ENVIRONMENTAL ASSESSMENT FOR

THE PROPOSED ISSUANCE OF A PERMIT FOR INCIDENTAL TAKE OF THE NORTHERN SPOTTED OWL

SKELLCOMA TREE FARM
WEYERHAEUSER COMPANY
COOS AND DOUGLAS
COUNTIES, OREGON

Prepared for:
U.S. Department of the Interior
Fish and Wildlife Service
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911 NE 11th Avenue
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Prepared by:

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16 November 1994

COVER SHEET

Title of Proposed Action: Issuance of a Permit for Incidental Take of Northern Spotted Owls and Implementation of the Weyerhaeuser Company Millicoma Tree Farm Habitat Conservation Plan.

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Legal Mandate: Endangered Species Act of 1973, as amended, Section 10(a), as implemented by 50 CFR 17.32(b)(1)

Location of Proposed Action: Weyerhaeuser Company
Millicoma Tree Farm
Coos and Douglas Counties, Oregon

Applicant Name:
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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF FIGURES

SUMMARY

Introduction

Weyerhaeuser Company (Weyerhaeuser) is applying for a permit from the U.S. Fish and Wildlife Service (USFWS) regarding northern spotted owls (*Strix occidentalis caurina*) on its Millicoma Tree Farm in Coos and Douglas Counties, Oregon. As one of the agencies responsible for administering the Endangered Species Act of 1973 (ESA), as amended, the USFWS is required to respond to all applications seeking permits allowing incidental take of a federally-listed species. This response includes preparation of an Environmental Assessment (EA) in compliance with the National Environmental Policy Act. If issued, the permit would allow incidental take resulting from the otherwise lawful harvest of commercial timber and other routine forest management activities within the home ranges of spotted owls residing on and adjacent to the tree farm. To minimize and mitigate the impacts of the incidental take, Weyerhaeuser would implement a Habitat Conservation Plan (HCP) that would consist of the following measures: a) the creation and maintenance of a dispersal landscape in managed second- and third-growth forest across the tree farm; b) the temporary retention of nesting, roosting and foraging habitat for spotted owls around four known activity centers on the tree farm to augment the dispersal landscape in the short term; c) the temporary retention of nesting, roosting and foraging habitat for spotted owls around four known activity centers on or near federal lands adjacent to the tree farm; d) protection of 70 acres of nesting, roosting and foraging habitat around all other known activity centers on the tree farm as long as they remain occupied; and e) seasonal protection of all active spotted owl nests on and adjacent to the tree farm. Measures proposed in the HCP, particularly those involving dispersal habitat, would be consistent with long-term goals for the survival and recovery of the northern spotted owl in the southern Oregon Coast Range identified by the Interagency Scientific Committee (ISC) to Address the Conservation of the Northern Spotted Owl (Thomas et al. 1990), the federal Spotted Owl Recovery Team (Recovery Team) (U.S. Fish and Wildlife Service 1992b) and the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (ROD) (USDA/USDI 1994). Any harvest of suitable owl habitat over the short term would be offset by a 50-year commitment by Weyerhaeuser to maintain dispersal habitat, which the ISC, federal Recovery Team and ROD have identified as a priority for the geographic area containing the Millicoma Tree Farm. The commitment could be extended by the USFWS up to an additional 30 years under criteria for extension

established in the HCP. To track compliance with the HCP, Weyerhaeuser would monitor habitat and owl populations on the tree farm and submit regular reports to the USFWS.

The permit area of the Millicoma Tree Farm (hereinafter referred to synonymously as the permit area and the tree farm) encompasses approximately 209,000 acres of managed commercial forest. The entire tree farm lies within the geographic range of the northern spotted owl, a species listed as threatened under the ESA. Surveys by Weyerhaeuser and others have identified the presence of 35 spotted owl pairs and resident singles (potential pairs) within the tree farm, and 44 pairs or singles on non-Weyerhaeuser lands within 1.5 miles of the tree farm. Past timber harvest in the area has reduced the amount of suitable habitat available to resident owls. Continued harvest of suitable habitat without measures to protect owls could leave some owls with insufficient habitat to survive and reproduce, which could be considered by the USFWS to be a "taking" under Section 9 of the ESA. Cessation of timber harvest in suitable habitat, on the other hand, would substantially reduce timber harvest revenues and prevent some future mill operations in the area.

Purpose of the Proposed Action

In response to the dual concerns of timber management and spotted owl protection, Weyerhaeuser has prepared an HCP in accordance with Section 10(a)(1)(B) of the ESA (Weyerhaeuser Company 1994). Under provisions of the ESA, the Secretary of the Interior (through the USFWS) may issue a permit for the taking of a threatened species if: a) the taking is incidental to an otherwise legal activity, b) the applicant for the permit prepares an HCP that minimizes and mitigates the impacts of the taking to the maximum extent practicable, c) the applicant ensures adequate funding for the plan, d) the USFWS determines through Section 7 consultation that the taking will not appreciably reduce the likelihood of survival and recovery of any species in the wild and e) any other measures found by the USFWS to be necessary are provided. Upon acceptance of the plan and verification that the above-listed criteria are met, the USFWS would issue a Section 10(a) permit for incidental take which may result from the otherwise legal harvest of suitable owl habitat on the Millicoma Tree Farm in the vicinities of spotted owl activity centers. To minimize and mitigate the impacts of the incidental taking, Weyerhaeuser would manage its forest lands on the Millicoma Tree Farm under provisions of the HCP for 50 years (until 2044). The proposed mitigation could continue up to 30 additional years (until 2074) at the discretion of the USFWS, if certain conditions for extension outlined in the HCP are met.

Issues and Concerns

In the development of the draft EA, several issues and concerns associated with each alternative were identified and analyzed as part of the discussion of environmental consequences. These subject areas focus on impacts to the following: 1) certain aspects of the physical environment, especially potential adverse impacts to soils and surface water quality and quantity, 2) certain aspects of the biological environment, especially potential adverse impacts to threatened and endangered species, fisheries resources and other sensitive wildlife and 3) certain aspects of the cultural and social environment, especially potential adverse impacts to the local economy and historic and cultural resources.

Alternatives

Alternative A: No Action (Avoid Incidental Take of Spotted Owls)

Under the No Action alternative, Weyerhaeuser would not receive an incidental take permit from the USFWS, and the proposed HCP (described in detail in Alternative B below) would not be implemented. Under this alternative, Weyerhaeuser would continue to harvest in accordance with applicable Oregon Forest Practices Rules.

Weyerhaeuser would exercise the necessary precautions to avoid incidental take of spotted owls as required by Section 9 of the ESA. On a case-by-case basis, known resident spotted owl sites would be protected from incidental take by maintaining existing nesting, roosting and foraging habitat in the vicinity of sites as long as sites remain occupied. Lands would not be managed to contribute to federal recovery efforts for the spotted owl within the region.

Weyerhaeuser would continue to manage the tree farm in accordance with Oregon Forest Practices Rules pertaining to harvest size and green-up requirements, and the result would be a mosaic of age classes in a fragmented pattern across the landscape. No efforts would be made to create dispersal habitat and reduce gaps between dispersal habitat in the landscape.

Alternative B: Issue a Permit for Incidental Take as Requested, and Implement the Habitat Conservation Plan (Proposed Action)

Overview

The permit as proposed would allow Weyerhaeuser the incidental take of spotted owls on its 209,000-acre Millicoma Tree Farm in Coos and Douglas Counties, Oregon for at least 50 years (until 2044). The term of the permit could be extended by the USFWS for up to three additional 10-year periods, if certain criteria for extension outlined in the HCP are met. Approval of this permit would be conditional upon implementation of the proposed HCP. Lands could be added to the HCP area or removed from the area in accordance with subsection 6.5 of the HCP.

Forest management under the Proposed Action is described in Table 5-2 of the HCP. As an example, Weyerhaeuser could use genetically-improved seedlings with an initial planting density of 400 per acre. One pre-commercial thinning could be performed after stands reach an average diameter at breast height (dbh) of 6.5 inches. Resulting density after pre-commercial thinning could be 250 trees per acre. Fertilization could occur when stands reach 20 to 28 years of age. Variations in this silvicultural prescription would occur from site to site, as long as the variations did not prevent the habitat objectives of the HCP from being met.

Estimated Level of Take

Under Alternative B, the harvest of existing suitable habitat (except stands retained for mitigation) and the possible incidental take of resident owls would begin in 1995 and continue until most existing nesting, roosting and foraging habitat is converted to young forest. Harvesting would proceed in compliance with Oregon State Forest Practices Rules, and would be based on technological and economic considerations associated with commercial industrial forestry, all of which would determine the rate of harvest and ultimately the rate of any incidental take. A detailed analysis of potential incidental take under Alternative B is provided in the HCP.

Mitigation and Conservation

The Millicoma HCP outlines five measures designed to minimize and mitigate the effects of the incidental take of spotted owls, as listed below (and summarized in section 2.0, Alternatives). A more detailed presentation of the mitigation measures appears in the HCP. Weyerhaeuser would operate under the HCP until 2044, with possible 10-year extensions by the USFWS until 2074 if criteria for extension stated in the HCP were met.

- The Maintenance of a Landscape Conducive to the Dispersal of Juvenile Spotted Owls
- Retention of Existing Nesting, Roosting and Foraging and Other Forest Habitat Around Four Spotted Owl Activity Centers on Weyerhaeuser Lands to Augment the Dispersal Landscape for At Least 20 Years
- Retention of Nesting, Roosting and Foraging and Other Forest Habitat Around Four Known Spotted Owl Activity Centers On or Near Federal Lands to Supplement and Enhance Those Sites for At Least 20 Years
- Protection of Occupied Spotted Owl Site Centers
- Seasonal Protection of Active Nests

Monitoring

Spotted owl surveys would be conducted by Weyerhaeuser to ensure the seasonal protection of known active nests and long-term protection of known occupied activity centers. Habitat conditions would be monitored and mapped to demonstrate the creation and maintenance of a dispersal landscape. Meetings would be held between Weyerhaeuser and the USFWS at specified intervals to report on implementation of the HCP. A detailed description of the monitoring program is provided in the HCP.

Funding

Weyerhaeuser would ensure that funds are available to implement the HCP along with other programs for the management and harvest of commercial timber on the Millicoma Tree Farm (Weyerhaeuser Company 1994).

Alternative C: Manage the Tree Farm for Dispersal Habitat Without the Retention of Nesting, Roosting and Foraging Habitat

The alternative of managing the tree farm for dispersal habitat without protecting any nesting, roosting and foraging habitat was also evaluated. The objective of this alternative would be the creation and maintenance of a dispersal landscape for spotted owls as described under Alternative B, but without protecting any older habitat for the first 20 years. In all other respects this alternative would be identical to Alternative B. The management of young forest stands would be directed toward increasing the growth of commercial wood fiber while enhancing conditions for juvenile spotted owls, as under Alternative B.

Alternative D: Manage the Tree Farm for Dispersal Habitat and Avoid the Incidental Take of Selected Spotted Owl Pairs

Weyerhaeuser could manage the tree farm for dispersal habitat, and simultaneously avoid the incidental take of selected spotted owl pairs. For purposes of analysis, it was assumed 10 pairs of owls would be protected from incidental take to correspond with the maximum number known to have reproduced in recent years. Incidental take would be avoided by retaining existing nesting, roosting and foraging habitat within the vicinity of 10 sites that are considered to be reproductively viable. This would increase the level of site protection from the four sites proposed in the HCP, and would more than double the acreage of mature forest dedicated to resident owl management. All other nesting, roosting and foraging habitat on the tree farm would be harvested. Dispersal habitat would be created and maintained through intensive silviculture, and all active nest sites on the tree farm would be monitored and protected as described under Alternative B.

Table S-1. Summary of impacts under each alternative.

ELEMENT	ALTERNATIVE A No Action	ALTERNATIVE B Proposed Action Habitat Conservation Plan	ALTERNATIVE C Dispersal Habitat Only	ALTERNATIVE D Dispersal Habitat and Some Nesting, Roosting and Foraging Habitat
Geology and Soils	Impacts	Impacts	Impacts	Impacts
	• Minor soil compaction, erosion and sedimentation to water courses from harvesting and temporary and permanent spur road construction.	• Same as No Action.	• Same as No Action.	• Same as No Action.
Air Quality	Impacts	Impacts	Impacts	Impacts
	• Generation of localized dust from road use during dry months. Watering would reduce impact.	• Same as No Action.	• Same as No Action.	• Same as No Action.
	• Minimal smoke generation from slash burning.	• Same as No Action.	• Same as No Action.	• Same as No Action.
Surface Water Quality and Quantity	Impacts	Impacts	Impacts	Impacts
	• Minimal sedimentation of water courses from harvesting and temporary and permanent spur road construction.	• Same as No Action.	• Same as No Action.	• Same as No Action.
	• Protection of riparian functions through adherence to Oregon Forest Practices Rules.	• Same as No Action.	• Same as No Action.	• Same as No Action.

Table S-1. Continued.

ELEMENT	ALTERNATIVE A No Action	ALTERNATIVE B Proposed Action Habitat Conservation Plan	ALTERNATIVE C Dispersal Habitat Only	ALTERNATIVE D Dispersal Habitat and Some Nesting, Roosting and Foraging Habitat
Vegetation	Impacts • Minor harvesting of habitat for plant species inhabiting moist coniferous forest habitat.	Impacts • Potential for more harvesting of habitat for sensitive plant species compared to No Action.	Impacts • Potential for more harvesting of habitat for sensitive plant species compared to No Action.	Impacts • Similar to No Action.
Fisheries	Impacts • Delivery of fine and coarse sediments to streams from road use, surface water runoff and mass wasting potential from minor new road construction in long term. • Increased road use in short term for intensive management of young stands. • Minor harvesting in riparian areas.	Impacts • Same as No Action. • Moderate existing road use in short and long term. • Same as No Action.	Impacts • Delivery of fine and coarse sediments to streams from road use, surface water runoff and mass wasting potential from minor new road construction in short term. • Lowest existing road use in short term. • Same as No Action.	Impacts • Delivery of fine and coarse sediments to streams from road use, surface water runoff and mass wasting potential from minor new road construction in short term. • Moderate existing road use in short and long term. • Same as No Action.

Table S-1. Continued.

ELEMENT	ALTERNATIVE A No Action	ALTERNATIVE B Proposed Action Habitat Conservation Plan	ALTERNATIVE C Dispersal Habitat Only	ALTERNATIVE D Dispersal Habitat and Some Nesting, Roosting and Foraging Habitat
Wildlife	Impacts	Impacts	Impacts	Impacts
Owls	• Protection of habitat for resident owls until sites are abandoned. Deterioration of conditions for juvenile dispersal.	• Harvest of all but 1,963 acres of resident owl habitat during first 10 to 20 years. Harvest of remaining resident owl habitat after 20 years. Creation and maintenance of dispersal landscape.	• Harvest of all resident owl habitat during first 10 to 20 years. Creation and maintenance of a dispersal landscape.	• Protection of habitat for the 10 most viable resident pairs until sites are abandoned. Creation and maintenance of a dispersal landscape.
Marbled Murrelets	• Avoidance of Incidental Take.	• Avoidance of Incidental Take.	• Avoidance of Incidental Take.	• Avoidance of Incidental Take.
General	• Gradual improvement of habitat for riparian and cavity nesting species. Removal of most mature and late-successional forest habitat except where protected for resident owls. Deterioration of conditions for mid-successional forest species due to management for higher tree densities.	• Gradual improvement of habitat for riparian and cavity nesting species. Removal of most mature and late-successional forest habitat, particularly after 20 years. Improvement in the quality and distribution of habitat for mid-successional forest species.	• Gradual improvement of habitat for riparian and cavity nesting species. Removal of most mature and late-successional forest habitat within 10 to 20 years. Improvement in the quality and distribution of habitat for mid-successional forest species.	• Gradual improvement of habitat for riparian and cavity nesting species. Removal of mature and late-successional forest habitat except where protected for 10 resident owl pairs. Improvement in the quality and distribution of habitat for mid-successional forest species.

Table S-1. Continued.

ELEMENT	ALTERNATIVE A No Action	ALTERNATIVE B Proposed Action Habitat Conservation Plan	ALTERNATIVE C Dispersal Habitat Only	ALTERNATIVE D Dispersal Habitat and Some Nesting, Roosting and Foraging Habitat
Land Use	Impacts • None	Impacts • None	Impacts • None	Impacts • None
Social and Economic Conditions	Impacts • Potential threat to economic viability of tree farm; potential contribution to future local mill closures.	Impacts • Minor reductions in timber harvested; minor economic impact.	Impacts • Similar to Alternative B; more timber could be harvested than under No Action.	Impacts • Greatest potential reduction in timber harvest of all alternatives.
Cultural Resources	Impacts • Potential disturbance of resource sites or features if any are present on the tree farm.	Impacts • Potential disturbance of resource sites or features if any are present on the tree farm.	Impacts • Potential disturbance of resource sites or features if any are present on the tree farm.	Impacts • Potential disturbance of resource sites or features if any are present on the tree farm.

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction and Need for the Proposed Action

Weyerhaeuser Company (Weyerhaeuser) is applying for a permit from the U.S. Fish and Wildlife Service (USFWS) regarding northern spotted owls (*Strix occidentalis caurina*) on its Millicoma Tree Farm in Coos and Douglas Counties, Oregon. As one of the agencies responsible for administering the Endangered Species Act of 1973 (ESA), as amended, the USFWS is required to respond to all applications seeking permits allowing incidental take of a federally-listed species. This response includes preparation of an Environmental Assessment (EA) in compliance with the National Environmental Policy Act. If issued, the permit would allow incidental take resulting from the otherwise lawful harvest of commercial timber and other routine forest management activities within the home ranges of spotted owls residing on and adjacent to the tree farm. To minimize and mitigate the impacts of the incidental take, Weyerhaeuser would implement a Habitat Conservation Plan (HCP) that would consist of the following measures: a) the creation and maintenance of a dispersal landscape in managed second- and third-growth forest across the tree farm; b) the temporary retention of nesting, roosting and foraging habitat for spotted owls around four known activity centers on the tree farm to augment the dispersal landscape in the short term; c) the temporary retention of nesting, roosting and foraging habitat for spotted owls around four known activity centers on or near federal lands adjacent to the tree farm; d) protection of 70 acres of nesting, roosting and foraging habitat around all other known activity centers on the tree farm as long as they remain occupied; and e) seasonal protection of all active spotted owl nests on and adjacent to the tree farm. Measures proposed in the HCP, particularly those involving dispersal habitat, would be consistent with long-term goals for the survival and recovery of the northern spotted owl in the southern Oregon Coast Range identified by the Interagency Scientific Committee (ISC) to Address the Conservation of the Northern Spotted Owl (Thomas et al. 1990), the federal Spotted Owl Recovery Team (Recovery Team) (U.S. Fish and Wildlife Service 1992b) and the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (ROD) (USDA/USDI 1994). Any harvest of suitable owl habitat over the short term would be offset by a 50-year commitment by Weyerhaeuser to maintain dispersal habitat, which the ISC, federal Recovery Team and ROD have identified as a priority for the geographic area containing the Millicoma Tree Farm. The

commitment could be extended by the USFWS up to an additional 30 years under certain criteria for extension established in the HCP. To track compliance with the HCP, Weyerhaeuser would monitor habitat and owl populations on the tree farm and submit regular reports to the USFWS.

The permit area of the Millicoma Tree Farm (hereinafter referred to synonymously as the permit area and the tree farm) encompasses approximately 209,000 acres of managed commercial forest. The entire tree farm lies within the geographic range of the northern spotted owl, a species listed as threatened under the ESA. Surveys by Weyerhaeuser and others have identified the presence of 35 spotted owl pairs and resident singles (potential pairs) within the tree farm, and 44 pairs or singles on non-Weyerhaeuser lands within 1.5 miles of the tree farm. Past timber harvest in the area has reduced the amount of suitable habitat available to resident owls. Continued harvest of suitable habitat without measures to protect owls could leave some owls with insufficient habitat to survive and reproduce, which could be considered by the USFWS to be a "taking" under Section 9 of the ESA. Cessation of timber harvest in suitable habitat, on the other hand, would substantially reduce timber harvest revenues and prevent some future mill operations in the area.

1.2 Purpose of the Proposed Action

In response to the dual concerns of timber management and spotted owl protection, Weyerhaeuser has prepared an HCP in accordance with Section 10(a)(1)(B) of the ESA (Weyerhaeuser Company 1994). Under provisions of the ESA, the Secretary of the Interior (through the USFWS) may issue a permit for the taking of a threatened species if: a) the taking is incidental to an otherwise legal activity, b) the applicant for the permit prepares an HCP that minimizes and mitigates the impacts of the taking to the maximum extent practicable, c) the applicant ensures adequate funding for the plan, d) the USFWS determines through Section 7 consultation that the taking will not appreciably reduce the likelihood of survival and recovery of any species in the wild and e) any other measures found by the USFWS to be necessary are provided. Upon acceptance of the plan and verification that the above-listed criteria are met, the USFWS would issue a Section 10(a) permit for incidental take which may result from the otherwise legal harvest of suitable owl habitat on the Millicoma Tree Farm in the vicinities of spotted owl activity centers. To minimize and mitigate the impacts of the incidental taking, Weyerhaeuser would manage its forest lands on the Millicoma Tree Farm under provisions of the HCP for 50 years

(until 2044). The proposed mitigation could continue up to 30 additional years (until 2074) at the discretion of the USFWS, if certain conditions as outlined in the HCP are met.

1.3 Other Activities Influencing The Environmental Assessment Scope

A number of other on-going planning efforts will influence future spotted owl populations in the vicinity of the Millicoma Tree Farm. These are considered, along with the proposed issuance of a permit for incidental take, in the cumulative effects portion of this EA. Federal lands in the vicinity of the tree farm are managed by the USDI Bureau of Land Management (BLM). The future management of federal lands will be directed by the ROD (USDA/USDI 1994). Under this plan, large portions of BLM land north, east and south of the Millicoma Tree Farm would be managed as Late-Successional Reserves (LSRs) which would be capable of supporting resident populations of spotted owls. State lands on the Elliott State Forest (northwest of the tree farm) are anticipated to be managed according to a management plan currently being prepared by the Oregon Department of Forestry (ODF). The maintenance of a population of breeding spotted owls is currently one of the objectives of the Elliott plan, although the size of that population is uncertain. Spotted owl habitat on private lands in the vicinity of the Millicoma Tree Farm is currently affected by the prohibitions on take of spotted owls under Section 9 of the ESA.

1.4 Federal Permits, Licenses and Entitlements Needed

A decision will be made by the USFWS whether to issue or deny Weyerhaeuser an incidental take permit for the northern spotted owl on the Millicoma Tree Farm in accordance with Section 10(a)(1)(b) of the ESA and its implementing regulations.

1.5 Issues and Concerns

In the development of the draft EA, several issues and concerns associated with each alternative were identified and analyzed as part of the discussion of environmental consequences (Section 4.0). These subject areas focus on impacts to the following: 1) certain aspects of the physical environment, especially potential adverse impacts to soils and surface water quality and quantity, 2) certain aspects

of the biological environment, especially potential adverse impacts to threatened and endangered species, fisheries resources and other sensitive wildlife and 3) certain aspects of the cultural and social environment, especially potential adverse impacts to the local economy and historic and cultural resources.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Alternatives Analyzed

A total of six alternatives, including the Proposed Action, are identified and are discussed in this EA. Four alternatives were analyzed in detail. Two additional alternatives were considered but not analyzed in detail because they were not considered feasible alternatives to the proposed action. Both would result in greater impacts to the northern spotted owl than the Proposed Action, and they were not considered economically practicable alternatives to the Proposed Action.

Actions Common to All Alternatives

Basic silvicultural and timber harvest operations on the Millicoma Tree Farm would be similar under all alternatives, with only minor differences in the locations and amounts of harvest, and the miles of roads used and constructed (Table 2-1).

Silvicultural Practices: The tree farm would be managed for commercial timber production in accordance with Oregon's Forest Practices Rules. Generally, individual forest stands would be planted and grown for the purpose of commercial timber harvest at intervals of 45 to 60 years of age, depending on local growing conditions. Seedlings would be planted by hand and thinned prior to reaching commercial size, if necessary, to achieve stocking levels that maximize the rate at which they grow and develop commercially valuable wood. One or more applications of fertilizer could occur at intervals of 5 to 10 years to further accelerate growth. Fertilization typically would be done by helicopter, in a manner consistent with Oregon Forest Practices Rules. One or more commercial thinnings could occur, depending on site and stand conditions, followed by harvest at rotation age. Harvest typically would be conducted by clearcutting under all alternatives. Discussions of slash burning practices and riparian management are provided in subsection 3.5, Air Quality and subsection 3.8, Fisheries, respectively.

Table 2-1. Harvest activities likely to occur under each alternative.

	Alternative A No Action	Alternative B Proposed Action Habitat Conservation Plan	Alternative C Dispersal Habitat Only	Alternative D Dispersal Habitat and Some NRF Habitat
Alternative Description	Avoid incidental take by protecting NRF habitat around known occupied owl sites.	Alter harvesting practices to create dispersal landscape for at least 50 years. Retain suitable NRF habitat for four known reproductive owl pairs for at least 20 years.	Create dispersal landscape for at least 50 years as under Alternative B, but retain no NRF habitat.	Create dispersal landscape as under Alternative B, but retain suitable NRF habitat for 10 known reproductive owl pairs for duration of permit.
Timber Harvesting	Retain NRF habitat while sites remain occupied. Accelerate harvest of young forest to compensate for deferred harvest of mature timber. No pre-commercial thinning.	Harvest most existing NRF habitat in short-term, followed by harvesting of younger forest. Pre-commercial thinning would occur.	Harvest all existing NRF habitat in short-term, followed by harvesting of younger forest. Pre-commercial thinning would occur.	Harvest some NRF habitat in short-term, followed by harvesting of younger forest. Pre-commercial thinning would occur.
Road Use and New Road Construction	Little new road construction in short-term. Existing roads used frequently to harvest younger timber. New road construction over long-term as nesting sites are abandoned.	Moderate to low amounts of new road construction over short-term. New road construction to harvest mature forest in long-term. All roads would receive moderate use in short- and long-term.	Most new road construction over short-term to harvest mature forest, reducing use of existing roads. New road construction low in long-term.	Moderate to low amounts of new road construction in short-term to harvest some mature timber. Existing roads would receive moderate use. New road construction low in long- term.
Burning	Limited burning.	Limited burning.	Limited burning.	Limited burning.
Riparian Protection	Follow Oregon Forest Practices Rules.	Follow Oregon Forest Practices Rules.	Follow Oregon Forest Practices Rules.	Follow Oregon Forest Practices Rules.

Short term = approximately 20 to 30 years.

A number of facilities are maintained on the tree farm to support ongoing forestry activities, including gravel pits, log sort yards and radio repeater stations. Additionally, various non-forestry uses have been permitted on the tree farm, such as easements for transmission lines and relay stations.

Over 94 percent of the tree farm (196,664 acres) have been harvested and reforested in the last 80 years. Another 8,727 acres, or 4 percent of the tree farm, remain in stands naturally regenerated after fires in the late 1800s and early 1900s. Only 2,727 acres can be described as old-growth (200 years old). The remainder of the tree farm is unvegetated (rock, road, creek, etc).

Roads and Access: Approximately 1,750 miles of permanent road have been constructed on the Millicoma Tree Farm since 1949; an average of 39 miles per year. Weyerhaeuser has constructed about 75 miles of permanent roads in the last five years, or an average of 15 miles per year. Approximately 11 miles of permanent roads were built in 1993. The rate of construction is expected to continue to decline. Weyerhaeuser anticipates approximately 100 miles of new roads would be constructed over the next 20 to 30 years (4 miles/year). After that time, few new roads would be needed. Most new roads would be short spur roads or replacements for old road segments. Roads would be located to avoid steep slopes wherever practicable. They would be built with a base of 4-inch rock and surfaced with 1-1/2-inch and smaller rock. Roads would be resurfaced approximately every seven years, or as needed. Water would be applied to road surfaces as a dust control measure during periods of active hauling.

Weyerhaeuser's ongoing year-round road maintenance program would continue under all alternatives in accordance with Oregon's Forest Practices Rules and best management practices. Culverts not performing at hydraulic capacity would be maintained or improved to efficiently pass surface water.

Pesticides and Herbicides: Herbicides would be used as needed to control brush and other vegetation that might otherwise suppress growth of commercial crop trees. Insecticides have been used rarely on the tree farm to date, although Weyerhaeuser could use insecticides if necessary to control future infestations. All such chemicals would be applied only in accordance with EPA label directions and Oregon Forest Practices Rules. There are no data to suggest such chemical applications have caused

environmental damage on the tree farm, and no such damage is expected from appropriate use of such chemicals in the future under any alternative.

2.1.1 Alternative A: No Action (Avoid Incidental Take of Spotted Owls)

Under the No Action alternative, Weyerhaeuser would not receive an incidental take permit from the USFWS, and the proposed HCP (described in detail in Alternative B below) would not be implemented. Under this alternative, Weyerhaeuser would continue to harvest in accordance with applicable Oregon Forest Practices Rules.

Weyerhaeuser would exercise the necessary precautions to avoid incidental take of spotted owls as required by Section 9 of the ESA. On a case-by-case basis, known resident spotted owl sites would be protected from incidental take by maintaining existing nesting, roosting and foraging habitat in the vicinity of sites as long as sites remain occupied. Lands would not be managed to contribute to federal recovery efforts for the spotted owl within the region.

The USFWS evaluates the potential for incidental take in areas of suitable habitat on a case-by-case basis. The burden of proof as to whether a take occurs from timber harvest activities within suitable habitat around occupied activity centers would be on the federal enforcement agencies. It is recognized that federal enforcement on an individual owl basis could be time-consuming, costly and difficult, with uncertain results due to the inherent uncertainties of litigation.

Weyerhaeuser currently harvests timber on the tree farm at a rate necessary to meet volume demands and business objectives. Stands with the highest volumes (mature forest) typically are harvested first. Young stands in managed forest generally produce more timber over time because of faster growth rates, but none of the second-growth timber matches the standing volume in mature forest. Therefore, Weyerhaeuser could be expected to continue harvesting the highest volume acres on the tree farm, excluding those stands of mature timber not available for harvest due to owl take avoidance. In the future, Weyerhaeuser would likely harvest younger timber before it reaches the size of the mature forest on the tree farm due to the economics of rotation ages.

If a permit is not approved, the likely trend in timber harvest on the tree farm would include more acres harvested in any one year, on a shorter rotation than proposed in the HCP. Weyerhaeuser would likely find it necessary to increase the harvest of younger timber and increase the number of acres harvested per year in the future to compensate for the loss of current and future timber volume due to owl protection. The overall operable land base would be reduced due to owl protection, and Weyerhaeuser would experience increased pressure to manage remaining lands more intensively to meet total volume demands. Individual stands would likely be planted and maintained at higher densities of trees and harvested at younger ages to maximize wood volume yield. By shortening the rotation age, a greater number of acres could be cut in any one year, and total volume of harvest could be maintained. Thus, under the No Action alternative, no new dispersal habitat would be grown, and habitat currently unsuitable for spotted owls would be harvested on an economic rotation.

Weyerhaeuser would continue to manage the tree farm in accordance with Oregon Forest Practices Rules pertaining to harvest size and green-up requirements, and the result would be a mosaic of age classes in a fragmented pattern across the landscape. No efforts would be made to create dispersal habitat and reduce gaps between dispersal habitat in the landscape.

2.1.2 Alternative B: Issue a Permit for Incidental Take as Requested, and Implement the Habitat Conservation Plan (Proposed Action)

Overview

The following description of Alternative B is a summary of Weyerhaeuser's proposed HCP (Weyerhaeuser Company 1994), which is herein incorporated by reference. A more detailed description of this alternative can be found in the HCP.

The permit as proposed would allow Weyerhaeuser the incidental take of spotted owls on its 209,000-acre Millicoma Tree Farm in Coos and Douglas Counties, Oregon for at least 50 years (until 2044). The term of the permit could be extended by the USFWS for up to three additional 10-year periods, if certain criteria for extension outlined in the HCP are met. Approval of this permit would be conditional upon implementation of the proposed HCP. Lands could be added to the HCP area or removed from the area in accordance with subsection 6.5 of the HCP.

Forest management under the Proposed Action is described in Table 5-2 of the HCP. As one example, Weyerhaeuser could use genetically-improved seedlings with an initial planting density of 400 per acre. One pre-commercial thinning could be performed after stands reach an average diameter at breast height (dbh) of 6.5 inches. Resulting density after pre-commercial thinning could be 250 trees per acre. Fertilization could occur when stands reach 20 to 28 years of age. Variations in this silvicultural prescription would occur from site to site, as long as the variations did not prevent the habitat objectives of the HCP from being met.

Estimated Level of Take

Under Alternative B, the harvest of existing suitable habitat (except stands retained for mitigation) and the possible incidental take of resident owls would begin in 1995 and continue until most existing nesting, roosting and foraging habitat is converted to young forest. Harvesting would proceed in compliance with Oregon State Forest Practices Rules, and would be based on technological and economic considerations associated with commercial industrial forestry, all of which would determine the rate of harvest and ultimately the rate of any incidental take. A detailed analysis of potential incidental take under Alternative B is provided in the HCP.

Mitigation and Conservation

The Millicoma HCP outlines five measures designed to minimize and mitigate the effects of the incidental take of spotted owls, as summarized below. A more detailed presentation of the mitigation measures appears in the HCP. Weyerhaeuser would operate under the HCP until 2044, with possible 10-year extensions by the USFWS until 2074 if criteria for extention stated in the HCP were met.

The Maintenance of a Landscape Conducive to the Dispersal of Juvenile Spotted Owls: Weyerhaeuser would manage the Millicoma Tree Farm as a dispersal landscape for spotted owls. Individual stands would be managed to provide roosting and foraging opportunities for dispersing owls. Some stands planted prior to 1994 would provide lesser amounts of dispersal habitat than stands planted under the HCP, depending on their ages and management histories. The size and spacing of dispersal stands would be controlled so that by 2014: 1) a minimum of 40 percent of the forested area on the tree farm

would be in a stand condition suitable for roosting and foraging by dispersing owls; 2) a minimum of 80 percent of the tree farm would be in dispersal habitat and gaps between dispersal stands less than 0.5 mile; 3) a minimum of 90 percent of the tree farm would be in dispersal habitat and gaps between dispersal stands less than 1 mile; and 4) a minimum of 99 percent of the tree farm would be in dispersal habitat and gaps between dispersal stands less than 3 miles. Once achieved, this condition would be maintained within the managed tree farm for the term of the HCP (until at least 2044).

Retention of Existing Nesting, Roosting and Foraging and Other Forest Habitat Around Four Spotted Owl Activity Centers on Weyerhaeuser Lands to Augment the Dispersal Landscape for At Least 20 Years: Weyerhaeuser would retain 1,592 acres of forest habitat around four existing spotted owl activity centers on the Millicoma Tree Farm to augment the dispersal landscape by providing a potential source of nesting, roosting and foraging habitat for dispersing owls. The sites would be protected from harvest for at least 20 years (through 2014). If other dispersal landscape criteria are met in 2014, the retained habitat would be made available for harvest.

Retention of Nesting, Roosting and Foraging and Other Forest Habitat Around Four Known Spotted Owl Activity Centers On or Near Federal Lands to Supplement and Enhance Those Sites for At Least 20 Years: Weyerhaeuser would protect from harvest approximately 371 acres of existing forest associated with four spotted owl activity centers on or near adjacent BLM lands. The habitat would be protected for at least 20 years.

Protection of Occupied Spotted Owl Site Centers: Weyerhaeuser would protect the best 70 acres of nesting, roosting and foraging habitat surrounding each of the 35 known spotted owl site centers on the Millicoma Tree Farm as long as the sites are occupied. Occupancy would be determined according to USFWS protocol (U.S. Fish and Wildlife Service 1992a). No site would be considered abandoned until protocol surveys fail to detect the presence of owls for three consecutive years. Any new site centers discovered on the tree farm also would be protected in a similar manner.

Seasonal Protection of Active Nests: Weyerhaeuser would avoid timber harvest and road construction within 0.25 mile of any active spotted owl nest on or near the Millicoma Tree Farm between 1 March and 30 September. The Millicoma Tree Farm was surveyed for spotted owls in 1990, and surveys were

expanded in 1991, 1992, 1993 and 1994. It is not expected that any new spotted owl activity centers would be located in the future. However, in addition to monitoring known activity centers, all scheduled harvests of suitable nesting, roosting and foraging habitat within 0.5 mile of known activity centers would be surveyed out 0.25 mile from the harvest boundary to avoid felling or disturbing an active spotted owl nest during the nesting season.

Monitoring

Spotted owl surveys would be conducted by Weyerhaeuser to ensure the seasonal protection of known active nests and long-term protection of known occupied activity centers. Habitat conditions would be monitored and mapped to demonstrate the creation and maintenance of a dispersal landscape. Meetings would be held between Weyerhaeuser and the USFWS at specified intervals to report on implementation of the HCP. A detailed description of the monitoring program is provided in the HCP.

Funding

Weyerhaeuser would ensure that funds are available to implement the HCP along with other programs for the management and harvest of commercial timber on the Millicoma Tree Farm (Weyerhaeuser Company 1994).

2.1.3 Alternative C: Manage the Tree Farm for Dispersal Habitat Without the Retention of Nesting, Roosting and Foraging Habitat

The alternative of managing the tree farm for dispersal habitat without protecting any nesting, roosting and foraging habitat was also evaluated. The objective of this alternative would be the creation and maintenance of a dispersal landscape for spotted owls as described under Alternative B, but without protecting any older habitat for the first 20 years. In all other respects this alternative would be identical to Alternative B. The management of young forest stands would be directed toward increasing the growth of commercial wood fiber while enhancing conditions for juvenile spotted owls, as under Alternative B.

2.1.4 Alternative D: Manage the Tree Farm for Dispersal Habitat and Avoid the Incidental Take of Selected Spotted Owl Pairs

Weyerhaeuser could manage the tree farm for dispersal habitat, and simultaneously avoid the incidental take of selected spotted owl pairs. For purposes of analysis, it was assumed 10 pairs of owls would be protected from incidental take to correspond with the maximum number known to have reproduced in recent years. Incidental take would be avoided by retaining existing nesting, roosting and foraging habitat within the vicinity of 10 sites that are considered to be reproductively viable. This would increase the level of site protection from the four sites proposed in the HCP, and would more than double the acreage of mature forest dedicated to resident owl management. All other nesting, roosting and foraging habitat on the tree farm would be harvested. Dispersal habitat would be created and maintained through intensive silviculture, and all active nest sites on the tree farm would be monitored and protected as described under Alternative B.

2.2 Alternatives Not Included in Detailed Analysis

In addition to the four alternatives discussed above, the following two alternatives were considered but not included in the detailed analysis because they were not determined to be feasible alternatives to the Proposed Action as described above in subsection 2.1.

2.2.1 Alternative E: Manage the Tree Farm for Dispersal Habitat According to the Federal 50-11-40 Rule

The ISC (Thomas et al. 1990) and the federal Recovery Team (U.S. Fish and Wildlife Service 1992b) proposed managing portions of federal lands within the range of the northern spotted owl as dispersal habitat. The prescription for dispersal habitat originally developed by the ISC became known as the 50-11-40 Rule. The goal of the rule was a landscape with 50 percent of the land area covered by coniferous forest with an average tree dbh of at least 11 inches and canopy closure of at least 40 percent. Within the landscape, the ISC also recommended that nesting, roosting and foraging habitat be retained in up to seven patches of 80 acres each per township (36 square miles) to contribute to the support of reproductive pairs in the future.

The Weyerhaeuser HCP is a comparable dispersal model for private lands that meets the same overall objective of the 50-11-40 Rule, which is to provide a landscape conducive to the dispersal of juvenile spotted owls between federally-managed LSRs. It applies the same underlying principles to the unique conditions of the private industrial forest. The proposed HCP would provide a landscape of 40 percent coniferous forest with trees averaging at least 10 inches in dbh. Canopy closure would exceed 70 percent in stands of dispersal habitat. The ISC would prescribe 5,080 acres of mature forest reserves for an area the size of the tree farm, while Weyerhaeuser would retain 5,450 acres in permanent riparian reserves and 1,963 acres in nesting, roosting and foraging habitat until at least 2014. The ISC prescription may assure a higher level of support for pair occupancy in the long term than the Weyerhaeuser HCP, but the 50-11-40 rule probably would not achieve that level in the commercial forest because of the nature of management practiced on private lands (e.g., shorter rotations and intensive silviculture). Alternative E does not differ considerably from Alternative B in terms of spotted owl dispersal (Millicoma HCP: Appendix A).

2.2.2 Alternative F: Manage the Tree Farm to Provide a Viable Population of Reproductive Spotted Owls

An alternative to the proposed HCP would be to manage the tree farm to improve the spatial distribution of nesting, roosting and foraging habitat and maintain a long-term capability of seven or more pairs of owls. The Millicoma Tree Farm currently has 35 known spotted owl activity centers, but the capability of the tree farm is estimated to be seven pairs of owls because of the high degree of habitat fragmentation and overlap. The number of activity centers that are viable in the long-term may be even less than seven.

Weyerhaeuser could retain and grow nesting, roosting and foraging habitat in patches of sufficient size and spacing to ensure a viable population of seven pairs over the long term. This could be accomplished by permanently dedicating mature habitat, or by managing portions of the tree farm on extended rotations to provide a constant amount, but varying configuration, of nesting, roosting and foraging habitat. Such a program could require the commitment of up to 10,007 acres of mature forest (1,906 acres per pair with 25 percent overlap of home ranges as per Thomas et al. 1990). Recent demographic data for the tree farm suggest that successful reproduction can be achieved with less than 1,906 acres of nesting, roosting and foraging habitat, but the long-term viability of such sites is

unknown. Dispersal habitat would not be an objective of this alternative, but dispersing owls could make use of the nesting, roosting and foraging habitat retained for resident owls. The amount of dispersal habitat would likely be less than under the proposed HCP, and the number of large gaps between habitat areas greater.

This alternative was not analyzed in detail because of the short-term and long term economic impacts. In the short term, a significant amount of the merchantable timber on the tree farm would remain protected for current and/or future spotted owl pairs. In the long-term, the commitment of up to 5 percent of the productive area of the tree farm (10,007 acres), and a larger percentage of the currently merchantable timber to the maintenance of spotted owls, is not considered economically feasible by Weyerhaeuser.

2.3 Comparison of Alternatives

Table 2-2 summarizes anticipated effects under each of the four analyzed alternatives (No Action, Proposed Action, Alternative C and Alternative D).

Table 2-2. Summary of impacts under each alternative.

ELEMENT	ALTERNATIVE A No Action	ALTERNATIVE B Proposed Action Habitat Conservation Plan	ALTERNATIVE C Dispersal Habitat Only	ALTERNATIVE D Dispersal Habitat and Some Nesting, Roosting and Foraging Habitat
Geology and Soils	Impacts • Minor soil compaction, erosion and sedimentation to water courses from harvesting and temporary and permanent spur road construction.	Impacts • Same as No Action.	Impacts • Same as No Action.	Impacts • Same as No Action.
Air Quality	Impacts • Generation of localized dust from road use during dry months. Watering would reduce impact. • Minimal smoke generation from slash burning.	Impacts • Same as No Action. • Same as No Action.	Impacts • Same as No Action. • Same as No Action.	Impacts • Same as No Action. • Same as No Action.
Surface Water Quality and Quantity	Impacts • Minimal sedimentation of water courses from harvesting and temporary and permanent spur road construction. • Protection of riparian functions through adherence to Oregon Forest Practices Rules.	Impacts • Same as No Action. • Same as No Action.	Impacts • Same as No Action. • Same as No Action.	Impacts • Same as No Action. • Same as No Action.

Table 2-2. Continued.

ELEMENT	ALTERNATIVE A No Action	ALTERNATIVE B Proposed Action Habitat Conservation Plan	ALTERNATIVE C Dispersal Habitat Only	ALTERNATIVE D Dispersal Habitat and Some Nesting, Roosting and Foraging Habitat
Vegetation	Impacts	Impacts	Impacts	Impacts
	• Minor harvesting of habitat for plant species inhabiting moist coniferous forest habitat.	• Potential for more harvesting of habitat for sensitive plant species compared to No Action.	• Potential for more harvesting of habitat for sensitive plant species compared to No Action.	• Similar to No Action.
Fisheries	Impacts	Impacts	Impacts	Impacts
	• Delivery of fine and coarse sediments to streams from road use, surface water runoff and mass wasting potential from minor new road construction in long term.	• Same as No Action.	• Delivery of fine and coarse sediments to streams from road use, surface water runoff and mass wasting potential from minor new road construction in short term.	• Delivery of fine and coarse sediments to streams from road use, surface water runoff and mass wasting potential from minor new road construction in short term.
	• Increased road use in short term for intensive management of young stands.	• Moderate existing road use in short and long term.	• Lowest existing road use in short term.	• Moderate existing road use in short and long term.
	• Minor harvesting in riparian areas.	• Same as No Action.	• Same as No Action.	• Same as No Action.

Table 2-2. Continued.

ELEMENT	ALTERNATIVE A No Action	ALTERNATIVE B Proposed Action Habitat Conservation Plan	ALTERNATIVE C Dispersal Habitat Only	ALTERNATIVE D Dispersal Habitat and Some Nesting, Roosting and Foraging Habitat
Wildlife	Impacts	Impacts	Impacts	Impacts
Owls	• Protection of habitat for resident owls until sites are abandoned. Deterioration of conditions for juvenile dispersal.	• Harvest of all but 1,963 acres of resident owl habitat during first 10 to 20 years. Harvest of remaining resident owl habitat after 20 years. Creation and maintenance of dispersal landscape.	• Harvest of all resident owl habitat during first 10 to 20 years. Creation and maintenance of a dispersal landscape.	• Protection of habitat for the 10 most viable resident pairs until sites are abandoned. Creation and maintenance of a dispersal landscape.
Marbled Murrelets	• Avoidance of Incidental Take.	• Avoidance of Incidental Take.	• Avoidance of Incidental Take.	• Avoidance of Incidental Take.
General	• Gradual improvement of habitat for riparian and cavity nesting species. Removal of most mature and late-successional forest habitat except where protected for resident owls. Deterioration of conditions for mid-successional forest species due to management for higher tree densities.	• Gradual improvement of habitat for riparian and cavity nesting species. Removal of most mature and late-successional forest habitat, particularly after 20 years. Improvement in the quality and distribution of habitat for mid-successional forest species.	• Gradual improvement of habitat for riparian and cavity nesting species. Removal of most mature and late-successional forest habitat within 10 to 20 years. Improvement in the quality and distribution of habitat for mid-successional forest species.	• Gradual improvement of habitat for riparian and cavity nesting species. Removal of mature and late-successional forest habitat except where protected for 10 resident owl pairs. Improvement in the quality and distribution of habitat for mid-successional forest species.

Table 2-2. Continued.

ELEMENT	ALTERNATIVE A No Action	ALTERNATIVE B Proposed Action Habitat Conservation Plan	ALTERNATIVE C Dispersal Habitat Only	ALTERNATIVE D Dispersal Habitat and Some Nesting, Roosting and Foraging Habitat
Land Use	Impacts • None	Impacts • None	Impacts • None	Impacts • None
Social and Economic Conditions	Impacts • Potential threat to economic viability of tree farm; potential contribution to future local mill closures.	Impacts • Minor reductions in timber harvested; minor economic impact.	Impacts • Similar to Alternative B; more timber could be harvested than under No Action.	Impacts • Greatest potential reduction in timber harvest of all alternatives.
Cultural Resources	Impacts • Potential disturbance of resource sites or features if any are present on the tree farm.	Impacts • Potential disturbance of resource sites or features if any are present on the tree farm.	Impacts • Potential disturbance of resource sites or features if any are present on the tree farm.	Impacts • Potential disturbance of resource sites or features if any are present on the tree farm.

3.0 AFFECTED ENVIRONMENT

3.1 Environmental Setting

The Millicoma Tree Farm is located east of U.S. Highway 101 in Coos and Douglas Counties, Oregon (Figure 3-1). The area consists of approximately 209,000 acres of conifer forests extending from the Oregon coast at Coos Bay approximately 25 miles east to the crest of the Oregon Coast Range and approximately 20 miles from north to south. Major access points to the area are Interstate 5 to the east and U.S. Highway 101 to the west.

3.2 Climate

The Millicoma Tree Farm is characterized by a wet, mild maritime climate, with annual rainfall averaging 60 to 120 inches. Most precipitation falls in the winter; summers are relatively dry. Precipitation is higher on the western portion of the tree farm due to the orographic effects of the coastal mountains (Franklin and Dyrness 1984). Fog drip also accounts for a significant portion of the precipitation in coastal areas.

3.3 Geology

The tree farm falls within the southern Oregon Coast Range Physiographic Province. The area is characterized by steep mountainous slopes with ridges that often are extremely sharp (Franklin and Dyrness 1984). Elevations in the area range from 100 to 3,200 feet. Much of the tree farm is highly dissected into complex dendritic and parallel drainage systems, and the area is considered geologically young. The tree farm consists of three main geologic regions; rough mountainous lands, upland plateaus and steep lower slopes. The rough mountainous lands region comprises the largest portion of the tree farm and includes steep, dissected slopes with narrow interfluves and v-shaped valleys. Many of the canyon walls in this area are rimmed with vertical sandstone escarpments separating a more gently sloping upper plateau from steep lower slopes. Landslides are evident throughout the province, caused by streams undercutting strata.

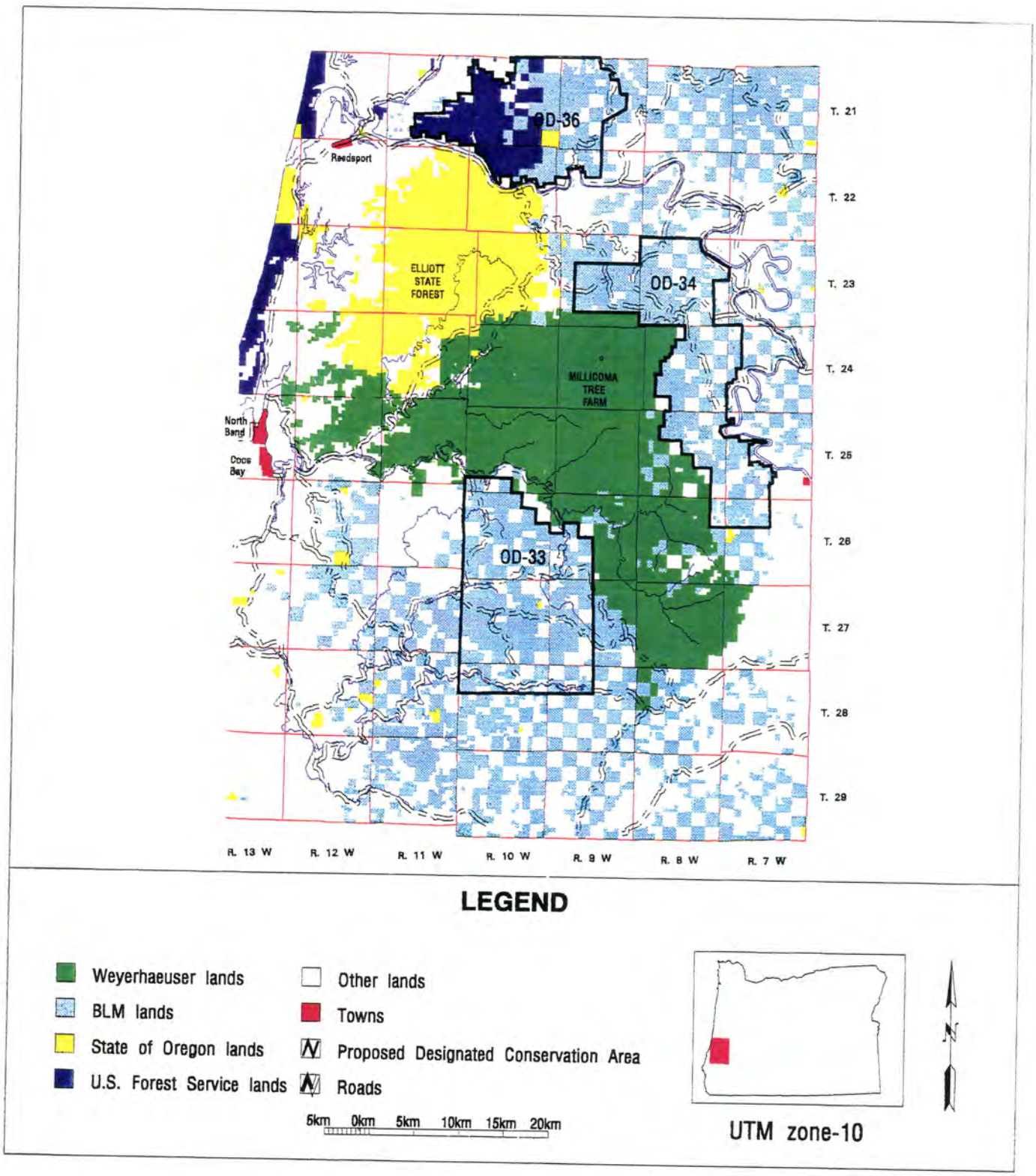


Figure 3-1. Millicoma Tree Farm location map.

The Alluvial Valleys and Upland Plateaus region comprises the remainder of the tree farm. The Alluvial Valleys region covers a small portion of the area. The majority of the alluvial valleys on the ownership have narrow floors subject to occasional overflow by streams in the region. The third province is the Upland Plateaus Province. This province is located primarily in the Roseburg District on the eastern portion of the tree farm above 2,000 feet in elevation. This area is characterized by broad, smooth, gentle to moderately-sloping plateaus that break sharply over rock cliffs to the steep, narrow valleys below (Duncan and Steinbrenner 1972).

3.4 Soils

There are seven major soil associations present on the Millicoma Tree Farm; five derived from sedimentary rocks, one from volcanic rock and one from alluvium. Soil associations consist of groupings of soil series occurring in the same geographic area that usually have similar parent materials. There are 22 soil series occurring on the tree farm. Callahan, Nabb and Jolson are the three most common, comprising approximately 50 percent of the tree farm. Eocene sandstone and siltstone are the parent materials for the Cooston, Noah, Remote, Millicoma and Yaokum Associations, while Eocene basalt is the parent material for the Keever Association. Older and sandstone alluviums are the parent materials for the Bessee Association (Duncan and Steinbrenner 1972).

Nearly 89 percent of the tree farm has moderate to good soil fertility (Douglas-fir Site Class III or better) (Duncan and Steinbrenner 1972). Hazard to windthrow, based on a combination of soils and topography, is low on 57 percent of the tree farm, moderate on 36.4 percent and high on 5.8 percent of the tree farm. High susceptibility areas occur on steep slopes with shallow, stony soils (Duncan and Steinbrenner 1972).

3.5 Air Quality

Air quality in the Millicoma Tree Farm vicinity meets Clean Air Act standards (Oregon Department of Forestry 1993a). The Oregon Department of Environmental Quality (DEQ) does not routinely sample air quality in the region, but judges air quality in the region to be in compliance with air quality

standards (Oregon Department of Forestry 1993a). The tree farm is subject to the highest primary and secondary air quality designations under the federal Clean Air Act. The tree farm has not been designated as a non-attainment area for national ambient air quality standards.

There are three potential sources of particulate air pollution associated with forest management activities; slash burning, wildfire and road use. The use of slash burning on forest lands in western Oregon has declined over the last 15 years resulting from implementation of the Smoke Management Plan (Oregon Department of Forestry 1993b). Under the Oregon Smoke Management Plan, the tree farm lies within the "restricted area" west of the summit of the Cascades (OAR 629-43-043). Burning related to forest management in this area requires a permit. Weyerhaeuser currently does not employ the practice of broadcast slash burning, but does conduct concentrated burns when necessary to relieve excessive slash accumulations and prevent downstream impacts from possible landing failures. The tree farm is located between two "designated areas" under the plan; Coos Bay to the west and Roseburg to the east. Designated areas are principal population centers protected from forest land smoke intrusions. No smoke intrusions were reported in 1993 in either the Coos Bay or Roseburg designated areas (Oregon Department of Forestry 1993b).

The Coos Forest Protection Association provides wildfire suppression services, minimizing air quality impacts from wildfires in the vicinity of the tree farm (Chase, pers. comm., 17 July 1994). This is a private, non-profit corporation providing protection from fires to its corporate members. Road construction and maintenance are described in Section 2.0, Alternatives.

3.6 Surface Water Quality and Quantity

The Millicoma Tree Farm is located in the Oregon South Coast Drainage Basin. Drainage basins are defined by the Oregon Department of Environmental Quality (DEQ) to implement basin-wide water quality management. Water quality in the South Coast Drainage Basin is managed to protect the following recognized beneficial uses: industrial water supply, anadromous fish passage, salmonid fish rearing and spawning, resident fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation and aesthetic quality. These uses apply to all streams and tributaries of estuaries and

adjacent marine waters of the South Coast Basin [ORS Chpt. 468. 340-41-322 (Oregon Department of Environmental Quality 1992)].

All waters on the tree farm meet or exceed the water quality standards for the highest water quality designation as adopted by Oregon and approved by the Environmental Protection Agency (EPA) under the federal Clean Water Act. Oregon's Forest Practices Rules have been approved by EPA as "sufficient" to implement state water quality standards under Sections 208, 303 and 319 of the federal Clean Water Act. No waters on the tree farm have been designated as water quality limited.

The Millicoma Tree Farm has several moderately-sized waterways that flow into the Coos or Umpqua Rivers (Figure 3-2). The Millicoma River joins the Coos River just east of Coos Bay, Oregon. The mainstem of the Millicoma River branches into East and West Forks near Allegany, Oregon. The South Fork Coos River becomes Williams River at the confluence with Tioga Creek. Fall Creek is a tributary to the South Fork Coos River, joining in Township 25 South, Range 10 West, Section 36. Bottom and Cedar Creeks are tributaries to the Williams River, converging in Township 26 South, Range 9 West, Section 9 and Township 26 South, Range 9 West, Section 14, respectively. Lake Creek flows northwest to the Umpqua River east of Reedsport, Oregon.

Seasonal variations in water quality may result from fluctuations in stream flow and temperature. Locally, water quality may be degraded due to natural or human-caused erosion, slope failure or removal of protective streamside vegetation.

Effective 1 September 1994, streams in Oregon were classified as Type F, D or N (Table 3-1). Fish-bearing streams are classified as Type F, including those fish-bearing streams used for domestic water supply. Type D streams include non-fish-bearing streams used for domestic water supply. Type N includes all other streams [OAR 629-57-2100]. Streams and tributaries present on the Millicoma Tree Farm include Type F, Type D and Type N.

Within each type category, streams are also categorized as large, medium or small based on mean annual discharge. Large streams are those with a flow of greater than 10 cubic feet per second (cfs).

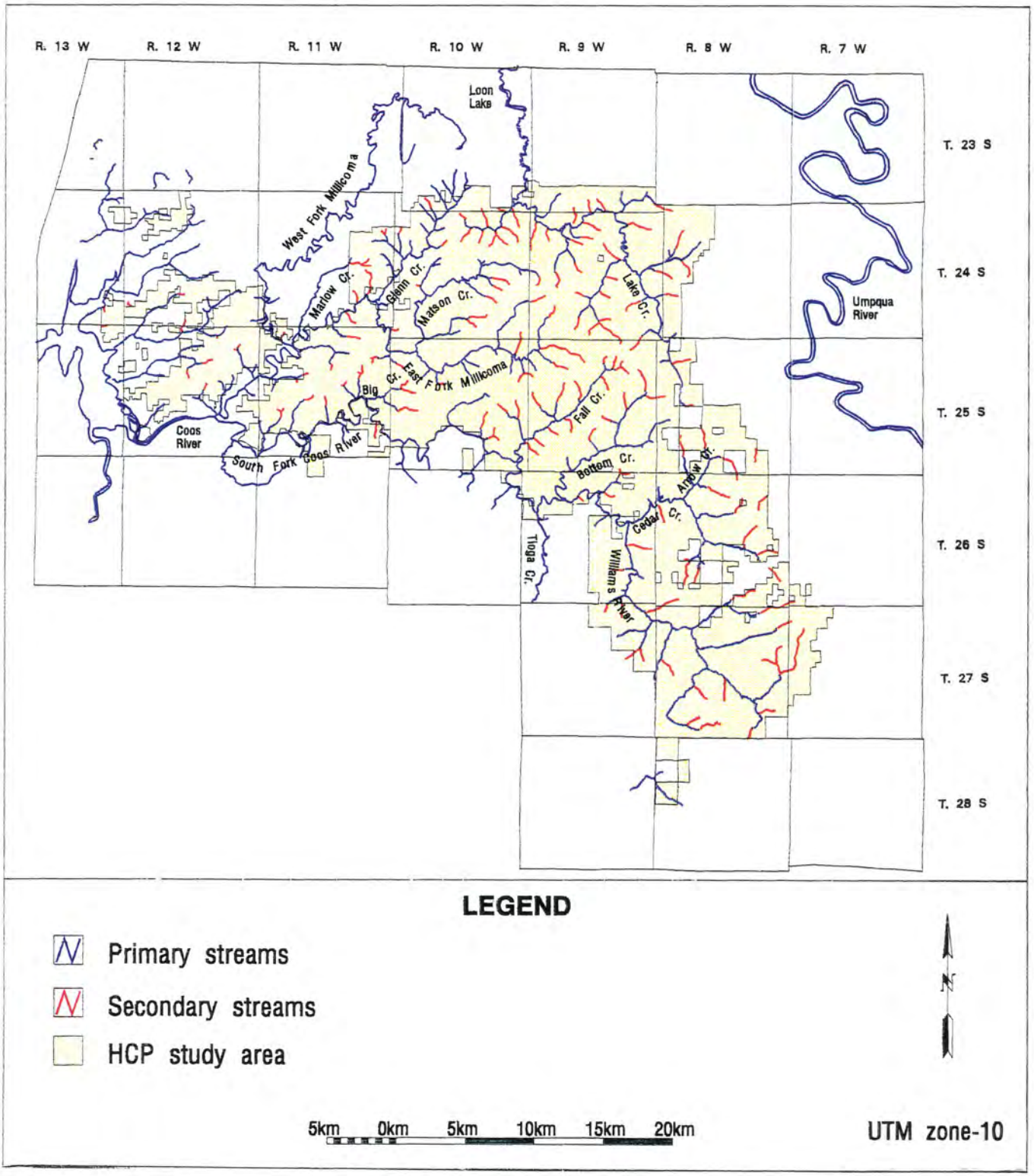


Figure 3-2. Water courses that flow into the Coos or Umpqua Rivers.

Table 3-1. Surface water classification system adopted by the Oregon Department of Forestry 1 July 1994.

	Stream Size		
Water Type	**Large**	**Medium**	**Small**
Type F	>10 cfs[1] average annual flow; fish-bearing	Between 2 and 10 cfs average annual flow; fish-bearing.	<2 cfs average annual flow; fish-bearing
Type D	>10 cfs average annual flow; domestic water supply	Between 2 and 10 cfs average annual flow; domestic water supply	<2 cfs average annual flow; domestic water supply
Type N	> 10 cfs average annual flow; other streams	Between 2 and 10 cfs average annual flow; other streams	<2 cfs average annual flow; other streams

[1] cfs - cubic feet per second
Note: All streams with a drainage area <200 acres are categorized as small.

Medium streams have a flow between 2 and 10 cfs, while small streams have a flow less than 2 cfs (Table 3-1).

Type F streams (formerly Class I streams) in the South Coast drainage basin are characterized by high dissolved oxygen levels (above 90% of the seasonal low), low turbidity, low temperature (below 64° F), low fecal coliform levels and low concentrations of toxic materials.

A search of the EPA STORET database yielded water quality data on the South Fork Coos, Mart Davis Creek and the mainstem and East and West Forks of the Millicoma River. The most recent data available on water quality were collected in 1992. Water quality parameters collected included water temperature, salinity and fecal coliform bacteria. The South Coast Drainage Basin water quality standards for fecal coliform and water temperature were met at all stations monitored (Appendix A).

The water quality monitoring did not include a comprehensive survey of concentrations of toxic materials (metals, etc.) (Environmental Protection Agency 1992). No water quality monitoring stations were located on the Millicoma Tree Farm.

As specified in the newly-adopted forest practices rules, Riparian Management Areas (RMAs) of specified widths must be maintained along each side of Type F, D and N streams during timber harvest operations [OAR 629-57-2230 through 629-57-2250]. The focus of the riparian policy is to provide adequate physical components and maintain function necessary to meet objectives for water quality, fish and wildlife. Along Type F, D and N waters, all trees within 20 feet of high water level must be maintained, in addition to all understory vegetation within 10 feet of high water level and all trees leaning over the channel. Riparian buffer strips averaging 50, 70 and 100 feet for small, medium and large streams must be retained along Type F streams. Within these strips, requirements have been set for retention of live conifers. Mean width of riparian buffer strips required for Type D streams must range from 20 to 70 feet. Buffer strips along Type N streams must average 70 feet for large streams and 50 feet for medium streams. Live conifer retention standards are also provided for Type D and N medium and large streams. Furthermore, roads are not permitted in riparian management areas (OAR 629-24-521), and OAR 629-24-621 requires that roads be located so as to minimize the risk of material entering waters and disturbance to channels.

3.7 Vegetation

3.7.1 Plant Communities

The majority of the Millicoma Tree Farm lies within the *Tsuga heterophylla* Zone, which may occur between sea level and approximately 3,000 feet in elevation (Franklin and Dyrness 1984). Dominant tree species within this zone include western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*) and western redcedar (*Thuja plicata*). The western-most portion of the tree farm lies within the *Picea sitchensis* Zone. This zone, usually found below approximately 500 feet in elevation, also may occur up to nearly 2,000 feet when mountain masses are located immediately adjacent to the ocean. This zone could be considered a variant of the *Tsuga heterophylla* Zone, distinguished by the occurrence of Sitka spruce (*Picea sitchensis*), proximity to the ocean and frequent summer fogs. Dominant trees within the *Picea sitchensis* Zone include Sitka spruce, western hemlock and western redcedar. Natural stands in these forest zones, if undisturbed, eventually develop "old-growth" characteristics, which include dominant trees greater than 3 feet in diameter and 200 feet in height, multiple age and size classes of trees ranging from large dominants to seedlings, large standing dead trees (snags) and heavy accumulations of logs on the forest floor (Franklin et al. 1981). Stands such as these may attain ages of several hundred years subject only to catastrophic disturbances, such as fire or wind.

The Millicoma Tree Farm is currently a mosaic of forest stands of varying ages (Figure 3-3; Table 3-2). Areas in the western portion of the tree farm are characterized by mature second-growth timber with residual old-growth trees in the overstory and a significant percentage of mature hardwoods. Areas in the southeast portion of the tree farm are characterized by small fragmented stands of mature timber in a matrix of recently harvested areas and young stands. Northeast and north-central portions of the tree farm contain a matrix of mid- and early-successional stands.

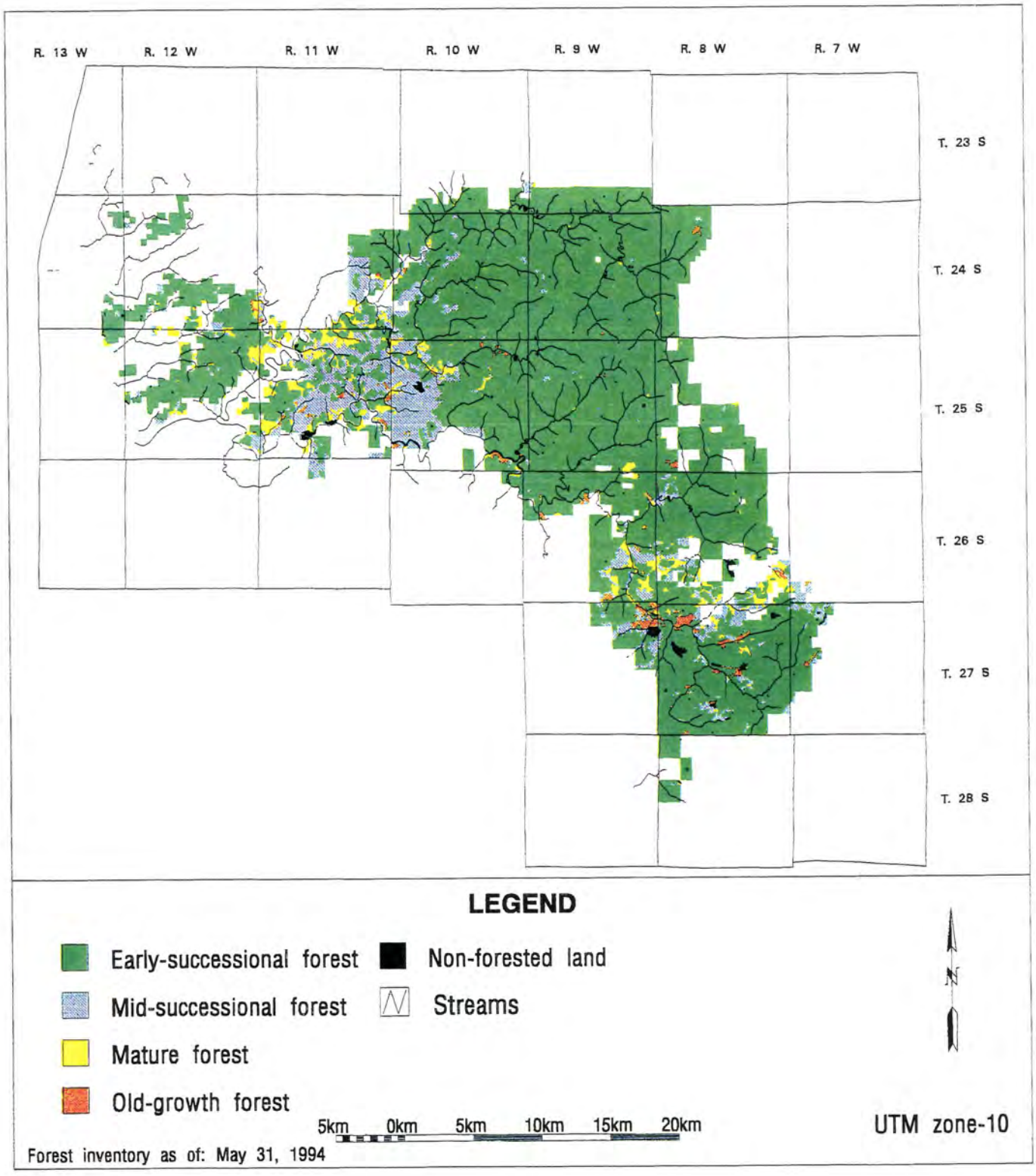


Figure 3-3. Forest cover types on the Millicoma Tree Farm in 1994.

Table 3-2. Forest cover types on the Millicoma Tree Farm in 1994.

Cover Type	Area (acres)
Early-successional Forest (0-39 years old)	171,517
Mid-successional Forest (40-79 years old)	25,147
Mature Forest (80-199 years old)	8,727
Old-growth Forest (200+ years old)	2,727
Non-forest Land	882
Total	209,000

3.7.2 Plant Species of Special Interest

The Millicoma Tree Farm supports no federally-listed plant species. Four endangered species and one threatened species can be found within the State of Oregon, but none are listed by the Oregon Natural Heritage Program (ONHP) as occurring within Coos or Douglas Counties.

The USFWS provided a list of plant species of concern that included seven candidates for federal listing likely to occur within the area of the Millicoma Tree Farm. The list included the western lily (*Lilium occidentale*), the wayside aster (*Aster vialis*), Oregon bensoniella (*Bensoniella oregana*), tall bugbane (*Cimicifuga elata*), salt-marsh bird's-beak (*Cordylanthus maritimus* ssp. *palustris*), shaggy horkelia (*Horkelia congesta ssp. congesta*) and slender meadowfoam (*Limnanthes gracilis* ssp. *gracilis*) (Table 3-3). The original consultation list was updated to include the crinite mariposa-lily (*Calochortus coxii*) and Umpqua mariposa-lily (*Calochortus umpquaeni*) (Vrilakas, pers. comm., 8 December 1993).

The ONHP maintains a database system containing information on the occurrences of rare, threatened and endangered plants and plant communities within the State of Oregon. A search of this database for the Millicoma Tree Farm produced documented occurrences of five of the plant species on the USFWS consultation list (Oregon Natural Heritage Program 1993a). Rare plant survey results also were requested from both the Coos Bay and Roseburg Bureau Districts because this information had not yet been incorporated into the ONHP database (Vrilakas, pers. comm., 8 December 1993). The Roseburg District had not conducted rare plant surveys within the area of the Millicoma Tree Farm in 1993 (Holmes, pers. comm., 17 December 1993) and had not noted the occurrence of any rare plants within the vicinity of the tree farm (Bureau of Land Management 1993a). Data received from the Coos Bay District indicated three occurrences of rare plants within the vicinity of the Millicoma Tree Farm (Bureau of Land Management 1993b). Two of the three plants noted are on the USFWS consultation list.

Table 3-3. Plant species with special federal status which may be present on or near the Millicoma Tree Farm.

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS[1]	OCCURRENCE POTENTIAL	HABITAT
Western lily	*Lilium occidentale*	PE	unlikely	Occurs in poorly drained, highly organic soils at the edges of bogs near the ocean.
Wayside aster	*Aster vialis*	C2	unlikely	Edges of woodlands, woodland openings and shaded roadsides.
Oregon bensoniella	*Bensoniella oregana*	C2	unlikely	Damp, well drained soils at the edges of bogs, meadows and springs above 3,500 feet elevation.
Crinite mariposa-lily	*Calochortus coxii*	C2	possible	Serpentine soils, on shady, north-facing slopes, often near ridgelines.
Umpqua mariposa-lily	*Calochortus umpquaeni*	C2	not present	Forest and meadow habitats.
Tall bugbane	*Cimicifuga elata*	C2	possible	Moist, shady coniferous or mixed deciduous-coniferous forests at low elevations.
Salt-marsh bird's-beak	*Cordylanthus maritimus ssp. palustris*	C2	possible	Immediately above the high tide line within salt marshes.
Shaggy horkelia	*Horkelia congesta ssp. congesta*	C2	possible	Dry open places.
Slender meadowfoam	*Limnanthes gracilis ssp. gracilis*	C2	possible	Natural habitat is flat, alluvial plains. Prefers areas of slowly receding spring flood waters.

[1] PE - Proposed Endangered
C2 - Federal Candidate

Many of the listed plant species are associated with unique habitats and, therefore, would receive protection under several sections of Chapter 629 of the Oregon Administrative Rules (OAR). Applicable forest practices rules include:

- OAR 629-24-113, which requires State Forester approval of written plans for forest management activities near sensitive resources,

- OAR 629-57-2200 through 629-57-2250 which regulates the width of Riparian Management Areas (since a limited degree of forest management activities are allowed within Riparian Management Areas, these rules may only afford partial protection to some of the listed species),

- OAR 629-24-900, which provides protection for biological sites which are ecologically and scientifically significant and

- OAR 629-57-2300 through OAR 629-57-2350, which provide protection for significant wetlands on forest lands.

This section presents habitat information for those species on the consultation list, results of the ONHP database search and reviews of the probability of each listed species to occur on the Millicoma Tree Farm based upon known habitat requirements (Appendix B). Habitat information is presented in Table 3-3, along with assessments of the potential for each species to occur on the Millicoma Tree Farm.

Western lily (*Lilium occidentale*)

The western lily, which is proposed for federal listing as endangered within the State of Oregon (U.S. Federal Register, 26 October 1992), is known to exist within Coos County (Appendix B). This species typically occurs at the edge of bogs near the ocean and is known to inhabit poorly drained, highly organic soils of *Sphagnum* origin. Common associates of this species include sundew (*Drosera* spp.), Pacific rhododendron (*Rhododendron macrophyllum*), evergreen huckleberry (*Vaccinium ovatum*), Labrador-tea (*Ledum groenlandicum*) and red alder (*Alnus rubra*) (Meinke 1982). As a result of the ONHP database search, one occurrence of western lily was noted within a bog along Highway 101. The occurrence of this species within the same approximate location also was noted within the 1993

rare plant survey information obtained from the Bureau Coos Bay District Office (Bureau of Land Management 1993b). The location of these occurrences (Township 24 South, Range 13 West) is approximately 3 miles from the western-most portion of the Millicoma Tree Farm (Oregon Natural Heritage Program 1993a). The potential for occurrence of this species on the Millicoma Tree Farm is remote, as this species usually is restricted to areas within 2 miles of the ocean (Meinke, pers. comm., 9 December 1993) (Table 3-3).

Wayside aster (*Aster vialis*)

The wayside aster is known to occur in Douglas County (Appendix B). The habitat of this species, which is a federal candidate for listing within the State of Oregon (U.S. Federal Register, 30 September 1993), includes the edges of woodlands, woodland openings and shaded roadsides (Oregon Natural Heritage Program 1993b). Eastman (1990) identifies open woodlands of the upper Willamette Valley as the primary habitat of this species. Meinke (1982) states associates of this species include Douglas-fir (*Pseudotsuga menziesii*), golden chinquapin (*Castanopsis chrysophylla*) and Pacific madrone (*Arbutus menziesii*). One occurrence of wayside aster was noted approximately 4 miles south of the southern-most portion of Weyerhaeuser ownership in Township 28 South, Range 8 West (Oregon Natural Heritage Program 1993a). Within the forested environment, this species inhabits clearings created through openings in the tree canopy (Meinke, pers. comm., 9 December 1993). Due to intensive forest management on the Millicoma Tree Farm, the occurrence potential for this species is remote (Table 3-3).

Oregon bensoniella (*Bensoniella oregana*)

Bensoniella is known to occur within both Coos and Douglas Counties (Appendix B). Eastman (1990) identifies moist streamsides and wet meadows in Pre-Cretaceous metasedimentary rock at elevations above 4,000 feet as the preferred habitat of this species. Meinke (1982) states damp, well-drained soils at the edges of bogs, meadows and springs within mixed coniferous zones from above 3,500 to 5,000 feet as the preferred habitats for this species. Common associates of bensoniella include currants (*Ribes* spp.), louseworts (*Pedicularis* spp.) and sedges (*Carex* spp.) (Meinke 1982). No occurrences of this species were noted as a result of the ONHP database search (Oregon Natural Heritage Program 1993a). Based upon low topographic elevations throughout the Millicoma Tree Farm (maximum elevation of 3,200 feet), the occurrence potential for this species is low (Table 3-3).

Crinite mariposa-lily (*Calochortus coxii*)

Crinite mariposa-lily, a federal candidate for listing (U.S. Federal Register, 30 September 1993), is known to occur within Douglas County (Appendix B). This species occurs on serpentine soils and on shady, north-facing slopes, often near ridgelines. Common associate species include incense-cedar (*Calocedrus decurrens*), Idaho fescue (*Festuca idahoensis*), Jeffrey pine (*Pinus jeffreyi*), Tolmie's mariposa-lily (*Calochortus tolmiei*), Bolander's onion (*Allium bolanderi* spp. *mirabile*), western azalea (*Rhododendron occidentalis*), Hooker's silene (*Silene hookeri*), ponderosa pine (*Pinus ponderosa*), Douglas-fir and Pacific madrone (Oregon Natural Heritage Program 1993b). As a result of the ONHP database search, no occurrences of this species were noted within the area of the tree farm (Oregon Natural Heritage Program 1993a). It is possible this species could occur on the Millicoma Tree Farm (Table 3-3).

Umpqua mariposa-lily (*Calochortus umpquaeni*)

Umpqua mariposa-lily, a federal candidate for listing (U.S. Federal Register, 30 September 1993), occurs within forest and meadow habitats. This species has been found to occur in a variety of habitats including forests dominated by incense-cedar, Pacific madrone and Douglas-fir and areas of limited shrubs, and has been found to be associated with moss, (*Phacelia capitata*), rosy plectritis (*Plectritis congesta*), podfern (*Aspidotis densa*), California danthonia (*Danthonia californica*) and Idaho fescue (Oregon Natural Heritage Program 1993b). This species is known to occur within Douglas County (Appendix B). No occurrences of this species have been noted in the area of the Millicoma Tree Farm (Oregon Natural Heritage Program 1993a). This species generally is known to occur only east of Interstate 5 (Meinke, pers. comm., 9 December 1993) and is not expected to occur on the tree farm (Table 3-3).

Tall bugbane (*Cimicifuga elata*)

Tall bugbane, a federal candidate for listing (U.S. Federal Register, 30 September 1993), is known to exist within Douglas County (Appendix B). This species occurs at the margins of or within moist, shady coniferous or mixed deciduous-coniferous woodlands at lower elevations. On the Willamette National Forest, this species appears to be limited to wetter, steep (60 to 80%), north-facing slopes. This species has been observed within areas where the herb layer is dominated by sword fern (*Polystichum munitum*). Other species indicative of potential sites include California maidenhair fern (*Adiantum*

jordanii) and wild sarsaparilla (*Aralia nudicaulis*) (Oregon Natural Heritage Program 1993b). No occurrences of this species were noted as a result of the ONHP database search (Oregon Natural Heritage Program 1993a). Since the Millicoma Tree Farm is dominated by low elevation coniferous forests with herbaceous layers often being dominated by sword fern, this species could potentially occur on the tree farm (Table 3-3).

Salt-marsh bird's beak (*Cordylanthus maritimus* ssp. *palustris*)

According to the ONHP (Appendix B), salt-marsh bird's-beak exists within Coos County. This species, which is a federal candidate for listing (U.S. Federal Register, 30 September 1993), grows just above the high tide line within salt marshes (Eastman 1990). Meinke (1982) found associates of this species to include pickleweed (*Salicornia virginica*), black knotweed (*Polygonum paronychia*) and American searocket (*Cakile edentula*). Other associates include California marsh-rosemary (*Limonium californicum*), seashore saltgrass (*Distichlis spicata*), California hairgrass (*Deschampsia californica*) and fleshy jaumea (*Jaumea carnosa*) (Oregon Natural Heritage Program 1993b). Eight separate occurrences of this species were noted as a result of the database search. Each occurrence noted was located adjacent to Coos Bay and west of Highway 101 (Oregon Natural Heritage Program 1993a). The occurrence of this species within the same approximate location also was noted in the 1993 rare plant survey information obtained from the Bureau Coos Bay District Office (Bureau of Land Management 1993b). The occurrence potential for this species on the Millicoma Tree Farm is limited to those portions of the tree farm located directly adjacent to saltwater. This species potentially could occur within these areas; however, the salinity of the water east of Highway 101 may be insufficient to support this species (Rittenhouse, pers. comm., 13 December 1993) (Table 3-3).

Shaggy horkelia (*Horkelia congesta* ssp. *congesta*)

Shaggy horkelia, known to exist within Douglas County (Appendix B), occurs primarily within open grassland habitats within the Willamette and Umpqua Valleys (Vrilakas, pers. comm., 8 December 1993; Meinke, pers. comm., 9 December 1993). Abrams (1944) lists dry open places as the preferred habitat of this species. This species is a federal candidate for listing within the State of Oregon (U.S. Federal Register, 30 September 1993). A plant monograph provided by the ONHP (1993c) states this species typically occurs from the lower Willamette Valley to the Umpqua River Valley and recommends the low hills of the Umpqua be taken as the type locality. The ONHP database search

identified one occurrence of shaggy horkelia approximately 5 miles south of the tree farm (Township 29 South, Range 8 West) (Oregon Natural Heritage Program 1993a). It is possible this species could occur on the Millicoma Tree Farm; however, the available habitat information tends to suggest this species prefers grassy areas rather than managed coniferous forests (Table 3-3).

Slender meadowfoam (*Limnanthes gracilis* ssp. *gracilis*)

Slender meadowfoam, known to occur within Douglas County (Appendix B), occurs in areas which are moist to wet in early spring, often on serpentine soils (Meinke 1982; Eastman 1990). This species has been reported within the elevation range of 1,500 to 5,600 feet. Common associates are presumed to be primarily herbaceous plants (Meinke 1982). Habitat information obtained from the ONHP (1993c) stated this species occasionally is found in ditches or disturbed areas, but the natural habitat is flat, alluvial plains, usually in open valley bottoms of ponderosa pine and Garry oak (*Quercus garryana*). Other common associates include California danthonia, annual hairgrass (*Deschampsia danthoides*), pine bluegrass (*Poa scabrella*), small-leaved bentgrass (*Agrostis microphylla*) and common buckbrush (*Ceanothus cuneatus*) (Oregon Natural Heritage Program 1993b). This species prefers areas of slowly receding spring flood waters (Meinke, pers. comm., 9 December 1993). The ONHP database search identified two occurrences of slender meadowfoam approximately 5 miles south of the tree farm (Township 29 South, Range 8 West) (Oregon Natural Heritage Program 1993a). Slender meadowfoam could occur on the Millicoma Tree Farm (Table 3-3).

In addition to the above-listed species, the ONHP database search also noted the occurrence of russet cotton-grass (*Eriophorum chamissonis*), whorled marsh pennywort (*Hydrocotyle verticillata*) and bog clubmoss (*Lycopodium inundatum*) within the area of the Millicoma Tree Farm (Oregon Natural Heritage Program 1993a). None of these species are federally listed (U.S. Federal Register, 30 September 1993).

Clustered lady's slipper (*Cypripedium fasciculatum*)

In addition to the western lily and salt-marsh bird's-beak, information received from the Bureau Coos Bay District also noted the possible occurrence of clustered lady's slipper (*Cypripedium fasciculatum*) directly south of the Millicoma Tree Farm (Bureau of Land Management 1993b). This species is a federal Candidate 2 (U.S. Federal Register, 30 September 1993) and is known to occur in Douglas

County (Appendix B). Based upon the information received, an occurrence of this species was not directly noted. Rather, the data form received was a record of a subsequent visit in which an attempt to find this species was unsuccessful. In addition, the data form noted the locational information for the previous sighting of this plant may be erroneous. The clustered lady's slipper occurs within moist to rather dry and rocky coniferous forests (Hitchcock et al. 1990). Subsequently, this species could occur on the Millicoma Tree Farm.

3.8 Fisheries

3.8.1 Fish Species of Concern on the Tree Farm

Overview

Approximately 114 miles of fish-bearing streams occur within the 209,000-acre Millicoma Tree Farm. Most of the tree farm lies within the Coos River Drainage Basin. However, Lake Creek, draining the northeast corner of the tree farm, flows northerly into the Umpqua River Basin. The major drainages within the tree farm include the West and East Fork of the Millicoma River, the South Fork of the Coos River and Lake Creek (Figure 3-2).

The rivers and streams within the tree farm support six species of anadromous fish: fall chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), chum salmon (*O. keta*), winter-run steelhead (*O. mykiss*), sea-run cutthroat trout (*O. clarki*) and Pacific lamprey (*Entosphenus tridentatus*). Resident cutthroat trout can be found in all fish-bearing streams on the tree farm. Rainbow trout (*O. mykiss*) are found in Lake Creek. Non-game fish in the basin include Coast Range sculpin (*Cottus aleuticus*), prickly sculpin (*C. asperi*), reticulate sculpin (*C. perplexus*), other sculpin species (*Cottus spp.*), Millicoma longnose dace (*Rhinichthys cataractae*), speckled dace (*R. osculus*), other dace species (*Rhyinicthys spp.*), sticklebacks (*Casterosteidae*), redside shiner (*Richardsonius balteatus*) and large-scale sucker (*Castostomus macrocheilus*) (Forsberg 1991). Fish surveys were not conducted specifically for preparation of the HCP or this EA.

Species Listed as Threatened or Endangered Under the ESA

The Millicoma Tree Farm supports no species of fish that are currently listed as threatened or endangered under the federal ESA.

Candidate Species for Federal Listing and State Sensitive Species

The National Marine Fisheries Service (NMFS) is currently reviewing the status of stocks (populations) of all anadromous salmonid species from Oregon, Washington and California to determine whether specific stocks qualify for listing as threatened or endangered. The Umpqua chub is also a federal candidate species under review for listing (Table 3-4). The ODFW's 1993 sensitive species list included six species of fish potentially located within the vicinity of the tree farm, including the Millicoma dace, coho salmon, fall chinook salmon, chum salmon, Umpqua chub and Pacific lamprey (Appendix D). All species of state or federal concern are addressed individually in the remainder of this subsection.

Fish Distribution

The Coos River Basin supports anadromous runs of fall chinook, coho and chum salmon; anadromous stocks of trout including winter steelhead and sea-run cutthroat; and resident rainbow and cutthroat trout. Information concerning distribution of these species and other fish species of concern, according to the ORIS database of 1991(Forsberg 1991), are provided in Figures 3-4 through 3-11 which begin on page 3-27 of this document . The ODFW initiated an Aquatic Inventory Project in the Coos River Basin in 1993 in accordance with their methods for stream habitat surveys (Moore et al. 1993). Migration barrier information is also reported in ODFW's Aquatic Inventory Project (Oregon Department of Fish and Wildlife 1993). Site-specific information on Arrow, Sow, Cedar, Big, Panther and Hodges Creeks and miscellaneous tributaries collected during 1993 was used in Figure 3-5 and Figure 3-7, supplementing the ORIS database. The ODFW completed additional stream surveys in the Coos River system during 1994 within the tree farm. However, the information was not available for this report.

Table 3-4. Fish species with special state or federal status that may be present on or near the Millicoma Tree Farm.

Common Name	Scientific Name	Federal Status[1]	State Status[1]	Occurrence	Habitat
Millicoma longnose dace	*Rhinichthys cataractae ssp.*	none	SC	present	streams
Pacific lamprey	*Lamptera tridentata*	none	SV	present	streams
Coho salmon, southcoast runs	*Oncorhynchus kisutch ssp.*	FR	SC	present	streams
Chum salmon	*Oncorhynchus keta*	FR	SC	present	streams
Fall chinook salmon	*Oncorhynchus tshawytscha*	FR	SC	present	streams
Umpqua chub	*Oregonichthys kalawatseti*	C2	SV	unlikely	streams
Steelhead	*Oncorhynchus mykiss*	FR	none	present	streams
Cutthroat trout	*Oncorhynchus clarki*	PE	none	present	streams

1 Status Codes:
C2 - Federal Candidate
SV - State Vulnerable
PE - Proposed Endangered
SC - State Critical
FR - Under Federal Review for Listing

Fish use in the Lake Creek system within the tree farm includes resident cutthroat and rainbow trout and non-game species. Anadromous fish use in Lake Creek does not extend upstream past the outflow of Loon Lake (Harris 1994).

Chinook salmon *(Oncorhynchus tshawytscha)*

The range of chinook salmon in North America extends from Ventura River, California to Point Hope, Alaska (Healey 1991). Within the Millicoma Tree Farm, fall chinook salmon are found in the East and West Forks of the Millicoma River, Williams River and South Fork Coos River (Figure 3-4; Oregon Department of Fish and Wildlife 1991). This species is also present in waters of the Elliott State Forest northwest of the tree farm (Oregon Department of Forestry 1993a). The ODFW lists the status of chinook salmon from the southern Oregon coast as critical and it is currently under review for federal listing (Table 3-4). In a review of the status of populations of salmon and steelhead in Oregon, Washington and California, the American Fisheries Society (AFS) considers chinook salmon in the Coos River Basin as a species of special concern (Nehlsen et al. 1991).

Adult chinook are the largest of the five anadromous species of Pacific salmon, with mature adults averaging 33 to 36 inches (Scott and Crossman 1973). Chinook salmon found in the Coos River and its tributaries typically migrate to sea as subyearlings, most likely spending two or six months in freshwater (Nicholas and Hankin 1989). Chinook salmon may spend up to eight years at sea, but chinook salmon spawning in waters on the tree farm typically mature after spending two or three winters at sea and mature at age three and four. Spawning in the Coos River and tributaries typically takes place from October to December and usually peaks in November (Nicholas and Hankin 1989). Spawning occurs in a variety of stream reaches from small tributaries to larger rivers, depths of a few inches to several feet, and substrate ranging in size from small gravel to cobble.

Coho salmon (*Oncorhynchus kisutch*)

Coho salmon occur from Monterey Bay, California to Point Hope, Alaska (Wydoski and Whitney 1979). Adults and juveniles are found in most rivers and small streams throughout Coos Bay and the Oregon coast. Coho salmon are found in Larson and Palouse Creeks and the mainstem Coos River, Marlow Creek and the mainstem Millicoma River (Figure 3-5) (Oregon Department of Fish and

Wildlife 1991). This species also occurs on the Elliott State Forest to the northwest of the tree farm (Oregon Department of Forestry 1993a). The ODFW lists the status of coho salmon populations south of Bandon, Oregon as critical. The species is not currently listed under the federal ESA, however the NMFS is currently reviewing the status of coho salmon throughout Oregon, Washington and California to determine whether specific populations qualify for listing as threatened or endangered (Table 3-4). Coho salmon are anadromous, typically spending 18 months in the marine environment before returning to their natal streams to spawn. Spawning occurs from September through December in small rivers and streams with areas of gravel and small cobble and velocities from 1 to 1.5 feet/second (Laufle et al. 1986; Reeves et al. 1989).

Juvenile coho salmon usually spend one year in freshwater before migrating to the marine environment. While in freshwater, juvenile coho are typically associated with backwater areas, pools, beaver ponds and side channels (Reeves et al. 1989).

Chum salmon (*Oncorhynchus keta*)

Chum salmon have the widest natural geographic range of all the Pacific salmon species. In the Coast Range of Oregon, chum populations are small. A small population of chum salmon exists in Marlow Creek (a tributary to the Millicoma River) and limited numbers enter other Coos Bay tributaries (Figure 3-6) (Salo 1991; Reimers et al. 1993). Some of the Marlow Creek fish may utilize portions of the Millicoma River within the tree farm. Chum salmon populations in tributaries to Coos Bay are listed as critical by the ODFW (Table 3-4) and are considered to be at high risk of extinction by the AFS (Nehlsen et al. 1991).

Chum salmon fry migrate to sea soon after emergence, primarily at night or during periods of increased turbidity (Salo 1991). Maturing chum reside in the ocean from one to five years before returning to freshwater to spawn. Spawning occurs in a variety of streams from large rivers to small streams (Salo 1991). Spawning adults average 9 pounds and 25 inches in length, although fish may attain lengths of more than 40 inches and a weight of over 40 pounds (Wydoski and Whitney 1979; Salo 1991).

Steelhead (*Oncorhynchus mykiss*)

Steelhead historically ranged from southern-most California to central Alaska (Scott and Crossman 1973) and are found in most rivers along the Oregon coast. Both summer and winter run races of steelhead occur in Oregon, although only winter run steelhead are found in the Coos River and its tributaries (Figure 3-7) (Pauley et al. 1986). Currently the NMFS is reviewing the status of coastal stocks of steelhead in Oregon, Washington and California. The ODFW has not listed any steelhead populations as state sensitive (Table 3-4).

Adult steelhead typically weigh from 5.5 to 12 pounds and usually spend two or three years at sea. They may, however, spend up to four years at sea and attain weights of more than 25 pounds. Winter steelhead enter streams during winter and early spring, spawning from March through May (Wydoski and Whitney 1979). Preferred spawning areas are well oxygenated, with small to medium gravel and velocities ranging from 2 to 4.8 feet/second (Pauley et al. 1986; Stolz and Schnell 1991). These areas are most often associated with tailouts of pools and riffles. Unlike chinook, coho and chum salmon, steelhead do not die after spawning and may survive to spawn again. Juvenile steelhead typically spend two to three years in freshwater before migrating to sea. While in freshwater, juvenile steelhead are found in a variety of stream habitats, but are most often found in association with submerged cover such as woody debris, boulders and aquatic vegetation (Pauley et al. 1986).

Cutthroat trout (*Oncorhynchus clarki*)

Coastal cutthroat trout *(O. clarki clarki)* are found from the Eel River in northern California to Seward, southeast Alaska (Scott and Crossman 1973). Cutthroat trout exhibit two basic life history types; anadromous (sea-run) and resident (those fish that spend their entire lives in freshwater). Sea-run cutthroat trout range in length from 10 to 18 inches, while resident fish are considerably smaller. Resident cutthroat trout are likely found in all fish-bearing streams within the Millicoma Tree Farm, however, sea-run cutthroat are not found in streams on tree farm (Figure 3-8). The ODFW list coastal cutthroat trout from the Columbia River basin as critical or a species for which listing as threatened or endangered may be appropriate. The AFS considers Oregon coastal cutthroat as a stock of special concern. In addition, the Umpqua River sea-run populations have been petitioned for listing under the ESA. The NMFS issued a proposed rule to list all life history forms of Umpqua cutthroat as endangered (U.S. Federal Register, 8 July 1994) (Table 3-4). However, it is the anadromous component of the Umpqua River cutthroat trout population that is in danger of extinction (U.S. Federal Register, 8 July

1994). South Umpqua River sea-run cutthroat do not have access to water courses on the tree farm. An anadromous migration barrier occurs downstream of Loon Lake (downstream of the tree farm). Therefore, only resident fish are found on the tree farm.

Cutthroat trout are found in a broad range of habitats, from large rivers and lakes to beaver ponds and small high-gradient mountain streams. Optimal cutthroat trout habitat is characterized by clear, cold, water and a silt-free rocky substrate. A 1:1 pool-riffle ratio with areas of slow, deep water; well-vegetated stream banks; abundant instream cover; and relatively stable flow and temperature regimes are also important habitat components (Raleigh and Duff 1981). Cutthroat trout typically spawn in low-gradient areas of streams during February and June, depending on elevation (Trotter 1989). Resident cutthroat trout generally mature at age three (Trotter 1989). Sea-run cutthroat trout in Oregon typically migrate to sea in the late spring or early summer after two to three years of freshwater residence (Benke 1992). After a relatively short residence in saltwater (two to five months), sea-run cutthroat return to their natal streams, spawning in late winter or early spring.

Umpqua chub (*Oregonichthys kalawatseti*)

The State of Oregon lists the Umpqua chub as a vulnerable species or a species that can be protected by additional monitoring and protective measures. The species is also a federal candidate for federal listing (Table 3-4). Little information is available on the Umpqua chub. The ODFW has indicated it has not been found in waters within the Millicoma Tree Farm (Figure 3-9) (Bender, pers. comm., 15 December 1993).

Millicoma longnose dace (*Rhinichthys cataractae spp.*)

Millicoma dace are found in the main South Coos, Williams and East and West Forks of the Millicoma Rivers and the lower section of Tioga Creek (Figure 3-10) (Bureau of Land Management 1992). Surveys by the BLM reveal Millicoma dace are well distributed within the basin, but abundance is low in most areas. Millicoma dace also occur on the Elliott State Forest to the northwest of the tree farm (Oregon Department of Forestry 1993a). The population seems to be stable but limited due to past habitat alteration (Reimers et al. 1993). The ODFW considers Millicoma longnose dace a sensitive species with a peripheral or naturally rare occurrence. No federal petitions or listings currently exist for this species (Table 3-4). Longnose dace typically attain lengths of 4 inches and ages of five years or more (Wydoski and Whitney 1979). Millicoma longnose dace live in fast-moving streams with gravel/cobble

substrates. Little information exists on the reproductive life history of Millicoma longnose dace, but longnose dace typically spawn in late spring or early summer in gravel of shallow riffles (Wydoski and Whitney 1979). Reductions in population size from historical levels may have resulted from splash dams which removed much of the suitable gravel and cobble habitat (Reimers et al. 1993).

Pacific lamprey (*Entosphenus tridentata*)

Pacific lamprey are found from southern California to the Gulf of Alaska and have been documented in various drainages throughout the Millicoma Tree Farm (Figure 3-11) (Forsberg 1991) and on the Elliott State Forest to the northwest of the tree farm (Oregon Department of Forestry 1993a). Pacific lamprey are listed as vulnerable by the State of Oregon but are neither federally-listed nor a federal candidate (Table 3-4).

Pacific lamprey are anadromous, spawning in rivers and streams and spending the majority of their life at sea. The adults are parasitic on marine fish in the open ocean. The larvae are filter feeders inhabiting the fine silt deposits in backwater areas and quiet eddies of streams (Wydoski and Whitney 1979). Larvae stay in fresh water for five to six years before migrating to the ocean (Wydoski and Whitney 1979; Scott and Crossman 1973). Adults enter rivers and streams in late spring and spawn during June and July in gravel substrate of riffles.

3.8.2 Fish Habitat Conditions

Historic Influences on Fish Habitat Conditions

This subsection reviews the evolution of general logging practices and other human influences in the Millicoma Tree Farm region, including regulatory developments designed to reduce adverse impacts to fish. However, not all of the generic practices described below were used on the tree farm. For example, there is no record that Weyerhaeuser conducted splash-damming on the tree farm.

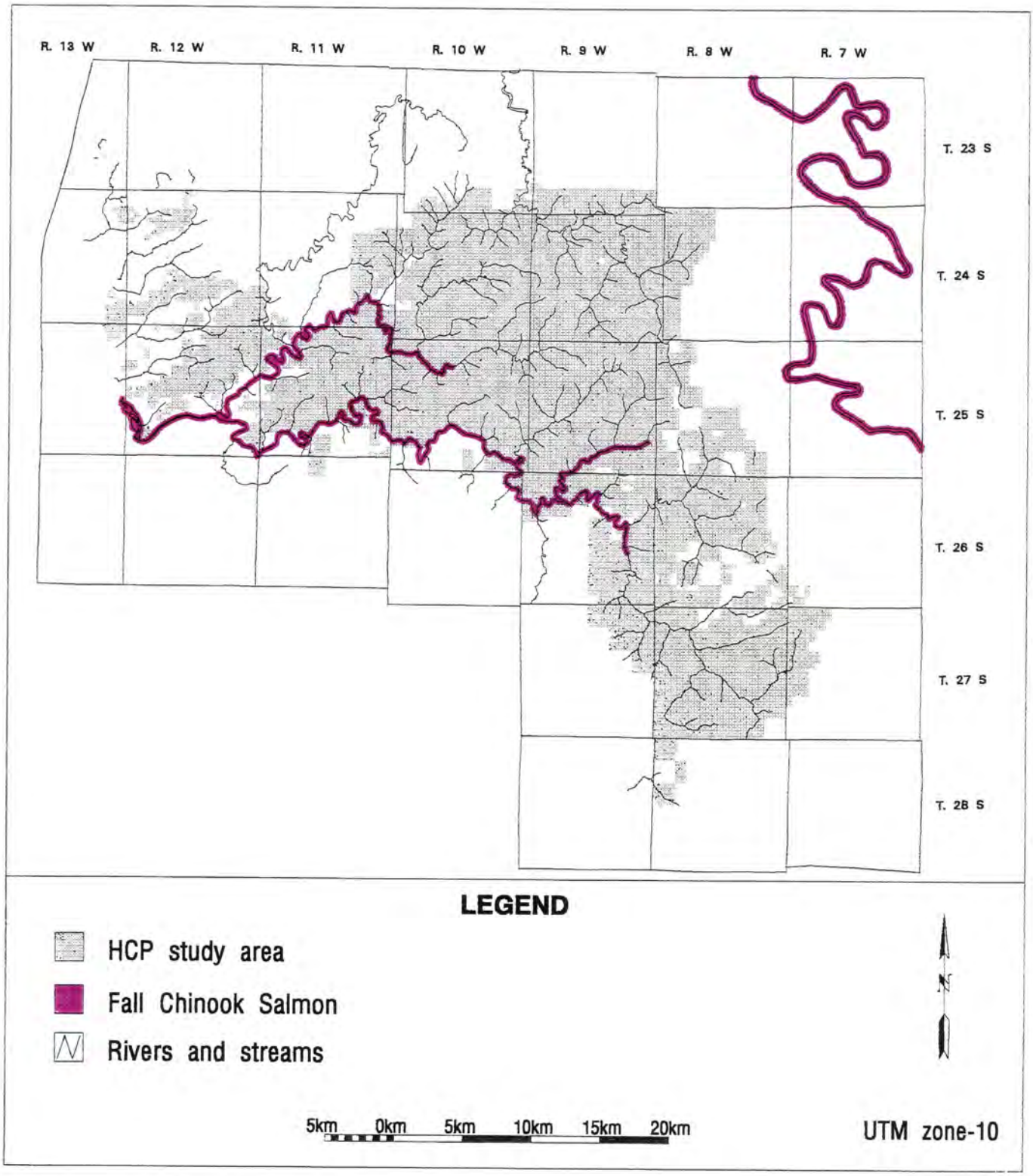


Figure 3-4. Fall chinook salmon distribution map.

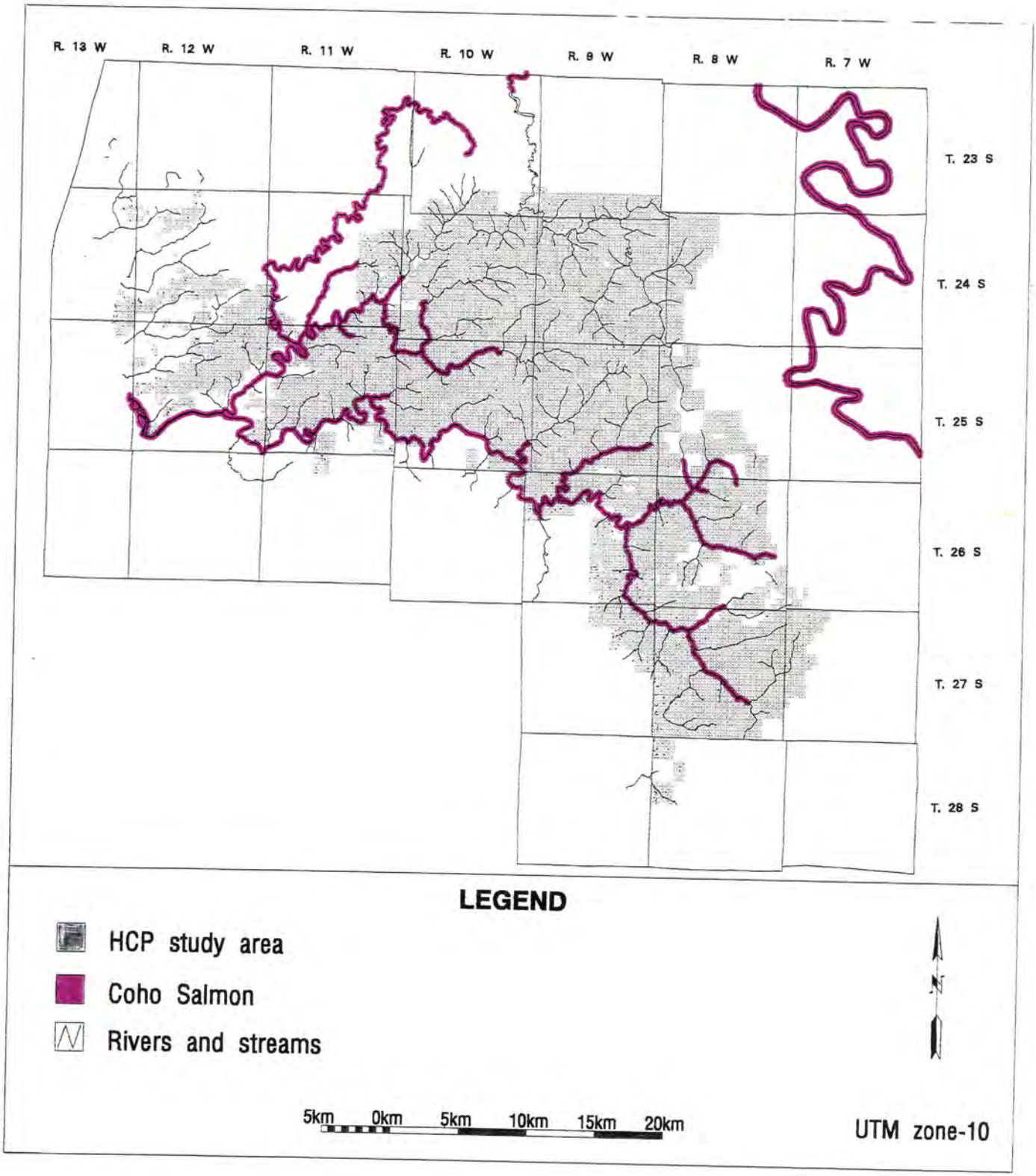


Figure 3-5. Coho salmon distribution map.

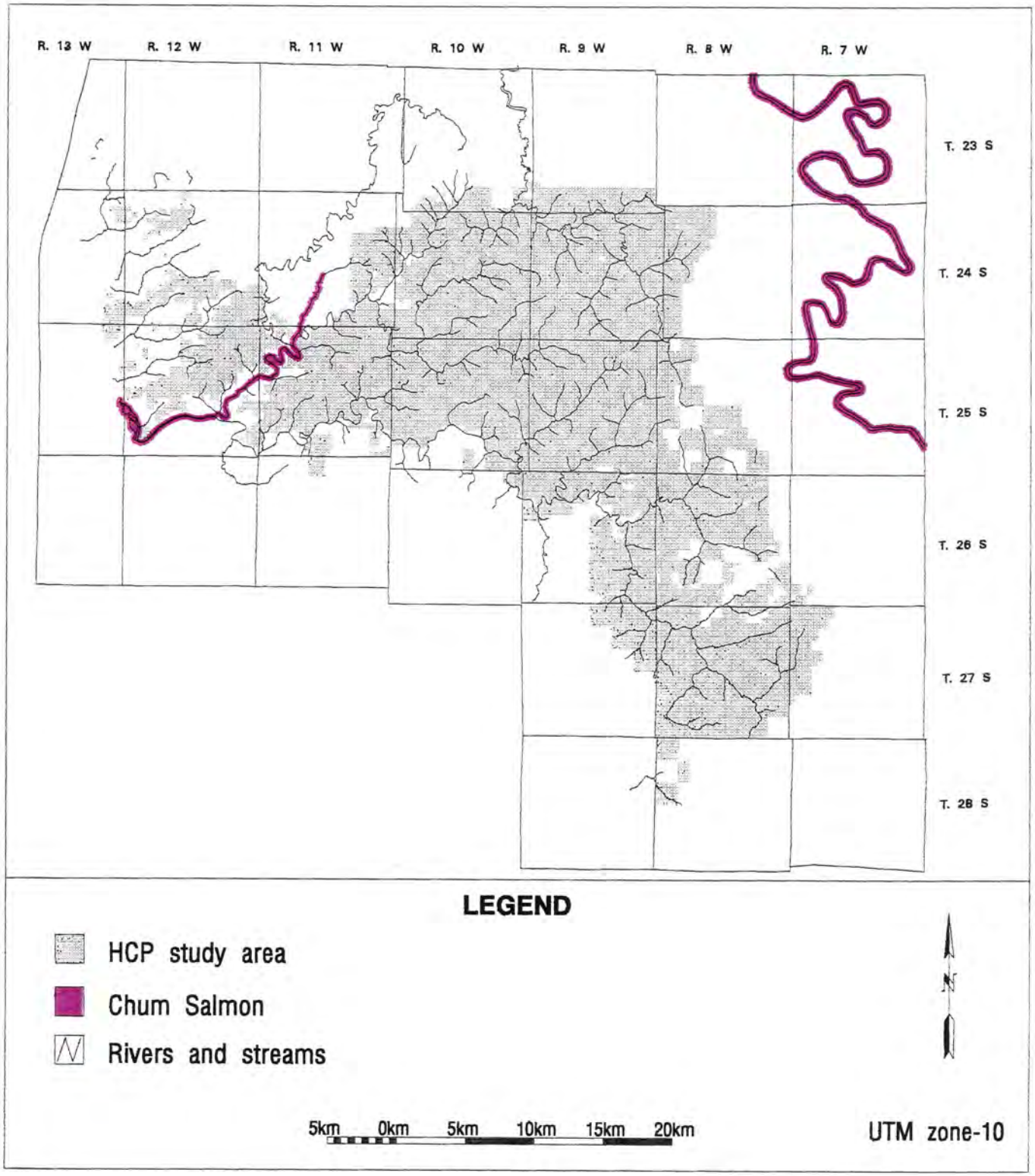


Figure 3-6. Chum salmon distribution map.

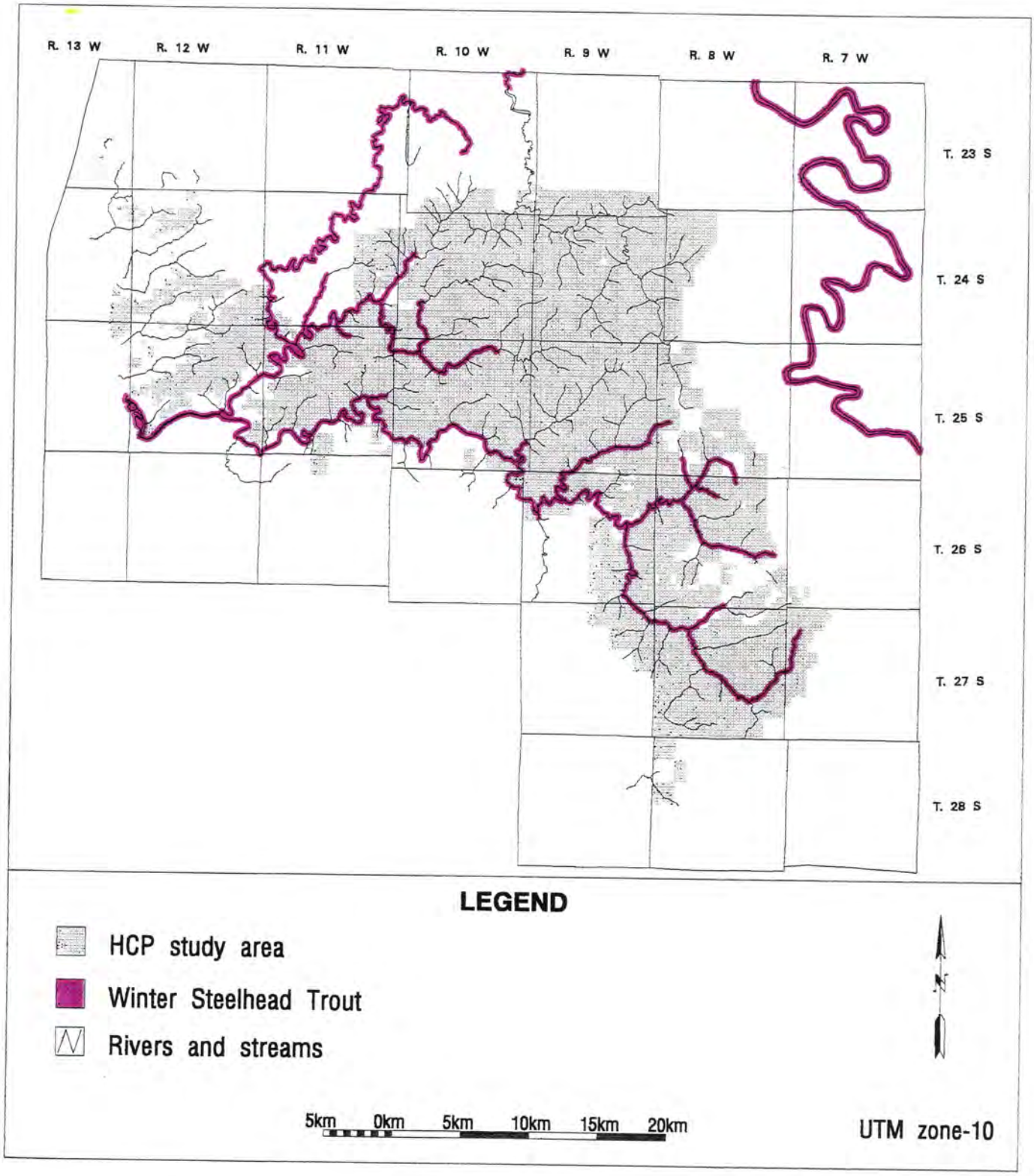


Figure 3-7. Winter steelhead distribution map.

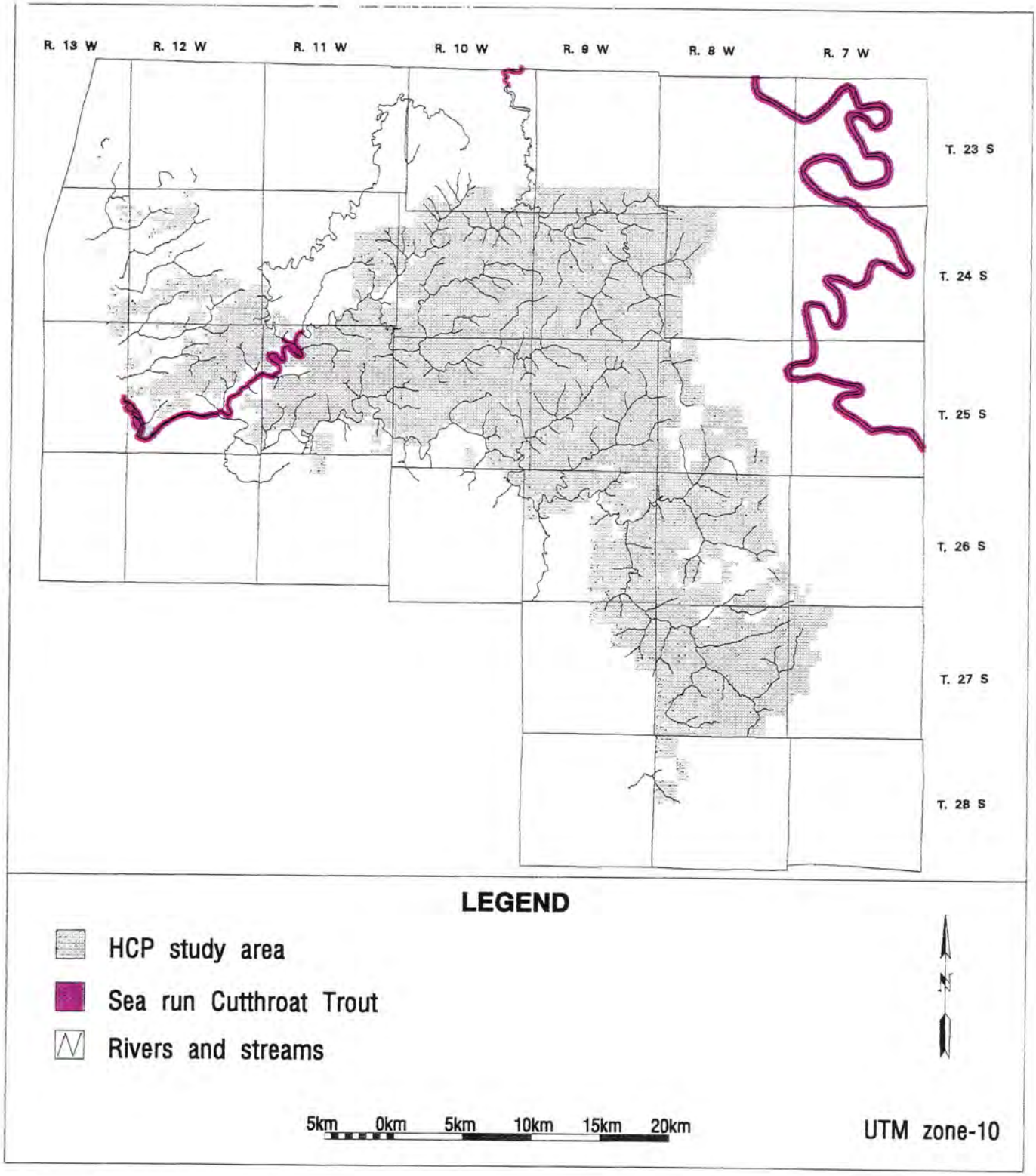
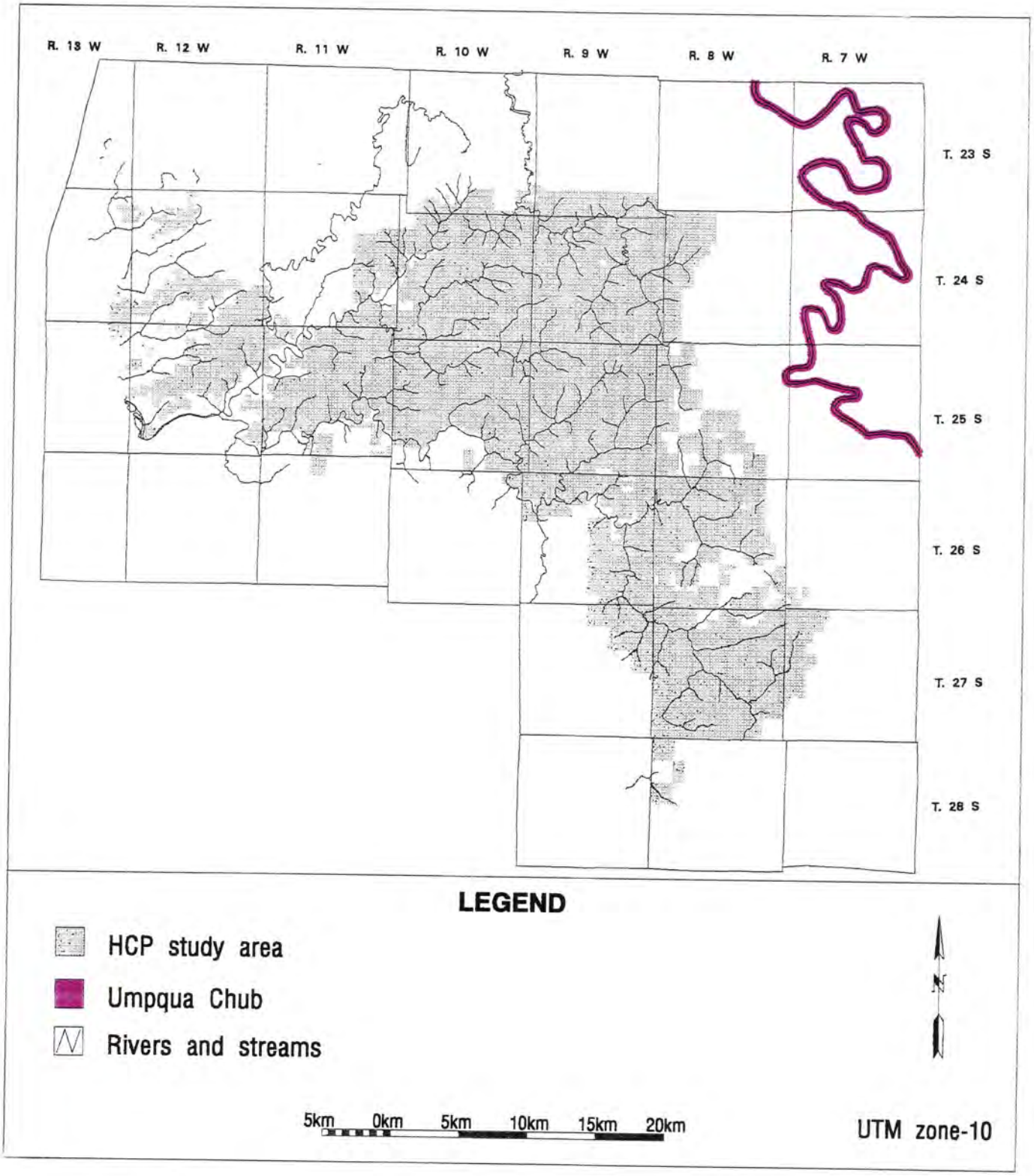


Figure 3-8. Sea-run cutthroat trout distribution map.



3-9. Umpqua chub distribution map.

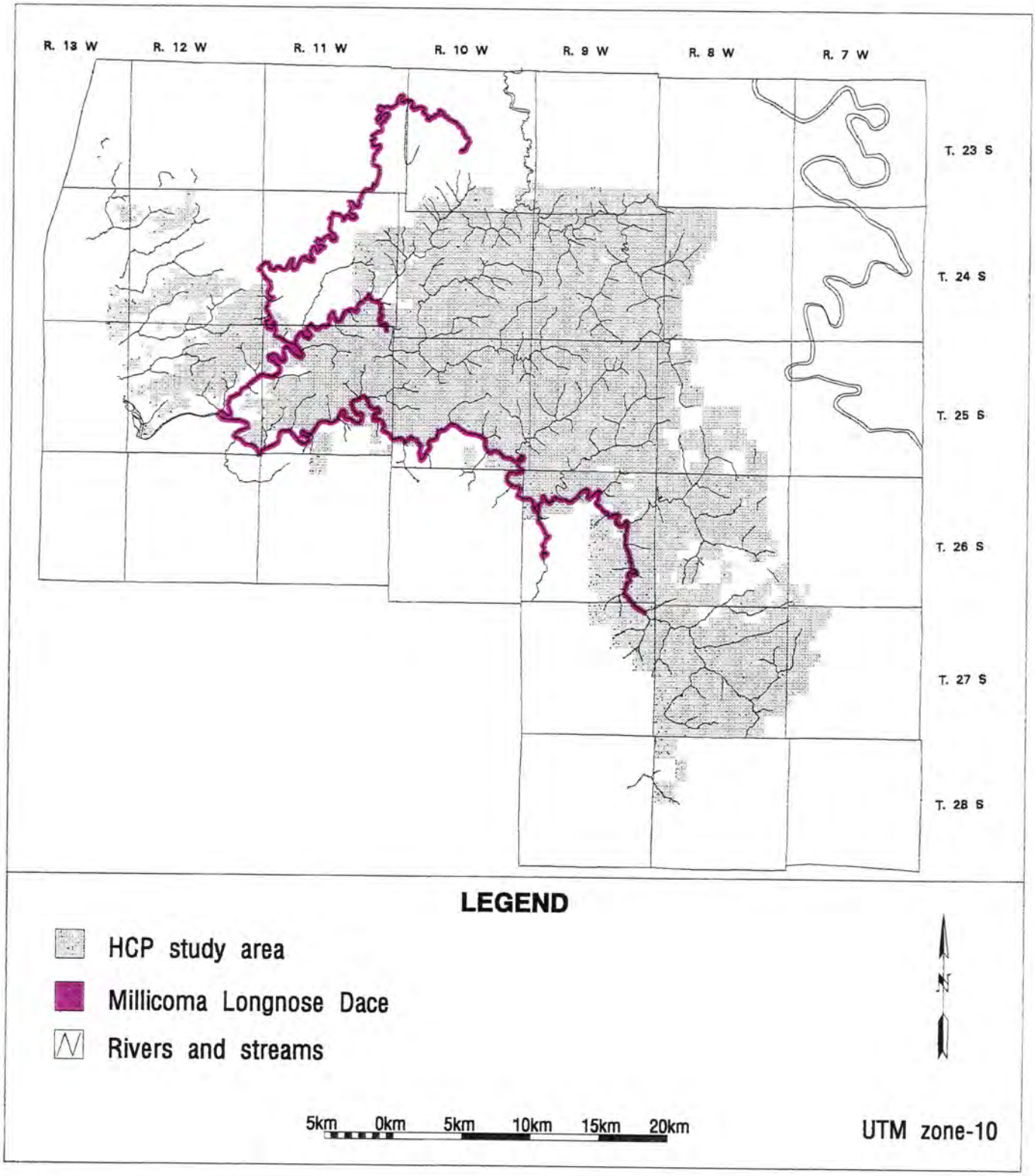


Figure 3-10. Millicoma longnose dace distribution map.

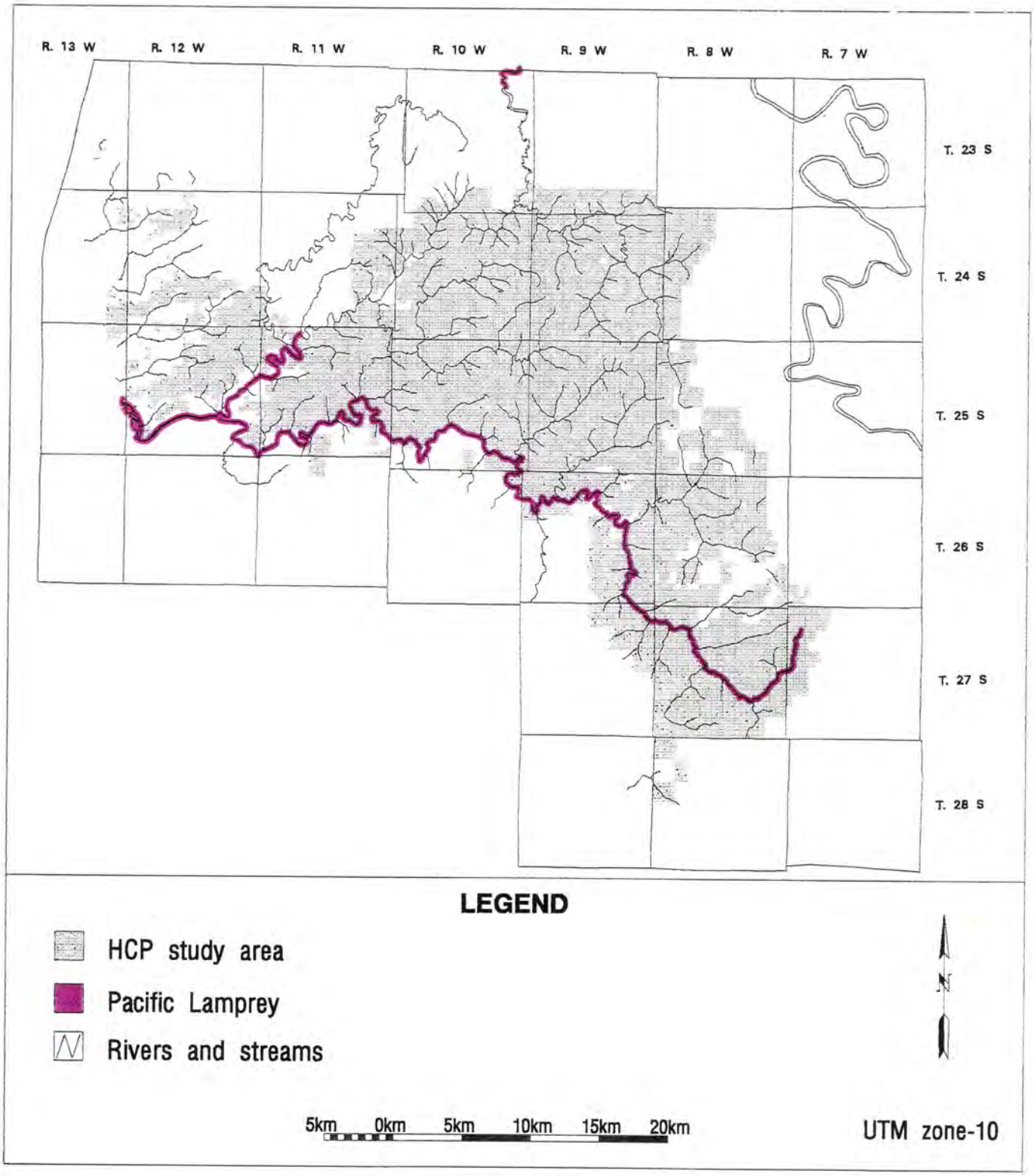


Figure 3-11. Pacific lamprey distribution map.

Additionally, while natural barriers to fish migration occur on some tributaries, there are no artificial dams located on the tree farm.

Early Harvests in the Region, 1870s - 1920s: Timber harvesting began in the Coos River Basin in the 1870s (Beckham 1990). Loggers used ox-teams and log chutes to transport logs to the river, where they awaited high winter stream flows for delivery downstream. Stream transportation of logs occurred from approximately 1 mile above Allegany on the East Fork (EF) Millicoma River. In 1884, the first splash dam in southwestern Oregon was built on the EF of the Millicoma River near Marlow Creek. Splash-damming was extensively used in the basin, since early development of roads and trucking was not economically or technologically viable. Numerous dams were built on the lower-most sections of the Millicoma River, South Fork (SF) Coos River and their tributaries (Beckham 1990). A total of at least 14 different dams were built on the Millicoma River between 1884 and the mid-1920s. No splash dams were located above Matson Creek in the Millicoma River basin. In addition to dams, loggers also continued the practice of employing high winter stream flows to transport logs downstream.

By the 1880s, virgin timber stands around Coos Bay had been largely harvested (Beckham 1990). Harvest activities were then concentrated in forests near the SF Coos River. Logging practices made a full transition from ox-teams to steam donkey engines. In 1898, the Simpson Logging Company began construction of a railroad to haul logs cut from the hillsides along Daniels Creek to the tidal sections of the SF Coos River. Simpson's system of steam donkeys and railroads was limited to tributary streams below McKnight's Landing at the head of the estuary. Much of the terrain in the SF Coos River basin was too rugged for rail. Thus, splash-damming and river drives continued to be the primary mode of downstream log transportation.

Logging above tidewater on the SF Coos River first occurred in 1887 along East and West Creeks (Beckham 1990). In 1905, three steam donkeys were used to log lands within the East and West Creek areas. Log ponds were developed approximately 3 miles above tidewater, and winter high flows were used to deliver a steady supply of logs between 1906 and 1916. Due to terrain constraints, construction of splash dams on the SF Coos River was a difficult undertaking and was not fully developed until 25 years later.

Throughout this early period, river driving continued without state regulation. In the 1910s, the Oregon State Highway Commission was created. The Log Boom Act was passed in 1917, empowering the Public Utility Commission (PUC) to hold hearings and award river-driving franchises within the state.

Expanded Development, 1930s - 1950s: A renewed period of logging occurred in the 1930s. In 1934, the Coos Bay Logging Company constructed a road 6 miles along the north bank of the SF Coos River from McKnight's Landing and up Big Creek toward Vaughn's Peak (Beckham 1990). Contract loggers also built a plank road on the south side of the SF Coos in 1934 and first opened the Salmon and Cox Creek watersheds for logging. Ground skidding with diesel-powered mechanical caterpillars (bulldozers) also began during this period.

The state began to regulate the long-established practice of river log-driving. Companies had to reduce operations, transporting logs only on the portion of the Millicoma River deemed navigable. In 1953, splashing operations ended as a result of public pressure, bringing to a close the era of river drives on the Millicoma River.

Splash-damming did not occur prior to the 1940s on the SF Coos River (Beckham 1990). The Coos River Boom Company completed construction of a dam in 1942, which remained in operation for 15 years. The SF Coos River dam lacked sufficient head to carry logs to the lower-most section of the river. Problems associated with this dam convinced the Pillsbury family to sell their extensive landholdings in the watershed to the Weyerhaeuser Company (Beckham 1990).

In 1943, a road was extended down Tioga Creek to the forks where Williams River and Tioga Creek formed the SF Coos River. The Tioga Dam was built 0.75 mile below the forks. It consisted of a spillway 52 feet in elevation above the river surface, nearly three times higher than typical splash dams. It was the largest and last operating splash dam in the period of river transportation in the Pacific Northwest.

Menasha Wooden Ware Company bought the assets of the Coos River Boom Company in 1953 and operated the splash dams until 1957 (Beckham 1990). In 1956 the Oregon state legislature banned

the use of rivers for running logs. As a result, Menasha developed a wide, all-season, heavy-rocked road extending 30 miles into the mountains from the head of tidewater. Menasha discontinued splashing by late 1957, ending an era in Oregon of moving logs by river (Beckham 1990).

Roading Era and Beginning of Forest Practices Regulations, 1940s - 1980s: Oregon adopted its first Forest Practices Act in 1941. This Act was the first in the nation to regulate harvesting practices on private lands. The Act required seed trees or seed stands be left to facilitate natural reforestation to maintain continuing productivity of forest lands. Amendments over subsequent years expanded the scope of forest practices regulations to cover all types of commercial forestry activities and to address a wide variety of environmental concerns.

Weyerhaeuser started logging in the area after constructing a mill in 1949 (Phillips, pers. comm., 14 September 1994). High-lead cable logging systems generally could reach 800 to 1,200 feet from the roads. Weyerhaeuser was the first to use steel towers for logging in the area.

Road building in the rugged terrain was considered too expensive by many landowners (Phillips, pers. comm., 14 September 1994). Streambeds were often used as roads up to the 1970s, until the Oregon Forest Practices Act (FPA) rules were implemented. Logs were pulled down to the stream and loaded on trucks.

In the 1950s, Weyerhaeuser became the first company to build a ridgetop road system. It was first developed to pass around Maston Creek Falls to harvest the Matson Creek drainage. This system placed roads away from streams and allowed logs to be yarded uphill, reducing impacts on fish habitat.

Since surfacing the early roads with rock was not affordable, all logging was performed in the summer. Up until the mid-1970s, the standard state road was 14 feet wide, made of dirt and constructed without ditches. Mainlines were 16 feet wide and included ditching. Weyerhaeuser was also one of the first companies to rock their roads. Using 8-inch minus rock trucked from the Umpqua Basin, Weyerhaeuser was able to log year-round.

The Oregon FPA was passed in 1971. The rules, written in 1972 by the state's Board of Forestry, applied to all state and private forest lands. The rules included general language about placement of logging roads and restricted logging across streams. The new rules provided that end-hauling and full bench construction could be required where site conditions warranted.

The State of Oregon did not regulate riparian areas before the 1970s, and as a consequence, it was common for harvest to occur to the streambank. Yarding across streams also was common. These practices were curtailed by the 1972 rules with implementation of buffer requirements. These rules were strengthened in 1983, 1987 and 1994 to improve protection of water quality and fish habitat.

Current Harvest Practices, 1990s: Portions of the state forest practices rules were recently revised effective 1 September 1994 (Appendix C). A summary of the these rules is presented in subsection 3.13 (Relevant Plans, Policies and Regulations). Weyerhaeuser voluntarily initiated compliance with the new rules in early 1994. Current forest practices rules address road location, design, construction and maintenance. Roads are no longer permitted in riparian management areas (RMAs). Unlike prior rules, roads must now be located to minimize the risk of material entering waters and to minimize disturbance to channels. Similarly, road building and maintenance are now to be conducted in accordance with the FPA to minimize adverse effects on water quality (Oregon Administrative Rules 1992 340-41-026). In relation to stream channels, current rules focus on: 1) minimizing stream crossings, 2) avoiding excessive sidehill cuts and fills near stream channels, 3) designing and maintaining culverts to pass peak stream flows corresponding to a 50-year return interval, 4) allowing passage of adult and juvenile fish, 5) reducing direct entry of surface runoff to nearby streams and filtering runoff through vegetative buffers or other systems before entering waters of the state and 6) measures and seasonal timing to prevent soil erosion.

The new rules are comprehensive in their protection of water resources, aquatic and riparian habitats. They are more stringent than the prior rules, which were approved by the EPA under Sections 208 and 319 of the Federal Clean Water Act as part of Oregon's Water Quality Management Plan. The Coos County Comprehensive Plan states that the Oregon Forest Practices Act is deemed adequate protection against adverse impacts to fish and wildlife habitat, wetlands and riparian areas from timber management practices. Oregon Department of Fish and Wildlife is hopeful the new rules will be the

first step toward compliance with a potential recovery plan for anadromous fish species recommended for listing as threatened or endangered.

Fire History

Forest fires swept along much of the coast of Oregon in the 1840s. Wildfires, typical in the region in the 1800s and early 1900s, are now subject to suppression. Slash burning has also declined over recent years. Weyerhaeuser currently does not employ the practice of broadcast slash burning, but does conduct concentrated burns when necessary to relieve excessive slash accumulations and prevent downstream impacts from possible landing failures. These practices minimize surface soil erosion and reduce some triggering mechanisms for mass wasting events in comparison to historic levels.

Summary of Historic Habitat Conditions

Historic logging practices within the tree farm suggest fish habitat conditions were, at one time, substantially degraded, especially with the use of splash-damming prior to Weyerhaeuser ownership. Breaching of splash dams would have had the effect of a human-caused dam-break flood. Spawning gravels were likely scoured and flushed from the streams, and heavy erosive power most likely contributed to bank erosion and sedimentation. Stream flooding may also have removed natural in-channel levels of wood and damaged adjacent riparian zones. Streams were channelized downstream with bulldozers to prevent log jams during splashing (Beckham 1990). In addition to causing stream habitat damage, the dams restricted or delayed anadromous fish passage upstream to spawning grounds. Most splash dams were located in tributaries and mainstem rivers in the lower portions of the Millicoma and SF Coos River watersheds.

In conjunction with instream and bank impacts, it was common to harvest to the streambank and to yard logs across streams. These activities, in combination with wildfires typical of the 1800s and early 1900s, removed riparian trees, reducing riparian functions valuable for fish habitat and exposing considerable areas to increased soil erosion and mass wasting events.

Roading in the 1940s and 1950s provided access to tracts of land in the upper watershed and facilitated year-round harvesting. Roads were considered an improvement in stream habitat conditions compared with splash-damming. Nevertheless, roads were often designed without a complete understanding of hillslope stability processes and surface water drainage considerations. Increased hillslope and road erosion and the resulting transportation of fine and coarse sediments to the streams likely occurred. It is probable fish habitat conditions, while improved somewhat, remained impaired during these periods.

Current Habitat Conditions

Habitat Studies and Projects: Little site-specific information is available concerning present aquatic habitat and riparian conditions or fish distribution throughout the tree farm. Spawning surveys have been conducted by ODFW, the BLM and the Oregon Department of Forestry (ODF) (Appendix D). The available information, summarized below, was derived from three basic sources; ODFW Oregon Rivers Information System (ORIS) database concerning fish habitat and distributions in Oregon streams (Forsberg 1991); ODFW Aquatic Inventory Project - Stream Habitat Reports for the Coos River Basin (Oregon Department of Fish and Wildlife 1993); and Reimers et al. (1993). Although the amount of habitat information may not represent present conditions of the entire tree farm, it indicates habitat conditions are capable of supporting a high level of fish production in these areas. Such information suggests fish habitat conditions may have recovered somewhat from conditions that likely occurred during early harvests (1870s to 1950s) and possibly from more recent harvests. Studies continue, and more information about habitat conditions on the tree farm will become available in the future.

In cooperation with Weyerhaeuser, the ODFW contracted to initiate an Aquatic Inventory Project in the Coos River Basin in 1993 in accordance with the Department's methods for stream habitat surveys (Moore et al. 1993). Nearly 13 miles of stream habitat, or approximately 11 percent of the fish-bearing waters on the tree farm, were surveyed. This project is continuing in 1994. A summary of key fish habitat diagnostics is presented in Table 3-5. In general, habitat conditions appear to offer adequate spawning and rearing conditions for salmonids. Reported stream temperatures were below 17°C (63°F) during the surveys. Pool frequencies were high, with the exception of Big Creek and SF Big Creek.

Fish abundance is likely limited somewhat in the upper-most reach in Big Creek and SF Big Creek due to the low frequency of pool habitat. Wood counts varied; some stream reaches were low in LWD counts, as expected given the history of the tree farm (fires and riparian harvest), while others supported an abundance of in-channel LWD. Cedar Creek, Hodges Creek and the lower reaches of Arrow Creek offered the lowest abundance of LWD in the stream reaches surveyed. Pool frequencies in these streams were good. A continual source of wood supply is necessary to maintain adequate pool frequencies.

The Oregon Forest Industries Council (OFIC) initiated a cooperative study of maximum and minimum summer stream temperatures throughout the state during 1992 and 1993 (Beak Consultants Incorporated 1993a, 1993b). A small number of streams from this study were located on the tree farm. The study indicates natural stream temperature levels are generally warm throughout most regions of the state. The report concluded that maximum instantaneous temperatures in most streams during warmer than average summers were greater than state standards, irrespective of the amount of shade canopy, elevation or region of the state. This observation was true for streams surveyed on the tree farm where instantaneous peak stream temperatures generally exceeded state standards, even where canopy cover was in excess of 80 and 90 percent closure levels.

Brief temperature excursions beyond standards do not necessarily represent adverse conditions for growth and survival of cold-water fishes. In-stream water temperatures fluctuate over the course of the day, affected by changes in air temperature, solar radiation input, stream aspect and channel characteristics for a given stream.

Habitat Characteristics: The capacity of freshwater streams to produce salmonid fishes is most often a function of the quality and quantity of habitat conditions for critical life history stages of the important species (Salo and Cundy 1987; Fausch et al. 1990; Meehan 1991). Factors influencing habitat conditions related to forest management practices are generally associated with: 1) the introduction of fine or coarse sediments; 2) the function of riparian zones to recruit LWD and provide shade to control stream temperatures and 3) the effects of peak stream flows on channel stability. These input factors are summarized below.

Table 3-5. Key fish habitat diagnostics summarized from site-specific ODFW stream habitat survey data.

STREAM	SURVEY LENGTH (m)	OPEN CANOPY (%)	STREAM TEMPERATURE (°C)	POOL FREQUENCY (%)	LWD (Pieces/100m)
Arrow Creek	5,070	17-51	12.5-14.0	26-79	3.6-66.0
Tributary 1	1,852	22-36	13.5-14.0	13-44	8.3-26.5
Tributary 2	944	45	17.0	51	45.6
Sow Creek	1,116	18-29	13.5-14.0	25-41	3.8-54.5
Cedar Creek	3,811	33-44	15.0-15.5	37-58	2.1-10.7
Big Creek	3,373	22-35	13.5-14.0	10-32	12.2-37.6
SF Big Creek	150	31	13.5	10	31.9
Panther Creek	2,402	22-30	15.0-16.0	21-30	5.0-41.4
Hodges Creek	2,015	27	13.0	30	13.6

Source: Oregon Department of Fish and Wildlife (1993).

Fine Sediment: Fine sediments enter stream networks naturally through bank erosion, soil creep and mass wasting events. Forest practices can influence delivery rates of fine sediment through erosion from road surfaces and harvest units and the potential increase in the rates of mass wasting events (Beschta 1978; Sullivan and Duncan 1980; Reid and Dunne 1984; Bilby 1985). Fine sediments (<0.85mm) can have detrimental effects on spawning success if heavy sedimentation of gravels occurs during the spawning and incubation period (Chapman 1988; Tappel and Bjornn 1983). Peterson et al. (1992) conducted a review of the available scientific literature and concluded survival, development of embryos and growth of alevins can be reduced if fine sediment size fractions exceed approximately 12 percent by weight of the total sample volume. If levels exceed 17 percent, spawning is considered degraded (Washington Forest Practices Board 1993). Fine sediments are most frequently flushed from forest mountain streams during peak flow events. Sediment deposition, if any, occurs in low gradient stream areas (<1%) or in the estuary. Low gradient mainstem spawners, like fall chinook and chum salmon, may be most affected by increases in fine sediment levels.

Fine sediments can also seasonally collect in pools and along quiescent stream areas throughout the stream network (Peterson et al. 1992; Lisle and Hilton 1992). Such sedimentation can reduce summer and winter rearing capacities by varying degrees by filling pools, embedding stream substrates and decreasing food production capabilities. All salmonid species would be affected to some extent by such sedimentation if annual flushing flows were insufficient to keep channel substrates clean of fines.

Fine sediment levels generated by road use are generally of very fine grain sizes (clay, silt and fine sand <0.43 mm) compared to fines entering streams from bank erosion or mass wasting failures. Sediment from forest roads in the Cascade Mountains rarely exceed 0.25 mm in size and are a maximum of 0.50 mm (Reid and Dunne 1984). Since these particles are transported to streams by overland flow generated by rainstorms, it is likely they are transported downstream in a continuously suspended manner and do not settle in spawning areas. It is unlikely sediment derived from roads would lead to long-term deposition of fine sediment through the stream network on the tree farm. Thus, it is rare for road use to generate levels of fines that would adversely influence spawning success.

Coarse Sediment: Coarse sediments enter the stream network naturally through bank erosion, mass wasting events and catastrophic landscape events. Forest practices can influence delivery rates of

coarse sediments to streams by altering natural rates of bank erosion, mass wasting and catastrophic events (Eisbacher and Clague 1984; Coho and Burgess 1991; Benda et al. 1992). The most notable practices affecting hillslope stability are generally related to inappropriate road construction techniques and harvest on steep slopes (loss of root strength). Whereas fish habitat is dependant to some degree on coarse sediments in streams (spawning gravels, deformable bed thickness capable of creating deep pools, etc.), too much coarse sediment can reduce the fish production capacity of a stream. Sediments can fill pools or deposit in amounts that change bed elevations and alter stream channels and water courses. Coarse sediment volumes deposited in thicknesses greater than the height of channel obstructions (LWD, boulders, etc.) will reduce the hydrologic value of the obstructions. Such depositions are considered too great a volume to benefit fish habitat (Benda 1993). Most coarse sediments enter and are transported in streams during peak flows and major storm events. The most devastating affect on fish resources in streams generally occurs when the stream bed is mobile during catastrophic events such as debris torrents or dam-break floods (Eisbacher and Clague 1984; Coho and Burgess 1991; Benda et al. 1992). Fish production in streams subject to debris torrents and dam-break floods can vary widely due to the dynamic nature of the stream channel and unstable habitat conditions.

Large Woody Debris: Large woody debris in streams provide channel structure, help trap and stabilize coarse gravel deposits, create scour for pool development, provide overhead and stream velocity cover for fish and to stabilize stream banks (Campbell 1986; Bisson et al. 1987; Beschta et al. 1987; Bilby and Ward 1991). Large woody debris is regarded as a critical fish habitat-forming feature in streams and offers considerable channel stability and diversity functions as well (Bisson et al. 1987; Sullivan et al. 1987). Large woody debris enters streams naturally through riparian recruitment, via mass wasting events and by undercutting stream banks. Forest practices can influence delivery of LWD through reduced recruitment as a result of riparian harvest (Gregory et al. 1987). Historic removal of in-channel wood through stream cleaning projects, use of splash dams and increases in natural rates of dam-break floods also reduce levels in LWD in streams.

Large woody debris is an important component in the development of pool habitat. Pool habitat is critical to both summer and winter rearing habitat for salmonid fish. The importance of pool habitat varies by species, stream gradient and season (Campbell and Neuner 1985). Pools provide good

feeding opportunities for fish with adequate stream depths for cover from avian and terrestrial predators. The amount of rearing space is often considered the most limiting factor to salmonid production in flowing waters (Chapman 1966; Reeves et al. 1989). General scientific literature reports that good habitat conditions occur when pool frequencies are between 20 and 50 percent by area (Raleigh 1984; Reeves et al. 1989; Reeves et al. 1991; Peterson et al. 1992). Pools areas below 10 percent are generally regarded as poor rearing habitat conditions and tend to limit salmonid productive capacities (Raleigh et al. 1984; Reeves et al. 1989).

Riparian Canopy: Another valuable function of riparian zones is the overhead canopy and shade levels that protect stream temperatures (Beschta et al. 1987; Sullivan et al. 1990). Since fish are cold-blooded species, stream temperatures may be the single most important factor affecting salmonid production, metabolism, growth, survival, behavior and habitat utilization. Optimum stream temperatures for salmonid fishes generally range between 50° F and 66° F (10° C and 19° C), with growth ceasing above 68° F (20° C) due to increased metabolic rates (Bell 1973). Lethal temperature levels over sustained periods vary between 72° F and 84° F (22° C and 29° C) depending on the species and degree of temperature acclimation. Stream temperature is primarily a function of air mass temperature (Caldwell et al. 1991), channel width, aspect and gradient, elevation, crown canopy and hillslope angle. Forest practices can affect stream temperatures because timber harvesting can reduce shade over the water surface. Shade removal can lead to increases in water temperature. However, it is difficult to generalize about the effects of removing shade on peak water temperatures, or the duration of elevated water temperatures, since the relationship between air temperature, shade, groundwater and other factors affecting in-stream temperatures are complex.

Documentation of riparian stand conditions on the tree farm are limited. Since initial implementation of riparian regulations in the 1970s, much of the riparian areas on the tree farm are in early-successional stages and are likely dominated by young or mature deciduous species. Riparian conditions along several reaches of Arrow, Sow, Cedar, Big, Panther and Hodges Creeks were inventoried by ODFW in the Aquatic Inventory Project for 1993. Data indicate the riparian stands are dominated either by deciduous species or mixed stands of deciduous and conifer species in young age classes (Table 3-6; Table 3-7). Most adjacent land uses were dominated by stands of second-growth timber.

Table 3-6. Matrix of species composition and stand sizes in riparian zones of stream reaches surveyed by ODFW.

DBH SIZE CLASSES (inches)	STAGES	CONIFEROUS	DECIDUOUS	MIXED	TOTAL
1-5	Saplings	1	5	0	6
6-11	Young Trees	1	4	9	14
12-20	Large Trees	0	3	5	8
20-35	Mature Stands	0	0	0	0
>36	Old-Growth	1	0	0	1
TOTAL		**3**	**12**	**14**	**29**

Source: Oregon Department of Fish and Wildlife (1993).

Table 3-7. Breakdown of current land use adjacent to the riparian zones in Table 3-6, above.

	RECENT HARVEST	YOUNG TIMBER	SECOND-GROWTH	OLD-GROWTH
Tally	2	8	17	1
Frequency (%)	7	29	60	4

Source: Oregon Department of Fish and Wildlife (1993).

Peak Flows: Flood flows during peak storm events are generally regarded as the channel forming events. Activities affecting the recurrence interval of peak flows can influence channel structure and have an effect on fish habitat (Lisle 1981). Of particular interest is the potential for redd scour or generic bed mobility, especially for salmon species with embryos incubating in the gravel during winter. Late fall and winter is the likely period for dramatic changes in peak flows in the Coast Range. Increased rates of redd scour, shifting stream channels or deposition of large deposits of coarse sediment during catastrophic events may be detrimental to fish production (Peterson et al. 1992).

Channels have a different capacity to handle peak flow changes depending on cross-sectional bed elevations, the upstream drainage (catchment) area, the amount of hydrologically-mature vegetation in the drainage and the amount of energy dissipating features (flow obstructions, bed complexity) in the channel (Dunne and Leopold 1978; Beschta et al. 1987). Recently harvested (hydrologically immature) vegetation tends to increase surface runoff (Helvey 1980; Harr 1983; Kattlemann et al. 1983) and, it has been speculated that winter rain-on-snow events could also be increased by harvesting. However, the anticipated effects of peak flow increases on stream channels have not been demonstrated during watershed analyses performed to date on similar basins in western Oregon and Washington (Beschta, pers. comm., 18 October 1994; Light, pers. comm., 4 November 1994). Any peak flow effects have been small, and they have generally been masked by channel changes caused by coarse sediment input.

Anticipated Trends in Fish Habitat Conditions

It is believed that fish habitat conditions have improved and will continue to improve in comparison to historic habitat conditions. Contemporary forest practices include retention of more trees in riparian buffers, fire suppression, improved road designs and maintenance and careful forest planning under extensive regulations. On-site trends will include substantial riparian buffer establishment, improvements in in-stream temperatures, adequate near- and long-term LWD recruitment and channel stability. The trend of improved habitat conditions is expected to continue as riparian stands mature and develop increased conifer components. On-site improvement trends will be further enhanced by ongoing Weyerhaeuser and other stream enhancement projects as described below.

3.8.3 Regional Fisheries Assessments and Enhancement Projects

Weyerhaeuser has participated in several fisheries assessment and enhancement projects in the Coos River Basin. In addition to fish habitat and stream temperature surveys mentioned above, the following projects are currently or have recently taken place:

- Weyerhaeuser is planning to conduct a watershed analysis on the East Fork of the Millicoma River in 1995. A team of scientists will analyze slopes, geology and streams and evaluate the potential for landslides and erosion and identify areas of high fish productivity. Prescriptions will be written to manage potential hazard areas to minimize damage to productive fish habitat.

- The Coos Watershed Association is conducting culvert assessments for passage on all anadromous fish-bearing streams in the Millicoma and Coos River Basins. Culverts are being assessed for passage of adult and juvenile fish, and recommendations are being made for culvert replacement, enhancement or maintenance where needed. Improvements will be scheduled for the summer of 1995.

- The Coos Watershed Association and Weyerhaeuser are enhancing a portion of Arrow Creek, a tributary to the upper reaches of the Coos River, with logs and rock weirs. The weirs are intended to collect gravel for future spawning opportunities and to create deep pools for summer rearing.

- The ODFW, Weyerhaeuser and ODF have placed three boulder weirs in the EF Millicoma River at the junction of Maston Creek to trap spawning gravel, create deep pools and slow winter water velocities.

- The ODFW Salmon and Trout Enhancement Program (STEP), ODF and Weyerhaeuser built a fish ladder to deepen and enlarge the Millicoma Pond, known to be used as a habitat for young fry as river velocities increased in the winter. A fish ladder was also constructed by ODFW and Weyerhaeuser at Big Creek, and the upstream portion blocked by nets to acclimate hatchery-reared fish in the spring prior to release in to the river.

- The University of California at Berkeley and Weyerhaeuser are studying the geology of zero-order basins, their potential for failure and potential impacts on downstream water quality and fisheries.

- The Coastal Oregon Productivity Enhancement (COPE) Team and Weyerhaeuser are studying the release of conifer regeneration from alder-dominated hardwood stands in an effort to determine if growth of existing conifers could be enhanced to contribute to LWD in streams sooner than normal under these conditions.

- In cooperation with Weyerhaeuser, the ODFW contracted to initiate an Aquatic Inventory Project in the Coos River Basin in 1993 in accordance with the Department's methods for stream habitat surveys (Moore et al. 1993). Nearly 13 miles of stream habitat, or approximately 11 percent of the fish-bearing waters on the tree farm, were surveyed. This project is continuing in 1994.

All of these cooperative efforts, assessments and enhancement projects are intended to help protect and enhance fish habitat on the tree farm, over and above the expected improvements in habitat conditions anticipated under the new forest practice rules. The site-specific habitat improvement, culvert passage review and fish laddering projects will directly benefit spawning and rearing habitat conditions and improve access to additional spawning areas. The watershed analysis procedure will address further management prescriptions primarily related to harvesting, road construction/maintenance and riparian management techniques at a landscape level to minimize adverse effects on downstream fish habitat.

3.8.4 Weyerhaeuser Voluntary Adaptive Management Program

Weyerhaeuser employs the concept of adaptive management into its forest planning efforts. Adaptive management is an environmental assessment process integrating economic, social and environmental understanding at the onset of a design phase, during the design phase and after implementation of a management plan (Holling 1978). The objective of adaptive management is to consider plan implementation as a set of experiments producing scientific results, which can be included in future (adapted) management decisions. An adaptive management program assists in improving habitat trends

by modifying forest management schemes based on updated research results such as those described above.

3.9 Wildlife

3.9.1 Regional Spotted Owl Status

The U.S. Forest Service (USFS) Scientific Advisory Team summarized the number of northern spotted owls detected in surveys from 1987 through 1992 to be 3,605 pairs and approximately 1,000 territorial singles in Washington, Oregon and California (U.S. Department of Agriculture 1993). The actual number of owls is expected to be greater because portions of the species range have not been surveyed (USDA/USDI 1994).

The federal Recovery Team divided the range of the spotted owl into 11 physiographic provinces based on geographic patterns in the distribution of natural vegetation. These divisions are modifications of the provinces described by Franklin and Dyrness (1984). The Millicoma Tree Farm lies within the Oregon Coast Range province, which includes the coastal mountains of western Oregon from the Columbia River south to the Middle Fork of the Coquille River. As of 1992, 303 pairs and 77 territorial singles were known to exist in the Coast Range province, primarily on public lands (U.S. Fish and Wildlife Service 1992b). Approximately half of the known owls (47%) were found south of State Highway 38 in the southern one-quarter of the province that includes the Millicoma Tree Farm. The higher density of owls in the southern portion of the province was attributed to the greater amount of federal land with suitable spotted owl habitat south of Highway 38 (U.S. Fish and Wildlife Service 1992b).

The Recovery Team analyzed trends in populations and habitats within each province, and identified a number of threats to the survival and recovery of the owl population. The Recovery Team considered the most severe threats in the Coast Range province to be low and declining populations; little nesting, roosting and foraging habitat; poor distribution of the remaining owls and habitat; isolation of the province from other populations of spotted owls; and high levels of predators. Most of these threats

were considered to be more severe in the northern portion of the province than in the area of the Millicoma Tree farm (U.S Fish and Wildlife Service 1992b).

The Recovery Team recommended three DCAs on federal lands in the vicinity of the Millicoma Tree Farm. These same areas were later adopted as LSRs in the ROD (USDA/USDI 1994), with only minor modifications in size and shape. They have been assigned LSR identification numbers in the Northwest Forest Plan, but they are referenced in this EA by the DCA numbers used in the Final Draft Recovery Plan because these numbers are more widely used.

The projected future capacity of the three DCAs ranges from 15 to 17 pairs of potentially-reproductive spotted owls, compared to the Recovery Plan target of 20 pairs per reserve (Table 3-8). The DCA populations of 20 or more reproductively-capable pairs are assumed to have a reasonable expectation of persisting 100 years, given known rates of mortality and immigration (Thomas et al. 1990: Appendix O). All three DCAs are therefore below optimum in size. The maximum recommended distance between DCAs of fewer than 20 pairs is 7 miles (Thomas et al. 1990), to allow for adequate dispersal of juvenile owls from one DCA to the other. The two DCAs lying on either side of the Millicoma Tree Farm are separated by approximately 12 miles, suggesting that dispersal could become a limiting factor in the future maintenance of owls in the DCAs.

After laying the groundwork for recovery on federal lands, the Recovery Team recommended a number of management actions for non-federal lands. The recommendations for non-federal lands in the Coast Range province are:

1. Provide nesting, roosting and foraging habitat on non-federal lands contained within federal DCAs;

2. Provide nesting, roosting and foraging habitat to support individual supplemental spotted owl pair areas and clusters on non-federal lands, particularly in the northern portion of the province;

Table 3-8. Current and future projected capability of Designated Conservation Areas in the vicinity of the Millicoma Tree Farm (U.S. Fish and Wildlife Service 1992b: page 133).

DCA Number	Total Area (acres)	Total NRF Habitat (acres)	Known Activity Centers	Current Projected Pairs	Future Projected Pairs
33	55,800	28,200	24	12	17
34	48,500	21,600	25	10	15
36	43,000	28,900	13	13	15

3. Provide dispersal habitat to assure successful dispersal of owls between DCAs and from the Coast Range province to adjacent provinces; and

4. Develop a habitat management plan for the state lands in the province.

Recommendation 1 does not pertain to the Millicoma Tree Farm because it is addressed specifically at non-federal lands within DCAs. Due to the history of land settlement in the Pacific Northwest, many forest areas are checkerboards of alternating federal and non-federal ownership. The Oregon Coast Range is typical of this condition, where square-mile parcels of USFS or BLM land alternate with private or state forest lands (Figure 3-1). Most of the DCAs identified by the Recovery Team in the Coast Range province encompass checkerboard ownership, and the team considered it important to manage the non-federal lands in a manner consistent with the federal objectives for the DCA. All three DCAs in the vicinity of the tree farm are heavily checkerboarded, but none of the lands within the DCAs belong to Weyerhaeuser because of the company's past efforts to consolidate its ownership through trade and acquisition.

Recommendation 2 was intended primarily for the northern portion of the Coast Range province, where federal lands are limited, and the Recovery Team felt local populations could not be maintained without the contribution of non-federal lands. It is less of a concern in the portion of the range south of State Highway 38 because of the greater relative amount of federal lands present there, but it is still pertinent because none of the DCAs meet the target of supporting 20 reproductive pairs.

Recommendation 3 is directed primarily at private lands in the southern portion of the province. The size and spacing of the DCAs leaves them at increased risk of local extinction unless adequate dispersal occurs. Dispersal habitat will be provided on some federal lands between the DCAs, but in areas where no federal lands are present, private and state lands provide the only opportunity.

Recommendation 4 is directed at state lands in the province. The Elliott State Forest, which lies directly north of the Millicoma Tree Farm, is one such state-owned parcel. Management plans being developed for the Elliott may include provisions for resident owls and/or dispersal habitat.

Surveys on Weyerhaeuser land were initiated in 1990. Survey areas were expanded in 1991, 1992, 1993 and 1994 to cover additional suitable habitat. Spotted owls were found at 35 activity centers on the tree farm. Forty-four additional activity centers occur within 1.5 miles of the tree farm. A detailed description of the existing owl population on and near the tree farm is presented in subsection 4.3.2 of the HCP.

Based on forest inventory information supplied by Weyerhaeuser, the Millicoma Tree Farm contains 16,275 acres of potentially suitable nesting, roosting and foraging habitat for spotted owls (Millicoma HCP: Figure 4-4). Optimal habitat is found in old-growth forests that exhibit the following characteristics (Thomas et al. 1990):

- Moderate to high canopy closure
- A multilayered, multispecies canopy dominated by large overstory trees
- A high incidence of large trees with various deformities such as cavities, broken tops and dwarf mistletoe infections
- Numerous large snags
- Large accumulations of fallen trees and woody debris on the ground
- Sufficient open space below the canopy for owls to fly.

This definition generally describes classic "old-growth" nesting, roosting and foraging habitat, but a limited amount of old-growth exists on the Millicoma Tree Farm. As noted in Table 3-2, the tree farm supports 8,727 acres of mature forest and 2,727 acres of old-growth forest. Portions of both forest types have the nesting, roosting and foraging habitat structural characteristics described above, for a total of approximately 3,630 acres of "old-growth" nesting, roosting and foraging habitat. However, spotted owls have been observed in numerous areas that do not meet the old-growth nesting, roosting and foraging definition. For purposes of this HCP, nesting, roosting and foraging habitat on the tree farm was expanded to include younger and less diverse habitat of the type that has been found to support owls in western Oregon, and could potentially support owls on the tree farm.

The spatial distribution of forest types on the tree farm is as important to potential spotted owl use as the structural conditions within each type. Forests 200 years of age and older are found in small

isolated patches and along riparian management areas. Stands of intermediate-age habitat are clumped in the northwest and southeast portion of the tree farm. Stands in the southeast are more isolated and surrounded by young forests (Figure 3-3). Conditions for resident spotted owls are likely to be correspondingly poorer in the southeast than in the northwest. The northeastern portion of the tree farm is almost entirely young forest, with few small, older patches. Spotted owl use of the northeastern portion of the tree farm is expected to be minimal.

3.9.2 **Marbled Murrelets** (*Brachyramphus marmoratus*)

The marbled murrelet (*Brachyramphus marmoratus*) is listed federally as a threatened species and by the State of Oregon as a critical species. The murrelet is a robin-sized seabird that nests from southeast Alaska to central California in large mature or old-growth coniferous forests within approximately 53 miles of the ocean. The marbled murrelet is a member of the family *Alcidae* and the only member of this family that nests in trees. Suitable habitat is considered to be old-growth forests and mature forests with an old-growth component (large trees greater than 32 inches diameter at breast height) (Interagency Interim Guidelines Committee 1991; Ralph and Nelson 1992). Trees must contain large branches with a thick moss or lichen covering for the nest platform. The minimum stand size for successful reproduction is unknown, as there is limited knowledge about the murrelet's nesting biology. The Millicoma Tree Farm currently supports an estimated 6,707 acres of forest that could potentially be suitable nesting habitat for marbled murrelets (Millicoma HCP: Figure 4-5).

Nests consist of depressions in moss or lichens on lateral branches of mature or old-growth trees (Marshall 1988). There is only one egg per clutch, and both parents attend to the young by making flights between the ocean and the nest at dusk and dawn. During the day, the nestling is left alone while the parents forage at sea. The initial fledgling flight of the young murrelet takes place at dusk and is a direct flight to the ocean.

It is believed that adults do not breed until after the second year. Although not colonial nesters, they may nest in small aggregations where suitable habitat is abundant (Marshall 1988). Throughout the non-breeding season, marbled murrelets are found on the ocean usually within 1 mile of shore where they feed on small fish and invertebrates. Occurrences along the coast are often adjacent to stands of

mature or old-growth coniferous forests. They are also found at inland salt waters and occasionally freshwater coastal lakes, usually within 15 miles of the ocean (Carter and Sealy 1986).

Marbled murrelets have been documented recently on the tree farm and in the vicinity in the Remmy Creek area north of the tree farm, around Daniels Creek on the western edge of the tree farm, on the Elliott State Forest northwest of the tree farm, on Bureau land to the south of the area and at Loon Lake just north of the tree farm (Oregon Natural Heritage Program 1993a; Nelson 1993; Oregon Department of Forestry 1993a). An offshore survey of the Oregon coast population of marbled murrelets has found murrelets to be relatively abundant between Newport and Coos Bay, Oregon (Strong 1992).

3.9.3 Other Species of Concern

An estimated 638 species of vertebrates (460 terrestrial, 178 freshwater and selected marine fish species) inhabit western Oregon and Washington (Brown 1985a). The USFWS, under the authority of the ESA, has identified species considered threatened or endangered due to low population numbers or other significant threats to their survival (U.S. Fish and Wildlife Service 1990), as well as candidate species under consideration for formal listing proposals (U.S. Fish and Wildlife Service 1991). Among the species potentially existing on the Millicoma Tree Farm, the USFWS has identified six that are currently listed as threatened or endangered, or are candidates for listing (U.S. Fish and Wildlife Service 1993) (Table 3-9). The species list includes the northern spotted owl. An additional 24 species have population levels in the 48 contiguous states are lower than historically recorded levels. This population decline is correlated with the widespread use of chlorinated hydrocarbon pesticides (e.g., DDT and derivatives). Disturbance and loss of nesting habitat have also contributed to the reduction in peregrine falcon numbers (Peregrine Falcon Recovery Team 1982). Peregrine falcons have historically occurred in a variety of coastal and inland areas throughout Oregon (Henny and Nelson 1981; Peregrine Falcon Recovery Team 1982). The Pacific Coast Recovery Plan for the peregrine falcon lists southwestern Oregon as a management unit for peregrine falcon recovery.

Table 3-9. Animal species with special state or federal status that may be present on or near the Millicoma Tree Farm.

Common Name	Scientific Name	Federal Status[1]	State Status[1]	Occurrence	Habitat
INVERTEBRATES					
Burnell's false water penny beetle	*Acneus burnellii*	C2	–	unknown	streams, lakes
REPTILES AND AMPHIBIANS					
Northwestern pond turtle	*Clemmys marmorata marmorata*	C2	SC	present	marshes, ponds, sloughs
Del Norte salamander	*Plethodon elongatus*	C2	SV	unlikely	forest floor, talus
Northern red-legged frog	*Rana aurora aurora*	C2	SU	present	ponds, streams, marshes
Clouded salamander	*Aneides ferreus*	–	SU	possible	forest floor
Western toad	*Bufo boreas*	–	SV	possible	marshes, ponds
Tailed frog	*Ascaphus truei*	–	SV	possible	streams
Southern seep salmander	*Rhyacotriton variegatus*	–	SV	possible	streams, springs
Sharptail snake	*Contia tenuis*	–	SV	not present	forest floor, moist areas
Foothill yellow-legged frog	*Rana boylii*	C2	SV	probable	streams
BIRDS					
Great grey owl	*Strix nebulosa*	–	SV	not present	boreal forest
Western snowy plover	*Charadrius alexandrinus nivosus*	LT	LT	not present	sandy spits, estuaries
Peregrine falcon	*Falco peregrinus*	LE	LE	possible	stream and forest
Marbled murrelet	*Brachyramphus marmoratus*	LT	SC	present	old-growth forest
Great egret	*Casmerodius albus*	–	SU	possible	marshes, ponds
Pileated woodpecker	*Dryocopus pileatus*	–	SV	present	mature forest
Fork-tailed storm petrel	*Oceanodroma furcata*	–	SV	not present	coastal islands
Purple martin	*Progne subis*	–	SC	not present	open forest
Northern bald eagle	*Haliaeetus leucocephalus*	LT	LT	present	mature forest
Northern spotted owl	*Strix occidentalis caurina*	LT	LT	present	mature forest

Table 3-9. Animal species with special state or federal status that may be present on or near the Millicoma Tree Farm (continued).

Common Name	Scientific Name	Federal Status[1]	State Status[1]	Occurrence	Habitat
Northern pygmy owl	*Glaucidium gnoma*	–	SU	present	mature forest
Western bluebird	*Sialia mexicana*	–	SV	possible	open forest
MAMMALS					
Columbia white-tailed deer	*Odocoileus virginianus leucurus*	LE	LE	unlikely	forest
California wolverine	*Gulo gulo luteus*	C2	LT	unlikely	high-elevation areas
Pacific fisher	*Martes pennanti*	C2	SC	possible	remote forest
White-footed vole	*Arborimus albipes*	C2	SU	possible	riparian areas
Pacific western big-eared bat	*Plecotus townsendii townsendii*	C2	SC	possible	caves, riparian areas
Ringtail	*Bassariscus astutus*	–	SU	possible	cliffs, talus
Pine marten	*Martes americana*	–	SC	possible	mature forest

1 Status Codes: C2 - Federal Candidate
SV - State Vulnerable
LT - Listed as Threatened
X - Information Pending
SC - State Critical
SU - State Status Undermined
LE - Listed as Endangered

Peregrine Falcon *(Falco peregrinus)*

The peregrine falcon is a cliff-nesting species that primarily preys on birds. Prey species include waterfowl, shorebirds, doves, pigeons and larger passerines. Preferred nest sites are sheer cliffs 150 feet or more in height with a small cave or overhung ledge. Acceptable surrounding habitat appears to include a broad range of cover types with the exception of desert (Peregrine Falcon Recovery Team 1982). Peregrine falcons are listed both federally and by the State of Oregon as endangered (Table 3-8).

Nesting peregrines forage over a large area, which frequently includes bodies of water, marshes, shorelines, wooded areas adjacent to water and grasslands. The presence of diverse and abundant avian prey, and the ease of prey capture, probably dictate the peregrine's choice of foraging habitat. Less is known of the winter habitat of peregrines in the Pacific Northwest. Some winter population movement may occur in the northern part of the range, including Oregon, although some adults remain near the nest site. Inland wetlands also appear to attract wintering peregrines. Peregrine falcons often migrate to areas where waterfowl and other prey species concentrate. There are documented occurrences of the peregrine falcon in the vicinity of the Millicoma Tree Farm (U.S. Fish and Wildlife Service 1993).

Western snowy plover (*Charadrius alexandrinus nivosus*)

The western snowy plover is a federally-listed threatened species (Table 3-9). The breeding range of the Pacific coast population of the western snowy plover extends from southern Washington State to southern Baja California. In Oregon, there are six locations identified as breeding sites for the western snowy plover. The species breeds primarily on open, unvegetated sandy spits, dune-backed beaches and areas adjacent to river mouths and estuaries. They require flat, open sandy or saline areas with limited driftwood and vegetation. The breeding season extends from mid-March through mid-September and the birds return to the same site annually. Snowy plovers feed in the wet sand of intertidal zones, dry sand above high tide lines and along the edge of salt marshes. Loss of habitat due to encroachment of European beach grass (*Ammophila arenaria*), human disturbance at nesting sites and nest predation by animals are considered the primary causes of decline of this species. Western snowy plover occurrences have been documented north of the tree farm near the mouth of Tenmile

Creek. The last documented sighting in this area was in 1987 (Oregon Natural Heritage Program 1993a).

Northern bald eagle (*Haliaeetus leucocephalus*)

The northern bald eagle is designated as a federally-threatened species in the State of Oregon and as a state-threatened species. Preferred nesting habitat consists of mature or old-growth trees in proximity to available food sources (rivers or lakes with abundant populations of fish or waterfowl). Eagles typically select the largest, most dominant trees in conifer stands, usually Douglas-fir, for nesting (Anthony et al. 1982). Nest sites are usually within 0.25 mile of open water. Preferred roosting habitat consists of stands of mature conifers with large branches that are usually in a wind-protected valley and may be up to 10 miles from available food sources (open water in rivers or lakes or ungulate winter range). Three nesting pairs of bald eagles are known to occur on the tree farm. A total of 51 acres of mature and old-growth forest are reserved to protect nesting habitat on the tree farm. Surveys are conducted each year to monitor nesting status. Northern bald eagle nesting activity has been documented near the South Fork of the Coos River, near Mettman Ridge and Palouse Creek and on Elliott State Forest northwest of the tree farm (Oregon Natural Heritage Program 1993a; Oregon Department of Forestry 1993a) (Table 3-9).

The Bald Eagle Management Guidelines for Oregon and Washington restrict certain activities, including timber harvesting, within a 330-foot radius around bald eagle nests, unless designed to enhance eagle habitat (U.S. Fish and Wildlife Service 1981). In addition, the Pacific Bald Eagle Recovery Plan (U.S. Fish and Wildlife Service 1986) restricts timber harvesting within 1,312 feet (0.25 mile) of bald eagle nests during the critical nesting period (0.5 mile if within line-of-sight).

Columbia white-tailed deer (*Odocoileus virginianus leucurus*)

The Columbia white-tailed deer is a federally-designated endangered species and has been documented as occurring in the Millicoma Tree Farm vicinity (Table 3-9). This species is typically found along the lower Columbia River and in the Umpqua Valley of southwest Oregon. Primary habitat includes riparian areas and sloughs in grassy and shrubby communities as well as early-successional forests. Columbia white-tailed deer primarily feed in wet meadows and along grass-shrub edges, but also use other edge types (shrub-forest, grass-forest). Ranges are generally 95 to 270 acres,

and typically 1 to 3 offspring are produced each year (Brown 1985a). This species has been sighted southwest of the tree farm area near Hawkins Lake (Oregon Natural Heritage Program 1993a). The last documented observation was in 1980 (Oregon Natural Heritage Program 1993a).

Candidate Species for Federal Listing

White-footed vole (*Arborimus albipes*)

The white-footed vole is designated as a federal candidate species (Category 2) and as a sensitive (peripheral) species by the State of Oregon (Table 3-9). Preferred habitat consists of riparian zones along small streams within forests of the Oregon Coast Range, particularly where there is abundant dead and down woody material and alder-dominated riparian forest.

Pacific fisher (*Martes pennanti*)

The Pacific fisher is found across Canada in forested regions of the western United States, in New England and in New York. This species is designated federally as a candidate species (Category 2) (Table 3-9). The range of the Pacific fisher includes most forested areas of northern California, Oregon and Washington, but it is considered rare throughout its range.

The Pacific fisher feeds on porcupines, squirrels, wood rats, hares, mice and grouse. Individual home ranges are large (up to 10 square miles in Canada), and large undisturbed tracts of mature coniferous forest (at least 100 square miles) are needed to maintain viable populations of fisher (Rodrick and Milner 1991). Because of the fisher's reluctance to use or cross large forest openings, it is believed they are rare in highly fragmented forest habitats.

California wolverine (*Gulo gulo luteus*)

The California wolverine is found in California, Oregon and Washington and is federally-designated as a candidate species (Category 2). Its status trend is listed as unknown (U.S. Fish and Wildlife Service 1991) (Table 3-9). The Service distinguishes the California wolverine from the North American wolverine, *Gulo gulo luscus*, which is found in Colorado, Idaho, Minnesota, Montana, North Dakota, Nevada, Utah and Wyoming. It is unlikely this species occurs on the tree farm.

Larrison (1976) lists the habitat of the wolverine as mostly coniferous forest, especially in mountainous areas. Stevens and Lofts (1988) list the habitat of wolverine in British Columbia as coniferous-dominated habitats, alpine tundra and fresh water emergent wetland habitats. Brown (1985) lists the primary habitat for wolverines to be conifer forests of subalpine forest parks and forested wetlands, with large sawtimber, old-growth, grass and shrub habitats used as secondary habitats. Wolverines prey upon carrion, small mammals, birds, bird eggs, insects and insect larvae in summer (Stevens and Lofts 1988). In winter they are capable of preying on large mammals in deep snow. The breeding period for wolverines is April to September, with the young born in early spring in dens located in protected areas, such as thickets or rock crevices (Whitaker 1980).

Pacific western big-eared bat (*Plecotus townsendii townsendii*)

Feeding habitat of the Pacific western big-eared bat consists of riparian areas, wet meadows and caves (Table 3-9). This species feeds primarily in meadows and early-successional conifer-hardwood and mixed conifer forests, as well as in grass-forb on dry hillsides. It feeds in a range of plant communities, including temperate and high temperate coniferous forest, in riparian and wetland areas and in conifer and mixed conifer forests. Breeding and resting habitat consists primarily of caves. Mating occurs from September to February, with birthing from May to July. The species is known to hibernate in western Oregon and Washington.

Burnell's false water penny beetle (*Acneus burnellii*)

This species is a federal candidate for listing (Category 2) and has been documented as occurring in the vicinity of the Millicoma Tree Farm (Table 3-9). They usually occur on rocky or gravel bottoms along wave-swept shores and in streams where water is shallow and swift. Adults are small, oval and flat. They are often found clinging to logs and stones. Eggs are deposited on the undersides of stones and hatch into distinctive larvae often called "water pennies" due to their shape and color. The entire life cycle of the species takes about two years (Pennak 1978).

Northwestern pond turtle (*Clemmys marmorata marmorata*)

The northwestern pond turtle is designated as a federal candidate species (Category 2) and has been documented in the vicinity of the Millicoma Tree Farm (Table 3-9). This species is found in California, Nevada, Oregon and Washington, where its status trend is listed as declining (U.S. Fish and Wildlife

Service 1991). Northwestern pond turtles inhabit marshes, ponds, sloughs and small lakes. They require abundant aquatic vegetation, protected shallows for juveniles, and logs, banks or floating vegetation for basking adults (Rodrick and Milner 1991). Northwestern pond turtles are opportunistic feeders on aquatic vegetation and small animals. This species has been documented as likely to occur along the Millicoma River from the confluence with the South Fork of the Coos River to the town of Allegany. A small population is also likely along the South Fork of the Coos River from approximately the confluence with the Millicoma River to the Dellwood gate, and along Tenmile Creek to the west of the tree farm area (Oregon Natural Heritage Program 1993a). The species has also been documented on the Elliott State Forest (Oregon Department of Forestry 1993a).

Northern red-legged frog (*Rana aurora aurora*)

The northern red-legged frog is a designated federal candidate species (Category 2) and is designated as a sensitive species by the State of Oregon (Table 3-9). Preferred habitat includes lowland and foothill ponds, streams, rivers and marshes in moist forests with vegetative cover at the water's edge. During the breeding season, slow-moving backwater pond areas of streams with little or no flow are necessary. During the non-breeding season the species uses dense, shrubby, low vegetation adjacent to water, although they may inhabit moist forested areas up to 900 feet from standing water if dense vegetation is present. This species has been documented northwest of the tree farm on the Elliott State Forest (Oregon Department of Forestry 1993a).

Foothill yellow-legged frog (*Rana boylii*)

The foothill yellow-legged frog is a federal candidate species and is listed as a vulnerable species in the State of Oregon (Table 3-9). This species ranges from western Oregon south to southern California. It is confined to the vicinity of permanent streams and is most common in and near streams with rocky, gravelly or sandy bottoms. Breeding occurs in calm sections of streams from early April to early June for about a two-week period. Adult frogs are known to feed on both aquatic and terrestrial invertebrates. Once considered abundant in southwestern Oregon, there is evidence that populations of this species in Oregon are greatly reduced (Leonard et al. 1993).

Del Norte salamander *(Plethodon elongatus)*

The Del Norte salamander is a candidate for federal listing (Category 2) (Table 3-9). This is an uncommon and poorly known species located primarily in southwest Oregon, and documented to occur in south Coos County (Leonard et al. 1993). The Del Norte salamander requires moist rock rubble areas, such as talus slopes, or logs and other down material in mixed coniferous forests or in mixed conifer-hardwood or hardwood forests. Breeding season is typically April to November, and clutch size averages 10 to 16 offspring (Brown 1985a).

Species Listed by the State of Oregon or Under Consideration for Listing

Clouded salamander (*Aneides ferreus*)

The clouded salamander occurs from the Coast Range of northwestern Sonoma County, California to the Coast Range and western Cascades of Oregon. This species occurs from sea level to 4,800 feet and inhabits large decaying logs and stumps, particularly Douglas-fir. Eggs are laid in spring and early summer within the cavities of large logs. Eggs hatch in about two months (Leonard et al. 1993). It's status is undetermined in the State of Oregon (Table 3-9).

Southern seep salamander (*Rhyacotriton variegatus*)

The southern seep salamander is a subspecies of the Olympic salamander (*Rhyacotriton olympicus*). This salamander inhabits cold streams, springs and seeps. When on land, it is found under stones within the splash zone and in moist, moss-covered talus. This salamander probably breeds in spring or early summer, and its distribution ranges from the Olympic Peninsula in Washington to Mendocino County, California (Stebbins 1966). This salamander is listed as a state vulnerable species in Oregon (Oregon Natural Heritage Program 1993a) (Table 3-9).

Western toad (*Bufo boreas*)

The Western toad occurs from northeast Mexico through the western United States and Canada into southeast Alaska. They are known to live from near sea level to 6,520 feet. They are most common near marshes and small lakes but may wander through drier forests. Western toads are active during the night, spending the day buried in the soil or under woody debris. When threatened they may secrete a mild poison. Breeding occurs from February to April. Embryos hatch in 3 to 10 days

depending on water temperatures. Western toads are sensitive to environmental changes, particularly the loss of wetlands. Populations of this toad have declined and it is now uncommon in the mountain meadows of the North Cascades and lowlands of western Washington for unknown reasons (Leonard et al. 1993). The western toad is a listed vulnerable species in the State of Oregon (Table 3-9).

Tailed frog (*Ascaphus truei*)

Tailed frogs occur between the Cascades and the Pacific coast from northwestern California to British Columbia. Tailed frogs are found only in cold, rocky streams from near sea level to 5,250 feet. During the day adult frogs hide beneath rocks in streams, while at night they feed along stream banks. Mating takes place in late September and early October. Eggs attach to undersides of large rocks in shallow streams. At night the larvae feed on algae covering rocks. Metamorphosis occurs after one to two years, depending on elevation. Tailed frogs are very sensitive to increased temperatures (Leonard et al. 1993; Nussbaum et al. 1983). This species is likely to be found on the Millicoma Tree Farm and is present on the Elliott State Forest to the northwest of the tree farm (Oregon Department of Forestry 1993a) (Table 3-9).

Sharptail snake (*Contia tenuis*)

The sharptail snake (*Contia tenuis*) is listed as a vulnerable species by the State of Oregon (Table 3-9). This species is found in valleys of Oregon and Washington in moist habitats. Sharptail snakes prefer logs and down material in deciduous hardwood forest and early- to mid-successional in mixed conifer-deciduous forest and forested wetlands. Breeding takes place from March to October, with a range of 2 to 9 eggs per clutch (Brown 1985a). The sharptail snake is not present on the tree farm (Sieglitz, pers. comm., 18 April 1994).

Great gray owl (*Strix nebulosa*)

The great gray owl (*Strix nebulosa*) is the largest North American owl, residing from Yukon Valley, Alaska, south to California and east across the boreal forests of Canada. The owl is most frequent in the Pacific Northwest in winter. Habitat includes dense forests and adjacent meadows. This species nests in abandoned nests of hawks and crows (Peterson 1961). The great gray owl is listed as a vulnerable species by the State of Oregon (Table 3-9). Documentation of the great gray owl in the Millicoma Tree Farm area is rare. The species was contacted only once during spotted owl surveying. The great gray owl is expected to be an infrequent visitor to the tree farm, and not a resident.

Northern pygmy owl (*Glaucidium gnoma*)

The northern pygmy-owl *(Glaucidium gnoma)* is found from southeast Alaska, northern British Columbia and western Alberta through the wooded mountains of the western states as far east as the Rocky Mountains, and south through Mexico to Guatemala (Peterson 1961). This species is a permanent resident of western Oregon. Primary habitat includes large sawtimber and old-growth coniferous and mixed-coniferous forests, forest edges and snags. For nesting, northern pygmy-owls use existing cavities in trees more than 30 feet in height. Home ranges have been reported as 0.75 miles in radius (Brown 1985a). The northern pygmy-owl is an undetermined status species in Oregon (Table 3-9).

Western bluebird *(Sialia mexicana)*

Western bluebirds *(Sialia mexicana)* are found from southern British Columbia to Montana and south through most of the western United States into southern Mexico. The State of Oregon lists the bluebird as a vulnerable species (Table 3-9). The basic habitat requirements of western bluebirds are elevated perches, open spaces, some cover and one or more nest cavities. They occupy a variety of habitat types, all of which are characterized by widely-spaced, understory vegetation and trees clustered to form areas of dense cover adjacent to more open spaces. Western bluebirds are ground/aerial feeders, usually foraging for insects and larvae by dropping from a low perch to the ground (Bent 1949; Brawn and Balda 1988). Western bluebirds may possibly occur on the tree farm (Sieglitz, pers. comm., 18 April 1994).

Fork-tailed storm-petrel *(Oceanodroma furcata)*

This species is found in the north Pacific from the Bering Sea to southern California. The fork-tailed storm-petrel is distinguished by a pearly-gray color with a white underside. Nesting usually occurs on coastal islands in rock crevices and foraging takes place over the open ocean (Peterson 1961; Larrison and Sonnenberg 1968). This species is a state vulnerable species in Oregon (Table 3-9).

Pileated woodpecker *(Dryocopus pileatus)*

The pileated woodpecker is found in western North American from British Columbia to northern California (American Ornithologist's Union 1983). This species resides in both deciduous and coniferous forests and is found mainly in dense forests of low to moderate elevation in Oregon and Washington (Larrison and Sonnenberg 1968). Rodrick and Milner (1991) indicate that pileated

woodpeckers inhabit mature and old-growth forests and second-growth forests with significant numbers of large snags and fallen trees. The optimum habitat is in coniferous forest with two or more canopy layers; with the upper canopy being approximately 80 to 100 feet high. The pileated woodpecker is a state vulnerable species in Oregon (Table 3-9). Mannan (1984) found that home ranges of pileated woodpeckers varied from 1,008 to 1,356 acres in the Coast Range of Oregon.

Great egret *(Casmerodius albus)*

The great egret is found from the northern United States to South America, but breeds locally in southeast Oregon, western Nevada, California, western Arizona and southern New Mexico. Typical habitat includes marshes, irrigated lands, ponds, shores and mudflats. Nests are usually constructed in colonies and are composed of sticks in large trees and dead brush over water or in tule flats (Peterson 1961). The great egret is a state status undetermined species in Oregon (Table 3-9).

Purple martin *(Progne subis)*

The purple martin is the largest of the North American swallows. This species is found from southern Canada to northern Mexico and the Gulf states. Breeding range spans from southwest British Columbia to southern California. Habitat includes open or harvested forests, towns and farms. Nesting usually occurs in tree cavities or buildings and other structures (Peterson 1961). The purple martin is a state critical species in Oregon (Table 3-9).

Pine marten *(Martes americana)*

In the Pacific Northwest, the pine marten is found in western Washington and Oregon (except in the Willamette Valley). Primary habitat includes snags and down logs in mature and old-growth coniferous forests, but the marten has also been found to use open- and closed-sapling and pole successional stages. Home range is estimated to be up to 590 acres. The pine marten typically mates from June to August and gives birth from April to May (Brown 1985a). The pine marten is a state critical species in Oregon (Table 3-9).

Ringtail *(Bassariscus astutus)*

The ringtail is found throughout most of the southwestern United States and in Mexico, with the northern-most extent of its range extending into southwest Oregon (Burt and Grossenheider 1964). Its primary habitat includes cliffs, talus and caves in early-successional states (grass-forb, shrub, open

sapling-pole stands) deciduous, conifer and mixed-conifer forests. The ringtail's home range is reported to be 1,250 to 1,500 acres (Brown 1985a). The ringtail is an undetermined status species in Oregon (Table 3-9).

3.10 Land Use

The HCP area covers approximately 209,000 acres of private industrial timberland in Coos and Douglas Counties, Oregon. The Millicoma Tree Farm is a mostly contiguous block, bordered to the south, east and northeast by a checkerboard of private lands and lands administered by the BLM. The Elliott State Forest, administered by the ODF, is located to the northwest of the tree farm. Lands to the west are mainly private and include the communities of North Bend and Coos Bay, while parcels of rural residences and small farms, particularly along rivers and streams, are located to the southwest and northeast of the tree farm (Slater, pers. comm., 14 December 1993).

Federal BLM lands in the area are managed for multiple uses, but timber harvest has traditionally been the primary use. Under recommendations of the ISC (Thomas et al. 1990) and the ROD (USDA/USDI 1994), much of the BLM lands to the northeast, east and southeast of the tree farm would be managed as late-successional reserves capable of supporting the spotted owl. Additional recommendations for the area from the Final Draft Recovery Plan for the Northern Spotted Owl (U.S. Fish and Wildlife Service 1992b) include developing cooperative management prescriptions with nonfederal landowners.

The tree farm is currently a mosaic of coniferous forest stands comprised primarily of Douglas-fir of varying age classes. Under commercial timber management, stands are harvested, typically by clearcutting, and planted with one or more early-successional species that are cultivated and harvested at intervals of 40 to 60 years. Approximately 171,517 acres of the tree farm are currently early-successional forest (0 to 39 years old), 25,147 acres are mid-successional forest (40 to 79 years old), 8,727 acres are mature forest (80 to 199 years old) and 2,727 acres are old-growth forest (200+ years old). Approximately 882 acres of the tree farm are non-forested (e.g., rock, road, etc.) (Table 3-1).

The spotted owl recovery strategy originally developed by the ISC called for the creation of a series of habitat reserves on federal lands across the full geographic range of the species (Thomas et al. 1990).

This same approach was adopted by the federal Recovery Team (U.S. Fish and Wildlife Service 1992b) and expanded to include other fish and wildlife species in the ROD (USDA/USDI 1994). Each LSR created under the ROD will be dedicated to the growth and maintenance of late-successional forest capable of meeting all the life requirements of the northern spotted owl, as well as other species. The Final Draft Recovery Plan (U.S. Fish and Wildlife Service 1992b) recommended that lands between reserves be managed to provide a landscape conducive to the dispersal of juvenile spotted owls.

The ISC and the federal Recovery Team divided the geographic range of the northern spotted owl into physiographic provinces based on distinct differences in geomorphology and vegetation (Thomas et al. 1990; U.S. Fish and Wildlife Service 1992a). The Millicoma Tree Farm lies in the southern Oregon Coast Range province, and includes most of the non-federal land between two LSRs and in the vicinity of a third. The Recovery Team also recommended that state lands within the Elliott State Forest to the northwest of the Tree Farm be managed in a similar manner to support some resident owls. The future management of the Elliott State Forest is presently uncertain; however, it is likely to support at least a small population of owls. Dispersal habitat between the Elliott State Forest and the federal reserves would also be provided by the Millicoma HCP.

Oregon's Department of Land Conservation and Development (LCDC) prescribes land use and conservation goals and objectives to be applied by state agencies, cities, counties and special districts throughout the state. Procedures include citizen advisory committees to assure state-wide citizen involvement in all phases of the planning process including public hearings and a land use board of appeals allowing for judicial review of land use decisions.

The state-wide land use and conservation goals are mandatory planning standards. All local plans must meet the goals. Goal 4 of Oregon's state-wide planning goals directly addresses forest land and states:

> "*To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use of forest land consistent with sound management of soil, air, water and fish and wildlife resources and to provide recreational opportunities and agriculture.*" (OAR Chapter 660, Division 15).

Although actual forest practices and operations on forest land are governed by Oregon's Forest Practices Act, Oregon's land use laws assure that forest lands will not be converted to other non-forest uses. The Millicoma Tree Farm is an area designated for commercial forestry under local land use laws. The Coos and Douglas Counties land use plans and implementing ordinances have been approved by the LCDC as meeting state-wide goals and objectives.

3.11 Social and Economic Conditions

3.11.1 Regional Population and Employment

The Millicoma Tree Farm is located in Coos and Douglas Counties, Oregon. Both counties are predominantly rural, and are heavily dependent on natural resource industries. In 1991, 13 percent of personal income in Coos County was derived directly from the timber industry and 27 percent of personal income was derived directly from the timber industry in Douglas County (Oregon Department of Forestry 1993a). Earnings by the wood products industry in Coos County in 1993 were $76 million, or 13 percent of total industry earnings. Wood products industry earnings in Douglas County were $237 million, or 16 percent of total earnings during the same period (Anderson, pers. comm., 29 September 1994; Angle, pers. comm., 30 September 1994). The 1990 population of Coos and Douglas Counties was 60,273 and 94,949, respectively. Populations of North Bend and Coos Bay, communities located west of the tree farm in Coos County, were 15,151 and 9,614, respectively (Table 3-10) (Bureau of the Census 1990).

Both Coos and Douglas Counties have been affected by the state-wide decline in levels of timber harvest. These effects are reflected in low population growth projections and high unemployment figures for each county. Population growth is expected to be 8 percent in Coos County between 1993 and 2000, while population growth in Douglas County is expected to be 5 percent during the same time period. Both Counties have experienced high rates of unemployment from 1990 to the present; corresponding to the decline in timber harvesting in the region. The 1990 unemployment rate for Coos County was 9 percent, corresponding with the 1990 unemployment rate for Douglas County at approximately 9 percent (Table 3-10). September 1993 unemployment figures showed increases in unemployment to 10 percent in Coos County and 11 percent in Douglas County (Oregon Department of Forestry 1993a).

Table 3-10. 1990 population and employment figures for counties and cities in the vicinity of the Millicoma Tree Farm.

CITY/COUNTY	POPULATION	TOTAL EMPLOYMENT	UNEMPLOYMENT RATE (%)
Coos County	60,273	23,604	9.1
City of North Bend	15,151	6,076	6.0
City of Coos Bay	9,614	3,930	10.1
Douglas County	94,649	37,689	8.6

Timber harvesting and mill production in both Coos and Douglas Counties have decreased substantially in the past 10 years. By 1992, Douglas County timber harvests had dropped to 48 percent of 1983 to 1987 levels, while harvests in Coos County had dropped to about 79 percent of 1983 to 1987 harvest levels. In Coos County, which is less dependent on timber from public lands than Douglas County, timber harvest from industrial lands remained relatively constant over the last decade.

In 1992, mill production in Coos County and adjacent Curry County was 47 percent of 1987 production, while 1992 mill production in Douglas County was 58 percent of 1987 production (Western Wood Products Association 1993).

3.11.2 The Millicoma Tree Farm

Weyerhaeuser closed its large log sawmill in North Bend in 1989 after 40 years of continuous operations. The mill had become technically obsolete, and a large-diameter log source was no longer available to supply the mill. Weyerhaeuser acquired a smaller mill in 1989 and converted it into a quality precision metric mill that can cut products of high value.

The new mill is principally supported by the harvest of merchantable timber on Weyerhaeuser-owned timberlands. The mill directly or indirectly supports a staff of approximately 500 people, including those who work at export dock facilities, on company and contract logging and trucking crews, and a transportation network to ship the finished product to the market. The mill and all support functions depend on the supply of logs from the Millicoma Tree Farm.

Weyerhaeuser's current efforts to avoid the incidental take of spotted owls on the Millicoma Tree Farm have resulted in a 20 percent reduction in harvest and have necessitated outside purchases of logs to supply the Coos Bay mill. The tree farm also produces logs which cannot be accommodated by the Coos Bay mill because of size, quality or species. These logs are processed by five other mills. Any future reduction in harvest levels will impact these other mills as well. Continued restrictions on harvest of Weyerhaeuser timber to protect the spotted owl will necessitate reductions in production or closure of the mill. This reduction would also negatively impact the five other mills Weyerhaeuser supplies. Any opportunity to increase harvest levels will have a beneficial effect on increasing timber supply in the immediate areas, both for Weyerhaeuser and other nearby mills.

3.12 Cultural Resources

Section 106 of the National Historic Preservation Act requires federal agencies to consider potential impacts to significant cultural resources of any proposed agency undertaking, such as the preparation of a NEPA Environmental Assessment and issuance of an Incidental Take Permit. Significant cultural resources can include prehistoric sites, historic properties and traditional cultural properties that are listed on or eligible for listing on the National Register of Historic Places. The Section 106 regulations also require consultation with the State Historic Preservation Office (SHPO), potentially affected Indian tribes, local governments and other interested parties.

A comprehensive literature search was conducted to determine the presence of any known cultural resources on the Millicoma Tree Farm and to assess the likelihood for additional unknown resources. The literature search included review of records of the Oregon SHPO; the Oregon Historical Society; the Oregon State Office of the BLM; the Coos and Douglas County Planning Departments; and university libraries. No field visits or field surveys were conducted to locate recorded resources or search for other possible resources.

The literature search revealed no previous cultural resource surveys or inventories of the Millicoma Tree Farm, and no recorded prehistoric or historic resources on the tree farm. The following information is, therefore, based on historic maps of the tree farm, records of known resources in the vicinity of the tree farm and background information on the cultural use patterns of indigenous and Euroamerican inhabitants of the general area.

Archaeological models for the area suggest a shift in Native settlement about A.D. 500 from inland and upland areas to coastal and estuarine environments. Inland and upland environments continued to be important for Native peoples on a seasonal basis, however, especially for resources such as camas. From archaeological and ethnohistoric data, natural settings such as interior valleys, springs and falls are likely to have associated Native American prehistoric and historic occupations. The literature review identified 33 valleys, 8 springs and 7 falls within the Millicoma Tree Farm of the type commonly associated with prehistoric and historic use. In addition, a trail labeled *Indian Trail* was noted on a

historic map. No field studies were undertaken to confirm the presence of cultural resources at any of these field locations or the conditions at these locations after 80 years of commercial forestry.

Previous archaeological studies in the vicinity of the tree farm focused on prehistoric sites along the coast, and excavations at those sites have been rare. The records of the Oregon SHPO include prehistoric sites around Coos Bay, near the confluence of the East Fork of the Millicoma River and one of its tributaries, and on a ridgetop in the Tioga Creek drainage. None of these sites are within 0.25 mile of the tree farm.

The coastal areas west of the tree farm and the Coos and Coquille River drainages were home to three Native peoples; the Hanis and Miluk Coos and the Upper Coquille or Mishikwutinetunne. The Hanis and Miluk Coos were settled primarily along the coast, especially around Coos Bay. There also were Hanis villages in the upper Coos River drainage. The Upper Coquille occupied most of the Coquille River drainage, with settlements concentrated around the modern community of Myrtle Point. The subsistence range of all three groups extended easterly to the summit of the Coast Range and would have included the area now occupied by the tree farm.

The State of Oregon Commission on Indian Services (1991) lists five federally recognized Native American Tribes which could have historically used the area now occupied by the tree farm, although none currently holds treaty rights to the tree farm. These include the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians; the Coquille Indian Tribe; the Cow Creek Band of Umpqua Indians; the Confederated Tribes of the Grand Ronde Community of Oregon; and the Confederated Tribes of Siletz Indians. Only the last two tribes currently have reservation lands. The Grand Ronde Reservation is at Grand Ronde, Oregon, about 135 miles north of the tree farm. The Siletz Reservation is at Siletz, Oregon, about 100 miles north of the tree farm.

Euroamerican settlement of the Coos Bay area began in the 1850s. From coastal settlements, homesteading spread up the lower Coos and Coquille River valleys in the 1860s and 1870s. Homesteading and farming in these drainages was largely limited to the upstream limit of the tide until the 1920s due to poor navigability and lack of good bottomland farther upstream. Logging around the Coos Bay area began in the 1850s and extended into the Coos River drainage in the 1870s, where it

soon became (and continues to be) the dominant activity. The introduction of splash dams in the 1880s accelerated timber operations. Initially undertaken by individual loggers and small operations, timber cutting was largely dominated by larger firms and corporations by the 1930s. Other Euroamerican uses of the tree farm area included transportation routes (trails and an early wagon road), hunting and fishing.

A comprehensive map review of the Millicoma Tree Farm area from 1857 through the 1930s was conducted to identify possible historic sites and locations. Any location at which an historic building, structure or other feature was shown was listed as the possible site of either an extant building or feature, ruins or historical archaeological deposits. The cartographic research identified approximately 80 locations of possible Euroamerican historical resources. These potential resources include 40 to 45 cabins and houses, 17 trails, 8 quarries, 5 camps (either logging or recreational), 5 lookouts, 1 footbridge and 1 wagon road. All of these buildings, structures and features appear on maps 50 years old or older and may thus be considered potentially eligible for listing in the National Register of Historic Places. No field surveys were conducted to verify the current conditions of these features.

The results of the cultural resource literature review suggest the potential for prehistoric and historic cultural resource sites on the Millicoma Tree Farm, based on known land use patterns of Native and Euroamerican inhabitants of the area. The most likely uses of the tree farm prior to Euroamerican settlement were the seasonal exploitation of natural resources, travel to and from the Willamette Valley and spiritual endeavors. Euroamerican use may have included homesteading, but probably centered mostly on logging and transportation.

Since 1913, approximately 95 percent of the tree farm has been harvested at least once and replanted with young trees. An extensive road system has been constructed to support timber management and harvest, and this probably has disturbed at least some cultural sites. The potential for intact cultural resources related to transportation is therefore low. The use of splash dams had a substantial impact on local stream corridors in the early days of logging, and probably reduced the potential for locating intact cultural resources in those areas. In a similar manner, early logging structures and features probably were replaced over time with their modern counterparts, eliminating much of the physical history of early Euroamerican use of the area. No field surveys have been done to locate cultural sites

on the tree farm, but the potential to find intact sites is probably localized to those areas where recent disturbance has been limited.

3.13 Relevant Plans, Policies and Regulations

The following plans, policies and regulations were incorporated into the environmental consequences assessment for each resource. They are summarized below to provide a reference for review of resource impacts.

- Federal Endangered Species Act (16 U.S.C. 1531 et seq.) and implementing regulations,
- Federal Coastal Zone Management Act (16 U.S.C. 1451 et seq.) and implementing regulations,
- Oregon Forest Practices Act and amendments,
- Oregon Administrative Rules, Chapter 629, Division 24, Forest Practices,
- Oregon Administrative Rules, Chapter 340, Division 41, Water Pollution and
- Coos County Land Use Policies.

The Federal Endangered Species Act (16 U.S.C. 1531 et seq.)

The principal purpose of the Federal Endangered Species Act of 1973 (ESA), as amended is:

> *"to provide a means whereby the ecosytems upon which endangered species and threatened species depend may be conserved [and] to provide a program for the conservation of such endangered species and threatened species..."* (Section 2(5)b, 16 U.S.C. 1531 et seq.).

The Secretaries of the Interior and Commerce must list any species they determine to be endangered (in danger of extinction) or threatened (likely to become endangered in the foreseeable future) and identify those species that are candidates for listing as threatened or endangered. Once listed, under current regulations, no person may "take" a threatened or endangered species. "Take" as defined in the ESA means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect a protected species. The USFWS has further defined the term "harm" in the definition of "take" to mean an act which actually kills or injures wildlife, including significant habitat degradation where it actually kills

or injures wildlife by significantly impairing essential behavioral patterns such as breeding, feeding or sheltering. An exception to the prohibition against take can be made under Section 10(a)(1)(B) of the ESA, which allows any take incidental to, and not the purpose of, the carrying out of an otherwise lawful activity; provided that, the Secretary finds, after opportunity for public comment with respect to a permit application and the related habitat conservation plan, that: a) the taking will be incidental; b) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; c) the applicant will ensure that adequate funding for the plan will be provided; d) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and e) any other measures required by the Secretary will be met. Regulations implementing the ESA for terrestrial and freshwater aquatic species are administered by the USFWS. The ESA also is addressed in Section 1.0 of this document.

Oregon Forest Practices Act (ORS 527.600 to 527.990)

The Oregon Forest Practices Act governs timber harvesting and associated activities on state and private lands. Forest practices are defined by the Act as;

- Reforestation of forest land,
- Road construction and maintenance,
- Harvesting of forest tree species, application of chemicals and
- Disposal of slash (Oregon Forest Practices of Act 1911; ORS 527.620).

Although the Forest Practices Act provides statutory requirements for implementing forest practices rules, and in some instances specific forest practices requirements, the authority for enforcing the Forest Practices Act is delegated to the Oregon Board of Forestry. The Board, created by the Forest Practices Act, is responsible for enforcing standards stated in the Act and for promulgating additional rules where directed by the Act to do so (Oregon Forest Practices of Act 1911; ORS 527.710).

Oregon Administrative Rules, Department of Forestry, Chapter 629, Division 24, Forest Practices

Chapter 629, Divisions 24 and 57 of the Oregon Administrative Rules govern forest practices on state and private land. These rules are promulgated by the state's Board of Forestry under the authority of the Forest Practices Act. Rules have been developed by the Board of Forestry that apply to all state and private forest lands as well as to forest lands in each of three regions designated by the Board. Portions of these rules were recently revised and adopted by the Board; these rules became effective 1 September 1994. The Millicoma Tree Farm is located in the Southwest Oregon region as defined by these rules. Forest practices rules applicable to timber harvesting activities on the Millicoma Tree Farm include, but are not limited to, the following:

- Notification process for timber harvesting activities and requirements for written plans (OAR 629-24-106 to 629-24-108, 629-24-113).
- Application of chemicals (OAR 629-24-200 to 629-24-210),
- Disposal of slash (OAR 629-24-300 to 629-24-301),
- Road design, construction and maintenance (OAR 629-24-620 to 629-24-624).
- Harvesting operations, including soil protection, location of landings, skid trails and fire trails, drainage systems and harvesting on high risk sites (OAR 629-24-642 to 629-24-649),
- Specified resource sites on forest lands, including harvesting in the vicinity of sensitive, threatened and endangered fish and wildlife species and sites that are ecologically and scientifically significant (OAR 629-24-690 to 629-24-813) and
- Water classification (OAR 629-57-2100)
- Riparian management and vegetation retention (OAR 629-57-2150 to 629-57-2280)
- Riparian management and protection measures for significant wetlands and lakes (629-57-2300 to 629-57-2500)
- Felling, yarding and site preparation in riparian management zones (OAR 629-57-2610 to 629-57-2650)

Stream Classification and Riparian Management Areas: Effective 1 September 1994, streams in Oregon will be classified as Type F, D or N (Table 3-1). Fish-bearing streams are classified as Type F, including those fish-bearing streams used for domestic water supply. Type D streams include non-fish-

bearing streams used for domestic water supply. Type N includes all other streams [OAR 629-57-2100]. Streams and tributaries on the Millicoma Tree Farm are classified as Type F, Type D and Type N.

Within each type category, streams are also categorized as large, medium or small based on mean annual discharge. Large streams are those with a flow of greater than 10 cubic feet per second (cfs). Medium streams have a flow between 2 and 10 cfs, while small streams have a flow less than 2 cfs (Table 3-1).

As specified in the newly-adopted forest practices rules, Riparian Management Areas (RMAs) of specified widths must be maintained along each side of Type F, D and N streams during timber harvest operations [OAR 629-57-2230 through 629-57-2250]. The focus of the riparian policy is to provide adequate physical components and maintain function necessary to meet objectives for water quality, fish and wildlife. Along Type F, D and N waters, all trees within 20 feet of high water level must be maintained, in addition to all understory vegetation within 10 feet of high water level and all trees leaning over the channel. Riparian buffer strips averaging 50, 70 and 100 feet for small, medium and large streams must be retained along Type F streams. Within these strips, requirements have been set for retention of live conifers. Mean width of riparian buffer strips required for Type D streams must range from 20 to 70 feet. Buffer strips along Type N streams must average 70 feet for large streams and 50 feet for medium streams. Live conifer retention standards are also provided for Type D and N medium and large streams. Furthermore, roads are not permitted in RMAs (OAR 629-24-521), and OAR 629-24-621 requires that roads be located so as to minimize the risk of material entering waters and to minimize disturbance to channels.

Protection of Wetlands, Bogs and Estuaries: Different categories of wetlands are recognized under current Oregon forest regulations. "Significant" wetlands include wetlands greater than 8 acres in size, estuaries and bogs. Stream-associated wetlands which are less than 8 acres are classified according to the stream with which they are associated. All other wetlands, including seeps and springs, are classified by acreage as either "other wetlands greater than 0.25 acre" or "other wetlands less than 0.25 acre". For wetlands greater than 8 acres which are not bog or estuarine habitat, OAR 629-57-2300 requires the establishment of a 100-foot-wide RMA extending outward from the wetland boundary.

Written plans addressing reforestation must also be developed for forested wetlands greater than 8 acres.

Current forest practices rules do not require the establishment of a riparian management area for other wetlands, seeps and springs. However, water quality, hydrologic functions, soil productivity and wildlife/aquatic habitats of the wetland must be protected during forest management activities in wetlands less than 8 acres.

OAR 629-57-2300 lists bogs as areas which are usually saturated, highly acidic and low in nutrients. When a forest management activity is proposed within 300 feet of a bog, the required width of the RMA is determined during the resource site inspection required by OAR 629-24-699. In general, current forest regulations require the establishment of a 50- to 100-foot RMA from the edge of the bog boundary. The required width of this RMA depends on the size of the bog, topography, erodibility of adjacent uplands, the stocking level of the timber stand adjacent to the bog boundary and the ability of leave trees within the area to withstand windthrow.

As with bog habitats, when a forest management activity is proposed within 300 feet of an estuary, the required width of the RMA is determined during the resource site inspection required by OAR 629-24-699. In general, the required width of a RMA for estuarine habitat ranges between 100 to 200 feet. The required width of this RMA depends on the size of the estuary, the stocking level of the timber stand adjacent to the estuary and the ability of leave trees to withstand windthrow.

For all of these areas, rules for live tree retention (OAR 629-57-2310), soil and water protection (OAR 629-57-2330), understory vegetation retention (OAR 629-57-2340) and snag and down wood retention (OAR 629-57-2350) must be applied to the wetland and established RMA. A review of state programs for compliance with the federal Coastal Zone Management Act's non-point source water quality standards found that all standards for forest management activities are covered by the Oregon Forest Practices Act (Slater, pers. comm., 29 September 1994).

The Coastal Zone Management Act of 1992 (CZMA) is intended to provide for the management of the nation's coastal zone and to preserve its significant resources. Each state must prepare a management

program, to be approved by the U.S. Secretary of Commerce, that identifies allowable land and water uses within a costal zone, considers cumulative impacts and determines how restrictions will be enforced (Reeve 1992).

In the State of Oregon, the Department of Land Conservation and Development (DLCD) is the primary responsible agency for implementing state coastal zone management standards. In 1977, the U.S. Secretary of Commerce approved Oregon's program as being consistent with the CZMA (Reeves 1992). This "program" includes the Oregon's Forest Practices Act as well as all other state land use laws. Weyerhaeuser conducts all timber harvesting and associated activities in compliance with Oregon laws determined to be consistent with the CZMA and would continue to do so under the proposed HCP (Slater, pers. comm., 29 September 1994).

Oregon Administrative Rules, Department of Environmental Quality, Chapter 340, Division 41, Water Pollution

Chapter 340, Division 41 contain rules regarding beneficial uses, policies, standards and treatment criteria for public waters in the State. These rules are promulgated and enforced by the Oregon Department of Environmental Quality and provide general requirements for protecting water quality applicable to all state waters as well as specific water quality standards and rules for each of the state's 21 major drainage basins. Water quality standards are to be maintained for a number of attributes, including dissolved oxygen, turbidity and temperature (Oregon Administrative Rules 1992 340-41-325). Forest management activities (including logging and road building and maintenance) are to be conducted in accordance with the Oregon Forest Practices Act to minimize adverse effects on water quality (Oregon Administrative Rules 1992 340-41-026).

The Millicoma Tree Farm is located in the South Coast Drainage Basin. Water quality in the basin is managed to protect industrial water supply, anadromous fish passage, salmonid fish rearing and spawning, resident fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation and aesthetic quality. These uses apply to all streams and tributaries of estuaries and adjacent marine waters of the South Coast Basin (Oregon Administrative Rules 1992 340-41-322).

Local Land Use Policies: Coos County

Forest management activities are regulated exclusively by the state's Board of Forestry. Local governments may not adopt any rules, regulations or ordinances or take any other actions that regulate or in any way affect timber harvesting and associated activities on forest lands located outside of an acknowledged urban growth boundary, with the exception of construction of permanent structures (Oregon Forest Practices Act 1911). The Coos County Comprehensive Plan states that the Oregon Forest Practices Act is deemed adequate protection against adverse impacts to fish and wildlife habitat and wetlands and riparian areas from timber management practices (Coos County 1985). The Millicoma Tree Farm is located outside of all designated urban growth boundaries in the County (Barron, pers. comm., 28 March 1994).

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Alternatives Analyzed

This section describes impacts that could result from harvest operations under each alternative. Mitigation measures that would be implemented to avoid, minimize, rectify, reduce or compensate for adverse impacts have been incorporated into the alternative descriptions and are discussed for each resource.

The following four alternatives are analyzed in this section:

- **Alternative A:** No Action (Avoid Incidental Take of Spotted Owls)
- **Alternative B:** Issue a Permit for Incidental Take as Requested, and Implement the Habitat Conservation Plan (Proposed Action)
- **Alternative C:** Manage the Tree Farm for Dispersal Habitat Without the Retention of Nesting, Roosting and Foraging Habitat
- **Alternative D:** Manage the Tree Farm for Dispersal Habitat and Avoid the Incidental Take of Selected Spotted Owl Pairs

4.2 Geology and Soils

All Alternatives

Soil and geology-related impacts due to road use and new road construction would be minor under all alternatives, including the No Action alternative. Rates of road construction on the tree farm are expected to continue to decline, and mitigation measures would be employed to minimize soil impacts from construction of roads under all alternatives as described in Section 2.0, Alternatives.

The impact of timber harvesting on geology and soils would also be minor under all alternatives. The acreage and location of harvest in any one year could vary slightly between alternatives, which could result in minor site-specific differences in soil-related impacts.

In general, timber harvesting and road construction activities have the potential to aggravate soil erosion processes, generating both site-specific and cumulative soil-related impacts. Surface erosion is more likely to occur when detachable soils on sufficiently steep slopes are exposed to overland flow and/or the impact of rainfall. Soil detachment and transport may be increased by road construction and maintenance and yarding techniques that disturb the duff layer, such as skidder/tractor yarding (Washington Forest Practices Board 1993). Site preparation techniques such as burning or scarification can increase the likelihood of soil erosion by exposing bare mineral soil to the weather. Skid trails and road and landing construction can compact soil and/or intercept subsurface flow zones, increasing overland flow. Hillslope erosion can be increased by runoff from roads, improperly maintained water bars and culverts, cut-and-fill slopes and skid trails (Washington Forest Practices Board 1993).

Management under all alternatives would likely result in minor impacts to geology and soils. Weyerhaeuser would continue to employ silvilculture methods that minimize the potential for substantial erosion impacts. Harvesting would be conducted using methods that minimize soil erosion. Weyerhaeuser currently does not employ the practice of broadcast slash burning, but conducts concentrated burns (e.g., on landings) when necessary. The amount and method of burning would not change appreciably under any alternative. Hillslope erosion would be further minimized by Weyerhaeuser's year-round road maintenance program as discussed in Section 2.0, Alternatives.

4.3 Air Quality

Alternative A

Impacts to air quality would be minor under the No Action alternative. Broadcast slash burning, if conducted, would be used minimally and in compliance with Oregon Forest Practices Rules. Some

concentrated burns would likely occur (e.g., on landings) when necessary to reduce excessive slash accumulations and prevent potential downstream impacts from landing failures.

Impacts to air quality from dust generated by road use would be a localized phenomenon with little effect off the tree farm. The most heavily used mainline haul roads leading onto the tree farm are paved, reducing off-site impacts due to dust. Dust-related impacts within the tree farm are a function of the total road mileage and intensity of use. Under the No Action alternative, few new roads would be constructed, but a maximum amount of road miles would be open and in use throughout the year. Dust would be generated primarily during dry months, but Weyerhaeuser would continue to take steps to minimize road dust through dust abatement measures road surface stabilization in accordance with Oregon's Forest Practices Rules. Roads would be watered during periods of heaviest dust production.

Alternative B

Broadcast slash burning, if conducted under this alternative, would be used minimally and in compliance with Oregon Forest Practices Rules. Some concentrated burns would likely occur as described under the No Action alternative. Silvicultural techniques, such as commercial thinning, would emphasize the growth of open stands that would likely reduce the fire hazard compared to the No Action alternative.

Road construction under Alternative B would be slightly increased in the first 25 years of the HCP compared to the No Action alternative, but the intensity of road use would be less. Dust would be generated during dry months, but the amount of dust generated would be less than the amount generated under the No Action alternative. Location of dust generation would not vary significantly between alternatives.

Alternative C

As with other alternatives, broadcast slash burning would be done sparingly under Alternative C. Concentrated burns would likely occur as described under the No Action alternative, but the amount of slash burning would likely be greater in the short-term because of the greater amount of harvesting in old-growth and mature forest, which generates more slash. Silvicultural techniques which promote the development of open forest stands would likely reduce the overall fire hazard on the tree farm and thereby reduce air quality impacts related to wildfire.

Road building in the first 10 years would increase compared to the No Action alternative, but road use intensity would decrease. The amount of dust generated by this alternative would therefore be less than the amount generated under the No Action alternative.

Alternative D

Under this alternative, broadcast slash burning, if conducted, would be used minimally and in compliance with Oregon Forest Practices Rules. Some concentrated burns would likely occur as described under the No Action alternative, above. Silvicultural techniques, such as early commercial thinning, would emphasize the growth of open stands that would reduce fire hazard and the air quality impacts of wildfire.

Road building to access stands currently occupied by 10 spotted owl pairs would be deferred until those stands were no longer occupied. Road building and usage in the near future would be at or near levels compared to the No Action alternative. Dust would be generated during dry months primarily by road use, but the amount and location of dust generation would not vary significantly from the No Action alternative.

4.4 Surface Water Quality and Quantity

All Alternatives

Effects on water resources would be minor under all alternatives. Commercial timber harvest and road construction would continue on the tree farm under all alternatives, and none of the alternatives (including No Action) would represent a significant departure from existing conditions relative to the maintenance and protection of water quality. Although the rate of harvest and the amount of road construction would vary slightly between alternatives, all activities would continue in compliance with Oregon Forest Practices Rules. Activities would include on-going road maintenance in accordance with Oregon Forest Practices Rules to minimize surface erosion (Section 2.0, Alternatives). Retention of shading vegetation in riparian areas would also continue as required by Oregon Forest Practices Rules designed to maintain adequate stream temperatures for fish. These rules include protective measures for defined water courses (subsection 3.13, Relevant Plans, Policies and Regulations).

Timber management activities have the potential to impact both surface water quality and quantity in forested areas. Major influences on water quality include erosion and sedimentation and changes in water temperature (Adams et al. 1988; Swanson et al. 1987). Compacted surfaces from logging roads and skid trails may carry increased surface runoff during storm events. The amount of erosion is typically proportional to road or skid trail density, and surface erosion on roads is typically most pronounced during the first season following construction. Soil disturbance caused by yarding of felled trees can also contribute to soil erosion and sedimentation (Brown 1985b).

The magnitude or timing of streamflows in forested watersheds can be altered during storm runoff due to the effects of vegetation removal on soil moisture, snowmelt rates and water detention storage on hillslopes (Washington Forest Practices Board 1993). Road construction may lead to surface disruption. The extent of these impacts depends largely on the character of hydrologic changes in a specific basin.

Removal of riparian vegetation through timber harvesting or natural causes can result in higher maximum summer temperatures and larger diurnal fluctuations, especially in small streams (Holtby and

Newcombe 1982; Sullivan et al. 1990). Vegetation typically provides substantial shade to streams in forested areas (Adams et al. 1988; Schuett-Hames et al. 1993). Stream temperature is a critical factor affecting survival and growth of salmonid fishes that reside in streams during the summer low flow period.

As described above, management under all alternatives would likely result in minor impacts to water resources and water quality. Potential erosion impacts would be minimized under all alternatives as described in subsection 4.2, Geology and Soils. A more detailed discussion is provided in subsection 4.6, Fisheries.

4.5 Vegetation

All Alternatives

None of the four plant species which are federally-listed as endangered and known to occur in the State of Oregon would be impacted under any of the alternatives. Similarly, Nelson's sidalcea (*Sidalcea nelsoniana*), which is federally-listed as threatened and known to occur in the state, would not be impacted under any alternative. None of these species are known to occur within Coos or Douglas Counties (Appendix B).

Nine plant species that are candidates for federal listing, and one that is proposed for federal listing, have the potential to occur on the tree farm. Impacts to these species would vary, depending on their actual presence within areas affected by Weyerhaeuser's forest management. Five of the species (western lily, wayside aster, Oregon bensoniella, Umpqua mariposa-lily and salt-marsh bird's-beak) are unlikely to occur on the tree farm due to the absence of suitable habitat. No significant impacts are likely to occur to these five species under any of the alternatives. Another two species (shaggy horkelia and slender meadowfoam) are typically found in grassland or open woodland habitat, which is rare on the tree farm and is not subject to disturbance under typical forest management. No significant impacts are expected to occur to these two species under any alternative. Three species (crinite mariposa-lily, tall bugbane and clustered lady's slipper) can be found associated with moist coniferous forest, which

is common on the tree farm. Impacts to these three species would vary by alternative, depending on the amount of forest habitat protected from harvest, but none of the impacts are expected to be significant.

Alternative A

Species associated with undisturbed coniferous forest stands, such as tall bugbane and clustered lady's slipper, could benefit temporarily from the protection of nesting, roosting and foraging habitat under the No Action alternative. As individual spotted owl home ranges are abandoned, however, harvest could resume and temporary protection of habitat for these plant species would end. If these, or any of the other special status plant species, occurred in forest outside the protected nesting, roosting and foraging habitat, they could be impacted at any time by harvest in accordance with Oregon Forest Practices Rules. The extent to which those species inhabit existing nesting, roosting and foraging stands is unknown, but their overall presence on the tree farm is expected to be limited. Impacts to plants of special status are, therefore, expected to be insignificant under the No Action alternative.

Alternative B

The potential to disturb or otherwise impact plant species associated with undisturbed coniferous forest stands (tall bugbane and clustered lady's slipper) would be greater under Alternative B as compared to the No Action alternative, but it is not expected to be substantial. A relatively small percentage of the tree farm has been undisturbed for the past 80 years (approximately 5%), and it is unlikely that the harvest of this coniferous forest would have a significant impact on any of the species of concern.

Alternative C

This alternative would have a slightly greater potential than Alternatives A and B to impact plant species associated with undisturbed coniferous forest stands because there would be fewer acres of protected

habitat. Impacts would be insignificant, however, due to the small total area of potential habitat and the limited potential for any of the species to occur on the tree farm.

Alternative D

Over the term of the HCP, this alternative would have potential impacts to plant species of special status similar to the No Action alternative. Habitat protected for the 10 potentially-reproductive spotted owl pairs could support those plant species associated with undisturbed coniferous forest stands if they are currently present in the specific stands. Overall, however, the differences between this and the other alternatives relative to special-status plants are insignificant.

4.6 Fisheries

Overview

Potential impacts are described by providing an overview of habitat impacts that can occur as a result of general harvest practices. A discussion of trends likely to occur on the tree farm is also provided for each of the alternatives.

No species of fish listed as threatened or endangered under the federal ESA occur within the 114 miles of fish-bearing streams on the 209,000-acre tree farm. Under each of the alternatives analyzed, Weyerhaeuser would continue to harvest in accordance with applicable state forest practices rules. Oregon's new Forest Practices Rules (Appendix C), effective September 1, 1994, are comprehensive in the protection of water resources, aquatic and riparian habitats. All fish-bearing streams adjacent to future timber harvests will have riparian buffers of varying distances under the new rules. Streamside vegetation in areas previously harvested will increase in size and effectiveness over time, contributing to improvement in fish habitat.

While past road construction and logging practices may have contributed to fish habitat deterioration, modern forest management activities offer considerable improvement with respect to fish habitat protection. Such improvement suggests a trend in improved habitat conditions that is expected to continue into the foreseeable future under the new forest practices rules. Accordingly, under the No Action alternative as well as under any of the alternatives, it is expected that potential impacts to fish or fish habitat would be minor, and there would be no material differences in impacts between the alternatives analyzed.

The capacity of freshwater streams to produce salmonid fishes is most often a function of the quality and quantity of habitat conditions for critical life history stages of the important species (Salo and Cundy 1987; Fausch et al. 1990; Meehan 1991). Factors influencing habitat conditions related to forest management practices are generally associated with: 1) the introduction of fine or coarse sediments; 2) the function of riparian zones to recruit LWD and provide shade to control stream temperatures; and 3) the effects of peak stream flows on channel stability. These input factors are summarized in subsection 3.8, Fisheries.

Alternative Analysis

Forest management activities that can influence the habitat input factors discussed above primarily include road construction and use and riparian harvest. All alternatives are compared below in relation to these two activities to assess relative differences in potential fish habitat impacts between the alternatives.

Alternative A

Overall future impacts to fish habitat are expected to be minor under Alternative A. Harvest practices and routine operations on the tree farm would continue in accordance with applicable state forest practices rules. Continued improving habitat trends are expected under all alternatives, including the No Action alternative. The trend toward larger riparian buffers and decreased erosion from hillslopes and road surfaces compared to prior practices is expected to continue. The potential for adverse

impacts on fisheries habitat primarily arising from ongoing road construction and harvest practices would be reduced by restrictions on riparian harvest and road construction under state forest practices rules.

Road Construction and Use: Effects of new road construction on fisheries resources on the tree farm would be related to delivery of fine and coarse sediments to streams through: 1) road use, 2) surface water runoff from the road drainage system and 3) the potential for mass wasting (fill failures, water capture/soil saturation and drainage impairment). However, contemporary road construction does not offer the same level of habitat concerns as roads built prior to the 1970s. Due to improved road construction designs, ongoing road maintenance and reduced rates of new construction, impacts upon fish habitat would decrease on the tree farm under the No Action alternative as compared to historical conditions. Furthermore, Oregon's revised forest practices rules will improve road design and construction techniques. It is expected that compliance with the new rules will improve fish habitat conditions, primarily with respect to delivery of fine and coarse sediments to stream networks under all alternatives.

Road construction, if not done properly, can have temporary adverse impacts on fish habitat. However, Weyerhaeuser already has completed a permanent road system providing access to all major parts of the tree farm. Under the No Action alternative, existing roads would be used more frequently, but few new roads would be constructed in the first 25 years of the HCP compared with other alternatives. Weyerhaeuser would continue to build some short, temporary spur roads and replace some old road segments. New roads would constructed over the long-term to access timber as nesting sites are abandoned. Total new road construction would be moderate over the long-term (30+ years) as compared to other alternatives.

The impacts of fine sediment due to road construction on water quality and fish habitat are greatest in the first rainy season after construction and generally decline thereafter. In most cases, input levels approach natural background within a few years after surfacing. Road construction work occurs primarily in summer, and steps are taken to revegetate exposed soils each fall by grass seeding to reduce erosion before the rainy season.

Limited new road construction under Alternative A in the short term is balanced somewhat by heavier traffic use on the existing road network. Given the likelihood of increased maintenance with increased road use, and the small size factors of fine sediment generated during road use (resulting in a primarily suspended sediment level in downstream waters), net effects of road construction and use would result in minor impacts to fisheries resources on or near the tree farm.

Weyerhaeuser has an ongoing road maintenance program that would continue under all alternatives and can be expected to reduce the potential for road-induced mass wasting or surface runoff to contribute sediments to streams. Culverts are currently being inventoried on anadromous fish-bearing streams for upstream and downstream passage of fish. Culverts would be replaced, enhanced or maintained under all alternatives and operation plans prepared to implement improvements (Clarke, pers. comm., 23 September 1994).

Riparian Harvest Effects: The new state forest practices rules require leaving riparian buffers of varying widths along all fish-bearing streams when the adjacent lands are harvested. Future actions within riparian zones under all alternatives would comply with new state forest practices rules. No timber will be removed from RMAs unless the basal area of live trees exceeds target levels for various stream classes as shown in Table 4-1. Current state regulations for water protection are designed to protect, maintain and, where appropriate, improve the functions and values of streams, lakes, wetlands and riparian management areas (subsection 3.13, Relevant Plans, Policies and Regulations); including meeting protection goals for fisheries.

Approximately 4 percent of the tree farm (8,096 acres) lies within 100-foot RMAs adjacent to primary and secondary streams (fish-bearing waters). Only 9 percent of this amount, 744 acres, or 0.36 percent of the tree farm, consists of spotted owl nesting, roosting and foraging habitat in RMAs that is the subject of the HCP (Table 4-2). This area is only a small portion of two large watersheds containing substantially more stream miles and riparian areas than those influenced under the HCP. As previously discussed, selective harvest under any alternative could only occur in these RMAs if riparian stand basal areas exceed target levels. Therefore, it is extremely unlikely that selective riparian harvests would have an effect on anadromous fish stocks in either the Coos River or Umpqua River basins.

Table 4-1. Riparian Management Area requirements for South Coast harvests under Division 57 of the OAR, 629-57-2230; Water Protection Rules.

Stream Category	Tree Retention Target Basal Area/1000 ft.	RMA Width (ft.)	Live Conifer/1000 ft.
Type F - Large (>10 cfs)	230	100	40
Type F - Medium (2-10 cfs)	120	70	30
Type F - Small (<2 cfs)	40	50	N/A
Type D/Type N - Large (>10 cfs)	140	70	N/A
Type D/Type N - Medium (2-10 cfs)	60	50	N/A
Type D - Small (<2 cfs)	0	20	N/A

F = Fish-bearing streams
D = Domestic water supply streams
N = All other streams

Table 4-2. Acres of nesting, roosting and foraging habitat within 100-foot Riparian Management Areas of fish-bearing streams used by species of concern on the tree farm.

Fish Species	Weyerhaeuser Ownership		
	NRF Habitat (ac.) within 100 ft. RMAs	RMA (ac.)	% of RMA that is NRF
Steelhead	283	8,096	3.5
Coho	278	Same	3.4
Fall chinook	155	Same	1.9
Millicoma longnose dace	156	Same	1.9
Pacific lamprey	150	Same	1.9
Sea-run cutthroat	5	Same	<0.1
Chum salmon	5	Same	<0.1
Umpqua chub	0	Same	0
Total fish-bearing network	744*	8,096	9*

NRF = Spotted owl nesting, roosting and foraging habitat

* = Totals not cumulative due to overlap among species

Coho and steelhead have the greatest distributions of all anadromous species and other species of concern within the tree farm. No more than 3.5 percent of the total RMAs along the fish-bearing network on the tree farm directly abut coho or steelhead habitat (Table 4-2). Based on the small amount of riparian area potentially influenced under any alternative and the riparian protection provided under current state regulations, riparian management activities under all alternatives would result in minor impacts to fisheries resources on or near the tree farm.

Alternative B

The potential for adverse impacts on fish resources are expected to be minor under Alternative B and would not differ substantially from impacts under the No Action alternative.

Road Construction and Use: Existing roads would be used at moderate levels (as compared to other alternatives) under Alternative B over the term of the HCP. A moderate amount of new road construction would occur under Alternative B to access mature timber in the short-term as compared to Alternative A.

The potential for road-related impacts on fish resources under Alternative B could include slightly greater coarse sediment input and slightly less fine sediment input to streams in the early years of the HCP (approximately 25 years) than under the No Action alternative. However, overall impacts to fisheries resources would not vary considerably from the No Action alternative.

Riparian Harvest Effects: Potential impacts to riparian areas under Alternative B would be similar to those described under the No Action alternative.

Alternative C

The potential for adverse impacts on fisheries resources are expected to be minor under Alternative C and would not differ substantially from impacts under the No Action alternative.

Road Construction and Use: Existing roads would receive the least amount of use (as compared to other alternatives) under Alternative C in the first 25 years. The greatest amount of new road construction would occur under Alternative C in the short term to harvest mature timber.

The potential for short-term road-related impacts to fish resources under Alternative C could include slightly greater coarse sediment input and less fine sediment input to streams than under the No Action alternative. However, overall impacts would not vary considerably from the No Action alternative.

Riparian Harvest Effects: Potential impacts to riparian areas under Alternative C would be similar to those described under the No Action alternative.

Alternative D

The potential for adverse impacts on fish resources are expected to be minor under Alternative D and would not differ substantially from impacts under the No Action alternative.

Road Construction and Use: Existing roads would be used at moderate levels (as compared to other alternatives) under Alternative D over the term of the HCP. Moderate to low amounts of new road construction would occur under Alternative D to access some mature timber. New road construction would be low in the long term.

The potential for short-term road-related impacts to fish resources under Alternative D could include slightly greater coarse sediment input and slightly less fine sediment input to streams than under the No Action alternative. However, overall impacts would not vary considerably from the No Action alternative.

Riparian Harvest Effects: Potential impacts to riparian areas under Alternative C would be similar to those described under the No Action alternative.

4.7 Wildlife

4.7.1 Northern Spotted Owl

Alternative A

Under the No Action alternative, Weyerhaeuser would avoid the incidental take of resident spotted owls while continuing to grow and harvest commercial timber. Some resident owls would persist on the tree farm, but many of the known owls would eventually relocate and/or perish due to the limited amount and fragmented nature of the remaining nesting, roosting and foraging habitat. Conditions for juvenile dispersal across the tree farm would likely deteriorate under the No Action alternative because Weyerhaeuser would be inclined to harvest forest stands earlier to replace the harvest volume lost to protected nesting, roosting and foraging habitat. The effects of the No Action alternative on dispersal conditions and resident spotted owls are discussed separately below.

Dispersal Landscape Conditions: The spotted owl recovery strategy originally developed by the ISC called for the creation of a series of habitat reserves on federal lands across the full geographic range of the species (Thomas et al. 1990). This same approach was adopted by the federal Recovery Team (U.S. Fish and Wildlife Service 1992) and expanded to address a broader range of fish and wildlife species in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (ROD) (USDA/USDI 1994), which is currently being implemented. Each LSR created under the ROD will be dedicated to the growth and maintenance of late-successional forest capable of meeting all life requirements of the northern spotted owl (among other species). Spotted owls within the LSRs are meant to form the basis for the recovery of the species. Owl populations within the LSRs will vary in size, depending on the size and shape of the reserve and the amount of suitable habitat within it. The objective of the ISC was to maintain a minimum population of 20 reproductively-capable pairs within each reserve, because populations of this size are expected to have a reasonable chance of short-term internal stability. Several LSRs will be too small to support 20 reproductive pairs because of the fragmented nature of the federal land ownership, but they represent the best available habitat on federal lands.

To allow for normal population processes to continue across the full range of the spotted owl and increase the chances for the species to persist over the long term, the Final Draft Recovery Plan for the Recovery Plan (U.S. Fish and Wildlife Service 1992b) provides for the individual reserve populations to be linked into a larger meta-population. Populations of wild animals are subject to a number of mortality factors such a predation, disease, lack of food and habitat loss; all of which can reduce the overall population size. In a stable population, mortality is offset by recruitment through reproduction and immigration. However, below some theoretical population size there exists a significant risk that natural variations in reproduction and mortality will result in periods where reproduction does not fully compensate for mortality, and the population can crash. Under such circumstances, recruitment through immigration becomes important to maintaining the local population. The ISC estimated that spotted owl populations of 20 or more reproductive pairs have a reasonable expectation of persisting at least 100 years in light of anticipated mortality factors (Thomas et al. 1990: Appendix O). Populations of fewer than 20 potentially-reproductive pairs are at an increased risk of local extinction, and immigration becomes an even more significant element in maintaining the species across the range. Theoretical population models suggest that immigration of only a few individuals per generation may be adequate to prevent deleterious genetic effects from inbreeding. However, immigration of a larger number of individuals may be needed to counteract the random death of individuals due to predation, starvation, habitat loss and catastrophic weather events.

The primary means of immigration among spotted owls is the dispersal of juveniles. In the first autumn of their lives, young owls leave the territories of their parents in search of a territory and mate of their own. If they are fortunate enough to find both, they tend to keep them for life. Adult owls are known to occasionally change mates and territories, but the frequency of change and the distances involved are relatively small compared to the dispersal movements of juveniles. The recolonization of vacant habitat and the movement of genetic material from one part of the population to another are accomplished primarily by the dispersal movements of the juveniles. Dispersal distances of nearly 100 miles have been reported (Gutierrez et al. 1985), although two-thirds of all dispersal distances analyzed by the ISC were 12 miles or less (Thomas et al. 1990: Appendix P). The ISC, therefore, recommended that habitat reserves of 20 or more potentially-reproductive pairs be spaced no more than 12 miles apart. The ISC also recommended that the federal lands between the reserves be managed to provide a landscape conducive to the dispersal of spotted owls between reserves.

The relationship between the size and the spacing of LSRs is somewhat variable. A large LSR (one capable of supporting a large population of reproductive spotted owls) is innately more stable and less dependent on immigration from adjacent LSRs. The spacing between large LSRs can, therefore, be greater without significantly reducing the long-term viability of the local owl populations. Conversely, small LSRs are more susceptible to local extinction and more dependent on immigration to remain viable. As the population within the LSR decreases in size, immigration becomes more important, and the management of a dispersal landscape between the LSRs becomes essential. The ISC recommended that the maximum distance between reserves of 20 or more spotted owl pairs should be 12 miles, and the maximum spacing between reserves with fewer than 20 pairs should be 7 miles (Thomas et al. 1990: page 29). This recommendation was carried through to the federal Final Draft Recovery Plan.

The ISC and the federal Recovery Team divided the geographic range of the spotted owl into physiographic provinces based on distinct differences on geomorphology and vegetation (Thomas et al. 1990; U.S. Fish and Wildlife Service 1992b). The Millicoma Tree Farm lies in the southern portion of the Oregon Coast Range province, directly between two federal LSRs and in the vicinity of a third (Figure 3-1). The LSRs are very similar in size, shape and location to Designated Conservation Areas (DCAs) OD-33, OD-34, and OD-36 in the Final Draft Recovery Plan (U.S. Fish and Wildlife Service 1992b: page 133). Weyerhaeuser lands abut DCAs OD-33 and OD-34, but do not fall within either.

The Final Draft Recovery Plan identified a number of threats to the spotted owl population in the Oregon Coast Range province, and made four general recommendations for the management of non-federal lands to contribute to the conservation of the species. The first recommendation was for the contribution of non-federal lands within DCAs to the maintenance of late-successional habitat for nesting, roosting and foraging. The Millicoma Tree Farm does not lie within either of the DCAs (now LSRs), and is not affected by this recommendation. The second recommendation is for the maintenance of spotted owl pair clusters on non-federal lands in the northern portion of the province, where federal lands are limited. The Millicoma Tree Farm lies outside this area of concern. The third recommendation pertains only to state lands in the province, and does not include Weyerhaeuser or other private landowners. The fourth recommendation is for the maintenance of habitat conditions conducive to the dispersal of juvenile spotted owls between the DCAs.

The tree farm includes most of the non-federal land between DCAs OD-33 and OD-34 and is, therefore, critical to the dispersal of juvenile owls among the two reserves. The average distance between the reserves is approximately 12 miles, which meets the ISC standard for reserves of 20 or more pairs, but the current and future projected capabilities of the DCAs are all below 20 pairs (Table 3-8). In addition, dispersal habitat conditions are less than optimal on roughly 50 percent of the BLM land surrounding the reserves (U.S. Fish and Wildlife Service 1992b: page 132), placing even greater importance on the dispersal landscape within the Millicoma Tree Farm. In the short term, the situation is particularly acute because the owl populations in the reserves are depressed due to the limited amount and fragmented nature of the habitat within the reserves. The amount and distribution of federal habitat in the reserves are expected to improve over the next 40 to 80 years as previously harvested or disturbed forest stands develop roosting, foraging and some nesting conditions. In the meantime, the effective population sizes in the reserves are expected to fall to 12 pairs (OD-33) and to 10 pairs (OD-34). This suggests that not only is the dispersal landscape on the Millicoma Tree Farm important to overall recovery of the spotted owl in the southern Oregon Coast Range, it is particularly important during the next 50 to 80 years while the federal reserve populations are depressed and more vulnerable to local extirpation.

The tree farm currently contains 48,708 acres of forest (23% of the total land area) in a condition capable of functioning as roosting and foraging habitat for dispersing juvenile owls (Figure 4-4, Millicoma HCP). The existing dispersal habitat is clumped, and gaps greater than 0.5 mile between stands of dispersal habitat make up 38 percent of the landscape. Under the No Action alternative, harvest of young timber would be accelerated on the tree farm to compensate for protected nesting, roosting and foraging habitat, and the resulting landscape would be appreciably less favorable to spotted owl dispersal than its current condition. By the year 2014, the total area of dispersal habitat on the tree farm without the HCP would be only 67,091 acres. By 2044, the total would be 30,096 acres, the distribution of the habitat would be patchy, and gap greater than 0.5 mile would make up more than 48 percent of the landscape (Figure 9-1, Millicoma HCP).

Resident Spotted Owls: The tree farm currently is occupied by up to 35 known spotted owl pairs and resident singles. Of the 35, only 10 pairs are known to have reproduced at least once since 1990

(Table 4-3, Millicoma HCP). It is impossible to predict which owls would persist under the No Action alternative, but it is unlikely that more than seven pairs could persist on the tree farm if protection of the existing habitat continued, because of the limited amount and fragmented nature of the habitat.

The tree farm contains an estimated 16,275 acres of nesting, roosting and foraging habitat, but much of this is in small, isolated patches. A landscape capability analysis conducted for the tree farm (Appendix B, Millicoma HCP) showed that less than 10,000 acres of the nesting, roosting and foraging habitat fell in cells (simulated owl home ranges) containing more than 20 percent total nesting, roosting and foraging habitat. Only one cell had more than 40 percent habitat. By contrast, recent research has suggested that home ranges with 40 percent or more nesting, roosting and foraging habitat are necessary to consistently support reproduction (Thomas et al. 1990; Ripple et al. 1991; Lehmkuhl and Raphael 1993). This suggests that some home ranges could remain viable and support potentially-reproductive spotted owls under the No Action alternative, but the number is probably small. Based on the recent history of reproduction on the tree farm (since 1990), and the landscape capability analysis conducted for the HCP, it is estimated that the maximum number of owls that could persist is approximately seven potentially-reproductive pairs. The remainder of the 35 activity centers on the tree farm (and possibly some of the seven) likely would be abandoned over time.

In some cases, both members of a pair would move to habitat elsewhere (or die), while in other cases one member would leave and the other would remain. Evidence of this process already is apparent in the high number of activity centers currently occupied by single owls, and the number of pairs that have not reproduced in recent years. The rate at which activity centers would be abandoned is impossible to predict, but it is unlikely that more than seven potentially-reproductive owl pairs would be present after the first 50 years.

Alternative B

The proposed HCP would result in the creation and maintenance of landscape conditions conducive to the dispersal of juvenile spotted owls across the Millicoma Tree Farm. Under the HCP, the tree farm

would link two reserve populations on adjacent federal lands, as well as a third potential population on state lands, and contribute to the eventual recovery of the species in Oregon. Simultaneous with the growth and development of dispersal landscape conditions would be the harvest of nesting, roosting and foraging habitat and eventual displacement of potentially-reproductive resident owls on the tree farm.

Dispersal Landscape Conditions: Under the HCP, the Millicoma Tree Farm would be managed to develop a landscape conducive to the dispersal of spotted owls in the shortest time practicable. The total area of dispersal habitat would increase to over 84,000 acres by 2014, and would remain at that level for at least 30 years (until 2044). Gaps over 0.5 mile in the landscape would be reduced to less than 20 percent of the tree farm (Figure 5-2, Millicoma HCP). After 2044, standard forest management as practiced by Weyerhaeuser would tend to maintain the dispersal landscape. If the USFWS determined that standard forest management alone were not sufficient, the HCP could be extended for up to three additional 10-year periods in accordance with conditions set forth in the HCP.

The HCP would be a long-term agreement designed to improve the likelihood of survival and recovery of the spotted owl over a large portion of southwest Oregon. The recovery and protection of the regional spotted owl population would be enhanced by this agreement because reproductive populations in federal reserves would be interconnected. Habitat provided by Weyerhaeuser would allow juvenile owls to disperse with a reasonable chance of success. Without the dispersal habitat provided for in the HCP, dispersing juvenile owls would have less chance of survival because they would be more vulnerable to predation and/or starvation while searching for their own home range.

Displacement of Resident Spotted Owls: The management measures proposed in the HCP would reduce the capability of the Millicoma Tree Farm to support reproductive spotted owls. The tree farm currently is occupied by up to 35 known spotted owl pairs and resident singles. Of the 35, only 10 pairs are known to have reproduced at least once since 1990 (Table 4-3). It is unlikely that more than seven pairs of spotted owls could persist on the tree farm if protection of the existing habitat continued, because of the limited amount and fragmented nature of the habitat (Appendix B, Millicoma HCP).

Timber harvest under the HCP eventually could displace all reproductive owls from the tree farm and effectively reduce the capability of the tree farm from seven pairs to none.

Over the term of the HCP, the location of individual owl sites is likely to change substantially. Some sites would be lost, others could be discovered or newly established. New sites might or might not be affected by management activities conducted under the HCP, depending on their location, habitat condition and harvest activity at the time. There is no accurate way to anticipate the location of future sites. Therefore, to estimate the impact of the HCP on individual owl sites, currently known sites have been used as surrogates for the potential impacts. However, the analysis assumes that any or all owl sites with centers located within 1.5 miles of the HCP area, currently or in the future, could be affected or taken by the activities allowed under the HCP.

In addition to the 35 known spotted owl activity centers on the tree farm, Weyerhaeuser owns land within 1.5 miles of 44 activity centers on adjacent private, state and federal lands, but owns suitable nesting, roosting and foraging habitat within 1.5 miles of only 34 of these centers (Table 4-3). Depending on the amount and distribution of nesting, roosting and foraging habitat available to owls inhabiting these activity centers, harvest of nesting, roosting and foraging habitat on Weyerhaeuser lands could reduce the reproductive viability of some of the owls and contribute to eventual abandonment of some of the activity centers (Table 4-3).

Seven of the 34 activity centers lie within the LSRs and have at least 1,906 acres of nesting, roosting and foraging habitat protected in the LSR (Table 4-3: item b). These seven activity centers would likely remain reproductively viable regardless of harvest activities on the tree farm. Another seven activity centers receive negligible contributions of nesting, roosting and foraging habitat from the tree farm (Table 4-3: item c). Only 32 total acres of nesting, roosting and foraging habitat on the tree farm lie within 1.5 miles of any of the seven activity centers, and the largest patch within 1.5 miles of any of those activity centers is 7 acres. All patches are isolated and distant from the activity center. Weyerhaeuser's harvest of this 32 acres of nesting, roosting and foraging would unlikely have a measurable affect on the future viability of the activity centers or the regional owl population. In a similar manner, Weyerhaeuser owns from 20 to 62 acres of fragmented nesting, roosting and foraging

Table 4-3. Summary of effects of the Millicoma HCP on spotted owl activity centers (sites) located off the tree farm.

Category		Number of Sites	Effects of HCP
a.	Sites With No NRF Within 1.5 Miles on Tree Farm	10	None
b.	Sites with At Least 1,906 Acres of NRF Protected in LSR	7	None
c.	Sites With Less Than 10 Acres of NRF With in 1.5 Miles on Tree Farm	7	Loss of 2 to 7 acres per site (32 acres total) in isolated patches. Negligible effect on sites.
d.	Sites With 20 to 62 Acres of NRF Within 1.5 Miles On Tree Farm	6	Loss of 20 to 62 acres per site (162 acres total) in isolated patches. Negligible effect on sites.
e.	Sites With Substantial Acres of NRF Within 1.5 Miles on Tree Farm	14	Loss of 24 to 769 acres per site. Potential significant effect on nine reproductive sites and five sites with no known reproduction.

habitat within 1.5 miles of six additional activity centers (Table 4-3: item d). The harvest of these 162 acres could have negligible effects on the respective activity centers.

Finally, Weyerhaeuser owns substantial amounts of nesting, roosting and foraging habitat within 1.5 miles of 14 activity centers (Table 4-3: item e). The harvest of this habitat would be unlikely in itself to lead to the abandonment of any activity center, but it could reduce the viability of one or more of the activity centers. None of the activity centers lies within an LSR or is proposed for long-term retention by the current landowner. Some of these owls could contribute to the regional population if they remained, particularly the nine that have been reproductively successful over the past five years, but none are included in long-term reserve areas for the region.

Habitat would be harvested gradually under the HCP to accommodate other environmental and economic concerns. The nesting, roosting and foraging habitat around few, if any, known activity centers would be completely harvested in a single year. Efforts would be made to concentrate annual harvests and impact as few activity centers as possible, so that the remaining activity centers can remain intact (and potentially occupied) as long as possible. The times at which individual owls would be displaced from the tree farm are unknown. Displacement would occur over a number of years, but because the actual timing cannot be predicted, the analysis assumes all loss could occur immediately.

Harvest activities would be scheduled to avoid disturbance of active spotted owl nests. Known sites would be surveyed to monitor for site status and nesting activity. No harvesting would occur within 0.25 mile of a known active nest from 1 March to 30 September. In addition, 70 acres of suitable habitat would be protected around all activity centers as long as they are occupied. An activity center will be determined to be unoccupied after protocol surveys have been conducted for three years with no spotted owls being present. The Millicoma Tree Farm was surveyed from 1990 through 1994, and few new spotted owl activity centers are likely to be located in the future. Nevertheless, in addition to monitoring known activity centers, all scheduled harvests of potential nesting, roosting and foraging habitat within 0.5 mile of previously known activity nests would be surveyed to prevent the felling of a spotted owl nest that may have been relocated into the area. These measures to avoid direct impacts to nesting spotted owls would reduce the risk of directly harming or killing owls, but they would have

minimal effect on the eventual displacement of owls from the tree farm due to the small amounts of habitat that would be protected.

There is the potential for a limited number of resident spotted owls on the tree farm in the future, given the emphasis on management for dispersal habitat (i.e., marginal roosting and foraging habitat) and the retention of mature forest along riparian corridors. The number of future resident owls is difficult to predict. These owls could periodically be displaced as a result of timber harvest.

Alternative C

This alternative would result in the creation of the dispersal landscape condition as described for Alternative B, but without the protection of nesting, roosting and foraging habitat in selected locations as proposed under Alternative B. The lack of the nesting, roosting and foraging habitat under Alternative C would slightly diminish the dispersal quality of the landscape, particularly in the locations where the harvest of the nesting, roosting and foraging habitat would contribute to gaps in the short term. The differences between Alternatives B and C would be negligible after 2014, because target landscape conditions would be achieved by then under both alternatives. Remaining habitat would be available for harvest in 2014 under Alternative A, leaving a landscape similar to that which would result under Alternative C.

The effects of Alternative C on resident spotted owls would be similar to effects under Alternative B. The capability of the tree farm to support potentially-reproductive owl pairs would be reduced to zero. The lack of limited nesting, roosting and foraging in protected areas (as proposed under Alternative B) probably would mean that the capability would be reduced to zero more rapidly than under Alternative B.

Alternative D

This alternative would result in the creation and maintenance of a dispersal landscape condition within the time frame described under Alternative B, as well as the maintenance of a population of up to 10 potentially-reproductive spotted owl pairs. The number of total activity centers on the tree farm likely would be reduced from the current number of 35, but the overall capability of the tree farm would remain the same or increase as the nesting, roosting and foraging habitat was gradually concentrated into large patches surrounding the 10 protected activity centers.

4.7.2 Marbled Murrelets

All Alternatives

Marbled murrelets have been documented to occur on the Millicoma Tree Farm. Approximately 6,707 acres have been identified as potential nesting habitat for marbled murrelets. Marbled murrelet occupancy of some mature and old-growth stands could conflict with harvest plans under any of the alternatives. While the permit would allow suitable spotted owl habitat to be harvested, it would not permit the take of marbled murrelets. Weyerhaeuser would take measures to avoid the take of marbled murrelets under all alternatives.

4.7.3 Other Species of Concern

All Alternatives

The overall effect of all alternatives on native wildlife would be generally improving habitat conditions. All alternatives would result in improvements due to current Oregon Forest Practices Rules relating to the size of harvest units, the spacing of harvest units, the protection of wetlands and riparian areas and the retention of snags and logs during harvest. Some alternatives would result in greater amounts of mature forest habitat on the tree farm in the short to mid-term, particularly Alternatives A, B and D. The

effects of these habitat changes on the species of special status are summarized in Table 4-4. For most species, these changes would not be substantial.

Four species of special concern; the California wolverine, the Pacific fisher, the pine marten and the great gray owl, occur infrequently, if ever, on the tree farm. Although harvesting mature forest under any alternative may reduce the potential habitat for these species, current populations would not be affected. Another species, the Pacific western big-eared bat, uses caves and bridges. Harvest activities anticipated under all the alternatives are unlikely to affect this species. Other species occurring in the area, but not expected to use the forests on the Millicoma Tree Farm, are the great egret, the fork-tailed storm petrel and the western snowy plover. These species mostly utilize marshes and beaches. The HCP area does not include these habitats, and no alternative would impact these species.

Three bald eagle nesting territories occur on the Millicoma Tree Farm. A total of 51 acres of mature forest are retained for bald eagle nest protection at these two sites. Timber harvest in the vicinity of the nest areas is conducted according to Weyerhaeuser's management plan for bald eagles, as approved by ODFW. Because the bald eagle is protected under the ESA, bald eagles would not be affected under any alternative.

It is not known if peregrine falcons are residents of the tree farm. Habitat for this species exists on the tree farm in areas with high cliffs, especially cliffs near water. Prey species present on the tree farm include band-tailed pigeons. Similar to existing forest management activities, management under allalternatives could result in temporary disruption of peregrine falcon nesting if harvest activity took place near a nest site, but long-term impacts to falcon habitat are unlikely.

Under all alternatives, forest management practices on the tree farm would continue to be conducted in compliance with Oregon Forest Practices Rules (see subsection 3.13, Relevant Plans, Policies and Regulations). Conditions for aquatic, riparian and wetland species generally would improve due to increased protection of their habitats under newly-adopted rules (OAR 629-57-2000 to OAR 629-57-3600). The retention of green trees, snags and logs during harvest, as required

Table 4-4. Anticipated changes in the amount of habitat available to species of special status under all alternatives.

COMMON NAME	ALT. A	ALT. B	ALT. C	ALT. D
INVERTEBRATES				
Burnell's false water penny beetle	+	+	+	+
REPTILES AND AMPHIBIANS				
Northwestern pond turtle	+	+	+	+
Foothill yellow-legged frog	+	+	+	+
Southern seep salamander	+	+	+	+
Del Norte salamander	+	+	+	+
Northern red-legged frog	+	+	+	+
Clouded salamander	+	+	+	+
Western toad	+	+	+	+
Tailed frog	+	+	+	+
Sharptail snake	+	+	+	+
BIRDS				
Great gray owl	o	o	o	o
Pileated woodpecker	+	+	+	+
Great egret	o	o	o	o
Western snowy plover	o	o	o	o
Peregrine falcon	o	o	o	o
Western bluebird	+	+	+	+
Northern pygmy owl	+	+	+	+
Fork-tailed storm petrel	o	o	o	o
Purple martin	+	+	+	+
Northern bald eagle	o	o	o	o
Northern spotted owl (resident)	–	–	–	–
Northern spotted owl (dispersal)	–	+	+	+
MAMMALS				
Columbia white-tailed deer	o	+	+	+
California wolverine	o	o	o	o
Pacific fisher	o	o	o	o
White-footed vole	o	o	o	o
Ringtail	+	+	+	+
Pacific western big-eared bat	o	o	o	o
Pine marten	o	o	o	o

o denotes no change in available habitat + denotes an increase in available habitat - denotes a decrease in available habitat

by Oregon Forest Practices Rules, also would improve habitat conditions over time for the species that use these features.

The amount and distribution of forest successional stages (forest stand age classes) would differ between the alternatives, and this would constitute the major difference between the alternatives with respect to potential effects on wildlife. In general, the amount of forest over 80 years old would decrease under all alternatives and the amount of forest under 80 years old would increase. The amount of forest over 80 years old under any alternative would depend on the amount of habitat protected for spotted owls. Alternative A would result in the protection of habitat until individual sites were abandoned, which could be as soon as three years or as long as 50 years, depending on the condition of the site and other factors. Alternative B would result in the protection of 1,963 acres of forest, most of which would be older than 80 years, until at least 2014. Alternative C would result in the protection of no older forest habitat beyond that in bald eagle management areas. Alternative D would result in the protection of habitat for the ten most reproductively-viable owl pairs on the tree farm until the sites were abandoned. As under Alternative A, protection under Alternative D could last as little as three years or as long as 50 years. Ultimately, most if the existing older habitat on the tree farm would be harvested and converted to plantations under all alternatives, leaving little long-term difference between the alternatives in that regard.

Within forest of younger age classes (0 to 40 years), all alternatives would result in a more uniform distribution in time and space than currently exists on the tree farm. Green-up requirements under Oregon Forest Practices Rules would promote smaller harvest units in the future and avoid the situation where entire drainages are harvested within a single decade. Individual drainages would have interspersed stands ranging in age from 0 to 40.

The habitat conditions within forest stands of a given age would vary by alternative in the future. Alternative A would result in denser, heavily-stocked stands and earlier harvest of second-growth stands than the other three alternatives, with poorer habitat conditions for dispersing owls and any other species that need to move quickly through the lower forest canopy or across the forest floor.

4.8 Land Use

All Alternatives

No impacts to land use would occur under any alternative. Commercial timber production and harvest would likely continue on the Millicoma Tree Farm under any alternative. Timber harvest patterns would be altered in some areas under some alternatives to meet habitat requirements of spotted owls. Although economic impacts would vary significantly under some alternatives, it is unlikely the Millicoma Tree Farm would be converted to a non-forested use under any alternative (subsection 4.9, Social and Economic Conditions).

The HCP would have no direct effect on land ownership or land use adjacent to the tree farm, as these areas would continue to be managed in accordance with state and federal plans and policies. Interagency efforts to coordinate habitat conservation planning for the northern spotted owl between state and federal land would be unaffected by the HCP.

4.9 Social and Economic Conditions

Alternative A

Timber harvesting levels under the No Action alternative would be greatly reduced from historic harvest levels, particularly in the next 10 to 20 years. Alternative A could threaten the economic viability of the tree farm and contribute to the future closure of local milling operations.

Weyerhaeuser's current efforts to protect spotted owl site centers on the Millicoma Tree Farm already have resulted in a 20 percent reduction in harvest and have necessitated the purchase of logs of others from a limited supply to support the Coos Bay mill. The tree farm also produces logs which cannot be used by the Coos Bay mill because of size, quality or species. These logs are processed by five other mills. Any future reduction in harvest levels would impact these other mills as well. With the

withdrawal of federal timber from the Coos Bay market, and the greatly reduced harvest from the Elliott State Forest, continued restrictions on harvest of Weyerhaeuser timber to protect the spotted owl could necessitate reductions in production or closure of the mill. This reduction also would impact five other mills which Weyerhaeuser supplies. Any opportunity to increase harvest levels would have a beneficial effect on increasing timber supply in the immediate areas, both for Weyerhaeuser and other nearby mills.

Alternative B

Implementation of Alternative B would result in a harvest reduction from historic harvest levels on the Millicoma Tree Farm, but compared to the No Action alternative, would allow harvest to proceed at a level sufficient to maintain the economic viability of the tree farm and provide timber to local milling operations. This alternative would also provide greater stability and predictability in the supply of harvested timber from the tree farm to Weyerhaeuser's Coos Bay mill and to other mills in the area than the No Action alternative.

Alternative C

Management under Alternative C would allow greater amounts of timber to be harvested from the tree farm than under the No Action alternative and the proposed HCP. Compared to the No Action alternative, Alternative C would allow harvest to proceed at a level sufficient to maintain the economic viability of the tree farm.

Alternative D

Alternative D could potentially have the greatest economic impact of all alternatives. The adjustment of management practices to create and maintain a dispersal landscape, coupled with the protection of Nesting, roosting and foraging habitat for 10 potentially-reproductive spotted owl pairs, would

significantly reduce timber harvest values in the short and long-term. Resulting impacts to mills would be comparable to the No Action alternative.

4.10 Cultural Resources

All Alternatives

The potential for impacts to cultural resources on the Millicoma Tree Farm would be comparable under all alternatives. Impacts could occur where: a) intact cultural resource sites or features remain, and b) management activities carried out under the Incidental Take Permit disturbed or destroyed those sites or features. On approximately 95 percent of the tree farm, future management would be a continuation or repeat of past management activities, probably with limited potential to impact cultural resources. Areas that were harvested before would be harvested again, in much the same manner as the previous harvest, except for increased stream protection, less broadcast burning and attention to wildlife habitat features, such as snags and logs. These recent changes to forest management practices would tend to provide some future protection to any intact resources in streamside areas or young forest stands. Existing roads would be maintained, upgraded or re-activated, but few new roads would be built in areas where harvesting has already occurred.

On the remaining 5 percent of the tree farm, harvest activity and road construction could occur in locations that have not previously been disturbed by logging. While many of these areas are among the steepest and most inaccessible portions of the tree farm, the potential exists for them to contain intact cultural resource sites. Some forest management activities, particularly road construction, could disturb cultural sites if they are present.

Much of the remaining undisturbed forest on the tree farm would be subjected to harvest and road construction under all alternatives; only the timing of harvest would differ between alternatives. This is the principal difference between the alternatives with respect to potential impacts on cultural resources. Alternative A would protect habitat until abandoned by the resident owls, which could be from 3 to 50 years (or longer), depending on the site. Alternative B would protect 1,963 acres of

habitat, some of which is undisturbed, until at least 2014. Alternative C would protect no habitat beyond that in bald eagle management areas. Alternative D would protect habitat for the ten most reproductively-viable owl pairs on the tree farm until the sites are abandoned, which could take three to 50 years (or longer) as noted under Alternative A. Aside from these differences in timing, there would be no significant differences between the alternatives regarding potential impacts to cultural resources.

Stream corridors, which probably were the focus of much of the prehistoric and historic use, would be partially protected from timber harvest and road construction under newly-adopted Oregon Forest Practices Rules. Impacts to any cultural resources located around springs and falls and in some valley bottoms would similarly be negligible. Weyerhaeuser would comply with all applicable Oregon cultural resource statutes and regulations in its management of the tree farm under all alternatives. There are currently no state requirements to identify cultural resources on private timber lands, but state law prohibits the disturbance of Indian burials and archaeological sites and objects on private lands.

4.11 Cumulative Impacts

The proposed issuance of a permit for incidental take would primarily effect spotted owls in and near the Millicoma Tree Farm. Two other proposed management activities on adjacent non-Weyerhaeuser lands also could effect spotted owls in the vicinity of the tree farm and should be considered in an assessment of potential cumulative effects. These proposals include the Elliott State Forest Management Plan and the ROD for federal lands.

The Elliott State Forest is in the process of developing a long-term management plan. Currently there have been seven alternative management strategies developed. Alternative Strategy 6 is being recommended as the Proposed Alternative, and will be used for this cumulative effects assessment. This Alternative would establish 17 management basins in which management objectives would be defined. Nine basins would be managed so that at least 50 percent of the basin consistently provides habitat for owls and murrelets. One basin would be managed to provide 40 percent of the basin as nesting, roosting and foraging habitat. Seven basins would be managed on 80-year rotations, except

for the habitat reserves. Spotted owls are expected to be permanent residents where habitat is 60 percent or over, and expected to be intermittent residents where habitat is 50 percent. Basins where suitable habitat is less than 40 percent would be considered suitable for dispersal. Twelve pairs of spotted owls are expected to be supported in the short term, and 10 pairs are expected to be supported over the life of the plan (Oregon Department of Forestry 1993a).

Three plans have been developed for managing spotted owls on federal land, the ISC report (Thomas et al. 1990), the Final Draft Recovery Plan (U.S. Fish and Wildlife Service 1992b) and the ROD (USDA/USDI 1994). While all of these plans vary slightly from each other, they all use the same basic strategy for management and protection of spotted owls. All three plans are based on providing reserve areas that would protect the breeding population of spotted owls (HCAs, DCAs and LSRs). The size and configuration of these reserves vary between plans, but in all three plans they form the basic framework for spotted owl protection. Between the reserve areas, each plan identifies the need to provide a matrix of habitat that would allow for the successful dispersal of juvenile spotted owls.

For the purpose of this cumulative effects analysis, the ROD will be used as the management strategy for the BLM land adjacent to the tree farm. Most land adjacent to the tree farm would be designated as LSRs, where harvesting would be conducted only in younger stands in order to accelerate the development of late-successional structure. The remaining adjacent BLM land would be managed as matrix lands. Management of matrix lands would be based on providing 640-acre blocks of land, spaced 3 to 5 miles apart, managed on 150-year timber harvest rotations. When an area is cut, 12 to 18 green trees would be retained per acre. At any point in time, 25 to 30 percent of the block must be in late-successional forest (USDA/USDI 1994).

The remaining area to be considered in this assessment is comprised of other state and private timberland. It is possible that other portions of private land surrounding the tree farm would develop long-term management plans, but at this time no such efforts are known.

Alternative A

The No Action alternative could contribute to the maintenance of a population of potentially-reproductive spotted owls in the southern Oregon Coast Range, particularly in the short term. While many of the existing spotted owl activity centers on the tree farm are not viable, some of the owls would undoubtedly persist and continue to reproduce if take were avoided. These potentially-reproductive owls would add to the effective size of the populations on public LSRs and increase the potential for effective movement of dispersing juveniles from one LSR to the other. Over the next 50 years however, conditions for both resident owls and dispersing juveniles would steadily deteriorate due to adjustments in forest stand management to compensate for lost timber volume.

Successful dispersal across the tree farm probably would be quite low after 20 to 30 years under the No Action alternative, but it is unlikely that it would cease altogether if the tree farm remained in timber production of some kind. This minimal rate of dispersal probably would be sufficient to allow the LSR populations to persist, assuming all other aspects of spotted owl management were addressed as planned on federal lands. The cumulative impact of the No Action alternative on the northern spotted owl would, therefore, would not be substantial.

Alternative B

As discussed in detail in the HCP, the issuance of an Incidental Take Permit for the Millicoma Tree Farm would result in the reduction of the known resident spotted owl population on the tree farm. The USFWS (1992b) estimated the known population in the Oregon Coast Range to include 303 pairs and 77 territorial singles, but they probably underestimated the total because they did not know of all owls on the Millicoma Tree Farm at the time the estimate was made. Harvest of suitable habitat under the HCP would eventually displace all or most of the 30 pairs and seven territorial singles known to reside on the tree farm, reducing the known population in the province by a maximum of 9 percent. At the same time, dispersal landscape conditions would improve between and adjacent to federal LSRs and the Elliott State Forest.

The incidental take of owls on the tree farm would not preclude or substantially impair the federal LSRs from reaching and maintaining target populations during recovery. Meanwhile, the creation and maintenance of the dispersal landscape on the tree farm would contribute to recovery efforts on public lands by increasing the potential for successful dispersal between the LSRs. The proposed HCP, therefore, would not appreciably reduce the chances for the spotted owl to recover in the wild, and would have no substantial cumulative impact on the owl in the Oregon Coast Range province.

Alternative C

The cumulative effects of Alternative C on spotted owls would be comparable to those described under Alternative B. There would be no appreciable difference between the two alternatives with respect to cumulative impacts.

Alternative D

The cumulative effects of Alternative D on spotted owls would be comparable to those described for Alternative B, except that a greater contribution to local recovery would be made by the protection of 10 potentially-reproductive spotted owl activity centers on the tree farm.

5.0 COMPLIANCE, CONSULTATION AND COORDINATION WITH OTHERS

5.1 List of Agencies Contacted for Pertinent Information

Ms. Robin Bown
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(503) 231-6179

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Mr. Logan Jones
Oregon Department of Forestry
2600 State Street
Salem, Oregon 97310
(503) 945-7360

Mr. Jim Clarke
Mr. Timm Slater
Ms. Debbie Gordon
Mr. Jeff Light
Weyerhaeuser Company
3050 Tremont
North Bend, Oregon 97459-9901
(503) 756-5121

Ms. Pam Blake
Oregon Department of Environmental Quality
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(503) 269-2721

Mr. Bob Meinke
Oregon Department of Agriculture
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Mr. Rich Ground
Mr. Clint Mann
Oregon Department of Forestry
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Mr. Dennis Ades
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Portland, Oregon 97204
(503) 229-5053

Mr. Reese Bender
Mr. Greg Sieglitz
Oregon Department of Fish and Wildlife
4475 Boat Basin Drive
P.O. Box 5430
Charleston, Oregon 97420
(503) 888-5515

Ms. Nancy Allen
Oregon Department of Fish and Wildlife
7118 NE Vandenburg Avenue
Corvallis, Oregon 97330
(503) 757-4186

Ms. Sue Vrilakas
Oregon Natural Heritage Program
1205 NW 25th Avenue
Portland, Oregon 97210
(503) 229-5078

5.2 Pertinent Federal, State and Local Laws, Orders and Regulations

The legal mandate for the proposed action is outlined in the cover sheet of this document. All other pertinent federal, state and/or local laws, federal executive orders and regulations are discussed in Section 4.0, Environmental Consequences, as applicable.

5.3 Distribution List

Federal and State Congressional Delegation

Office of State Representative Larry Campbell
Office of State Representative Veral Tarno
Office of State Senator Bill Bradbury
Office of U.S. Congressman Peter DeFazio
Office of U.S. Senator Bob Packwood
Office of U.S. Senator Mark Hatfield

Federal Agencies

U.S. Bureau of Land Management
- Coos Bay District
- Roseburg District

U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
- Siuslaw National Forest

U.S. National Marine Fisheries Service

State and Local Agencies

Coos County Board of Commissioners
Douglas County Board of Commissioners
Office of the Governor
State of Oregon
- Department of Environmental Quality
- Department of Fish and Wildlife
- Department of Forestry
- Department of Land Conservation and Development
- Department of Water Resources
- Division of State Lands

Economic Development Department
Fish and Wildlife Commission
Historic Preservation Office

Native American Tribes

Confederated Tribes of the Grande Ronde
Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians
Cow Creek Band of Umpqua Indians
Coquille Tribe
Confederated Tribe of the Siletz Indians

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APPENDIX D: WATER QUALITY MONITORING STATIONS

WATER QUALITY MONITORING STATIONS

In the area of the Millicoma Tree Farm:

South Fork Coos River at Daniels Creek Road

South Fork Coos River at Dellwood

Millicoma River at County Boat Ramp

Mart Davis Creek at County Boat Ramp

Millicoma River at Rooke-Higgins County Park (Sec. 13)

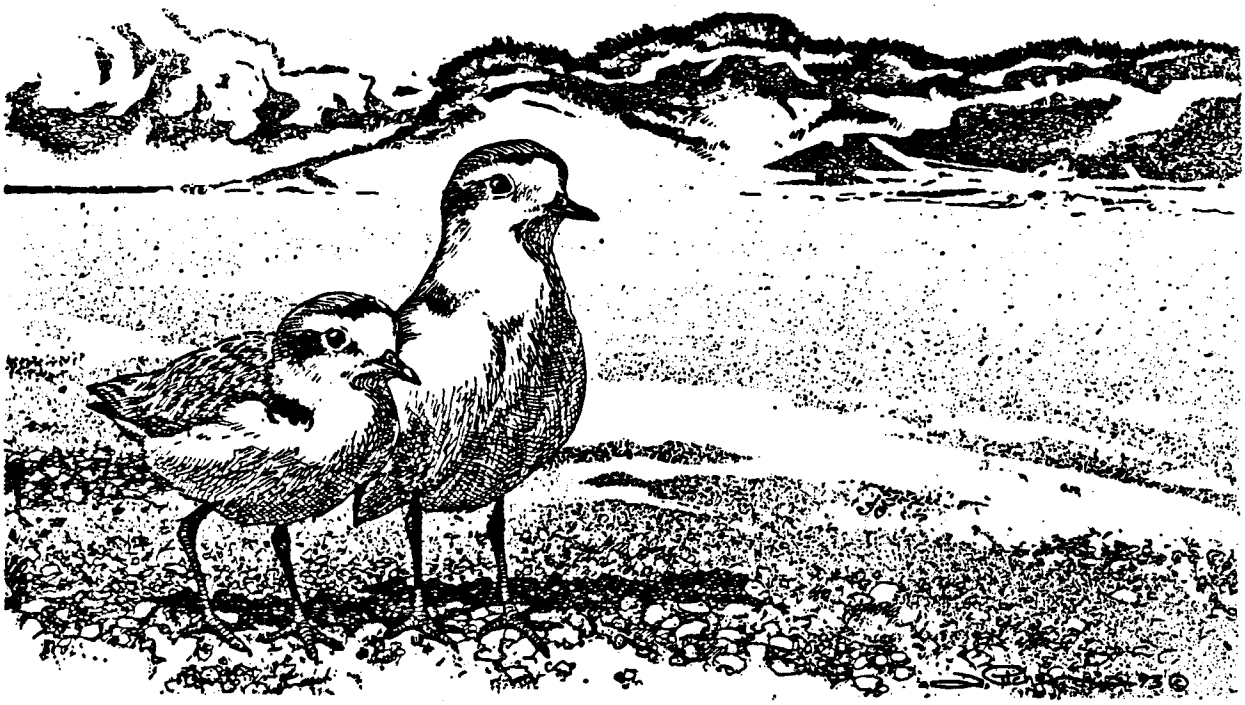
West Fork Millicoma River at Allegany

East Fork Millicoma River at Private Road

Source: 1992 Survey (EPA STORET)

APPENDIX B: PLANT SPECIES DATABASE SEARCHES

RARE, THREATENED AND ENDANGERED PLANTS AND ANIMALS OF OREGON



OREGON NATURAL HERITAGE PROGRAM

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The Nature Conservancy and the State of Oregon

With assistance from:

The Native Plant Society of Oregon
The Nature Conservancy
The Oregon Department of Agriculture
The Oregon Department of Fish and Wildlife
The Oregon Division of State Lands
The Oregon Natural Heritage Advisory Council

Cover Illustration: Western snowy plover (*Charadrius alexandrinus nivosus*), drawn by John C. Pitcher.

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Oregon Natural Heritage Program. 1993. Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Program, Portland, Oregon. 79 pp.

This plant list is an update of the 1991 edition of this book. All status changes for specific taxa reflect new information obtained since then. Both the format, definitions and categories of the lists are identical to the previous edition. The main body of the text now an alphabetical listing of all taxa on all the lists. Descriptions of the categories and lists can be found in the Introduction on page two. State distribution is included for all taxa on the Lists in this edition.

At the end of the main list, the various taxa included are listed again by lists. These include a) The USFWS Candidate List with federally listed taxa; b) The ODA Candidate List with state listed taxa; c), List 1; d) List 2; e) List 3; f) List 4; and g) Taxa Considered but Rejected. Details on these lists are included below.

List 1 contains taxa which are endangered or threatened throughout their range or which are presumed extinct. The status of taxa on this list represents its status throughout its range. Species which are extirpated from Oregon are included with an -ex after the List number (1-ex). Taxa known or thought to be extinct throughout their range have an -X following the list number (1-X).

List 2 contains species which are threatened, endangered or possibly extirpated from Oregon, but are more common or stable elsewhere. Taxa extirpated from Oregon are included with an -ex after the List number (2-ex).

List 3 contains species for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range. This is equivalent to the Review List of past editions.

List 4 contains taxa of concern which are not currently threatened or endangered. It includes taxa which are very rare but are currently secure, as well as taxa which are declining in numbers or habitat but are still too common to be proposed as threatened or endangered. This is equivalent to the Watch List of past editions.

Included in the text as Considered but Rejected, are taxa which were included in the 1989 editions, and have been dropped. An entire list of Taxa Considered but Rejected is included as the last List in the plant section. These taxa have been dropped for one of three reasons: 1) they have taxonomic problems serious enough to warrant exclusion from the list (T); 2) they are considered at present to be too common or secure to warrant inclusion on this list (C); or 3) they were originally included on one of the lists because they were suspected to occur in the state, but were dropped because they have never been documented in Oregon (N).

In all of the lists, we have made an effort to include the variety or subspecies which occurs in Oregon. Often this may be the only variety or subspecies from the state, and in the past these may have been included without a subspecific or varietal name. In this edition, these taxa have been included with an asterisk (*) following the scientific name. ONHP is interested in information regarding any occurrences of other subspecies or varieties of these taxa found in Oregon.

ONHP is interested in obtaining and computerizing all location data for taxa on Lists 1 and 2. Manual files are maintained for those on List 3 and 4. It is critical that additional information be obtained for List 3 taxa so accurate status determinations can be made. Information on status or occurrences of any species included would be appreciated. Distribution information is based on historical and current reports and is included to aid in searches and to increase general knowledge of these taxa.

STATE ENDANGERED PLANT PROTECTION

Oregon Department of Agriculture
Plant Conservation Biology Program
Department of Botany and Plant Pathology
Oregon State University, Corvallis, OR 97331
Robert J. Meinke, Program Leader
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In 1987, the Oregon Legislature passed Senate Bill 533 (unofficially the "*Oregon Endangered Species Act*") at the urging of the Native Plant Society of Oregon and others in the state's botanical community. This bill, and its accompanying statutes (ORS 564.100-564.135), direct the state Department of Agriculture (ODA) to maintain a strong program to conserve and protect native plant species threatened or endangered with extinction. The Endangered Species Program (now part of the overall Plant Systematics and Conservation Biology Program in ODA's Natural Resources Division) was initiated 1988.

With the exception of ODA's ability to regulate the import, export, and commercial trafficking of threatened and endangered plants (under ORS 564.120), the state's authority concerning these species currently extends only to state-owned or state-leased lands. The statutes do not require private or federal land owners to safeguard species protected by state law, although ODA is ready and willing to work with the owners or managers of these lands in conservation efforts if they request help. There continues to be excellent cooperation with federal agencies concerning the management of the 19 species currently listed as threatened and endangered by the State of Oregon. In addition, ODA collaborates in the study and evaluation of many other candidate and sensitive taxa. These types of studies, focusing on systematics, reproductive biology, and demography (i.e., monitoring research), provide data that support or refute the state listing of candidate and sensitive taxa. Such biologically-based projects are critical for accurate status determinations of many rare species, and have contributed to the current proposal to place approximately 20 additional species to the state threatened and endangered list in the fall of 1993.

ODA has developed administrative rules (OAR 603-73-005 through 603-73-100) that specify procedures pursuant to the listing, reclassification, or delisting of plant species by the state as threatened or endangered; the development of regulations and programs intended to assist and direct state land management agencies in their important roles involving native plant protection; and the initiation of a system of permits for transplanting, scientific study,or collection of threatened or endangered plants. *Any person or organization*

engaging in the collection or study of listed species must register with, and receive a permit from, ODA. If you are interested in reading the latest laws and regulations governing threatened and endangered plant studies and management requirements in Oregon, write to ODA and ask for a cope of the endangered species administrative rules (address requests to the Natural Resources Division, Oregon Department of Agriculture, 635 Capitol Street NE, Salem, OR 97310-0110.

Since 1991, the ODA Plant Conservation Biology Program has developed a joint research agreement with Oregon State University, and much of the ODA program activities are presently based at OSU. With the recent acquisition of the University of Oregon Herbarium, OSU is now the center of taxonomic research in the state. In addition, the newly formed Restoration Ecology and Plant Conservation Biology Cooperative Project (the hub of the OSU/ODA research interaction on campus) provides excellent opportunities for scientists concerned with plant rarity and endangerment issues to work together towards common goals. Anyone interested in learning more about the Cooperative Project or the ODA program in general should contact Bob Meinke at OSU.

A Brief History of Rare Plant Protection in Oregon

by Rhoda M. Love, Past President
Native Plant Society of Oregon (NPSO)

When the Federal Endangered Species Act was passed in 1973, the attention of the nation began to focus on this country's rare and endangered plants. That year, the Smithsonian Institution, in Washington, D.C., was directed by Congress to prepare a list of U.S. plant species thought to be extinct or in danger of extinction. In Oregon, Dr. Kenton L. Chambers of the Oregon State University Herbarium in Corvallis began a list of plants rarely collected in Oregon. At about the same time, Jean L. Siddall of Lake Oswego was preparing a list for the Oregon Natural Area Preserves Advisory Committee, of those plants considered rare by Oregon botanists. Chambers and Siddall soon realized that they were examining the same species and pooled their efforts.

In June, 1975, the U.S. Fish and Wildlife Service published the names of nearly 3,000 rare and endangered United States plants in the Federal Register. At about that time, Jean Siddall set up an Advisory Committee of professional taxonomists, and an office called the Oregon Rare and Endangered Plant Project. The Project drew up this state's first list of rare, threatened and endangered plant species. The list, in booklet form, was published by the Oregon Natural Area Preserves Advisory Committee to the State Land Board in 1979. The authors of the book, *Rare, Threatened and Endangered Vascular Plants in Oregon - An Interim Report*, were Jean L. Siddall, Kenton L. Chambers and David H. Wagner of the University of Oregon Herbarium in Eugene. This 1979 document was the forerunner of the book you now hold in your hand.

Shortly after the appearance of this Interim Report in 1979, the Oregon Natural Heritage Program, an office established by the Oregon Field Office of The Nature Conservancy and the state of Oregon in 1975, began a comprehensive computerized data base for Oregon rare plant and animal species. This data base is constantly updated as new information on Oregon's rare plants is received. With the cooperation of NPSO, ODFW, the Oregon Natural Heritage Advisory Council, the Rare and Endangered Plant Project, USFWS, and state and federal botanists and zoologists, the *Interim Report* was updated and published in July, 1983 as *Rare, Threatened and Endangered Plants and Animals of Oregon*, by the Oregon Natural Heritage Data Base. Subsequent updates were printed in 1985, 1987, and 1989. These books have become essential resources for any individual or agency carrying out land management activities involving rare plants and animals in the state of Oregon.

Another important publication, *Threatened and Endangered Vascular Plants of Oregon, An Illustrated Guide*, by Robert J. Meinke, then a graduate student at Oregon State University, was published by the USFWS in Portland in 1982. Presently out of print, this volume is nevertheless used and prized by Oregon botanists for its botanical drawings and its thorough coverage of many of Oregon's rarest plants.

By the mid-1980's, NPSO realized that the federal listing process for endangered plants was too slow and cumbersome to adequately protect the approximately 100 plant species on Oregon's rare and endangered list. Therefore, in 1985, this non-profit society of amateur and professional botanists from throughout the state, under its legislative chair Esther McEvoy, began drafting state legislation which would afford protection for Oregon's endangered species. The membership of the Native Plant Society rallied in support of this legislative effort. Following the lead of the society's two tireless lobbyists, Esther McEvoy and Julie Kierstead, and with the help of the Oregon Natural Resources Council and a number of supportive legislators, the effort culminated in 1987 with the passage of Oregon Senate Bill 533, the Oregon Endangered Species Act.

In addition to sponsoring and supporting endangered species legislation, NPSO carries on its own rare plant protection program. Members in 11 chapters across the state monitor rare plants in each area, and report findings to the state R&E chair. This information is then incorporated into ONHP's databases. In addition, each chapter has an active schedule of programs, workshops and field trips. New members are always welcome. For information write to:

Membership Chair, NPSO
2584 NW Savier St.
Portland, OR 97210

Since the passage of the federal Endangered Species Law in 1973, great strides have been made in Oregon to understand and protect our state's rare plants. Starting two decades ago with the visionary efforts of Kenton Chambers and Jean Siddall, hundreds of individuals and organizations have taken part and still take part in this important effort. The book you hold in your hand represents the combined efforts of these Oregonians who have worked together for many years toward one goal -- to save Oregon's beautiful and unique native flora and fauna from extinction.

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODA Status	ONHP List
Arenaria franklinii Dougl. ex Hook. var. *thompsonii* Peck Thompson's sandwort	CB; WA Gill	3B	C	1-ex
Arenaria rossii R. Br. var. *rossii* Ross' sandwort	BM; ID, WA + Wall	--	--	3
Argemone munita Dur. & Hig. = *A. m.* ssp. *rotundata* prickly-poppy	BR, OU; NV Harn, Malh	--	--	2
Arnica viscosa Gray Shasta arnica	WC, EC; CA Desc, Doug, Klam	--	--	2
Artemisia arbuscula Nutt. ssp. *thermopola* Beetle cleft-leaf sagebrush	HP, BM; CA, ID, NV Bake, Croo, Gran, Whee	--	--	3
Artemisia campestris L. ssp. *borealis* (Pall.) Hall & Clem. var. *wormskioldii* (Bess.) Cronq. northern wormwood	CB; WA Sher	C1	C	1-ex
Artemisia hudoviciana Nutt. ssp. *estesii* Chamb. ined Estes' artemisia	EC, HP Croo, Desc, Jeff	C2	--	1
Artemisia packardiae Grimes & Ertter Packard's artemisia	BR, OU; ID, NV Harn, Malh	--	--	3
Artemisia papposa Blake & Cronq. Owyhee sagebrush	OU; ID, NV Malh	--	--	2
Asarum wagneri Lu & Mesler green-flowered wild-ginger	WC, EC Doug, Jack, Klam	--	C	1
Asclepias cryptoceras Wats. pallid milkweed	BM, BR, HP, OU; CA, ID, NV, WA + Bake, Croo, Gran, Harn, Malh, Wall, Whee	--	--	4
Asplenium septentrionale (L.) Hoffm. grass-fern	WC; CA Doug	--	--	2
Asplenium trichomanes-ramosum L. = *A. viride* green spleenwort	BM; CA, ID, NV, WA + Wall	--	--	2
Aster brickellioides Greene smooth rayless aster	KM; CA Curr, Jack, Jose	--	--	3
Aster curtus Cronq. white-topped aster	WV; WA, BC Clac, Lane, Linn, Mari, Mult	C2	C	1
Aster gormanii (Piper) Blake Gorman's aster	WC Clac, Jeff, Linn, Mari	C2	C	1
Aster vialis (Brads.) Blake wayside aster	CR, WV, WC Doug, Lane	C2	C	1
Astragalus accidens Wats. var. *hendersonii* (Wats.) Jones thicket milkvetch	WV, KM; CA Doug, Jack, Jose	--	--	2
Astragalus alvordensis Jones Alvord milkvetch	BR, OU; NV Harn, Malh	--	--	4
Astragalus applegatei Peck Applegate's milk-vetch	EC Klam	LE	LE	1
Astragalus atratus Wats. var. *owyheensis* * (Nels. & Macbr.) Jones Owyhee milk-vetch	BM, OU; ID, NV Bake, Malh	--	C	4
Astragalus californicus (Gray) Greene California milk-vetch	KM; CA Jack	--	--	3
Astragalus calycosus Torr. King's rattleweed	BR, OU; CA, ID, NV + Malh	--	--	2

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODA Status	ONHP List
Astragalus collinus Dougl. ex Hook. var. *laurentii* (Rydb.) Barn. Laurence's milk-vetch	CB Gill, Morr, Sher, Umat	C2	C	1
Astragalus diaphanus Dougl. var. *diaphanus* transparent milk-vetch	HP, CB; WA Gill, Gran, Morr, Sher, Umat, Wasc, Whee	--	--	4
Astragalus diaphanus Dougl. var. *diurnus* (Wats.) Barn. South Fork John Day milk-vetch	BM, HP Gran	C2	C	1
Astragalus gambelianus E. Sheldon Gambel milk-vetch	WV; CA Jack	--	--	3
Astragalus hoodianus How. Hood River milk-vetch	EC, CB; WA Hood, Wasc	--	--	2
Astragalus howellii Gray Howell's milk-vetch	EC, HP, CB Sher, Wasc	--	C	1
Astragalus kentrophyta Gray var. *douglasii* Barn. Douglas' milk-vetch	CB; WA Umat	3A	C	1-X
Astragalus mulfordiae M.E. Jones Mulford's milk-vetch	OU; ID Malh	C2	C	1
Astragalus peckii Piper Peck's milk-vetch	EC, HP Desc, Klam	PE	C	1
Astragalus reventus Gray var. *canbyi* M. E. Jones long-leaved milk-vetch	CB; WA Sher	--	--	3
Astragalus robbinsii (Oakes) Gray var. *alpiniformis* (Rydb.) Barn. * Wallowa milk-vetch	BM Wall	3C	--	4
Astragalus salmonis Jones Trout Creek milk-vetch	BM, BR, HP, OU; ID Bake, Gran, Harn, Malh	--	--	3
Astragalus sclerocarpus Gray stalked-pod milk-vetch	CB; WA + Gill, Morr, Sher, Wasc	--	--	4
Astragalus solitarius Peck weak milk-vetch	BR, OU; NV Harn, Malh	C2	--	4
Astragalus sterilis Barn. = *A. cusickii* ssp. *s.* sterile milk-vetch	OU; ID Malh	C2	C	1
Astragalus succumbens Dougl. Columbia milk-vetch	CB; WA Gill, Morr, Umat	--	--	4
Astragalus tegetarioides M.E. Jones bastard kentrophyta	BM, BR; CA Harn	C2	C	1
Astragalus tetrapterus Gray four-winged milk-vetch	BR, OU; NV + Harn, Klam, Lake, Malh	--	--	4
Astragalus tyghensis Peck Tygh Valley milk-vetch	HP, CB Wasc	C2	C	1
Astragalus umbraticus Sheld. woodland milk-vetch	KM, WC; CA Curr, Doug, Jose, Lane	--	--	2
Balsamorhiza rosea Nels. & Macbr. rosy balsamroot	CB; WA Umat	--	--	2-ex
Balsamorhiza sericea Weber silky balsamroot	KM; CA Jose, Curr	--	--	4
Bensoniella oregona (Abr. & Bacig.) Morton bensonia	CR, KM; CA Coos, Curr, Doug, Jose	C2	C	1

Betula papyrifera Marsh. var. *commutata* - Considered but rejected, taxonomic problems

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODA Status	ONHP List
Bergia texana (Hook) Seub. Texas bergia	WV, OU; ID, WA + Malh, Mult	--	--	4
Bolandra oregana Wats. Oregon bolandra	WC, BM; WA Bake, Hood, Mult, Wall	--	C	1
Botrychium ascendens W.H. Wagner upward-lobed moonwort	BM; CA, ID, MT, NV, WA, AB, BC, ON Wall	C2	C	1
Botrychium campestre W.H. Wagner & Farrar prairie moonwort	BM; AB, SK, ND + Wall	--	--	2
Botrychium crenulatum W.H. Wagner crenulate moonwort	KM, BM; AZ, CA, ID?, MT, UT, WA? Croo, Gran, Jack, Unio, Wall	C2	C	1
Botrychium lanceolatum (Gmel.) Angstrom lance-leaved grape-fern	EC, BM, BR; WA, ID + Bake, Gran, Harn, Klam, Wall	--	--	2
Botrychium lunaria (L.) Swartz moonwort	BM; NV, WA + Wall	--	--	2
Botrychium minganense Vict. gray moonwort	WC, EC, BM, BR; CA, ID, WA + Bake, Gran, Harn, Hood, Lane, Linn, Unio, Wall, Wasc	--	--	2
Botrychium montanum W.H. Wagner mountain grape-fern	WC, EC, BM; CA, WA, BC + Gran, Linn, Mari, Wall, Wasc	--	--	2
Botrychium paradoxum W.H. Wagner twin-spike moonwort	BM; MT, UT, WA, AB Gran, Wall	C2	--	1
Botrychium pedunculosum W.H. Wagner stalked moonwort	BM; AB, BC, SK Wall	C2	C	1
Botrychium pinnatum St. John pinnate grape-fern	EC, BM, BR; CA, WA, ID + Bake, Gran, Harn, Wall, Wasc	--	--	2
Botrychium pumicola Cov. in Underw. pumice grape-fern	EC; CA Desc, Klam, Lake	C1	C	1
Botrychium simplex - Considered but rejected, too common				
Botrychium virginianum - Considered but rejected, too common				
Brodiaea californica Lindl. California brodiaea	WV; CA Jack	--	--	3
Brodiaea terrestris Kell. dwarf brodiaea	CR, KM; CA Coos, Curr	--	--	2
Bulbostylis capillaris (L.) C.B. Clarke sand sedge	? ; CA + ?	--	--	3
Bupleurum americanum Coult. & Rose bupleurum	BM; ID + Bake, Wall	--	--	2
Calamagrostis breweri Thurb. Brewer's reedgrass	WC, EC; CA Clac, Hood, Mari, Jeff	--	--	2
Callitriche marginata Torr. winged water-starwort	WV, CB; CA + Jose, Wasc	--	--	3
Calochortus coxii Godfrey & Callahan crinite mariposa-lily	WV Doug	C2	C	1
Calochortus greenei Wats. Greene's mariposa-lily	WV, KM, WC; CA Jack	C2	C	1
Calochortus howellii Wats. Howell's mariposa-lily	KM Curr, Jose	C2	C	1
Calochortus indecorus Ownbey & Peck Sexton Mt. mariposa-lily	KM Jose	C2*	C	1-X

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODA Status	ONHP List
Calochortus longebarbatus Wats. var. *longebarbatus* long-bearded mariposa-lily	EC; CA, WA Klam, Wasc	3C	--	2
Calochortus longebarbatus Wats. var. *peckii* Ownb. Peck's mariposa-lily	BM Croo, Harn, Whee	C2	--	1
Calochortus macrocarpus Dougl. var. *maculosus* Nels. & Macbr. ex Macbr. green-band mariposa-lily	BM; ID, WA Wall	--	--	3
Calochortus monophyllus (Lindl.) Lem. one-leaved mariposa-lily	KM; CA Jack	--	--	2
Calochortus nudus Wats. Shasta star-tulip	KM; CA Jack	--	--	2
Calochortus umpquaensis Fredricks Umpqua mariposa-lily	WV, KM, WC Doug, Jack, Jose	C2	LE	1
Camassia howellii Wats. Howell's camas	WV, KM, WC Jack, Jose	C2	C	1
Camissonia graciliflora H. & A. slender-flowered evening-primrose	CR, WV; CA Jose, Linc	--	--	3
Camissonia ovata Nutt. golden eggs	WV; CA Doug	--	--	3
Camissonia palmeri Wats. Palmer's evening-primrose	OU; CA, ID, NV Malh	--	--	3
Camissonia pygmaea (Dougl.) Raven dwarf evening-primrose	HP, CB; WA Gill, Gran, Umat, Whee	--	--	1
Campanula scabrella Engelm. rough harebell	BM; CA, ID, WA Wall	--	--	3
Cardamine nuttallii Greene var. *gemmata* (Greene) Roll. purple toothwort	KM; CA Curr, Doug, Jack, Jose	C2	C	1
Cardamine nuttallii Greene var. *covilleana* (O. Schulz) Roll. Coville's toothwort	KM; CA Curr, Jack, Jose	--	--	3
Cardamine pattersonii Hend. Saddle Mt. bittercress	CR Clat	C2	C	1
Carex atrata L. var. *atrosquama* (Mkze.) Cronq. blackened sedge	BM; ID, WA + Wall	--	--	3
Carex backii F. Boott Back's sedge	BM, BR; WA + Bake, Harn, Unio, Wall	--	--	3
Carex buxbaumii Wahl. Buxbaum's sedge	KM, WC, EC; CA, ID, WA + Curr, Desc, Jack, Klam, Lane	--	--	3
Carex comosa F. Boott bristly sedge	WV, WC, EC; CA, WA, ID + Colu, Doug, Lane, Mult	--	--	3
Carex concinna R. Br. low northern sedge	BM; ID, WA + Bake, Wall	--	--	2
Carex dioica L. var. *gynocrates* (Wormsk.) Ostenf. yellow bog sedge	BM; NV + Wall	--	--	2
Carex eleocharis L. Bailey involute-leaved sedge	EC, BM; CA, ID, NV + Bake, Croo, Klam	--	--	3
Carex gigas (Holm.) Mkze. (includes *C. scabriuscula*) Siskiyou sedge	KM; CA Curr, Jack, Jose	--	--	2

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODA Status	ONHP List
Castilleja pilosa (Wats.) Rydb. var. *steenensis* (Penn.) N. Holmg. =*C. steenensis* Steens Mt. paintbrush	BR Harn	C2	C	1
Castilleja rubida Piper purple alpine paintbrush	BM Wall	--	C	1
Castilleja rupicola Piper cliff paintbrush	EC, WC; WA, BC Linn, Mari, Mult	--	--	3
Castilleja schizotricha Greenm. split-hair paintbrush	KM; CA Jack, Jose	--	--	2
Castilleja thompsonii Pennell Thompson's paintbrush	EC; WA, BC Wasc	--	--	3
Caulanthus crassicaulis (Torr.) Wats. thick-stemmed wild cabbage	BR; NV Harn, Lake	--	--	4
Caulanthus major (M.E. Jones) Payson slender wild cabbage	BR; CA, NV Harn	--	--	2
Caulanthus pilosus Wats. hairy wild cabbage	BM, BR, HP, OU; CA, ID, NV Bake, Desc, Harn, Malh	--	--	4
Chaenactis cusickii Gray Cusick's chaenactis	OU; ID Malh	--	C	1
Chaenactis macrantha D.C. Eat. large-flowered chaenactis	BR, OU; CA, ID, NV Harn	--	--	2
Chaenactis nevii Gray Nevius' chaenactis	HP Gill, Gran, Jeff, Wasc, Whee	--	--	4
Chaenactis stevioides H. & A. broad-flowered chaenactis	BR, OU; CA, ID, NV Harn	--	--	2
Cheilanthes feei Moore Fee's lipfern	BM; CA, ID, NV?, WA + Wall	--	--	2
Cheilanthes intertexta Maxon coastal lipfern	WV, KM; CA Doug, Jack	--	--	2
Chlorogalum angustifolium Kell. narrow-leaved amole	WV; CA Jack	--	--	2
Cicendia quadrangularis (Lam.) Griseb. timwort	WV, KM; CA + Coos, Doug, Lane, Linn	--	--	2
Cicuta bulbifera L. bulb-bearing waterhemlock	EC; ID, WA + Klam	--	--	2-ex
Cimicifuga elata Nutt. tall bugbane	CR, WV, KM, WC; WA, BC; Bent, Clac, Colu Doug, Jose, Lane, Linn, Mari, Mult, Polk Wash, Yamh	--	C	1
Claytonia nevadensis Wats. Sierra spring-beauty	BR; CA, NV Harn	--	--	4
Claytonia umbellata Wats. umbellate spring-beauty	BR, BM, HP, CB; CA, NV Harn, Wall, Wasc	--	--	4
Clematis columbiana (Nutt.) T. & G. var. *columbiana* * rock clematis	EC, BM; ID, WA + Bake, Unio, Wall	--	--	3
Clintonia andrewsiana Torr. Andrew's bead-lily	KM; CA Curr	--	--	2-ex
Cochlearia officinalis L. spoonwort	KM; CA, WA + Coos, Curr	--	--	2

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODA Status	ONHP List
Collomia larsenii (Gray) Payson = *C. debilis* var. *larsenii* Larsen's collomia	WC, EC; CA, WA Clac, Desc, Hood, Jeff, Lane	--	--	4
Collomia macrocalyx Leib. ex Brand. bristle-flowered collomia	BM, HP, OU, CB Croo, Gill, Gran, Jeff, Malh, Wasc, Whee	3C	--	4
Collomia mazama Coville Mt. Mazama collomia	WC, EC Doug, Jack, Klam	C2	C	1
Collomia renacta Joyal Barren Valley collomia	BR; NV Malh	C2	C	1
Coptis trifolia (L.) Salisb. three-leaf goldthread	WC, EC; BC + Clac, Wasc	--	--	2
Cordylanthus maritimus Nutt. ex Benth. ssp. *palustris* (Behr) Chuang & Heckard • salt-marsh bird's-beak	CR; CA Coos, Lane, Linc, Till	C2	C	1
Corydalis aquae-gelidae Peck & Wilson cold-water corydalis	WC; WA Clac, Linn, Mari, Mult	C2	C	1
Corydalis caseana Gray var. *cusickii* (Wats.) C.L. Hitchc. Cusick's corydalis	BM; ID Bake, Lane, Unio	--	--	3
Coryphantha vivipara (Nutt.) Britt. & Brown var. *vivipara* • cushion coryphantha	HP, BR; CA, ID, NV + Harn, Jeff	--	--	3
Crepis modocensis Greene ssp. *modocensis* low hawksweed	BR, HP, BM, OU; CA + Croo, Harn, Lake, Malh, Whee	--	--	3
Cryptantha humilis (Greene) Pays. low cryptantha	BR, OU; CA, ID, NV + Malh	--	--	3
Cryptantha leiocarpa (F. & M.) Greene seaside cryptantha	KM; CA Curr	--	--	3
Cryptantha leucophaea (Dougl.) Pays. gray cryptantha	CB; WA Gill	--	--	2-ex
Cryptantha milobakeri Johnst. Milo Baker's cryptantha	WV, KM; CA Jack, Jose	--	--	3
Cryptantha propria (Nels. & Macbr.) Pays. Malheur cryptantha	BR, HP, OU; ID Gran, Harn, Malh, Whee	--	--	4
Cryptantha rostellata Greene beaked cryptantha	EC, HP; CA, WA Croo, Jeff, Wasc	--	--	2
Cryptantha simulans Greene pinewoods cryptantha	EC, BM; CA, ID, WA Harn	--	--	3
Cryptantha spiculifera (Piper) Pays. Snake River cryptantha	BM, HP; NV, ID, WA + Bake, Gran, Malh, Whee	--	--	3
Cryptantha thompsonii Johnst. Thompson's cryptantha	BM; WA Bake	--	--	3
Cryptogramma stelleri (S.G. Gmel.) Prantl Steller's rock-brake	BM; NV, WA + Bake?, Wall	--	--	2
Cupressus bakeri Jeps. Baker's cypress	KM; CA Jack, Jose	--	--	2
Cymopterus acaulis (Pursh) Raf. var. *greeleyorum* Grimes & Packard Greeley's cymopterus	OU; ID Malh	--	--	3

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODA Status	ONHP List
Honkenya peploides (L.) Ehrh. sea-beach sandwort	CR; WA, AK, BC + Lane, Linc, Till	--	--	3
Horkelia congesta Dougl. ssp. *congesta* shaggy horkelia	WV, KM Bent, Doug, Lane, Linn	--	C	1
Horkelia hendersonii How. Henderson's horkelia	KM; CA Jack	C2	C	1
Horkelia tridentata Torr. ssp. *tridentata* three-toothed horkelia	WV, KM; CA Jack	--	--	3
Howellia aquatilis Gray howellia	WV; CA, ID, MT, WA Clac, Mari, Mult	PT	--	1-ex
Hulsea algida Gray alpine hulsea	BM; ID Unio, Wall	--	--	4
Huperzia occidentalis (Clute) Beitel = *Lycopodium selago* fir club-moss	WC, EC; ID + Clac, Hood, Linn, Mari, Mult, Wasc	--	--	2
Hydrocotyle verticillata Thunb. whorled marsh-pennywort	WV, KM; CA + Bent, Coos, Curr, Doug	--	--	2
Hymenoxys lemmonii (Greene) Cockerell = *H. cooperi* var. *canescens* Cooper's goldflower	BR, OU; CA, NV Lake, Malh	--	--	2
Iliamna latibracteata Wiggins California globe-mallow	CR, KM, WC; CA Coos, Curr, Doug, Jack, Jose	--	--	2
Isopyrum stipitatum Gray dwarf isopyrum	WV; CA Bent, Doug, Mari, Polk, Yamh	--	--	3
Ivesia rhypara Ertter & Reveal var. *rhypara* grimy ivesia	BR, OU; NV Lake, Malh	C2	C	1
Ivesia rhypara Ertter & Reveal var. *shellyi* Ertter Shelly's ivesia	BR Lake, Harn	C2	C	1
Ivesia shockleyi Wats Shockley's ivesia	EC, BR; CA Lake	--	--	2
Juncus bryoides F.J. Herm. mosslike dwarf rush	BR; CA, ID, NV + Harn	--	--	3
Juncus capillaris F.J. Herm. hairstemmed rush	BR; CA Harn	--	--	3
Juncus gerardii Loisel. mud rush	CR; WA, BC + Linc	--	--	3
Juncus hemiendytus Herm. var. *abjectus* (Herm.) Ertter * = *J. abjectus* least rush	BR; CA, ID Harn, Lake	--	--	3
Juncus kelloggii Engelm. Kellogg's dwarf rush	WV, EC; CA, WA + Colu, Hood, Jose, Mari	--	--	3
Juncus tiehmii Ertter Tiehm's rush	BR; CA, ID, NV + Harn	--	--	3
Juncus torreyi Cov. Torrey's rush	WV, BM, HP, OU; CA, ID, WA + Bake, Jeff, Malh, Morr, Mult, Umat, Unio, Wasc	--	--	3
Juncus triglumis L. var. *albescens* Lange three-flowered rush	BM; MT, CO, WY, BC + Wall	--	--	3
Kalmiopsis leachiana (Hend.) Rehder var. novum Douglas County populations of kalmiopsis	WC Doug	--	--	1

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODA Status	ONHP List
Lilium kelloggii Purdy Kellogg's lily	KM; CA Curr	--	--	2
Lilium occidentale Purdy western lily	CR, KM; CA Coos, Curr	PE	LE	1
Lilium pardalinum Kellogg ssp. *wigginsii* (Beane & Vollmer) Skinner Wiggin's lily	KM; CA Jack, Jose	--	--	4
Limnanthes floccosa How. ssp. *bellingeriana* (Peck) Arroyo Bellinger's meadow-foam	WV, WC, EC; CA Jack, Klam	C2	C	1
Limnanthes floccosa How. ssp. *grandiflora* Arroyo big-flowered wooly meadow-foam	WV Jack	C2	C	1
Limnanthes floccosa How. ssp. *pumila* (How.) Arroyo dwarf meadow-foam	WV Jack	C1	C	1
Limnanthes gracilis How. var. *gracilis* * slender meadow-foam	WV, KM, WC Doug, Jack, Jose	3C	C	1
Limonium californicum (Boiss.) A.A. Heller western marsh-rosemary	CR; CA Coos, Linc	--	--	2
Linanthus bolanderi (Gray) Greene = *L. bakeri* Baker's linanthus	WV, KM, EC, HP; CA, WA Desc, Doug, Jeff, Jose, Wasc	--	--	3
Lindernia anagallidea - Considered but rejected, merged with *L. dubia*, which is common.				
Lipocarpha aristulata (Cov.) G.C. Tucker aristulate lipocarpha	WV, CB; CA, ID, WA + Bent, Jose, Umat	--	--	3
Lipocarpha occidentalis (Gray) G.C. Tucker western lipocarpha	CB; CA, WA Umat	--	--	3
Listera borealis Morong northern twayblade	BM; ID, WA + Wall	--	--	2
Lithophragma campanulata How. large-flowered hill star	KM, WC, EC; CA Curr, Jack, Jose, Klam	--	--	3
Lloydia serotina (L.) Sweet alp lily	CR; WA, NV + Clat	--	--	3
Lobelia dortmanna L. water lobelia	EC; WA + Jeff	--	--	2
Lomatium bradshawii (Rose) Math. & Const. Bradshaw's lomatium	WV Bent, Lane, Linn, Mari	LE	LE	1
Lomatium cookii Kagan Agate Desert lomatium	WV Jack, Jose	C1	LE	1
Lomatium cusickii (Wats.) Coult. & Rose Cusick's lomatium	BM; ID, WA Bake, Gran, Wall	--	--	4
Lomatium engelmannii Mathias Engelmann's desert-parsley	KM; CA Jose	--	--	2
Lomatium erythrocarpum Meinke & Const. red-fruited lomatium	BM Bake	C1	C	1
Lomatium farinosum (Geyer ex Hook.) Coult. & Rose var. *hambleniae* (Const. & Math.) Schlessm. * Hamblen's lomatium	HP, CB; WA Wasc	--	--	2
Lomatium greenmanii Mathias Greenman's lomatium	BM Wall	C1	LT	1

APPENDIX C: SEPTEMBER 1995 OREGON FOREST PRACTICES RULES

Oregon

DEPARTMENT OF
FORESTRY

STATE FORESTER'S
OFFICE

"STEWARDSHIP IN FORESTRY"

SUBJECT: **FOREST PRACTICE RULES FOR WATER PROTECTION DIVISIONS 24 AND 57**

TO: Department of Forestry Field Offices
Interested Parties

FROM: Ted Lorensen, Policy Unit Manager
Forest Practices Section

DATE: July 1, 1994

Attached are the forest practice rules that were revised during the waters of the state project. These rules are included in Chapter 629 of Oregon Administrative Rules. These have been filed with the Secretary of State, and will be effective September 1, 1994.

(1) Totally new rules adopted in Division 24 are: 211 and 302.

(2) Division 57 is an entirely new division. It contains some rules that were amended and moved from Divsion 24, along with some entirely new rules.

(3) Amended rules in Division 24 are: 101, 111, 113, 118, 120, 203, 204, 301, 421, and 521.

(4) Repealed rules in Division 24 are: 109, 110, 115, 116, 117, 210, 446, 546, 646, 1000, 1100, 1200, 1300, 1350, 1400, 1450, 1500, 1550, 1600, 1650, 1900, 1910, 1920, and 1930. (Some were moved to Division 57 and include amendments.)

Before September 1, we intend to have the forest practice rules documents reformatted to incorporate these rules, printed, and available to the field offices and to the general public. We have the list of quantities from the field offices for that printing.

If you have any questions concerning these rules, contact either Nada Austin (945-7470), JoDana Bright (945-7472) or myself (945-7478).

TLL:NA
Attachment

2600 State Street
Salem, OR 97310
(503) 945-7200
TDD: 1-800-437-4490

DEFINITIONS

629-24-101

As used in OAR Chapter 629, Divisions 24 and 57, unless otherwise required by context:

(1) "Abandoned resource site" means a resource site that the State Forester determines is not active.

(2) "Active resource site" means a resource site that the State Forester determines has been used in the recent past by a listed species. 'Recent past' shall be identified for each species in administrative rule. Resource sites that are lost or rendered not viable by natural causes are not considered active.

(3) "Active roads" are roads currently being used or maintained for the purpose of removing commercial forest products.

(4) "Alternate plan" means a written plan proposing practices or protection standards different than those specified in rule.

(5) "Aquatic area" means the wetted area of streams, lakes and wetlands up to the high water level. Oxbows and side channels are included if they are part of the flow channel or contain fresh water ponds.

(6) "Basal area" means the area of the cross-section of a tree stem derived from DBH.

(7) "Basal area credit" means the credit given towards meeting the live tree requirements within riparian management areas for placing material such as logs, rocks or rootwads in a stream, or conducting other enhancement activities such as side channel creation or grazing exclosures.

(8) "Bog" means a wetland that is characterized by the formation of peat soils and that supports specialized plant communities. A bog is a hydrologically closed system without flowing water. It is usually saturated, relatively acidic, and dominated by ground mosses, especially sphagnum. A bog may be forested or non-forested and is distinguished from a swamp and a marsh by the dominance of mosses and the presence of extensive peat deposits.

(9) Buffer strip" means a protective area adjacent to an area requiring special attention or protection.

(10) "Channel" is a distinct bed or banks scoured by water which serves to confine water and that periodically or continually contains flowing water.

(11) "Chemicals' means and includes herbicides, insecticides, rodenticides, fertilizers, and adjuvants.

(12) "Conflict" means resource site abandonment or reduced resource site productivity that the State Forester determines is a result of forest practices.

(13) "Contaminate" means the presence in the atmosphere, soil, or water of sufficient quantities of chemicals as may be injurious to public health, safety, or welfare, or to domestic, commercial, industrial, agricultural, or recreational uses, or to livestock, wildlife, fish, or other aquatic life.

(14) "Department" means the Oregon Department of Forestry.

(15) "Diameter breast height" (DBH) means the diameter of a tree inclusive of the bark measured four and one-half feet above the ground on the uphill side of the tree.

(16) "Domestic water use" means the use of water for human consumption and other household human use.

(17) "Dying or recently dead tree" means a tree with less than ten percent live crown or a standing tree which is dead, but has a sound root system and has not lost its small limbs. Needles or leaves may still be attached to the tree.

(18) "Established seedling" means a seedling of acceptable forest tree species which has survived two years in the site.

(19) "Estuary" means a body of water semi-enclosed by land and connected with the open ocean within which saltwater is usually diluted by freshwater derived from the land. "Estuary" includes all estuarine waters, tidelands, tidal marshes, and submerged lands extending upstream to the head of tidewater. However, the Columbia River Estuary extends to the western edge of Puget Island.

(20) "Fertilizers" means any substance or any combination or mixture of substances designed for use principally as a source of plant food.

(21) "Filling" means the deposit by artificial means of any materials, organic or inorganic.

(22) "Fish use" means inhabited at any time of the year by anadromous or game fish species or fish that are listed as threatened or endangered species under the federal or state endangered species acts.

(23) "Fledgling tree" means a tree or trees close to the nest which the State Forester determines are regularly used by young birds to develop flying skills.

(24) "Foraging area" means an area (usually a body of water) where bald eagles concentrate their hunting activities.

(25) "Foraging perch" means a tree or other structure that overlooks a vantage point while hunting.

(26) "Forestland" means land which is used for the growing and harvesting of forest tree species, regardless of how the land is zoned or taxed or how any state or local statutes, ordinances, rules or regulations are applied.

(27) "Geographic region" means large areas where similar combinations of climate, geomorphology, and potential natural vegetation occur, established for the purposes of implementing the water protection rules.

(28) "Herbicides" means any substances used to destroy, repel, or mitigate any weed or to prevent or retard any undesirable plant growth.

(29) "High risk areas" are lands determined by the State Forester to have asignificant potential for destructive mass soil movement or stream damage because of topography, geology, biology, soils, or intensive rainfall periods.

(30 "High risk sites" are specific locations determined by the State Forester within high risk areas. A high risk site may include but is not limited to: slopes greater than 65%, steep headwalls, highly dissected land

formations, areas exhibiting frequent high intensity rainfall periods, faulting, slumps, slides, or debris avalanches.

(31) "High water level" means the stage reached during the average annual high flow. The "high water level" often corresponds with the edge of streamside terraces, a change in vegetation, or a change in soil or litter characteristics.

(32) "Hydrologic function" means soil, stream, wetland and riparian area properties related to the storage, timing, distribution, and circulation of water.

(33) "Important springs" are springs in arid parts of eastern Oregon that have established wetland vegetation, flow year round in most years, are used by a concentration of diverse animal species, and by reason of sparse occurrence have a major influence on the distribution and abundance of upland species.

(34) "Inactive roads" are roads used for forest management purposes exclusive of removing commercial forest products.

(35) "Insecticides" means any substances used to destroy, repel, or mitigate any insect.

(36) "Key components" means the attributes which are essential to maintain the use and productivity of a resource site over time. The key components vary by species and resource site. Examples include fledgling trees or perching trees.

(37) "Lake" means a body of year-round standing open water.

(a) For the purposes of the forest practice rules, lakes include:

(A) The water itself, including any vegetation, aquatic life, or habitats therein; and

(B) Beds, banks or wetlands below the high water level which may contain water, whether or not water is actually present.

(b) "Lakes" do not include water developments as defined in section (75) of this rule.

(38) "Large lake" means a lake greater than eight acres in size.

(39) "Live tree" means a tree that has 10 percent or greater live crown.

(40) "Local population" means the number of birds that live within a geographical area that is identified by the State Forester. For example: the area may be defined by physical boundaries, such as a drainage or subbasin.

(41) "Main channel" means a channel that has flowing water when average flows occur.

(42) "Natural barrier to fish use" is a natural feature such as a waterfall, increase in stream gradient, channel constriction, or other natural channel blockage that prevents upstream fish passage.

(43) "Nest tree" means the tree, snag, or other structure that contains a bird nest.

(44) "Nesting territory" means an area identified by the State Forester that contains, or historically contained, one or more nests of a mated pair of birds.

(45) "Other wetland" means a wetland that is not a significant wetland or stream-associated wetland.

(46) "Perch tree" means a tree identified by the State Forester which is used by a bird for resting, marking its territory, or as an approach to its nest.

(47) "Prior approval" means written approval of the State Forester given for specific forest practices before the operation begins. Where timing is critical, verbal permission may be granted followed by immediate written confirmation.

(48) "Relief culvert" means a structure to relieve surface runoff from roadside ditches to prevent excessive buildup in volume and velocity.

(49) "Removal" means the taking or movement of any amount of rock, gravel, sand, silt, or other inorganic substances.

(50) "Replacement tree" means a tree or snag within the nesting territory of a bird that is identified by the State Forester as being suitable to replace the nest tree or perch tree when these trees become unusable.

(51) "Resource site" is defined for the purposes of protection and for the purposes of requesting a hearing.

(a) For the purposes of protection:

(A) For threatened and endangered bird species, "resource site" is the nest tree, roost trees, or foraging perch and all identified key components.

(B) For sensitive bird nesting, roosting and watering sites, "resource site" is the nest tree, roost tree or mineral watering place, and all identified key components.

(C) For significant wetlands, "resource site" is the wetland and the riparian management area as identified by the State Forester.

(b) For the purposes of requesting a hearing under ORS 527.670(4) and ORS 527.700(3), "resource site" is defined in OAR 629-56-900.

(52) "Riparian area" means the ground along a water of the state where the vegetation and microclimate are influenced by year-round or seasonal water, associated high water tables, and soils which exhibit some wetness characteristics.

(53) Riparian management area" [is determined under OAR 629-24-117 and] means an area along each side of specified waters of the state within which vegetation retention and special management practices are required for the protection of water quality, hydrologic functions, and fish and wildlife habitat.

(54) "Rodenticides" means any substance used to destroy small mammals.

(55) "Roosting site" means a site where birds communally rest at night and which is unique for that purpose.

(56) "Roost tree" is a tree within a roosting site that is used for night time roosting.

(57) "Sapling" means live trees of commercial species, less than 11 inches DBH, of good form and vigor.

(58) "Side channel" means a channel other than a main channel of a stream that only has flowing water when high water level occurs.

(59) "Significant wetlands" means those wetland types, adopted by the Board in OAR 629-56-310, that require site specific protection.

(60) "Snag" means a tree which is dead but still standing, and that has lost its leaves or needles and its small limbs.

(61) "Sound snag" means a snag that retains some intact bark or limb stubs.

(62) "Staging tree" is a tree within the vicinity of a roosting site that is used for perching by bald eagles before entering the roost.

(63) "Stream" means a channel, such as a river or creek, that carries flowing surface water during some portion of the year.

(a) For the purposes of the forest practice rules, streams include:

(A) The water itself, including any vegetation, aquatic life, or habitats therein;

(B) Beds and banks below the high water level which may contain water, whether or not water is actually present;

(C) The area between the high water level of connected side channels.

(D) Beaver ponds, oxbows, and side channels if they are connected by surface flow to the stream during a portion of the year; and

(E) Stream-associated wetlands.

(b) "Streams" do not include:

(A) Ephemeral overland flow (such flow does not have a channel); or

(B) Road drainage systems or water developments as defined in section (75) of this rule.

(64) "Stream-associated wetland" means a wetland that is not classified as significant and that is next to a stream.

(65) "Structural exception" means the State Forester determines that no actions are required to protect the resource site. The entire resource site may be eliminated.

(66) "Structural protection" means the State Forester determines that actions are required to protect the resource site. Examples include retaining the nest tree or perch tree.

(67) "Temporal exception" means the State Forester determines that no actions are required to prevent disturbance to birds during the critical period of use.

(68) "Temporal protection" means the State Forester determines that actions are required to prevent disturbance to birds during the critical period of use.

(69) "Tree leaning over the channel" means a tree within a riparian management area if a portion of its bole crosses the vertical projection of the high water level of a stream.

(70) "Type D stream" means a stream that has domestic water use, but no fish use.

(71) "Type F stream" means a stream with fish use, or both fish use and domestic water use.

(72) "Type N stream" means a stream with neither fish use nor domestic water use.

(73) "Vacated roads" are roads that have been made impassable and are no longer to be used for forest management purposes or commercial forest harvesting activities.

(74) "Water bar" means a diversion ditch and/or hump in a trail or road for the purpose of carrying surface water runoff into the vegetation and duff so that it does not gain the volume and velocity which causes soil movement or erosion.

(75) "Water development" means water bodies developed for human purposes that are not part of a stream such as waste treatment lagoons, reservoirs for industrial use, drainage ditches, irrigation ditches, farm ponds, stock ponds, settling ponds, gravel ponds, cooling ponds, log ponds, pump chances, or heli-ponds that are maintained for the intended use by human activity.

(76) "Waters of the state" include lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, wetlands, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon, and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters which do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction.

(77) "Wetland" means 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. Wetlands include marshes, swamps, bogs, and similar areas. Wetlands do not include water developments as defined in section (75) of this rule.

(78) "Written plan" means a plan submitted by an operator, for written approval by the State Forester, which describes how the operation will be conducted, including the means to protect resource sites described in ORS 527.710(3)(a) (relating to the collection and analysis of resource site inventories), if applicable.

Stat. Auth.: ORS Ch. 527.710

SURFACE MINING PRACTICES

OAR 629-24-111

(1) The development and use of surface mining operations which are located on forestland, from which materials are to be utilized for forest access roads or other supporting forest management activities, such as riprapping, bridge wing wall diversions, culvert bedding, and other

similar activities located on forestland, shall be done in such a manner[,] as to protect water quality, retain soil stability, and provide for general safety during mining operation and after operations have ceased.

(2) (a) Quarry sites shall not be located in streambeds;

(b) When reasonable alternatives exist, quarry sites should be located away from state and federal highway routes;

(c) Prevent overburden, solid wastes, and petroleum products from entering waters of the state;

(d) Stabilize banks, headwalls, and other surfaces of quarry sites in order to prevent surface soil erosion or mass soil movement;

(e) When the site is abandoned as a material source, it will be left in the condition described in subsections (c) and (d) of this section.

Stat. Auth.: ORS Ch. 527.710

WRITTEN PLANS

629-24-113

(1) Operators shall obtain written approval from the State Forester of written plans before conducting any operations requiring notification under OAR 629-24-107, which are within:

(a) 100 feet of a large lake, or within 100 feet of a stream classified as Type F or Type D. Written plans for Type F and Type D streams, and large lakes are further described in OAR 629-57-2030.

(b) 300 feet of a specific site involving threatened or endangered wildlife species, or sensitive bird nesting, roosting, or watering sites; as listed by approximate legal description, in a document published by the Department of Forestry titled "Cooperative Agreement Between the Board of Forestry and the Fish and Wildlife Commission, March 28, 1984."

(c) 300 feet of any resource site identified in OAR 629-24-700 (Sensitive Bird Nesting, Roosting and Watering Resource Sites on Forest Lands), OAR 629-24-800 (Threatened and Endangered Species that use Resource Sites on Forest Lands), or OAR 629-57-2300 (Significant Wetlands).

(d) 300 feet of any nesting or roosting site of threatened or endangered species listed by the U.S. Fish and Wildlife Service or by the Oregon Fish and Wildlife Commission by administrative rule.

(2) The State Forester shall notify the operator of the presence of one of the sites listed in section (1) of this rule and the requirement of the written plan at any time the State Forester determines the presence of the above sites.

(3) Written plans required under section (1) of this rule shall be subject to the hearings provisions of ORS 527.700(3) (Appeals from orders of State Forester hearings procedure; stay of operation); and shall be subject to the provisions of ORS 527.670(1), (11) and (12) (Commencement of operations; when notice and written plan required; appeal of plan) prescribing certain waiting periods and procedures.

(4) The State Forester may also require the operator to submit a written plan when an operation involves practices requiring prior approval. Written

plans required under this section shall not be subject to the provisions of ORS 527.700(3) or 527.670(10), (11) and (12).

(5) Operators shall comply with all provisions of an approved written plan.

(6) A written plan shall contain specific information applicable to the operation regarding but not limited to the location of roads and landings, road and landing design, construction techniques, drainage systems, disposal of waste materials, felling and bucking, buffer strips, yarding systems and layout, riparian management area protection measures, resource site protection measures and post-operation stabilization measures.

(7) Written plans required for resource sites under subsection (1)(b) of this rule shall include a description of how the operation shall be conducted to protect the resource site.

(8) Modification of the written plan shall be required when, based on information that was not available or was unknown at the time the original written plan was approved, the State Forester determines the approved written plan will no longer provide for compliance with applicable forest practice rules or adequately address the conflict with the resource site. Written plans with modifications required under this section shall not be subject to the provisions of ORS 527.670(10) and (11) relating to waiting periods for approval of written plans.

Stat. Auth.: ORS Ch. 526.670, 527.700 & 527.710

INTERIM PROCESS FOR PROTECTING SENSITIVE RESOURCE SITES REQUIRING WRITTEN PLANS

OAR 629-24-118

(1) Protection practices for sites requiring written plans under OAR 629-24-113(1)(b) or (d) shall be determined for each site as follows:

(a) The State Forester shall notify the operator and landowner of the presence of a site requiring a written plan, and request their input into the decision making process.

(b) The State Forester shall, when practical, inspect the proposed operation with the landowner or landowner's representative, the operator, and the appropriate representative of the Oregon Department of Fish and Wildlife. The State Forester shall then determine if the proposed forest practice is in conflict with the protection of the sensitive resource site.

(c) If planned forest practices are determined to conflict with protection of the sensitive resource site, the written plan shall describe reasonable measures sufficient to resolve the conflict in favor of the resource site. Reasonable measures to resolve the conflict in favor of the resource site may include but are not limited to preparing and implementing a habitat management plan, limiting the timing of forest practices, redesigning the proposed practices in favor of site protection and excluding the forest activities outright.

(d) If planned forest practices are determined not to conflict with protection of the sensitive resource site, the written plan shall describe how the operation will be conducted in compliance with existing forest practice rules. No additional protection measures shall be required.

Stat. Auth.: ORS Ch. 527.710

COMPLIANCE WITH STATUTORY REQUIREMENTS

629-24-120

(1) In addition to all other requirements of administrative rule promulgated under the Oregon Forest Practices Act, operators, landowners and timber owners who conduct forest operations shall comply with the requirements in:

(a) ORS 527.740 (Clear-cut limitations);

(b) ORS 527.745 (Reforestation of clear-cuts);

(c) ORS 527.750 (Exceeding clear-cut size limitations);

(d) ORS 527.755 (Scenic highways and visually sensitive corridors); and

(e) Section 5, Chapter 919, Oregon Laws 1991 (Live and dead wood retention in clear-cuts greater than ten acres).

(2) Failure to comply with the requirements in section (1) of this rule may be subject to any of the enforcement mechanisms provided in the Oregon Forest Practices Act under ORS 527.680, 527.690, 527.990 or 527.992.

Stat. Auth.: ORS Ch. 527.710

PROTECTION OF STREAMS, LAKES, WETLANDS, AND DWELLINGS WHEN APPLYING CHEMICALS

OAR 629-24-203

(1) Operators shall protect waters of the state and inhabited dwellings from contamination when applying chemicals aerially or from the ground by following the requirements of the chemical product label and by meeting the additional protection measures listed in this rule.

(2) When applying herbicides near or within riparian management areas, operators shall maintain vegetation required to be protected by OAR 629-57-2200 through 629-57-2500.

(3) When spraying chemicals by aircraft, operators shall leave an unsprayed strip of at least 60 feet on each side of the aquatic areas of Type F and Type D streams, lakes, significant wetlands, or other areas of standing open water.

(4) When applying chemical spray from the ground, operators shall leave unsprayed a strip of at least ten feet on each side of the aquatic areas of Type F and Type D streams, lakes, significant wetlands, or other areas of standing open water.

(5) Chemical spray application in or adjacent to the riparian management areas of Type F or Type D streams, lakes or significant wetlands shall be made parallel to the edge of the water or area of standing open water and must be made prior to application to the remainder of the area to be treated.

(6) When applying herbicides by aircraft near inhabited dwellings, operators shall leave an unsprayed strip of at least 60 feet adjacent to such dwellings.

(7) Operators shall not directly apply fertilizers within 100 feet of domestic use portions of Type F and Type D streams. For other waters of the state, no untreated strips are required to be left by operators when applying

fertilizers, except that precautions shall be taken to avoid direct application of fertilizers to other streams, lakes, significant wetlands, or areas of open water.

Stat. Auth.: ORS Ch. 527.710

OAR 629-24-204 SELECTION AND MAINTENANCE OF MIXING AND LANDING AREAS

(1) Mix chemicals or clean tanks or equipment only where the chemicals will not contaminate waters of the state.

(2) Mixing areas and aircraft landings areas shall be located where spillage of chemicals will not contaminate waters of the state. Operators shall not locate chemical mixing and staging areas for aerial chemical applications within 100 feet of Type F or Type D streams.

(3) If any chemical is spilled, operators shall take immediate and appropriate action to contain or neutralize it.

Stat. Auth.: ORS 526 & 527

NOTIFICATION OF COMMUNITY WATER SYSTEM MANAGERS WHEN APPLYING CHEMICALS

OAR 629-24-211

(1) The purpose of this rule is to ensure that community water system managers are appropriately notified of planned chemical operations so that they can coordinate their monitoring activities with planned operations.

(2) This rule applies to community water systems where the drainage area upstream of their intake is 100 square miles or less. The State Forester shall maintain a list of community water systems for which notification is required. A community water system with a drainage area of more than 100 square miles upstream of its intake may request to be added to the list based upon its ability to conduct effective monitoring in the watershed. The list shall be available at department field offices where notifications are submitted.

(3) When chemicals will be aerially applied within 100 feet or applied from the ground within 50 feet of domestic portions of Type F or Type D streams, and the water use is by a community water system as designated under section (2) of this rule, the operator shall notify the water system manager of a planned chemical operation at least 15 days before the operation commences.

(4) Operators shall provide the following additional information before commencing operation if requested by the affected water system manager at the time of notification required in section (3) above:

(a) The application technology that will be used;

(b) Practices that will be followed to minimize drift toward the stream;

(c) How the landowner will determine whether or not chemicals have entered the stream, pursuant to 629-24-208;

(d) The planned time schedule for the application.

Stat. Auth.: ORS Ch. 527.710 & 527.765

MAINTENANCE OF PRODUCTIVITY AND RELATED VALUES

629-24-301

Operations on forestland shall be planned and conducted in a manner which will provide adequate consideration to treatment of slashing to protect residual stands of timber and reproduction to optimize conditions for reforestation of forest tree species, to maintain productivity of forestland, to maintain forest health, and maintain air and water quality and fish and wildlife habitat.

(1) Reduce the volume of debris as much as practicable by such methods as:

(a) Well planned and supervised felling and bucking practices to minimize breakage and slash accumulations.

(b) Increased utilization of wood fibre including, but not limited to, salvaging, pre-logging, and relogging when a market exists.

(c) Stage cutting where applicable, with successive cuts delayed until slashing created by previous operations is reduced.

(2) In those areas where slash treatment is necessary for protection or regeneration, the following methods may be used:

(a) Scattering of slash accumulations;

(b) Piling or windrowing of slash;

(c) Mechanized chopping, compaction, or burying of slashing;

(d) Prescribed burning;

(e) Provisions for additional protection from fire during the period of increased hazard. Protect fish habitat when establishing water sources.

(3) Dispose of or disperse unstable slash accumulations around landings to prevent their entry into streams.

(4) When treating competing vegetation, plan harvesting practices to break up or destroy such vegetation. When necessary, follow up with application of chemicals and/or by burning.

Stat. Auth.: ORS Ch. 527.710

PRESCRIBED BURNING

OAR 629-24-302

(1) Prescribed burning is a tool used to achieve reforestation, maintain forest health, improve wildlife habitat and reduce wildfire hazard. Prescribed burning is to be done consistent with protection of air and water quality, and fish and wildlife habitat. The purpose of this rule is to ensure that necessary prescribed burning is planned and managed to maximize benefits and minimize potential detrimental effects.

(2) When planning and conducting prescribed burning, operators shall:

(a) Comply with the rules of Oregon's "Smoke Management Plan."

(b) Adequately protect reproduction and residual timber, humus and soil surface.

(c) Consider possible detrimental effects of prescribed burning upon riparian management areas, streams, lakes, wetlands, and water quality, and how these effects can be best minimized.

(d) Lay out the unit and use harvesting methods that minimize detrimental effects to riparian management areas, streams, lakes, wetlands, and water quality during the prescribed burning operation.

(e) Fell and yard the unit to minimize accumulations of slash in channels and within or adjacent to riparian management areas.

(f) Minimize fire intensity and amount of area burned to that necessary to achieve reforestation, forest health or hazard reduction needs.

(3) When burning within 100 feet of Type F and Type D streams, within 100 feet of large lakes, and within 300 feet of significant wetlands, operators shall describe in the written plan how detrimental effects will be minimized within riparian management areas; especially when burning on highly erosive soils, for example decomposed granite soils and slopes steeper than 60 percent.

(4) During prescribed burning operations, operators shall protect components such as live trees, snags, downed wood, and understory vegetation required to be retained by OAR 629-57-2200 through OAR 629-57-2440. When the operator has taken reasonable precautions to protect the components, but some detrimental effects occur, the intent of the rule is met if the overall integrity of the riparian management area is maintained. Operators shall not salvage trees killed by prescribed fire in a riparian management area if the trees were retained for purposes of OAR 629-57-2200 through OAR 629-57-2500.

(5) When, in the judgment of the State Forester, the need for prescribed burning outweighs the benefits of protecting components required to be left within the riparian area, aquatic area and wetlands, protection requirements may be modified. This judgment shall consider the environmental impacts and costs of alternative treatments.

Stat. Auth.: ORS Ch. 527.710

ROAD LOCATION

629-24-421

Operators shall locate roads on stable areas and construct them in such a manner as to minimize the risk of material entering waters of the state and to minimize disturbance to channels, lakes, wetlands, and flood plains:

(1) Fit the road to the topography so that a minimum alteration of natural features will be necessary.

(2) Avoid steep, narrow canyons, slide areas, slumps, marshes, wet meadows, riparian management areas, and natural or man-made drainage channels[,] where practical alternatives exist. If there is an apparent risk of material entering waters of the state, obtain prior approval from the State Forester.

(3) Minimize the number of stream crossings.

(4) Cross streams at right angles to the main channel when it is practical.

(5) Leave or re-establish areas of vegetation between roads and waters of the state to act as a buffer strip.

(6) To minimize road construction, make use of existing roads where practical. Where roads traverse land in another ownership but will adequately serve the operation, attempt to negotiate with the owner for use before resorting to location of new roads.

(7) Avoid excessive sidehill cuts and fills near stream channels.

(8) Landowners and operators shall not locate roads parallel to any waters in areas where such roads are under the high water level of the waters, or in riparian management areas, without prior approval of the State Forester.

Stat. Auth.: ORS Ch. 527.710

ROAD DESIGN

629-24-422

Establish design criteria for each road so that it is best adapted to the terrain and soil properties providing for a drainage system which will control the dispersal of surface runoff water from roads and exposed soils in order to minimize turbid waters from draining into waters of the state:

(1) Use plans that balance cuts and fills or provide waste or borrow areas which minimize damage to soil and water.

(2) Roads should be planned no wider than necessary to accommodate the immediate anticipated use.

(3) Specify cut and fill slopes at the normal angle of repose or less.

(4) Operators shall design and construct stream crossing structures (culverts, bridges and fords) to:

(a) Minimize excavation of side slopes near the channel.

(b) Minimize the volume of material in the fill.

(A) Minimizing fill material is accomplished by restricting the width and height of the fill to the amount needed for safe use of the road by vehicles, and by providing adequate cover over the culvert or other drainage structure.

(B) Fills over 15 feet deep contain a large volume of material that can be a considerable risk to downstream beneficial uses if the material moves downstream by water. Consequently, for any fill over 15 feet deep operators shall obtain approval by the State Forester of a written plan that describes the fill and drainage structure design. Approval of such written plans shall require that the design be adequate for minimizing the likelihood of surface erosion, embankment failure, and other downstream movement of fill material.

(c) Prevent erosion of the fill and channel.

(5) Operators shall design and construct stream crossings (culverts, bridges, and fords) to:

(a) Pass a peak flow that at least corresponds to the 50-year return interval. When determining the size of culvert needed to pass a peak flow corresponding to the 50-year return interval, operators shall select a size that is adequate to preclude ponding of water higher than the top of the culvert; and

(b) Allow migration of adult and juvenile fish upstream and downstream during conditions when fish movement in that stream normally occurs.

(6) An exception to the requirements in subsection (5)(a) of this rule is allowed to reduce the height of fills where roads cross wide flood plains. Such an exception shall be allowed if:

(a) The stream crossing site includes a wide flood plain (greater than 100 feet); and

(b) The stream crossing structure passes a peak flow of not less than to the 10-year return interval; and

(c) An overflow depression is constructed in the road fill at a location away from the culvert and at an elevation lower than the top of the culvert; and

(d) The road surface and downstream edge of the overflow depression is armored with rock of sufficient size and depth to protect the fill from eroding when a flood flow occurs.

(7) Design roads to drain naturally by outsloping and through grade changes wherever possible. Where outsloping is not feasible, use roadside ditches and culverts.

(8) Provide dips, water bars, and cross drainage on all temporary roads.

(9) Relief culverts should have a minimum slope of one percent and be provided with a sediment-catching basin at the entrance. Use downspouts and other slope protection measures to avoid erosion of fill areas.

(10) Drainage should be placed above stream crossings so that the water may be filtered through vegetative buffers or other systems before entering waters of the state.

Stat. Auth.: ORS Ch. 526 & 527

ROAD CONSTRUCTION

629-24-423

Debris overburden and other waste material associated with road construction shall be placed in such a manner as to prevent entry into waters of the state. Landowners and operators shall:

(1) Deposit excess material in stable locations above the high water level where it will not enter waters of the state.

(2) Clear drainage ways of all debris generated during road construction or maintenance which potentially interferes with drainage.

(3) Stabilize sidecast material which is potentially unstable or erodible by use of seeding, compacting, riprapping, benching or other suitable means.

(4) In the construction of road fills, compact the material to reduce the entry of water and minimize the settling of fill material.

(5) Construct temporary or permanent stream crossings to result in minimum disturbance to banks, existing channels, and riparian management areas. Temporary crossings shall be removed promptly after use.

(6) Keep machine activity in beds of streams to an absolute minimum. Acceptable activities where machines are allowed in streambeds (such as

when installing a culvert) shall be restricted to when water levels are low. Operators shall obtain prior approval of the State Forester for machine activity in Type F or Type D streams, lakes, and significant wetlands.

(7) Install drainage structures as soon as feasible during the pioneering stage of road construction. Uncompleted road grades subject to washing before grading should be adequately cross-drained.

(8) Retain outslope drainage during construction operations, and remove all berms on the outside edge except those intentionally constructed for protection of road grade fills.

(9) Conduct road and bridge construction during that time of year which will prevent serious soil erosion. When this is not practical, measures to prevent erosion shall be taken.

(10) Place woody debris or boulders in stream channels for stream habitat enhancement only upon prior approval of the State Forester.

(11) For all roads constructed or reconstructed on or after September 1, 1994, operators shall install water crossing structures where needed to maintain the flow of water and passage of adult and juvenile fish between side channels or wetlands and main channels.

Stat. Auth.: ORS Ch. 526 & 527

ROAD MAINTENANCE

629-24-424

Maintenance on both active and inactive roads shall be sufficient to maintain a stable surface, keep the drainage system operating, and to protect the quality of the waters of the state:

(1) Clean culvert inlets and outlets and ditches before runoff periods to diminish danger of clogging and the possibility of washouts.

(2) When it is the intention of the landowner to discontinue active use of the road or to control unauthorized use, the road shall be maintained to the degree necessary to provide appropriate drainage and soil stability.

(3) Plan applications and apply road oil or other surface stabilizing material in such a manner as to prevent their entry into waters of the state.

(4) Provide drainage where groundwater causes slope instability.

(5) When it is the intention of the landowner to vacate a road or put-a-road-to-bed, the landowner shall make a concerted effort to prevent continual use of the road, and the road shall be left in such a state as to provide for adequate drainage and soil stability without continuous active maintenance.

(6) In order to maintain fish passage through water crossing structures, operators shall:

(a) Maintain conditions at the structures so that passage of adult and juvenile fish is not impaired during periods when fish movement normally occurs. This standard is required only for roads constructed or reconstructed after September 1994, but is encouraged for all other roads; and

(b) As reasonably practicable, keep structures cleared of woody debris and deposits of sediment that would impair fish passage.

(c) Other fish passage requirements under the authority of ORS 498.268 and 509.605 that are administered by other state agencies may be applicable to water crossing structures, including those constructed before September 1, 1994.

Stat. Auth.: ORS Ch. 526 & 527

ROAD LOCATION

629-24-521

Operators shall locate roads to minimize the risk of material entering waters of the state and to minimize disturbance to channels, lakes, wetlands, and flood plains.

(1) Fit the road to the topography so that a minimum alteration of natural features will be necessary.

(2) Avoid locating roads in steep, narrow canyons, slide areas, steep headwalls, slumps, marshes, meadows, riparian management areas, or existing drainage channels where practical alternatives exist. If there is a risk of material entering the waters of the state, the operator shall obtain prior approval from the State Forester.

(3) Avoid locating roads on high risk sites if practical alternatives exist. Obtain prior approval from the State Forester before building roads on high risk sites.

(4) Minimize road density in high risk areas whenever practical alternatives exist.

(5) Minimize the number of stream crossings.

(6) When it is practical, cross streams at right angles to the main channel.

(7) Operators shall leave or re-establish areas of vegetation between roads and streams.

(8) Operators shall not locate roads in riparian management areas without prior approval of the State Forester.

(9) To minimize road construction, make use of existing roads where practical. Where roads traverse land in another ownership but will adequately serve the operation, attempt to negotiate with the owner for use before resorting to location of new roads.

Stat. Auth.: ORS Ch. 527.710

ROAD DESIGN

629-24-522

Consistent with good safety practices, design each road to the minimum use standards adapted to the terrain and soil materials, so as to minimize disturbance to existing drainages and damage to water quality.

(1) Use a flexible design to minimize damage to soil and water quality. Designate end-hauling where disposal of excess material from high risk sites is indicated.

(2) Roads should be designed no wider than necessary to accommodate the immediate anticipated use.

(3) Design cut and fill slopes to minimize the risk of mass soil movement.

(4) Operators shall design and construct stream crossing structures (culverts, bridges and fords) to:

(a) Minimize excavation of side slopes near the channel.

(b) Minimize the volume of material in the fill.

(A) Minimizing fill material is accomplished by restricting the width and height of the fill to the amount needed for safe use of the road by vehicles, and by providing adequate cover over the culvert or other drainage structure.

(B) Fills over 15 feet deep contain a large volume of material that can be a considerable risk to downstream beneficial uses if the material moves downstream by water. Consequently, for any fill over 15 feet deep operators shall obtain approval of the State Forester of a written plan that describes the fill and drainage structure design. Approval of such written plans shall require that the design be adequate for minimizing the likelihood of surface erosion, embankment failure, and other downstream movement of fill material.

(c) Prevent erosion of the fill and channel.

(5) Operators shall design and construct stream crossings (culverts, bridges, and fords) to:

(a) Pass a peak flow that at least corresponds to the 50-year return interval. When determining the size of culvert needed to pass a peak flow corresponding to the 50-year return interval, operators shall select a size that is adequate to preclude ponding of water higher than the top of the culvert; and

(b) Allow migration of adult and juvenile fish upstream and downstream during conditions when fish movement in that stream normally occurs.

(6) An exception to the requirements in subsection (5)(a) of this rule is allowed to reduce the height of fills where roads cross wide flood plains. Such an exception shall be allowed if:

(a) The stream crossing site includes a wide flood plain (greater than 100 feet); and

(b) The stream crossing structure passes a peak flow of not less than the 10-year return interval; and

(c) An overflow depression is constructed in the road fill at a location away from the culvert and at an elevation lower than the top of the culvert; and

(d) The road surface and downstream edge of the overflow depression is armored with rock of sufficient size and depth to protect the fill from eroding when a flood flow occurs.

(7) Design roads to drain naturally by outsloping and through grade changes wherever possible. Where outsloping is not feasible, use roadside ditches and culverts.

(8) Provide dips, water bars, and cross drainage on all temporary roads.

(9) Whenever practical, avoid diverting water from natural drainage ways. Dips, water bars, and cross drainage culverts should be placed above stream crossings so that water can be filtered through vegetative buffers before entering waters of the state.

(10) Provide drainage where surface and groundwater cause slope instability.

(11) Select stable areas for disposal of end-haul materials. Avoid overloading areas which may become unstable from additional material loading.

(12) Design roads so that water is not concentrated into high risk sites.

Stat. Auth.: ORS Ch. 526 & 527

ROAD CONSTRUCTION

629-24-523

Debris, overburden, and other materials associated with road construction shall be placed in such a manner as to prevent entry into the waters of the state. Landowners and operators shall:

(1) Deposit end-haul and other excess material in stable locations above the high water level where it will not enter waters of the state.

(2) Clear drainage ways of woody debris generated during road construction and maintenance.

(3) Place woody debris or boulders in stream channels for stream habitat enhancement only upon prior approval of the State Forester.

(4) Stabilize exposed material which is potentially unstable or erodible by use of seeding, compacting, riprapping, benching, leaving light slashing, or other suitable means.

(5) In the construction of road fills, compact the material to reduce the entry of water and minimize the settling of fill material.

(6) Construct stream crossings to result in minimum disturbance to banks, existing channels, and riparian management areas. Temporary crossing structures shall be removed promptly after use and, where applicable, approaches to the crossings shall be water barred.

(7) Keep machine activity in beds of streams to an absolute minimum. Acceptable activities where machines are allowed in streambeds (such as when installing a culvert) shall be restricted to low water levels. Operators shall obtain prior approval of the State Forester for machine activity in Type F or Type D streams, lakes, and significant wetlands.

(8) Install drainage structures on live streams as soon as feasible. Uncompleted road grades subject to washing should be adequately crossdrained.

(9) Retain outslope drainage during construction operations and remove all berms on the outside edge, except those intentionally constructed for protection of road grade fills.

(10) Keep soil disturbance to a minimum by constructing roads when soil moisture conditions are favorable.

(11) Operators shall not incorporate slash, logs, and other large quantities of organic material into road fills where fill failure due to organic material decomposition may impact waters of the state.

DIVISION 24 INDEX

THE FOLLOWING RULES WERE REPEALED:

[STREAM CHANNEL CHANGES, 629-24-109]

[LEAKAGE OR ACCIDENTAL SPILLAGE OF PETROLEUM PRODUCTS, 629-24-110]

[OPERATIONS ON DESIGNATED COASTAL SHORELANDS, 629-24-115]

[DESIGNATION OF WATERS; NOTICE TO LANDOWNERS; RECONSIDERATIONS, 629-24-116]

[DETERMINING WIDTH OF RIPARIAN MANAGEMENT AREA, 629-24-117]

[NOTIFICATION, POSTING OF ACCESS ROUTES AND ROAD CLOSURE WHEN AERIALLY APPLYING 2,4,5-T OR SILVEX, 629-24-210]

[PROTECTION OF THE WATERS OF THE STATE, 629-24-446]
[PROTECTION OF THE WATERS OF THE STATE, 629-24-546]
[PROTECTION OF THE WATERS OF THE STATE, 629-24-646]

THE FOLLOWING RULES WERE REORGANIZED AND MOVED TO DIVISION 57:

[PURPOSE AND GOAL, 629-24-1000]

[SIGNIFICANT WETLAND TYPES, 629-24-1100]

[PROTECTION OF SIGNIFICANT WETLANDS, 629-24-1200]

[WETLANDS LARGER THAN EIGHT ACRES: NON-FORESTED WETLAND PROTECTION RULES, 629-24-1300]

[WETLANDS LARGER THAN EIGHT ACRES: FORESTED WETLAND PROTECTION RULES, 629-24-1350]

[ESTUARIES, 629-24-1400]

[ESTUARIES: SIGNIFICANT WETLAND PROTECTION RULES, 629-24-1450]

[BOGS, 629-24-1500]

[BOGS: SIGNIFICANT WETLAND PROTECTION RULES, 629-24-1550]

[IMPORTANT SPRINGS IN EASTERN OREGON, 629-24-1600]

[IMPORTANT SPRINGS IN EASTERN OREGON: SIGNIFICANT WETLAND PROTECTION, 629-24-1650

[WETLANDS PROTECTION, 629-24-1900]

[PROTECTING SOIL AND HYDROLOGY, 629-24-1910

[UNDERSTORY VEGETATION RETENTION, 629-24-1920]

[SNAG AND DOWN WOOD RETENTION, 629-24-1930]

[LIVE TREE RETENTION, 629-24-1940]

(12) For all roads constructed or reconstructed on or after September 1, 1994, operators shall install water crossing structures where needed to maintain the flow of water and passage of adult and juvenile fish between side channels or wetlands and main channels.

Stat. Auth.: ORS Ch. 526 & 527

ROAD MAINTENANCE

629-24-524

Maintenance of active and inactive roads shall be sufficient to maintain a stable surface, to keep the drainage system operating, and to protect the quality of the waters of the state.

(1) Clean culvert inlets and outlets, drainage structures and ditches before and during the rainy season to diminish danger of clogging and the possibility of washouts. Provide for practical preventive maintenance programs for high risk sites that will address the problems associated with high intensity rainfall events.

(2) Restore road surface crown or outslope all roads prior to the rainy season.

(3) When it is the intention of the landowner to discontinue active use of the road or to control unauthorized use, the road shall be maintained to the degree necessary to provide appropriate drainage and soil stability.

(4) When it is the intention of the landowner to vacate a road to "put-a-road-to-bed," the road shall be posted "closed"; shall be blocked to prevent continued use by vehicular traffic; and the road shall be left in such a state as to provide for adequate drainage and soil stability.

(5) Plan applications and apply road oil or other surface stabilizing material in such a manner as to prevent their entry into waters of the state.

(6) Maintain and repair active and inactive roads as needed to minimize damage to waters of the state.

(7) Place material removed from ditches in a stable location.

(8) In order to maintain fish passage through water crossing structures, operators shall:

(a) Maintain conditions at the structures so that passage of adult and juvenile fish is not impaired during periods when fish movement normally occurs. This standard is required only for roads constructed or reconstructed after September 1994, but is encouraged for all other roads; and

(b) As reasonably practicable, keep structures cleared of woody debris and deposits of sediment that would impair fish passage.

(c) Other fish passage requirements under the authority of ORS 498.268 and 509.605 that are administered by other state agencies may be applicable to water crossing structures, including those constructed before September 1, 1994.

Stat. Auth.: ORS Ch. 526 & 527

ROAD LOCATION

629-24-621

Operators shall locate roads to minimize the risk of material entering waters of the state and to minimize disturbance to channels, lakes, wetlands, and flood plains:

(1) Fit the road to the topography so that a minimum alteration of natural features will be necessary.

(2) Avoid locating roads in steep, narrow canyons, slide areas, steep headwalls, slumps, marshes, meadows, riparian management areas, or existing drainage channels where practical alternatives exist. If there is a risk of material entering the waters of the state, the operator shall obtain prior approval from the State Forester.

(3) Avoid locating roads on high risk sites if practical alternatives exist. Obtain prior approval from the State Forester before building roads on high risk sites.

(4) Minimize road density in high risk areas whenever practical alternatives exist.

(5) Minimize the number of stream crossings.

(6) When it is practical, cross streams at right angles of the main channel.

(7) Operators shall leave or re-establish areas of vegetation between roads and waters of the state.

(8) Operators shall not locate roads in riparian management areas without prior approval of the State Forester.

(9) To minimize road construction, make use of existing roads where practical. Where roads traverse land in another ownership but will adequately serve the operation, attempt to negotiate with the owner for use before resorting to location of new roads.

Stat. Auth.: ORS Ch. 527.710

ROAD DESIGN

629-24-622

Consistent with good safety practices, design each road to the minimum use standards adapted to the terrain and soil materials, so as to minimize disturbance to existing drainages and damage to water quality:

(1) Use a flexible design standard to minimize damage to soil and water quality. Designate end-hauling where disposal of excess material from high risk sites is indicated.

(2) Roads should be designed no wider than necessary to accommodate the current anticipated use.

(3) Design cut and fill slopes to minimize the risk of mass soil movement.

(4) Operators shall design and construct stream crossing structures (culverts, bridges and fords) to:

(a) Minimize excavation of side slopes near the channel.

(b) Minimize the volume of material in the fill.

(A) Minimizing fill material is accomplished by restricting the width and height of the fill to the amount needed for safe use of the road by vehicles, and by providing adequate cover over the culvert or other drainage structure.

(B) Fills over 15 feet deep contain a large volume of material that can be a considerable risk to downstream beneficial uses if the material moves downstream by water. Consequently, for any fill over 15 feet deep operators shall obtain approval by the Sate Forester of a written plan that describes the fill and drainage structure design. Approval of such written plans shall require that the design be adequate for minimizing the likelihood of surface erosion, embankment failure, and other downstream movement of fill material.

(c) Prevent erosion of the fill and channel.

(5) Operators shall design and construct stream crossings (culverts, bridges, and fords) to:

(a) Pass a peak flow that at least corresponds to the 50-year return interval. When determining the size of culvert needed to pass a peak flow corresponding to the 50-year return interval, operators shall select a size that is adequate to preclude ponding of water higher than the top of the culvert; and

(b) Allow migration of adult and juvenile fish upstream and downstream during conditions when fish movement in that stream normally occurs.

(6) An exception to the requirements in subsection (5)(a) is allowed to reduce the height of fills where roads cross wide flood plains. Such an exception shall be allowed if:

(a) The stream crossing site includes a wide flood plain (greater than 100 feet); and

(b) The stream crossing structure passes a peak flow of not less than the 10-year return interval; and

(c) An overflow depression is constructed in the road fill at a location away from the culvert and at an elevation lower than the top of the culvert; and

(d) The road surface and downstream edge of the overflow depression is armored with rock of sufficient size and depth to protect the fill from eroding when a flood flow occurs.

(7) Design roads to drain naturally through grade changes, outsloping, insloping, roadside ditches, dips, or other suitable devices. Provide dips, water bars and/or cross drainage on all temporary roads.

(8) Whenever practical, avoid diverting water from natural drainage ways. Dips, water bars, and cross drainage culverts should be placed above stream crossings so that water may be filtered through vegetative buffers before entering waters of the state.

(9) Select stable areas for disposal of end-haul materials. Avoid overloading areas which may become unstable from additional material loading.

(10) Provide drainage where surface and groundwater cause slope instability.

(11) Design roads so that water is not concentrated into high risk sites.

Stat. Auth.: ORS Ch. 526 & 527

ROAD CONSTRUCTION

629-24-623

Debris, overburden, and other materials associated with road construction shall be placed in such a manner as to minimize entry into the waters of the state. Landowners and operators shall:

(1) Deposit end-haul and other excess material in stable locations above the high water level where it will not enter waters of the state.

(2) Clear major drainage ways of woody debris generated during road construction.

(3) Place woody debris or boulders in stream channels for stream habitat enhancement only upon prior approval of the State Forester.

(4) Stabilize exposed material which is potentially unstable or erodible by use of seeding, compacting, rip-rapping, benching, leaving light slashing, or other suitable means.

(5) Consider using catch or settling basins at the head of culverts.

(6) In the construction of road fills, compact the material to reduce the entry of water and minimize erosion.

(7) Construct stream crossings to result in minimum disturbance to banks, existing channels, and riparian management areas. Temporary crossings shall be promptly removed after use, and where applicable, road ends shall be water barred.

(8) Keep machine activity in beds of streams to an absolute minimum. Acceptable activities where machines are allowed in streambeds (such as when installing a culvert) shall be restricted to when water levels are low. Operators shall obtain prior approval of the State Forester for machine activity in Type F or Type D streams, lakes, and significant wetlands.

(9) Install drainage structures on live streams as soon as feasible. Uncompleted roads subject to erosion should be adequately cross-drained.

(10) Retain outslope drainage during construction operations, and remove unnecessary berms on the outside edge except those intentionally constructed for protection of road grade fills.

(11) Keep erodible soil disturbance to a minimum by constructing roads when soil moisture conditions are favorable.

(12) Operators shall not incorporate slash, logs, and other large quantities of organic material into road fills where fill failure due to organic material decomposition may impact waters of the state.

(13) For all roads constructed or reconstructed on or after September 1, 1994, the operators shall install water crossing structures where needed to maintain the flow of water and passage of adult and juvenile fish between side channels or wetlands and main channels.

Stat. Auth.: ORS Ch. 526 & 527

ROAD MAINTENANCE

629-24-624

Maintenance on both active and inactive roads shall be sufficient to maintain a stable surface, to keep the drainage system operating, and to protect the quality of the waters of the state:

(1) Clean culvert inlets and outlets, drainage structures and ditches before and during the rainy season to diminish danger of clogging and the possibility of washouts. Provide for practical preventive maintenance programs for high risk sites that will address the problems associated with high intensity rainfall events.

(2) Winterize roads by water barring, surface crowning, or outsloping prior to the rainy season.

(3) When it is the intention of the landowner to discontinue active use of the road or to control unauthorized use, the road shall be maintained to the degree necessary to provide appropriate drainage and soil stability.

(4) Reduce roadside vegetation along main roads to a level which permits safe visibility.

(5) Plan applications and apply road oil or other surface stabilizing material in such manner as to prevent their entry into waters of the state.

(6) When it is the intention of the landowner to vacate a road or put-a-road-to-bed, the road shall be posted "closed" and shall be blocked to prevent continued use by vehicular traffic and the road shall be left in such a state as to provide for adequate drainage and soil stability.

(7) Maintain and repair active and inactive roads as needed to minimize damage to waters of the state.

(8) Place material, removed from ditches, in a stable location.

(9) In order to maintain fish passage through water crossing structures, operators shall:

(a) Maintain conditions at the structures so that passage of adult and juvenile fish is not impaired during periods when fish movement normally occurs. This standard is required only for roads constructed or reconstructed after September 1, 1994, but is encouraged for all other roads; and

(b) As reasonably practicable, keep structures cleared of woody debris and deposits of sediment that would impair fish passage.

(c) Other fish passage requirements under the authority of ORS 498.268 and 509.605 that are administered by other state agencies may be applicable to water crossing structures, including those constructed before September 1, 1994.

Stat. Auth.: ORS Ch. 526 & 527

LOCATION OF LANDINGS, SKID TRAILS, AND FIRE TRAILS

629-24-443

(1) Landowners and operators shall locate landings, skid trails, and fire trails on stable areas so as to minimize the risk of material entering waters of the state.

(2) Landowners and operators shall not locate landings in riparian management areas without prior approval of the State Forester.

(3) Landowners and operators shall use fill material for landing construction that is free of woody or other organic debris, remove all loose woody material and slash from fill area, and compact the fill material in layers during construction.

(4) Landowners and operators shall avoid tractor skidding across slumps and slides.

Stat. Auth.: ORS Ch. 526 & 527

LOCATION OF LANDINGS, SKID TRAILS, AND FIRE TRAILS

629-24-543

(1) Landings shall be of minimum size and shall be located on stable areas to minimize the risk of material entering waters of the state.

(2) Landowners and operators shall not locate landings in riparian management areas without prior approval of the State Forester. Landings shall be located on firm ground above the high water level of any stream. Landings shall not be placed on unstable areas, on steep side hill areas, or where excessive excavation is needed.

Stat. Auth.: ORS Ch. 526 & 527

LOCATION OF LANDINGS, SKID TRAILS, AND FIRE TRAILS

629-24-643

(1) Landowners and operators shall locate landings, skid trails, and fire trails on stable areas so as to minimize the risk of material entering waters of the state.

(2) Landowners and operators shall not locate landings in riparian management areas without prior approval of the State Forester.

(3) Landowners and operators shall locate landings on firm ground above the high water level of any stream and avoid unstable areas or steep side-hill areas or excessive excavation.

(4) Landowners and operators shall avoid tractor skidding across slumps and slides.

Stat. Auth.: ORS Ch. 526 & 527

MAINTENANCE OF PRODUCTIVITY AND RELATED VALUES

629-24-448

Harvesting practices should first be designed to assure the continuous growing and harvesting of forest tree species by suitable economic means and also to protect the soil, air, water, and wildlife resources:

(1) Where major scenic attractions, highways, recreation areas or other high use areas are located within or traverse forestland, conduct prompt cleanup and regeneration.

(2) Obtain prior approval from the State Forester before operating near or within:

(a) Critical wildlife or aquatic habitat sites that are listed in a cooperative agreement between the Board of Forestry and the Fish and Wildlife Commission or sites designated by the State Forester; or

(b) Habitat sites of any wildlife or aquatic species classified by the Department of Fish and Wildlife as threatened or endangered.

(3) Wherever practical, plan clearcutting operations so that adequate wildlife escape cover is available within one-quarter mile.

(4) Wherever practical, preserve snags, fruit, nut, and berry producing shrubs and trees for wildlife habitat.

Stat. Auth.: ORS Ch. 526 & 527

MAINTENANCE OF PRODUCTIVITY AND RELATED VALUES

629-24-548

Design harvesting practices to assure the continuous growing and harvesting of forest tree species by suitable economic means, and also to protect soil, air, water, and wildlife resources.

(1) Where major scenic attractions, highways, recreation areas, or other high use areas are located within or traverse forestland, conduct prompt cleanup and regeneration.

(2) Obtain prior approval from the State Forester before operating near or within:

(a) Critical wildlife or aquatic habitat sites that are listed in a cooperative agreement between the Board of Forestry and the Fish and Wildlife Commission, or sites designated by the State Forester; or

(b) Habitat sites of any wildlife or aquatic species classified by the Department of Fish and Wildlife as threatened or endangered.

(3) Whenever practical, plan clearcutting operations so that adequate wildlife escape cover is available within one-quarter mile from any portion of the clearcut unit.

(4) Minimize compaction and movement of top soil on mechanical clearing projects. Place debris above the high water mark of any stream or body of open water.

(5) Slash, logs, and other large quantities of organic material shall not be incorporated into landing fills where fill failure due to organic material decomposition may impact waters of the state.

(6) Whenever practical, retain snags for wildlife habitat.

Stat. Auth.: ORS Ch. 526 & 527

MAINTENANCE OF PRODUCTIVITY AND RELATED VALUES

629-24-648

Design harvesting practices to assure the continuous growing and harvesting of forest tree species by suitable economic means and also to protect the soil, air, water, and wildlife resources.

(1) Where major scenic attractions, highways, recreation areas, or other high use areas are located within or traverse forestland, conduct prompt cleanup and regeneration.

(2) Obtain prior approval from the State Forester before operating near or within:

(a) Critical wildlife or aquatic habitat sites that are listed in a cooperative agreement between the Board of Forestry and the Fish and Wildlife Commission or sites designated by the State Forester; or

(b) Habitat sites of any wildlife or aquatic species classified by the Department of Fish and Wildlife as threatened or endangered.

(3) Whenever practical, plan clear-cutting operations so that adequate wildlife escape cover is available within one-quarter mile.

(4) Wherever practical, preserve fruit, nut, and berry producing shrubs and trees.

(5) On mechanical clearing projects, minimize compaction and movement of top soil. Place debris above the high water mark of any stream, water course, or body of open water.

(6) Slash, logs, and other large quantities of organic material shall not be incorporated into landing fills where fill failure due to organic material decomposition may impact waters of the state.

(7) Whenever practical, retain snags for wildlife habitat.

Stat. Auth.: ORS Ch. 526 & 527

SENSITIVE RESOURCE SITES; PURPOSE

629-24-690

These rules provide a protection goal, describe the duties of the State Forester, landowner, timber owner and operator, and outline protection for:

(1) Sensitive Bird Nesting, Roosting and Watering Resource Sites (OAR 629-24-700);

(2) Threatened and Endangered Fish and Wildlife Species that use Resource Sites on Forest Lands (OAR 629-24-800);

(3) Biological Sites that are Ecologically and Scientifically Significant (OAR 629-24-900); and

(4) Significant Wetlands on Forestlands (629-57-2300 to 629-57-2350).

Stat. Auth.: ORS Ch. 527.710(3)(a)(c)

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DIVISION 57 INDEX

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(NOTE: DIVISION 57 IS NEW. SOME RULE LANGUAGE WAS TRANSFERRED FROM DIVISION 24; THOUGH MOST LANGUAGE IS COMPLETELY NEW.)

DEFINITIONS

629-57-000

The definitions in OAR 629-24-101 apply to OAR Chapter 629, Division 57, unless otherwise defined in the Division 57 rules.

Stat. Auth.: ORS Ch. 527.710

FOREST ACTIVITY SAFETY

629-57-010

Compliance with worker safety regulations is essential for ensuring the safety of operators and their employees. Regulation of forest practices must be achieved in a manner which allows operators to comply with applicable federal and state safety requirements. In administering the forest practice rules to meet the resource protection goals, especially requirements related to working near snags, residual green trees and unstable material, the State Forester shall use appropriate discretion.

Stat. Auth.: ORS Ch. 527.710

WATER PROTECTION RULES; PURPOSE AND GOALS

629-57-2000

(1) The leading use on private forestland is the growing and harvesting of trees, consistent with sound management of soil, air, water, fish and wildlife resources. There is a unique concentration of public resource values in and near waters of the state because these areas are critical for the overall maintenance of fish and wildlife and for maintaining water quality. Consequently, the policies of the Forest Practices Act, including encouraging economically efficient forest practices, are best achieved by focusing protection measures in riparian management areas.

(2) OAR 629-57-2000 through 629-57-2670 shall be known as the "water protection rules."

(3) The purpose of the water protection rules is to protect, maintain and, where appropriate, improve the functions and values of streams, lakes, wetlands, and riparian management areas. These functions and values include water quality, hydrologic functions, the growing and harvesting of trees, and fish and wildlife resources.

(4) The water protection rules include general vegetation retention prescriptions for streams, lakes and wetlands that apply where current vegetation conditions within the riparian management area have or are likely to develop characteristics of mature forest stands in a "timely manner." Landowners are encouraged to manage stands within riparian management areas in order to grow trees in excess of what must be retained so that the excess may be harvested.

(5) The water protection rules also include alternative vegetation retention prescriptions for streams to allow incentives for operators to actively

manage vegetation where existing vegetation conditions are not likely to develop characteristics of mature conifer forest stands in a "timely manner."

(6) OARs 629-57-2270 and 629-57-2320 allow an operator to propose site-specific prescriptions for sites where specific evaluation of vegetation within a riparian management area and/or the condition of the water of the state is used to identify the appropriate practices for achieving the vegetation and protection goals.

(7) The overall goal of the water protection rules is to provide resource protection during operations adjacent to and within streams, lakes, wetlands and riparian management areas so that, while continuing to grow and harvest trees, the protection goals for fish, wildlife, and water quality are met.

(a) The protection goal for water quality (as prescribed in ORS 527.765) is to ensure through the described forest practices that, to the maximum extent practicable, non-point source discharges of pollutants resulting from forest operations do not impair the achievement and maintenance of the water quality standards.

(b) The protection goal for fish is to establish and retain vegetation consistent with the vegetation retention objectives described in OAR 629-57-2220 (streams), OAR 629-57-2300 (significant wetlands), and OAR 629-57-2400 (lakes) that will maintain water quality and provide aquatic habitat components and functions such as shade, large woody debris, and nutrients.

(c) The protection goal for wildlife is to establish and retain vegetation consistent with the vegetation retention objectives described in OAR 629-57-2220 (streams), OAR 629-57-2300 (significant wetlands), and OAR 629-57-2400 (lakes) that will maintain water quality and habitat components such as live trees of various species and size classes, shade, snags, downed wood, and food within riparian management areas. For wildlife species not necessarily reliant upon riparian areas, habitat in riparian management areas is also emphasized in order to capitalize on the multiple benefits of vegetation retained along waters for a variety of purposes.

Stat. Auth.: ORS Ch. 527.710 & 527.765

WATER PROTECTION RULES; APPLICABILITY AND MONITORING

OAR 629-57-2010

(1) Except as described below, the water protection rules shall become effective on September 1, 1994 and shall be applied as follows:

(a) Operations for which a notification has been received after April 22, 1994, must comply with the water protection rules in all portions of the operation that have not been felled prior to September 1, 1994.

(b) Operations for which a notification has been received and a written plan has been approved by the State Forester on or before April 22, 1994, shall continue to comply with the written plan and the rules that were in effect April 21, 1994, through December 31, 1994, unless the operator has requested and the State Forester has approved a change to the water protection rules as allowed in subsection (1)(d).

(c) After December 31, 1994 the water protection rules shall apply fully to all operations.

(d) Operators may request to have the water protection rules apply to an operation at any time following April 22, 1994. The State Forester shall approve such requests so long as the operator will fully apply the water protection rules on the operation.

(2) (a) For the purposes of the Oregon Forest Practices Act (ORS 527.610 to ORS 527.770, and related sections, Chapter 919, Oregon Laws 1991), Type F and Type D streams classified under OAR 629-57-2100 are equivalent to "Class I streams."

(b) For the purposes of ORS 215.730(1)(b)(c), Type N Streams classified under OAR 629-57-2100 are equivalent to "Class II streams."

(3) (a) Monitoring and evaluation of the water protection rules are necessary because of the innovative approach taken in the rules. Monitoring and evaluation are needed to increase the level of confidence of all concerned that the rules will maintain and improve the condition of riparian vegetation and waters of the state over time.

(b) In cooperation with state and federal agencies, landowners and other interested parties, the department shall conduct monitoring on a continuing basis to evaluate the effectiveness of the water protection rules. The monitoring shall determine the effectiveness of the rules to meet the goals of the Forest Practices Act and the purposes stated in the rules, as well as their workability and operability.

(c) It is the Board of Forestry's intent that the department and its cooperators place a high priority on assessing the monitoring needs and securing adequate resources to conduct the necessary monitoring. The department shall work with its cooperators and the Legislature to secure the necessary resources, funding and coordination for effective monitoring.

(d) The department shall report to the Board of Forestry annually about current monitoring efforts and, in a timely manner, present findings and recommendations for changes to practices. The Board of Forestry shall consider the findings and recommendations and take appropriate action.

Stat. Auth.: ORS Ch. 527.710

WATERSHED SPECIFIC PRACTICES FOR WATER QUALITY LIMITED WATERSHEDS AND THREATENED OR ENDANGERED AQUATIC SPECIES

629-57-2020

(1) The objective of this rule is to describe a process for determining whether additional watershed-specific protection rules are needed for watersheds that have been designated as water quality limited or for watersheds containing threatened or endangered aquatic species.

(2) The Board of Forestry shall appoint an interdisciplinary task force, including representatives of forest landowners within the watershed and appropriate state agencies, to evaluate a watershed, if the board has determined based on evidence presented to it that forest practices in a watershed are measurably limiting to water quality achievement or species maintenance, and either:

(a) The watershed is designated by the Environmental Quality Commission as water quality limited; or

(b) The watershed contains threatened or endangered aquatic species identified on lists that are adopted by rule by the State Fish and Wildlife Commission, or are federally listed under the Endangered Species Act of 1973 as amended.

(3) The board shall direct the task force to analyze conditions within the watershed and recommend watershed-specific practices to ensure water quality achievement or species maintenance.

(4) The board shall consider the report of the task force and take appropriate action.

(5) Nothing in this rule shall be interpreted to limit the Board's ability to study and address concerns for other species on a watershed basis.

Stat. Auth.: ORS Ch. 527.710 and 527.765

WRITTEN PLANS FOR STREAMS, LAKES, WETLANDS AND RIPARIAN MANAGEMENT AREAS

629-57-2030

(1) Operators shall obtain written approval from the State Forester of a written plan before conducting any operation requiring notification under OAR 629-24-107 within:

(a) 100 feet of fish use or domestic water use streams (classified as Type F or Type D under OAR 629-57-2100), except as described in section (3) of this rule.

(b) 300 feet of significant wetlands.

(c) 100 feet of large lakes.

(2) In addition to the written plan requirements in OAR 629-24-113(6), operators shall specifically describe in the written plan for operations within 100 feet of domestic water use portions of Type F or D streams the practices and methods that will be used to prevent sediment from entering waters of the state.

(3) The State Forester may waive, in writing, the requirement for a written plan within 100 feet of a Type F or Type D stream, if the State Forester determines the intended forest practice will not directly affect the physical components of the riparian management area. "Physical components" means materials such as, but not limited to, vegetation, snags, rocks, and soil. "Directly affect" means that physical components will be moved, disturbed, or otherwise altered by the operation activity, even if only temporarily.

(4) Written plans required under section (1) of this rule are subject to the process required for a written plan pursuant to ORS 527.670 (8) through (12), and appeal pursuant to ORS 527.700.

(5) The operator shall comply with all provisions of an approved written plan.

Stat. Auth.: ORS Ch. 527.670 & 527.710

MODIFICATION OF REQUIREMENTS FOR FOREST HEALTH AND PUBLIC SAFETY

629-57-2040

Protection requirements for streams, lakes, wetlands and riparian management areas may be modified by prior approval of the State Forester for reasons of forest health or because of hazards to public safety or property. Hazards to public safety or property include hazards to river navigation and hazards to improvements such as roads, bridges, culverts, or buildings. Forest health concerns include fire, insect infestations, disease epidemics, or other catastrophic events not otherwise addressed in OAR 629-57-2260. Such modifications of protection requirements should prevent, reduce or alleviate the forest health conflict or hazard while meeting the intent of the protection goals as much as possible.

Stat. Auth.: ORS Ch. 527.710

WATER CLASSIFICATION

629-57-2100

(1) The purpose of this water classification system is to match the physical characteristics and beneficial uses of a water body to a set of appropriate protection measures.

(2) For the purposes of applying appropriate protection measures, waters of the state shall be classified as either streams, wetlands, or lakes.

(3) Streams shall be classified further according to their beneficial uses and size.

(4) Streams shall be classified into one of the following three beneficial use categories:

(a) Streams that have fish use, including fish use streams that have domestic water use, shall be classified as Type F.

(b) Streams that have domestic water use, but not fish use, shall be classified as Type D.

(c) All other streams shall be classified as Type N.

(5) For purposes of classification, a stream is considered to have domestic water use only if a water use permit has been issued by the Oregon Water Resources Department.

(6) A channel is considered to have domestic water use upstream of an intake for the distances indicated below:

(a) For domestic water use that is a community water system (as defined under OAR 333-61-020), Type D classification shall initially apply to the length of stream that was designated as Class I under the classification system that was in effect on April 22, 1994, which is that shown on district water classification maps at the time of adoption of this rule.

(b) For domestic water use that is not a community water system, Type D classification shall be initially applied for the shortest of the following distances:

(A) The distance upstream of the intake to the farthest upstream point of summer surface flow;

(B) Half the distance from the intake to the drainage boundary; or

(C) 3000 feet upstream of the intake.

(c) Type D classification shall apply to tributaries off the main channel as long as the conditions of subsections (6)(a) and (b) of this rule apply.

(7) (a) A representative of a community water system or other domestic use water permit holder may request that the department designate additional lengths of channels upstream of a domestic water intake or reservoir as Type D. The representative or permit holder must present evidence that the additional stream protection is needed. The department will decide whether or not to extend Type D classification to these other channels based on evidence presented by the requesting party showing that protection measures associated with Type N classification would be insufficient to prevent adverse detrimental temperature increases, turbidity increases, or other adverse water quality changes at the domestic water use intake or reservoir.

(b) The process and criteria described in subsection (7)(a), and the criteria under section (6) of this rule will be used to evaluate the extent of Type D classification for new community water systems.

(c) The department will decide whether or not to extend the length of Type D classification within 30 days of the presentation of evidence.

(8) The domestic water use classification may be waived by the department at the request of a landowner who is the sole domestic water use permit holder for an intake and who owns all the land along upstream channels that would be affected by the classification related to that intake. This waiver shall not affect the classification related to downstream domestic water use intakes.

(9) A stream or lake will be considered to have fish use if inhabited at any time of the year by anadromous or game fish species or fish that are listed as threatened or endangered species under the federal or state endangered species acts.

(10) The fish use classification does not apply to waters where fish were introduced through a fish stocking permit that includes documentation that the stream had no fish prior to stocking.

(11) The department, with assistance from the Oregon Department of Fish and Wildlife, will conduct a comprehensive field survey to identify fish use on non-federal forestland in Oregon. However, this survey will take a number of years to complete. In the interim, the following procedures apply to determining which unsurveyed waters are designated Type F:

(a) The department will assume that waters have fish use if they were Class I under the previous classification system. Waters that were Class I solely because of domestic water use are excluded.

(b) If waters within the boundaries of a proposed operation were not Class I (under the previous classification system) and fish use is unknown, then:

(A) The department will conduct a field survey for fish after a notification of operation is received; or

(B) The department will approximate the upstream extent of fish use in a watershed by considering the connection of the water with

downstream waters where fish use is known. Fish use will be assumed to occur upstream of the known fish use until the first natural barrier to fish use is encountered.

(c) Where fish use is unknown, an operator may request that the department conduct a field survey for fish use for reaches of a stream that will be included within an operation that is scheduled to start at least 12 months following the request. The operator shall limit such requests to operations that are part of a landowner's planned harvest schedule and will be conducted during the following year. The department, with assistance from the Oregon Department of Fish and Wildlife when needed, shall attempt to complete such surveys within 12 months following the request. If the survey cannot be conducted in the time indicated, the stream will be considered to have no fish use. However, if the operation has not commenced within six months of the time the operation was scheduled to begin, the stream will again be considered to have unknown fish use.

(d) The department may use other reliable fish survey information when determining whether or not a stream has fish use. This information could include surveys done by landowners, federal or state agencies, universities, or other persons or entities. The department will determine whether such information is reliable.

(12) For each of the three beneficial use categories (Type F, Type D, and Type N), streams shall be categorized further according to three size categories: large, medium, and small. The size categories are based on average annual flow.

(a) Small streams have an average annual flow of two cubic feet per second or less.

(b) Medium streams have an average annual flow greater than two and less than ten cubic feet per second.

(c) Large streams have an average annual flow of ten cubic feet per second or greater.

(13) The assignment of size categories to streams on forestland will be done by the department as follows:

(a) The department will index average annual flow to the upstream drainage area and average annual precipitation. The methodology is described in Technical Note FP1 dated April 21, 1994.

(b) Actual measurements of average annual flow may substitute for the calculated flows described in the technical note.

(c) Any stream with a drainage area less than 200 acres shall be assigned to the small stream category regardless of the flow index calculated in subsection (13)(a).

(14) Wetlands shall be classified further as indicated below:

(a) The following types of wetlands are classified as "significant wetlands":

(A) Wetlands that are larger than eight acres;

(B) Estuaries;

(C) Bogs; and

(D) Important springs in eastern Oregon.

(b) Stream-associated wetlands that are less than eight acres are classified according to the stream with which they are connected.

(c) All other wetlands, including seeps and springs are classified according to their size as either "other wetlands greater than one-quarter acre" or "other wetlands less than one-quarter acre."

(15) Lakes shall be classified further as indicated below:

(a) Lakes greater than eight acres are classified as "large lakes."

(b) All other lakes are classified as "other lakes."

Stat. Auth.: ORS Ch. 527.710 & Chapter 919 Oregon Laws 1991, Section 9

DESIGNATION OF WATERS; NOTICE TO LANDOWNERS; RECONSIDERATION.

629-57-2110

(1) The State Forester shall maintain a map showing the classification of waters of the state in each Department of Forestry unit office where notice of operations required by ORS 527.670(6) may be submitted. The map shall show streams, lakes and significant wetlands of known classification within the geographic area of responsibility for that unit office. For streams, the maps shall indicate the size class and, when known, extent of fish use and domestic water use classification.

(2) Once a water of the state has been classified according to OAR 629-57-2100, the State Forester shall not change the classification without written notice to the landowners immediately adjoining the portion(s) of water to be reclassified. Notice to landowners shall include the reason for the change of classification and applicable rules.

(3) Any landowner whose land immediately adjoins the water to be reclassified, any landowner who has received a water right or was granted an easement affecting the water classification, or any state resource agency may request reconsideration of classifications of waters of the state by the department. Such a request shall be in writing and shall identify on a map the portion of the stream or water of the state which should be reconsidered. The request shall present evidence that the current classification is not consistent with OAR 629-57-2100 "Water Classification."

(4) The department shall have up to 14 days to provide a final decision on a request for reconsideration of water classification. Until such a decision is provided, operators shall conduct any operation based upon the most protective potential water classification.

Stat. Auth.: ORS Ch. 527.710

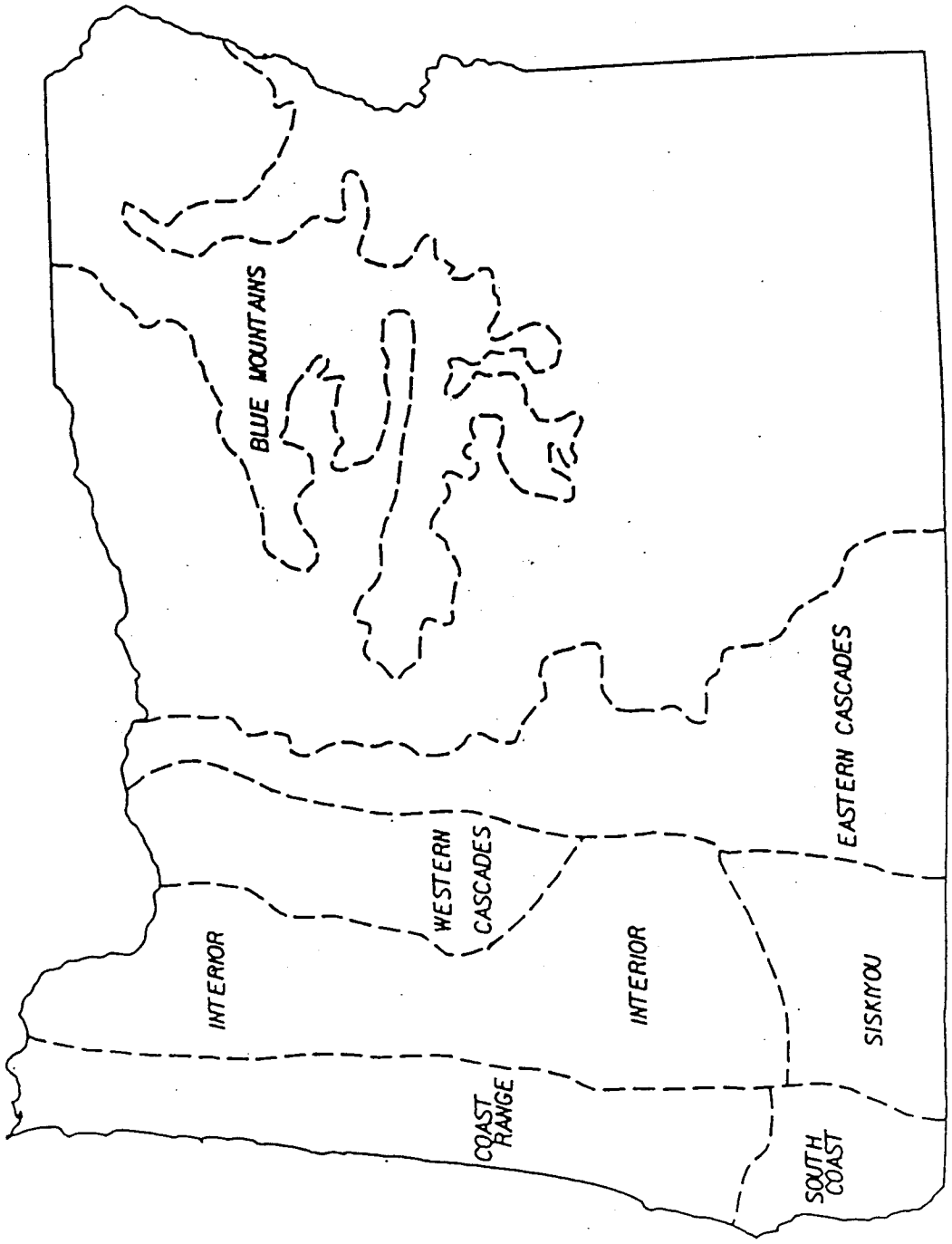


FIGURE 1.
(OAR 629-57-2120)

GEOGRAPHIC REGIONS

629-57-2120

For the purposes of assigning protection measures to waters of the state, seven geographic regions have been delineated for forested areas within the state. The boundaries and names of the geographic regions are displayed in Figure 1. Precise boundaries are found on maps at department field offices. Geographic regions are not "forest regions" established pursuant to ORS 527.640(1).

Stat. Auth. ORS Ch. 527.710

RIPARIAN MANAGEMENT AREAS AND WATER QUALITY PROTECTION MEASURES

629-57-2150

(1) Riparian management area widths are designated to provide adequate areas along streams, lakes, and significant wetlands to retain the physical components and maintain the functions necessary to accomplish the purposes and to meet the protection objectives and goals for water quality, fish, and wildlife set forth in OAR 629-57-2000.

(2) Specified protection measures, such as for site preparation, yarding and stream channel changes, are required for operations near waters of the state and within riparian management areas to maintain water quality.

(3) (a) Operators shall apply the specified water quality protection measures and protect riparian management areas along each side of streams and around other waters of the state as described in OAR 629-57-2200 through 629-57-2670.

(b) Operators may vary the width of the riparian management area above or below the average specified width depending upon topography, operational requirements, vegetation, fish and wildlife resources and water quality protection as long as vegetation retention and protection standards are met. However, the average width of the entire riparian management area within an operation must equal or exceed the required width.

Stat. Auth.: ORS Ch. 527.710

RIPARIAN MANAGEMENT AREA WIDTHS FOR STREAMS

629-57-2200

(1) (a) The riparian management area widths for streams are designated for each stream type as shown in Table 1.

(b) Except as indicated in section (2), operators shall measure the riparian management area width as a slope distance from the high water level of main channels.

(c) Notwithstanding the distances designated in subsection (1)(a), where wetlands or side channels extend beyond the designated riparian management area widths, operators shall expand the riparian management area as necessary to entirely include any stream-associated wetland or side channel plus at least 25 additional feet. This provision does not apply to small Type N streams.

(2) In situations where the slope immediately adjacent to the stream channel is steep exposed soil, a rock bluff or talus slope, operators shall

measure the riparian management area as a horizontal distance until the top of the exposed bank, bluff or talus slope is reached. From that point, the remaining portion of the riparian management area shall be measured as a slope distance.

Stat. Auth.: ORS Ch. 527.710

VEGETATION RETENTION GOALS FOR STREAMS; DESIRED FUTURE CONDITIONS

629-57-2220

(1) The purpose of this rule is to describe how the vegetation retention measures for streams were determined, their purpose and how the measures are implemented. The vegetation retention requirements for streams described in OAR 629-57-2230 through OAR 629-57-2270 are designed to produce desired future conditions for the wide range of stand types, channel conditions, and disturbance regimes that exist throughout forestlands in Oregon.

(2) The desired future condition for streamside areas along fish use streams is to grow and retain vegetation so that, over time, average conditions across the landscape become similar to those of mature streamside stands. Oregon has a tremendous diversity of forest tree species growing along waters of the state and the age of mature streamside stands varies by species. Mature streamside stands are often dominated by conifer trees. For many conifer stands, mature stands occur between 80 and 200 years of stand age. Hardwood stands and some conifer stands may become mature at an earlier age. Mature stands provide ample shade over the channel, an abundance of large woody debris in the channel, channel-influencing root masses along the edge of the high water level, snags, and regular inputs of nutrients through litter fall.

(3) The rule standards for desired future conditions for fish use streams were developed by estimating the conifer basal area for average unmanaged mature streamside stands (at age 120) for each geographic region. This was done by using normal conifer yield tables for the average upland stand in the geographic region, and then adjusting the basal area for the effects of riparian influences on stocking, growth and mortality or by using available streamside stand data for mature stands.

(4) The desired future condition for streamside areas that do not have fish use is to have sufficient streamside vegetation to support the functions and processes that are important to downstream fish use waters and domestic water use and to supplement wildlife habitat across the landscape. Such functions and processes include: maintenance of cool water temperature and other water quality parameters; influences on sediment production and bank stability; additions of nutrients and large conifer organic debris; and provision of snags, cover, and trees for wildlife.

(5) The rule standards for desired future conditions for streams that do not have fish use were developed in a manner similar to fish use streams. In calculating the rule standards, other factors used in developing the desired future condition for large streams without fish use and all medium and small streams included the effects of trees regenerated in the riparian management area during the next rotation and desired levels of instream large woody debris.

(6) For streamside areas where the native tree community would be conifer dominated stands, mature streamside conditions are achieved by retaining

a sufficient amount of conifers next to large and medium sized fish use streams at the time of harvest, so that halfway through the next rotation or period between harvest entries, the conifer basal area and density is similar to mature unmanaged conifer stands. In calculating the rule standards, a rotation age of 50 years was assumed for even-aged management and a period between entries of 25 years was assumed for uneven-aged management. The long-term maintenance of streamside conifer stands is likely to require incentives to landowners to manage streamside areas so that conifer reforestation occurs to replace older conifers over time.

(7) Conifer basal area and density targets to produce mature stand conditions over time are outlined in the general vegetation retention prescriptions. In order to ensure compliance with state water quality standards, these rules include requirements to retain all trees within 20 feet and understory vegetation within 10 feet of the high water level of specified channels to provide shade.

(8) For streamside areas where the native tree community would be hardwood dominated stands, mature streamside conditions are achieved by retaining sufficient hardwood trees. As early successional species, the long-term maintenance of hardwood streamside stands will in some cases require managed harvest using site specific vegetation retention prescriptions so that reforestation occurs to replace older trees. In order to ensure compliance with state water quality standards, these rules include requirements in the general vegetation retention prescription to retain all trees within 20 feet and understory vegetation within 10 feet of the high water level of specified channels to provide shade.

(9) In many cases the desired future condition for streams can be achieved by applying the general vegetation retention prescriptions, as described in OAR 629-57-2230 and OAR 629-57-2250. In other cases, the existing streamside vegetation may be incapable of developing into the future desired conditions in a "timely manner." In this case, the operator can apply an alternative vegetation retention prescription described in OAR 629-57-2260 or develop a site specific vegetation retention prescription described in OAR 629-57-2270. For the purposes of the water protection rules, "in a timely manner" means that the trees within the riparian management area will meet or exceed the applicable basal area target or vegetation retention goal during the period of the next harvest entry that would be normal for the site. This will be 50 years for many sites.

(10) Where the native tree community would be conifer dominant stands, but due to historical events the stand has become dominated by hardwoods, in particular, red alder, disturbance is allowed to produce conditions suitable for the re-establishment of conifer. In this and other situations where the existing streamside vegetation is incapable of developing characteristics of a mature streamside stand in a "timely manner," the desired action is to manipulate the streamside area and woody debris levels at the time of harvest (through an alternative vegetation retention prescription or site specific vegetation retention prescription) to attain such characteristics more quickly.

Stat. Auth.: ORS Ch. 527.710

GENERAL VEGETATION RETENTION PRESCRIPTION FOR TYPE F STREAMS

629-57-2230

(1) (a) Operators shall apply the vegetation retention requirements described in this rule to the riparian management areas of Type F streams.

(b) Segments of Type F streams that are different sizes within an operation shall not be combined or averaged together when applying the vegetation retention requirements.

(c) Trees left to meet the vegetation retention requirements for one stream type shall not count towards the requirements of another stream type.

(2) Operators shall retain:

(a) All understory vegetation within 10 feet of the high water level;

(b) All trees within 20 feet of the high water level; and

(c) All trees leaning over the channel.

(3) Operators shall retain within riparian management areas and streams all downed wood and snags that are not safety or fire hazards. Snags felled for safety or fire hazard reasons shall be retained where they are felled unless used for stream improvement projects approved by the State Forester.

(4) Notwithstanding the requirements of section (2) of this rule, vegetation, snags and trees within 20 feet of the high water level of the stream may be felled, moved or harvested as allowed in other rules for road construction, yarding corridors, temporary stream crossings, or for stream improvement.

(5) Operators shall retain at least 40 live conifer trees per 1000 feet along large streams and 30 live conifer trees per 1000 feet along medium streams. This includes trees left to meet the requirements described in section (2) of this rule. Conifers must be at least 11 inches DBH for large streams and 8 inches DBH for medium streams to count toward these requirements.

(6) Operators shall retain trees or snags six inches or greater DBH to meet the following requirements (this includes trees left to meet the requirements of sections (2) and (5) of this rule):

(a) If live conifer tree basal area in the riparian management area is greater than the standard target shown in Table 2 where the harvest unit will be a clearcut (as defined by ORS 527.620(2)), or Table 3 where the harvest unit will be a partial harvest or thinning, operators shall retain live conifer trees of sufficient basal area to meet the standard target.

(b) If live conifer tree basal area in the riparian management area is less than the standard target (as shown in Table 2 where the harvest unit will be a clearcut, or Table 3 where the harvest unit will be a partial harvest or thinning) but greater than one-half the standard target shown in Table 2, operators shall retain all live conifer trees six inches DBH or larger in the riparian management area (up to a maximum of 150 conifers per 1000 feet along large streams, 100 conifers per 1000 feet along medium streams, and 70 conifers per 1000 feet along small streams).

(c) If live conifer tree basal area in the riparian management area is less than one-half the standard target shown in Table 2:

(A) Operators may apply an alternative vegetation retention prescription as described in OAR 629-57-2260, where applicable, or develop a site specific vegetation retention prescription as described in OAR 629-57-2270; or

(B) Operators shall retain all conifers in the riparian management area and all hardwoods within 50 feet of the high water level for large streams, within 30 feet of the high water level for medium streams, and within 20 feet of the high water level for small streams.

(7) In the Coast Range, South Coast, Interior, Western Cascade, and Siskiyou geographic regions, hardwood trees and snags six inches or greater DBH may count toward the basal area requirements in subsection (6)(a) of this rule as follows:

(a) All cottonwood and Oregon ash trees within riparian management areas that are beyond 20 feet of the high water level of large Type F streams, may count toward the basal area requirements.

(b) Up to 10 percent of the basal area requirement may be comprised of sound conifer snags at least 30 feet tall and other large live hardwood trees, except red alder, growing in the riparian management area more than 20 feet from the high water level and at least 24 inches DBH.

(8) In the Eastern Cascade and Blue Mountain geographic regions, hardwood trees, dying or recently dead or dying trees and snags six inches or greater DBH may count toward the basal area requirements in subsection (6)(a) of this rule as follows:

(a) The basal area of retained live hardwood trees may count toward meeting the basal area requirements.

(b) Up to 10 percent of the basal area retained to meet the basal area requirement may be comprised of sound conifer snags at least 30 feet tall.

(c) For small Type F streams, the maximum required live conifer tree basal area that must be retained to meet the standard target is 40 square feet. The remaining basal area required may come from retained snags, dying or recently dead or dying trees, or hardwoods if available within the riparian management area.

(9) Notwithstanding the requirements indicated in this rule, operators may conduct precommercial thinning and other release activities to maintain the growth and survival of conifer reforestation within riparian management areas. Such activities shall contribute to and be consistent with enhancing the stand's ability to meet the desired future condition.

(10) When determining the basal area of trees, the operator may use the average basal area for a tree's diameter class, as shown in Table 4, or determine an actual basal area for each tree. The method for determining basal area must be consistent throughout the riparian management area.

(11) (a) For large and medium Type F streams, live conifer trees retained in excess of the active management target and hardwoods retained beyond 20 feet of the high water level of the stream that otherwise meet the requirements for leave trees may be counted toward requirements for leave trees within clearcuts (pursuant to Section 5, Chapter 919, Oregon Laws 1991).

(b) For small Type F streams, all retained live trees that otherwise meet the requirements for leave trees may count toward requirements for leave trees within clearcuts.

(12) Trees on islands with ground higher than the high water level may be harvested as follows:

(a) If the harvest unit is solely on an island, operators shall apply all the vegetation retention requirements for a large Type F stream described in this rule to a riparian management area along the high water level of the channels forming the island.

(b) Otherwise, operators shall retain all trees on islands within 20 feet of the high water level of the channels forming the island and all trees leaning over the channels. In this case, conifer trees retained on islands may count toward the basal area requirement for adjacent riparian management areas so long as the trees are at least 11 inches DBH for large streams and eight inches DBH for medium streams.

(13) When applying the vegetation retention requirements described in this rule to the riparian management areas, if an operator cannot achieve the required retention without leaving live trees on the upland side of a road that may be within the riparian management area and those trees pose a safety hazard to the road and will provide limited functional benefit to the stream, the State Forester may modify the retention requirements on a site specific basis.

Stat. Auth.: ORS Ch. 527.710

LIVE TREE RETENTION CREDIT FOR IMPROVEMENT OF TYPE F STREAMS

629-57-2240

(1) Many Type F streams currently need improvement of fish habitat because they lack adequate amounts of large woody debris in channels, or they lack other important habitat elements.

(2) This rule allows operator incentives to place conifer logs in channels or to take other enhancement actions to create immediate improvements in fish habitat.

(3) Subject to prior approval of the State Forester, operators may place conifer logs or downed trees in Type F streams and receive basal area credit toward meeting the live tree retention requirements in a stream's riparian management area.

(4) For each conifer log or tree the operator places in a large or medium Type F stream, the basal area credit is twice the basal area of the placed log or tree.

(5) For each conifer log or tree the operator places in a small Type F stream, the basal area credit is equal to the basal area of the placed log or tree.

(6) Basal area credit will be determined by measuring the cross-sectional area of the large end of a log or by measuring the point on a downed tree that would be equivalent to breast height.

(7) To receive basal area credit for downed trees or conifer logs placed in a stream, the operator shall comply with the guidance and restrictions for placing logs or trees prescribed by the State Forester.

(8) Operators may propose other stream enhancement projects for basal area credit such as creation of backwater alcoves, riparian grazing exclosures (such as fencing), and placement of other instream structure such as boulders and rootwads. When a project is approved by the department through consultation with the Oregon Department of Fish and Wildlife,

basal area credit shall be given toward meeting the live tree requirements within riparian management areas. The basal area credit shall be negotiated between the department, operator and Oregon Department of Fish and Wildlife.

(9) Basal area credit may be given to an operation for enhancement projects conducted at locations other than at the operation site so long as the project is in the same immediate vicinity as the operation site (for instance, within one or two miles of the operation).

(10) Basal area credit may be given to an operation for improvement projects conducted at a later date (this may be necessary to avoid operating under high water conditions or to protect spawning areas), but the project must be completed within six months of the completion of the operation.

(11) In granting basal area credit, the standing tree basal area retained within riparian management areas of Type F streams shall not be reduced to less than the active management targets shown in Table 2 or 3, as applicable.

(a) For small Type F streams in the Eastern Cascade and Blue Mountain geographic regions, the live conifer tree basal area may be reduced to 30 square feet for the active management target. The remaining portion of the basal area requirement must come from snags, dying or recently dead or dying trees, or hardwood trees if available in the riparian management area.

(12) Operators shall notify the State Forester of the completion of live tree retention credit stream improvement projects that were planned for locations other than on the operation site under section (10) of this rule or that were planned to be completed at another date under section (11) of this rule.

Stat. Auth.: ORS Ch. 527.710

GENERAL VEGETATION RETENTION PRESCRIPTION FOR TYPE D AND TYPE N STREAMS

629-57-2250

(1) (a) Operators shall apply the vegetation retention requirements described in this rule to the riparian management areas of Type D and Type N streams.

(b) Segments of Type D or Type N streams that may be of a different size within operation shall not be combined or averaged together when applying the vegetation retention requirements.

(c) Trees left to meet the vegetation retention requirements for one stream type shall not count toward the requirements of another stream type.

(2) Operators shall retain along all Type D, and large and medium Type N streams:

(a) All understory vegetation within 10 feet of the high water level;

(b) All trees within 20 feet of the high water level; and

(c) All trees leaning over the channel.

(3) Operators shall retain all downed wood and snags that are not safety or fire hazards within riparian management areas and streams. Snags felled for safety or fire hazard reasons shall be retained where they are felled unless used for stream improvement projects approved by the State Forester.

(4) Notwithstanding the requirements of section (2), vegetation, snags and trees within 20 feet of the high water level of the stream may be felled, moved or harvested as allowed in the rules for road construction, yarding corridors, temporary stream crossings, or for stream improvement.

(5) Operators shall retain at least 30 live conifer trees per 1000 feet along large Type D and Type N streams and 10 live conifer trees per 1000 feet along medium Type D and Type N streams. This includes any trees left to meet the requirements described in section (2) of this rule. Conifers must be at least 11 inches DBH for large streams and eight inches DBH for medium streams to count toward these requirements.

(6) Operators shall retain all understory vegetation and non-merchantable conifer trees (conifer trees less than six inches DBH) within 10 feet of the high water level on each side of small perennial Type N streams indicated in Table 5.

(a) The determination that a stream is perennial shall be made by the State Forester based on a reasonable expectation that the stream will have summer surface flow after July 15.

(b) The determination in subsection (6)(a) of this rule can be made based on a site inspection, data from other sources such as landowner information, or by applying judgment based upon stream flow patterns experienced in the general area.

(c) Operators are encouraged whenever possible to retain understory vegetation, non-merchantable trees, and leave trees required within clearcuts (pursuant to Section 5, Chapter 919, Oregon Laws 1991) along all other small Type N streams within harvest units.

(7) Operators shall retain trees six inches or greater DBH to meet the following requirements (this includes trees left to meet the requirements of sections (2) and (5) of this rule):

(a) If the live conifer tree basal area in the riparian management area is greater than the standard target shown in Table 6 where the harvest will be a clearcut (as defined by ORS 527.620(2)), or in Table 7 where the harvest unit is a partial harvest or thinning, operators shall retain along all Type D, and medium and large Type N streams live conifer trees of sufficient basal area to meet the standard target.

(b) If the live conifer tree basal area in the riparian management area is less than the standard target (as shown in Table 6 where the harvest will be a clearcut or Table 7 where the harvest unit is a partial harvest or thinning), but greater than one-half the standard target shown in Table 6, operators shall retain along all Type D, and medium and large Type N streams all conifers 6 inches DBH or larger in the riparian management area (up to a maximum of 100 conifers per 1000 feet along large streams, and 70 conifers per 1000 feet along medium streams).

(c) If the live conifer tree basal area in the riparian management area is less than one-half the standard target shown in Table 6:

(A) Operators may apply an alternative vegetation retention prescription as described in OAR 629-57-2260, where applicable, or develop a site specific vegetation retention prescription as described in OAR 629-57-2270; or

(B) Operators shall retain along all Type D, and medium and large Type N streams all conifers in the riparian management area and all hardwoods within 30 feet of the high water level for large streams and within 20 feet of the high water level for medium streams.

(8) In the Coast Range, South Coast, Interior, Western Cascade, and Siskiyou geographic regions, hardwood trees and snags six inches or greater DBH may count toward the basal area requirements in subsection (7)(a) of this rule as follows:

(a) All cottonwood and Oregon ash trees within riparian management areas that are beyond 20 feet of the high water level of large Type D and N streams, may count toward the basal area requirements.

(b) For large Type D and N streams, up to 10 percent of the basal area requirement may be comprised of sound conifer snags at least 30 feet tall and other large live hardwood trees, except red alder, growing in the riparian management area more than 20 feet from the high water level and at least 24 inches DBH.

(c) For medium Type D and N streams:

(A) Up to 30 square feet of basal area per 1000 feet of stream may be comprised of hardwood trees.

(B) Up to five percent of the basal area retained may be comprised of sound conifer snags that are at least 30 feet tall.

(9) In the eastern Oregon and Blue Mountain geographic regions:

(a) The basal area of all retained live hardwood trees may count toward meeting the basal area requirements.

(b) For large Type D and N streams, up to 10 percent of the basal area requirement may be comprised of sound conifer snags at least 30 feet tall.

(c) For medium Type D and N streams:

(A) Up to 30 square feet of basal area per 1000 feet of stream may be comprised of hardwood trees.

(B) Up to five percent of the basal area retained may be comprised of sound conifer snags that are at least 30 feet tall.

(10) Notwithstanding the requirements indicated in this rule, operators may conduct precommercial thinning and other release activities to maintain the growth and survival of conifer reforestation within riparian management areas. Such activities shall contribute to and be consistent with enhancing the stand's ability to meet the desired future condition.

(11) When determining the basal area of trees along streams in a harvest unit, operators may use the average basal area for a tree's diameter class, as shown in Table 4 in OAR 629-57-2230, or determine an actual basal area for each tree. The method for determining basal area must be consistent throughout the riparian management area.

(12) All live trees retained along Type D and N streams that otherwise meet the requirements for leave trees may count toward requirements for leave trees within clearcuts (pursuant to Section 5, Chapter 919, Oregon Laws 1991).

(13) Trees on islands with ground higher than the high water level may be harvested as follows:

(a) If the harvest unit is solely on an island, operators shall apply all the vegetation retention requirements for a large Type F stream described in this rule to a riparian management area along the high water level of the channels forming the island.

(b) Otherwise, operators shall retain all trees on islands within 20 feet of the high water level of the channels forming the island and all trees leaning over the channels. In this case, conifer trees retained on islands may count toward the basal area requirement for adjacent riparian management areas so long as the trees are at least 11 inches DBH for large streams and 8 inches DBH for medium streams.

(c) All merchantable trees may be harvested from islands within small Type N streams.

(14) When applying the vegetation retention requirements described in this rule to the riparian management areas, if an operator cannot achieve the required retention without leaving live trees on the upland side of a road that may be within the riparian management area and those trees pose a safety hazard to the road and will provide limited functional benefit to the stream, the State Forester may modify the retention requirements on a site specific basis.

Stat. Auth.: ORS 527.710

ALTERNATIVE VEGETATION RETENTION PRESCRIPTIONS

629-57-2260

(1) Alternative prescriptions are intended to apply to situations where the existing streamside stand is too sparse or contains too few live conifers to maintain fish, wildlife, and water quality resources over time. Future desired streamside stand conditions are achieved through immediate manipulation of vegetation, including reforesting the riparian management area with conifers.

(2) Sections (3) and (4) of this rule are alternative vegetation retention prescriptions that operators may apply if the conifer basal area in the riparian management area is no more than one-half of the standard target indicated in either Table 2 of OAR 629-57-2230 or Table 6 of OAR 629-57-2250, as may be applicable, and conditions described in the alternative prescription are applicable.

(3) Alternative Vegetation Retention Prescription 1 (Catastrophic Events). This alternative prescription applies to streamside stands that have been damaged by wildfire or by catastrophic windthrow, insect or disease mortality. Such mortality must occur at the stand level and shall not include normal endemic mortality. The prescription is intended to provide adequate stream shade, woody debris, and bank stability for the future while creating conditions in the streamside area that will result in quick establishment of a new and healthy stand. Operators shall:

(a) Retain trees that have fallen in the stream. Only portions of these trees that are outside the high water levels and do not contribute to the ability of the downed tree to withstand movement during high flows may be harvested.

(b) Retain all live and dead trees within 20 feet of the high water level of large and medium streams and 10 feet of the high water level of small streams.

(c) For Type F streams, retain live trees, dying or recently dead trees, and downed logs sufficient to satisfy the active management target shown in Table 2.

(d) For Type D and N streams, retain live trees, dying or recently dead trees, or downed logs sufficient to satisfy the standard target shown in Table 6.

(e) Live conifers shall be retained first to meet the target. If live conifers are too few to satisfy the target, then the target shall be met as much as possible by including windthrown trees within the channel and dying or recently dead trees.

(f) For purposes of this prescription the basal area of a windthrown tree in the channel or a retained dying or recently dead tree contributes two times its basal area toward meeting the target.

(4) Alternative Vegetation Retention Prescription 2 (Hardwood Dominated Sites). This alternative prescription applies to streamside sites that are capable of growing conifers, and where conifer stocking is currently low and unlikely to improve in a "timely manner" because of competition from hardwoods and brush. If portions of such riparian management areas currently contain abundant conifer basal area, it is intended that these areas of good conifer basal area be segregated and managed using the general vegetation retention prescription while the remainder is managed according to this alternative prescription. The alternative prescription is intended to provide adequate stream shade, some woody debris, and bank stability for the future while creating conditions in the streamside area that will result in quick establishment of a conifer stand. The operator shall:

(a) Evaluate the stand within the riparian management area and, where they exist, segregate segments (200 feet or more in length) that are well-stocked with conifer, as identified from an aerial photograph, from the ground or through other appropriate means. The general vegetation retention prescription for vegetation retention shall be applied to these segments.

(b) For the remaining portion of the riparian management area that has lower conifer basal area, the riparian management area shall be divided into conversion blocks and retention blocks.

(c) No more than half of the total stream length in the harvest unit can be included within conversion blocks. Conversion blocks can be no more than 500 feet long and must be separated from each other by at least 200 feet of retention block or by at least a 200 foot segment where the general vegetation retention prescription is applied.

(d) Within conversion blocks the operator shall retain:

(A) All trees growing in the stream or within 10 feet of the high water level of the stream.

(B) All trees leaning over the channel within 20 feet of the high water level of large streams.

(e) Within retention blocks the operator shall retain:

(A) For large streams, all conifer trees within 50 feet of the high water level of the stream and all hardwood trees within 30 feet of the high water level of the stream.

(B) For medium streams, all conifer trees within 30 feet of the high water level of the stream and all hardwood trees within 20 feet of the high water level of the stream.

(C) For small streams, all trees within 20 feet of the high water level of the stream.

Stat. Auth.: ORS Ch. 527.710

SITE SPECIFIC VEGETATION RETENTION PRESCRIPTIONS FOR STREAMS AND RIPARIAN MANAGEMENT AREAS

629-57-2270

(1) (a) Operators are encouraged to develop site specific vegetation retention prescriptions in an alternate plan.

(b) A primary aim of these prescriptions is to identify opportunities and allow incentives for restoring or enhancing riparian management areas or streams.

(c) Another purpose of site specific vegetation retention prescriptions is to allow for changes to the vegetation retention requirements in OARs 629-57-2230 and 629-57-2250. The changes must provide for the functions and values of stream and their riparian management areas as described in the vegetation retention goals for streams while affording a better opportunity to meet other objectives.

(2) Operators may develop site specific vegetation retention prescriptions for streams and their riparian management areas to achieve the vegetation retention goals described in OAR 629-57-2220 if:

(a) The potential of the streamside stand to achieve basal area and stand density similar to mature conifer forest stands in a "timely manner" is questionable; or

(b) In-stream conditions are impaired due to inadequate large woody debris or other factors; or

(c) The modification of a standard or practice would result in less environmental damage than if the standard or practice were applied.

(3) A site specific vegetation retention prescription shall be approved if the State Forester determines that when properly executed the alternate plan will have no significant or permanent adverse effects: and

(a) It will meet or exceed the vegetation retention goals in a more "timely manner" than if the plan were not implemented; or

(b) The long-term benefits of the proposed restoration practice are greater than short-term detrimental effects; or

(c) The proposed practice will result in less environmental damage than if the regular rules were followed.

(4) Factors that may need to be considered in the plan include, but are not limited to, the potential of the existing streamside stand to achieve mature conifer forest characteristics, the long-term supply of woody debris, survival of planted conifers, sensitivity to changes in water temperature and water quality, the potential for sedimentation, the stability of woody debris placed in aquatic areas, and monitoring the direct effects of the proposed practices.

Stat. Auth.: ORS Ch. 527.710

REFORESTATION WITHIN STREAM RIPARIAN MANAGEMENT AREAS

OAR 629-57-2280

Harvested portions of riparian management areas along streams are subject to the same reforestation requirements that apply to adjacent areas outside of the riparian management areas. Reforestation is more difficult in riparian management areas due to a number of factors. To succeed with the required reforestation, landowners should anticipate and plan for such factors as brush control measures, animal damage problems, and tree species that are suitable for wetter sites.

Stat. Auth.: ORS Ch. 527.710

RIPARIAN MANAGEMENT AREAS AND PROTECTION MEASURES FOR SIGNIFICANT WETLANDS

629-57-2300

(1) (a) The purpose of these rules is to protect the functions and values of significant wetlands, including wetlands larger than eight acres, estuaries, bogs and important springs in eastern Oregon on forestlands.

(b) Significant wetlands on forestlands provide a wide range of functions and values, including those related to water quality, hydrologic function, fish and other aquatic organisms, and wildlife.

(c) Estuaries are unique systems because they form transitions between terrestrial, marine, and freshwater environments. Because of this link, estuarine systems are among the most biologically productive in the world. Estuaries support many resident species. Estuaries also provide food, spawning area, and shelter for numerous other species at critical points in their life cycles. Removal of shoreline trees reduces the overall productivity of the estuary by reducing leaf and litter fall, thus depriving the estuary of substrate, and by removing feeding and resting habitat for birds and small mammals.

(d) Bog communities are a result of specific hydrologic, soil, and nutrient conditions. Bogs are usually saturated, low in nutrients, and highly acidic. Changes in runoff, sediment loading, and nutrient loading can alter the plant community composition. The peat soils have evolved over time. Compaction damages plant communities and may encourage the invasion of exotic species. Harvesting may disrupt shade tolerant vegetation, alter plant community characteristics, and hasten succession. Compaction, saturated conditions, and poor nutrient status make reforestation difficult.

(e) In arid parts of eastern Oregon, springs provide a critical source of water. These important springs have established wetland vegetation, flow year round in most years, and are used by a concentration of diverse animal species. By reason of sparse occurrence, important springs have a major influence on the distribution and abundance of upland species. Important springs shall be identified by the State Forester.

(2) (a) The goals of significant wetlands protection are to maintain the functions and values of significant wetlands on forestlands over time, and to ensure that forest practices do not lead to resource site destruction or reduced productivity, while at the same time ensuring the continuous growth and harvest of forest tree species. In order to accomplish these goals, the rules focus on the protection of soil, hydrologic functions, and specified levels of vegetation.

(b) The intent of the rules is to minimize soil disturbance and to minimize disturbance to the natural drainage patterns of the significant wetland.

(c) Vegetation retention (including understory vegetation, snags, downed wood, and live trees) is needed to prevent erosion and sedimentation into the significant wetland, minimize soil disturbance and hydrologic changes, and to maintain components of the vegetation structure to provide for other benefits, particularly fish and wildlife values.

(3) Significant wetlands other than estuaries, bogs or important springs in eastern Oregon shall have riparian management areas extending 100 feet from the wetlands.

(4) When an operation is proposed within 300 feet of an estuary, bog or important spring in eastern Oregon, the State Forester shall determine the riparian management area during the resource site inspection required by OAR 629-24-699. Riparian management areas shall extend outward 100 to 200 feet from the estuary, 50 to 100 feet from the bog, or 50 to 100 feet from the important spring in eastern Oregon. The distance determination of the State Forester shall depend on:

(a) Stocking level of the timber stand adjacent to the estuary, bog or spring;

(b) Ability of the area to withstand windthrow;

(c) Size of the estuary, bog or spring. As the size increases, the size of the riparian management area shall increase; and

(d) For bogs and springs only, topography and erodibility of adjacent uplands.

(5) For all significant wetlands, operators shall provide the following to the wetlands and riparian management areas:

(a) Live tree retention (OAR 629-57-2310);

(b) Soil and hydrologic function protection (OAR 629-57-2330);

(c) Understory vegetation retention (OAR 629-57-2340);

(d) Snag and down wood retention (OAR 629-57-2350).

(6) For forested significant wetlands, written plans must address reforestation.

Stat. Auth.: ORS Ch. 527.710

LIVE TREE RETENTION FOR SIGNIFICANT WETLANDS

629-57-2310

(1) In significant wetlands and their riparian management areas, operators shall retain approximately 50 percent of the original live trees, by species, in each of the following diameter classes (DBH):

(a) 6 to 10 inches;

(b) 11 to 20 inches;

(c) 21 to 30 inches; and

(d) larger than 30 inches.

(2) As part of the live trees in subsection (1) above, operators shall retain trees bordering significant wetlands.

(3) For estuaries and the adjacent riparian management areas, operators shall protect live trees that are:

(a) Perch and nest trees for predatory birds and colonial nesting birds;

(b) Likely to provide for future large woody debris to the estuaries' perimeters; and

(c) Contributing to bank stability.

Stat. Auth.: ORS Ch. 527.710

SITE SPECIFIC VEGETATION RETENTION PRESCRIPTIONS FOR SIGNIFICANT WETLANDS

629-57-2320

(1) Operators are encouraged to develop site specific vegetation retention prescriptions for significant wetlands by alternate plans.

(2) The functions and values of forested wetlands vary with species composition, stocking levels, and geographic location. Operators are encouraged to propose site specific vegetation retention prescriptions in alternate plans that allow for changes to the live tree requirements in OAR 629-57-2310 and that provide equal or better protection of the functions and values of forested significant wetlands and forested stream-associated wetlands, and address operational concerns.

Stat. Auth.: ORS Ch. 527.710

SOIL AND HYDROLOGIC FUNCTION PROTECTION FOR SIGNIFICANT WETLANDS

629-57-2330

(1) In significant wetlands and their riparian management areas, operators shall protect soil from disturbances that result in impaired water quality, hydrologic functions, or soil productivity. Operators shall protect hydrologic functions by minimizing disturbances and shall prevent accelerating the natural conversion of the wetlands to uplands.

(2) The written plan required under OAR 629-57-2030 shall describe how the operation will be conducted to prevent adverse effects on water quality, hydrologic functions or soil productivity. The following practices shall be addressed in written plans when they are proposed in significant wetlands:

(a) Filling within wetlands;

(b) Machine activity within wetlands; and

(c) Road construction within wetlands.

(3) Operators shall not drain significant wetlands.

(4) Notwithstanding subsection (3) of this rule, minor drainage for reforestation may be allowed through a written plan approved by the State Forester. Any drainage for reforestation must be designed so the significant wetland is not converted to an upland.

Stat. Auth.: ORS Ch. 527.710

UNDERSTORY VEGETATION RETENTION FOR SIGNIFICANT WETLANDS

629-57-2340

(1) The purpose of retaining understory vegetation is to provide soil stability and bank stability in and along significant wetlands, to maintain cover and shade for wildlife habitat and aquatic habitat, and to protect water quality.

(2) To achieve the purpose of understory retention, the operator shall limit disturbance of understory vegetation within significant wetlands and their riparian management areas to the minimum necessary to remove timber harvested from the area and achieve successful reforestation.

(3) The written plan required in OAR 629-57-2030 for operations within 300 feet of significant wetlands shall describe how disturbance to the understory vegetation will be minimized during harvest or site preparation for reforestation.

Stat. Auth.: ORS Ch. 527.710

SNAG AND DOWNED WOOD RETENTION FOR SIGNIFICANT WETLANDS

629-57-2350

(1) For significant wetlands, operators shall retain all snags and downed trees within the wetlands and the applicable riparian management areas.

(2) Notwithstanding subsection (1) of this rule, any snag defined to be a safety hazard under the safety requirements found in OAR 437, Division 6, Forest Activities, or determined to be a fire hazard by the State Forester, may be felled. Any snag felled because of a safety or fire hazard shall be left unyarded.

(3) Notwithstanding subsection (1) of this rule, retention requirements may be modified for reasons of forest health for trees that are dying or recently dead or dying because of fire, insect or disease epidemics, or other catastrophic events when addressed in a written plan approved by the State Forester.

(4) Snags and downed wood left pursuant to subsection (1) of this rule may not be counted toward the requirements of Section 5, chapter 919, Oregon Laws 1991.

Stat. Auth.: ORS Ch. 527.710

RIPARIAN MANAGEMENT AREAS AND PROTECTION MEASURES FOR LAKES

629-57-2400

(1) The purpose of this rule is to protect the functions and values of lakes. Lakes on forestlands provide a wide range of functions and values, including those related to water quality, hydrologic functions, aquatic organisms, fish and wildlife.

(2) Operators shall protect riparian management areas extending:

(a) 100 feet from the high water level of large lakes; and

(b) 50 feet from the high water level of other lakes that have fish use or other lakes that are equal to or greater than one half acre in size.

(c) No riparian management area is required for other lakes that do not have fish and that are less than one-half acre.

(3) For all lakes with riparian management areas, operators shall provide the following to the riparian management areas and the aquatic areas:

(a) Live tree retention (OAR 629-57-2410);

(b) Soil and hydrologic function protection (OAR 629-57-2420);

(c) Understory vegetation retention (OAR 629-57-2430); and

(d) Snag and down wood retention (OAR 629-57-2440).

(4) For all lakes not having riparian management areas, the lakes shall be protected as other wetlands (OAR 629-57-2500).

Stat. Auth.: ORS Ch. 527.710

LIVE TREE RETENTION FOR LAKES

OAR 629-57-2410

(1) Operators shall retain in the riparian management areas of lakes approximately 50 percent of the original live trees, by species, in each of the following diameter classes (DBH):

(a) 6 to 10 inches;

(b) 11 to 20 inches;

(c) 21 to 30 inches; and

(d) larger than 30 inches.

(2) As part of the live trees in subsection (1) above, trees on the edge of lakes shall be retained.

Stat. Auth.: ORS Ch. 527.710

SOIL AND HYDROLOGIC FUNCTION PROTECTION FOR LAKES

629-57-2420

(1) Operators shall protect soil within the riparian management areas of lakes from disturbances that result in impaired water quality, hydrologic functions, or soil productivity. Operators shall protect hydrologic functions by minimizing disturbances and shall prevent accelerating the natural conversions of lakes to uplands.

(2) Operators shall not drain lakes except for lakes formed by plugged culverts or beaver dams and as allowed in rule for road maintenance.

Stat. Auth.: ORS Ch. 527.710

UNDERSTORY VEGETATION RETENTION FOR LAKES

629-57-2430

(1) The purpose of retaining understory vegetation is to provide soil stability and bank stability along lakes, to maintain cover and shade for wildlife habitat and aquatic habitat, and to protect water quality.

(2) To achieve the purpose of understory retention, operators shall limit disturbance of understory vegetation within riparian management areas of lakes to the minimum necessary to remove timber harvested from the areas and to achieve successful reforestation.

Stat. Auth.: ORS Ch. 527.710

SNAG RETENTION AND DOWNED WOOD RETENTION FOR LAKES

629-57-2440

(1) For lakes, operators shall retain all snags and downed trees within the lakes and the applicable riparian management areas.

(2) Notwithstanding subsection (1) of this rule, any snag defined to be a safety hazard under the safety requirements found in OAR 437, Division 6, Forest Activities, or determined to be a fire hazard by the State Forester, may be felled. Any snag felled because of a safety or fire hazard shall be unyarded.

(3) Notwithstanding subsection (1) of this rule, retention requirements may be modified for reasons of forest health for trees that are dying or recently dead because of fire, insect or disease epidemics, or other catastrophic events when addressed in a written plan approved by the State Forester.

(4) Snags and downed wood left pursuant to this rule may not be counted toward the requirements of Section 5, chapter 919, Oregon Laws 1991.

Stat. Auth.: ORS Ch. 527.710

PROTECTION MEASURES FOR "OTHER WETLANDS," SEEPS AND SPRINGS

629-57-2500

(1) There is no riparian management area for other wetlands, seeps and springs.

(2) When operating in or along other wetlands greater than one-quarter acre, the operator shall:

(a) Protect soil and understory vegetation from disturbance that results in reduced water quality, hydrologic function or soil productivity. Operators shall protect hydrologic functions by minimizing disturbances to soils during forest operations and shall prevent accelerating the natural conversions of wetlands to uplands;

(b) Leave snags and downed trees in the wetlands, except for any snags determined by the State Forester to be fire hazards, or any snags that must be felled to achieve compliance with the safety requirements found in OAR 437, Division 6, Forest Activities.

(A) Any snags felled because of safety or fire hazards shall be left unyarded.

(B) Snags and downed wood left within other wetlands, seeps or springs may apply toward the requirements of Sec. 5, Chapter 919, Oregon Laws 1991.

(3) When conducting operations along other wetlands less than one quarter acre, springs or seeps, operators shall protect soil and vegetation from disturbances which would cause adverse effects on water quality, hydrologic function, and wildlife and aquatic habitat.

(4) Identification of other wetlands is sometimes difficult, especially when the wetland has no standing water. This is particularly true when the other wetland is forested or very small. In recognition of these facts, the State Forester shall apply appropriate discretion when determining compliance with this rule.

(5) Operators are encouraged to:

(a) Retain portions of in-unit live green trees and snags as blocks of intact vegetation around other wetlands; and

(b) For other wetlands that are forested, adequately consider how reforestation will be accomplished.

Stat. Auth.: ORS Ch. 527.710

FELLING, REMOVAL OF SLASH

629-57-2610

(1) Operators shall fell, buck, and limb trees in ways that minimize disturbance to channels, soils and retained vegetation in riparian management areas, streams, lakes and all wetlands greater than one-quarter acre, and that minimize slash accumulations in channels, significant wetlands and lakes.

(2) During felling operations operators shall:

(a) Whenever possible, fell all conifer trees away from riparian management areas, streams, lakes and significant wetlands, except for trees felled for approved stream improvement projects.

(b) On steep slopes, use felling practices such as jacking, line pulling, high stumps, whole tree yarding, or stage-cutting as necessary and feasible to prevent damage to vegetation retained in riparian management areas, soils, streams, lakes and significant wetlands.

(c) When hardwoods must be felled into or across streams, lakes or significant wetlands, operators shall:

(A) Buck and yard the trees to minimize damage to beds, banks and retained vegetation.

(B) When it can be done consistent with protecting beds and banks, yard hardwood trees or logs away from the water before limbing.

(3) Operators shall minimize the effects of slash that may enter waters of the state during felling, bucking, limbing or yarding by:

(a) Removing slash from Type F and Type D streams, lakes and significant wetlands as an ongoing process (removal within 24 hours of the material entering the stream) during the harvest operation.

(b) Not allowing slash to accumulate in Type N streams, lakes or wetlands in quantities that threaten water quality or increase the potential for mass debris movement.

(c) Placing any slash that is removed from streams, lakes, or wetlands above high water levels where it will not enter waters of the state.

Stat. Auth.: ORS Ch. 527.710

YARDING; CABLE EQUIPMENT

629-57-2620

(1) Operators shall maintain the purposes and functions of vegetation required to be retained in riparian management areas, and minimize disturbances to beds and banks of streams, lakes, all wetlands larger than one-quarter acre, and retained vegetation during cable yarding operations.

(2) Operators shall minimize the yarding of logs across streams, lakes, significant wetlands, and other wetlands greater than one-quarter acre whenever harvesting can be accomplished using existing roads or other practical alternatives.

(3) Operators may use yarding corridors through retained streamside trees as long as the numbers and widths of yarding corridors is minimized. Operators shall obtain prior approval of the State Forester when yarding across streams classified as Type F or Type D, any large or medium Type N streams, lakes, or significant wetlands.

(4) When yarding across Type F or Type D streams, any large or medium Type N streams, lakes, or significant wetlands is necessary, it shall be done by swinging the yarded material free of the ground in the aquatic areas and riparian areas.

(5) Cable yarding across streams classified as small Type N or other wetlands greater than one-quarter acre shall be done in ways that minimize disturbances to the stream channel or wetland and minimize disturbances of retained streamside vegetation.

Stat. Auth.: ORS Ch. 527.710

YARDING; GROUND-BASED EQUIPMENT
629-57-2630

(1) Operators shall maintain the purposes and functions of vegetation required to be retained in riparian management areas, and minimize disturbances to beds and banks of streams, lakes, all wetlands larger than one-quarter acre, and retained vegetation during ground-based yarding operations.

(2) Operators shall not operate ground-based equipment within any stream channel except as allowed in the rules for temporary stream crossings.

(3) Operators shall minimize the number of stream crossings.

(4) For crossing streams that have water during the periods of the operations, operators shall:

(a) Construct temporary stream crossing structures such as log crossings, culvert installations, or fords that are adequate to pass stream flows that are likely to occur during the periods of use. Structures shall be designed to withstand erosion by the streams and minimize sedimentation.

(b) Choose locations for temporary stream crossing structures which minimize cuts and fills or other disturbances to the stream banks.

(c) Minimize the volume of material in any fills constructed at a stream crossing. Fills over eight feet deep contain such a large volume of material that they can be a considerable risk to downstream beneficial uses should the material move downstream by water. For any fill for a temporary crossing that is over eight feet deep, operators shall obtain approval by the State Forester of a written plan that includes a description of how the fills would be constructed, passage of water, and the length of time the fills would be in the stream.

(d) Design temporary structures so that fish movement is not impaired on Type F streams.

(e) Remove all temporary stream crossing structures immediately after completion of operations or prior to seasonal runoff that exceeds the water carrying capacity of the structures, whichever comes first. When removing temporary structures, operators shall place fill material where it will not enter waters of the state.

(5) For stream crossings where the channels do not contain water during the periods of the operations, operators are not required to construct temporary crossings as long as disturbances are no greater than what would occur if structures were constructed. Soil that enters the channels during the yarding operations must be removed after completion of the operation or prior to stream flow, whichever comes first. When removing such materials from the channels, operators shall place the materials in locations where they will not enter waters of the state.

(6) Operators shall construct effective sediment barriers such as water bars, dips, or other water diversion on stream crossing approaches after completion of operations, or prior to rainy season runoff, whichever comes first.

(7) Machine activity near (generally within 100 feet) streams, lakes, and other wetlands greater than one-quarter acre shall be conducted to minimize the risk of sediment entering waters of the state and preventing changes to stream channels. Operators shall locate, construct, and maintain skid trails in riparian management areas consistent with OARs 629-24-443, 444, 445, 543, 544, 545, 643, 644, 645.

(8) Operators shall minimize the amount of exposed soils due to skid trails within riparian management area. Except at stream crossings, operators shall not locate skid trails within 35 feet of Type F or Type D streams. Operators shall provide adequate distances between all skid trails and waters of the state to filter sediment from runoff water.

(9) Operators shall locate and construct skid trails so that when high stream flow occurs water from the stream will not flow onto the skid trail.

Stat. Auth.: ORS Ch. 527.710

MECHANICAL SITE PREPARATION

629-57-2640

(1) When mechanical site preparation is necessary in riparian management areas or near waters of the state, operators shall conduct the oeprations in a way that sediment or debris does not enter waters of the state.

2) When using mechanical site preparation, operators shall provide adequate distance between disturbed soils and waters of the state to filter sediment from run-off water.

(3) Operators shall not use mechanical site preparation in riparian management areas:

(a) On slopes over 35 percent, with the exception of excavator-type equipment used during dry periods; or

(b) On sites with evidence of surface or gully erosion; or

(c) Where exposure or compaction of the subsoil is likely to occur.

(4) During mechanical site preparation, operators shall not place debris or soil in waters of the state or where it may enter waters of the state.

Stat. Auth.: ORS Ch. 527.710

STREAM CHANNEL CHANGES

629-57-2650

(1) Operators shall not channelize, relocate, or divert water from any stream, except as allowed in the forest practices rules for construction of roads, approved stream improvement projects or temporary stream crossings.

(2) Operators shall not add to or remove soil or rock from any streams, except as allowed in the forest practice rules for construction of roads, approved stream improvement projects or temporary stream crossings.

Stat. Auth.: ORS Ch. 527.710

BEAVER DAMS OR OTHER NATURAL OBSTRUCTIONS

629-57-2660

(1) Except as needed for road maintenance, operators shall not remove beaver dams and other natural obstructions from waters of the state during forest operations without prior approval of the State Forester. Removal of any beaver dam that is within 25 feet of a culvert shall be considered to be needed for road maintenance.

(2) Prior approval for removal of a beaver dam or obstruction may be granted if:

(a) A beaver dam or obstruction threatens existing forests or plantations; or

(b) Beaver dam removal is part of a beaver population control program approved by the Oregon Department of Fish and Wildlife; or

(c) Retaining the beaver dam or obstruction would result in greater environmental harm than benefit.

(3) Sediment releases and downstream channel scouring can occur when beaver dams are removed. Operators are encouraged to use techniques that result in a gradual release of water when a dam is removed.

Stat. Auth.: ORS Ch. 527.710

HEADWATER AMPHIBIAN SPECIES

OAR 629-57-2670

Amphibians that are sensitive to temperature and moisture fluctuations may live in small Type N streams. Operators are encouraged to retain portions of in-unit green live trees and snags as blocks of intact vegetation along small Type N streams.

Stat. Auth.: ORS Ch. 527.710

PETROLEUM PRODUCT PRECAUTIONS

629-57-3600

(1) Operators shall take adequate precautions to prevent leaks or spills of petroleum products that may enter waters of the state.

(2) Operators shall take immediate and appropriate action to stop and contain any leaks or spills of petroleum products.

Stat. Auth.: ORS Ch. 527.710

Table 1. Riparian Management Area Widths for Streams of Various Sizes and Beneficial Uses (OAR 629-57-2200)

	Type F	Type D	Type N
LARGE	100 feet	70 feet	70 feet
MEDIUM	70 feet	50 feet	50 feet
SMALL	50 feet	20 feet	Apply specified water quality protection measures, and see OAR 629-57-2250.

TABLE 2. General Prescription for Type F streams: Streamside Tree Retention for Clearcut Harvest Units (OAR 629-57-2230)

Geographic region	SQUARE FEET OF BASAL AREA PER 1000 FEET OF STREAM, EACH SIDE					
	LARGE Type F RMA = 100 feet		MEDIUM Type F RMA = 70 feet		SMALL Type F RMA = 50 feet	
	Standard Target	Active Management Target	Standard Target	Active Management Target	Standard Target	Active Management Target
Coast Range and South Coast	230	170	120	90	40	20
Interior and Western Cascade	270	200	140	110	40	20
Siskiyou	220	170	110	90	40	20
Eastern Cascade and Blue Mountain	170	130	90	70	50[1]	50[2]

[1] The maximum live conifer tree basal area that must be retained is 40 square feet. The remaining basal area may come from snags, dying or recently dead or dying trees, or hardwood trees if available within the riparian management area.

[2] Live conifer tree basal area may be reduced to 30 square feet for the active management target. The remaining portion of the basal area requirement must come from snags, dying or recently dead or dying trees, or hardwood trees if available within the riparian management area.

TABLE 3. General Prescription for Type F Streams: Streamside Tree Retention for Partial Harvest or Thinning Units (OAR 629-57-2230)

Geographic region	SQUARE FEET OF BASAL AREA PER 1000 FEET OF STREAM, EACH SIDE					
	LARGE Type F RMA = 100 feet		MEDIUM Type F RMA = 70 feet		SMALL Type F RMA = 50 feet	
	Standard Target	Active Management Target	Standard Target	Active Management Target	Standard Target	Active Management Target
Coast Range and South Coast	300	270	160	140	50	30
Interior and Western Cascade	350	310	180	160	50	30
Siskiyou	290	260	140	120	50	30
Eastern Cascade and Blue Mountain	220	200	120	100	50[1]	50[2]

TABLE 4. Basal Area for Various Diameter Classes (OAR 629-57-2230)

Diameter Breast Height (inches)	Basal Area (square feet)	Diameter Breast Height (inches)	Basal Area (square feet)
6 to 10	0.3	41 to 45	10.1
11 to 15	0.9	46 to 50	12.6
16 to 20	1.8	51 to 55	15.3
21 to 25	2.9	56 to 60	18.3
26 to 30	4.3	61 to 65	21.6
31 to 35	5.9	66 to 70	25.2
36 to 40	7.9	71 to 75	29.0

[1] The maximum live conifer tree basal area that must be retained is 40 square feet. The remaining basal area may come from snags, dying or recently dead or dying trees, or hardwood trees if available within the riparian management area.

[2] Live conifer tree basal area may be reduced to 30 square feet for the active management target. The remaining portion of the basal area requirement must come from snags, dying or recently dead or dying trees, or hardwood trees if available within the riparian management area.

TABLE 5. Vegetation Retention for Specified Small Type N Streams (OAR 629-57-2250)

Geographic Region	Retain Understory Vegetation and Unmerchantable Conifers 10 Feet Each Side of Stream for:
Eastern Cascades and Blue Mountains	All perennial streams.
South Coast	Portions of perennial streams where the upstream drainage area is greater than 160 acres.
Interior	Portions of perennial streams where the upstream drainage area is greater than 330 acres.
Siskiyou	Portions of perennial streams where the upstream drainage area is greater than 580 acres.
Coast Range and Western Cascades	No retention required.

TABLE 6. General Prescription for Type D, and Large and Medium Type N Streams: Streamside Tree Retention for Clearcut Harvest Units (OAR 629-57-2250)

Geographic Region	SQUARE FEET OF BASAL AREA PER 1000 FEET OF STREAM, EACH SIDE		
	LARGE TYPE D AND N RMA = 70 feet	MEDIUM TYPE D AND N RMA = 50 feet	SMALL TYPE D RMA = 20 feet
	Standard Target	Standard Target	Standard Target
Coast Range and South Coast	90	50[1]	0
Interior and Western Cascade	110	50[1]	0
Siskiyou	90	50[1]	0
Eastern Cascade and Blue Mountain	70	50[1]	0

[1] Hardwoods may count up to 30 square feet per 1000 feet towards meeting the standard target.

TABLE 7. General Prescription for Type D, and Large and Medium Type N Streams: Streamside Tree Retention for Partial Harvest and Thinning Units (OAR 629-57-2250)

Geographic Region	SQUARE FEET OF BASAL AREA PER 1000 FEET OF STREAM, EACH SIDE		
	LARGE TYPE D AND N RMA = 70 feet	MEDIUM TYPE D AND N RMA = 50 feet	SMALL TYPE D RMA = 20 feet
	Standard Target	Standard Target	Standard Target
Coast Range and South Coast	140	60[1]	0
Interior and Western Cascade	160	60[1]	0
Siskiyou	120	60[1]	0
Eastern Cascade and Blue Mountain	100	60[1]	0

[1] Hardwoods may count up to 30 square feet of basal area per 1000 feet toward meeting the standard target.

APPENDIX D: WILDLIFE DATABASE SEARCHES

U.S. Fish and Wildlife Service
Ecological Services
Oregon State Office
2600 SE 98th Avenue, Suite 100
Portland, OR 97266

Office phone: (503) 231-6179
FAX Number: (503) 231-6195

Date: November 17, 1993
Time: 9:14am

FAX Transmittal

To: Peter Farnum
FAX Number: (206) 924-6970

From: Robin Bown
Joe Burns

Distribution

- [x] Urgent - Hand Carry
- [ ] Call Recipient at #
- [ ] Usual Routing

Subject: Species List for the Coos Bay Operations

Number of pages (including transmittal sheet): 4

Comments: Attached is a copy of the species list for the general area of Weyerhaeuser's Coos Bay operations. No all species may occur on Weyerhaeuser's property. We suggest you check the habitat requirements of the candidate species to see if your lands contain their habitat. If you have any questions, please contact myself or Josh Millman.

ATTACHMENT A

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR IN THE AREA OF THE PROPOSED WEYERHAUSER HCP
1-7-94-SP-50

LISTED SPECIES[1,2,3,4]

Mammals			
Columbian white-tailed deer	*Odocoileus virginianus leucurus*		LE
Documented occurrences			
Birds			
Marbled murrelet	*Brachyramphus marmoratus*		LT
Documented occurrences			
Western snowy plover	*Charadrius alexandrinus nivosus*		LT
Documented occurrence			
Coastal populations			
Peregrine falcon	*Falco peregrinus*		LE
Documented occurrence			
Bald eagle	*Haliaeetus leucocephalus*		LT
Documented occurrences			
Northern spotted owl	*Strix occidentalis caurina*	CH	LT
Documented occurrences			

PROPOSED SPECIES[5]

Western lily	*Lilium occidentale*		PE
Documented occurrence			

CANDIDATE SPECIES[6,7]

Mammals			
White-footed vole	*Arborimus albipes*		C2
Pacific western big-eared bat	*Plecotus townsendii townsendii*		C2
Documented occurrences			
California wolverine	*Gulo gulo luteus*		C2
Pacific fisher	*Marte pennanti pacifica*		C2
Amphibians and Reptiles			
Northwestern pond turtle	*Clemmys marmorata marmorata*		C2
Documented occurrences			

Del Norte salamander	*Plethodon elongatus*	C2
Northern red-legged frog	*Rana aurora aurora*	C2
Fish		
Umpqua Oregon chub	*Oregonichthys kalawatseti*	C2
Invertebrates		
Burnell's false water penny beetle	*Acneus burnellii*	C2
Documented occurrence		
Plants		
Wayside aster	*Aster vialis*	C2
Documented occurrence		
Bensoniella	*Bensoniella oregona*	C2
Documented occurrence		
Tall bugbane	*Cimicifuga elata*	C2
Documented occurrence		
Salt-marsh bird's-beak	*Cordylanthus maritimus* ssp. *palustris*	C2
Documented occurrence		
Shaggy horkelia	*Horkelia congesta* ssp. *congesta*	C2
Documented occurrences		
Slender meadowfoam	*Limnanthes gracilis* ssp. *gracilis*	C2
Documented occurrences		
Western senecio	*Senecio hesperius*	C2
Documented occurrence		

(Last species deleted per 1 December 1993 telephone conversation with Josh Millman, U.S. Fish and Wildlife Service)

(E) - Endangered (T) - Threatened (CH) - Critical Habitat
(S) - Suspected (D) - Documented

(C1)- Category 1: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

(C2)- Category 2: Taxa for which existing information indicates may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

(3A)- Category 3A: Taxa for which the Service has persuasive evidence of extinction.

(3B)- Category 3B: Names that on the basis of current taxonomic understanding do not represent taxa meeting the Act's definition of "species."

(3C)- Category 3C: Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat.

* *If a vertebrate or plant, a single asterisk indicates taxon is possibly extinct. If an invertebrate, a single asterisk indicates a lack of information for the taxon since 1963.*

** *Consultation with National Marine Fisheries Service required.*

1/ *U. S. Department of Interior, Fish and Wildlife Service, July 15, 1991, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12.*

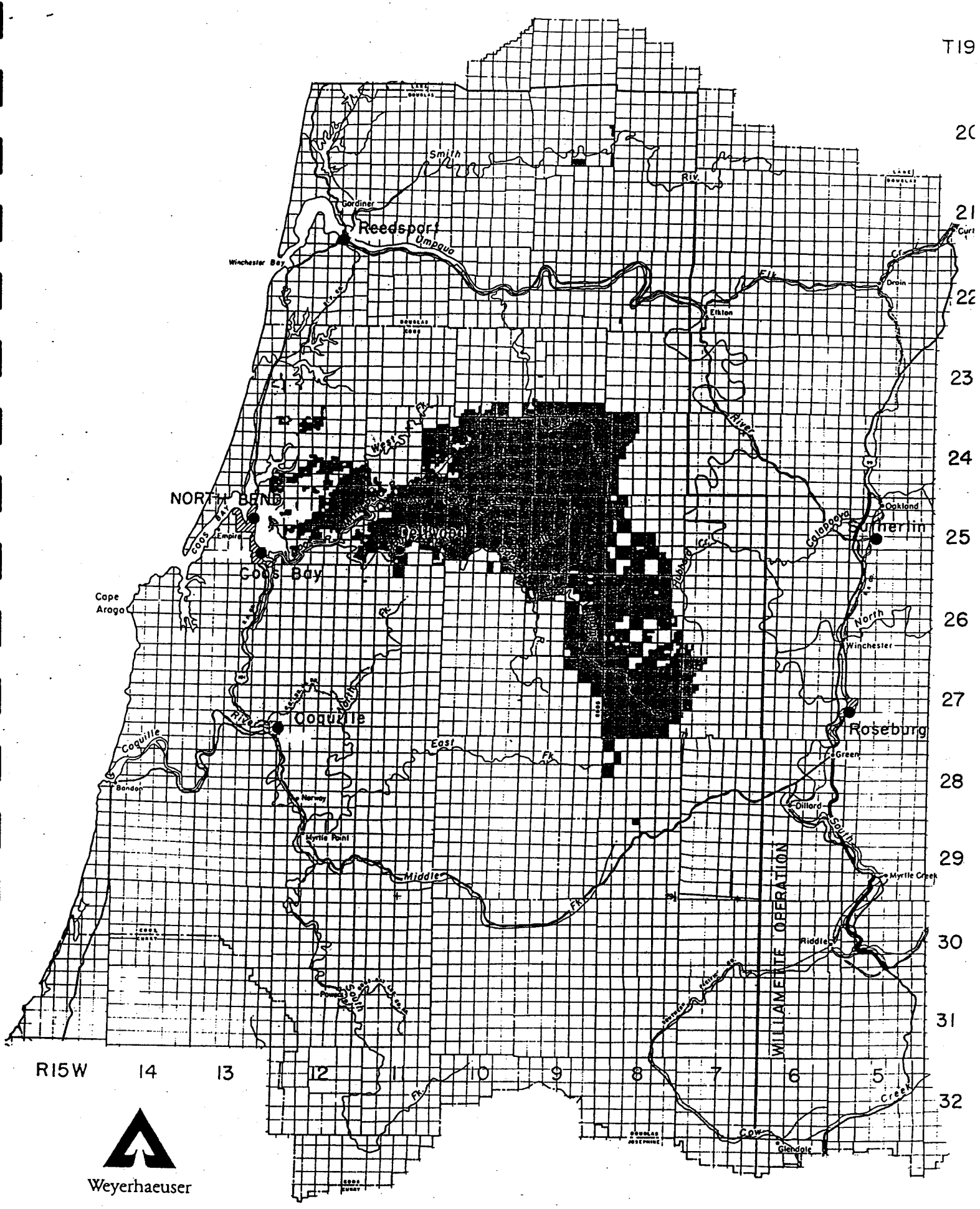
2/ *Federal Register Vol. 57, No. 10, January 15, 1992. Final Rule-Critical Habitat for the Northern Spotted Owl*

3/ *Federal Register Vol. 57, No. 191, October 1, 1992, Final Rule-Marbled Murrelet*

4/ *Federal Register Vol. 58, No. 42, March 5, 1993, Final Rule-Western Snowy Plover*

5/ *Federal Register Vol. 57, No. 207, October 26, 1992, Proposed Rule-Lilium occidentale*

[6] *Federal Register Vol. 56, No. 225, November 21, 1991, Notice of Review-Animals*
[7] *Federal Register Vol. 58, No. 188, September 30, 1993, Notice of Review-Plants*

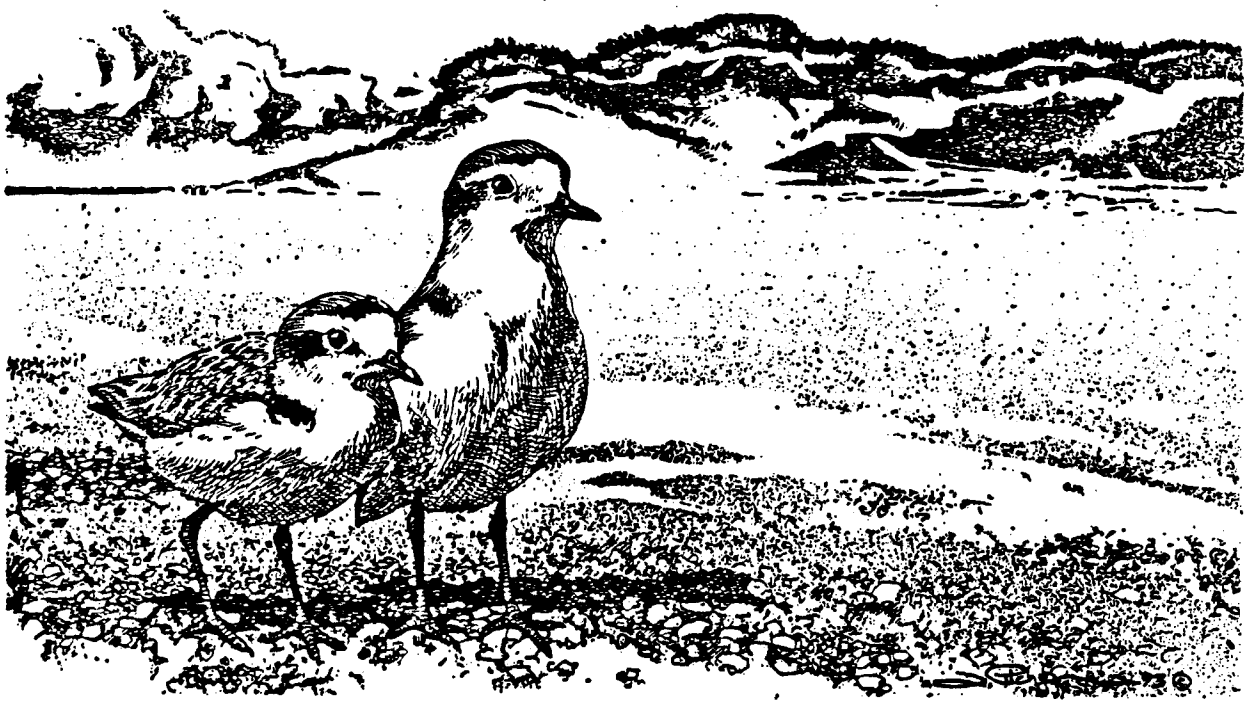


Weyerhaeuser

SOUTHWEST OREGON OPERATIONS

Millicoma Tree Farm 1993

RARE, THREATENED AND ENDANGERED PLANTS AND ANIMALS OF OREGON



OREGON NATURAL HERITAGE PROGRAM

AUGUST, 1993

Compiled and Published by:

Oregon Natural Heritage Program
1205 N.W. 25th Ave.
Portland, OR 97210
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FAX (503) 228-3153

A Cooperative Project of
The Nature Conservancy and the State of Oregon

With assistance from:

The Native Plant Society of Oregon
The Nature Conservancy
The Oregon Department of Agriculture
The Oregon Department of Fish and Wildlife
The Oregon Division of State Lands
The Oregon Natural Heritage Advisory Council

Cover Illustration: Western snowy plover (*Charadrius alexandrinus nivosus*), drawn by John C. Pitcher.

Bibliographic reference to this publication should read:

Oregon Natural Heritage Program. 1993. Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Program, Portland, Oregon. 79 pp.

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODFW Status	ONHI List
Lampetra minima Miller Lake lamprey	EC Klam	3A	--	1-X
Lampetra richardsoni (western brook lamprey) Dropped from list; too common.				
Lampetra tridentata Pacific lamprey	CR, WV, KM, EC, HP Bent, Clac, Clat, Colu, Coos, Curr, Gill, Hood, Lane, Linc, Linn, Mari, Morr, Mult, Polk, Sher, Till, Umat, Wall, Wash, Yamh	--	SV	4
Lampetra tridentata ssp. Goose lake lamprey	EC, BR; CA Lake	C2	SC	3*
Oncorhynchus clarki ssp. (Willow/Whitehorse cutthroat trout) synonomized with Lahontan cutthroat trout		C2	--	--
Oncorhynchus clarki ssp. Alvord cutthroat trout	BR; NV Harn	3A	--	1-X
Oncorhynchus clarki clarki coastal cutthroat trout, Columbia River anadromous form	WV, WC, EC; WA +	--	SC	3*
Oncorhynchus clarki clarki coastal cutthroat trout, coastal runs	CR	--	--	3*
Oncorhynchus clarki henshawi Lahontan cutthroat trout	OU; NV Malh	LT	LT	1*
Oncorhynchus clarki lewisi westslope cutthroat trout	HP Gran	--	SV	1*
Oncorhynchus keta chum salmon	CR	--	SC	2*
Oncorhynchus kisutch ssp. coho salmon, Columbia River runs	CB, BM; WA	--	SC	1*
Oncorhynchus kisutch ssp. coho salmon, south coast runs (= runs south of Bandon)	KM; CA Coos, Curr, Jack, Jose	--	SC	1*
Oncorhynchus mykiss gibbsi inland redband trout	BM, BR, CB, OU; ID Bake, Croo, Gran, Harn, Malh, Morr, Umat, Wall, Wasc	C2	SV	3*
Oncorhynchus mykiss ssp. Catlow Valley redband trout	BR Harn	C2	SV	3*
Oncorhynchus mykiss ssp. Goose Lake redband trout	EC; CA Lake	C2	SV	2*
Oncorhynchus mykiss ssp. Jenny Creek redband trout	KM Jack			3*
Oncorhynchus mykiss ssp. Warner Valley redband trout	BR Lake	C2	SV	3*
Oncorhynchus nerka ssp. sockeye salmon (Snake River runs)	ID	LE	--	1-ex
Oncorhynchus tshawytscha ssp. fall chinook salmon, Lower Columbia River runs (downstream of Bonneville)	CR, WV, WC; WA	--	SC	3*
Oncorhynchus tshawytscha ssp. fall chinook salmon, Snake River runs	BM; ID Bake, Wall	LT	SC	1*
Oncorhynchus tshawytscha ssp. fall chinook salmon, south coast runs	KM; CA Coos, Curr	--	SC	3*

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODFW Status	ONHP List
Oncorhynchus tshawytscha ssp. spring/summer chinook salmon, Snake River runs	BM; ID Bake, Wall	LT	SC	1*
Oregonichthys crameri Oregon chub	WV Bent, Lane, Linn	PE	SC	1*
Oregonichthys kalawatseti Umpqua chub	CR, WV, WC Doug	C2	SV	3*
Rhinichthys cataractae ssp. Millicoma dace	CR Coos	--	SP	3*
Rhinichthys osculus ssp. Foskett spring speckled dace	BR Lake	LT	LT	1*
Richardsonius egregius Lahontan redside	BR; NV Malh	--	SP	2*
Salvelinus confluentus bull trout	WC, EC, BM, HP; WA Klam, Lake, Wall	C2	SC	3*
Amphibians				
Ambystoma tigrinum melanostictum blotched tiger salamander	BR, OU Harn, Malh	--	SU	3*
Aneides ferreus clouded salamander	CR, WV, KM, WC; CA, BC Bent, Clac, Clat, Colu, Coos, Curr, Doug, Jack, Jose, Lane, Linc, Linn, Mari, Mult, Polk, Till, Wash, Yamh	--	SU	3*
Aneides flavipunctatus black salamander	WV, KM; CA Jack, Jose	--	SP	3*
Ascaphus truei tailed frog	CR, KM, WC; CA, ID, WA + Bent, Clac, Clat, Coos, Curr, Doug, Jack, Jose, Lane, Linc, Linn, Mari, Mult, Till, Yamh	--	SV	3*
Batrachoseps attenuatus California slender salamander	KM; CA Curr	--	SP	2*
Batrachoseps wrighti Oregon slender salamander	WC, EC Clac, Hood, Lane, Linn, Mari, Mult, Wasc	--	SV	1*
Bufo boreas western toad	CR, WV, KM, WC, EC, BM, BR, HP, OU, CB; CA, ID WA +; Bake, Clac, Clat, Colu, Coos, Croo, Curr, Desc, Doug, Gran, Harn, Hood, Jack, Jeff, Jose, Klam, Lake, Lane, Linc, Linn, Malh, Mult, Sher, Till, Umat, Unio, Wall, Wasc, Wash, Whee	--	SV	3*
Bufo woodhousii (Woodhouse's toad) - Dropped from list; too common.				
Dicamptodon copei Cope's giant salamander	CR, WC; WA Clac, Clat, Mult	--	SU	2*
Plethodon elongatus Del Norte salamander	KM; CA Coos, Curr, Jose, Jack	C2	SV	3*
Plethodon larselli Larch Mountain salamander	WC, EC; WA Hood, Mult	C2	SV	3*
Plethodon stormi Siskiyou Mountains salamander	KM; CA Jack, Jose	C2	SV	2*
Rana aurora aurora northern red-legged frog	CR, KM, WV, WC; CA, WA + Bent, Clac, Clat, Colu, Coos, Curr, Doug, Jack, Jose, Klam, Lane, Linc, Mari, Mult, Polk, Till, Wash, Yamh	C2	SU	3*
Rana boylei foothill yellow-legged frog	CR, KM, WV, WC; CA Coos, Curr, Doug, Jack, Jose, Klam, Lane, Linn, Mari	C2	SV	3*

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODFW Status	ONHP List
Rana cascadae Cascade frog	WC, EC; CA, WA; Clac, Desc, Doug, Hood, Jack, Jeff, Klam, Lane, Linn, Mari, Mult, Wasc	C2	SV	3*
Rana pipiens (northern) leopard frog	OU, CB; CA, ID, NV, WA + Bake, Malh, Morr, Umat, Wasc	--	SV	2*
Rana pretiosa spotted frog (east of the Cascades)	KM, EC, BM, BR, OU; ID, NV Bake, Croo, Desc, Gran, Harn, Jeff, Klam, Lake, Malh, Umat, Unio, Wall, Wasc	C2	SU	3*
Rana pretiosa spotted frog (west of the Cascades)	CR, KM, OCR, WV, WC; CA, WA Clac, Colu, Coos, Jack, Lane, Linn, Mult, Wash, Yamh	C1	SC	1*
Rhyacotriton cascadae Cascade seep salamander	CR, WV, WC; WA Clac, Hood, Lane, Linn, Mult	--	SV	3*
Rhyacotriton kezeri Columbia seep salamander	CR, WV, WC; WA Clac, Till, Yamh	--	SV	3*
Rhyacotriton variegatus southern seep salamander	CR, WV, KM, WC Bent, Coos, Curr, Doug, Jose, Linc, Polk, Till	--	SV	3*
Taricha granulosa mazama Crater Lake newt	EC Klam	--	--	3*
Reptiles				
Chrysemys picta painted turtle	WV, BM, CB; ID, WA + Bake, Colu, Hood, Mari, Morr, Mult, Sher, Umat, Unio, Wall, Wasc, Yamh	--	SC	3*
Clemmys marmorata marmorata northwestern pond turtle	CR, WV, KM, WC, EC; CA, WA Bent, Clac, Coos, Curr, Doug, Jack, Jose, Klam, Lane Linn, Mari, Mult, Till, Wash, Yamh	C2	SC	2*
Contia tenuis sharptail snake	CR, WV, KM, WC, CB; CA, WA Bent, Curr, Doug, Jack, Jose, Lane, Linn, Polk, Till	--	SV	4*
Crotaphytus bicinctores desert-collared lizard	BR, OU; CA, ID, NV + Harn, Malh	--	SV	3*
Lampropeltis getula common kingsnake	WV, WC; CA, NV + Doug, Jack, Jose	--	SV	3*
Lampropeltis zonata California mountain kingsnake	WV, KM, WC, EC; CA, WA Curr, Doug, Jack, Jose, Wasc	--	SV	3*
Phrynosoma douglassii (short-horned lizard) - Dropped from list; too common.				
Phrynosoma platyrhinos desert horned lizard	BM, BR, OU; CA, ID, NV + Bake, Harn, Lake, Malh	--	SV	3*
Sonora semiannulata western ground snake	OU; ID, NV + Malh	--	SP	3*
Birds				
Accipiter gentilis northern goshawk	KM, WC, EC, BM, BR, HP; CA, ID, WA, NV + Bake, Clac, Croo, Desc, Doug, Gran, Harn, Hood, Jack, Jeff, Klam, Lake, Lane, Malh, Mari, Morr, Umat, Unio, Wall, Wasc, Whee	C2	SC	3*
Aegolius acadicus (northern saw-whet owl) Dropped from list; too common.				
Aegolius funereus boreal owl	EC, BM; ID, WA + Desc, Wall?	--	--	3*
Agelaius tricolor tricolored blackbird	WV, KM, EC; CA Jack, Klam, Mult	C2	SP	2*

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODFW Status	ONHP List
Ammodramus savannarum grasshopper sparrow	WV, CB; CA, ID, NV, WA + Doug, Gill, Jack, Jose, Lane, Umat, Whee	--	SU	3*
Amphispiza bilineata black-throated sparrow	BR; CA, NV + Harn, Lake	3C	--	3*
Anser albifrons elgasi tule white-fronted goose	EC, BM, BR; CA + Klam, Harn, Lake, Unio	3C	--	4
Anthus spinoletta (water pipit) Dropped from list; too common.				
Archilochus alexandri black-chinned hummingbird	WC, BM, BR; CA, ID, NV, WA + Gran, Harn, Jack, Lake, Wall	--	--	3*
Athene cunicularia burrowing owl	WV, EC, HP, BR, BM, OU, CB; ID + Bake, Croo, Desc, Gill, Gran, Harn, Jeff, Klam, Lake, Malh, Morr, Sher, Umat, Unio, Wall, Wasc, Whee	--	SC	3*
Aythya affinis lesser scaup	EC, BR, HP, OU; CA, ID, NV, WA + Desc, Harn, Klam, Lake, Malh	--	--	4*
Aythya collaris ring-necked duck	WC, EC, BM, BR, HP; CA, ID, WA + Bake, Clac, Desc, Harn, Klam, Lake, Unio	--	--	4
Bartramia longicauda upland sandpiper	BM, BR; ID, WA + Croo, Gran, Klam, Lake, Umat, Unio	--	SC	2*
Brachyramphus marmoratus marbled murrelet	CR, KM; CA, WA + Bent, Clack, Coos, Curr, Doug, Lane, Linc, Till	LT	SC	1*
Branta canadensis leucopareia Aleutian Canada goose (wintering)	CR, KM; CA, AK Coos, Curr, Till	LT	LE	1*
Branta canadensis minima cackling Canada goose (wintering)	CR, WV, EC; CA, WA +; Colu, Curr, Bent, Lane Lane, Linn, Mari, Mult, Polk, Till, Wash, Yamh	--	--	4
Branta canadensis occidentalis dusky Canada goose (wintering)	CR, WV; WA + Bent, Colu, Lane, Linn, Mari, Polk, Till, Yamh, Wash	--	--	4
Bucephala albeola bufflehead	WC, EC; ID, WA + Desc, Doug, Jeff, Klam, Mari	--	SP	2*
Bucephala islandica Barrow's goldeneye	WC, EC; ID, WA + Clac, Desc, Doug, Jeff, Hood, Klam, Lane, Linn, Mari	--	SP	4*
Buteo regalis ferruginous hawk	BM, BR, HP, OU, CB; CA, ID, NV, WA +; Bake, Croo, Gran, Gill, Harn, Malh, Morr, Umat, Unio, Wall	C2	SC	3*
Buteo swainsoni Swainson's hawk	BM, BR, HP, OU, CB; CA, ID, NV, WA + Bake, Croo, Gill, Gran, Harn, Jeff, Lake, Malh, Morr, Sher, Whee	3C	SV	3*
Casmerodius albus great egret	CR, EC, BR; CA, NV + Coos, Harn, Klam, Lake	--	SU	4*
Catharus fuscescens veery	BM, BR, OU; ID, NV, WA +; Bake, Croo Gran, Harn, Malh, Morr, Umat, Unio, Wall, Whee	--	--	4*
Centrocercus urophasianus phaios western sage grouse (northeast populations)	EC, BM, HP; CA; ID, NV, WA + Bake, Croo, Desc	C2	SV	2*
Centrocercus urophasianus phaios western sage grouse (southeast populations)	BR, OU; CA, ID, NV, WA + Harn, Klam, Lake, Malh	C2	--	3*
Charadrius alexandrinus nivosus western snowy plover (coastal populations)	CR, KM; CA, WA + Clat, Coos, Curr, Doug, Lane, Linc, Till	LT	LT	1*
Charadrius alexandrinus nivosus western snowy plover (interior populat.)	EC, BR; CA, ID, NV + Harn, Klam, Lake	C2	LT	2*
Charadrius semipalmatus (semipalmated plover) Considered but rejected; not established as a breeding population.				

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODFW Status	ONHP List
Chlidonias niger black tern	EC, BR; CA, ID, NV, WA + Bake, Harn, Klam, Lake, Malh, Unio	C2	--	4*
Coccyzus americanus yellow-billed cuckoo	EC, BM, BR, OU; CA, ID, NV + Desc, Harn, Lake, Malh, Unio	3B	SC	2*
Coturnicops noveboracensis yellow rail	EC; CA + Klam, Lake	--	SC	2*
Cypseloides niger black swift	WC; CA, WA + Lane	--	SP	3*
Dendragapus canadensis spruce grouse	BM; ID, WA + Bake, Wall, Whee	--	SU	3*
Dolichonyx oryzivorus bobolink	BM, BR, HP; ID, WA + Bake, Harn, Unio, Wall	--	SV	4*
Dryocopus pileatus pileated woodpecker (eastern populations)	EC, BM; CA, WA + all but Gill	--	SC	3*
Dryocopus pileatus pileated woodpecker (western populations)	CR, WV, KM, WC; CA, ID, WA + all	--	SV	4*
Dumetella carolinensis gray catbird	BM, BR; ID, WA + Bake, Gran, Harn, Malh, Umat, Unio, Wall	--	--	4*
Egretta thula snowy egret	EC, BR, OU; CA, ID, NV, WA + Harn, Klam, Lake, Malh	--	SV	2*
Elanus leucurus (=Elanus caeruleus) white-tailed kite	CR, WV; CA + Bent, Jack, Till	--	--	3*
Eremophila alpestris strigata streaked horned lark (in Willamette Valley)	WV Bent, Clac, Colu, Lane, Linn, Mari, Mult, Wash, Yamh	--	SU	3*
Falco columbarius merlin	EC; WA, ID + Klam	--	--	2-ex
Falco peregrinus anatum American peregrine falcon	CR, KM, EC; CA, ID, NV, WA + Curr, Doug, Gran, Jack, Jose, Hood, Klam, Lane, Till	LE	LE	1*
Gavia immer common loon	WC; WA +	--	--	2-ex*
Glaucidium gnoma northern pygmy owl	ALL but BR; CA, ID, NV, WA + all	--	SU	3*
Grus canadensis tabida greater sandhill crane	WC, EC, BM, BR, HP, OU, CB; CA, ID, NV + Bake, Clac, Croo, Desc, Gran, Harn, Jack, Klam, Lake, Lane, Linn, Malh, Unio, Wasc	--	SV	4*
Gymnogyps californianus California condor	CR, KM; CA	LE	--	1-ex
Gymnorhinus cyanocephalus pinyon jay	EC, BM, BR, HP; CA, ID, NV + Croo, Desc, Jeff, Klam, Lake	--	--	3*
Haliaeetus leucocephalus bald eagle	ALL; CA, ID, NV, WA + all	LT	LT	1*
Histrionicus histrionicus harlequin duck	WC, EC, BM; ID, WA + Clac, Doug, Hood, Lane, Linn, Wall	C2	SP	2*
Ixobrychus exilis hesperis western least bittern	EC, BR; CA + Harn, Klam	C2	SP	2*
Lanius ludovicianus loggerhead shrike	WV?, KM, WC, EC, BM, BR, HP, OU, CB; CA, ID, NV, WA +; Bake, Croo, Desc, Gill, Gran, Harn, Jack, Jeff, Klam, Lake, Lane, Linn, Malh, Morr, Sher, Umat, Unio, Wall, Wasc, Whee	C2	SU	3*

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODFW Status	ONHP List
Larus pipixcan Franklin's gull	BR; ID + Harn	--	SP	2*
Leucosticte arctoa atrata black rosy finch	BR, BM; CA, ID, NV, WA + Harn, Unio, Wall	--	SP	3*
Leucosticte arctoa tephrocotis Wallowa rosy finch	BM Wall	--	--	2*
Melanerpes formicivorus acorn woodpecker	WV, KM; CA + Bent, Coos, Curr, Doug, Jack, Jose, Lane, Mari, Polk	--	SU	3
Melanerpes lewis Lewis' woodpecker (not including Blue Mountains physiographic province)	WV, KM, WC, EC, HP, CB; CA, ID, NV, WA+ Desc, Jack, Jeff, Klam, Lake, Mult, Wasc	--	SC	3*
Numenius americanus long-billed curlew	EC, BM, BR, HP, OU, CB; ID, NV, WA + Bake, Croo, Desc, Gill, Harn, Jeff, Klam, Lake, Malh, Morr, Sher, Umat, Wall, Whee	3C	--	4
Oceanodroma furcata fork-tailed storm-petrel	CR; CA, WA +	--	SV	2*
Oreortyx picta mountain quail (Heritage Program tracking populations east of the Cascades only)	CR, WV, KM, WC, EC, BM, CB; CA, ID, NV, WA + Bent, Clac, Clat, Coos, Curr, Doug, Gran, Hood, Jack, Jose, Klam, Lane, Linc, Linn, Mari, Mult, Polk, Sher, Till, Wall, Wasc, Wash, Yamh	C2	--	4*
Otus flammeolus flammulated owl	EC, BM; CA, ID, NV, WA + Bake, Croo, Desc, Gran, Harn, Hood, Jack, Jeff, Klam, Lake, Malh, Umat, Unio, Wall, Wasc, Whee	--	SC	4*
Pelecanus erythrorhynchos American white pelican	EC, BR; CA, ID, NV, WA + Harn, Klam, Lake	--	SV	2*
Pelecanus occidentalis brown pelican (wintering)	CR, KM; CA, WA + Clat, Coos, Curr, Doug, Lane, Linc, Till	LE	LE	2*
Picoides albolarvatus white-headed woodpecker	KM, WC, EC, BM; CA, ID, WA + Bake, Croo, Desc, Gran, Harn, Hood, Jack, Jeff, Jose, Klam, Lake, Malh, Morr, Umat, Unio, Wall, Wasc, Whee	--	SC	3*
Picoides arcticus black-backed woodpecker	KM, WC, EC, BM; CA, ID, NV, WA + Bake, Clac, Croo, Curr, Desc, Doug, Gran, Hood, Jack, Jeff, Jose, Klam, Lake, Lane, Linn, Mari, Morr, Umat, Unio, Wall, Wasc, Whee	--	SC	4*
Picoides tridactylus three-toed woodpecker	WC, EC, BM; ID, NV +; Bake Coos, Desc, Jack, Klam, Lane, Linn, Umat, Unio, Wall	--	SC	4*
Pinicola enucleator pine grosbeak	BM; CA, ID, NV, WA + Bake, Gran, Harn, Umat, Unio, Wall, Whee	--	--	3*
Plegadis chihi white-faced ibis	BR; CA, NV + Harn, Lake	C2	SV	4*
Podiceps auritus horned grebe	EC, BM, BR; ID, WA + Harn, Lake, Wall	--	SP	4*
Podiceps grisegena red-necked grebe	WC, EC; WA + Jack, Klam	--	SC	2*
Polioptila caerulea blue-gray gnatcatcher	WV, WC, EC, BR; CA, NV + Harn, Jack, Jose, Klam, Lake	--	--	3*
Pooecetes gramineus vesper sparrow	WV Bent, Clac, Lane, Linn, Mari, Mult, Polk, Wash, Yamh	--	SU	3*
Progne subis purple martin	CR, WV, KM, WC, EC; CA, WA + Bent, Clat, Colu, Coos, Curr, Doug, Hood, Jack, Klam, Lake, Lane, Linc, Mult, Till, Wasc	--	SC	3*

Scientific Name Common Name	Physiographic Province; Adjacent States Oregon Counties	FWS Status	ODFW Status	ONHP List
Riparia riparia bank swallow	EC, BM, BR, HP, OU, CB; CA, ID, NV, WA + Bake, Croo, Desc, Gran, Harn, Jeff, Klam, Lake, Malh, Morr, Sher, Umat, Unio, Wall, Wasc, Whee	--	SU	3*
Sayornis nigricans black phoebe	KM; CA, NV + Coos, Jack	--	--	4*
Seiurus noveboracensis northern waterthrush	EC; ID + Desc	--	--	3*
Selasphorus platycercus broad-tailed hummingbird	BM, BR, OU; CA, ID, NV + Lake, Malh, Wall	--	--	3*
Selasphorus sasin Allen's hummingbird	KM; CA Curr	--	--	4*
Setophaga ruticilla American redstart	WC, EC; ID, WA +; Bake, Doug, Gran, Harn, Jack, Klam, Morr, Umat, Unio, Wall	--	--	4
Sialia currucoides (mountain bluebird)	Considered but rejected; too common, minimal threats.			
Sialia mexicana western bluebird	ALL; CA, NV, ID, WA + all	--	SV	4*
Sitta pygmaea pigmy nuthatch	WC, EC, BM, BR; CA, ID, NV, WA + Bake, Croo, Desc, Doug, Gran, Harn, Jack, Jeff, Jose, Klam, Lake, Malh, Morr, Umat, Unio, Wall, Wasc, Whee	--	SV	4*
Sphyrapicus thyroideus Williamson's sapsucker	KM, WC, EC, BM, BR; CA, ID, NV, CA + Bake, Croo, Desc, Gran, Harn, Hood, Jack, Jeff, Jeff, Jose, Klam, Lake, Morr, Umat, Unio, Wall, Wasc, Whee	--	SU	4*
Spizella atrogularis black-chinned sparrow	KM; CA, NV + Curr	--	--	3*
Sterna caspia Caspian tern	CR, EC, BR, OU; CA, NV, WA + Clat, Colu, Harn, Lake, Malh	--	--	4
Sterna forsteri Forster's tern	EC, BR; CA, ID, NV, WA + Klam, Lake, Harn	--	--	3*
Strix nebulosa great gray owl	WC, EC, BM; CA, ID, NV, WA +; Bake, Desc, Doug, Gran, Jack, Klam, Lake, Umat, Unio, Wall, Whee	--	SV	4*
Strix occidentalis caurina northern spotted owl	CR, KM, WC; CA, WA; Bent, Clac, Clat, Colu, Coos, Curr, Desc, Doug, Hood, Jack, Jeff, Jose, Klam, Lane, Linc, Linn, Mari, Mult, Polk, Till, Wasc, Wash, Yamh	LT	LT	1*
Tringa melanoleuca greater yellowlegs	BM; AK + Wall	--	--	2*
Tringa solitaria solitary sandpiper	WC; AK +	--	--	3*
Tympanuchus phasianellus columbianus Columbian sharp-tailed grouse	EC, BM, BR, HP, CB; ID, MT, WA, BC Wall?	C2	--	1-ex
Mammals				
Antrozous pallidus pacificus Pacific pallid bat	WV, KM, WC, EC; CA, ID?, NV, WA + Doug, Jack, Klam, Lane, Mult	--	SV	3*
Bassariscus astutus ringtail	WV, KM, WC; CA, NV + Coos, Curr, Doug, Jack, Jose, Lane	--	SU	3*
Brachylagus idahoensis pygmy rabbit	EC, BM, BR, HP, OU, CB; CA?, ID, NV, WA + Bake, Croo, Desc, Harn, Klam, Lake, Malh, Unio	C2	SV	2*
Canis lupus gray wolf	ALL; ID, WA + all	LE	LE	2-ex

Common Name	Oregon Counties	Status	Status	List
Enhydra lutris nereis southern sea otter	CR, KM; CA +	LT	--	2-ex
Euderma maculatum spotted bat	BR, HP; CA, ID, NV + Harn, Whee	C2	--	2*
Eumetopias jubatus northern sea lion	CR, KM; CA Coos, Curr, Lane, Linc, Till	LT	SV	3*
Felis lynx canadensis North American lynx	WV, EC, BM, BR, HP, CB; ID, WA + Bake, Jeff, Wall	C2	--	2*
Gulo gulo luteus California wolverine	CR, KM, WC, EC, BM, BR, HP, CB; CA Bake, Clac, Croo, Desc, Doug, Gran, Harn, Hood, Jack, Jeff, Jose, Klam, Lake, Lane, Linc, Linn, Mari, Mult, Till, Umat, Unio, Wall, Whee	C2	LT	2*
Lepus townsendii white-tailed jackrabbit	EC, BM, BR, HP, OU, CB; CA, ID, NV, WA + Bake, Croo, Desc, Gill, Gran, Harn, Jeff, Klam, Lake, Malh, Morr, Sher, Umat, Unio, Wall, Wasc, Whee	--	SU	3*
Martes americana pine marten	CR, KM, WC, EC, BM; CA, ID, WA +	--	SC	3*
Martes pennanti pacifica Pacific fisher	KM, WC, EC, BM; CA, ID, WA + Bake, Curr, Doug, Jose, Klam, Lane, Unio, Wall	C2	SC	2*
Myotis thysanodes ssp. fringed bat	CR, WV, WC; Clac, Colu, Linc	--	SV	1*
Odocoileus virginianus leucurus Columbian white-tailed deer	CR, WV; WA Clat, Colu, Doug, Lane	LE	LE	1*
Ovis canadensis californiana California bighorn sheep	BR, HP, OU; CA, NV Gran, Harn, Lake, Malh, Whee	C2	--	4*
Ovis canadensis canadensis Rocky Mt. bighorn sheep	BM; ID, WA + Bake, Wall	--	--	4
Phenacomys (=Arborimus) albipes white-footed vole	CR, KM, WC; CA Bent, Clat, Colu, Coos, Curr, Doug, Jack, Klam, Lane, Linc, Linn, Polk, Till, Wash, Yamh	C2	SU	3*
Plecotus townsendii townsendii Pacific western big-eared bat	ALL; CA, ID, NV, WA + Bent, Clac, Clat, Croo, Curr, Desc, Doug, Harn, Jack, Jose, Lake, Lane, Linn, Malh, Mari, Mult, Till, Umat, Unio, Wall, Wasc, Wash, Whee	C2	SC	2*
Sorex preblei Preble's shrew	BM, BR, HP, OU; WA Desc, Harn, Malh, Wall	C2	--	4*
Spermophilus elegans nevadensis = *S. richardsoni nevadensis* Wyoming ground squirrel	OU; ID, NV + Malh	3C	--	2-ex
Spermophilus washingtoni Washington ground squirrel	HP, CB; WA Gill, Morr, Umat	--	SC	2*
Tadarida brasiliensis Brazilian free-tailed bat	WV, KM, EC; NE + Jack, Klam	--	--	3*
Thomomys bottae detumidus (Pistol River pocket gopher) - Considered but rejected, questionable taxon.		C2	--	--
Thomomys mazama helleri (Gold Beach pocket gopher) - Considered but rejected, questionable taxon.		C2	--	--
Ursus arctos grizzly bear	BM; ID, WA +	LT	--	1-ex
Vulpes macrotis kit fox	EC, BR, OU; CA, NV + Harn, Klam, Malh	--	LT	2*

APPENDICES OF THE

ANNUAL PROGRESS REPORT

FISH RESEARCH PROJECT
OREGON

PROJECT TITLE: Improvement of Methods Used to Estimate the Spawning Escapement of Oregon Coastal Natural Coho Salmon

CONTRACT NUMBER: F-145-R-1

PROJECT PERIOD: 1 October 1991 to 30 September 1992

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APPENDIX A

Results of Random Spawning Surveys Conducted in 1991-92

Appendix Table A-1. Results of random spawning surveys, 1991. Continued.

BASIN GROUP, BASIN OR SUBBASIN	ASSUMED SPAWNING DENSITY	SURVEY SEGMENT			ESTIMATED SPAWNING DENSITY (FISH/MILE)	AUC QUALIFICATION CRITERIA		ASSUME NO SPAWNING	VERIFY NO SPAWNING
		NUMBER	NAME	LENGTH (MILES)		STANDARD	RELAXED		
COOS-COQUILLE FISHERY MANAGEMENT DISTRICT									
COOS BAY	HIGH								
COOS BAY MAIN STEM									
		22322.000	PALOUSE CR		0			X	
		22320.003	LARSON CR	0.7	14	X	X		
		22320.002	LARSON CR	1.3	34	X	X		
		22147.000	LILLIAN CR		0			X	
		22141.001	WILSON CR	0.5	0	X	X		
MILLICOMA RIVER									
		22306.002	MILLICOMA R, W FK	0.5	5	X	X		
		22306.001	MILLICOMA R, W FK	0.9	15	X	X		
		22298.001	MILLICOMA R, W FK	0.7	12	X	X		
		22290.001	MILLICOMA R, W FK	0.8	10	X	X		
		22278.000	MILLICOMA R, W FK		0			X	
		22273.003	MILLICOMA R, E FK	1.2	6	X	X		
		22263.000	CEDAR CR		0			X	
		22253.000	SCHOOLHOUSE CR		0			X	
		22246.002	GLENN CR	0.7	107	X	X		
		22231.001	MART DAVIS CR	0.5	6	X	X		
SOUTH FORK									
		22218.001	FIVEMILE CR	0.1	0	X	X		
		22214.002	CEDAR CR	1.3	0	X	X		
		22211.001	CEDAR CR, TRIB F	0.9	0	X	X		
		22203.001	CEDAR CR, TRIB A	0.3	0	X	X		
		22198.001	BOTTOM CR	1.0	3	X	X		
		22188.001	TIOGA CR	1.4	8	X	X		
		22157.001	WREN SMITH CR	1.5	8	X	X		
COQUILLE RIVER	HIGH								
COQUILLE RIVER MAIN STEM									
		21692.000	HALL CR		0			X	
		21649.000	CALLOWAY CR		0			X	
		21645.002	FAT ELK CR	0.4	17	X	X		
		21628.001	LAMPA CR	1.3	0	X	X		
		21617.001	MACK CR	1.0	1	X	X		
		21613.003	BILL CR	1.0	20	X	X		
NORTH FORK									
		22047.001	COQUILLE R, N FK	1.2	18	X	X		
		22045.003	COQUILLE R, N FK	1.6	48	X	X		
		22045.002	COQUILLE R, N FK	1.3	10	X	X		
		22035.001	COQUILLE R., N FK	1.4	10	X	X		
		22034.003	STEINON CR	0.8	0	X	X		
		22034.002	STEINON CR	1.1					
		22034.001	STEINON CR	1.0					
		22027.000	COQUILLE R, N FK		0			X	
		22014.002	MIDDLE CR	1.0	19	X	X		
		22001.002	CHERRY CR	1.8	52	X	X		
		21999.001	JERUSALEM CR	0.5	4	X	X		
		21997.000	COQUILLE R, N FK		0			X	
		21947.000	COQUILLE R, N FK		0			X	
		21945.000	COQUILLE R, N FK		0			X	
		21944.002	LLEWELLYN CR	0.9	3	X	X		
EAST FORK									
		21958.000	COQUILLE R, E FK		0			X	
		21957.002	STEEL CR	0.8	53	X	X		

Appendix Table A-1. Results of random spawning surveys, 1991. Continued.

BASIN GROUP, BASIN OR SUBBASIN	ASSUMED SPAWNING DENSITY	SURVEY SEGMENT NUMBER	SURVEY SEGMENT NAME	SURVEY SEGMENT LENGTH (MILES)	ESTIMATED SPAWNING DENSITY (FISH/MILE)	AUC QUALIFICATION CRITERIA STANDARD	AUC QUALIFICATION CRITERIA RELAXED	ASSUME NO SPAWNING	VERIFY NO SPAWNING
		21956.000	COQUILLE R, E FK		0			X	
		21950.000	COQUILLE R, E FK		0			X	
MIDDLE FORK									
		21809.000	COQUILLE R, M FK		0			X	
		21793.000	COQUILLE R, M FK		0			X	
		21782.001	SLATER CR	0.5	61	X	X		
		21772.005	SANDY CR	1.0	0	X	X		
		21772.003	SANDY CR	1.0	8	X	X		
		21768.000	TANNER CR		0			X	
		21761.000	COLE CR		0			X	
		21755.006	ROCK CR	1.0	0		X		
		21754.001	RASLER CR	0.9	0	X	X		
		21743.001	AXE CR	1.1					
		21732.001	ENDICOTT CR	0.3					
SOUTH FORK									
		21933.000	BARKER CR		0			X	
		21919.000	SQUAW CR, W FK		0			X	
		21879.001	UPPER LAND CR	1.2					
		21876.000	POLE CR		0			X	
		21873.000	BANNER CR		0			X	
		21873.000	BANNER CR		0			X	
		21869.000	ESTES CR		0			X	
		21858.001	DUDE CR	0.2	3	X	X		
		21722.002	CATCHING CR, S FK	1.8	6		X		
		21722.001	CATCHING CR, S FK	1.1	13		X		
		21717.001	KOONTZ CR	0.9	10		X		
MISCELLANEOUS SMALL OCEAN TRIBUTARY	MODERATE								
		21597.000	JOHNSON CR		0			X	
		21593.000	CHINA CR		0			X	

Oregon Coastal Salmon Spawning Surveys, 1991

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Appendix A. Average peak number of fish per mile observed in standard stream segments, 1948-91.

Year	Chinook salmon				Coho salmon				Chum salmon	
	Miles	Jacks	Adults	Total	Miles	Jacks	Adults	Total	Miles	Adults
1948	0.0	--	--	--	0.0	--	--	--	1.6	696
1949	0.0	--	--	--	0.0	--	--	--	1.6	1,329
1950	8.1	4	25	30	34.6	3	21	24	2.4	364
1951	8.1	1	24	25	36.6	6	55	62	2.4	699
1952	24.2	6	49	55	36.6	5	54	58	2.4	309
1953	23.4	3	13	16	36.6	2	15	17	2.4	508
1954	22.6	2	12	15	36.6	5	28	33	2.4	641
1955	22.4	11	13	24	36.6	2	24	25	2.4	145
1956	21.2	4	11	16	36.6	8	28	36	2.4	133
1957	25.2	12	31	43	36.6	2	35	37	2.4	277
1958	27.0	6	36	41	34.0	2	12	14	2.4	285
1959	29.5	2	27	29	34.7	1	29	30	2.4	118
1960	26.5	14	22	37	39.4	5	10	16	4.8	66
1961	31.9	7	34	41	39.4	7	30	38	4.8	99
1962	29.4	7	29	36	38.9	4	26	30	4.8	460
1963	29.4	7	37	43	42.7	5	16	21	4.8	338
1964	32.4	8	36	44	43.2	7	44	50	4.8	318
1965	32.4	10	38	47	43.2	7	33	40	4.8	133
1966	32.3	8	46	54	43.2	3	24	27	4.8	312
1967	35.7	6	31	37	41.2	10	22	32	4.8	160
1968	35.7	6	22	29	33.1	1	17	18	4.8	175
1969	32.9	5	20	25	43.2	6	19	25	4.8	240
1970	31.9	11	49	61	43.2	3	24	27	4.8	408
1971	36.2	7	33	40	41.2	2	30	32	4.8	286
1972	35.9	11	36	47	37.8	4	11	15	4.8	441
1973	33.9	3	32	35	39.1	2	18	20	4.8	708
1974	38.2	7	31	37	37.7	7	13	20	4.8	711
1975	20.4	10	34	45	25.1	4	16	20	4.8	645
1976	21.5	14	32	46	22.6	3	18	21	4.8	243
1977	20.1	13	57	70	23.8	1	6	8	3.3	492
1978	25.7	7	58	65	25.1	3	9	11	3.3	837
1979	28.2	11	54	65	25.5	2	18	19	3.7	65
1980	31.7	15	53	68	39.7	3	12	15	3.3	275
1981	29.2	6	47	53	53.8	2	8	9	1.8	109
1982	30.3	8	54	63	53.8	7	16	22	4.8	556
1983	23.3	3	29	32	53.8	2	6	8	3.8	390
1984	28.4	5	51	57	53.8	3	16	19	4.8	333
1985	26.8	13	68	81	53.8	5	17	22	4.8	127
1986	49.5	9	68	77	53.5	3	17	20	4.8	163
1987	52.9	5	68	74	51.7	4	11	14	4.8	280
1988	54.9	6	99	105	51.7	3	19	22	4.8	766
1989	54.9	4	64	69	51.7	3	14	17	4.8	115
1990	54.9	4	54	59	51.7	2	8	10	4.8	94
1991	54.9	5	64	68	51.7	2	12	14	4.8	302

APPENDIX B

Counts of Salmon in Standard Surveys

Appendix Table B-1. Extended.

Year	North Fork Siuslaw River (0.8 mi) A	J	West Fork Indian Creek (1.2 mi) A	J	Rodgers Creek (1.3 mi) A	J	Lake Creek (0.8 mi) A	J	West Fork Millicoma River (0.5 mi) A	J	East Fork Millicoma River (0.5 mi) A	J
1950	--	--	--	--	--	--	--	--	--	--	--	--
1951	--	--	--	--	--	--	--	--	--	--	--	--
1952	12	1	--	--	--	--	--	--	--	--	--	--
1953	--	--	--	--	--	--	19	10	--	--	--	--
1954	--	--	--	--	--	--	--	--	--	--	--	--
1955	10	6	--	--	--	--	--	--	--	--	--	--
1956	10	3	--	--	--	--	1	1	--	--	--	--
1957	--	--	--	--	--	--	17	8	--	--	--	--
1958	26	9	--	--	--	--	42	16	--	--	--	--
1959	4	0	--	--	--	--	35	5	--	--	--	--
1960	--	--	--	--	--	--	--	--	--	--	--	--
1961	2	2	--	--	--	--	26	22	3	3	--	--
1962	58	14	--	--	--	--	12	4	2	0	--	--
1963	6	1	--	--	--	--	27	2	0	2	--	--
1964	31	13	--	--	--	--	212	35	1	0	--	--
1965	8	1	--	--	--	--	28	11	2	0	--	--
1966	22	13	--	--	--	--	111	11	5	1	--	--
1967	10	4	--	--	--	--	110	31	7	0	--	--
1968	5	2	--	--	--	--	52	32	0	0	--	--
1969	7	0	--	--	--	--	140	52	6	2	--	--
1970	17	12	--	--	--	--	256	76	12	0	--	--
1971	3	0	--	--	--	--	49	10	21	22	--	--
1972	3	0	--	--	--	--	88	56	8	12	--	--
1973	3	2	--	--	--	--	--	--	21	1	--	--
1974	2	0	--	--	--	--	131	68	16	28	--	--
1975	2	0	--	--	--	--	106	60	22	4	--	--
1976	5	2	--	--	--	--	188	74	28	24	--	--
1977	23	2	--	--	--	--	181	60	19	8	--	--
1978	13	2	--	--	--	--	115	24	42	18	--	--
1979	11	0	--	--	--	--	128	12	35	24	--	--
1980	13	9	--	--	--	--	218	24	30	65	--	--
1981	20	4	--	--	--	--	140	43	4	4	--	--
1982	32	5	--	--	--	--	204	34	8	2	--	--
1983	30	11	--	--	--	--	28	0	9	0	--	--
1984	44	12	--	--	--	--	103	7	0	1	--	--
1985	36	15	--	--	--	--	268	70	11	2	--	--
1986	46	24	--	--	--	--	255	68	5	2	66	5
1987	88	15	67	14	16	3	207	25	19	11	26	1
1988	140	26	137	13	123	10	538	52	22	6	41	3
1989	99	6	94	6	44	5	555	34	18	3	7	1
1990	81	9	87	4	51	6	578	43	12	3	15	2
1991	63	4	87	12	35	1	701	27	4	1	38	5

Appendix Table B-1. Extended.

Year	South Fork Coos River (1.0 mi) A	J	Williams River (1.0 mi) A	J	North Fork Coquille River (1.0 mi) A	J	Middle Creek (2.0 mi) A	J	Lower East Fork Coquille River (1.0 mi) A	J	Upper East Fork Coquille River (0.3 mi) A	J
1950	--	--	--	--	--	--	--	--	--	--	--	--
1951	--	--	--	--	--	--	--	--	--	--	--	--
1952	--	--	--	--	0	0	--	--	--	--	--	--
1953	--	--	--	--	1	0	--	--	--	--	--	--
1954	--	--	--	--	0	0	--	--	--	--	--	--
1955	--	--	--	--	--	--	--	--	--	--	--	--
1956	--	--	--	--	0	0	--	--	--	--	--	--
1957	--	--	--	--	2	0	--	--	--	--	--	--
1958	--	--	--	--	18	5	1	0	--	--	--	--
1959	--	--	--	--	23	1	5	0	--	--	--	--
1960	--	--	--	--	1	0	0	0	--	--	--	--
1961	--	--	--	--	24	8	21	5	10	4	--	--
1962	--	--	--	--	13	6	28	12	--	--	--	--
1963	--	--	--	--	27	3	6	1	--	--	--	--
1964	--	--	--	--	8	4	7	0	16	4	--	--
1965	--	--	--	--	45	35	4	0	15	4	--	--
1966	--	--	--	--	41	6	7	3	36	8	--	--
1967	--	--	--	--	34	8	0	0	36	17	--	--
1968	--	--	--	--	38	23	17	20	43	7	--	--
1969	--	--	--	--	26	9	8	6	--	--	--	--
1970	--	--	--	--	50	37	9	3	171	50	--	--
1971	--	--	--	--	20	3	5	3	104	39	--	--
1972	--	--	--	--	23	15	23	5	115	25	--	--
1973	--	--	--	--	14	1	8	0	35	2	--	--
1974	53	51	11	6	8	2	7	1	154	26	--	--
1975	28	11	36	16	30	15	16	17	155	11	--	--
1976	57	20	36	9	20	6	2	3	65	36	--	--
1977	72	22	45	33	46	5	--	--	159	37	--	--
1978	139	37	11	1	5	1	27	0	110	3	--	--
1979	104	25	76	18	41	25	21	15	66	7	--	--
1980	251	205	52	3	10	1	5	2	20	6	--	--
1981	126	26	42	17	22	2	8	0	32	2	--	--
1982	144	24	70	17	39	9	36	6	70	12	--	--
1983	--	--	--	--	33	5	--	--	7	1	--	--
1984	29	7	18	5	58	6	14	1	96	12	--	--
1985	53	19	46	22	27	6	--	--	81	11	--	--
1986	116	18	44	6	22	3	13	4	84	23	4	1
1987	283	15	26	2	13	2	--	--	124	24	2	0
1988	151	9	61	7	30	5	80	12	77	7	7	0
1989	102	4	30	3	35	3	67	12	82	11	10	1
1990	75	4	27	1	31	7	43	6	107	23	16	3
1991	81	2	8	1	74	5	44	3	114	11	8	1

APPENDIX C

Results of Surveys Conducted in 1991

Appendix Table C-1. Results of spawning ground surveys conducted for fall chinook salmon, 1991.

1991-92 SPAWNING GROUND SURVEY SUMMARY
NORTH COAST FISHERIES DISTRICT
CHINOOK SALMON

	SURVEY EFFORT				PEAK COUNTS (LIVE AND DEAD) ADULTS			JACKS		
	NO SURVEYS	MILES	TIMES SURVEYED	TOTAL MILES	1991 PEAK	PER MILE	1991 PEAK DATE	1991 PEAK	PER MILE	1991 PEAK DATE
NORTH COAST DISTRICT	22	17.8	154	116.8		26			2	
STANDARD SURVEYS	6	5.0	61	51.0		37			2	
SUPPLEMENTAL SURVEYS	16	12.8	93	65.8		22			2	
WILD	22	17.8	154	116.8		26			2	
NEHALEM RIVER	22	17.8	154	116.8		26			2	
STANDARD SURVEYS	6	5.0	61	51.0		37			2	
SUPPLEMENTAL SURVEYS	16	12.8	93	65.8		22			2	
WILD	22	17.8	154	116.8		26			2	
MAIN STEM	16	12.5	115	91.2		28			2	
BUSTER CREEK (LOWER)	1	1.0	3	3.0	0	0		0	0	
COOK CREEK	1	1.0	8	8.0	48	48	11/11/91	4	4	11/06/91
CRONIN CREEK	1	1.0	15	15.0	6	6	12/04/91	0	0	
EAST HUMBUG CREEK	1	1.0	7	7.0	15	15	11/06/91	3	3	11/06/91
HUMBUG CREEK	1	1.0	11	11.0	43	43	11/14/91	0	0	
MAIN STEM SPOT CHECK #10	1	0.3	4	1.2	5	17	10/10/91	0	0	
MAIN STEM SPOT CHECK #2	1	1.0	7	7.0	51	51	10/16/91	6	6	10/01/91
MAIN STEM SPOT CHECK #4	1	1.5	6	9.0	2	1	09/25/91	0	0	
MAIN STEM SPOT CHECK #6	1	0.1	6	0.6	19	190	10/16/91	1	10	10/01/91
MAIN STEM SPOT CHECK #7	1	0.1	7	0.7	29	290	10/15/91	0	0	
MAIN STEM SPOT CHECK #9	1	0.2	12	2.4	25	125	10/10/91	2	10	10/10/91
MAIN STEM SPOTCHECK #3	1	1.5	7	10.5	28	19	10/15/91	4	3	09/19/91
MAIN STEM SPOTCHECK #8	1	0.5	7	3.5	82	164	10/18/91	6	12	10/11/91
MAIN STEM SURVEY #1	1	0.8	6	4.8	0	0		0	0	
MAINSTEM #11	1	0.5	3	1.5	0	0		0	0	
WOLF CREEK	1	1.0	6	6.0	0	0		0	0	
NORTH FORK	1	0.5	13	6.5		60			2	
SOAPSTONE CREEK	1	0.5	13	6.5	30	60	11/14/91	1	2	10/30/91
SALMONBERRY RIVER	1	0.5	7	3.5		84			2	
SALMONBERRY RIVER	1	0.5	7	3.5	42	84	11/11/91	1	2	11/11/91
ROCK CREEK	4	4.3	19	15.6		9			1	
ROCK CR-KEASEY "STANDARD"	1	3.0	3	9.0	8	3	10/02/91	1	0	10/09/91
ROCK CREEK SPOT CHECK #1	1	0.3	7	2.1	28	93	10/08/91	2	7	10/08/91
ROCK CREEK SURVEY #2	1	0.5	7	3.5	3	6	09/24/91	0	0	
ROCK CREEK SURVEY #4	1	0.5	2	1.0	0	0		0	0	

Appendix Table C-1. Continued.

1991-92 SPAWNING GROUND SURVEY SUMMARY
COOS/COQUILLE/TENMILE FISHERIES DISTRICT
CHINOOK SALMON

	SURVEY EFFORT				PEAK COUNTS (LIVE AND DEAD)					
					ADULTS			JACKS		
	NO SURVEYS	MILES	TIMES SURVEYED	TOTAL MILES	1991 PEAK	PER MILE	1991 PEAK DATE	1991 PEAK	PER MILE	1991 PEAK DATE
COOS/COQUILLE/TENMILE DISTRICT	12	10.1	61	54.7		74			11	
STANDARD SURVEYS	12	10.1	61	54.7		74			11	
WILD	3	4.0	13	19.0		33			2	
HATCHERY FED	3	2.0	16	10.5		101			34	
HATCHERY UNFED	6	4.1	32	25.2		100			10	
COOS RIVER	4	3.0	18	12.5		44			3	
STANDARD SURVEYS	4	3.0	18	12.5		44			3	
WILD	2	2.0	7	7.0		45			2	
HATCHERY FED	2	1.0	11	5.5		42			6	
MILLICOMA RIVER	2	1.0	11	5.5		42			6	
EAST FORK MILLICOMA RIVER	1	0.5	5	2.5	38	76	11/15/91	5	10	11/07/91
WEST FORK MILLICOMA RIVER	1	0.5	6	3.0	4	8	11/07/91	1	2	11/07/91
SOUTH FORK	2	2.0	7	7.0		45			2	
SOUTH FORK COOS RIVER	1	1.0	3	3.0	81	81	11/07/91	2	2	11/01/91
WILLIAMS RIVER A	1	1.0	4	4.0	8	8	11/22/91	1	1	11/15/91
COQUILLE RIVER	8	7.1	43	42.2		87			15	
STANDARD SURVEYS	8	7.1	43	42.2		87			15	
WILD	1	2.0	6	12.0		22			2	
HATCHERY FED	1	1.0	5	5.0		160			61	
HATCHERY UNFED	6	4.1	32	25.2		100			10	
NORTH FORK	2	3.0	19	25.0		39			3	
MIDDLE CREEK D	1	2.0	6	12.0	44	22	11/29/91	3	2	12/05/91
NORTH FORK (UPPER-A)	1	1.0	13	13.0	74	74	11/12/91	5	5	11/12/91
EAST FORK	2	1.3	6	3.9		94			9	
EAST FORK (ABOVE DORA)	1	0.3	3	0.9	8	27	11/13/91	1	3	11/13/91
EAST FORK (LOWER)	1	1.0	3	3.0	114	114	11/13/91	11	11	11/13/91
MIDDLE FORK	2	1.0	7	3.5		92			11	
MIDDLE FORK	1	0.5	4	2.0	49	98	11/08/91	7	14	11/08/91
ROCK CREEK (LOWER-A)	1	0.5	3	1.5	43	86	12/03/91	4	8	12/03/91
SOUTH FORK	2	1.8	11	9.8		157			41	
SALMON CREEK (LOWER)	1	0.8	6	4.8	123	154	11/25/91	12	15	11/25/91
SOUTH FORK C	1	1.0	5	5.0	160	160	11/13/91	61	61	11/13/91

Appendix Table C-3. Results of spawning ground surveys conducted for coho salmon, 1991.

1991-92 SPAWNING GROUND SURVEY SUMMARY
NORTH COAST FISHERIES DISTRICT
COHO SALMON

	SURVEY EFFORT				PEAK COUNTS (LIVE AND DEAD)						ESTIMATED RUN SIZE(AUC)				
					ADULTS			JACKS			ADULTS			JACKS	
	NO. SURVEYS	MILES	TIMES SURVEYED	TOTAL MILES	1991 PEAK	PER MILE	1991 PEAK DATE	1991 PEAK	PER MILE	1991 PEAK DATE	SURVEYS	RUN SIZE	PER MILE	RUN SIZE	PER MILE
NORTH COAST DISTRICT	9	8.7	104	98.9		31			1		8		32		1
STANDARD SURVEYS	7	6.6	86	80.2		18			1		7		34		1
SUPPLEMENTAL SURVEYS	2	2.1	18	18.7		73			2		1		16		2
WILD	7	6.2	81	69.9		39			1		6		38		1
HATCHERY FED	1	1.0	11	11.0		16			1		1		16		2
HATCHERY UNFED	1	1.5	12	18.0		8			1		1		12		0
NECANICUM RIVER	1	1.5	12	18.0		8			1		1		12		0
STANDARD SURVEYS	1	1.5	12	18.0		8			1		1		12		0
HATCHERY UNFED	1	1.5	12	18.0		8			1		1		12		0
MAIN STEM	1	1.5	12	18.0		8			1		1		12		0
UPPER NECANICUM	1	1.5	12	18.0	12	8	11/13/91	1	1	11/13/91	1	17	12	1	0
ELK CREEK	1	0.5	13	6.5		20			2		1		49		0
STANDARD SURVEYS	1	0.5	13	6.5		20			2		1		49		0
WILD	1	0.5	13	6.5		20			2		1		49		0
WEST FORK	1	0.5	13	6.5		20			2		1		49		0
WEST FORK	1	0.5	13	6.5	10	20	11/14/91	1	2	12/18/91	1	25	49	0	0
NEHALEM RIVER	7	6.7	79	74.4		37			1		6		32		1
STANDARD SURVEYS	5	4.6	61	55.7		20			1		5		35		1
SUPPLEMENTAL SURVEYS	2	2.1	18	18.7		73			2		1		16		2
WILD	6	5.7	68	63.4		41			1		5		35		1
HATCHERY FED	1	1.0	11	11.0		16			1		1		16		2
MAIN STEM	6	5.7	68	63.4		41			1		5		35		1
FISHHAWK CREEK	1	1.1	7	7.7	138	125	12/02/91	3	3	12/02/91					
HAMILTON CREEK	1	1.0	11	11.0	8	8	11/13/91	4	4	11/13/91	1	15	15	4	4
NORTH FORK CRONIN CREEK	1	0.5	13	6.5	4	8	11/18/91	0	0		1	6	11	0	0
NORTH FORK WOLF CREEK	1	1.1	12	13.2	60	55	11/27/91	0	0		1	130	118	0	0
OAK RANCH CREEK	1	1.0	12	12.0	11	11	12/10/91	1	1	12/10/91	1	17	17	1	1
WEST HUMBUG CREEK	1	1.0	13	13.0	11	11	11/14/91	0	0		1	15	15	0	0
NORTH FORK	1	1.0	11	11.0		16			1		1		16		2
LITTLE NORTH FORK	1	1.0	11	11.0	16	16	11/07/91	1	1	11/07/91	1	16	16	2	2

Appendix Table C-3. Continued.

1991-92 SPAWNING GROUND SURVEY SUMMARY
COOS/COQUILLE/TENMILE FISHERIES DISTRICT
COHO SALMON

	SURVEY EFFORT				PEAK COUNTS (LIVE AND DEAD)						ESTIMATED RUN SIZE(AUC)				
					ADULTS			JACKS			ADULTS			JACKS	
	NO. SURVEYS	MILES	TIMES SURVEYED	TOTAL MILES	1991 PEAK	PER MILE	1991 PEAK DATE	1991 PEAK	PER MILE	1991 PEAK DATE	SURVEYS	RUN SIZE	PER MILE	RUN SIZE	PER MILE
COOS/COQUILLE/TENMILE DIST	20	17.8	171	167.4		25			5		10	43		8	
STANDARD SURVEYS	9	9.8	119	127.2		17			4		9	42		7	
SUPPLEMENTAL SURVEYS	1	1.0	17	17.0		12			7		1	48		18	
LAKE SURVEYS	10	7.0	35	23.2		39			6						
WILD	2	2.3	27	30.9		16			8		2	32		16	
HATCHERY FED	12	8.8	63	49.0		34			5		2	38		11	
HATCHERY UNFED	6	6.7	81	87.5		18			2		6	48		4	
TENMILE CREEK	10	7.0	35	23.2		39			6						
LAKE SURVEYS	10	7.0	35	23.2		39			6						
HATCHERY FED	10	7.0	35	23.2		39			6						
NORTH TENMILE LAKE	3	2.2	9	6.6		58			7						
ALDER CREEK (STD UNIT)	1	0.5	3	1.5	19	38	12/20/91	4	8	12/20/91					
BIG CREEK (STD UNIT)	1	0.5	3	1.5	61	122	12/20/91	5	10	12/10/91					
NOBLE CR (STD UNIT)	1	1.2	3	3.6	48	40	12/09/91	6	5	12/09/91					
SOUTH TENMILE LAKE	7	4.8	26	16.6		30			5						
ADAMS (MF STD UNIT)	1	0.8	4	3.2	14	18	01/28/92	3	4	01/28/92					
ADAMS (RF STD UNIT)	1	0.7	4	2.8	5	7	01/28/92	1	1	01/28/92					
HATCHERY CREEK (LEFT FORK	1	0.1	4	0.4	4	40	12/19/91	2	20	12/19/91					
HATCHERY CREEK (MAIN STEM	1	0.5	4	2.0	12	24	12/19/91	3	6	12/08/91					
HATCHERY CREEK (RIGHT FOR	1	0.1	4	0.4	0	0		0	0						
JOHNSON (RF STD UNIT)	1	0.8	3	2.4	57	71	12/20/91	10	13	12/20/91					
ROBERTS (STD UNIT NO 2)	1	1.8	3	5.4	50	28	12/23/91	6	3	12/10/91					
COOS RIVER	4	3.7	54	50.5		13			5		4	38		13	
STANDARD SURVEYS	3	2.7	37	33.5		13			5		3	35		11	
SUPPLEMENTAL SURVEYS	1	1.0	17	17.0		12			7		1	48		18	
WILD	1	1.3	13	16.9		11			7		1	34		18	
HATCHERY FED	2	1.8	28	25.8		14			4		2	38		11	
HATCHERY UNFED	1	0.6	13	7.8		15			5		1	43		13	
MAIN STEM	2	2.3	30	33.9		11			7		2	41		18	
LARSON CREEK	1	1.3	13	16.9	14	11	12/20/91	9	7	12/20/91	1	44	34	24	18
PALOUSE CREEK	1	1.0	17	17.0	12	12	11/21/91	7	7	01/29/92	1	48	48	18	18
MILLICOMA RIVER	1	0.6	13	7.8		15			5		1		43		13
MARLOW CREEK	1	0.6	13	7.8	9	15	11/21/91	3	5	11/15/91	1	26	43	8	13

Appendix D. Estimated population size of coho salmon in coastal lake basins, 1955 - 1991. A = adults, J = jacks.

Year	Siltcoos Lake		Takkenitch Lake		Tenmile Lake	
	A	J	A	J	A	J
1955	--	--	--	--	41,500	36,000
1956	--	--	--	--	29,027	51,609
1957	--	--	--	--	30,372	29,189
1958	--	--	--	--	12,104	16,075
1959	--	--	--	--	7,509	4,442
1960	--	--	--	--	5,492	27,074
1961	--	--	--	--	15,354	19,459
1962	--	--	--	--	17,708	20,517
1963	--	--	--	--	10,647	30,458
1964	--	--	--	--	18,828	24,747
1965	--	--	--	--	12,104	11,845
1966	--	--	--	--	12,776	14,171
1967	--	--	--	--	11,207	21,363
1968	--	--	--	--	7,285	5,076
1969	--	--	--	--	6,052	17,000
1970	--	--	--	--	14,800	56,059
1971	--	--	--	--	26,674	11,686
1972	--	--	--	--	7,509	4.422
1973	--	--	--	--	12,328	8,054
1974	--	--	--	--	4,161	2,707
1975	--	--	--	--	2.349	3,181
1976	--	--	--	--	1,493	1,010
1977	--	--	--	--	1,842	1,082
1978	--	--	--	--	962	613
1979	--	--	--	--	630	830
1980	--	--	--	--	1,493	2,273
1981	--	--	--	--	2,548	1,696
1982	--	--	--	--	2,685	3,948
1983	--	--	--	--	732	654
1984	--	--	--	--	3,905	1,444
1985	3,634	1,484	419	281	3,742	2,617
1986	4,228	2,217	3,089	1,463	4,474	2,707
1987	1,649	252	597	317	1,952	1,083
1988	2,618	300	542	194	2,603	1,489
1989	2,083	691	545	570	2,138	2,075
1990	1,621	445	1,085	625	1,708	835
1991	2,895	336	1,215	165	3,173	947