity because they were struggling for their own survival and tribal social-cultural integrity over the past 150 years. Those tribal communities each must apply for and be granted this status to be listed as federally recognized tribes. There are five tribes in the study area that were federally recognized through legal means other than treaties: (1) the Confederated Tribes of the Grand Ronde Community of Oregon, (2) the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians, (3) the Confederated Tribes of Siletz Indians, (4) the Coquille Indian Tribe, and (5) the Cow Creek Band of Umpqua Tribe of Indians.

Traditional ecological knowledge: This term is used to describe the knowledge held by the tribes about their immediate environment and the cultural practices that build on that knowledge. traditional ecological knowledge includes knowledge of plants, animals, and the development and use of appropriate technologies to increase or maintain suitable conditions for species of cultural value to local tribal communities.

Treaty**:** Ratified federal treaties refer to formal agreements between the federal government and Native American tribes under Article II, Section 2 of the United States Constitution, approved by the president and subsequently ratified by the United States Senate. A treaty is a constitutionally recognized agreement between sovereign nations. These legally binding agreements are protected under the United States Constitution, which states that, like the United States Constitution, they are the "supreme law of the land." Under these treaties, tribes ceded millions of acres of land while reserving certain rights, such as fishing, hunting, and gathering, as well as rights to determine use of reserved land and its resources. Some treaties reserved the rights to usual and accustomed grounds and stations. These are locations on and off reservations where treaty tribes hold certain treaty-granted usage rights, based on ancestral use. As discussed for the five tribes in the study area, treaties were prepared but never ratified.

Treaty tribe: A Native American tribe that formally negotiated a treaty with the United States government between 1855 and 1868 that was subsequently ratified by Congress in the United States Senate. There are three treaty tribes in Oregon: (1) Confederated Tribes of the Umatilla Indian Reservation (Treaty with the Walla Walla, Cayuse, etc., 1855), (2) Confederated Tribes of Warm Springs Reservation (Treaty with the Tribes of Middle Oregon, 1855), and (3) the Klamath Tribes (Klamath Tribes Treaty of 1864). The Umatilla and Warm Springs have treaty-reserved fishing rights on the Columbia River. These two treaty tribes have co-management responsibilities with the states (primarily Oregon, Washington, and Idaho) for the management of fish. The Columbia River Inter-Tribal Fish Commission is a tribal organization that provides coordination and technical assistance to these tribes in regional, national, and international efforts.

Tribe: As defined in Section 1(b) of Executive Order 13175, a tribe is an Indian or Alaska Native federally recognized tribe, band, Nation, pueblo, village, or community that the Secretary of Interior acknowledges to exist as an Indian tribal entity pursuant to the Federally Recognized Indian Tribe List Act of 1994, 25 United States Code (USC) 479a and annual update to the Department of the Interior list of Indian Entities Recognized by and Eligible to Receive Services from the United States Bureau of Indian Affairs, published in the *Federal Register* (FR) (87 FR 4636). Several of the nine federally recognized tribes in Oregon are confederations of multiple tribes.

Trust doctrine: The trust doctrine is a source of federal responsibility to Native Americans requiring the federal government to support tribal self-government and economic prosperity, duties that stem from the government's promise to protect Native American tribes and respect their sovereignty.

Unratified federal treaties: Unratified federal treaties are treaties negotiated but not ratified by the United States Senate. Unratified treaties were negotiated with the Lower Chinook, Clatsop, Clackamas, Tillamook, Umpqua, Siletz, and Rogue River Tribes of the Oregon–Washington coast and other groups who established claims against the government for wrongful taking of their lands. Reservations established on the Oregon coast were all terminated by United States Congress, House Resolution No. 108 in 1954, which took effect in 1956. Executive orders have since restored reservations at Grand Ronde and Siletz in Oregon.

Supporting Information on Affected Tribes

This section describes the history and context for each of the five tribes in the study area including, but not limited to, the tribe's organization, its federal recognition, ratified and unratified treaties, ceded lands, treaty reserved rights, case law, federal trust doctrine, and noted use of resources in the study area such as fishing and hunting agreements with the State of Oregon and United States of America.

Confederated Tribes of the Grand Ronde Community of Oregon

The Confederated Tribes of the Grand Ronde Community of Oregon is a federally recognized Indian tribe consisting of 30 tribes and bands with ancestral ties to western Oregon and southwestern Washington (Confederated Tribes of the Grand Ronde Community of Oregon 2022). The original Grand Ronde Reservation was 61,000 acres established by executive order on June 30, 1857, in the headwaters of the Yamhill River watershed. The General Allotment Act of 1887 removed the original reservation lands from federal trust status to private ownership and transferred reservation lands to tribal members and subsequently sold to private ownership. In 1901, the federal government declared 25,791 acres of the reservation lands “surplus” and sold them.

Federal recognition of the Tribe ended on August 13, 1954, when Congress passed the Western Oregon Termination Act. Passage of the Grand Ronde Restoration Act (Public Law 98-165) reestablished federal recognition in 1983. The Grand Ronde Reservation Act (25 USC 713f note; 102 stat. 1594), signed on September 9, 1988, established 9,811 acres of the original reservation. The Tribe has acquired additional trust lands since gaining federal recognition and the total community land base is currently 10,773 acres in Yamhill and Polk Counties (BIA 2019). The number of enrolled members is approximately 5,567 (Oregon Blue Book 2021).

A Consent Decree among the State of Oregon, the United States of America, and the Confederated Tribes of the Grand Ronde Community of Oregon permanently defines tribal hunting, fishing, trapping, and animal gathering rights. The Confederated Tribes of the Grand Ronde Community of Oregon Fish and Wildlife Ordinance (Chapter 801) regulates subsistence and ceremonial hunting and fishing by tribal members defined in the Consent Decree. Hunting and fishing pursuant to the Consent Decree occur in the Trask Management Unit. The Trask Unit includes portions of the Tualatin and Yamhill watersheds flowing into the Willamette River and portions of the Nestucca, Wilson, Trask, and Salmon watersheds flowing westward into the Pacific Ocean.

The Tribe’s Natural Resources Department manages reservation lands for timber, recreation, and fish and wildlife. Pursuant to the Consent Decree, the Tribe receives an allocation of hunting tags for the Trask Unit and the Tribe issues fishing licenses for tribal members to fish within the Trask Unit. The Tribe may establish its own tribal hunting and fishing programs on tribal lands.

Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians

The Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians is a federally recognized confederated tribe made up of three tribes: Coos Tribes, Lower Umpqua Tribe, and Siuslaw Tribe (Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians 2022). Their ancestral lands include the south-central coast of Oregon.

A treaty was drafted in 1855 with the Coos, Lower Umpqua, and Siuslaw Indians and the United States of America providing compensation to the Tribe in terms of food, clothing, employment, education, and health benefits in exchange for ceded lands. As with many other western Oregon tribes, the United States Senate never ratified the treaty. A small privately held 6-acre parcel in Coos Bay was donated to the Tribe to establish a reservation to be held in trust by the Bureau of Indian Affairs (BIA).

Federal recognition of the Tribe ended on August 13, 1954, when Congress passed the Western Oregon Termination Act. The Tribe never sold the small parcel in Coos Bay and instead maintained it to provide services to tribal members. Passage of the Coos, Lower Umpqua, and Siuslaw Restoration Act (Public Law 98-481) reestablished federal recognition on October 17, 1984. The tribal community and tribal government services encompass Coos, Curry, Lincoln, Douglas, and Lane Counties. The number of enrolled members is approximately 1,297 (Oregon Blue Book 2021).

Title II of the Western Oregon Tribal Fairness Act (Public Law 115-103, January 2018) transferred 14,472 acres of federally owned lands to the Tribe to be held in trust by the BIA. The parcels are in Lane, Douglas, and Coos Counties (Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians Forestry Department 2021).

Confederated Tribes of Siletz Indians

The Confederated Tribes of Siletz Indians is a federally recognized confederated tribe made up of many different tribes: Clatsop, Chinook, Klickitat, Molala, Kalapuya, Tillamook, Alsea, Siuslaw/Lower Umpqua, Coos, Coquelle, Upper Umpqua, Tututni, Chetco, Tolowa, Takelma, Galice/Applegate, and Shasta (Confederated Tribes of Siletz Indians 2022).

Federal recognition of the Tribe ended on August 13, 1954, when Congress passed the Western Oregon Termination Act. Passage of the Siletz Indian Tribe Restoration Act (Public Law 95-195) reestablished federal recognition in 1977.

The Tribe has acquired additional trust lands since gaining federal recognition and the total community land base is currently 3,745 acres in Lincoln County (BIA 2019). Trust lands include a few contiguous parcels and scattered parcels east of Siletz, Oregon in the Siletz River watershed. The number of enrolled members is approximately 5,080 (Oregon Blue Book 2021).

A Consent Decree among the State of Oregon, the United States of America, and the Confederated Tribes of Siletz Indians permanently defines tribal hunting, fishing, trapping, and animal gathering rights. The Confederated Tribes of Siletz Indians Hunting, Fishing and Gathering Ordinance regulates subsistence and ceremonial hunting and fishing by tribal members defined in the Consent Decree (Siletz Tribal Code 7.001). Hunting and fishing pursuant to the Consent Decree occur in the Stott Mountain Management Unit and the north portion of the Alsea Management Unit. This includes portions of the Alsea, Siletz-Yaquina, and Yamhill watersheds. The Consent Decree identifies three cultural fishing sites on tributaries of the Siletz River.

Coquille Indian Tribe

The Coquille Indian Tribe is a federally recognized tribe in southwestern Oregon (Coquille Indian Tribe 2022).

Federal recognition of the Coquille Indian Tribe ended on August 13, 1954, when Congress passed the Western Oregon Termination Act. Passage of the Coquille Restoration Act restored federal recognition on June 28, 1989.

The Tribe does not have an agreement with the State of Oregon and the United States of America establishing hunting and fishing rights for tribal members. However, the Tribe is seeking recognition of rights to hunt, fish, gather, and practice cultural traditions and ceremonies at their usual and accustomed places (Coquille Indian Tribe 2019).

The Tribe has acquired additional trust lands since gaining federal recognition. The Coquille Forest was created in 1996 (Public Law 104-208). This act restored 5,410 acres to the Coquille Indian Tribe, as the Coquille Forest. The Coquille Forest is located in Coos County. The total community land base is currently 6,132 acres in Coos County (BIA 2019). The number of enrolled members is approximately 1,113 (Oregon Blue Book 2021).

Cow Creek Band of Umpqua Tribe of Indians

The Cow Creek Band of Umpqua Tribe of Indians is a federally recognized tribe in southwestern Oregon (Cow Creek Band of Umpqua Tribe of Indians 2022). Their ancestral lands are between the Coast Range and Cascade Range of Oregon along the South Umpqua River and Cow Creek. The Cow Creek Tribe signed a treaty with the United States of America on September 19, 1853. The United

States Senate ratified the treaty on April 12, 1854. However, the treaty did not permanently secure land for a reservation in exchange for ceded lands.

Federal recognition of the Cow Creek Tribe ended on August 13, 1954, when Congress passed the Western Oregon Termination Act. Passage of the Cow Creek Band of Umpqua Tribe of Indians Recognition Act (Section 1 of Public Law 97–391) restored federal recognition on December 29, 1982.

Title I of the Western Oregon Tribal Fairness Act (Public Law 115-103, January 2018) transferred 17,519 acres of federally owned lands to the Cow Creek Tribe to be held in trust by the BIA. This plus other lands held in trust by BIA since gaining federal recognition total 22,308 acres in Douglas County (BIA 2019). Trust lands include a few contiguous parcels and scattered parcels south and east of Roseburg, Oregon, in the South Umpqua watershed. In 2000, the Tribe purchased K-Bar Ranches and has since purchased additional properties throughout the Umpqua River valley (K-Bar Ranch 2022). In 2013, the Tribe expanded the ranch into the Rogue River valley with the purchase of the Rogue River Ranch near Central Point, Oregon. At present, the Tribe, including the K-Bar Ranches, manages approximately 5,500 acres.

The number of enrolled members is approximately 1,760 (Oregon Blue Book 2021).

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