REVISED
EDITION 4.2

AN ILLUSTRATED MANUAL

INCLUDES PRIVATE FOREST ACCORD UPDATES

Oregon Forest Resources Institute

OREGON'S FOREST PROTECTION LAWS

DIGITAL VERSION

Published January 2025

New rules, new manual

This revised fourth edition of *Oregon's Forest Protection Laws: An Illustrated Manual* incorporates a major revision of more than 100 Oregon Forest Practices Act (OFPA) rules as a result of the Private Forest Accord agreement between Oregon forest products companies and conservation groups, which was signed in October 2021. This version was originally released in digital format and went through an extensive review process, including public comments.

Since it was first published in 2002, this manual has become a standard reference for planning and executing timber harvests, as well as other forestry work. Previous editions helped loggers, foresters, woodland owners, stewardship foresters and forestry educators understand and use best management practices to keep Oregon's forests sustainable. It is a visual resource, often found dog-eared and grimy in vehicles out in the forests. The publication seeks to make OFPA rules easy to understand and describes laws and rules that apply to Oregon's private forest landowners. Always verify current requirements and wording in the rules, as changes may occur.

This manual is not intended to replace the official version of the rules, which are available from the Oregon Department of Forestry (ODF), nor is it intended to replace the advice and resources of an ODF stewardship forester. The two-way communication between the stewardship forester and the landowner helps the state achieve its goals for best management practices.

The Oregon Forest Resources Institute (OFRI) produced this manual as part of its mission: to support the forest sector and the stewardship of natural resources by advancing Oregonians' understanding of the social, environmental and economic benefits of our forests. This education manual provides essential information for landowners, foresters and forest operators. OFRI acknowledges and thanks many people, agencies and organizations that participated in developing and reviewing the content; they are listed on the inside back cover at the end of the manual. OFRI would also like to acknowledge Robert Logan's vision for producing the original edition and Mike Cloughesy for his contributions.

The OFPA rules continue to evolve by responding to advances in forest research and experience, as well as public values for Oregon's forests. But as the rules have evolved, one thing has not changed: Oregon's forest landowners, managers and operators remain dedicated to sustainable forest management. Use this updated edition as an educational resource to help you manage and sustain our state's valuable forest resources.

Julie Woodward
Director of Forestry
Oregon Forest Resources Institute

A resource for

- landowners, foresters and operators who manage and work in Oregon's forests
- those who develop management plans
- anyone interested in learning about the Oregon Forest Practices Act and other forest protection laws

Ways to use this manual:

- referring to it before starting any forest operation
- using it to plan forest management objectives while protecting natural resources
- keeping it in your vehicle as a ready reference

In this manual, you'll find information on protecting forests and meeting the Oregon Forest Practices Act requirements when:

- harvesting trees, especially around streams, lakes or wetlands and on steep slopes
- providing for the needs of wildlife
- disposing of forest slash
- building or improving forest roads
- applying chemicals to forestland
- protecting forests from fire and using fire

FOR FASTER ACCESS to items commonly referenced in this manual, bookmark this page:

KnowYourForest.org/manual-links

Verify rules with your ODF stewardship forester before moving forward with an operation.

INTRODUCTION

This manual includes the most recent changes as a result of the Private Forest Accord. Each chapter covers a topic that is integral to understanding the changes to the Oregon Forest Practices Act (OFPA) rules.

At the beginning of each chapter, you'll find a list of applicable rules for ease of reference.

APPLICABLE OREGON FOREST PRACTICES RULES

Adaptive management

629-603-0000: Adaptive management program purpose
629-603-0100: Adaptive management program overview
629-603-0400: Independent Research and Science Team
629-603-0450: Housing agency for IRST

Planning forest operations

629-605-0140: Notification to the state forester — types of operations
629-605-0150: Notification to the state forester — when, where and how
629-605-0160: Forest practices regions
629-605-0170: Written plans
629-605-0173: Plans for an alternate practice

Oregon's forest practice laws help protect soil, air, water, wildlife and other natural resources. At the same time, they ensure the state's vast forests will be sustained for generations to come, providing valued environmental, social and economic benefits.

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OREGON'S FOREST PRACTICES SHOW:

Forests matter

Forests provide environmental, social and economic benefits that extend beyond their boundaries. They provide clean water, habitat for fish and wildlife, and recreation. They create jobs, products and tax revenues that result in healthy communities. The Oregon Forest Practices Act (OFPA) helps sustain these values in a socially accountable manner.

Oregonians value their forests

Forests are key to our quality of life as Oregonians. Forest landowners, operators and foresters are stewards of Oregon's forests. They accept responsibility for sustaining our forests and for protecting soil, air, fish, wildlife, water quality and other valued resources. The OFPA rules ensure landowners can manage their forests for a variety of objectives while meeting public expectations for forest stewardship.

Oregon was first

The Oregon Forest Practices Act was the first law of its kind in the nation. The Oregon Legislature passed OFPA in 1971 in response to emerging concerns about multiple forest resources, including findings from pioneering research on forest watersheds. The OFPA also provides a statutory framework for a comprehensive program that includes detailed rules, technical assistance and monitoring.

Common standards protect forests

The OFPA sets standards for any commercial activity that establishes, manages or harvests trees on Oregon's forestlands. They regulate these forest operations on all non-federal lands (private, state-owned and county- or city-owned).

Operations on lands managed by the U.S. Forest Service and Bureau of Land Management are not directly regulated, yet both agencies agree to meet or exceed the OFPA requirements.

Finding the rules

At the beginning of each chapter, a list of applicable rules offers an easy reference. Access the full Oregon Forest Practices Act and its rules through the Oregon Department of Forestry's (ODF) website: **oregon.gov/odf**. Click on the "About ODF" tab and select "Laws & rules" from the drop-down menu to download the current version for reference.

Rules are modified over time, so refer to the ODF site for the most current version.

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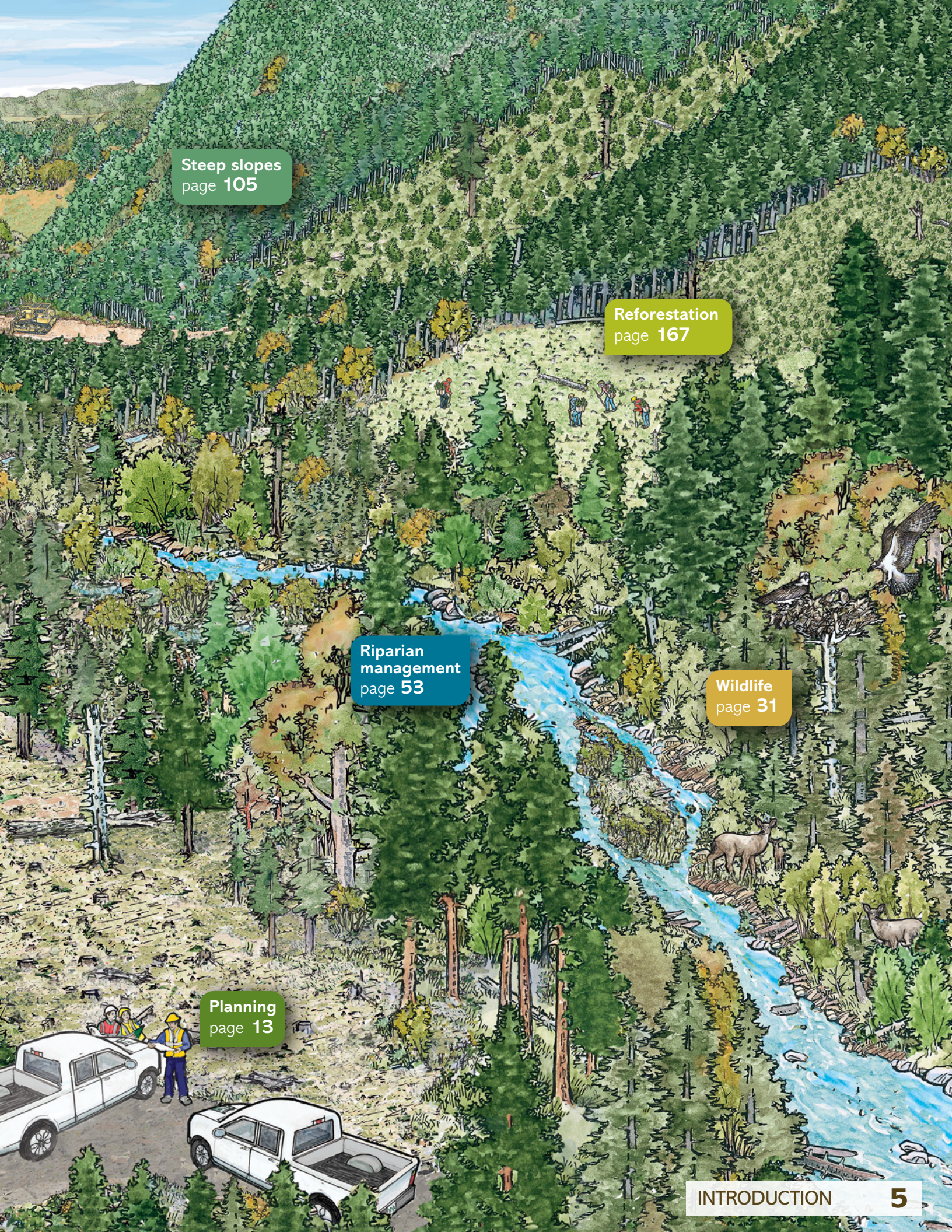
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ROLE OF THE OREGON DEPARTMENT OF FORESTRY

Oregon Board of Forestry

Oregon law gives ODF's Oregon Board of Forestry primary responsibility to adopt or revise state forest practice rules. The board uses information and input from regional committees and other diverse advisory groups to identify recommended changes to the rules. This approach helps keep the requirements current and responsive to evolving knowledge and concerns. Occasionally, the Oregon Legislature has amended the Oregon Forest Practices Act (OFPA) to include some specific requirements for forest operations, such as those for timber harvests near scenic highways.

ODF foresters

ODF foresters employed by ODF work with landowners and operators to help them achieve their objectives while complying with the rules. This involves a balance of education, technical design and enforcement. ODF foresters review pre-operation plans, inspect operations, determine reforestation compliance, investigate complaints and take enforcement actions. Sometimes enforcement action may lead to civil or criminal penalties. Some foresters work directly with small forest landowners.

How do I find a local ODF office?

For more information about Oregon's Forest Practices Act, please contact your local ODF district office, or the headquarters office at:

2600 State St. Building C
Salem, OR 97310

503-945-7200; Fax 503-945-7212
TTY 800-437-4490

Email: forestryinformation@odf.oregon.gov
Web: **oregon.gov/odf**

This manual explains OFPA requirements. The application of forest practices on specific sites can sometimes be complex. Always verify details with ODF. Get a copy of the OFPA rules. Ask your ODF forester before starting any forestry work. You may also benefit from educational and technical assistance from the Oregon State University Extension Service, consulting foresters, and other specialists and organizations.

COMPLY WITH THE OREGON FOREST PRACTICES ACT AND RULES

The Oregon Forest Practices Act (OFPA) and its rules evolve over time. Landowners and their advisors must stay informed about changes. ODF foresters are good sources of information. Before moving forward with a timber harvest, prepare by asking these questions:

- What are the site features, including the slopes, drainage and other natural characteristics?
- How could the harvest and road construction affect water quality?
- Are there soils with potential for compaction and erosion?
- Are there riparian and wetland areas that require special attention?
- What accommodations need to be made to protect wildlife habitat?
- When reforestation is needed after harvest, what is the plan?
- What slash treatment and site preparation will be necessary to establish a new forest?

A notification is not a permit. The 15-day waiting period and written plan review allow for planning to comply with forest protection rules.

File a Notification of Operation as required

After you've planned the operation, submit a Notification of Operation via ODF's E-notification website at least 15 days prior to the start of the operation. Notification is required for anyone cutting and selling timber, including operations on farmland or rural residential land. Failure to file a notification is a violation under the OFPA. For more information, see E-Notification at **oregon.gov/odf**.

Here's an overview of the process:

- The landowner, operator or a representative submits a Notification of Operation using the Forest Activity Electronic Reporting and Notification System, commonly known as FERNS, to tell ODF what activities are planned, where they will take place and who will be doing them.
- ODF must have the Notification of Operation at least 15 days before the operation starts.
- The notification form is also used to apply for a permit to use power-driven machinery or burning. See more about fire prevention requirements in the Harvesting chapter.
- When a notification is submitted, FERNS will send an e-mail with a notification number, which is important for forest products harvest tax purposes.
- Throughout the operation, the landowner or operator must follow all forest practice requirements that apply.
- Anyone can subscribe to receive copies of notifications and submit official comments about written plans for forestry work.
- Landowners must notify ODF of completed activities, generally by the end of the calendar year.

NOTIFICATION REQUIREMENTS

When a commercial activity establishes, manages or harvests forest trees, it is an operation or forest practice. Most involve road construction and maintenance, site preparation, reforestation, harvesting or use of pesticides or fertilizers. Before doing any of these activities, landowners and operators will usually need to inform the state by submitting an E-Notification of Operation (see page 7) to the Oregon Department of Forestry (ODF). This list clarifies what does and does not require notification:

Requires a notification

- road construction reconstruction
- slash disposal (burning, chipping, biomass processing, etc.)
- precommercial thinning
- harvesting
- chemicals application and use of petroleum products
- quarry site development for rock used in forest operations
- site preparation for reforestation
- converting forestland to non-forest use

Does not require a notification

- tree planting
- cutting firewood for personal use
- collecting tree boughs, cones or similar minor forest products

An **emergency operation** can start without a notification, when its delay could result in additional resource damage. Within 48 hours after starting an emergency road reconstruction operation, the operator must contact ODF, report the operation and demonstrate that an emergency actually existed.

Activities that are not operations

These activities must be conducted in compliance with any applicable forest practice requirements, even though they do not require a notification:

- Christmas tree farms on land used solely for their production
- hardwood plantations harvested on a rotation cycle that is 12 or fewer years after planting and subject to intensive agricultural practices
- agricultural tree crops, including nuts, fruits, seeds and nursery stock
- ornamental, street or park trees within an urbanized area
- juniper species management in a unit of less than 120 contiguous acres within a single ownership
- trees intended to mitigate agricultural practices that are established or managed for windbreaks, riparian filters or shade strips immediately adjacent to actively farmed lands

In some cases, a permit to operate power-driven machinery may be required for operations or activities that do not require a notification.

Other requirements covered in this manual

- when to provide wildlife trees and down logs while harvesting
- limitations on the size of clearcut harvests
- how to protect bird nesting, roosting and watering sites
- ensuring fish passage through stream-crossing structures
- how to operate where rapidly moving landslides might occur
- how to harvest and reforest next to scenic highways
- log landing requirements
- proper disposal of logging waste
- chemical application

Notification of completion

Using the E-notification system or other methods, landowners* must notify ODF of completed activities:

- at the end of the calendar year the notification was submitted, or
- at the end of the following calendar year for notifications that continue into that year.

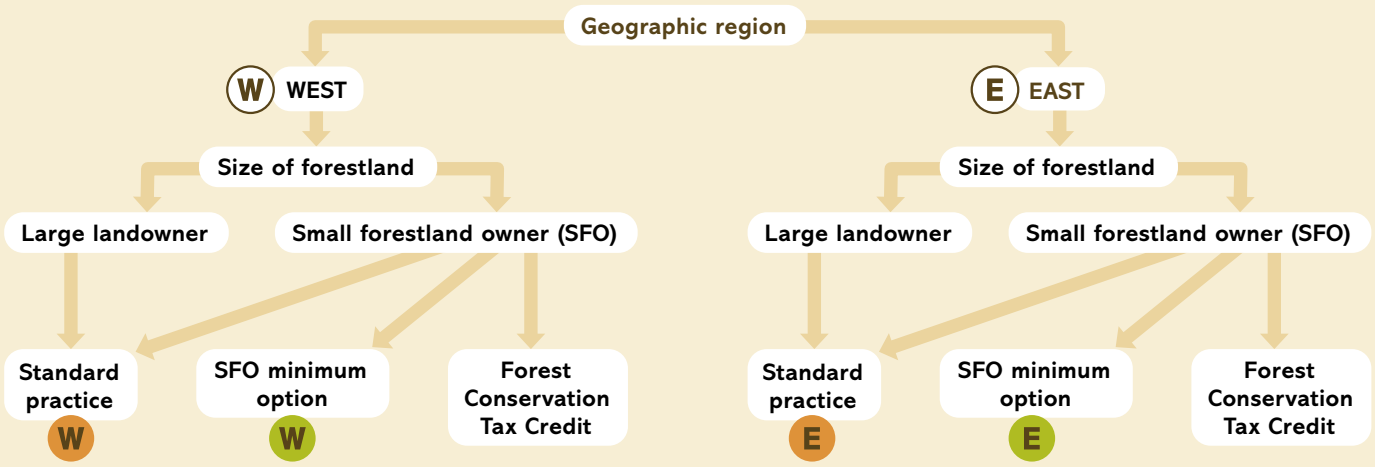
Landowners must complete a notification for each forest operation activity covered by an E-notification.

**SFO minimum option harvests have different deadlines.*

TYPES OF FOREST LANDOWNERS

Oregon's forest practice rules apply to private forest landowners differently depending on how many acres of forestland they own, how much they harvest and where the forestland is located. This flow chart helps identify the rules that apply to each type of forest landowner:

Rules that apply to forest landowners



Size of forestland

A small forestland owner (SFO) is defined under the Oregon Forest Practices Act (OFPA) as an individual who:

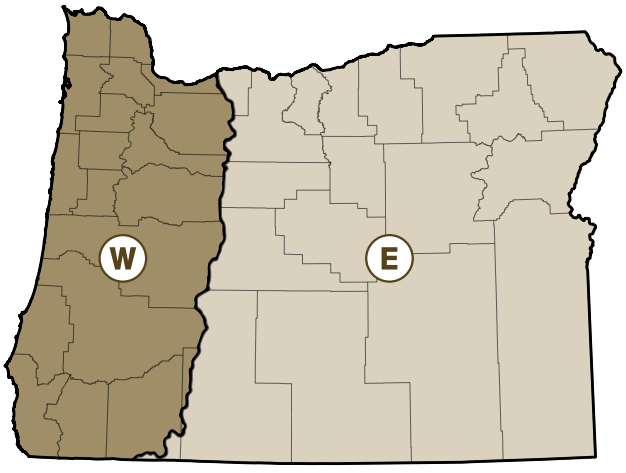
- owns or holds in common ownership less than 5,000 acres of forestland in Oregon
- harvests no more than two million board feet of merchantable forest products per year on average over the past three years
- affirms that they do not plan to exceed an annual harvest average of two million board feet in the next 10 years

An emergency exception may allow SFOs to exceed the timber harvest threshold when the Oregon Department of Forestry (ODF) agrees the harvest will provide funds to pay estate taxes, extraordinary medical expenses or a court-ordered judgement.

All other landowners are referred to as large landowners.

Look for these icons for specific information regarding your situation

- W *western Oregon*
- E *eastern Oregon*
- W *western Oregon, standard practice*
- W *western Oregon, SFO minimum option*
- E *eastern Oregon, standard practice*
- E *eastern Oregon, SFO minimum option*



Small forestland owners (SFOs)

About 35% of the forestland in Oregon is privately owned, and nearly five million acres of that land is in ownerships that are less than 5,000 acres. Oregon law recognizes that SFOs often differ from large forest landowners in their management goals and financial resources. They also own a disproportionate share of Oregon's forested lowland fish and wildlife habitat. In recognition of these differences, Oregon created the Small Forestland Owner Office, housed within ODF, to provide supportive services to Oregon's SFOs, including regulatory, incentive and technical assistance.

To qualify as an SFO with access to special programs and resources, as well as specific rules in the OFPA, landowners must notify ODF that they meet the forestland ownership size and harvest volume requirements when submitting a Notification of Operation. Available programs include the SFO minimum option for stream habitat protection, the Small Forestland Investment in Stream Habitat (SFISH) program, and the Forest Conservation Tax Credit. Consult with your ODF forester to better understand options for SFOs.

Local soil and water conservation districts, watershed councils and other organizations may also offer assistance programs for forest landowners. ODF works with the Natural Resources Conservation Service, the U.S. Forest Service and the Farm Service Agency to help make financial assistance available to qualified landowners. Through these programs, landowners can receive payments for desired practices, project cost sharing from 50% to 75%, annual land rental payments, tax credits, or partial to full land value compensation for easements. Contracts are required for some programs, and multi-year commitments may be an option.

For more information about assistance for SFOs, see Appendix.

Find more information at ODF's Small Forestland Owner Office: **oregon.gov/odf/working/pages/sfo.aspx**

You can also contact your local ODF forester to determine which programs are available for your property: **oregon.gov/odf/working/pages/findaforester.aspx**

Look for this color

Throughout this manual, you'll find information specific to SFOs highlighted in light blue.

Applies to small forestland owners only

PRIVATE FOREST ACCORD

Since it was first enacted in 1971, the Oregon Forest Practices Act (OFPA) has been amended and changed, and the Private Forest Accord set a landmark because of the extent of changes made and the collaborative process used to identify them. Each of the manual's chapters includes the most recent changes as a result of this agreement. Two additional items are described below.

The Private Forest Accord – signed in 2021 by 13 conservation and fisheries groups, 11 timber companies and the Oregon Small Woodlands Association – outlines key goals, including significant changes to Oregon's forestry regulations, that should allow Oregon to receive federal approval for a Habitat Conservation Plan (HCP) for aquatic wildlife on private forestlands, and an accompanying incidental take permit for those species. It also outlines an adaptive management process for coordinating future changes to the OFPA. The Oregon Legislature passed several bills that codified the Private Forest Accord into state law in 2022.

Habitat conservation plan

Changes to parts of the OFPA stemming from the Private Forest Accord should lead to creation of a federally approved HCP that outlines how the state's new forestry rules are likely to benefit certain species of fish and amphibians.

Private landowners will automatically be covered under ODF's incidental take permit. This provides regulatory assurance under the Endangered Species Act and protects landowners against any incidental take during forest operations and activities covered under the HCP. Also, the HCP will not establish restrictions to ongoing and planned forest management activities beyond those covered in the OFPA.

The HCP is intended to include the following aquatic wildlife species:

- all native salmon and trout
- bull trout
- mountain whitefish
- Pacific eulachon/smelt
- green sturgeon
- Columbia torrent salamander
- southern torrent salamander
- coastal giant salamander
- Cope's giant salamander
- coastal tailed frog

If approved by the relevant federal agencies, the HCP will cover all privately owned forestlands in Oregon for a term of 50 years for fish species and 25 years for amphibian species. The approval process for the HCP will probably conclude in 2027.

Adaptive management process

The Private Forest Accord outlines an adaptive management program to coordinate future changes to the OFPA. With stakeholder input, the program will use a science-driven process to analyze the need for any changes to rules, policies or training.

The program's purpose is to apply the best available science to the Oregon Board of Forestry's decision-making, which includes measuring the effectiveness of the rules to meet certain biological goals and objectives (BGOs) that benefit several fish and amphibian species. The program ensures effective change to meet the BGOs, seeks to limit operational costs when possible, and creates a process to increase awareness of regulatory changes.

The BGOs broadly describe the desired future conditions of an HCP in order to direct work toward reaching the vision and purpose of these goals. Each goal has one or more objectives that define how to reach these conditions in measurable terms.

Adaptive management program participants

Through the adaptive management program, two public committees will advise the Board of Forestry: the Adaptive Management Program Committee (AMPC) and the Independent Research and Science Team (IRST). Both the AMPC and IRST must maintain self-developed guides, may receive participation grants and may use super-majority votes for important decisions. The IRST applies science to answer the policy questions put forth by the AMPC, and there is a process to report that information back to the board. This team must include one member each from a public institution, the timber industry and a conservation group. Members must be subject matter experts with graduate degrees in natural resources disciplines such as forestry, fisheries and ecology.

For transparency and accountability, ODF will provide status reports on AMPC and IRST to the board annually, and contract for performance audits every six years. The public may take part in board decisions via public comment.

PLANNING

APPLICABLE OREGON FOREST PRACTICES RULES

Planning forest operations

629-605-0100: Compliance
629-605-0105: Notice of Federal Endangered Species Act
629-605-0110: Annual review
629-605-0120: Consultation
629-605-0130: Compliance with the rules and regulations of the Department of Environmental Quality
629-605-0140: Notification to the state forester — types of operations
629-605-0150: Notification to the state forester — when, where and how
629-605-0160: Forest practices regions
629-605-0170: Written plans
629-605-0173: Plans for an alternate practice
629-605-0175: Harvest Type 3 units exceeding 120 acres
629-605-0180: Interim process for protecting sensitive resource sites requiring written plans
629-605-0190: Written plans for operations near critical, threatened or endangered wildlife habitat sites
629-605-0200: Compliance with statutory requirements
629-605-0210: Harvest Type 3 units within single ownerships
629-605-0220: Judicial determinations of rule validity
629-605-0400: Forest activity safety
629-605-0500: Modification of requirements for forest health and public safety

Planning helps forest landowners scope out what they want to do on their land, determine which rules may apply and identify how to move forward. A management plan benefits any activity on the land and lays the foundation for deciding how to harvest timber.

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KNOW YOUR LAND

Many landowners find that creating a forest management plan helps them better understand their land.

Consider the resources on your land and think about your objectives before you start planning. You may want to produce some revenue, create wildlife habitat, manage for older forest structure or develop a fire-resilient forest. You might even have several goals you want to accomplish.

Many landowners find that taking the time to create a forest management plan helps them better understand their land and how they want to use it. The plan will look at all the resources on the property, including trees, roads, water sources, wildlife habitat and recreation. Putting together a forest management plan before harvesting timber helps ensure your forest management activities align with your property goals.

Planning for a timber harvest

Harvesting timber begins with a plan that varies depending on the landowner's goals. Yet, no matter the goal, a carefully crafted plan helps ensure the harvest meets requirements of the Oregon Forest Practices Act (OFPA) and leads to a smoother operation. Consider your management objectives, site conditions, resource protections, harvest type, and economic factors as you put the plan together. It's always a good idea to consult with your Oregon Department of Forestry ODF forester early in the process. Reforestation may be required following harvest.

This chapter deals with your initial work, from pre-planning a timber harvest to determining the harvest type. Other chapters will help you understand the reforestation and riparian management requirements.

CHECKLIST OF ITEMS TO CONSIDER

A lot goes into developing a plan for a timber harvest. This manual will help you understand what to consider and which rules apply, depending on your situation. You need to understand your site's riparian and wildlife resources, as well as steep slopes, before you finalize your harvest plan. Before harvesting, consider slash management, site prep, reforestation and any road maintenance needs.

This manual's appendix provides some additional information on selecting contractors, as well as a glossary and list of acronyms that will help you understand words and phrases that are new to you. A list of resources concludes the manual.

This checklist can help you as you move through preparing a plan for timber harvest:

MANAGEMENT OBJECTIVES

Many landowners approach forestland management with specific objectives that inform how they will plan for timber harvest. Often, a plan balances these objectives:

- ☐ income from timber:
  - > short- and long-term income needs
  - > markets
  - > tax considerations
- ☐ fish and wildlife habitat
- ☐ aesthetics
- ☐ recreation
- ☐ fire protection
- ☐ forest health

Help is available from ODF foresters, consulting foresters and forestry engineers to develop management plans, design timber harvest units and roads, contract loggers, and market your timber. Learn more at **KnowYourForest.org**.

RIPARIAN RESOURCES

- ☐ identify streams, wetlands and lakes, including stream surveys
- ☐ determine riparian management areas (RMAs)
- ☐ know protections needed during harvest
- ☐ establish vegetation retention
- ☐ follow necessary perenniality stream protocols in advance of harvest

WILDLIFE RESOURCES

- ☐ be aware of threatened and endangered species' critical habitat
- ☐ determine sensitive wildlife resource sites
- ☐ develop protections for specific species, including critical nesting sites
- ☐ know requirements for leave trees, snags and down logs

STEEP SLOPES ON YOUR LAND

- ☐ identify high landslide hazard locations (HLHLs)
- ☐ consult the ODF steeps slopes map
- ☐ take steep slopes training from ODF to understand requirements, if applicable
- ☐ learn about the small forestland owner (SFO) minimum option
- ☐ complete a written plan

HARVESTING

- ☐ review logging methods/water-crossing structures
- ☐ prevent fire during forest operations
- ☐ understand how to fell, buck and limb trees near water
- ☐ learn about ground-based and cable logging
- ☐ locate log landings
- ☐ know how to use petroleum products

SITE PREPARATION

- ☐ control vegetation after harvest and review:
  - > chemical use requirements
  - > application options and records
  - > water protection practices
- ☐ plan for management of slash
- ☐ understand prescribed burning options

REFORESTATION

- ☐ know requirements for reforestation
- ☐ learn standards and calculations
- ☐ understand landowner responsibilities
- ☐ understand basal area
- ☐ pre-order seedlings

Stay informed about reforestation

When you harvest timber or purchase cut-over land, you have a legal obligation to know if you need to reforest. Sellers of land with reforestation requirements must inform potential purchasers about the reforestation responsibility, as this obligation transfers to the new landowner.

ROADS

- ☐ construct new roads
- ☐ maintain roads
- ☐ perform a Forest Road Inventory and Assessment (FRIA) or Road Condition Assessment (RCA)
- ☐ learn requirements for abandoned roads

SITE CONDITIONS

Assess site conditions including:

- ☐ topography
- ☐ soil
- ☐ forest health
- ☐ forest stand type

RESOURCE PROTECTION

Identify and take action to protect the following resources:

- ☐ public improvements (e.g., county roads, state highways, hatcheries and campgrounds)
- ☐ cultural, archaeological and historical sites
- ☐ municipal water sources

TIMING OF OPERATIONS

Schedule your harvest operations and water-crossing work to minimize the following impacts:

- ☐ soil compaction and erosion
- ☐ excessive bark damage in the spring
- ☐ fish and wildlife disturbance during crucial times in their life cycles
- ☐ damage to roads and public resources
- ☐ accumulation of pine slash in eastern Oregon from January to June

E-Notification

You must notify ODF before starting a forest operation, at least 15 days in advance of any work. Forest landowners or their designee must file a Notification of Operation or Permit to Use Fire or Power-Driven Machinery by submitting an E-Notification through the Forest Activity Electronic Reporting and Notification System (FERNS), **ferns.odf.oregon.gov/e-notification**. You will need to create an account to access this web-based, centralized database of all forestry operations subject to ODF oversight. See Introduction for more information on notification requirements.

Completion Report: Using the E-notification system or other methods, landowners must notify ODF of completed activities at the end of the calendar year the notification was submitted or at the end of the next year, when operations continue into that year. Report completion for each activity covered in the original notification. SFO minimum harvest options have different timelines.

Any interested person or party can also subscribe to FERNS to receive electronic notifications of pending forest operations in their area. They can also review and submit official comments about forest operation work plans. Subscriptions need to be renewed annually.

Helicopter application of pesticides may require a 30-day notification. FERNS includes real-time communications about upcoming helicopter applications to neighbors living within one mile of the planned application site.

STEPS TO DETERMINE TIMBER HARVEST REQUIREMENTS

Wildlife trees like this snag provide habitat for birds and other wild animals.

Before you submit your E-Notification of timber harvest plans to ODF using FERNS, have this information ready:

- the harvest unit site class
- the harvest unit acreage
- the diameters and basal area of the trees you will leave standing

STEP 1: Decide on the kind of harvest (Type 1, 2, 3 or 4)

Refer to Table 1-1 on the next page. Landowners can choose among four broad types of harvest. That decision, along with harvest acreage, determines legal requirements for reforestation, limiting harvest unit size, and leaving wildlife trees and down logs.

Regardless of harvest type, forest landowners must protect streams, lakes, wetlands and wildlife sites. These topics, along with harvest slash disposal and forest fire regulations, are discussed later in this manual.

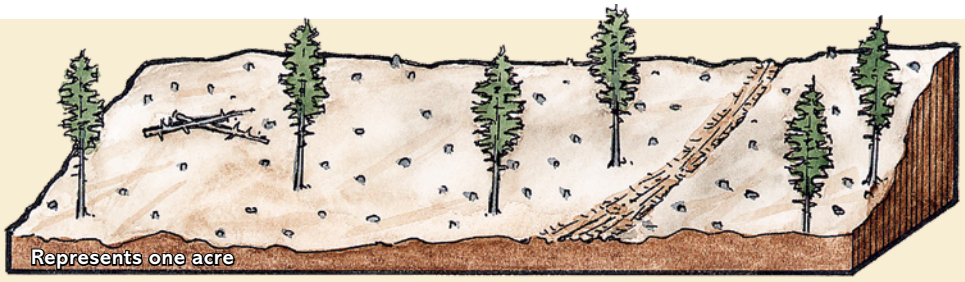
LEAVE TREE AND DOWN LOG REQUIREMENTS

Leave at least two wildlife trees and two down logs per acre. For more detailed information, see the Wildlife chapter.

Table 1-1 Four types of harvest and their requirements

TYPE 1 HARVEST

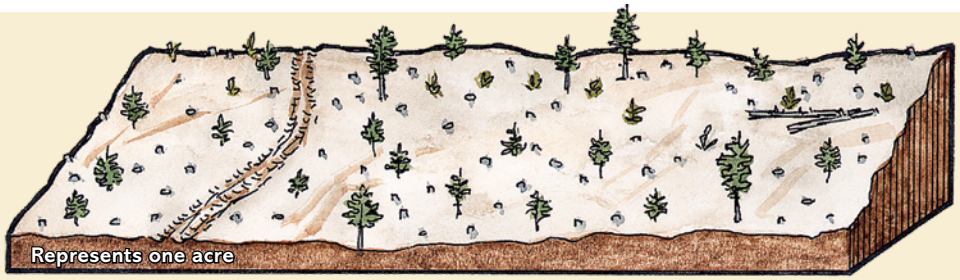
Heavy thinning or shelterwood cutting so few or no seedlings, saplings or poles remain.



- Does not meet reforestation stocking standards.
- Must replant within two years and have "free-to-grow" seedlings within six years.*
- No wildlife trees or down logs are required if retaining an adequate basal area of trees 11 inches in diameter or larger (see Table 1-7).

TYPE 2 HARVEST

A clearcut in which the required seedlings, saplings and poles are left. The number of large trees is below Table 1-7 requirements.



Requirements for <25-acre harvests

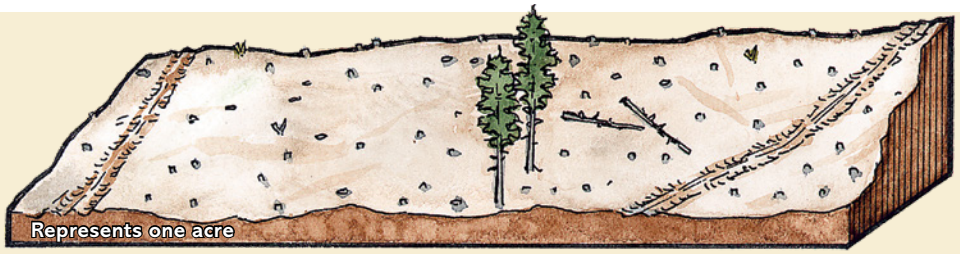
- Meets the reforestation stocking standards.
- No reforestation required.

Requirements for >25-acre harvests

- Leave two wildlife trees and two down logs per acre.**
- No reforestation required.

TYPE 3 HARVEST

A clearcut where few seedlings, saplings or poles remain. The number of large trees is below Table 1-7 requirements.



Requirements for <25-acre harvests

- Does not meet reforestation stocking standards.
- Must replant within two years and have "free-to-grow" seedlings within six years.*

Requirements for >25-acre harvests

- Leave two wildlife trees and two down logs per acre.**
- Subject to 120-acre harvest unit size limitation.
- Must replant within two years and have "free-to-grow" seedlings within six years.*

TYPE 4 HARVEST

Commercial thinning to leave space between remaining trees, or a light, partial cut.

- Meets the reforestation stocking standards.
- No reforestation required.
- No wildlife trees or down logs are required if retaining an adequate basal area of trees 11 inches in diameter or larger (see Table 1-7).

*For full details about reforestation requirements, see the Reforestation chapter. **For more information about wildlife trees and down logs, see the Wildlife chapter.

STEP 2: Identify the harvest's site class

Forests are classified by site class numbers according to how well trees grow. Trees grow faster in locations with fertile soils and plenty of moisture, and these areas have higher site classes. Trees grow more slowly in rocky soils and drier climates where the site class is lower. The Oregon Forest Practices Act (OFPA) uses six forest site classes ranging from I, the highest site class, down to VI, the lowest. These classes are based on forest productivity — how many cubic feet of wood an acre of forest can grow each year until the trees reach maturity and their growth slows down.

Several important requirements in the OFPA are based on site class. Table 1-2 shows groupings of site classes according to their wood production.

Table 1-2 Site classes for Oregon forestlands

Site class	I, II, III (High)	IV and V (Medium)	VI (Low)
Annual forest growth (cubic ft. of wood volume per acre per year)	120 plus	50-119	20-49

Site class helps determine harvest type and reforestation stocking standards, requirements for harvest unit leave trees and down wood, and harvest size limitations.

WAYS TO DETERMINE SITE CLASS FOR YOUR HARVEST UNIT OR REFORESTATION AREA

- Contact your local ODF office for help.
- Hire a consulting forester to determine the site class for you.
- Determine the site class yourself. To do so, you will first calculate your "site index" using the instructions in the section below.

FINDING SITE INDEX TO DETERMINE SITE CLASS

Site index is a measure of the height (in feet) that forest trees will grow to at a specific age, usually 50 or 100 years, and in a particular location. A higher site index value indicates that trees grow faster and the forest is more productive. Site index varies for different tree species because each species has its own characteristic growth rate.

There are two options for finding the site index, which helps determine site class:

1. Check the soil survey published by the Natural Resources Conservation Service (NRCS) for most Oregon counties. Locate your harvest unit on the soil survey map, find your soil type, and note the site index for the primary tree species that grows in your area.
2. Measure site index directly by following these steps:
   - > Choose at least three trees, all the same species, that have grown with their crowns in the upper portion of the forest canopy.
   - > Measure and record the age and height for each tree:

     To determine age, use an increment borer to take a core sample from the tree at 4.5 feet (breast height) above the ground and count the growth rings. Add five to 10 years to the ring count to account for the number of years it took the tree to grow to breast height. This is the total age of the tree.

     To determine height, use a clinometer or angle-measuring device. Measuring tree height is not difficult, but it takes instruction and practice to be accurate.
   - > Use the table for your tree species to figure out the site index for each tree measured. For example, let's say you measured a Douglas-fir tree in western Oregon that is 70 years old and 110 feet tall. Table 1-4 shows that the 100-year site index of the tree would be 130. That means that if the tree continues growing to age 100, it is expected to grow to about 130 feet tall. Tables 1-4, 1-5 and 1-6 allow you to find Douglas-fir site indexes (100- or 50-year basis) and ponderosa pine site indexes (100-year basis).

Now, determine your site class: Take the site index figure from Tables 1-4, 1-5 or 1-6 and plug it into Table 1-3 to find the corresponding site class. For example, the Douglas-fir tree that had a 100-year site index of 130 is in the "high" category, which includes Site Classes I, II and III.

A publication from Oregon State University Extension Service, called *Tools for Measuring Your Forest*, can help you find the site index for your property. It includes instructions on how to use an increment borer, clinometer and other forest measurement tools.

Table 1-3 Matching site index to site class

Site class	I, II, III (High)	IV and V (Medium)	VI (Low)
Douglas-fir site index (100-year basis, westside)	124 or more	80-123	Contact ODF
Douglas-fir site index (50-year basis, westside)	92 or more	70-91	Contact ODF
Ponderosa pine site index (100-year basis)	109 or more	64-108	40-63

Table 1-4 Site index for Douglas-fir, western Oregon, 100-year basis														
Total age (years)	Total height (feet)													
20	21	24	26	29	31	34	37	39	42	44	47	49	52	54
30	37	41	46	50	55	60	64	69	74	78	83	88	92	96
40	48	54	60	66	72	78	84	90	96	102	108	114	120	126
50	56	63	70	77	84	91	98	105	112	119	125	132	139	146
60	63	70	78	86	93	101	109	117	124	132	140	148	156	163
70	68	77	85	94	102	110	119	127	135	144	152	161	170	178
80	73	82	91	100	109	118	127	136	145	154	163	172	181	190
90	77	86	96	105	115	125	134	144	153	163	172	182	192	201
100	80	90	100	110	120	130	140	150	160	170	180	190	200	210
Site index	80	90	100	110	120	130	140	150	160	170	180	190	200	210

Table 1-5 Site index for Douglas-fir, western Oregon, 50-year basis										
Age (years, at DBH)	Total height (feet)									
10	16	18	20	22	24	27	29	32	34	37
20	30	35	40	44	49	54	59	63	68	73
30	42	49	56	63	70	76	83	90	97	103
40	53	61	69	78	86	95	103	112	120	129
50	60	70	80	90	100	110	120	130	140	150
Site index	60	70	80	90	100	110	120	130	140	150

Table 1-6 Site index for ponderosa pine, 100-year basis													
Total age (years)	Total height (feet)												
20	6	9	12	16	20	25	30	35	40	45	50	55	60
30	11	15	20	26	32	38	44	51	57	64	70	77	84
40	16	22	28	35	42	49	55	63	70	77	85	93	100
50	21	28	35	43	51	58	65	73	80	89	97	105	113
60	26	34	42	50	58	66	73	81	90	99	107	115	124
70	30	39	47	56	64	73	80	89	98	108	116	125	134
80	34	43	52	61	70	79	88	97	106	116	124	133	143
90	37	47	57	66	75	85	94	104	113	123	132	142	152
100	40	50	60	70	80	90	100	110	120	130	140	150	160
Site index	40	50	60	70	80	90	100	110	120	130	140	150	160

STEP 3: Determine how many acres the timber harvest unit will cover

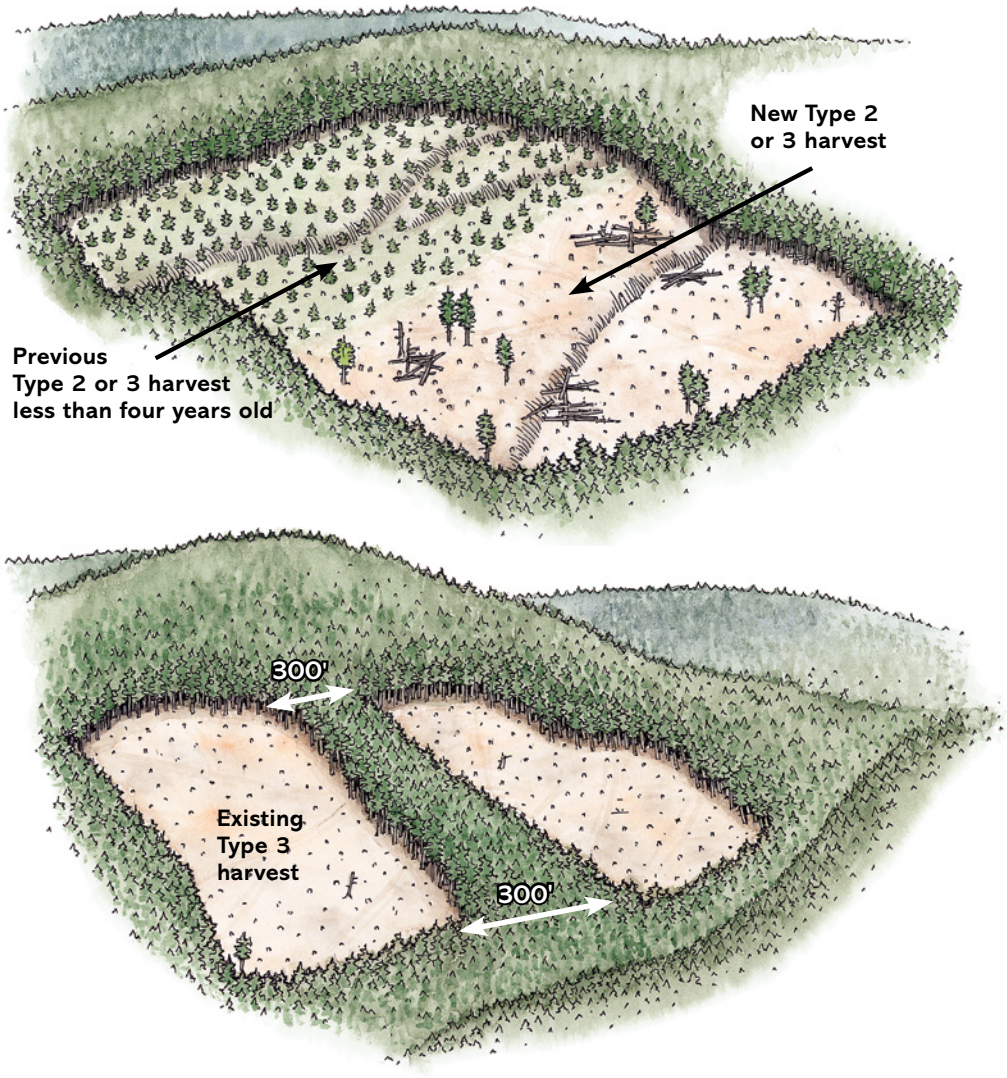
The OFPA limits clearcuts to 120 acres. Adjacent land in the same ownership cannot be clearcut until new trees on the original harvest site are at least four feet tall or are four years old and the stand is "free-to-grow." Refer to the Wildlife chapter for specific rules.

Accurate acreage measurements are your responsibility. Figure out the size of your harvest unit using a scaled aerial photograph, topographic map or global positioning system. The FERNS system provides several types of base maps you can use to draw and edit your harvest unit boundary and calculate the acreage.

STEP 4: Decide which leave trees will be on the harvest unit

The number of leave trees and their diameters are two of the keys to determining the type of harvest you intend and the requirements that will apply to the harvest unit.

Measure the trees you plan to leave in the timber harvest unit. Tree diameter is measured 4.5 feet above the ground, on the uphill side of the tree, and is referred to as diameter at breast height (DBH). Refer to Table 1-7 and the Wildlife chapter.



STEP 5: Check to see if the logging operation is likely to be active during a "declared fire season"

A "declared fire season" exists when the local risk of wildfire is identified as significant — a period often extending from early July to October. During this time, operators are required to be alert and able to suppress a small fire, with equipment on-site. They must also meet daily fire watch requirements and have additional liability for a fire originating in the timber harvest unit. See the Harvesting chapter for more information.

Table 1-7 Leave trees and site class

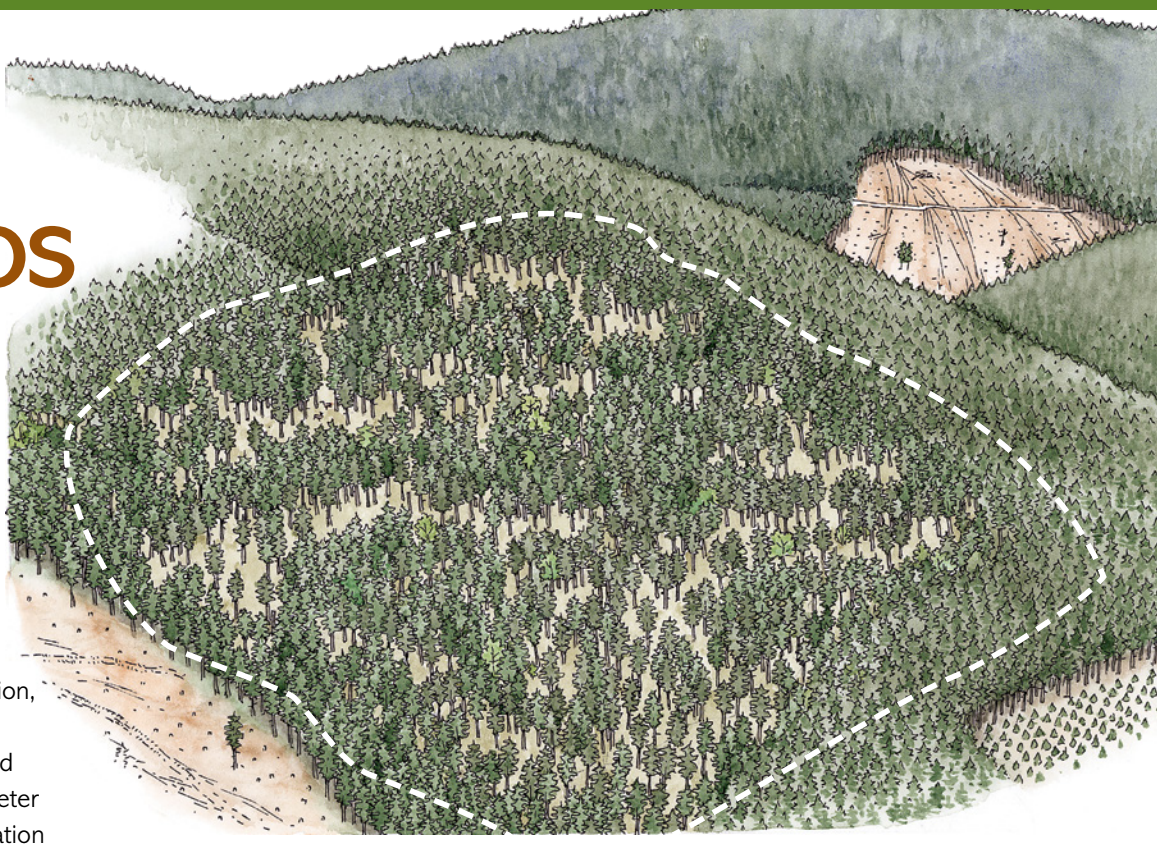
When planning a harvest of 25 or more acres, leave standing the amount of trees in columns two or three, or leave at least two wildlife trees and two down logs per acre.

Site class	Number of trees per acre at least 11 inches at DBH	OR	Square feet of basal area per acre of 11-inch or larger trees
I, II and III	50		33
IV and V	30		20
VI	15		10

STEP 6: Find out if a written plan is required

Written plans protect streams, wetlands, bird sites and public safety. Sometimes the requirements for a written plan may be waived. For more information about written plan requirements, see page 28.

TIMBER HARVEST SCENARIOS



Harvest unit example: Site Class III (high); harvest size 35 acres; leaving 90 square feet per acre of trees with 11-inch DBH or larger.

Will there be a reforestation requirement after harvest?

Using the example in the illustration, let's determine if the stocking of seedlings, saplings and poles, and trees 11 inches or larger in diameter meets the standards for reforestation for Site Class III forestland. Note: Standards are different for each site class; see Table 6-1 in the Reforestation chapter to find the standards for all site classes. Landowners can decide to plant or leave an "equivalent combination" determined by the "equivalent calculation" formula described in the Reforestation chapter.

One option: Reforestation required. The landowner plans to remove most of the trees, leaving some scattered trees that add up to about 10 square feet of basal area per acre. Because the stand is very dense, not many saplings or seedlings will remain after harvest. In this case:

- Trees left after harvest will be less than the reforestation stocking standards for Site Class III forestland, so reforestation will be required.
- The harvest unit size is more than 25 acres and there will be less than 33 square feet of basal area, so wildlife trees and down logs will have to be left (see Table 1-7).
- Based on the illustrations and descriptions in Table 1-1, timber harvest Type 2 and Type 3 might match these changed harvest goals. Because both reforestation and wildlife trees are required, it must be a Type 3 harvest.
- Type 3 harvests have one more restriction: They are limited to 120 acres unless ODF reviews a written plan for an exemption before logging.

Another option: No reforestation required. Although the forest could be clearcut, you've decided to first thin trees to provide some income and improve the growth and vigor of the remaining stand. You plan to leave at least 90 square feet of basal area per acre in 11-inch DBH or larger trees. With this decision, you meet or exceed the reforestation rule standard for Site Class III forestland. No reforestation, which usually involves planting seedlings, will be required.

WHAT ARE SEEDLINGS?

Seedlings are live trees of acceptable species of good form and vigor with a DBH of less than 1 inch.

WHAT ARE SAPLINGS AND POLES?

Saplings and poles are live trees of acceptable species of good form and vigor with a DBH of 1-10 inches.

What about leaving wildlife trees and down logs?

(See also the Wildlife chapter.)

One option: Originally, you planned a harvest of 25 acres or less, so wildlife trees, snags and down logs would not be required. However, you need a bit more income this year to cover some expenses, so you harvest about 35 acres. You now need to determine if the trees you intend to leave after harvest will meet or exceed the standards in Table 1-7.

Another option: You could also keep 90 square feet of basal area per acre of trees with a DBH of 11 inches or larger. That is higher than the Site Class III reforestation standard of 80 square feet. As a result, leave wildlife trees and down logs are not required.

What type of harvest will it be?

Use Table 1-1 to determine harvest type. You have a vision of how the forest will look after harvest, and it seems to match the illustration and description for the Type 4 harvest. A Type 4 harvest has no requirement for reforestation or wildlife trees. The Type 4 harvest matches your planned harvest.

SEEDLING SOURCES

There are many sources for seedlings in Oregon. Be sure to consider ordering seedlings at least a year in advance of needing to plant them. Before ordering, determine the species, type and size of seedlings and when they will be available for planting. At some times, seedling supplies are very tight, so planning ahead several years can be beneficial. Plan to plant more than the minimum number of trees per acre to allow for seedling losses.

Legally, landowners must replant within 24 months after a clearcut or heavy partial cut. Planting requirements range from 200 trees per acre for most of western Oregon to 100-125 trees per acre for dry pine sites in eastern Oregon. By the end of the sixth year, trees must be "free-to-grow."

ODF publishes an annual catalog, *Sources of Native Forest Nursery Seedlings*, to help landowners find suitable tree stock for their planting goals. It provides information about:

- seed zones, including maps that show where a seed was collected and can be safely transplanted
- genetically improving seedlings
- selecting seed sources
- forest seedling nurseries
- resources to help during reforestation

MAPPING TOOLS

ODF offers extensive maps and data on its website, **oregon.gov/odf**. Its GIS Hub provides geospatial data, applications, published maps and resources to support stewardship of Oregon's forests. You'll also find ODF district maps, fire protection district maps and a state/U.S. Forest Service ownership map. Soil survey maps are also available from the Natural Resources Conservation Service (**nrcs.usda.gov**).

Landmapper (**oregon.landmapper.ecotrust.org/landmapper**), a simple online tool, can be used to create maps of your property in Oregon, including aerial photos, street maps, topography, streams and soil types.

CULTURAL RESOURCES

Cultural resources are archaeological sites or objects found on public or private lands.

Typical indications of archeological sites include stone tools, fire-cracked rock, shells, bone fragments and things like house pit depressions, hearths, fire rings, cairns (heaps of stones that signify memorials or landmarks) and similar items. Glassy rock fragments, along with tools and debris from making them — in an area where they are not normally found — may also indicate archaeological sites.

Importance and age

The number of archaeological sites is limited. They are irreplaceable and nonrenewable. They are also an inherent part of the cultural heritage of Oregon.

Cultural resources include more than prehistoric or Native American artifacts. Even old logging remains, stumps with springboard notches, camp dumps, railroad grades, homestead cabins, historic irrigation ditches, scribed trees and trails are included in the definition of cultural resources. In addition to artifacts, traditional hunting and gathering sites and religious sites may also be historical cultural records.

Legal protections

Oregon laws protect archaeological objects and sites.

The State Historic Preservation Office maintains a comprehensive, statewide inventory of sites, structures and objects that are potentially significant to Oregon's history, prehistory, architecture, archaeology and culture. This office is part of the Oregon Parks and Recreation Department.

If human remains are encountered during excavation, operations must be stopped. Report them to the landowner, the state police, the State Historic Preservation Office and the Commission on Indian Services.

ODF cannot provide cultural resource advice or guidance. For that information, landowners are directed to the State Historic Preservation Office at 503-986-0690.

oregon.gov/oprd/oh/pages/default.aspx

SCENIC HIGHWAYS

Oregon's popular scenic highways are often bordered by forestlands. When located along certain designated scenic highways, these lands have unique timber harvest requirements to help maintain the public's enjoyment of roadside trees.

Scenic highways are designated by the Oregon Legislature to create a buffer and limit the visual impact of logging operations. A visually sensitive corridor is 150 feet wide, and the adjacent stand provides a 150- to 300-foot buffer. Landowners will receive a notification if there is a scenic highway designation after they submit a Notification of Operation through FERNS. Alternate plans can be submitted for consideration by an ODF forester.

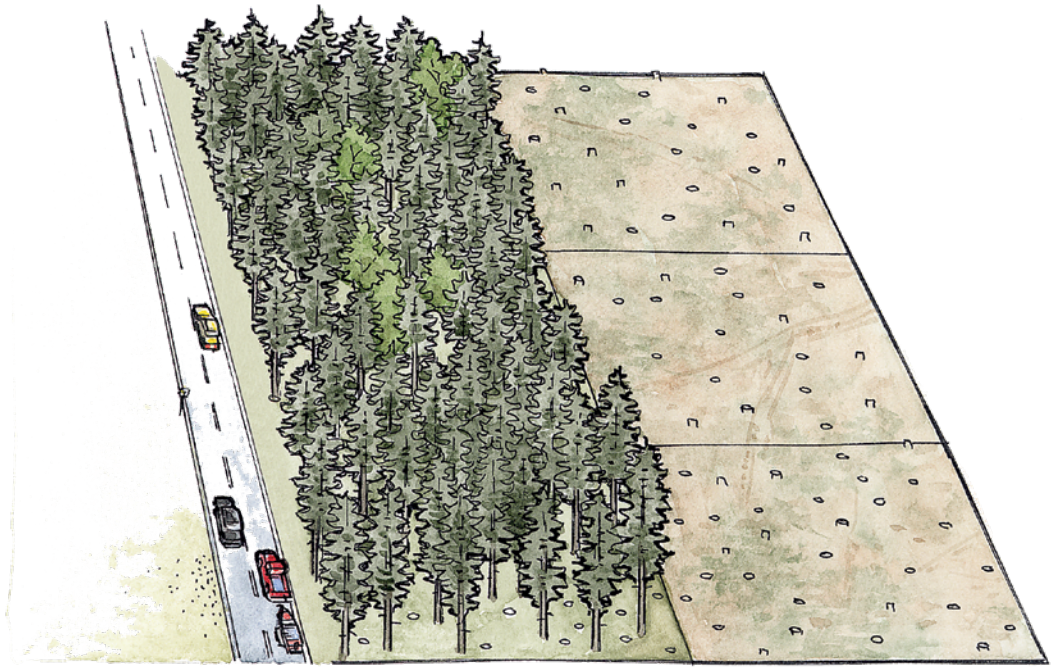
Three scenarios are exempt from the scenic highway requirements:

- timber harvests along highways within urban growth boundaries
- harvests on lands zoned as rural residential
- harvests on single ownerships of less than 5 acres

Scenic highways

Interstate: 5, 84, 204 and 405

State: 6, 7, 20, 18, 22, 26, 27, 30, 31, 34, 35, 36, 38, 42, 58, 62, 66, 82, 97, 101, 126, 138, 140, 199, 230, 234 and 395



Harvest areas within a visually sensitive corridor must be cleared of large timber harvest debris within 30 days of harvest completion or within 60 days of cessation of active harvest activity. If the harvest is Type 1 or Type 3, reforestation must be completed by the end of the first planting season following the harvest.

Oregon's scenic highway requirements apply to the "visually sensitive corridor" that extends 150 feet from the edge of the highway (Area 1 in the illustration). This distance is measured on the slope, along both sides of a scenic highway. The "edge of the highway" means the fence for interstate highways and the outermost edge of the pavement for state highways.

Requirements

Owners have two options for temporarily leaving trees within the 150-foot corridor (Area 1):

- Leave at least 50 healthy trees with a DBH of 11 inches or larger on each acre. This number is a minimum, not an average. Hardwoods make good visual screens, so conifers do not have to be left if there are enough hardwoods. The trees on each acre are intended to be distributed throughout the visual corridor.

  Note: One acre of scenic corridor 150 feet wide will be approximately 290 feet long.

- Leave at least 50 healthy trees that are 40 square feet of basal area on each acre.

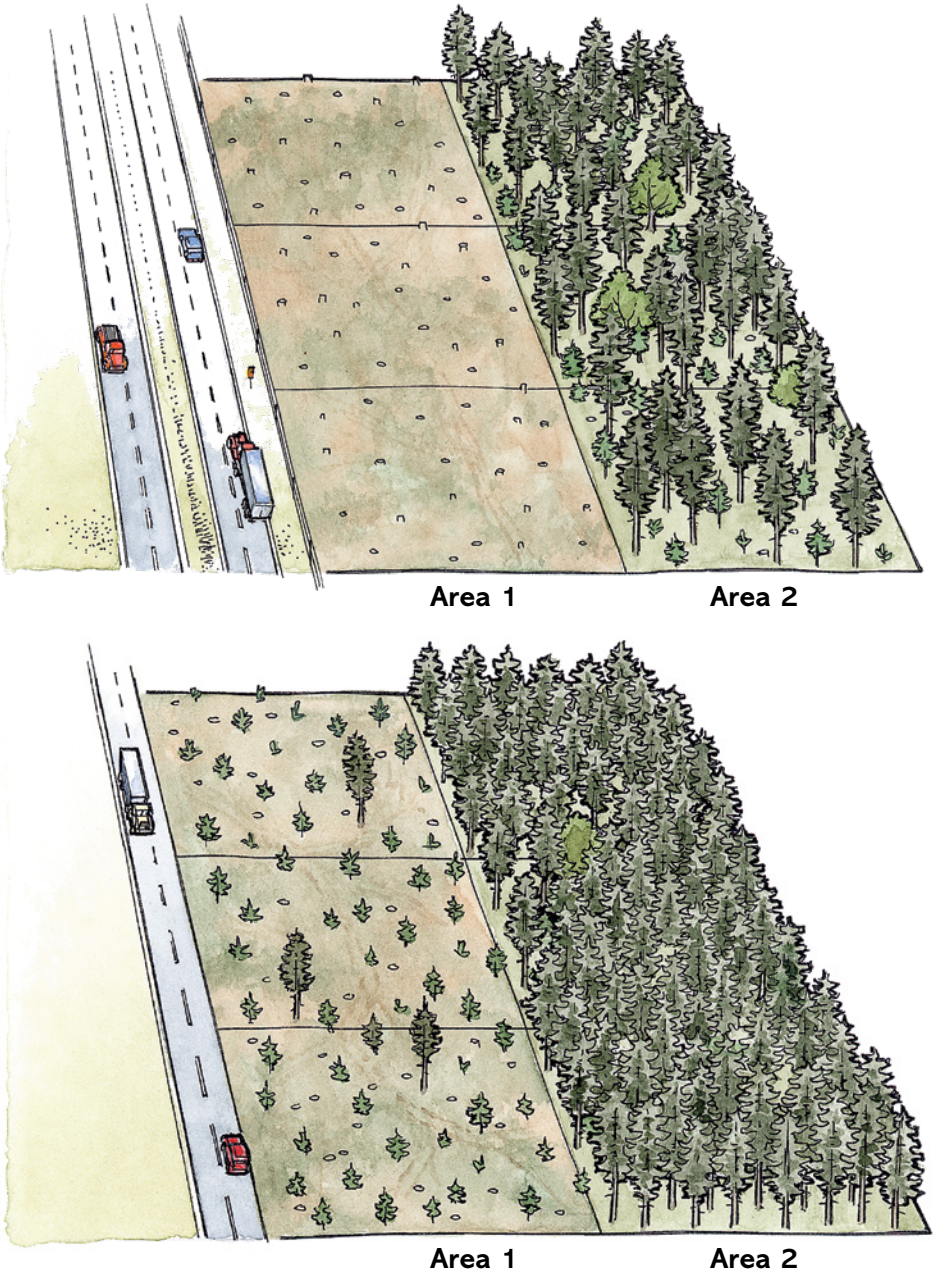
  Note: 50 trees per acre = 17 trees per 100 feet of corridor length.

Harvesting temporary trees

Temporary trees may be removed when both of the following conditions are met: the new trees in the corridor understory reach an average height of 10 feet, and the corridor contains the minimum per-acre number of free-to-grow seedlings or saplings required for reforestation. (See the Harvesting chapter.)

An alternative rule applies when the area extending from 150 to 300 feet from the edge of the highway (Area 2) has at least 40 square feet of basal area, or when it contains the minimum per-acre number of free-to-grow seedlings or saplings required for reforestation and these trees have an average height of 10 feet. In that case, no trees are required to be left in the visually sensitive corridor, or trees initially left may be removed. (See illustration, right.)

If the stocking in the scenic corridor (Area 1) is already below 50 healthy trees on each acre, Area 2 cannot be harvested until Area 1 is reforested and the stand has attained an average height of 10 feet.



Liability for injury or damage from trees left in corridors

When complying with scenic corridor requirements, landowners and operators are not liable for injury or damage caused by trees left in those corridors. Where public safety is a serious concern, the Oregon Department of Transportation may encourage or prescribe removal of specific trees growing along highways.

Modifications or waivers

ODF may approve modifications or waive scenic corridor requirements under the following circumstances:

- to maintain motorist safety
- to protect improvements such as dwellings or bridges
- to protect forest health
- to provide the motoring public with exposure to distant scenic vistas
- when trees that are required to be left are not visible to motorists
- when a land use change is inconsistent with a visually sensitive corridor
- when the requirements will result in severe economic hardship for the owner because nearly all of the owner's property is within the corridor

WRITTEN PLANS

Several parts of this manual mention requirements for written plans. Some harvest activities require operators to submit a written plan to ODF in addition to their Notification of Operation. An operator, timber owner or landowner must prepare the plan and describe the details of their operations. Written plans allow ODF foresters to work with operators to help them meet OFPA requirements.

There are two kinds of written plans:

Statutory written plans

ODF foresters must review submitted statutory plans. They may comment, but they won't provide a formal approval. If a waiting period is required, it cannot be waived. These plans do not apply to operations conducted under a stewardship agreement. The following activities require statutory plans:

- operations within 100 feet of a Type F, SSBT or D stream, even when dry (see Introduction)
- operations within 100 feet of wetlands larger than 8 acres (see the Riparian Management chapter)
- operations within 300 feet of areas identified by ODF as important for certain wildlife species

A statutory written plan may not be required if the operation activity will not directly affect the physical components of the riparian management area (RMA). For more information, check with your local ODF forester or see Forest Practices Act Technical Note 10: Statutory Written Plans, available on ODF's website, **oregon.gov/odf**.

Non-statutory written plans

These plans are like statutory written plans, except that ODF foresters can waive or reduce a required waiting period. They review these plans but do not provide a formal approval. The following activities require a non-statutory written plan:

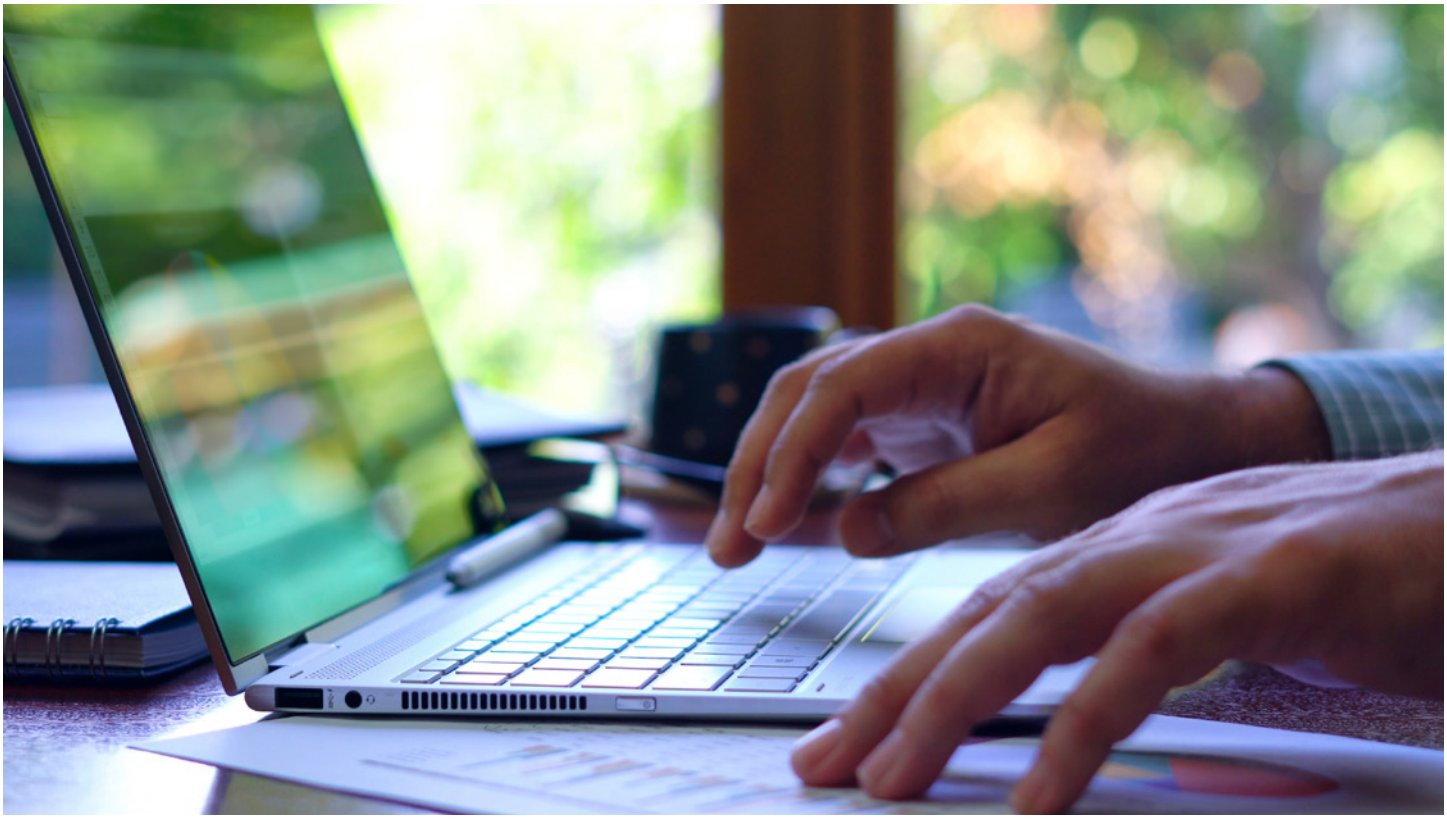
- operating near or within habitat sites of any wildlife or aquatic species classified as threatened or endangered
- conducting timber harvesting or road construction operations with intermediate or substantial downslope public safety risk
- constructing a stream crossing fill over a debris torrent-prone stream with intermediate or substantial downslope public safety risk
- locating a waste-fill area within a drainage containing debris torrent-prone streams with intermediate or substantial downslope public safety risk
- cable yarding across streams classified as medium or large Type Np
- harvesting timber where yarding will occur within stream adjacent failures identified upslope of the Type F or Type SSBT stream RMA
- harvesting timber where yarding will occur within stream adjacent failures identified upslope of the Type F or Type SSBT stream RMA
- operating within 100 feet of a large lake
- operating near a resource site requiring special protection
- operating near a Northern Spotted Owl resource site

The ODF forester cannot waive written plan requirement for these activities:

- creating risks outside of 100 feet of Type F, Type SSBT, Type D streams and to significant wetlands or waters of the state
- conducting machine activity in Type N streams or lakes
- constructing roads in RMA of Type N streams or lakes
- constructing or reconstructing any crossings over water excluding Type F, Type SSBT, or Type D streams or significant wetlands
- activities in a critical location outside of 100 feet of Type F, Type SSBT, Type D streams or significant wetlands
- placing woody debris or boulders in Type N stream channels for stream enhancement
- constructing or reconstructing any water crossing with fill over 15 feet deep in any Type N stream, wetland that does not meet the definition of significant wetland, lakes, bays, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets or canals
- temporary placement of fill within the RMA of any Type N stream, wetland that does not meet the definition of significant wetland, lakes, bays, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets or canals
- harvesting timber in a unit that contains designated debris flow traversal areas
- harvesting timber in a unit that contains designated sediment source areas and slope retention areas
- harvesting timber in a unit that contains designated debris flow traversal areas

Items needed in every written plan:

- a legal description or reference to a Notification of Operation number
- a map showing the proposed operation, the protected resource, and section lines, access roads and other important landscape features
- a complete description of the planned operation
- a description of the resource site(s) you are planning to protect
- specific techniques and methods used to protect the resource(s)



ALTERNATE PRACTICES

The Oregon Forest Practices Act provides landowners and operators with an option to modify specific requirements in the law and its rules, if comparable or better protection of forest resources can be achieved. This approach requires submitting to ODF for approval a "Plan for an Alternate Practice," a document prepared by the landowner, operator or timber owner describing the proposed practices that would differ from those specified in the applicable law or rule.

Landowners and operators who are considering alternate forest practices or methods should contact ODF early; not only can staff provide helpful guidance, but a written plan and formal approval are also required before operations can begin. The written plan must describe in sufficient detail the alternate practice and how it would yield results equal to or better than the standard forest practice requirements. Once the written plan is approved by ODF, the alternate practice effectively becomes the forest practice rule the landowner or operator must follow, and all provisions of the written plan must be met.

These are examples of situations for which approval of alternate practices may be granted:

- management actions for reasons of forest health, public safety or safety hazards
- specific practices that will improve soil, water quality, or fish or wildlife habitat
- necessary management following a disaster, storm, pest or disease epidemic
- when required forest practices would conflict with resource site protection
- to exceed the 120-acre clearcut size limit
- to modify the reforestation requirements
- to modify the tree retention requirements along streams, wetlands or lakes
- to convert forestland to non-forest use
- to conduct activities unique to a bona fide research project
- to modify the requirements for special resource sites (threatened fish and wildlife, sensitive birds, significant wetlands, etc.)

Situations where ODF may approve alternative practices include necessary management following a natural disaster.

WILDLIFE

APPLICABLE OREGON FOREST PRACTICES RULES

Planning forest operations

629-605-0100: Compliance
629-605-0105: Notice of Federal Endangered Species Act
629-605-0140: Notification to the state forester — types of operations
629-605-0170: Written plans
629-605-0173: Plans for an alternate practice
629-605-0190: Written plans for operations near critical, threatened or endangered wildlife habitat sites

Forest practices reforestation rules

629-610-0100: Exemption from reforestation for wildlife food plots

Treatment of slash

629-615-0100: Maintenance of productivity and related values

Water protection rules: Vegetation retention along stream

629-642-0105: General vegetation retention prescriptions for Type SSBT streams
629-642-0110: Relief for general vegetation retention prescriptions for Type SSBT streams

Water protection rules: Riparian management areas and protection measures for lakes

629-645-0000: Riparian management areas and protection measures for significant wetlands

Water protection rules: Specific rules for operations near waters of the state

629-660-0050: Beaver dams or other natural obstructions
629-660-0060: Headwater amphibian species

Specific resource site protection rules

629-665-0000: Specified resource site protection rules
629-665-0100: Species using sensitive bird nesting, roosting and watering sites
629-665-0110: Osprey resource sites; key components; protection requirements; exceptions
629-665-0120: Great blue heron resource sites; key components; protection requirements; exceptions
629-665-0130: Bald eagle nesting sites; key components; protection requirements; exceptions
629-665-0200: Resource sites used by threatened and endangered species
629-665-0210: Interim requirements for northern spotted owl nesting sites

Pest control; forest practices

ORS 527.710: Duties of the board; rules; inventory for resource protection; consultation of other agencies required
ORS 527.676: Leaving snags and downed logs in harvest Type 2 or 3 units; green trees to be left near certain streams

There are laws in Oregon protecting wildlife during timber harvest activities. Understanding the rules for wildlife protection is part of good forest management.

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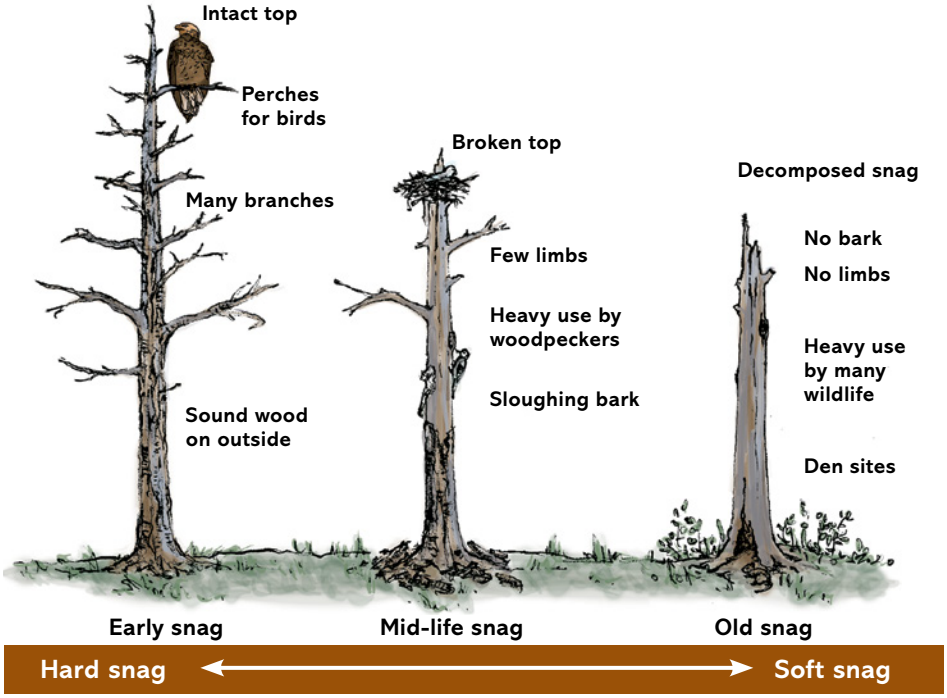
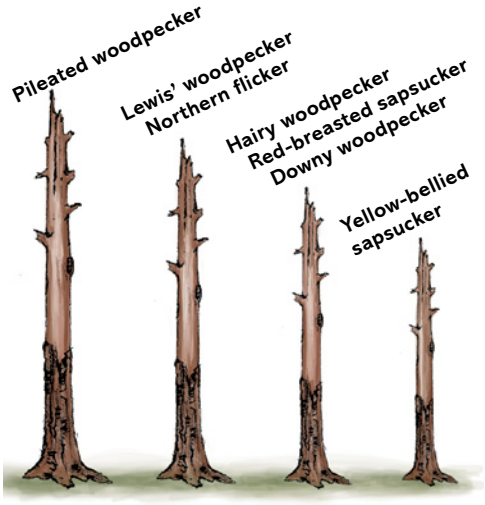
PROTECTING WILDLIFE DURING MANAGEMENT IS THE LAW

It is important to remember that following the Oregon Forest Practices Act (OFPA) rules does not provide coverage under the federal Endangered Species Act (ESA) or Bald and Golden Eagle Protection Act. Under these acts, it is illegal to have "take" of threatened or endangered species or of bald or golden eagles. As defined in the ESA, take is "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Incidental take is an unintentional, but not unexpected, taking. This can occur when habitat is removed, manipulated or altered, along with the disturbance of a nest site.



Snag diameters most often used by woodpeckers



Larger-diameter, taller snags stand longer and provide more cavities.

Wildlife protections also exist under state law through the OFPA, and include certain restrictions and requirements when conducting forest operations. The goal of the OFPA, in part, is to contribute to overall fish and wildlife maintenance. Wildlife are addressed in the OFPA through requirements to provide components of habitat such as snags, down logs and green trees in certain harvest units, and through retaining buffers of trees and vegetation along streams, wetlands, lakes and other sensitive resources. In addition, nesting sites of specific bird species are required to be protected when logging. Even if a species is not identified as threatened or endangered at the state or federal level, their protection and enhancement is still a good forest management practice.

Terms to know

A **WILDLIFE TREE** is either a snag or a green tree of a minimum size that is required to be left standing.

A **SNAG** is a dead standing tree that has lost its needles and small limbs.

A **DOWN LOG** is an existing down log or a down green tree of a minimum size.

Protected areas under the log are used as nesting cover by grouse and as hiding cover by rabbits and hares.

When the bark loosens, there is hiding cover for tree frogs and amphibians. The trunk is a food source for woodpeckers, particularly pileated woodpeckers.

Small mammals burrow into the interior as the log softens. Bears, raccoons and skunks feed on insects.

WILDLIFE LEAVE TREES

Providing natural structures that serve as habitat, such as snags, wildlife leave trees and down logs is important for certain wildlife species. Snags provide homes to owls, woodpeckers, bats, squirrels, bluebirds, wood ducks, swallows, mergansers, weasels, raccoons and many other animals. More than 50 species of birds and mammals use snags for nesting, roosting, denning, feeding and shelter.

A lack of snag cavities for nesting and roosting can limit populations of some bird and bat species. Snags larger than 20 inches DBH (diameter at breast height) can be a limiting factor for these species on private lands. Snags can be created from live trees, and wildlife respond quickly to their availability. You can avoid the cost of creating snags by selecting existing snags, or defective or deformed trees, for retention. In eastern Oregon, down logs are used by 150 species of wildlife, including amphibians, reptiles, birds and mammals. Logs are also important to certain insects, fungi and plants. Be aware that too many down logs can be a fire hazard; however, a forest without down logs may have fewer species of plants and animals. It's not necessary to leave sound logs. Deformed or rotten parts of tree stems left in the forest after a timber harvest can meet down log requirements if they would be solid enough to pick up with a log loader (See Table 2-1).

A timber harvest of 25 acres or more that will leave fewer trees per acre or basal area per acre than indicated in Table 2-2 will require retaining wildlife trees and down logs. Just like the requirements for reforestation, the trees per acre and basal area requirements vary according to site class.

Table 2-1 Down log minimum lengths and diameters

These sizes = 1 down log (10 cubic feet)		These sizes = 2 down logs (20 cubic feet)	
Length (feet)	Diameter (inches, small end)	Length (feet)	Diameter (inches, small end)
6	18	6	25
8	15	8	21
10	14	10	19
12	12	12	17
14	11	14	16
20	9	20	13
28	8	28	11
		36	9
		44	8

Table 2-2 Leave trees and site class

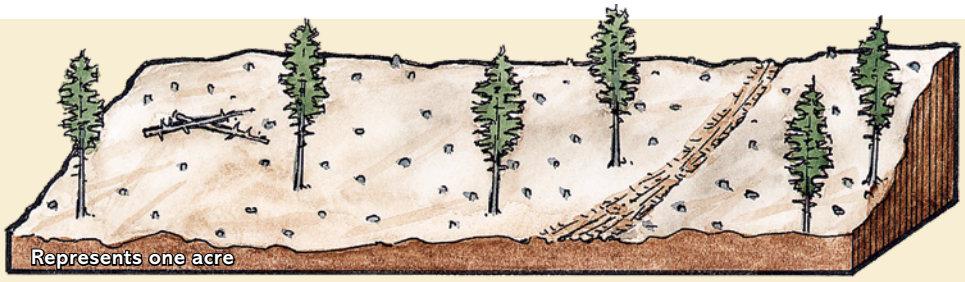
When planning a harvest of 25 or more acres, leave standing the amount of trees in columns two or three, or leave at least two wildlife trees and two down logs per acre.

Site class	Number of trees per acre at least 11 inches at DBH	OR	Square feet of basal area per acre of 11-inch or larger trees
I, II and III	50		33
IV and V	30		20
VI	15		10

Table 2-3 Four types of harvest and their requirements

TYPE 1 HARVEST

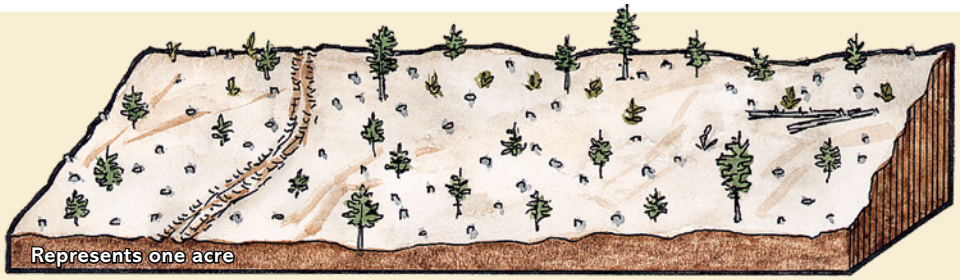
Heavy thinning or shelterwood cutting so few or no seedlings, saplings or poles remain.



- Does not meet reforestation stocking standards.
- Must replant within two years and have "free-to-grow" seedlings within six years.*
- No wildlife trees or down logs are required if retaining an adequate basal area of trees 11 inches in diameter or larger (see Table 2-2).

TYPE 2 HARVEST

A clearcut in which the required seedlings, saplings and poles are left. The number of large trees is below Table 2-2 requirements.



Requirements for <25-acre harvests

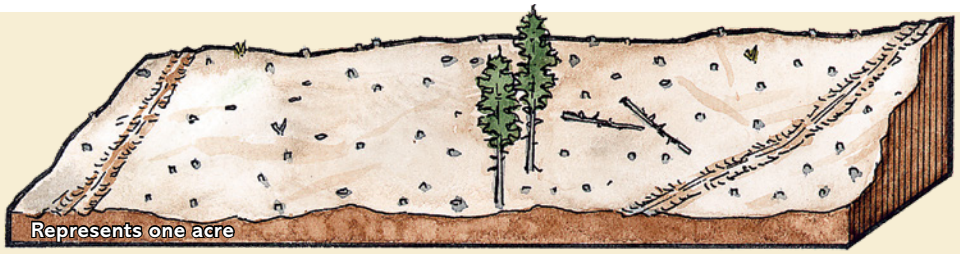
- Meets the reforestation stocking standards.
- No reforestation required.

Requirements for >25-acre harvests

- Leave two wildlife trees and two down logs per acre.**
- No reforestation required.

TYPE 3 HARVEST

A clearcut where few seedlings, saplings or poles remain. The number of large trees is below Table 2-2 requirements.



Requirements for <25-acre harvests

- Does not meet reforestation stocking standards.
- Must replant within two years and have "free-to-grow" seedlings within six years.*

Requirements for >25-acre harvests

- Leave two wildlife trees and two down logs per acre.**
- Subject to 120-acre harvest unit size limitation.
- Must replant within two years and have "free-to-grow" seedlings within six years.*

TYPE 4 HARVEST

Commercial thinning to leave space between remaining trees, or a light, partial cut.

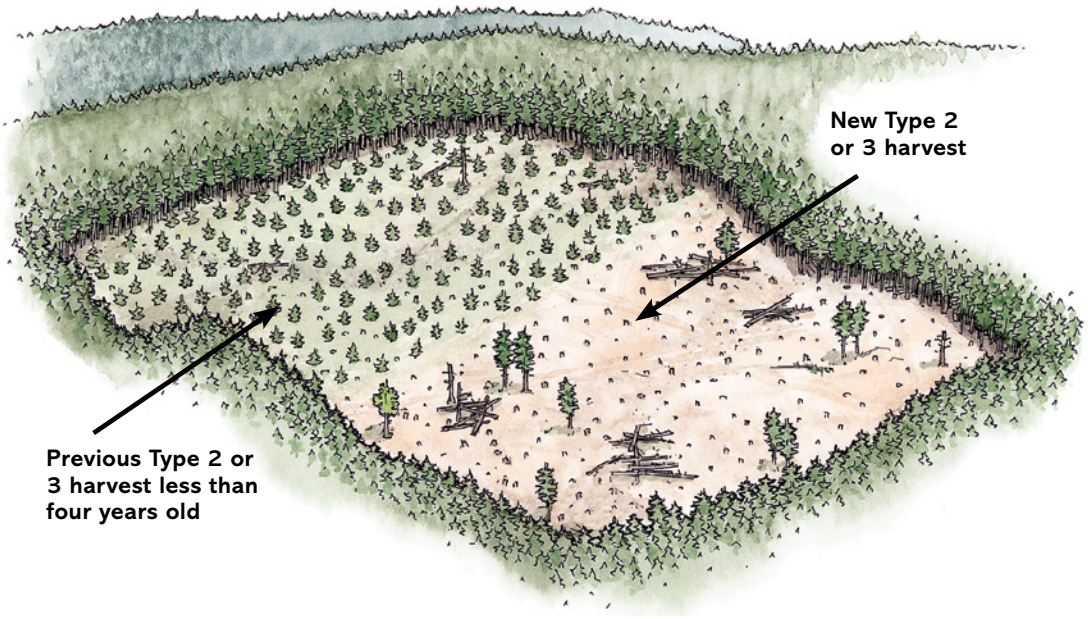
- Meets the reforestation stocking standards.
- No reforestation required.
- No wildlife trees or down logs are required if retaining an adequate basal area of trees 11 inches in diameter or larger (see Table 2-2).

*For full details about reforestation requirements, see the Reforestation chapter. **For more information about wildlife trees and down logs, see the Wildlife chapter.

Wildlife trees and down logs must be left in all Type 2 or 3 harvests that are larger than 25 acres (Table 2-3), and in some cases when adjacent new and older Type 2 or 3 harvests together exceed 25 acres (see example, right).

On average, for each acre you must leave at least:

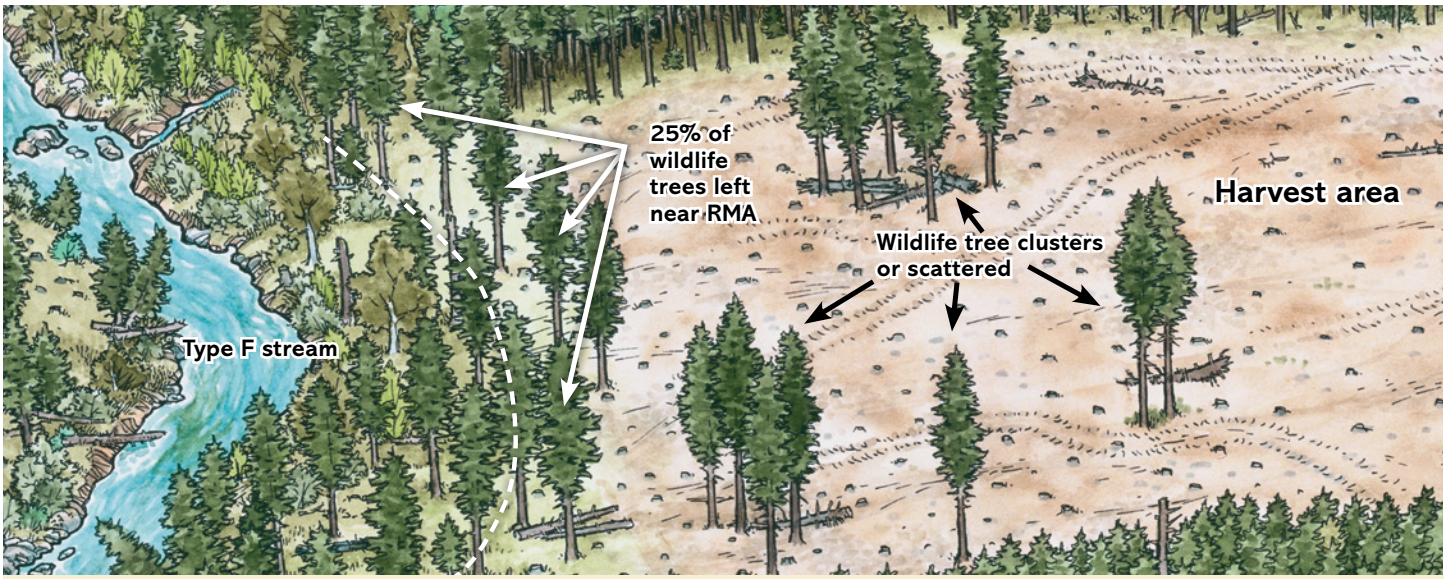
- two snags or two green trees at least 30 feet tall and 11 inches DBH or larger, at least 50% of which are conifers, plus
- two down logs or down trees, at least 50% of which are conifers. Each must be at least 6 feet long with a total volume of at least 10 cubic feet. Logs containing 20 cubic feet or more count as two logs (see Table 2-1). If a harvest unit does not have enough down logs to meet this requirement, some trees may need to be dropped and retained to make up for the deficiency.



Wildlife trees, snags and down logs may be left anywhere within a timber harvest unit. This could include leaving them in riparian, designated debris flow traversal, designated sediment source and slope retention areas. Leave trees and down logs can be left in one or more clusters across the harvest unit or scattered. Research suggests that leaving them in riparian areas is the most beneficial for wildlife. When clumped, they should be in groups of 15 or more.

Regardless of the size of the harvest unit, all snags and down logs must be left in all wetlands and in all riparian management areas for wetlands, lakes and most streams.

Harvest areas next to Type F streams.



Leave these wildlife trees:

Two snags or two green trees
- at least 30 feet tall
- 11 inches DBH or larger and
- 50% must be conifers

And two down logs or down trees
- at least 6 feet long
- at least 10 cubic feet total volume and
- 50% must be conifers

Requirements near certain streams

To provide increased benefits to fish, the Oregon Department of Forestry (ODF) may require operations adjacent to a fish-bearing or domestic-use stream to leave additional trees standing in riparian management areas (RMAs). Up to 25% of the green trees are required to be retained, or be left in or adjacent to the RMA of the stream. Additionally, ODF may require logging operations to leave available green trees and snags in or adjacent to small, non-fish-bearing streams subject to rapidly moving landslides. In this case, the logging operator would leave available green trees and snags within an area that extends 50 feet on each side of the stream, for a maximum of 500 feet upstream from a riparian management area of a fish-bearing stream.

Alternative plans

The location and species of wildlife trees and down logs may be modified following review by ODF. For example, hardwood species may be substituted for conifer species when managing for hardwoods. Additional leave trees in one unit can also be substituted for those required in another. This type of modification requires a plan for an alternate practice (see the Planning chapter).

Required tree retention may count toward wildlife tree retention requirements

In some cases, required retention trees along streams will also count toward the total retained wildlife trees needed for a planned timber harvest. You may count trees in harvest Types 2 or 3 that otherwise meet the wildlife tree requirements within a portion (or all) of the tree retention area, depending on the stream type. (See "Stream protection design and layout in timber harvest areas" in the Riparian Management chapter.) Required tree retention may count toward wildlife tree retention requirements in the following scenarios:

- All trees meeting wildlife tree requirements within the outer 20 feet of the required stream buffer width for medium and large Type F and Type SSBT streams in western Oregon.
- All trees within the required stream buffer widths for small Type F, Type SSBT, Type D, Type Np and Type Ns streams in western Oregon.
- All retained trees in the outer stream buffer zone along all stream types in eastern Oregon.
- All retained trees in the outer buffer zone (SFO minimum) along Type F, Type SSBT and Type N streams in eastern Oregon.
- All trees retained as required for designated debris flow traversal, designated sediment source and slope retention areas, as well as stream-adjacent failures that otherwise meet the requirements for leave trees, may count toward requirements for wildlife leave trees within harvest Type 2 or 3 units.
- SFO minimum features identified in the slopes model, and stream-adjacent failures that otherwise meet the requirements for leave trees, may count toward requirements for wildlife leave trees within harvest Type 2 or 3 units.
- Snags and down wood left within wetlands, seeps or springs may be counted toward wildlife leave tree requirements, provided they meet the definition of a wildlife tree or down log.

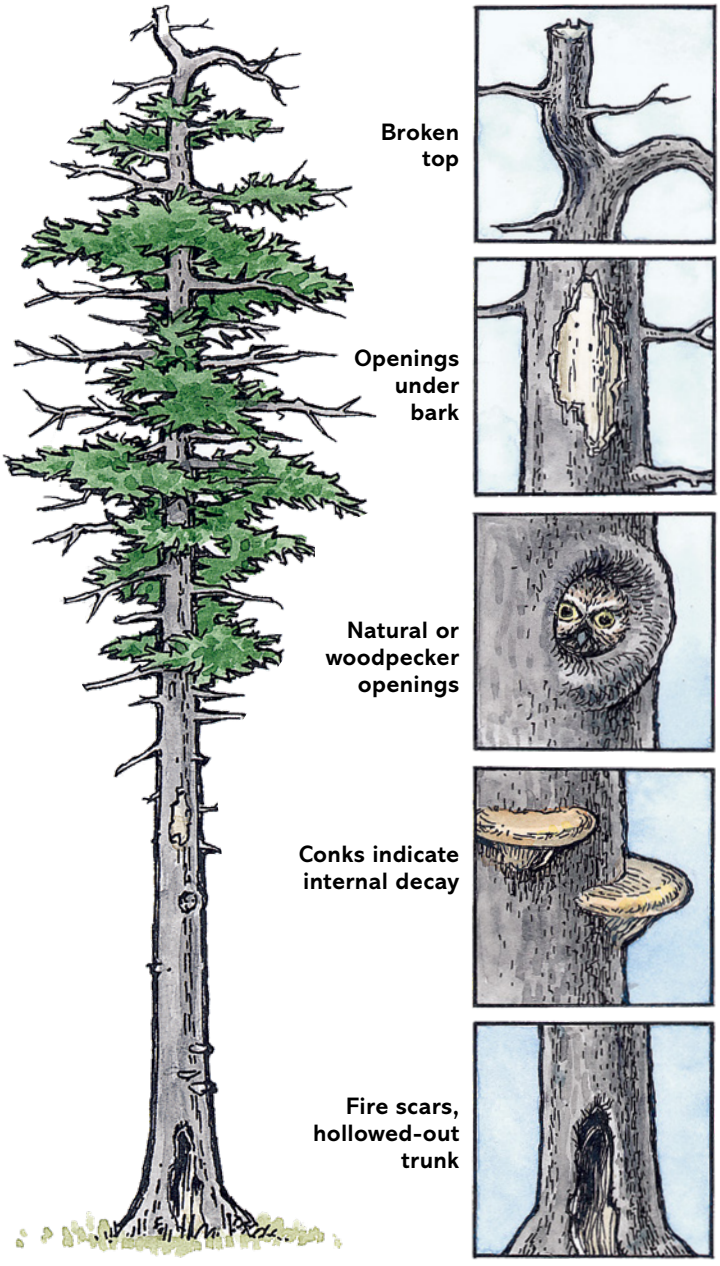
Note that trees required to be left for other reasons, such as for bird protection (e.g., bald eagles and osprey) or for wetlands, lakes and 300-foot buffers between clearcut harvest units, do not count toward the wildlife tree retention requirements. These trees cannot be double-counted.

Harvests of fewer than 25 acres

Leaving wildlife trees, snags or down logs is not required if your actual timber harvest, combined with any adjacent prior harvest on the same ownership, is less than 25 acres. However, leaving wildlife trees, snags and logs voluntarily is always encouraged since it benefits many forest animals.

Fire and safety considerations

Snags are vulnerable to lightning strikes, and during a wildfire hollow snags also can create a chimney effect where burning embers are sent into the air, starting new fires some distance away. However, despite these hazards they are extremely important for wildlife.



Snags can collapse or drop limbs without warning. Oregon law requires forest operators to always identify snags and other potentially dangerous trees.

Never operate machines near snags. They can be accidentally bumped, or the ground vibration can cause unexpected collapse of the tree. Always mark a safety hazard area around snags. Isolate snags and notify all forest workers by marking the area with plastic ribbon.

If wildlife trees being retained consist of snags or other dangerous trees, workers should be notified about the hazard areas before any logging or other forest operations begin. Reminding workers of these hazards when work commences is also suggested, especially when moving cables, during log skidding or when tree felling is occurring nearby.

Minimize worker exposure to wildlife tree hazards by leaving snags and other dangerous trees among a clump of other trees; along harvest boundaries; within or near stream riparian management, slope retention or debris flow traversal areas; between cable corridors; on rock outcrops; or at the back end of the timber harvest area.

Selecting wildlife trees and snags

Before beginning tree felling in timber harvests larger than 25 acres, identify the wildlife trees that will be left. This will ensure enough wildlife trees are left in the harvest area. The first choice should be to leave safe snags in safe locations, but it is often necessary to leave green wildlife trees that will eventually become snags. Look for the following traits to identify these types of trees:

- a broken or dead top
- dead branches in the crown
- old wounds or scars at the base of the tree
- indication of internal rot (fungi, conks or existing woodpecker cavities)
- the largest-diameter and tallest trees

Protecting down logs

Down logs can be crushed and broken by equipment. Never allow yarding and skidding without informing workers about down log needs. It may be possible to save existing down logs by identifying their locations.

SENSITIVE WILDLIFE RESOURCE SITES

Habitat sites of fish and wildlife species identified as threatened and endangered, or on other lists adopted by rule by the Oregon Fish and Wildlife Commission, or federally listed under the Endangered Species Act (ESA) must be protected through forest management.

Sensitive wildlife sites include:

- sensitive bird nesting, roosting or watering sites specifically identified for protection in the Oregon Forest Practices Act (OFPA)
- critical wildlife or aquatic habitat sites that are listed in a 1984 cooperative agreement between Oregon's Board of Forestry and the Fish and Wildlife Commission

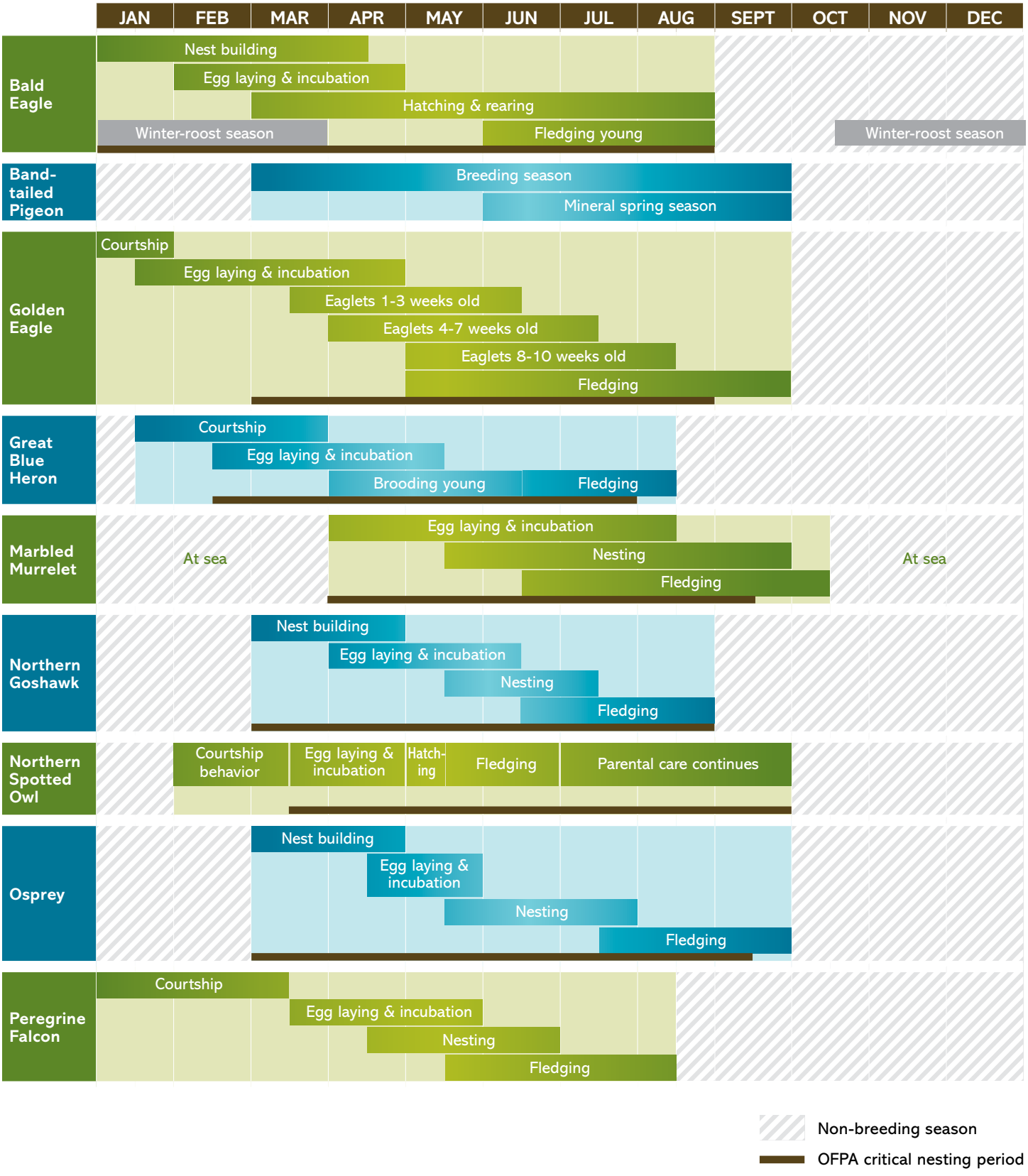
Certain wildlife species are associated with sensitive resource sites

Managed forests provide valuable habitat for wildlife at all forest stages. Some wildlife, including sensitive, threatened and endangered species, have special protections. Understanding when these species are most sensitive, such as during nesting season, is helpful in planning operations to avoid conflict with these species. The nesting chart (next page) outlines the nesting seasons for all bird species with special protections under the OFPA. In addition, the chart highlights the critical nesting period for each species:

- northern spotted owl
- bald eagle
- osprey
- great blue heron
- golden eagle
- marbled murrelet
- band-tailed pigeon

The Oregon Department of Forestry (ODF) has responsibility for maintaining inventories of sensitive resource sites. When you submit your Notification of Operation online, it is ODF's responsibility to identify any sensitive resource sites that may conflict with your operation. Landowners do not have a responsibility under the OFPA to search for and inventory unknown sites. However, if a landowner or operator knows of or discovers a non-inventoried site during planning, or while conducting a logging or other forest operation, they must stop the operation and inform ODF so they can evaluate the site and determine if protection is needed.

Critical Nesting Chart



When operations conflict with sensitive resource sites, protection is required. For some sites, such as significant wetlands and sites used by northern spotted owls, bald eagles, great blue herons and osprey, potential conflicts have been identified, and levels of protections are established in the OFPA rules. For other sites, such as those used by golden eagles, band-tailed pigeons, marbled murrelets or other threatened or endangered species, ODF determines if a conflict exists and works with the landowner to develop or review their site-specific plan. If needed, ODF will recommend protection measures that will avoid conflict. In both cases, the following questions must be answered:

Note that additional fish or wildlife species may be protected in the future if granted federal threatened or endangered status.

1. IS THE SITE ACTIVE?

"Active" means the site has been used in the recent past by one of the species listed on the following pages. For example, a bald eagle may be using another nest site, but the nest site on your property may still require protection. Another example is an old osprey nest that was last used by the bird six years ago. This site would be considered "abandoned." No protection is required for abandoned resource sites. Multi-year surveys are usually needed to show that a site has been abandoned, and these surveys are subject to ODF review.

2. WHAT ARE THE POSSIBLE CONFLICTS, IF ANY?

A conflict exists if an operation may lead to sensitive resource site destruction, abandonment or reduced productivity. The proposed operation is reviewed and the site is inspected with the landowner, operator and representative of the Oregon Department of Fish and Wildlife (ODFW) to identify conflicts. If there are no conflicts, no special protection measures are required.

3. HOW WILL CONFLICTS BE RESOLVED?

A written plan must describe reasonable measures sufficient to resolve the conflict in favor of the resource site. Reasonable measures may include but are not limited to protecting the site and key habitat components, limiting the timing of forest practices, redesigning the proposed practices in favor of site protection and excluding the forest activities outright.

Other considerations for sensitive resource sites

- Compliance with OFPA requirements does not ensure compliance with the federal ESA or the Bald and Golden Eagle Protection Act. It is the responsibility of the landowner and operator to know and incorporate federal ESA requirements in their actions.
- Landowners with approved "incidental take permits" under the federal ESA may be allowed some exceptions to compliance with the forest practices requirements.
- Additional information about the federal ESA can be obtained from the Oregon offices of the National Marine Fisheries Service (for listed anadromous fish) or the U.S. Fish and Wildlife Service (wildlife and non-anadromous fish):

National Marine Fisheries Service
Oregon State Habitat Office
1201 NE Lloyd Blvd., Suite 1100
Portland, OR 97232
503-231-2202

U.S. Fish and Wildlife Service Oregon State Office
2600 SE 98th Ave., Suite 100
Portland, OR 97266
503-231-6179

NORTHERN SPOTTED OWL

The northern spotted owl is a federally threatened species. A threatened species is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Northern spotted owls nest in unique forest habitats that require protection when the birds are nesting.

Northern spotted owl resource site

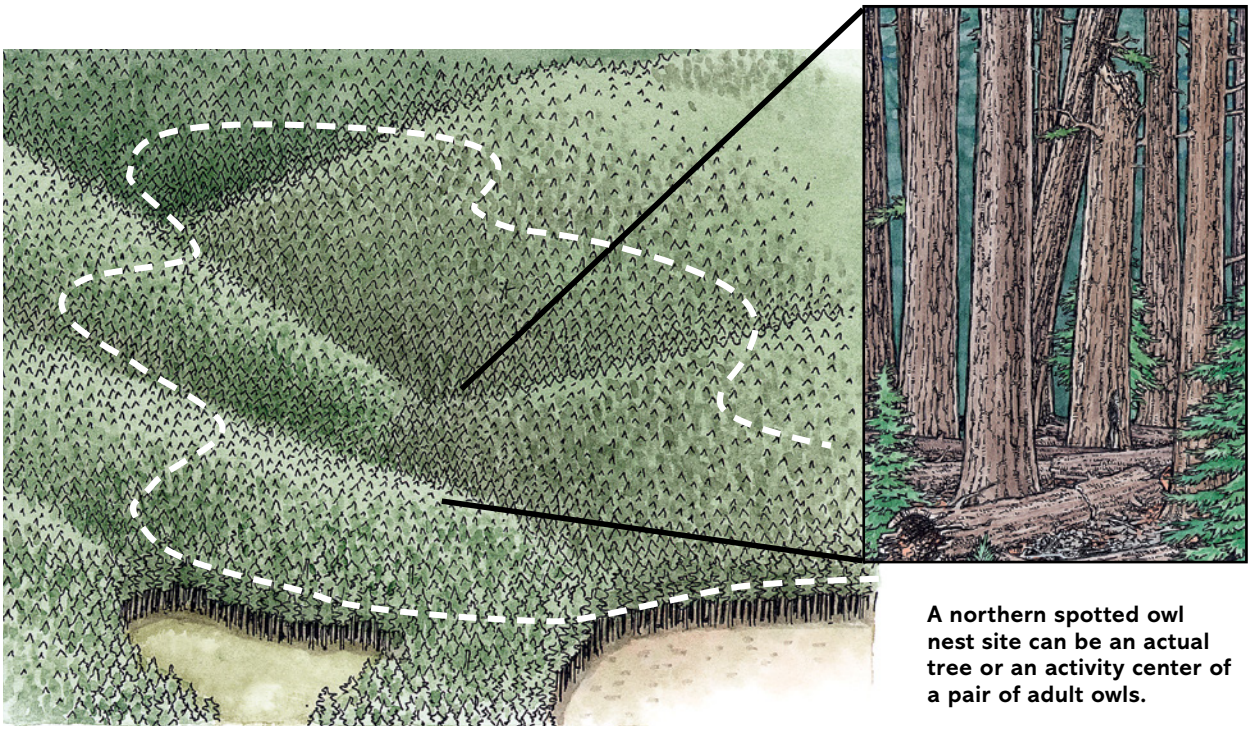
A 70-acre "core area" encompassing a northern spotted owl nesting site, which can be an actual tree or an activity center of a pair of adult northern spotted owls, is the resource site. Nesting sites require protection until there is reliable evidence that the site is no longer occupied by a pair of northern spotted owls. The shape of the core area can vary depending on the characteristics of the forest. The boundary is designed to make a contiguous habitat, or core area, used by the nesting owls.

Protect the resource site

When a landowner submits a Notification of Operation within one-half mile of a northern spotted owl resource site, ODF will inform the landowner that the owl resource site exists. ODF maintains an inventory of owl sites. If the proposed operation conflicts with the northern spotted owl resource site, the landowner must submit a written plan for review prior to beginning the operation.

The 70-acre core area of suitable northern spotted owl habitat is determined by the landowner

A 70-acre core area of suitable northern spotted owl habitat is required for protection of the nest site. In most cases, timber harvesting is not allowed within this area. Nearby operations that may disturb nesting owls are restricted from March 1 to Sept. 30.



A northern spotted owl nest site can be an actual tree or an activity center of a pair of adult owls.

(sometimes multiple landowners) and ODF. Fledgling owls need this area before they leave the nest site. Juvenile owl mortality is very high, and is often caused by predation from other owls or starvation. Suitable habitat is important for their survival before they disperse from the nest.

The core area must be located so that it includes forest stands that come closest to approximating suitable habitat for northern spotted owls. Suitable northern spotted owl habitat for the core area means:

- a stand of trees with moderate to high canopy closure (60-80%)
- a multi-layered, multi-species canopy dominated by large overstory trees (greater than 30 inches DBH)
- a high incidence of large trees with deformities (large cavities, broken tops and other evidence of "decadence")
- numerous large snags and large accumulations of fallen trees and other woody debris on the ground
- sufficient open space below the canopy for owls to fly

Forest practices that do not maintain the core area's habitat suitability for owls are not allowed. In most cases, timber harvesting within the core area will not be allowed.

The period between March 1 and Sept. 30 is when nesting owls can least tolerate disturbance. Forest operations within one-quarter mile of a nest site are not allowed during this time. Seasonal restrictions may be waived if survey data shows that the spotted owls are not actively nesting or not present.

Exceptions

ODF may grant exceptions to the protection requirements if the operator has obtained an incidental take permit from federal authorities under the federal ESA.

MARBLED MURRELET

The marbled murrelet is a federally threatened species. Marbled murrelets spend most of their time at sea, but breed in older coniferous forests up to 50 miles inland. Breeding sites are characterized by large trees, multiple canopy layers and moderate to high canopy closure. Marbled murrelets do not build their own nests; instead, they utilize old raptor nests or other horizontal nest platforms, such as those created by large moss-covered limbs, mistletoe brooms, limb deformities or tree damage.

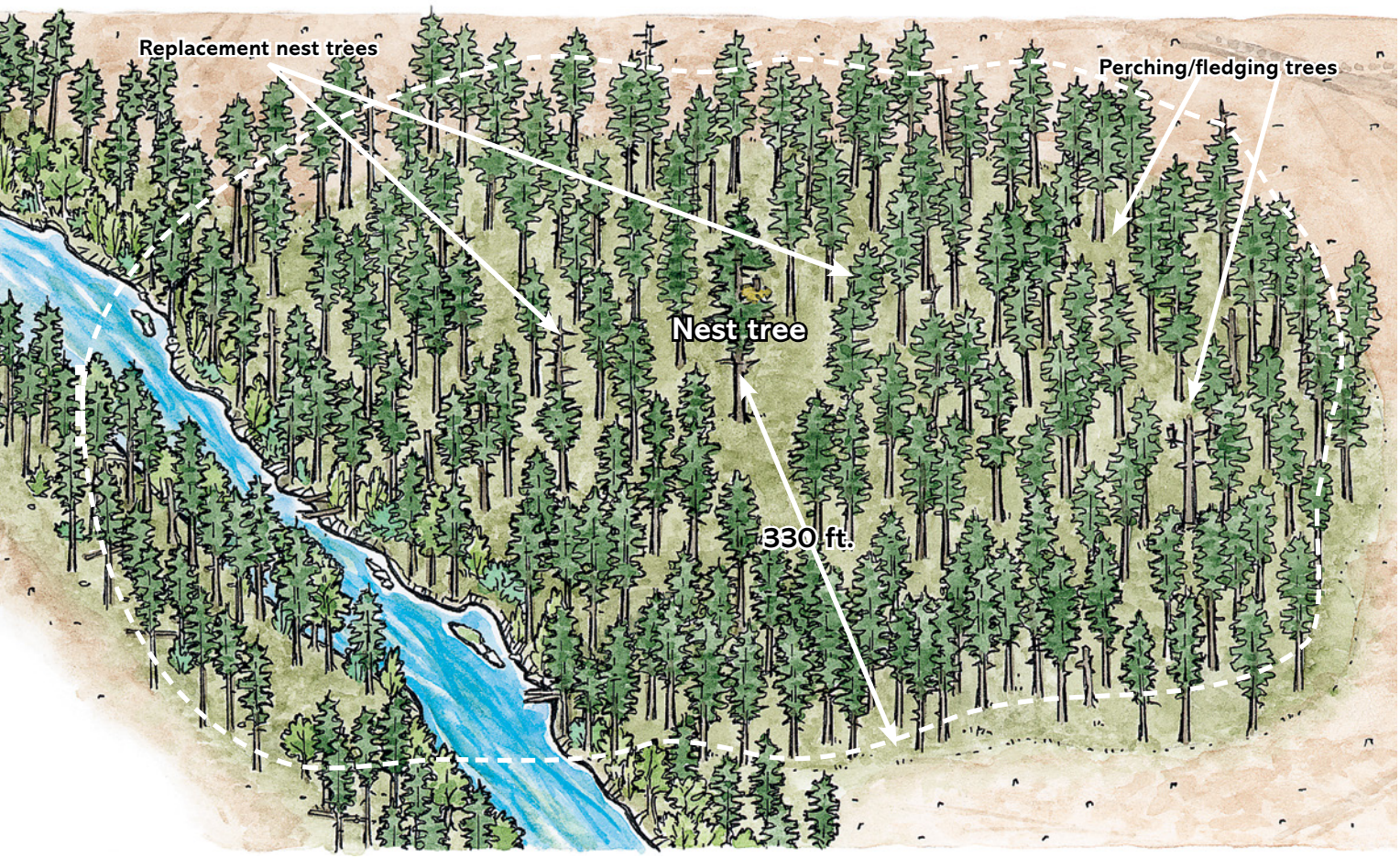
Marbled murrelet nesting site protection

A written plan is required if forest operations are planned near a known marbled murrelet location. Recommended protection measures include:

- maintaining site integrity
- avoiding disturbance during the nesting season
- submitting plans to ODF before operating within or near a resource site

BALD EAGLE

The bald eagle is a legally protected species, and forests with suitable nest trees are needed for its maintenance. Bald eagle nesting sites are sensitive to forest practices and require protection.



The protected area around a bald eagle nest tree is no less than 330 feet in all directions from the nest tree. Size and shape depend on use of the area by bald eagles. The resource site includes the active nest tree and all identified key components, such as perching or fledging trees, replacement nest trees and a forested area around the nest tree. Do not disturb within 660 feet of the resource site (1,000 feet for aircraft, including drones). For nesting sites, operations are restricted from Jan. 1 to Aug. 31.

Bald eagle nesting resource site

- Bald eagles often construct more than one nest, and vary their use between them from year to year. All bald eagle nests within a given territory require protection, although a nest may not be currently occupied or may not have been used for raising young for many years.
- An active nest tree is one in which a bald eagle has nested in the past five years, whether or not the tree still contains a nest. As long as the nest tree remains standing, it and the surrounding designated area require protection for up to five years. If the nest tree has fallen but the surrounding area has suitable replacement nest trees present, the area requires protection for up to a five-year period. This is to allow time to determine if the eagles will return and rebuild a new nest.
- Replacement nest trees ensure maintenance of a site in the future. Bald eagles show a strong attachment to a chosen territory. If a nest tree is lost, the pair will use a nearby replacement nest tree.
- Perch trees are often adjacent to the nest tree. In addition to perching, they're used as nest access points by adults, or as pilot trees their young use when learning to fly. They're often snags or live trees with exposed, strong, lateral branches high in the crown.
- Perching, fledging and replacement trees comprise a forested area around the nest tree that provides additional protection and acts as a visual screen.

Protect the nesting site

When a landowner proposes an operation within one-half mile of a bald eagle nesting site, ODF begins a review. If they determine that the operation may pose a conflict for the site, they will require a written plan describing how the site will be protected.

Any forest operations around the site must be designed to protect the trees from damage and windthrow. Experts must agree on the vegetation to be left. Trees are left to perform a job, either to provide a visual screen for the site or to protect the site from windthrow. This area should not be less than 330 feet from the nest. Its size and shape depend on actual use of the area by bald eagles. General guidelines for nesting areas call for maintaining the existing integrity of the stand.

From Jan. 1 to Aug. 31, when nest construction, mating and rearing of young occurs, forest operations are not permitted within 660 feet (or 1,000 feet for aircraft, including drones). ODF may modify this time period and the distances where forest operations are not permitted, if an operation will not cause the birds to flush from these trees.

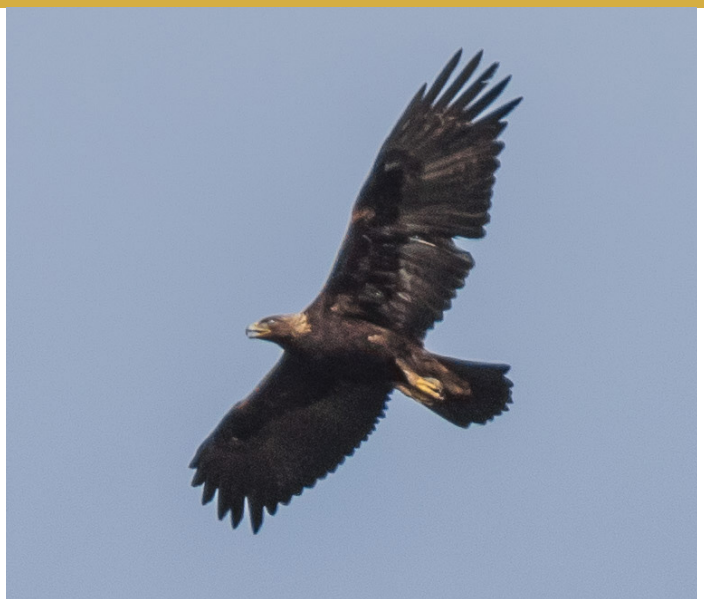
Exceptions

ODF may grant exceptions to the protection requirements if the operator has obtained an incidental take permit from federal authorities under the Bald and Golden Eagle Protection Act.

Facts about bald eagle nests:

- Nests are 5 to 8 feet in diameter and 2 to 3 feet deep.
- Nests are typically located partway down the tree, as eagles prefer to have live branches to shelter the nest.
- They are found in large trees, in prominent locations, giving a clear view of the water. Nest trees are usually located within 1/4 mile of large water bodies, but rarely right on the water's edge.
- In contrast, osprey nests are smaller, located at the very top of a broken-topped tree or snag and typically very close to the water's edge.

GOLDEN EAGLE



The golden eagle is a legally protected species. Golden eagles are found in many habitats, including open ponderosa pine and mixed-conifer or deciduous forests. Nests can be found on cliffs or in trees. Nests are massive (sometimes greater than 10 feet in diameter) and are used year after year. Golden eagles are known to consume a wide variety of prey, including ground squirrels, marmots and other birds. They will also eat domestic sheep, lambs and carrion, and will take prey away from other raptors.

Golden eagle resource site

The resource site includes the active nest tree and any identified key components, such as forested areas around the nest tree that offer perching, fledging and replacement nest trees. An active nest tree is one that has been used by golden eagles in the recent past.

Protect the resource site

Your local ODF office has the responsibility for maintaining inventories of golden eagle resource sites. ODF will notify you if there is an OFPA-protected golden eagle near your planned operation when you submit your written Notification of Operation form. Only certain sites listed in the 1984 ODF and ODFW cooperative agreement are protected under the OFPA. However, other golden eagle sites may warrant voluntary protection or protection under the Bald and Golden Eagle Protection Act.

A conflict may exist if an operation has the potential to modify or destroy the resource site, cause nest abandonment or failure, or reduce productivity at the resource site. Conflicts are solved by working with ODF, and may include measures such as:

- conducting a site inspection with ODF and applicable wildlife agencies
- implementing timing restrictions for forest operations outside the nesting season of Jan. 1 to Sept. 30

OSPREY

Osprey resource sites are protected under the OFPA. Osprey resource sites require protection because they provide for successful reproduction of this important species. The birds often nest in large, prominent snags or trees with broken tops. These trees have a limited life span and are vulnerable to damage from forest practices. When using the nesting sites, the birds are also sensitive to human disturbance.

Osprey resource site

The resource site includes the active nest tree and any identified key components such as perching, fledging and replacement nest trees. An active nest tree is one that has been used by osprey within the past five nesting seasons.

Osprey are fish-eating raptors. After foraging, an adult osprey eats part of a fish in a tree near the nest and delivers the remainder to the nest. These same trees are also used as perches by osprey fledglings when learning to fly. Perching and fledging trees tend to

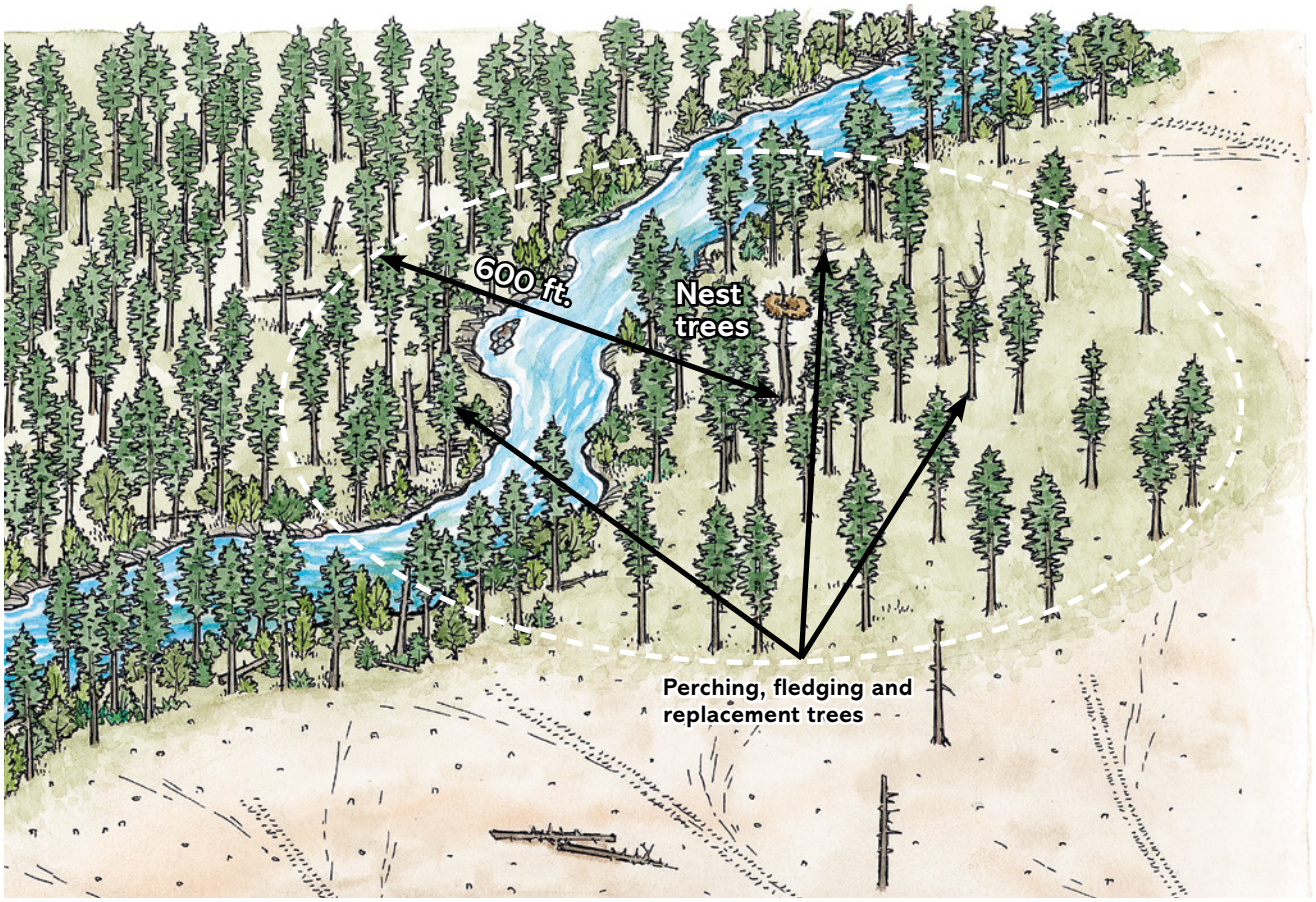
be taller and larger in diameter than nest trees, and have broken or dead tops, forks or lateral branches high in the crown. This allows easy access for osprey as well as views of their surroundings.

Protect the resource site

- The goal is to avoid resource site abandonment or reduced use of the site. This is accomplished by maintaining site integrity and avoiding disturbance during the critical period of use when nest construction, mating and rearing of young occur.
- During forest operations, the active nest tree and perching, fledging and replacement trees must be left standing and protected from damage.
- The operation must be designed to protect the trees from windthrow. A buffer is not required around the nest tree. However, some sites may benefit from a buffer or additional trees to protect the nest tree from windthrow.
- During the critical period of use, the active nest tree and any identified perch trees must be protected from disturbance. Forest operations are not allowed within 600 feet of the active nest tree or perch trees from March 1 to Sept. 15. Seasonal restriction periods can be modified if survey information shows that osprey are not nesting or are not present.
- First, identify the active nest tree. Then choose suitable perching, fledging and replacement nest trees that are likely to be used by osprey. Replacement trees should be taller than the surrounding forest, preferably dead or dead-topped trees with platforms large enough to support nests. Perch and fledgling trees are also taller than surrounding forest, and can be dead or alive.
- Resting perches are used by adults when not fishing or tending the nest, and by fledglings when learning to fly. These are large, tall snags or trees that have broken or dead tops, forks or lateral branches high in the crown.
- Eight to 12 trees are adequate for perching, fledging and replacement trees, and should be located near the active nest tree.
- Activities that cause disturbance include timber harvesting, log hauling, road construction and low-flying aircraft.

Exceptions

There are exceptions to protecting osprey resource sites if ODF determines that the loss of the site will not adversely affect the local osprey population and there are no economically feasible alternatives. Check with ODF.



Eight to 12 trees, located near the nest tree, are adequate to provide perching, fledging and replacement trees. Areas of high winds may require that surrounding trees be left to protect the resource site from damage.

Restrict operations March 1 to Sept. 15. Forest operations must not cause birds to flush.

GREAT BLUE HERON

Great blue heron resource sites are protected under the OFPA. They are colonial nesters, which means there are often many nests together in what's called a "rookery." However, great blue herons do sometimes nest individually. A rookery is a cluster of large nests located near the tops of trees. The rookery is usually located near water and is used year after year.

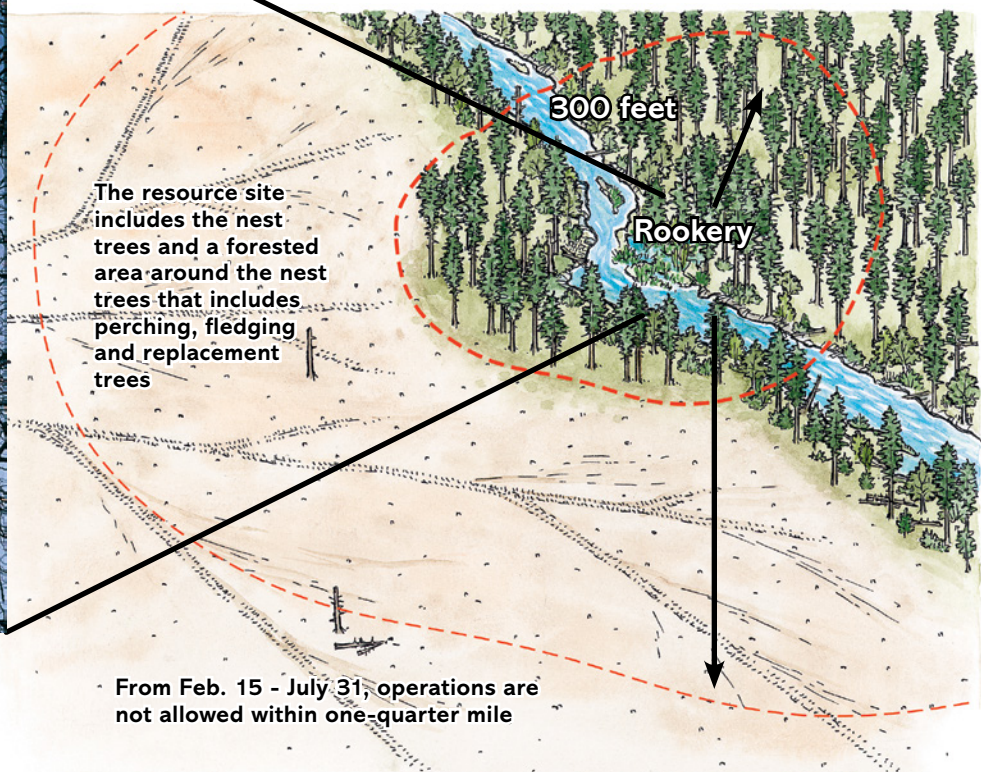
Great blue heron resource site

The resource site includes the active nest tree and any identified key components such as a forested area around the nest tree that has perching, fledging and replacement nest trees. An active nest tree is one that has been used by great blue herons within the past three nesting seasons.

Protect the resource site

- The goal is to avoid resource site abandonment or reduced use. This is accomplished by maintaining site integrity and avoiding disturbance during the critical period of use when nest construction, mating and rearing of young occur.
- During forest operations, the active nest tree and perching, fledging and replacement nest trees must be left and protected from damage. The operation must be designed to protect the resource site trees from windthrow.
- During the critical period of use, the active nest tree and any key components must be protected from disturbance. Forest operations are not allowed within one-quarter mile of the active nest trees Feb. 15 to July 31. Seasonal restriction periods can be modified if survey information shows that herons are not nesting or are not present.

These great blue heron nests have plenty of space for these large birds to fly in and out. Older trees with open branching are chosen.



- First, identify the active nest trees. Then choose a vegetative area around the nest trees. Trees used as nest sites should be tall, with plenty of space for these large birds to fly in and out. Older trees with open branching are ideal. A 300-foot area around the outermost nest trees is needed to give a visual screen around the rookery and protect nesting, perching, fledging and replacement trees from windthrow.
- Activities likely to cause the birds to flush from the nest include timber harvesting, log hauling, road construction and low-flying aircraft.

Exceptions

There are exceptions to protecting a great blue heron resource site if ODF determines that the loss of the site will not adversely affect the local population and there are no economically feasible alternatives. Check with ODF.

BAND-TAILED PIGEON

Certain band-tailed pigeon mineral sites are protected under the OFPA. Band-tailed pigeons nest primarily in Douglas-fir trees within closed-canopy conifer or mixed-conifer forests.

Nests are loosely constructed twig platforms and are located from 6 feet to 120 feet off the ground. Band-tailed pigeons need closed-canopy forests for nest sites and open-canopy forests for foraging, as well as mineral sites. Mineral sites such as springs, estuaries, wastewater sites or livestock salting areas are used more frequently if they have an abundance of nearby perching locations. Use is also dependent upon the salt content of the site. These birds are known to travel long distances away from mineral and nest sites for food (more than 30 miles).

Band-tailed pigeon resource site

The resource site includes the mineral watering site and any identified key components, such as surrounding trees for band-tailed pigeons to perch in.

Protect the resource site

ODF will notify you if there is a protected band-tailed pigeon mineral spring resource site near your planned operation when you submit your Notification of Operation form. Only sites listed in the 1984 ODF and ODFW agreement are protected. Other sites may warrant voluntary protection. A conflict may exist if an operation has the potential to modify or destroy the resource site or cause abandonment of the site. Conflicts are solved by working with ODF, and may include measures such as:

- conducting a site inspection with ODF and applicable wildlife agencies
- implementing timing restrictions for forest operations outside the use season of June to September
- developing a plan for protecting habitat around the resource site
- revising forest operations to avoid the resource site
- retaining buffers around mineral springs
- retaining trees for band-tailed pigeons to perch in to rest and before dropping down to use a mineral spring

AMERICAN BEAVER

The American beaver occurs statewide in all ecoregions of Oregon where suitable habitat occurs. Beavers are known as ecosystem engineers for their ability to change the environment where they live.

Except as needed for road maintenance, operators must submit a written plan to ODF prior to removing beaver dams and other natural obstructions from waters of the state during forest operations. If the beaver dam is within 25 feet of a culvert, it is considered road maintenance.

A written plan for beaver dam or obstruction removal must demonstrate that:

- a beaver dam or obstruction threatens existing forests or plantations
- beaver dam removal is part of a population control program approved by ODFW
- retaining the beaver dam or obstruction would result in greater environmental harm than benefit

Non-emergency beaver conflict

Beaver trapping regulations are the responsibility of ODFW, and do impact private lands. Contacting your local ODFW office is a good idea if you have a non-infrastructure beaver conflict. You will have 30 days to work with ODFW on non-lethal solutions before lethal action is allowed. After 30 calendar days, forest landowners may choose to lethally remove beaver at their discretion.

Note that the 30-day wait period prior to lethal beaver removal only applies to large landowners who own 5,000 or more forested acres.

Emergency beaver conflict

You can address immediate threats to infrastructure caused by beaver without advance notice to ODFW. In the case of emergency beaver conflict, a landowner may:

- destroy the beaver dam
- install mitigation devices (e.g., beaver deceivers), as long as these are in compliance with fish passage requirements (Recommended reading: Oregon Forest Resources Institute's Wildlife in Managed Forests: American Beaver)
- lethally remove the beaver without advance notification, but any lethally removed beaver must be reported to ODFW

Recreational beaver trapping

Recreational trapping (i.e., trapping not associated with damage) of beaver on private forestlands, other than small forestlands, must be for personal use only. A licensed fur trapper, who is not the landowner or an agent of the landowner may trap a beaver on privately owned forestland. But they may not sell or exchange the pelt of the beaver unless it was trapped on small private forestland.

Beavers trapped for damage reasons on forestland other than small forestland, those taken after the 30 days, or those taken due to damaging infrastructure, may still be sold.

Damage beaver trapping

All take of beaver on private forestlands must be reported to ODFW, where records will be maintained in the agency's wildlife damage complaint system. This action can be accomplished by the landowner or the person doing the taking (landowner's agent). ODFW will likely require the following information:

- name of the person who committed the take of the beaver
- location of the take
- reason for the take
- number of beavers taken

Contact information for ODFW beaver reporting:
dfw.state.or.us/agency/directory/contact_us.asp

WILDLIFE FOOD PLOTS

Wildlife food plots are areas on small forestlands that, instead of being used for growing and harvesting a forest tree species, are planted with vegetation capable of substantially contributing to wildlife nutrition.

Establishing wildlife food plots

Landowners may establish wildlife food plots within the boundaries of their land as long as they meet these requirements:

- They cannot exceed 2.5% of the small forestland, if the small forestland is 500 acres or less in size.
- They cannot exceed 2.0% of the small forestland, if the small forestland is more than 500 acres but not more than 1,000 acres in size.
- They cannot exceed 1.0% of the small forestland, if the small forestland is more than 1,000 acres in size.

Because establishing a food plot is an exception to reforestation requirements, only areas subject to reforestation requirements are eligible. Areas naturally devoid of trees are not eligible for use as a food plot under this rule, but may still be good areas to conduct voluntary habitat enhancement projects. A written plan is required for the establishing a food plot, and any changes to the food plot or forest management, including reforestation, requires notification to ODF. (See the Reforestation chapter.)

AMPHIBIANS

The Riparian Management chapter of this manual describes specific no-cut buffer widths required along streams. These rules are intended to benefit both fish and stream-associated amphibians. Amphibians that are sensitive to temperature and moisture fluctuations may live in small Type N streams. Forest operators are encouraged to retain portions of green live trees and snags in timber harvest units as blocks of intact vegetation along small Type N streams, to benefit amphibians.

Applies to small forestland owners only

RIPARIAN MANAGEMENT

APPLICABLE OREGON FOREST PRACTICES RULES

Water protection rules: Purpose, goals, classification and riparian management areas

629-635-0100: Purpose and goals
629-635-0120: Watershed-specific practices for water quality limited watersheds and threatened or endangered aquatic species
629-635-0100: Water classification
629-635-0210: Designation of waters; notice to landowners; reconsideration
629-635-0220: Geographic region
629-635-0300: Riparian management areas and water quality protection measures
629-635-0310: Riparian management area measurements for streams and wetlands

Water protection rules: Vegetation along streams

629-643-0000: Vegetation retention goals for streams; desired future conditions
629-643-0100: Western Oregon standard practice vegetation retention prescriptions for Type F and Type SSBT streams
629-643-0105: Western Oregon standard practice vegetation retention prescriptions for Type N Streams
629-643-0120: Eastern Oregon standard practice vegetation retention prescriptions for Type F and Type SSBT streams
629-643-0125: Eastern Oregon standard practice vegetation retention prescriptions for Type N streams
629-643-0130: Standard practice requirements for small Type N streams
629-643-0135: Standard practice vegetation retention for seeps and springs, side channels and stream-associated wetlands
629-643-0140: Small forestland owner minimum option vegetation retention prescription requirements
629-643-0141: Western Oregon small forestland owner minimum management option prescription
629-643-0142: Eastern Oregon small forestland owner minimum option prescription
629-643-0143: Small forestland owner small Type N streams vegetation requirements
629-643-0145: Small forestland owner minimum option prescription for seeps and springs
629-643-0150: Type D vegetation retention requirements
629-643-0200: Placing large wood key pieces in Type F or Type SSBT streams to improve fish habitat
629-643-0300: Alternative vegetation retention prescriptions
629-643-0400: Site-specific vegetation retention prescriptions for streams and riparian management areas
629-643-0500: Reforestation within stream riparian management areas

Water protection rules: Riparian management areas and protection measures for significant wetlands

629-645-0000: Riparian management areas and protection measures for significant wetlands
629-645-0010: Live tree retention for significant wetlands
629-645-0020: Site-specific vegetation retention prescriptions for significant wetlands
629-645-0030: Soil and hydrologic function protection for significant wetlands
629-645-0040: Understory vegetation retention for significant wetlands
629-645-0050: Snag and downed wood retention for significant wetlands

Water protection rules: Riparian management areas and protection measures for lakes

629-650-0000: Riparian management areas and protection measures for lakes
629-650-0005: Written plans for operations near large lakes
629-650-0010: Live tree retention for lakes
629-650-0020: Soil and hydrologic function protection for lakes
629-650-0030: Understory vegetation retention for lakes
629-650-0040: Snag retention and downed wood retention for lakes

Water protection rules: Protection measures for "other wetlands," seeps and springs

629-655-0000: Protection measures for “other wetlands,” seeps and springs

Streams, lakes, wetlands and other riparian areas can be altered by forest practices. This chapter will help you identify, classify and lay out protection for these areas.

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RIPARIAN AREAS ARE IMPORTANT ECOLOGICAL ZONES

Riparian areas are ecological zones at the interface of land (terrestrial) and water (aquatic) habitats. They are found along the edges of streams, lakes, reservoirs, springs, marshes, bogs, ponds and seeps. Riparian areas contain unique plants, provide habitat to important species, cycle nutrients, regulate the delivery of solar energy, and filter pollutants from water bodies.

The Oregon Forest Practices Act focuses protections around riparian areas because of the unique concentration of valuable public resources and the potential for forestry activities to impact them. The overall goal of riparian area protections is to continue to grow and harvest trees while ensuring:

- Non-point-source pollution (sedimentation) resulting from forest operations does not impair water quality.
- Vegetation that maintains, enhances or restores water quality, and that provides aquatic habitat components such as shade, large wood and nutrients are established and retained.
- Live trees of various species and sizes, snags and downed wood are present within riparian management areas to shade the water and provide habitat for fish and other aquatic species.

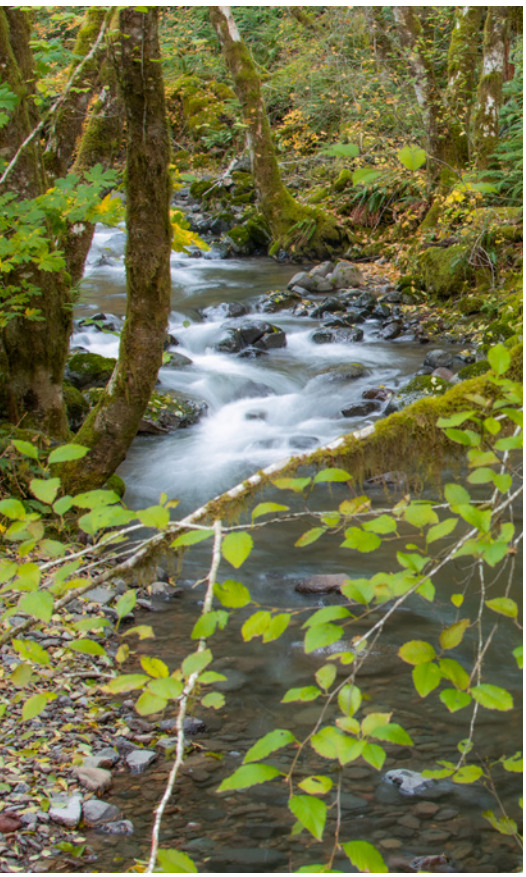
If your forest practice activity occurs adjacent to riparian areas, this section will help you identify and classify water bodies and follow the required protections.

WATER CLASSIFICATION

The requirements of the Oregon Forest Practices Act are intended to protect fish, wildlife and water quality when forest practice activities occur near water. Protection measures are based on how the water body near an operation is classified, as well as the geographic region where it is located.

Waters of the state

Waters of the state are lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, wetlands, inlets, canals, and the Pacific Ocean within the territorial limits of the State of Oregon.



Stream identification and classification

A stream is a channel with a distinct bed or banks scoured by water, that serves to confine water and that contains flowing water during some portion of the year. For the purposes of the Oregon Forest Practices Act (OFPA), if scouring and a distinct channel are not present, the flowing water is not considered a stream. Streams may include beaver ponds, oxbows and side channels, if they are connected by surface flow to the stream during a portion of the year. There are five stream types, based on use or seasonality, and three stream sizes, which result in 13 possible classifications.

Stream types

Type F streams have fish and may also be used for domestic water.

Type SSBT streams have salmon, steelhead or bull trout use.

Type D streams are used for domestic water, have no fish and are more likely to be small streams.

Type N streams have no fish.

Type Np streams are small Type N perennial streams that flow water year-round and have no fish or domestic use.

In eastern Oregon, Type Np streams are further classified as terminal or lateral. Terminal Type Np streams are the largest Type Np stream by drainage basin that is immediately upstream of a Type F or Type SSBT stream. Lateral Type Np streams include all other Type Np streams within a drainage basin that are not terminal.

Type Ns streams are small, seasonal Type N stream reaches that have flowing water only during certain times of the year.

Stream sizes

Small streams have an average annual flow of 2 cubic feet per second or less, or have a drainage area less than 200 acres. They generally have widths less than 7 feet.

Medium streams have an average annual flow greater than 2 and less than 10 cubic feet per second. They generally have widths of 7 to 12 feet.

Large streams have an average annual flow greater than 10 cubic feet per second. They generally have widths greater than 12 feet.

The combination of size and use designates each stream. For example, a medium-sized stream with fish would be called a “medium Type F” stream.

Geographic regions for water protection

The protection requirements for streams differ according to the geographic region where the stream is located: western Oregon or eastern Oregon, divided by the Cascade Crest. Refer to the region map in the Introduction chapter.

Determining stream and wetland classification

The Oregon Department of Forestry's (ODF) FPA Streams and Steep Slopes Viewer (**oregon.gov/odf/working/pages/fpa.aspx**) provides digital access to statewide maps of streams, lakes and significant wetlands of known classification size, along with information such as stream size, domestic use, fish distribution, flow duration (perenniality), channel end, and modeled end of fish use released in 2023. A flow permanence model is scheduled to be released in 2025. Field surveys can be used to verify or overwrite the modeled results for stream seasonality, stream channel end, and fish use (see page 98).

Wetlands

Wetlands are areas that are frequently inundated or saturated by surface water or groundwater, which results in local vegetation that can tolerate or thrive in saturated soils. There are three major categories of wetlands:

SIGNIFICANT WETLANDS

- wetlands greater than 8 acres
- estuaries
- bogs
- important springs in eastern Oregon

STREAM-ASSOCIATED WETLANDS

These are wetlands less than 8 acres that are next to a stream. Protection requirements are based on the classification of the stream they are connected to.

OTHER WETLANDS (INCLUDING SEEPS AND SPRINGS) OF TWO TYPES

- those greater than one-quarter acre
- those less than one-quarter acre (most seeps and springs are this type)

Lakes

Lakes are bodies of year-round standing open water. They do not include water bodies developed for human needs that are not part of a stream, such as farm ponds. There are two kinds of lakes:

- large lakes, which are greater than 8 acres
- all other lakes

RIPARIAN AREA PROTECTIONS

In the Oregon Forest Practices Act, riparian areas include the ground along waterways where vegetation and microclimate are influenced by year-round or seasonal water, associated high-water tables and soils that exhibit some wetness. To help protect water bodies during and after forest practice activities, riparian management areas (RMAs) are regionally specified and have requirements for retaining trees, snags and understory vegetation, and for limited or modified practices that reduce disturbances from forestry activities that could impact aquatic habitat and water quality. Protection measures apply even when the water body is dry.

There are two major types of riparian protections: tree retention areas, where cutting trees is limited; and equipment limitation zones (ELZs), where disturbance from equipment use is minimized, but trees can still be harvested. These protections and how they apply in your situation will be discussed more in the following sections. The rules outline minimum protections; you can always choose to leave more trees and vegetation than is required.

Riparian management areas (RMAs)

In Oregon, RMAs are designated in the OFPA to provide protection to the riparian zone and waterways. RMAs are areas along each side of specified waterways where vegetation retention and special management practices are required for the protection of water quality, hydrologic functions, and fish and wildlife habitat.

Tree retention areas

Tree retention areas are a type of RMA where the cutting of trees is limited. Most or all the trees in a tree retention area must be retained. A primary goal of tree retention RMAs is to develop more streamside areas with mature forest characteristics. Such forests shade the stream channel to help keep the water cool for fish, and provide large logs that fall into the stream for fish habitat; channel-influencing root masses; snags for wildlife; and leaves, needles, branches and insects that feed aquatic life.

Equipment limitation zones (ELZs)

An equipment limitation zone (ELZ) is a type of RMA protection for streams that extends the full length of a stream channel where other tree retention areas are not required. Equipment use and tree removal is permitted within the ELZ, but operators are expected to minimize ground and vegetation disturbance. If soil disturbance of

Riparian management areas protect key resources.

Riparian management area plants, down logs and soils serve as a filter, trapping pollutants and keeping them from entering streams, wetlands and lakes.

Many wildlife species, such as this Columbia torrent salamander, rely on riparian management areas for the necessities of life: food, water, protection from predators and a place to rear young.

the ELZ area exceeds 20% in cable portions of a timber harvest unit, and 10% in ground-based portions of a harvest unit, remediation is required in consultation with an Oregon Department of Forestry (ODF) stewardship forester. A retention-equipment limitation zone (R-ELZ) applies to all Type Np streams and is an ELZ with retention of all trees less than 6 inches in diameter at breast height (DBH) and all vegetation, where possible. ELZs and R-ELZs are 35 feet wide in western Oregon and 30 feet wide in eastern Oregon. These widths apply to both sides of the stream, measured from the edge of the active channel (high-water mark). These widths are roughly equivalent to a boom length of reach for commonly used logging equipment.

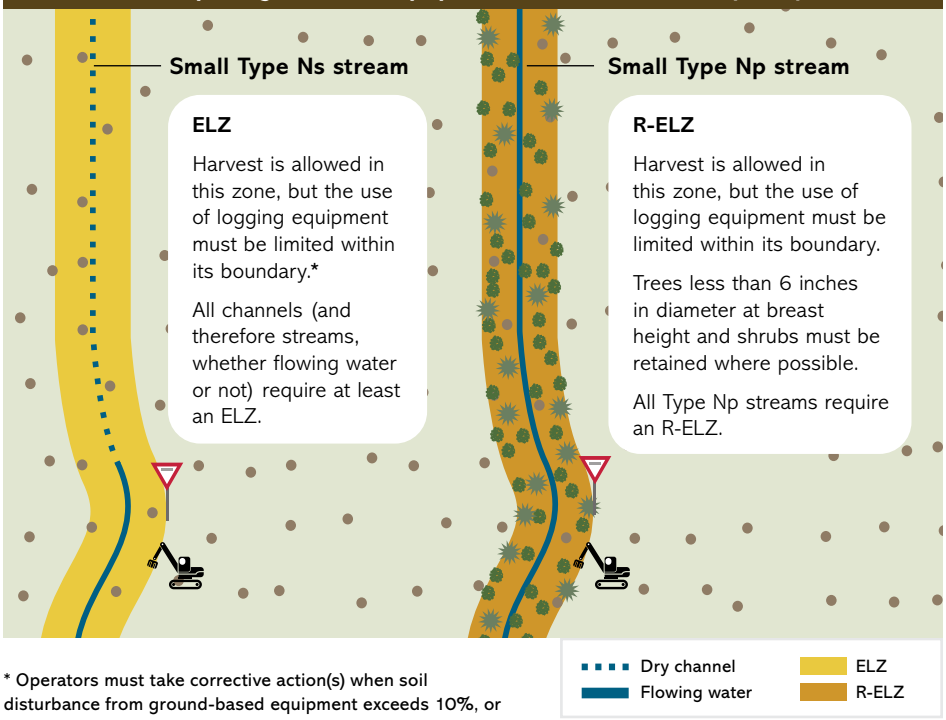
During timber harvests, all stream channels receive at least an ELZ, and all Type Np streams have at least an R-ELZ.

Note that in order to be identified as Type Np for purposes of protection layout, streams must be upstream of a confluence with Type F/SSBT and have continuous flowing water without a 250' break within the Area of Inquiry (see Stream Surveys section later in this chapter). Therefore, any perennial stream segments directly flowing into a Large or Medium Type N or above a 250' break in flow would receive only an ELZ.

In eastern Oregon, Type Ns streams that flow directly into Type F or Type SSBT streams receive an R-ELZ for 750 feet upstream of the confluence.

For additional information on ELZs during harvesting activities, refer to the Harvesting chapter and ODF's Forest Practices Technical Guidance on ELZs, available at **oregon.gov/odf/working/pages/fpa.aspx**.

Comparing the two equipment limitation zones (ELZs)



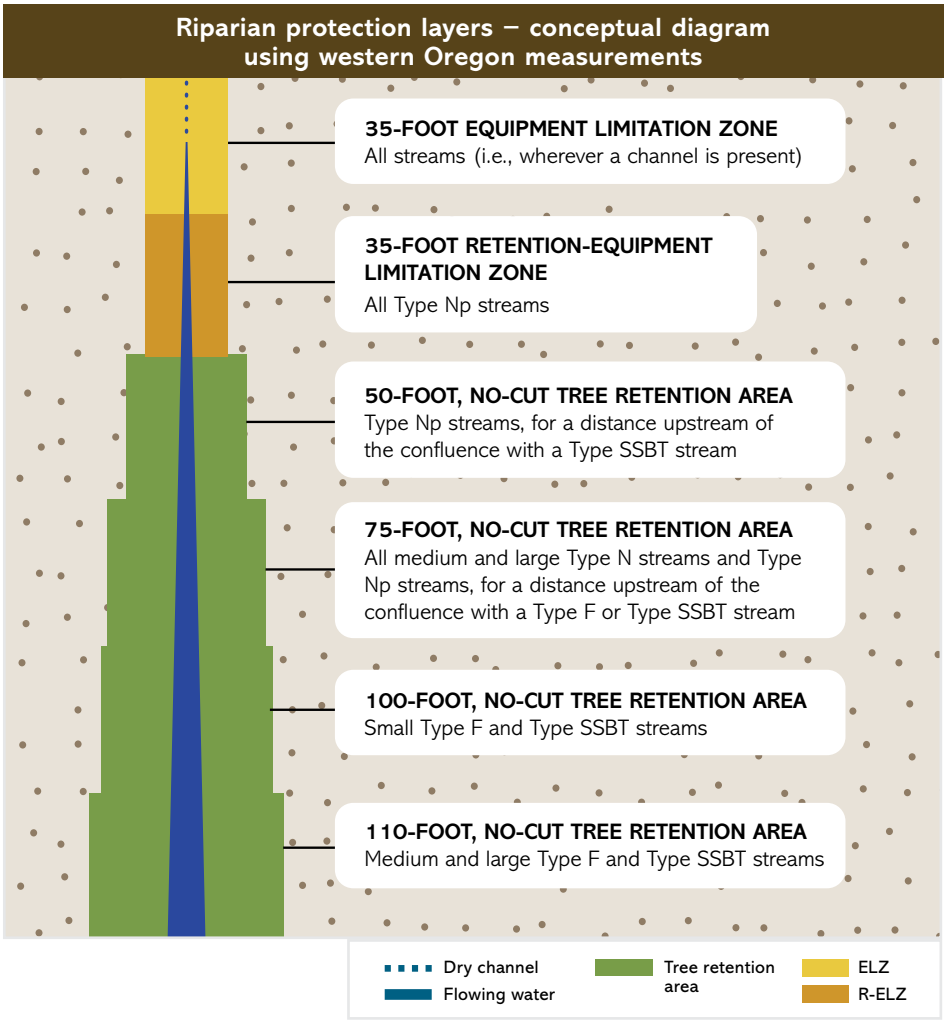
* Operators must take corrective action(s) when soil disturbance from ground-based equipment exceeds 10%, or cable-based equipment exceeds 20% of the total area within any ELZ or R-ELZ within a logging operation unit. (OAR 629-630-0700, 629-630-0800)

Understanding the terminology used for Oregon's riparian area protections

You may hear people use the term "buffers" when referring to riparian protections in Oregon. By definition, a buffer is an area that serves as a protective barrier. In this case, a buffer protects riparian zones from disturbances caused by forestry activity that can alter important riparian area characteristics, such as water quality or temperature.

The Oregon Forest Practices Act refers to such riparian protections as riparian management areas (RMAs). Prior to 2023, many people thought of riparian buffers only as retaining standing trees near streams. However, many other types of required buffers are applicable to riparian areas during timber harvest unit planning and layout, site preparation, herbicide application, logging equipment use near streams and on steep slopes, and more. In 2023, additional types of buffers were added to the Forest Practices Act rules, including equipment limitation zones (ELZs); slope retention areas and designated debris flow traversal areas for logging on steep slopes; and expanded tree retention areas along streams.

This section of the *Illustrated Manual* addresses how to determine and lay out tree retention areas and equipment limitation zones in RMAs. To avoid confusion and accurately communicate riparian protections in Oregon, we will specify the type of protection (e.g., tree retention area or ELZ) rather than using generic terms such as "RMA" or "buffer."



It is helpful to think of stream protections as additive layers that, when drawn together, appear somewhat like a tiered cake.

The base layer of protection on every stream is an equipment limitation zone (ELZ) where disturbance must be minimized. Layers are added as the size of the stream increases, and with the presence of fish and certain species of fish.

After the base ELZ, retention-ELZs (R-ELZs) are added for all Type Np streams. This is followed by tree retention areas of limited length for non-fish perennial streams flowing into fish (F) or salmon, steelhead or bull trout (SSBT) types, and then tree retention areas for the full length of medium and large non-fish and domestic streams, and all Type F and SSBT streams.

Note: This diagram uses westside, standard practice measurements, but the concept of protection layering applies to all landowner sizes and in eastern Oregon.

RMA widths differ

Depending on:

- geographic region (eastern or western Oregon) where the stream is located
- stream type and size
- what type of stream a Type Np stream flows into and proximity to the confluence
- size of the lake
- kind and size of the wetland
- landowner type (large or small forestland owner) and protection option chosen

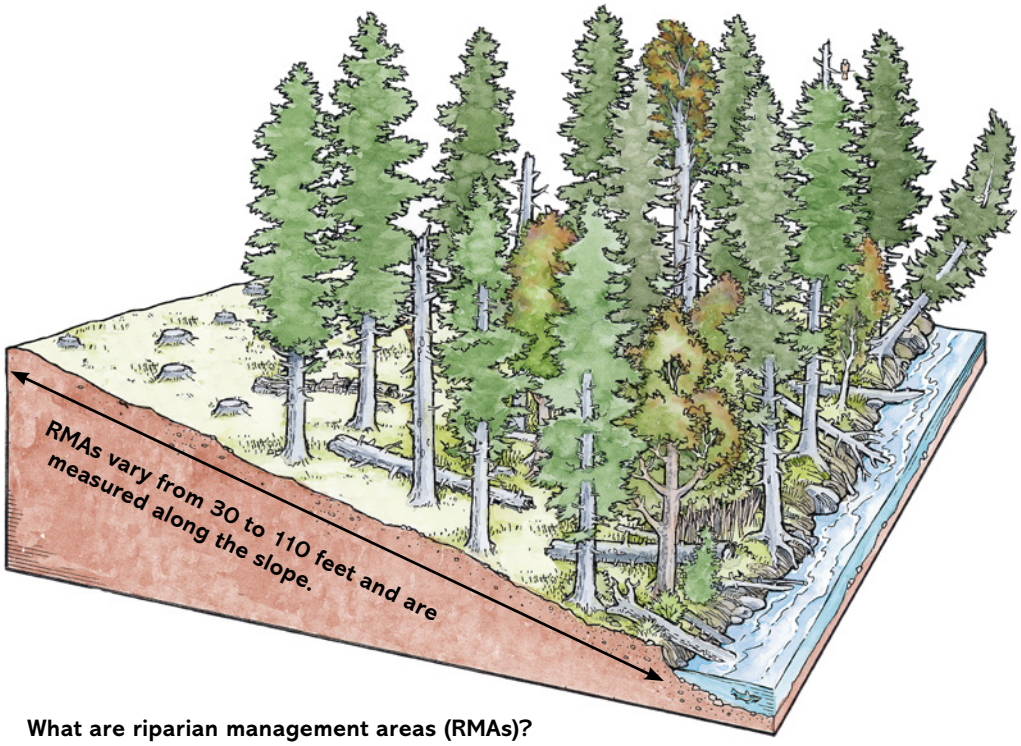
Note: When there are two water features adjacent to or connected to one another, use the RMA width required for the more dominant water feature.

RMAs are required around all streams and most other water bodies

Either tree retention areas or ELZs are required for lakes, stream-associated wetlands, significant wetlands, and all stream types and sizes. Apart from those associated with streams, no RMA is required for seeps, springs or other wetlands smaller than one-quarter acre.

STREAM PROTECTION DESIGN AND LAYOUT IN TIMBER HARVEST AREAS

Once you have decided to conduct forest practice activities that involve cutting trees, and have determined the timber harvest type and size (refer to the Planning chapter for details on harvest types), it is time to identify the water features that require protection within the harvest area. This section will help you plan for and meet the water protection requirements while harvesting timber along waterways. This is a complicated part of the Oregon Forest Practices Act, but it is intended to allow for flexibility to accommodate different scenarios. To lay out the stream protection measures you will be required to follow under Oregon law, read through this entire section, noting the specific rules for the region where your forested property is located, the size of that property, and protection options based on whether you are a small or large forest landowner.



What are riparian management areas (RMAs)?

RMAs are found along the edges of streams, lakes, reservoirs, springs, marshes, bogs, ponds and seeps.

To help protect these water bodies, RMAs are locally specified and have requirements for retaining trees, snags and understory vegetation, and for limited or modified practices.

Understanding end of perenniality

"End of perenniality" (EOP), also known as the "uppermost point of perenniality," or "uppermost flow feature extent" (FFE) when surveying, is not separately defined in the Forest Practices Act rules. But it refers to a significant point on the ground, which is used to delineate between riparian protections. Anything downstream of this point in the stream must receive perennial non-fish (Type Np) protection, while anything upstream must be protected as a seasonal non-fish (Type Ns) stream. The term "end of perenniality," or EOP, is used in this manual as a succinct way of referring to the modeled, verified or operational field-surveyed EOP.

Note that the presence of flowing water at the time of the timber harvest unit layout is not necessarily used to define riparian protections, because water flow changes over the course of the year — especially for seasonal streams. For more information on determining EOP, refer to the stream surveys sections on page 98.

STEPS FOR LAYOUT OF RIPARIAN AREAS

1. First, look at the known water features within, adjacent to, and beyond your timber harvest unit. Locate streams, wetlands, lakes, bogs, estuaries, seeps and springs. Because some stream protections are applied based on what is upstream or downstream of stream segments within a harvest unit, you will need to include the bigger picture of the riparian system, including what is known about stream status off of your property if the streams you are protecting cross a boundary line.

   This is both a field and office exercise, utilizing a map of the proposed harvest area to traverse the ground to get a sense for what is there, and reviewing resource layers within the Oregon Department of Forestry's (ODF) forest practices mapping website and any other mapping software.

   Riparian area protections are the focus of this section, but in some cases, protections for one subject area interact with protections for another. Here are some examples:

   > If sensitive wildlife species are identified and/or leave trees are required based on harvest type and size, see the Wildlife chapter.

   > If the ODF map indicates steep or unstable slopes adjacent to or near streams, see the Steep Slopes chapter.

   > If you plan to build or maintain roads or temporary stream crossings in conjunction with the harvest, see the Roads and Water Crossings chapter.

   > If your harvest unit contains or is adjacent to a wetland, see page 89.

   > If your harvest unit is near a lake, see page 87.

2. Once you've identified that your harvest area contains or is adjacent to water, you will need to determine how the water body is classified and which stream types, seasonality and end points are present. If you haven't already, review the section on water classification and protection on page 56.

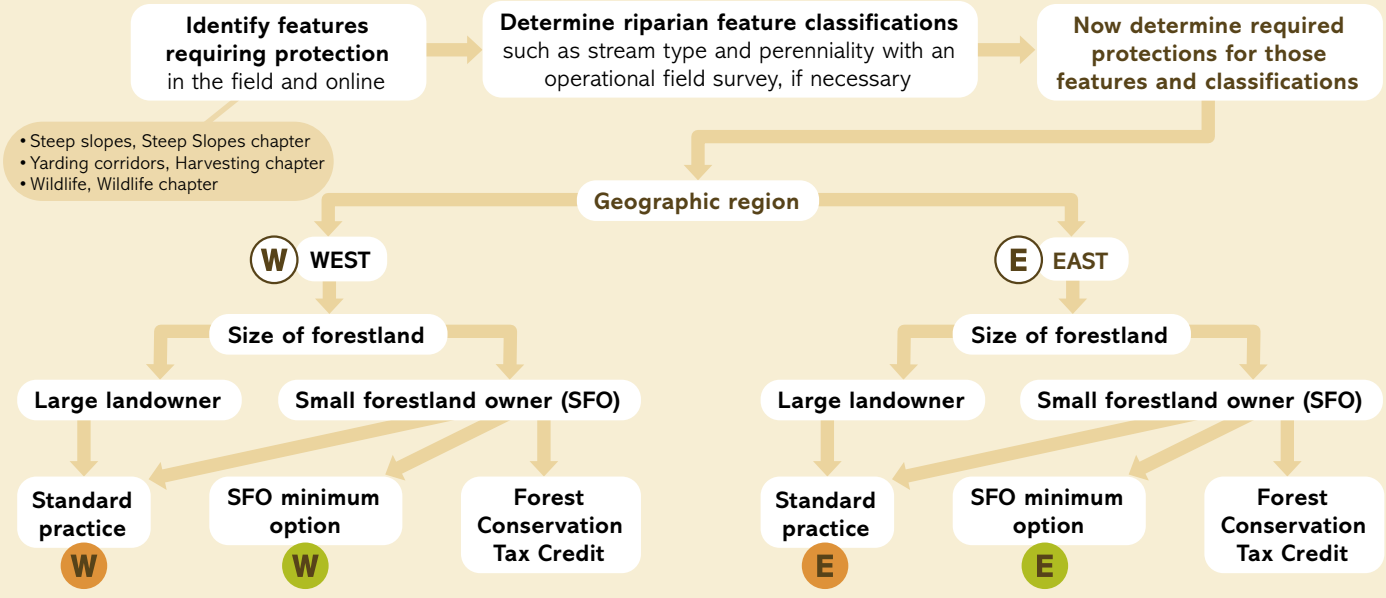
3. If necessary or desired, conduct a survey to verify fish-use, stream end and seasonality. For more information on when and how to survey streams, see the stream surveys section on page 98. Once the modeled end of perenniality is available from ODF, you are not required to conduct a stream survey and can utilize the modeled information. Until that time, in the absence of a survey, assume the full length of the stream or other water body is perennial and apply the maximum protection required for those waters.

4. From this point, the region where your forested property is located, how much forestland you own, and whether you decide to use one of the alternative options for qualified small forestland owners (SFOs) will determine how you design your riparian protection area(s). The decision tree below will direct you to the section that applies to you based on these factors.

Look for these icons for specific information regarding your situation:

- (W) *western Oregon*
  - (W) *western Oregon, standard practice*
  - (W) *western Oregon, SFO minimum option*
- (E) *eastern Oregon*
  - (E) *eastern Oregon, standard practice*
  - (E) *eastern Oregon, SFO minimum option*

Riparian protection layout flow chart



Both regions and forestland sizes: In some situations, you may use alternative vegetation retention prescriptions (see page 94) or site-specific vegetation retention prescriptions (see page 96).

W Western Oregon, standard practice

All large forest landowners with property west of the Cascade Range must follow the standard practice for water protection. SFOs may also voluntarily choose to follow the standard practice to qualify for a tax credit. Some small landowners may be required to follow the standard practice due to the fifth field watershed restriction (see page 65). The western Oregon standard practice requires fixed-width tree retention areas (no-cut buffers) along each side of Type F, Type SSBT, Type D, and large and medium Type N streams. Tree retention areas along Type F and Type SSBT streams are the same width. Small Type N streams require equipment limitation zones (ELZs) for Type Ns and retention-equipment limitation zones (R-ELZs) for Type Np. A tree retention area is required for a set distance from the confluence along a Type Np that flows into Type F or Type SSBT streams.

Table 3-1 Western Oregon standard practice distances for vegetation retention in RMAs

Stream type	Large	Medium	Small	Upstream distance
Type F or Type SSBT	110 ft.	110 ft.	100 ft.	N/A
Type N	75 ft.	75 ft.	See Type Np	N/A
Type Np, into Type SSBT			75 ft. and 50 ft.	75 ft. for 500 ft., then 50 ft. for 650 ft. RH Max = 1,150 ft.
Type Np, into Type F			75 ft.	RH Max = 600 ft.
Type D	75 ft.	75 ft.	75 ft. or 20 ft.*	See OAR 629-643-0150

* 20 feet outside of Type Np vegetation retention requirements

E Eastern Oregon, standard practice

All large forest landowners with property east of the Cascades must follow the standard practice for water protection. SFOs may also voluntarily choose to follow the standard practice to qualify for a tax credit. Some small landowners may be required to follow the standard practice due to the fifth field watershed restriction (see page 65). Eastern Oregon has two zones within a streamside RMA. The inner zone is a fixed-width tree retention area (no-cut buffer) of 30 feet for all stream sizes and types where tree retention is required. The outer zone, which varies from 20 feet to 70 feet in width, depending on stream size, can be managed actively, and trees removed for harvest, with a written plan. The outer zone has disturbance limits in the form of an equipment limitation zone (ELZ) and a minimum of 60 square feet of basal area of well-distributed trees that must be retained. To meet the basal area minimum, 27 trees from the largest diameter class per acre must be retained. The remainder of the trees retained to reach 60 square feet of basal area must be greater than eight inches in diameter at breast height. When present, fire-resilient trees, including ponderosa pine, Douglas-fir, western larch and hardwoods, should be left. Generally, leave a distribution of different species and sizes of trees to promote fire resiliency and overall forest stand health. ELZs are required for Type Ns streams, and retention-equipment limitation zones (R-ELZs) are required for Type Np streams. Type Np streams are designated as terminal or lateral. Along terminal Type Np streams that flow into a Type F or Type SSBT stream, a 30-foot-wide tree retention area inner zone and a 30-foot-wide outer zone are required for 500 feet upstream of the confluence with the Type F or Type SSBT stream. Along a lateral Type Np stream, a 30-foot-wide inner zone (no outer zone) is required for 250 feet upstream of the confluence with a Type F or Type SSBT stream. Along Type Ns streams that flow into a Type F or Type SSBT stream, a 30-foot-wide R-ELZ must be maintained for 750 feet upstream from the confluence with the Type F or Type SSBT stream.

Table 3-2 Eastern Oregon standard practice distances for vegetation retention in RMAs

Stream type	Large		Medium		Small		Upstream distance[1]
	Inner	Outer[2]	Inner	Outer[2]	Inner	Outer[2]	
Type F or Type SSBT	30 ft.	70 ft.	30 ft.	70 ft.	30 ft.	45 ft.	-
Type N	30 ft.	45 ft.	30 ft.	45 ft.	-	-	-
Type Np, Terminal					30 ft.	30 ft.	RH Max = 500 ft.
Type Np, Lateral					30 ft.	N/A	RH Max = 250 ft.
Type D	30 ft.	-	30 ft.	-	30 ft. or 20 ft.[3]	-	See OAR 629-643-0150

1. Upstream distance from either Type F or Type SSBT
2. Outer zone shall retain 60 square feet of basal area per acre; apply OAR 629-643-0120
3. 20 feet outside of Type Np vegetation retention requirements

Large landowners may skip to page 68 to continue the riparian protection layout process.

Small forestland owner (SFO)

SFOs can choose one of three protection options when harvesting timber. (For more details on who qualifies as an SFO, see the Introduction chapter.)

1. **Standard practice:** Voluntarily follow the standard practice used by large landowners when harvesting timber around riparian management areas (RMAs).
2. **SFO minimum option:** Manage according to alternative minimum rules defined in a special section of the Oregon Forest Practices Act. These are roughly equivalent to RMA widths prior to January 1, 2024. Use of the SFO minimum option is limited to 5% of the horizontal lineal feet of those types of streams owned by SFOs over a five-year rolling average, per the defined fifth field watershed. The SFO minimum option is not available along Type D streams.
3. **Forest Conservation Tax Credit (FCTC):** Follow the standard practice used by large forest landowners and claim a tax credit for some of the timber value of the area committed to conservation. This option was established to incentivize SFOs to adopt standard practice prescriptions. When taking this option, the SFO becomes eligible for a tax credit equal to the stumpage value of the additional timber retained in a forest conservation area by adopting the standard practice, in excess of what would be retained in the SFO minimum option. The FCTC is not available along Type D streams or for Type 4 harvests.

CHOOSING AN OPTION

Implications of choosing one option over another will be unique to each landowner and harvest situation. For a side-by-side comparison table of RMA requirements by option, see Table 3-5 (page 68) for westside and Table 3-6 (page 69) for eastside. SFOs may find it useful to lay the standard practice and minimum option out simultaneously, so that the financial, visual and practical implications of each option are easier to understand. Gathering the required stumpage valuation for the tax credit can be done simultaneously with this layout, or it may be simpler to wait until layout is complete; both marked lines are needed to establish the FCTC area. If both options are laid out before a decision is made, taking the SFO minimum option would mean removing the outer line of ribbon before harvest operations begin. Note that the costs of layout and appraisal are included in the tax credit but cannot be recovered for the standard practice or SFO minimum option.

When laying the standard and minimum options out together, the trees between the two ribbon lines represent the potential FCTC area. (It may be helpful to use two different colors of ribbon.) You can remove the outer ribbons representing the standard option before harvest if you decide to take the SFO minimum option.

Indicate which option you are electing when notifying the Oregon Department of Forestry (ODF) of a timber harvest operation, at least 15 days prior to the expected start date of the operation. Note that ODF can be notified of plans for a harvest operation using the SFO minimum option, and you can decide at the time of harvest to take the standard option and tax credit, but not the reverse.

SFO minimum option

The SFO minimum option is available to landowners who qualify as small forestland owners under specific criteria outlined in the OFPA, and who prefer to harvest more trees in certain riparian areas. There is a minimum option for harvest Types 1, 2 and 3, but not Type 4. It allows the use of narrower tree retention area widths than the standard option.

Landowners must indicate that they are taking the SFO minimum option on the Notification of Operation they submit to ODF and certify that they meet the definition of a small forestland owner. The Notification of Operation and written plan required for harvest operations near a stream (see the Planning chapter for information on written plans) must also include:

1. classification of the stream(s)
2. horizontal lineal feet of riparian area adjacent to, or inside, the operation area
3. whether riparian measurements are for one or both sides of the RMA

Upon completion of harvest operations, actual lineal feet of riparian area harvested must be reported to the state within 90 days to update the use of the SFO minimum option from "proposed" to "actual."

Applies to small forestland owners only

ROLLING FIVE-YEAR CAP ON SFO MINIMUM OPTION USE BY WATERSHED

Use of the minimum option is restricted to 5% of the lineal stream feet (horizontal distance, both sides) per stream classification, within a fifth field watershed, over five years. The "5-5-5 rule" is an easy way to refer to and remember this. ODF must notify the landowner within 15 days of the submission of a Notification of Operation if the minimum option is not available in the current tax year. If the SFO is unable to take the minimum option, they can either enter a waiting list for when the option becomes available, or use the standard practice and become eligible for 125% of the stumpage value of the forest conservation area, if taking the FCTC option.

W WESTERN OREGON SFO MINIMUM OPTION

In western Oregon, the SFO minimum option is approximately equal to the RMA widths required for all landowners prior to July 1, 2023, with additional protections for small Type N streams. Fixed-width tree retention areas under the minimum option are applied around Type F, Type SSBT, Type D, and large and medium Type N streams. Small Type N streams require ELZs for Type Ns and R-ELZs for Type Np. Along Type Np streams that flow into Type F streams or Type SSBT streams, a 35-foot-wide tree retention area is required for a set distance from the confluence with the Type F or Type SSBT stream.

Table 3-3 Western oregon SFO minimum option distances for vegetation retention in RMAs

Stream type	Large	Medium	Small	Upstream distance[1]
Type SSBT	100 ft.	80 ft.	60 ft.	N/A
Type F	100 ft.	70 ft.	50 ft.	N/A
Type N	70 ft.	50 ft.	See Type Np	
Type Np, into Type SSBT			35 ft.	RH Max = 1,150 ft.
Type Np, into Type F			35 ft.	RH Max = 600 ft.
Type D	75 ft.	75 ft.	35 ft. or 20 ft.[2]	See OAR 629-643-0150

1. Upstream distance from either Type F or Type SSBT
2. 20 feet outside of Type Np vegetation retention requirements

E EASTERN OREGON SFO MINIMUM OPTION

In eastern Oregon, the width of the inner zone of the no-cut tree retention area for the SFO minimum option is 30 feet, the same as the standard practice. The difference between the standard option and the SFO minimum option is in the managed outer zone width.

Forest Conservation Tax Credit (FCTC)

The FCTC provides SFOs a financial incentive for retaining larger unharvested areas next to streams. SFOs who agree to limit timber harvests in the forest conservation area for 50 years by following the standard practice for harvests (rather than the SFO minimum option) can receive a tax credit based on the value of the unharvested timber inside the conservation area and related costs.

The width of the area that may be eligible for the tax credit (called the forest conservation area) is the distance between the outermost edge of the standard practice width and the outermost edge of the SFO minimum option width (outer zone only in eastern Oregon). The tax credit area extends for the length of the tree retention area adjacent to or within the harvest unit.

Applies to small forestland owners only

Forest Conservation Tax Credit (FCTC)

(continued)

W WESTERN OREGON

In western Oregon, for all stream types except for small Type N streams, the length of the FCTC area is the length of frontage of the timber harvest unit on that stream type segment. For small Type Np streams, the length of the tax credit area follows the same lengths as the standard practice option, where tree retention areas are required on tributaries to Type F and Type SSBT streams. There is no FCTC for small Type Ns streams, because no additional tree retention is required in these areas. An additional FCTC area is located along dry channels of Type Np streams. See page 83 and OAR 629-607-0450(2) for more detailed information.

E EASTERN OREGON

In eastern Oregon, only five stream types are eligible for the FCTC option: medium and small Type F and Type SSBT streams, and medium Type N streams. For these five stream types, the length of the FCTC area is the length of frontage of the harvest unit on that stream type segment. Within the FCTC area, only the timber that exceeds the required minimum 60 square feet of basal area per acre can be included toward the tax credit amount.

Table 3-4 Eastern Oregon SFO minimum option distances for vegetation retention in RMAss

Stream type	Large		Medium		Small		Upstream distance[1]
	Inner	Outer	Inner	Outer	Inner	Outer[2]	
Type F or Type SSBT	30 ft.	70 ft.	30 ft.	50 ft.	30 ft.	30 ft.	N/A
Type N	30 ft.	45 ft.	30 ft.	30 ft.	-	-	-
Type Np, Terminal					20 ft.	20 ft.	RH Max = 500 ft.
Type Np, Lateral					20 ft.	N/A	250 ft.
Type D	30 ft.	-	30 ft.	-	20 ft.	-	See OAR 629-643-0150

1. Upstream distance from either Type F or Type SSBT
2. Outer Zone shall retain 60 square feet of basal area per acre; apply OAR 629-643-0120

The timber in the forest conservation area needs to be valued according to a specific process (see OAR 629-607-0500). Applicable stumpage values can be calculated using one of these methods:

- **Conversion return:** Determine volume of retained timber by species and log grades. A value is established from current delivered log price information – less a reasonable cost for harvest and delivery – for the area in which the retained timber would ordinarily be sold.
- **Actual comparison:** May be used when the timber being retained is similar in species and log grades to the timber being harvested. Calculate using actual revenues in the harvest area adjacent to the forest conservation area.
- **Cash flow modeling:** Determine the value of standing timber by using the projected volume of the stand over a harvest rotation based on species and site class. Figure the value at harvest age and discount it using the interest rate set by the USDA Farm Service Agency for a direct farm ownership loan.

Costs (for appraisal and for filing and recording deed restriction) may be included in the credit amount only to the extent that those costs are not claimed as an income tax deduction by the taxpayer. It may be necessary to hire a professional forester to perform this appraisal; however, the costs incurred for the appraisal can be added to the value of the tax credit. The tax credit amount is the appraised value of the timber in the FCTC area plus appraisal and deed restriction filing costs.

Tax credit uses:

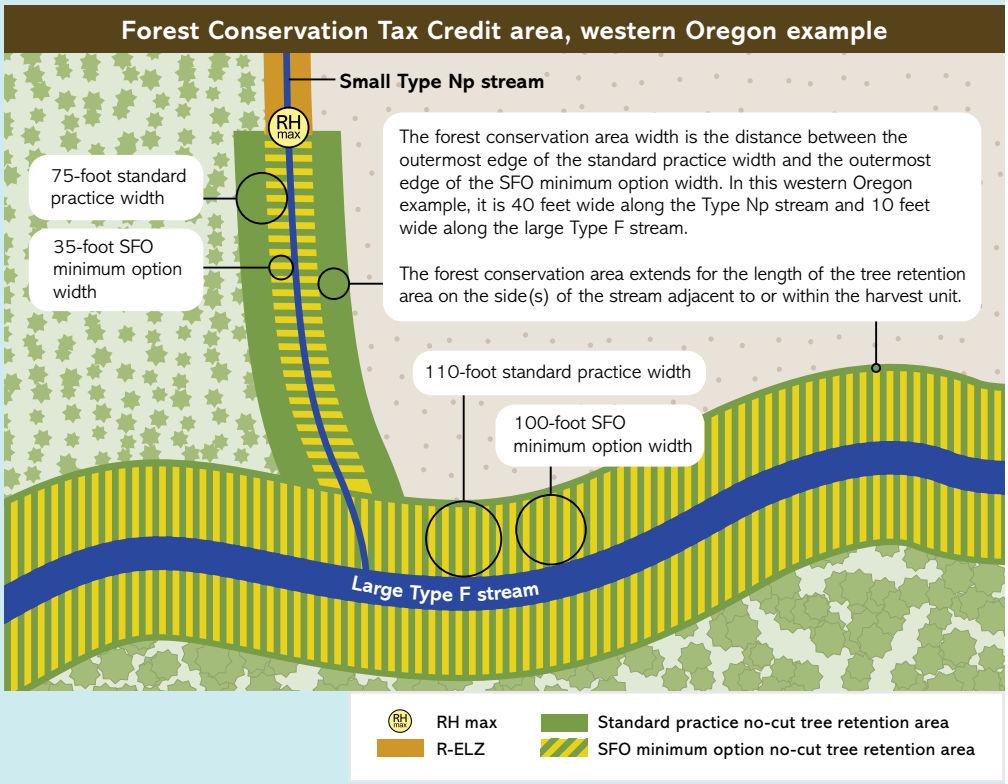
- offset Oregon income or estate tax liability
- lump sum or over multiple consecutive or non-consecutive tax years
- transfer to heirs

Note: The tax credit is not transferable to a new landowner if the land is sold.

Applies to small forestland owners only

Once the credit is issued, the standard practice must be used in the RMA for 50 years from the date of notification. During that time, trees cannot be removed unless for public safety, incidental removal, or personal use. Consult with an ODF stewardship forester if you are considering removing any trees from the forest conservation area.

Specific details of the FCTC, including eligibility, stumpage value certification, transfer to heirs, deed restriction and appeals, are found in OAR 629-607-0400 to 0800.



To qualify for the FCTC, you must:

- be a small forestland owner
- plan to do a Type 1, 2 or 3 timber harvest (harvest Type 4, thinning, is excluded)
- harvest an area equal to or larger than the area you elect not to harvest
- agree to follow standard practice harvest rules
- indicate intent to apply for the tax credit
- submit required information and documentation to ODF within three months of harvest completion
- retain the conservation area for 50 years

Options for SFOs with significant disproportionate impacts

If an SFO's property qualifies as significantly disproportionately impacted by the updated Forest Practices Act rules, there are a few options that provide some financial relief.

"Significantly disproportionately impacted" applies to an SFO's parcel that:

- has a dwelling and is 10 acres or more
- has a total encumbrance from all small forestland minimum option RMAs, as described in OAR 629-643-0140, greater than 20% of the forested acreage of the parcel
- generates timber revenue that is required to sustain management activities on forest properties, cover annual costs of ownership, provide regular contributions to income, or contribute more than 5% of the revenue to a planned estate investment, as demonstrated by a forest management plan

If these criteria are met, the SFO can be exempted from the watershed cap (5-5-5 rule) and count all trees retained in RMAs towards the wildlife leave tree retention requirements, per OAR 629-607-0100(3).

Additionally, if the impacted SFO meets income limits based on federal adjusted income — not more than 125% of Oregon's median household income, averaged over the three previous tax years — the stumpage value in the FCTC area can be multiplied by 125%.

Applies to small forestland owners only

W Table 3-5 Western Oregon stream RMA matrix

Stream type	W Standard practice width	W SFO minimum option width	SFO FCTC option credit width
Large Type SSBT	110 ft.	100 ft.	Area between 100 ft. and 110 ft.
Medium Type SSBT	110 ft.	80 ft.	Area between 80 ft. and 110 ft.
Small Type SSBT	100 ft.	60 ft.	Area between 60 ft. and 100 ft.
Large Type F	110 ft.	100 ft.	Area between 100 ft. and 110 ft.
Medium Type F	110 ft.	70 ft.	Area between 70 ft. and 110 ft.
Small Type F	100 ft.	50 ft.	Area between 50 ft. and 100 ft.
Large Type N	75 ft.	70 ft.	Area between 70 ft. and 75 ft.
Medium Type N	75 ft.	50 ft.	Area between 50 ft. and 75 ft.
Small Type Np that flows into Type SSBT	Upstream retention distance is the shorter of the RH Max or the uppermost flow feature (per protocol). RMA width = 75 ft. on first 500 ft. of stream length, then 50 ft. on the next 650 ft. . Total RH Max from confluence with SSBT is 1,150 ft. .	Upstream retention is the shorter of the RH Max or uppermost flow feature. RMA width = 35 ft. and the total RH Max is 1,150 ft. from confluence with the Type SSBT stream.	**Width** = Area between 35 ft. and the outside edge of the standard practice (50 ft. or 75 ft.) **Length** = Same as standard practice
	The tree retention areas and 35 ft. R-ELZ and ELZ apply to each side of the stream as follows: 1. R-ELZs are to extend from end of RH Max, upstream to the identified uppermost flow feature. The end of the tree retention area is squared off at the end of the tree retention area (RH Max) in this case. 2. If the uppermost flow feature is determined to be within the RH Max for the stream, the ELZ shall extend upstream to the end of the stream channel and end of tree retention area will extend as a radius around the uppermost flow feature.		
Small Type Np that flows into Type F	Upstream retention distance is the shorter of the RH Max or the uppermost flow feature (per protocol). RMA width = 75 ft. and total RH Max is 600 ft. from the confluence with the Type F stream.	Upstream retention is the shorter of the RH Max or uppermost flow feature. RMA width = 35 ft. and the total RH Max is 600 ft. from confluence with the Type F stream.	**Width** = Area between 35 ft. and the outside edge of the standard practice (75 ft.) **Length** = Same as standard option
	The tree retention areas and 35 ft. R-ELZ and ELZ apply to each side of the stream as follows: 1. R-ELZs are to extend from end of RH Max, upstream to the identified uppermost flow feature. The end of tree retention area is squared off at the end of the tree retention area (RH Max) in this case. 2. If the uppermost flow feature is determined to be within the RH Max for the stream, the ELZ shall extend upstream to the end of the stream channel, and end of tree retention area will extend as a radius around the uppermost flow feature.		
Small Type Ns	35 ft. ELZ	35 ft. ELZ	None

Flow feature – flowing water for 25 continuous feet or more.

RH Max – The maximum tree retention distance described for any particular small Type Np stream that flows into a Type F or SSBT stream.

ELZ – Equipment limitation zone. Minimize soil disturbance. Take corrective action to restore lost function if soil disturbance is >10% ground-based equipment, >20% cable yarding.

R-ELZ – Retention-equipment limitation zone. Retain trees <6 inches diameter at breast height (DBH) and shrubs where possible. Minimize soil disturbance. Take corrective actions to restore lost function if soil disturbance is >10% ground-based equipment, >20% cable yarding.

SFO – Small forestland owner of less than 5,000 acres of forest who harvested less than 2 million board feet a year on average for the last three years and plans to harvest on average that amount for the next 10 years, qualifying for the SFO minimum option.

SFO FCTC option – Forest Conservation Tax Credit available to SFOs who choose to follow the standard practice RMA widths and claim a tax credit for the value of timber left standing in the strip of forestland between the standard option RMA width and SFO minimum option RMA width.

Note: Widths are measured as slope distance from the edge of the active channel, or channel migration zone if present.

E Table 3-6 Eastern Oregon stream RMA matrix

Stream type	E Standard practice width		E SFO minimum option width		SFO FCTC option credit width
	Inner	Outer	Inner	Outer	
Large Type F or SSBT	30 ft.	70 ft.	30 ft.	70 ft.	N/A
Medium Type F or SSBT	30 ft.	70 ft.	30 ft.	50 ft.	Area between 80 ft. and 100 ft.
Small Type F or SSBT	30 ft.	45 ft.	30 ft.	30 ft.	Area between 60 ft. and 75 ft.
Large Type N	30 ft.	45 ft.	30 ft.	45 ft.	N/A
Medium Type N	30 ft.	45 ft.	30 ft.	30 ft.	Area between 60 ft. and 75 ft.
ELZ or R-ELZ		30 ft.	ELZ of 30 ft. apply to all outer zones where applicable		
Small Type Np terminal that flows into Type F or SSBT	30 ft.	30 ft.	20 ft.	20 ft.	**Width** = Area between 40 ft. total RMA and the outside edge of the standard practice 60 ft. total RMA **Length** = Same as standard practice
	Upstream retention distance is the shorter of the RH Max or the uppermost flow feature (per protocol). RMA width = 30 ft. inner zone and 30 ft. outer zone for 500 ft. of stream length. Total RH Max from confluence with Type F or SSBT stream is 500 ft.		Upstream retention distance is the shorter of the RH Max or uppermost flow feature. RMA width = 20 ft. inner zone and 20 ft. outer zone. Total RH Max from confluence with Type F or SSBT stream is 500 ft.		
	The tree retention areas and 30 ft. R-ELZ and ELZ apply to each side of the stream as follows: 1. The ELZs apply to the outer edge of the inner zone and extend out 30 ft.. R-ELZs are to extend upstream to the identified most uppermost flow feature. The end of the tree retention area is squared off at the end of the RH Max in this case. 2. If the uppermost flow feature is determined to be within the RH Max for the stream, the ELZ shall extend upstream to the end of the stream channel, and tree retention area will extend as a radius around the uppermost flow feature.				
Small Type Np lateral that flows into Type F or SSBT	30 ft.	0 ft.	20 ft.	0 ft.	**Width** = Area between 20 ft. total RMA and the outside edge of the standard practice 30 ft. total RMA **Length** = Same as standard practice
	Upstream retention distance is the shorter of the RH Max or the uppermost flow feature (per protocol). RMA width = 30 ft. inner zone with no outer zone. Total RH Max is 250 ft. from the confluence with the Type F or SSBT stream.		Upstream retention distance is the shorter of the RH Max or uppermost flow feature. RMA width = 20 ft. inner zone with no outer zone. Total RH Max is 250 ft. from confluence with the Type F or SSBT stream.		
	The tree retention areas and a 30 ft. R-ELZ and/or ELZ apply to each side of the stream as follows: 1. R-ELZs are to extend from end of RH Max, upstream to the identified uppermost flow feature. The end of the tree retention area is squared off at the end of the RH Max in this case. 2. If the uppermost flow feature is determined to be within the RH Max for the stream, the ELZ shall extend upstream to the end of the stream channel, and end of tree retention area will extend as a radius around the uppermost flow feature.				
Small Type Ns that flows into Type F or SSBT	30 ft. R-ELZ extending 750 ft. upstream from confluence. ELZ applies on remainder of channel.		30 ft. R-ELZ extending 750 ft. upstream from confluence. ELZ applies on remainder of channel.		N/A
Small Type Ns	30 ft. ELZ from edge of inner zone extending out.		30 ft. ELZ from edge of inner zone extending out.		N/A

Flow feature – flowing water for 25 continuous feet or more.

RH Max – The maximum tree retention distance described for any particular small Type Np Stream that flows into a Type F or SSBT stream.

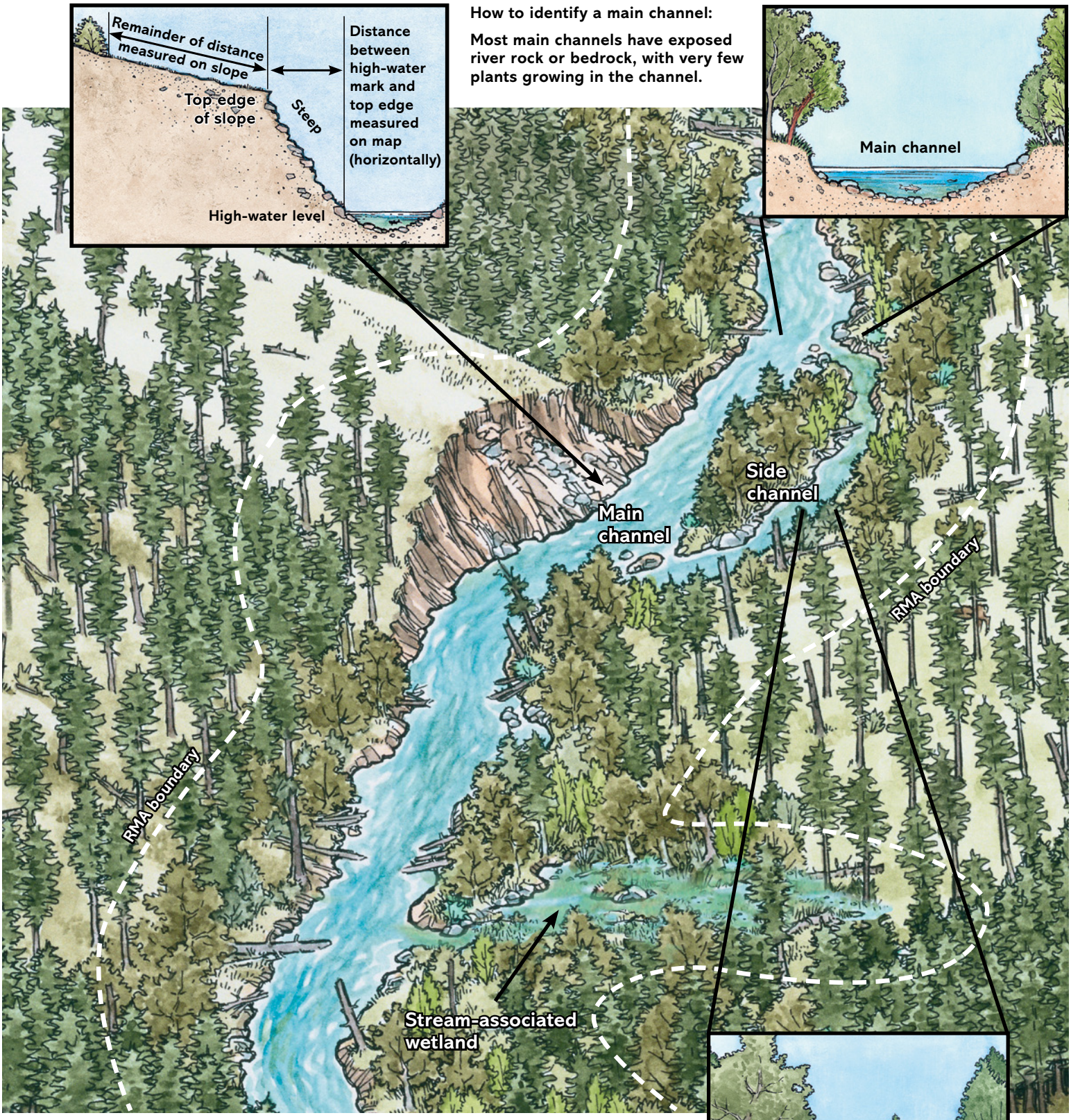
ELZ – Equipment limitation zone. Minimize soil disturbance. Take corrective action to restore lost function if soil disturbance is >10% ground-based equipment, >20% cable yarding.

R-ELZ – Retention-equipment limitation zone. Retain trees <6 inches diameter at breast height (DBH) and shrubs where possible. Minimize soil disturbance. Take corrective actions to restore lost function if soil disturbance is >10% ground-based equipment or >20% cable yarding.

General guidelines for riparian protection layout

- The protections apply to all harvest types that include a riparian area.
- The rules outline minimum protections; there is always the option to leave more than is required.
- Written plans outlining resource protection measures are required for operations that require a notification, and that occur within 100 feet of:
  - > a Type F, Type SSBT or Type D stream
  - > a significant wetland (not an estuary) greater than eight acres, a bog, or an important spring in eastern Oregon,

  and within 300 feet of a significant wetland that is an estuary
- The width of the RMA is measured as slope distance from the edge of the active channel or channel migration zone. The active channel is the area between the high-water level of the average yearly flow (not the highest flood flow level), where trees and other year-round plants start growing. On many streams, it's the upper edge of the stream bank (see illustrations on next page and page 61).
- All measurements related to riparian protection layout are made on slope distance, except in the fifth field watershed rule for determining eligibility for the SFO minimum option based on use.
- Varying the width of tree retention areas is allowed to account for topography, operational requirements, vegetation, and fish and wildlife resources, but the average width of the entire length of the tree retention area must meet or exceed the required width. Averaging may not extend across stream segments of different size categories. Averaging may not be used for tree retention areas along lakes.
- The RMA boundary should be marked generally parallel to the stream with flagging, marking paint or signs, at intervals frequent enough to avoid confusion during logging.
- Marking of ELZs is less practical because most commercial trees are removed, and equipment may operate within them. At a minimum, the transition and end points where stream protections change should be communicated to the logging operator (preferably including a map that shows these points and all ELZs) and, if marked, designed to be highly visible during all stages of logging.
- Where steep exposed soil, a rock bluff, or talus (loose rock) slope occurs next to a stream, measure the RMA as a horizontal distance to the top of the exposed bank, bluff or talus slope. From there, measure the rest of the RMA as a slope distance.
- Where seeps and springs occur within vegetation retention areas (only the inner zone in eastern Oregon), retain all trees within 35 feet (standard practice) or 15 feet (SFO minimum option) of the seep or spring. This may necessitate extending or bumping out the tree retention area to a maximum of 35 or 15 feet if the seep or spring lies at the edge of the tree retention area. See page 90 for seep and spring protection details, and a diagram of this scenario. Locating required wildlife leave trees immediately adjacent to seeps and springs is encouraged.
- Where there is a stream-adjacent failure next to a Type F or Type SSBT stream on a slope that is greater than 70%, the width of the tree retention area may extend to the lesser of 170 feet, or where the slope breaks by 20% or more.
- Where side channels and stream-associated wetlands occur at the edge of (or extend beyond) a tree retention area, the tree retention area should be expanded to include the wetland or side channel, plus 25 additional feet. This includes where tree retention areas are required along small Type N streams.
- Where channel migration zones (CMZs) are present, the tree retention area width begins at the edge of the CMZ. See Forest Practices Technical Guidance (available at **oregon.gov/odf/working/pages/fpa.aspx**) for help identifying a CMZ.
- Alternative vegetation retention prescriptions are an option for forest areas experiencing stand-level mortality. See page 94.
- A site-specific vegetation retention prescription is an option that allows for changes to the vegetation retention requirements when restoring or enhancing RMAs or streams (see page 96).



How to identify a main channel:

Most main channels have exposed river rock or bedrock, with very few plants growing in the channel.

How to identify a side channel:

Side channels only carry water when the main channel reaches a certain level. Exposed river rock may be less obvious, and terrestrial plants may grow in side channels. Side channels are separated from the main channel by an island (that can support terrestrial vegetation and is above the average bankfull elevation).

STREAM PROTECTION LAYOUT EXAMPLES AND PROCESS

The following examples and processes apply to all regions, landowners and protection options, unless otherwise specified.

Look for these icons for specific information regarding your situation

- (W) *western Oregon*
- W *western Oregon, standard practice*
- W *western Oregon, SFO minimum option*
- (E) *eastern Oregon*
- E *eastern Oregon, standard practice*
- E *eastern Oregon, SFO minimum option*

Example 1

TYPE F, TYPE SSBT, TYPE D, AND LARGE AND MEDIUM TYPE N STREAMS

This is the most straightforward type of stream protection layout, because tree retention area widths are fixed for the length of the stream along the timber harvest, and are applied to all fish-bearing, medium and large non-fish-bearing, and domestic streams. The widths are measured from the edge of the active channel or the channel migration zone (CMZ), which is the area where the active channel is prone to move and could create a near-term loss of riparian function.

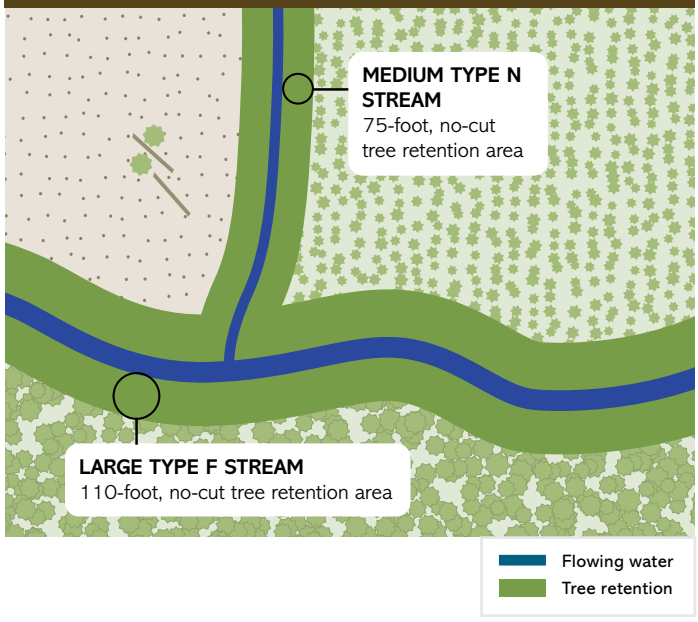
(W) WESTERN OREGON TREE RETENTION AREA WIDTHS

W Standard practice:

- Large and medium Type F and Type SSBT streams: 110 feet
- Small Type F and Type SSBT streams: 100 feet
- Large and medium Type N or Type D streams: 75 feet

See Table 3-1 on page 63.

Medium Type N connected to large Type F, western Oregon standard practice

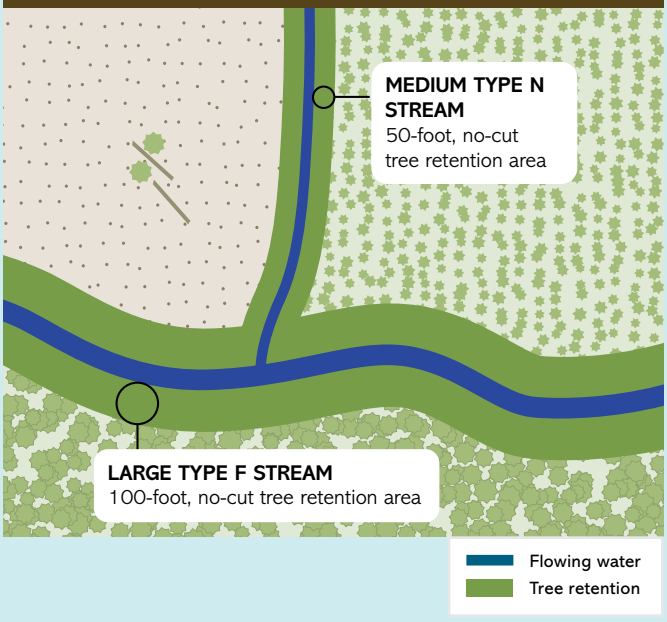


W SFO minimum:

- Large Type F and Type SSBT streams: 100 feet
- Medium Type SSBT streams: 80 feet
- Medium and large Type D streams: 75 feet
- Medium Type F and large Type N streams: 70 feet
- Small Type SSBT streams: 60 feet
- Medium Type N and small Type F streams: 50 feet

See Table 3-3 on page 65.

Medium Type N connected to large Type F, western Oregon SFO minimum option



Applies to small forestland owners only

E EASTERN OREGON TREE RETENTION AREA WIDTHS

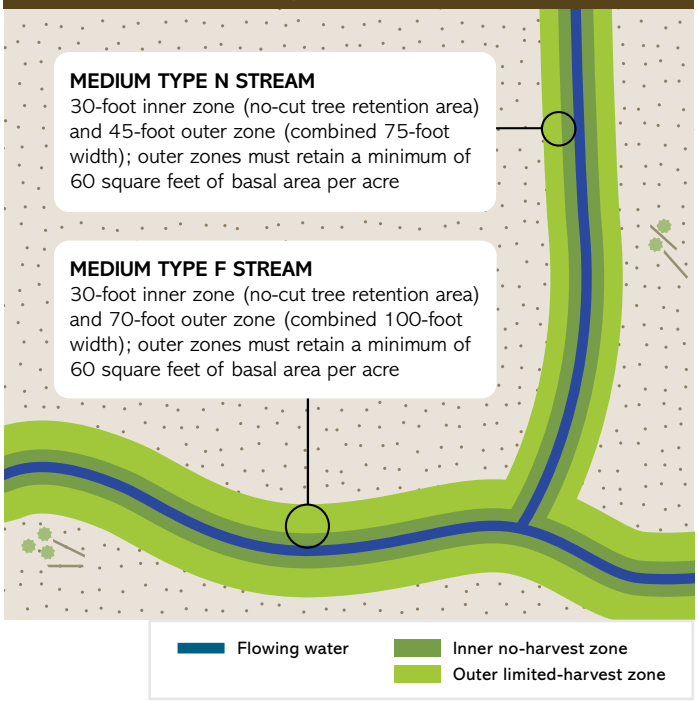
E Standard practice: For all stream sizes and types, an **inner zone** no-cut tree retention area width of 30 feet is required. For the **outer zone**, tree harvest is permitted with a written plan, but an equipment limitation zone (ELZ) must be adhered to and 60 square feet of basal area per acre must be retained in a way that facilitates stand health and fire resiliency (see specifics in tan box below). Outer zone widths are:

- Large and medium Type F and Type SSBT streams: 70 feet
- Small Type F and Type SSBT, and large and medium Type N streams: 45 feet

Note: There is no outer zone for Type D streams.

See Table 3-2 on page 63.

Medium Type N to medium Type F/SSBT, eastern Oregon standard practice



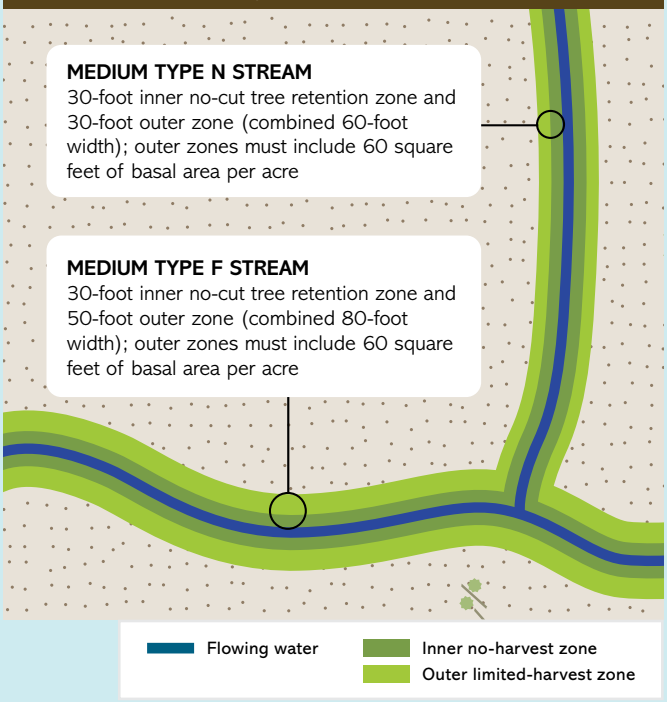
E SFO minimum: For all stream sizes and types except small Type D, an **inner zone** no-cut tree retention area width of 30 feet is required. The inner zone width of small Type D streams is 20 feet. For the **outer zone**, tree harvest is permitted with a written plan, but an equipment limitation zone (ELZ) must be adhered to and 60 square feet of basal area per acre must be retained in a way that facilitates stand health and fire resiliency (see specifics in tan box below). Outer zone widths are:

- Large Type F and Type SSBT streams: 70 feet
- Medium Type F and Type SSBT streams: 50 feet
- Medium N and small Type F and Type SSBT streams: 30 feet
- Large Type N streams: 45 feet

Note: There is no outer zone for Type D streams.

See Table 3-4 on page 66.

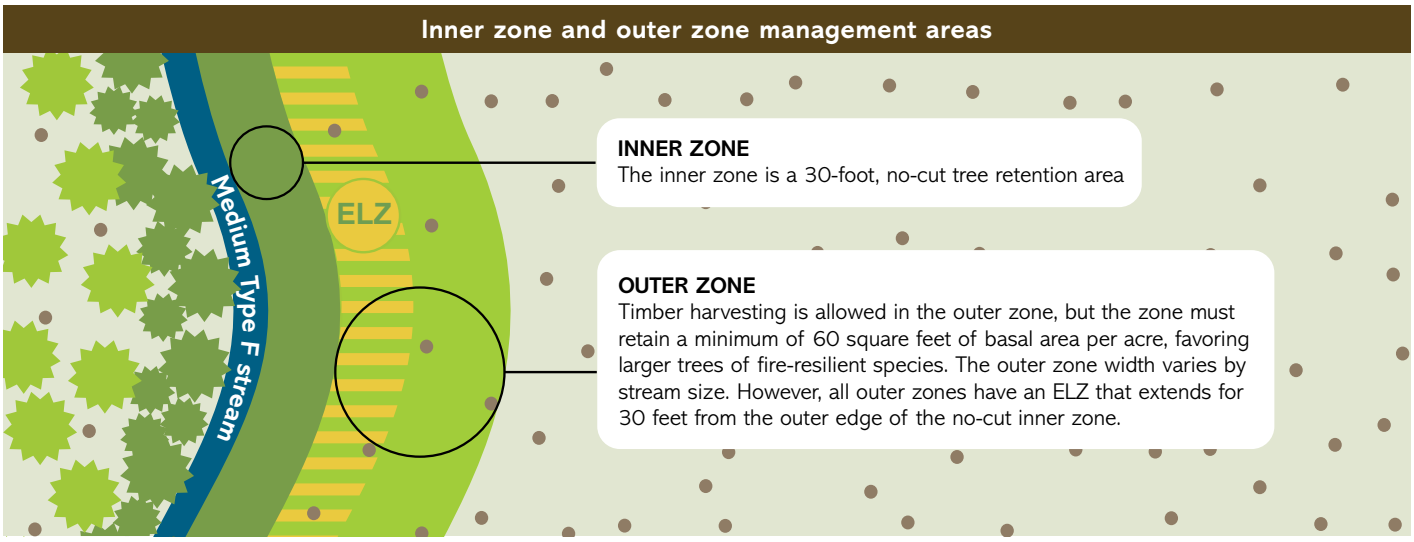
Medium Type N to medium Type F/SSBT, eastern Oregon SFO minimum option



OUTER ZONE MANAGEMENT IN EASTERN OREGON

The rules for outer zone management in eastern Oregon are intended to create riparian areas that have sufficient fire-resilient tree cover through active management. The rules outline specific guidelines for how to meet that intent, leaving room for flexibility based on the existing conditions through use of a written plan. A written plan should describe existing forest stand conditions, and how, specifically, the operation will meet the outer zone basal area minimum and goals for fire resiliency and overall stand health.

Applies to small forestland owners only



While these tree retention areas (inner zone only in eastern Oregon) are technically no-cut buffers, falling, moving or harvesting vegetation, snags or trees is permitted in certain circumstances, such as for road construction and temporary stream crossings (see the Roads and Water Crossings chapter), yarding corridors (see the Harvesting chapter), or for stream improvement (see page 93). Management within the tree retention area is possible in certain circumstances with a written plan, including precommercial thinning for growth, survival and fire resiliency in both regions, or in the outer zone in eastern Oregon. See pages 94 and 96 for additional circumstances. Ensure you have reviewed and meet the requirements from other sections before planning to cut trees within tree retention areas.

Within the required tree retention area distances for both regions (inner zone for eastern Oregon only), retain:

- all trees and vegetation within the distances from the edge of the active channel or channel migration zone
- all trees leaning over the channel
- all downed wood and snags that are not safety or fire hazards. (Any trees felled for these reasons must be left in place unless used for stream improvement projects.)

For eastern Oregon only, within the outer zone, retain:

- a minimum of 60 square feet of basal area per acre in well-distributed trees
- 27 trees from the largest diameter class per acre toward the basal area target
- trees greater than eight inches in diameter at breast height until the basal area target is reached
- when present, fire-resilient trees, including ponderosa pine, Douglas-fir, western larch and hardwoods
- a distribution of different species and sizes of trees that promote fire resiliency and overall stand health

A written plan is required to manage within the outer zone and should describe the current conditions in the riparian management area, as well as how the operation will meet the basal area minimum and promote fire resiliency and overall stand health. Operators must adhere to a 30-foot ELZ from edge of the inner zone on all stream types under both the standard practice and the SFO minimum option. If the inner zone is not applicable, then the 30-foot ELZ would start at the edge of the active channel.

The field situation is rarely as simple as this example. It is likely that, if you have a Type F, Type SSBT or larger Type N stream, there will be tributaries to that stream within the timber harvest area. This situation will be addressed in Example 2.

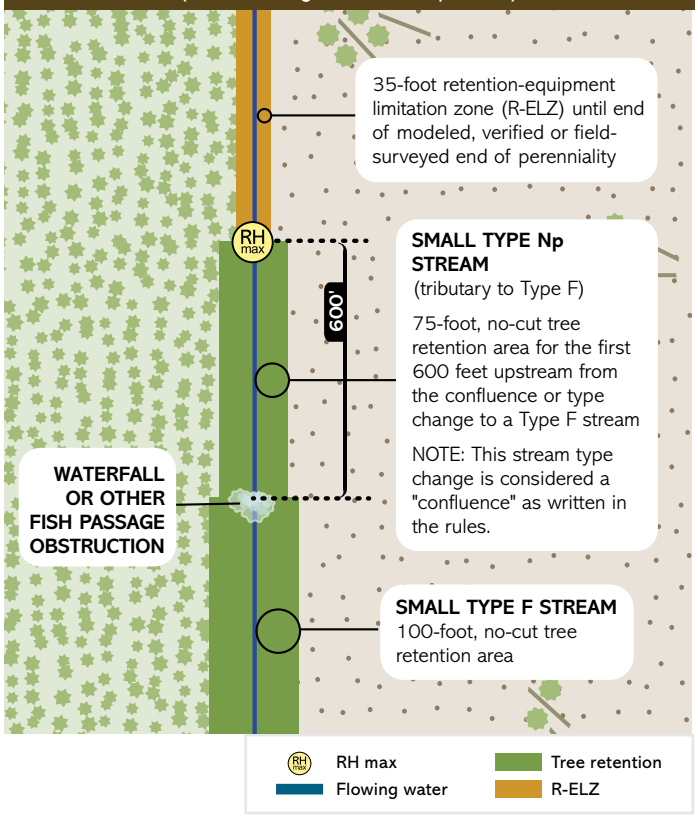
Field scenario questions for Example 1

1. What if my stream type changes size (or from fish-bearing to non-fish-bearing) along the stream length that is adjacent to the timber harvest area?

In either case, treat the stream as if it has two segments split at the location where the stream changes size or type; each segment receives the protection that matches its type. You may not average tree retention area width along the two different segments.

If the stream type change is from a small Type Np to a Type F or Type SSBT, the layout upstream of the type change should follow the tiered protections required for small Type Np streams flowing into Type F or Type SSBT streams (as addressed in Example 2). The point of type change, which is likely to be a fish obstruction such as a waterfall, is considered a "confluence" as written in the rules.

Example of small Type Np stream changing to small Type F stream
(western Oregon, standard practice)



Note: This diagram uses westside, standard practice measurements, but the inline stream protection layout concept illustrated for this field scenario will be the same for all landowner sizes and in eastern Oregon.

2. What if an existing road within a tree retention area has hazardous trees that need to be removed?

Where vegetation retention area requirements span a road and adjacent trees present a safety risk, there is a provision to remove them, provided the following:

- the width of the area of harvested trees is less than 15 feet on the upslope edge of the road
- an equivalent basal area is retained elsewhere in the unit adjacent to the tree retention area

3. Can I count trees in the tree retention area toward my wildlife leave tree requirements?

Yes, you may count trees in harvest Type 2 or Type 3 units that otherwise meet the wildlife tree requirements, within all or a portion of the tree retention areas and ELZs, depending on stream type. As a reminder, wildlife trees must have a minimum diameter at breast height of 11 inches and be at least 30 feet tall. For more information on wildlife tree requirements, see the Wildlife chapter.

W Western Oregon, standard practice

- medium and large Type F and Type SSBT streams: **all trees within the outer 20 feet** of the required width
- small Type F and Type SSBT, Type D, and Type Np and Type Ns streams where tree retention areas are required: **all trees** within the required widths

W Western Oregon, SFO minimum option

- medium and large Type F and Type SSBT streams: **all trees within the outer 20 feet** of the required width
- small Type F and Type SSBT and all Type N streams where tree retention areas are required: **all trees** within the required widths

Forest Conservation Tax Credit (FCTC)

- all trees retained within the FCTC area (the difference between the SFO minimum option and the standard option)

E Eastern Oregon, standard practice

- along all stream types: **all retained trees in the outer zone** that otherwise meet wildlife leave tree requirements

E Eastern Oregon, SFO minimum option

- along Type F, Type SSBT and Type N streams: **all retained trees in the outer zone** that otherwise meet wildlife leave tree requirements

Applies to small forestland owners only

4. What if the tree retention area or R-ELZ is densely stocked with young or small trees and requires precommercial thinning?

Precommercial thinning is permitted to retain growth and survival of the young trees in reforested areas, or to promote fire resiliency, with a written plan. Your written plan should describe how your treatment will facilitate achieving the desired future conditions for riparian management areas (RMAs).

5. What if the tree retention area is densely stocked with commercial trees and requires thinning?

You can propose thinning in overstocked RMAs with trees of commercial size, but this requires filing a plan for an alternate practice (PFAP) and approval from an Oregon Department of Forestry (ODF) stewardship forester (see page 96). Updated basal area tables were retained after the Private Forest Accord agreement was reached to help plan for and justify thinning in these cases.

Oregon forest practice rules allow for precommercial thinning in dense stands near streams, with a written plan.

Example 2

TYPE Ns OR TYPE Np STREAMS

Small Type N streams are separated into two different types based on the seasonality of flow. Type Np streams are perennial and have flowing water year-round. Type Ns streams have a defined channel, but are seasonal and dry up for part of the year. For the purpose of the Oregon Forest Practices Act, if no channel is present, there is no stream. All channels – and therefore streams – receive at least an ELZ. Note that ELZ requirements are defined by region and not the size of the forestland. There is no SFO minimum option for ELZs, because the harvesting of commercial-size trees is not restricted in an ELZ.

(W) Western Oregon

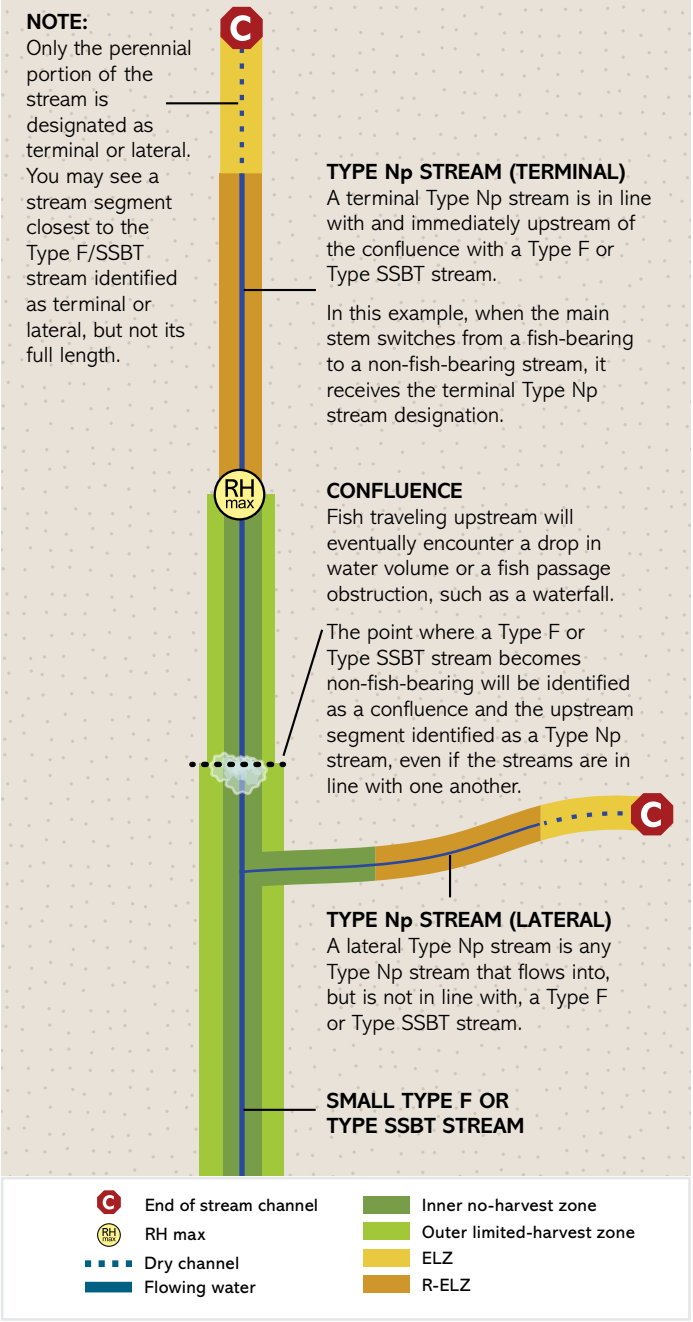
Type Ns streams in western Oregon have a 35-foot-wide ELZ, no matter what type or size stream they flow into. All Type Np streams receive at least an R-ELZ, also 35 feet wide. Proximity to the confluence of the Type Np stream with the Type F or Type SSBT stream determines the required protection. For a specified distance upstream from the confluence of Np streams flowing into Type F or Type SSBT streams, additional protection beyond the R-ELZ is required.

(E) Eastern Oregon

Type Ns streams in eastern Oregon have a 30-foot-wide ELZ, unless they flow directly into a Type F or Type SSBT stream, where an R-ELZ is required upstream from the confluence. All Type Np streams receive at least an R-ELZ, also 30 feet wide. Proximity to the confluence of the Type Np stream with the Type F or Type SSBT stream determines the required protection. For a specified distance upstream from the confluence of Type Np and Type Ns streams flowing into Type F or Type SSBT streams, additional protection beyond the R-ELZ or ELZ is required.

In eastern Oregon, Np streams are further classified as terminal or lateral. A terminal stream is the largest Type Np stream in a basin that is immediately upstream of a Type F or Type SSBT stream. Laterals are other non-terminal Type Np streams within the basin. These classifications are found on ODF's FPA Streams and Steep Slopes viewer and within the Forest Activity Electronic Reporting and Notification System (FERNS). See the diagram on the next page to help with interpreting terminal and lateral designations.

E Interpreting terminal and lateral stream designations in eastern Oregon



TYPE NP TO MEDIUM OR LARGE TYPE N

Small Type Np streams flowing into medium or large Type N streams do not fall within the definition of the Area of Inquiry and thus do not require a tree retention area, or a R-ELZ. This is true even if the cumulative upstream distance (including the medium or large Type N segment) from a Type F or SSBT stream is less than the RH max.

IF THE TYPE Np STREAM FLOWS INTO A TYPE F OR TYPE SSBT STREAM WITHIN A CERTAIN DISTANCE, A TREE RETENTION AREA MAY BE REQUIRED.

W Western Oregon

To determine what the next step is if you're in western Oregon, answer the following question:

Does the closest portion of the Np stream within the timber harvest unit flow directly into a Type F stream within 600 feet, or a Type SSBT stream within 1,150 feet (slope distance)?

If you answered no, protections are simply a 35-foot ELZ on both sides of the Type Ns stream and a 35-foot R-ELZ on both sides of the small Type Np stream. You may operate equipment and harvest trees within the ELZ but must minimize disturbance to vegetation and soil. In addition, for R-ELZs along Type Np streams, all trees less than 6 inches in diameter at breast height (DBH) and shrub species must be retained where possible. Where soil disturbance exceeds 10% in ground-based logging units and 20% in cable units, the operator must take corrective action to replace the equivalent of lost functions in consultation with an ODF stewardship forester.

If you answered yes, a tree retention area will be required for all or part of the Type Np streams within the unit, and an R-ELZ will be required for any portion upstream of the RH max (see the "Understanding RH max" sidebar on the next page). Continue reading to learn how to lay out protections for these tributaries.

E Eastern Oregon

To determine what to do next if you're in eastern Oregon, answer the following questions:

Does the closest portion of a terminal Type Np stream within the harvest unit flow into a Type F or Type SSBT stream within 500 feet (slope distance)?

Or, does the closest portion of a lateral Type Np stream within the harvest unit flow into a Type F or Type SSBT stream within 250 feet (slope distance)?

Or, does the closest portion of a Type Ns stream within the harvest unit flow into a Type F or Type SSBT stream within 750 feet (slope distance)?

If you answered no to these questions, protections are simply a 30-foot ELZ on both sides of the Type Ns stream and a 30-foot R-ELZ on both sides of the small Type Np stream.

You may operate equipment and harvest trees within the ELZ but must minimize disturbance to vegetation and soil. In addition, for R-ELZs along small Type Np streams, all trees less than 6 inches DBH and shrub species must be retained where possible. Where soil disturbance exceeds 10% in ground-based logging units and 20% in cable units, the logging operator must take corrective action to replace the equivalent of lost functions in consultation with an ODF stewardship forester.

UNDERSTANDING RH MAX

The RH max is the maximum tree retention distance described for any small Type Np stream that flows into a Type F or Type SSBT stream. What "RH" stands for is not defined in the Forest Practices Act rules, but it refers to the maximum upstream distance along the Type Np stream that will require a protective tree retention, or "retention harvest," area. The distance to the RH max from the confluence, and thus the length of the required tree retention area along a Type Np stream, varies depending on whether the stream flows into a Type F or Type SSBT stream (westside), or whether the Type Np stream is terminal or lateral (eastside).

Use the Oregon Department of Forestry's FPA Streams and Steep Slopes viewer to identify small Type N streams within your planned timber harvest area, determine or plan to survey for their presence or perenniality, and estimate their upstream distance from a confluence with a Type F or SSBT stream.

If you answered yes to these questions, a tree retention area will be required for all or part of the terminal and lateral Type Np streams within the timber harvest unit, and an R-ELZ will be required for all or part of the Type Ns streams within the unit. Continue reading to learn how to lay out protections for these tributaries.

LAYING OUT PROTECTIONS FOR A TYPE Np STREAM THAT FLOWS INTO A TYPE F OR TYPE SSBT STREAM

This layout process is the same for all regions and the small forestland owner minimum option, but required lengths and widths are different.

To determine these key points, landowners have three options: They can conduct an operational field survey, use data from a previously approved operational field survey, or work with a modeled end of perenniality (EOP). When modeled EOP data is available from ODF, it will be found via the forest practices planning website (**oregon.gov/odf/working/pages/fpa.aspx**) or in FERNS. For a detailed explanation of the stream surveying process, see page 98.

Initiating protection layout for Type Np (and Type Ns in eastern Oregon) tributaries to Type F and Type SSBT streams is best done as an office exercise after initial field work is completed. Use a detailed map that includes the timber harvest unit boundaries and the hydrography statewide flow line layer to identify stream locations and types. Follow these steps to design the required riparian area protections on paper before laying them out in the field:

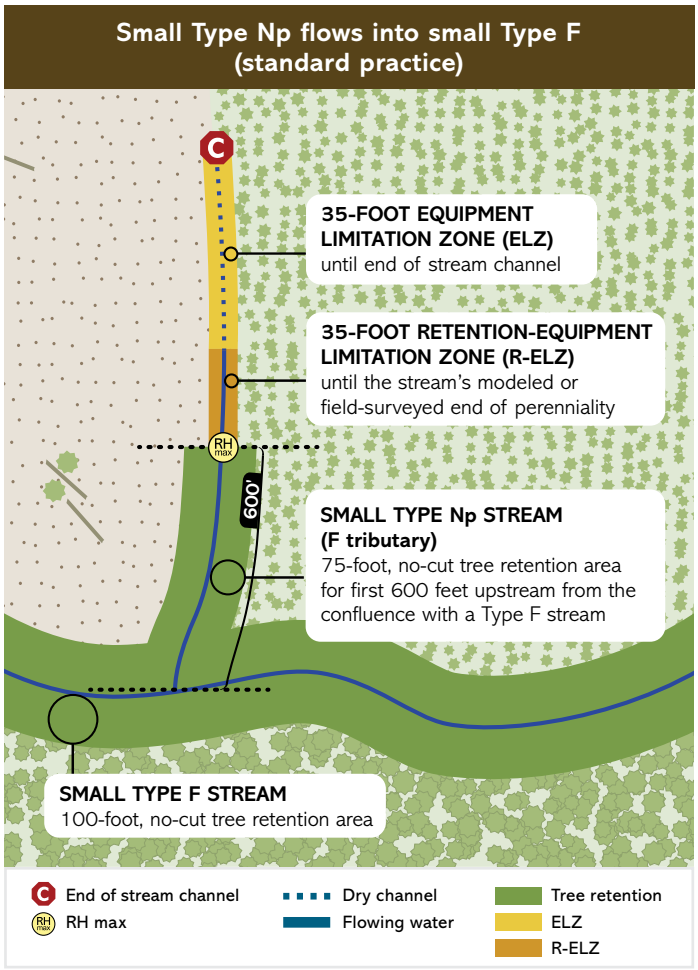
1. Locate key points along the small Type Np stream, including:
   - > verified, modeled or operational field-surveyed EOP
   - > verified, modeled or operational field-surveyed end of channel
   - > if field-surveyed, any short water (flowing water less than 25 feet long) found beyond the EOP, but within the Area of Inquiry
   - > for an SFO taking the tax credit only: if field-surveyed, any areas of dry channel 100 feet or greater in length occurring before the EOP and before the RH max
2. Identify whether the Type Np stream flows into a Type F or Type SSBT stream.
3. For eastern Oregon only, identify whether the small Type Np stream is lateral or terminal.
4. Begin at the confluence of the small Type Np stream (and Type Ns in eastern Oregon) with the Type F or Type SSBT stream, and work upstream to apply the required protections.

Note: If the modeled EOP is not yet available, no previously approved field surveys are available on ODF's forest practices website or in FERNs, and no field survey has been conducted, all small Type N streams should be treated conservatively as Type Np streams.

W Western Oregon small Type Np stream that flows into a Type F stream

W Standard practice: Leave a 75-foot-wide tree retention area on both sides of the stream for 600 feet upstream along the Type Np stream from the confluence with the Type F stream. The end of the 600 feet is the RH max.

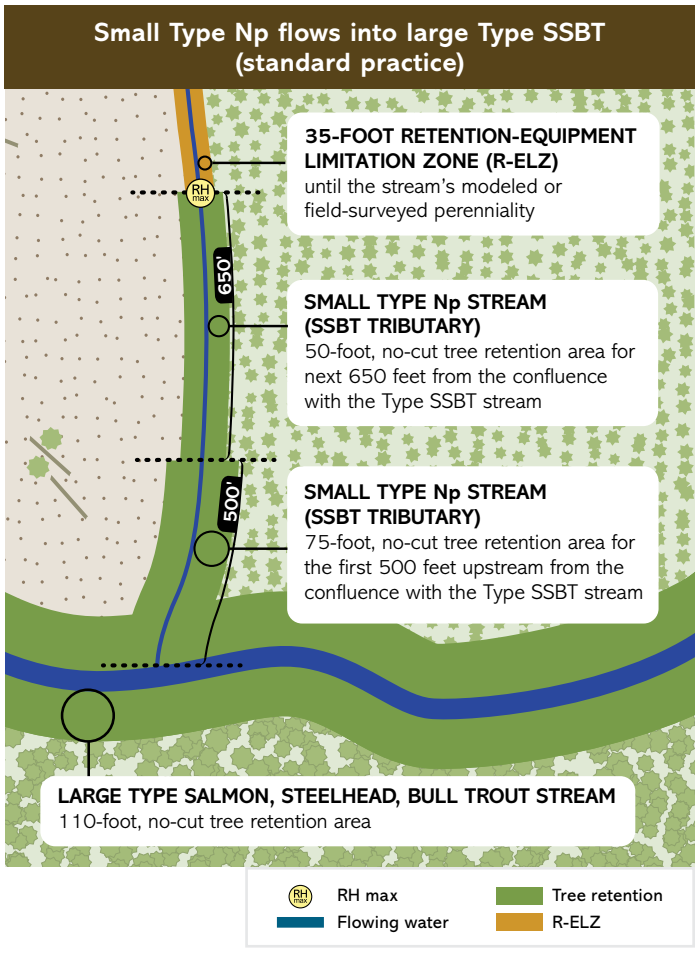
W SFO minimum option: Leave a 35-foot-wide tree retention area on both sides of the stream for 600 feet upstream along the Type Np stream from the confluence with the Type F stream. The end of the 600 feet is the RH max.



W Western Oregon small Type Np stream that flows into a Type SSBT stream

W Standard practice: Leave a 75-foot-wide tree retention area on both sides of the stream for 500 feet upstream along the Type Np stream from the confluence with the Type SSBT stream, and then a 50-foot-wide tree retention area for an additional 650 feet upstream. The sum of the two lengths, 1,150 feet, is the RH max.

W SFO minimum option: Leave a 35-foot-wide tree retention area on both sides of the stream for a maximum distance of 1,150 feet upstream of the Type SSBT stream. The end of the 1,150 feet is the RH max.



Applies to small forestland owners only

E Eastern Oregon small Type Np stream that flows into a Type F or Type SSBT stream

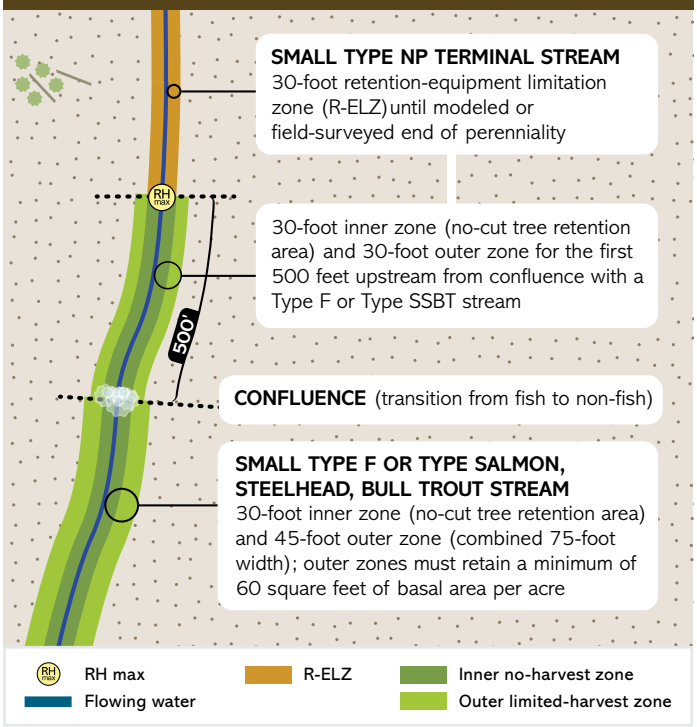
E Standard practice, terminal stream: Leave a 30-foot-wide inner zone tree retention area and a 30-foot-wide outer zone on both sides of the small Type Np stream for 500 feet upstream from the confluence with the Type F or Type SSBT stream. All other inner and outer zone retention requirements apply (refer to details in Example 1 on page 75). The end of the 500 feet is the RH max.

E Standard practice, lateral stream: Leave a 30-foot-wide inner zone tree retention area on both sides of the small Type Np stream for 250 feet upstream from the confluence with the Type F or Type SSBT stream. All other inner zone tree retention area requirements apply (refer to details in Example 1 on page 75). There is no outer zone. The end of the 250 feet is the RH max.

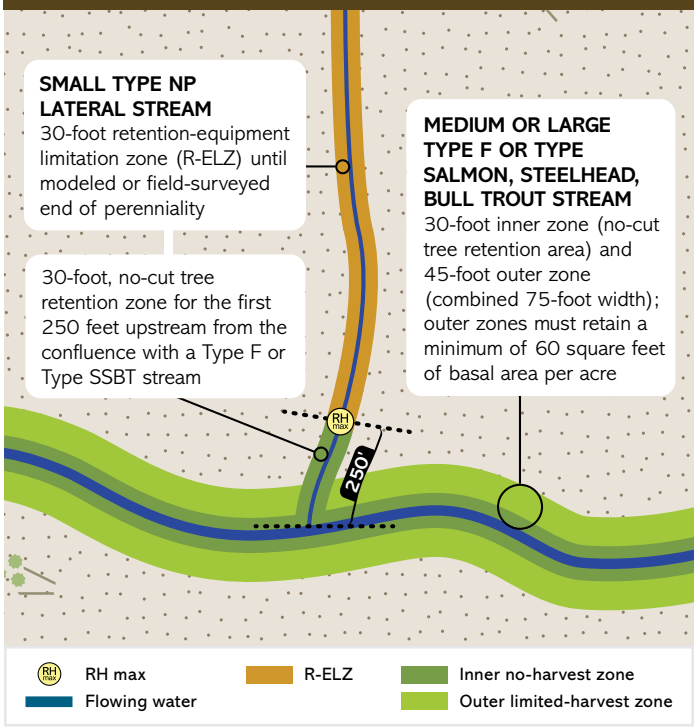
E SFO minimum option, terminal stream: Leave a 20-foot-wide inner zone tree retention area and a 20-foot-wide outer zone on both sides of the small Type Np stream for 500 feet upstream from the confluence with the Type F or Type SSBT stream. All other inner and outer zone retention requirements apply (refer to details in Example 1 on page 75). The end of the 500 feet is the RH max.

E SFO minimum option, lateral stream: Leave a 20-foot-wide inner zone tree retention area on both sides of the small Type Np stream for 250 feet upstream from the confluence with the Type F or Type SSBT stream. All other inner zone tree retention area requirements apply (refer to details in Example 1 on page 75). There is no outer zone. The end of the 250 feet is the RH max.

Small Type Np flows into small Type F or Type SSBT (standard practice)



Small Type Np flows into medium or large Type F or Type SSBT (standard practice)



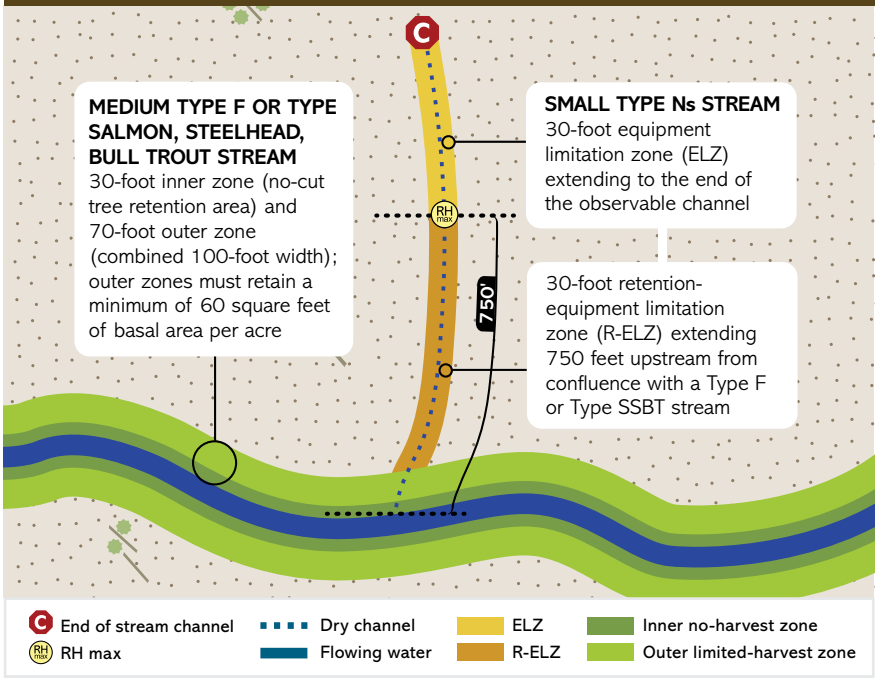
Applies to small forestland owners only

(E) Eastern Oregon small Type Ns stream that flows into a Type F or Type SSBT stream

(E) (E) Standard practice and SFO minimum option

A 30-foot-wide R-ELZ is required, extending 750 feet upstream from the confluence with the Type F or Type SSBT stream. Note: This is the only situation where a Type Ns stream receives an R-ELZ. The end of the 750 feet is the RH max. (See diagram, right.)

Small Type Ns to medium Type SSBT (standard practice)



ONCE YOU'VE IDENTIFIED THE TYPE Np STREAM SCENARIO THAT APPLIES TO YOUR HARVEST UNIT, CONTINUE HERE

Working upstream from the confluence, layout depends on which of the following situations happens first. If the Type Np stream:

1. **Extends upstream beyond the timber harvest unit and/or property line.** Protections apply as described for the distances listed until the RH max is reached, or the stream leaves the property or the edge of the unit.

- **Branches out.** When the Type Np stream branches out, each branch is eligible for perennial protection provided the branches are Type Np streams. The distances extend from the confluence of the Type Np stream with the Type F or Type SSBT stream, and accumulate in an upstream direction for each branch of the Type N stream system. The distances do not reset at the branch. If one branch is Type Ns, the tree retention area only extends up the Type Np branch. The eastern Oregon 30-foot or western Oregon 35-foot ELZ will apply to the Type Ns branch. (See diagram, page 82, top.)

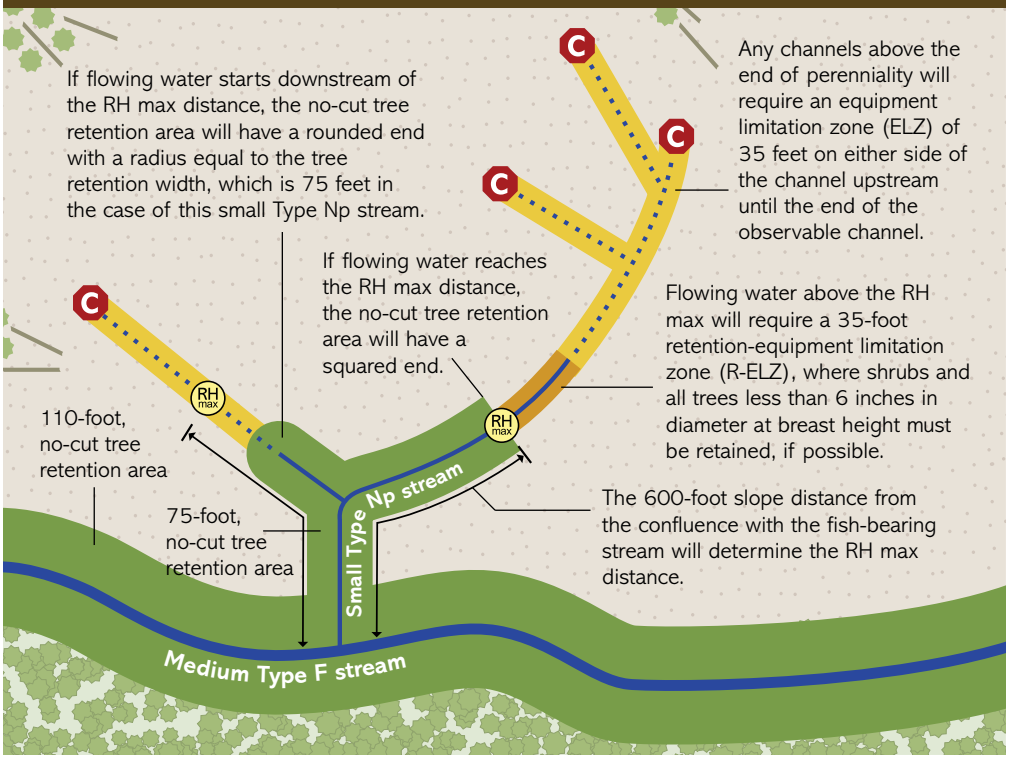
2. **Reaches end of perenniality (EOP).** When the verified, modeled or operational field-surveyed EOP is reached before the RH max, the vegetation retention area will have a round end with a radius equal to the buffer width. An ELZ extends beyond the RH max for the length of the channel (see the left branch in the diagram, page 82, top).

3. **Extends upstream beyond the RH max within the harvest unit.** If the end of the required tree retention area is reached (RH max) within the harvest unit, the EOP will determine the next stage of layout. Where perenniality extends upstream of the RH max, the tree retention area will terminate at the RH max with a perpendicular end (see right branch of the diagram, page 82, top). An eastern Oregon 30-foot or western Oregon 35-foot R-ELZ extends upstream from there, until the EOP. Once the EOP is reached, an eastern Oregon 30-foot or western Oregon 35-foot ELZ extends to the end of the channel.

Note: Where a) the stream channel crosses a property boundary; b) the RH max has been reached; c) the EOP has not been established within the harvest unit; and d) there is no stream status information upstream of the property line, then an R-ELZ continues from the RH max to the property line, no matter the flow status of the stream. R-ELZ protections are applied in case a short section of dry channel happens to exist at the property line, but a flow feature exists in the channel on the neighboring property. See the tan sidebar on page 83 and question on page 84.

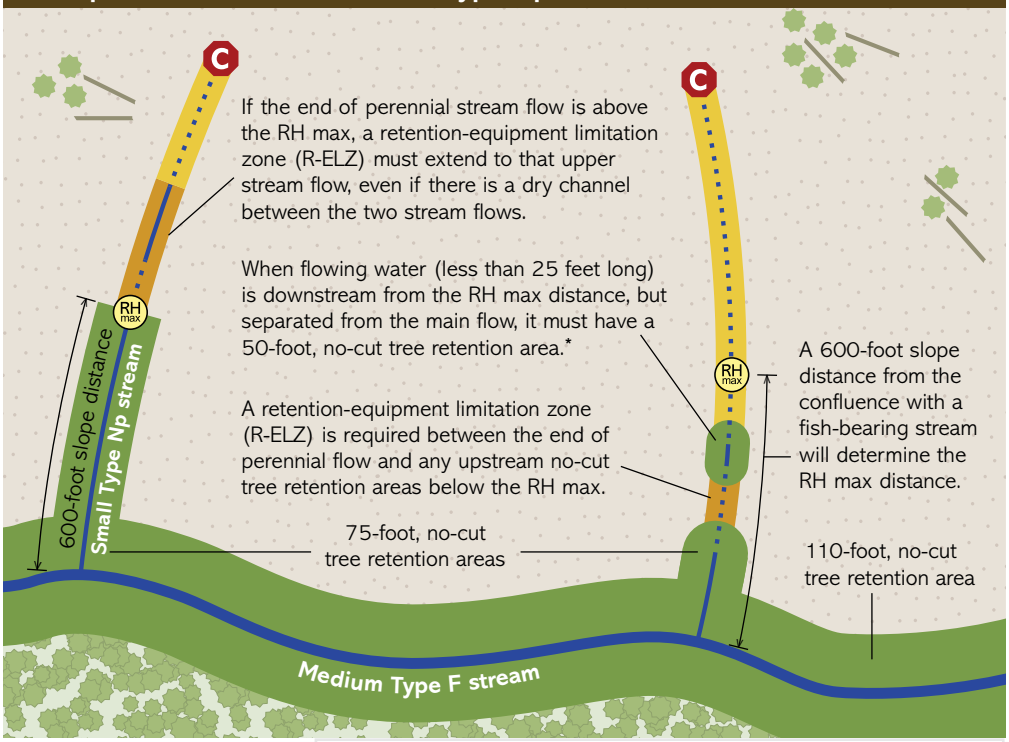
Note: If a stream survey was conducted, flow features within the 250-foot Area of Inquiry extend perennial protections to the end of the farthest upstream flow feature, even when there is a dry channel between them (see left side of the diagram, page 82, bottom). For detailed information on the stream survey process and the Area of Inquiry, see page 98.

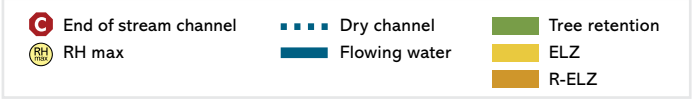
Special consideration: Small Type Np stream fork with RH max



Note: This diagram uses westside, standard practice measurements, but the concepts illustrated apply to both sizes of forestland and in both regions of Oregon.

Special consideration: Small Type Np stream with intermittent flow





*Flowing water must be within the Area of Inquiry (AOI), above perenniality and below RH max. If there is enough dry channel in between that AOI is exhausted, this would not receive a 50-foot buffer. (OAR 629-643-0130)

Note: This diagram uses westside, standard practice measurements, but the concepts illustrated apply to both sizes of forestland and in both regions of Oregon.

Field scenario questions for Example 2

1. What if flowing water less than 25 feet in length (short water) was found within the Area of Inquiry (AOI) during a survey?

Large forest landowner, both regions: If the short water is found within the AOI, upstream of the EOP and before the RH max, the short water receives a 50-foot tree retention area and an R-ELZ between it and the downstream tree retention area. This creates a shape like a dog bone, narrower in the middle and wider on the ends. You can also think of it as "dotting the 'i.'" See the right side of the lower diagram on page 82.

SFO, both regions: If the short water is found within the AOI, upstream of the end of perenniality and before the RH max, the short water receives a 35-foot tree retention area and an R-ELZ between it and the downstream tree retention area. This creates a shape like a dog bone, narrower in the middle and wider on the ends. You can also think of it as "dotting the 'i.'" See the right side of the lower diagram on page 82.. (Note: SFOs will use a 35-foot tree retention area instead of the standard 50-foot buffer indicated in the diagram.)

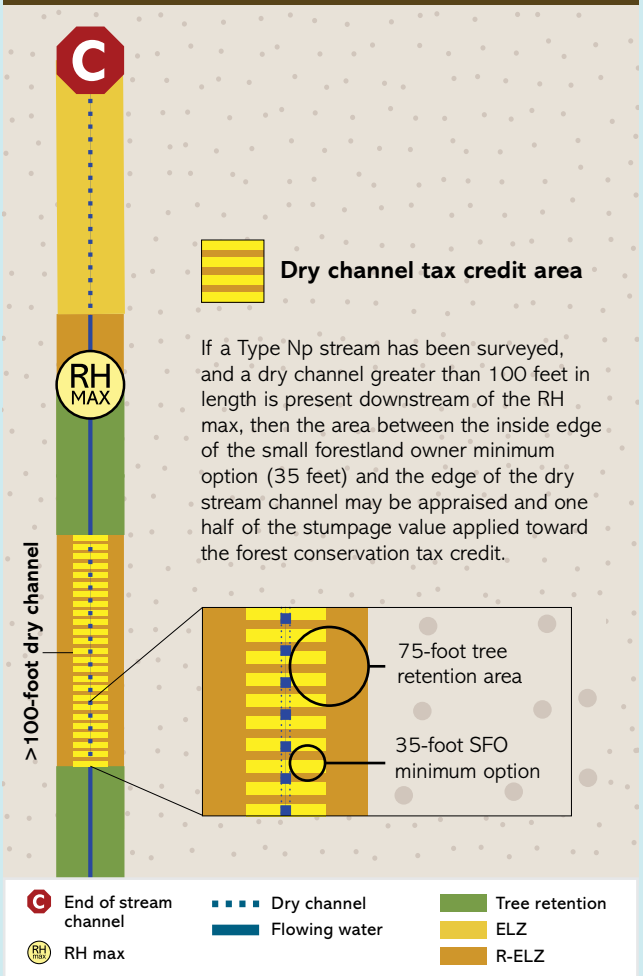
LAYING OUT PROTECTIONS WHERE SMALL TYPE N STREAMS CROSS A PROPERTY LINE

Unique layout issues arise when a small Type N stream crosses a property line and the flow status on the neighboring property is unknown. The easiest way to approach this situation is to get permission from your neighbor to conduct a complete survey of the stream. When surveying the stream on the neighboring property is not an option, the property line scenarios found in question 3 represent a conservative approach (as described in the Forest Practices Act rules), which applies the maximum protections for the stream type. The described scenarios are examples of the most basic situations that may be encountered in the woods. Obtain the most complete information you can about the stream, and discuss the application of protections for the situation on your property with your stewardship forester.

2. What if a section of dry channel is found within the Area of Inquiry between the confluence of a Type Np stream with a Type F or Type SSBT stream and the RH max?

This applies only to small forestland owners taking the Forest Conservation Tax Credit (FCTC). It is meant to provide some financial compensation for the protection of dry channels. In this instance, if the stream has been surveyed and more than 100 feet of dry channel is found between two flow features downstream of the RH max, one-half of the stumpage value between the minimum option and the edge of the dry channel (35 feet in western Oregon or 20 feet in eastern Oregon) is included in the tax credit. This is the only instance in the FCTC rules where one-half of the stumpage value is assigned.

Dry channel tax credit area on small Type Np stream that has been surveyed



Applies to small forestland owners only

Applies to large forest landowners only

3. What if a Type Np stream crosses a property line, the Area of Inquiry crosses the property line, and the upstream or downstream status of the stream is unknown?

If a landowner receives permission to go onto the neighboring property, the entire stream can be surveyed as if it is on one ownership and protections laid out as described in the preceding section.

A landowner cannot be compelled to conduct a stream survey on a neighboring property, but modeled information or previous surveys may already be available in ODF's streams mapping and FERNS. Where this information is not available, layout is based on assumptions that provide the most protection for the Type Np stream. Continue reading for details that apply to whether you are the upstream or downstream neighbor.

When you are the upstream neighbor

If end of perenniality has been determined to be downstream, an unknown stream can be considered Type Ns.

If a partial downstream survey has been completed and is available in ODF's streams mapping or FERNS, and the upstream landowner utilizes the downstream information to complete the survey upstream, protections can be applied as if the stream survey is complete.

If no survey exists downstream and the area cannot be surveyed, the upstream landowner must assume flowing water extends to the property line and begin the Area of Inquiry at the property line. Use map distances to locate the RH max and lay out protections accordingly.

When you are the downstream neighbor

Where the RH max is reached, end of perenniality has not been established within the harvest unit (meaning the Area of Inquiry has not been completed and it crosses the property line), and there is no stream status information upstream of the property line, an R-ELZ continues from the RH max to the property line, no matter the flow status of the stream. R-ELZ protections are applied in case a short section of dry channel happens to exist at the property line, but a flow feature exists in the channel on the neighboring property.

4. What if a small Type Np flows to a medium or large Type N stream that then immediately flows into a Type F or Type SSBT stream, within the distance of the RH max?

Small Type Np streams that flow into medium or large Type N streams are not defined as within the Area of Inquiry and thus do not need to be surveyed. The protection is an ELZ for these streams, even if they are perennial and lie within the cumulative upstream RH max distance of the medium or large Type N's confluence with the Type F or Type SSBT stream.

5. What if a channel shown in ODF's FPA Streams and Steep Slopes viewer does not exist on the ground or is incorrectly mapped?

Both non-existent channels and incorrectly mapped features can be addressed using the process described in Small Type N Stream Guidance and Flow Permanence Field Survey Protocol, available at ODF's FPA website under "Forest Practices Technical Guidance". Documentation, including geospatial points taken while surveying on the ground, will need to be provided to update the regulatory layers. Geometry edits such as removing nonexistent stream segments and relocating stream channels that are incorrectly mapped can be made directly by ODF, without further review or approval required by ODFW.

6. What if a mapped channel is non-continuous or is not connected to the Type F or Type SSBT stream (is reabsorbed into the soil and disappears)?

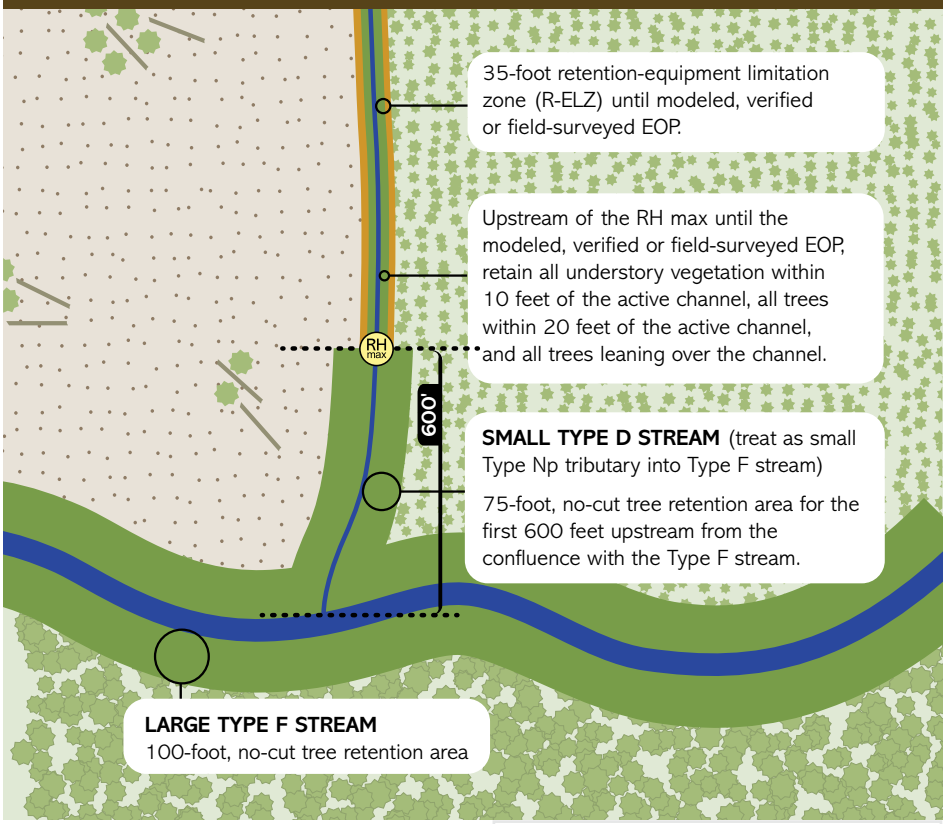
Channels can form and disappear within a unit, and perennial flow can appear, form a channel, and be reabsorbed completely within a unit, disconnected from the mapped hydrology. These situations are not uncommon, but each one is unique and may require different solutions. Document these conditions thoroughly during the field survey process and discuss how to lay out stream protections with your stewardship forester.

NOTE FOR SMALL FORESTLAND OWNERS

If the stream has been surveyed and the Area of Inquiry (AOI) extends across the property line, but there is not a flow feature in the last 100 feet, the tree retention area is extended to the shorter of the RH max distances or the farthest upstream flow feature within the property. This is essentially an exception for small forestland owners to not have to assume upstream flow across a property line. It allows termination of the tree retention area before an off-property RH max is reached. An R-ELZ is still required between the last flow feature and the property line.

If the stream has been surveyed on your property, the end of perenniality (EOP) is established, and the AOI occurs entirely on your property, but a flow feature exists in FERNS upstream of the property line, an R-ELZ is required from the EOP to the property line.

Vegetation retention for small Type D streams, upstream of the RH max until the modeled, verified or field-surveyed end of perenniality (EOP)



Note: This diagram uses westside, standard practice measurements, but the concepts illustrated apply to both landowner sizes and in both regions

Example 3

SMALL TYPE D STREAM

As previously mentioned for all forestland owners in Example 1, medium and large Type D streams receive a 75-foot-wide tree retention area in western Oregon, and a 30-foot-wide tree retention area (with no outer zone) in eastern Oregon. If the Type D stream extends above where tree retention areas are required for a Type Np stream (above the RH max), an additional tree retention area is required (see diagram to the left). The additional protection is the same for western and eastern Oregon.

Logging operators must retain:

- all understory vegetation within 10 feet of the active channel
- all trees within 20 feet of the edge of the active channel
- all trees leaning over the channel

These retained trees can be counted toward wildlife trees if they otherwise meet the Forest Practices Act wildlife leave tree requirements.

Applies to small forestland owners only

Example 4

ALTERNATE PRACTICE

Can I propose another way to achieve the desired conditions for riparian management areas (RMAs)?

Yes. Under the rules for site specific vegetation retention (OAR 629-643-0400), you can submit a plan for an alternate practice (PFAP) in consultation with an ODF stewardship forester. Alternate practices are allowed specifically because written requirements cannot fit every situation and alternatives may work better. The PFAP is a document prepared by the landowner, logging operator or timber owner, that describes practices different from those prescribed in state statutes or administrative rules. Common situations where a PFAP might be helpful include:

- overstocked conditions within tree retention areas
- hardwood-dominated RMAs where a new cohort of hardwoods or conifers could be planted
- tree removal and revegetation plans after catastrophic events, such as storms or wildfires

Proposed alternate practices must enhance or accelerate creation of the desired conditions for RMAs, and they require the approval of a stewardship forester. For more information, see "Site-specific vegetation retention prescriptions" on page 96.

If your need for an alternate practice is due to stand-level mortality, you may be able to utilize an alternative vegetation retention prescription. See page 94 for more details.

In riparian management areas that are conifer-growing sites currently dominated by hardwoods, especially red alder, more extensive harvesting may be allowed so that conifers can be planted. This is one of several reasons to utilize site-specific vegetation retention rules and write a plan for alternate practice (see page 96).

In riparian management areas where the native tree community is hardwood-dominated stands, such as ash, cottonwood or maple, the goal is to retain and grow sufficient hardwood trees. Some timber harvesting may be needed for successful reforestation to replace dead and dying trees in these stands.

HARVESTING TIMBER NEAR A LAKE

Lakes have year-round standing open water. A lake includes the water, vegetation, aquatic life and habitats within the water and in beds, banks or wetlands below the normal high-water level. Water developments that are not part of a natural stream – including constructed features such as drainage and irrigation ditches; farm, stock and log ponds; and pump chances – are not considered lakes.

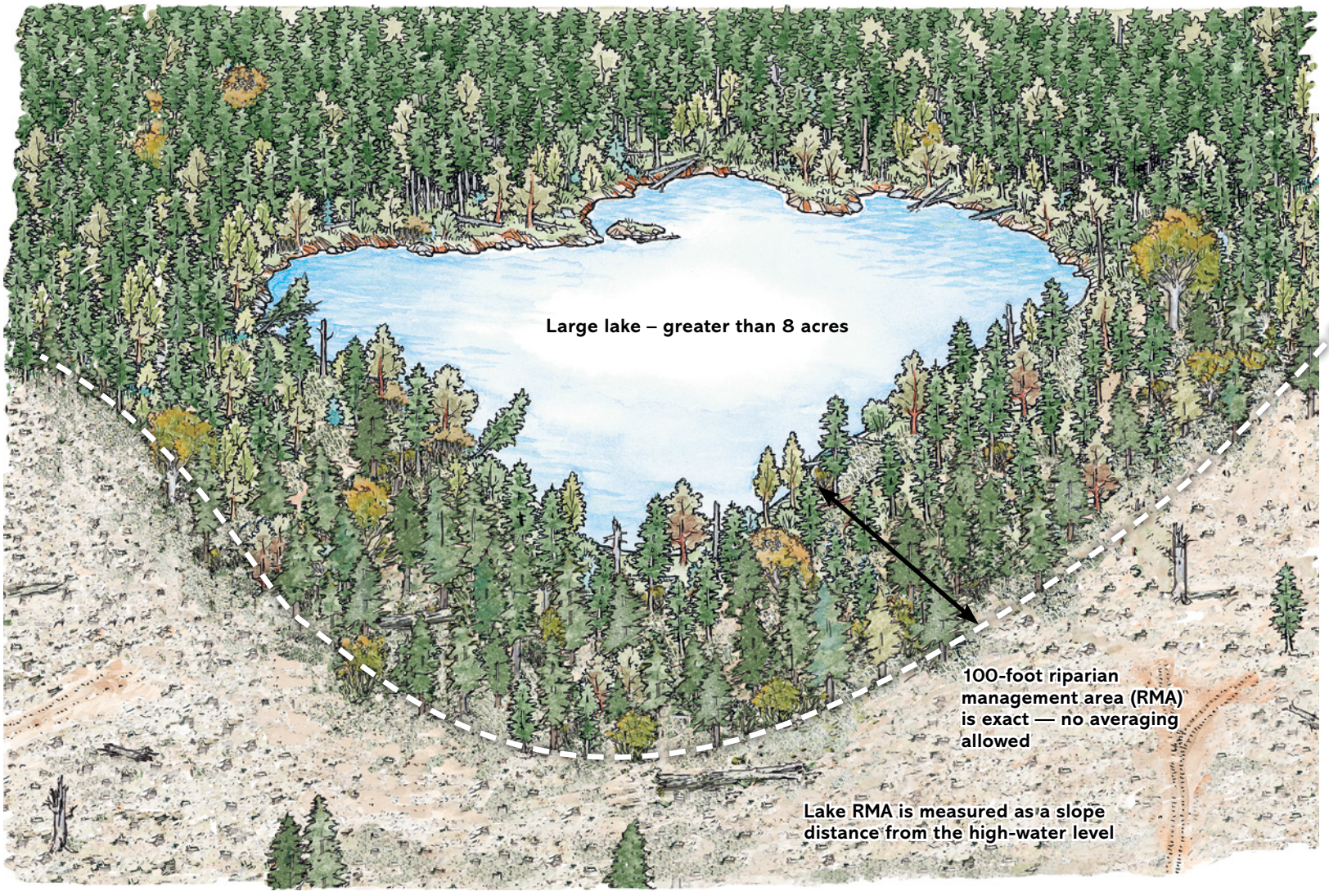
Two major classes of lakes

For the purposes of the Oregon Forest Practices Act, the two major classes of lakes are:

- **large lakes**, which are greater than 8 acres
- **other lakes** of two different types:
  - > between 1/2 acre and 8 acres, or less than 8 acres with fish
  - > less than 1/2 acre with no fish

The intent of the forest practice rules around lakes is to protect the following functions and values:

- water storage
- water quality
- water quantity
- habitats for aquatic plants, fish and wildlife



Protecting lakes during forest operations

Tree retention riparian management area (RMA) requirements for lakes are specified in Table 3-7. Note these same protections apply across regions and sizes of forestland; there is no small forestland owner minimum option.

The following protections apply to lakes during logging operations, and vary based on the size of the lake and whether it contains fish:

For large lakes:

- A written plan, reviewed by the Oregon Department of Forestry (ODF), is required for logging operations within 100 feet of a large lake.
- The tree retention RMA width is 100 feet, as measured from the high-water level. The 100-foot RMA is exact; no averaging is allowed.

For other lakes that have fish use or are between 1/2 acre and 8 acres:

- The tree retention RMA width is 50 feet, as measured from the high-water level.

For other lakes less than 1/2 acre that do not contain fish:

- No tree retention RMA is required.

Within all tree retention RMAs around lakes:

- Leave all trees along the edge of the lake. Additional leave trees should be well distributed within the RMA.
- All snags and down wood in the lake and RMA must be left. Snags felled for safety must be left on the ground and cannot count toward snag and live tree requirements in adjacent timber harvest areas.
- Logging or road-building operations must never cause sedimentation or drain lakes.
- Disturbance of understory vegetation should be limited to the minimum necessary to remove timber and achieve successful reforestation.
- Activities in the lake RMA must not impair water quality, disturb natural drainage or affect soil productivity.
- Timber felling, yarding and mechanical site preparation requirements in lake RMAs are covered in the Harvesting chapter.

Table 3-7 Lake protection requirements (all landowners and regions)

Class of lake	Riparian management area width (feet)	Retention requirements
Large lakes (greater than 8 acres)	100	Leave understory plants, all snags and down wood, and 50% of the trees by species and size*
Other lakes (between 1/2 acre and 8 acres, or fewer than 8 acres with fish)	50	Same as for large.
Other lakes (less than 1/2 acre, no fish)	No RMA	If more than 1/4 acre, leave snags and down wood**

*Leave 50% of the original live trees by species in each of the following size classes:

- 6-10 inches DBH
- 11-20 inches DBH
- 21-30 inches DBH
- greater than 30 inches

The goal is to leave approximately the same species and size distribution as before the timber was harvested near the lake.

**These can be counted toward requirements to leave snags and down logs in clearcut

HARVESTING TIMBER IN OR NEAR A WETLAND

Wetlands, especially smaller ones, are harder to identify than streams and lakes. Wet soils, surface water or groundwater, and water-tolerant plants can indicate a wetland. Plants found in wetlands include Oregon ash, Sitka spruce, cottonwood, willow, cattails, skunk cabbage, reed canary grass, rushes and sedges. Terms for specific types of wetlands include swamps, marshes, bogs and seeps. Water developments that are not part of natural streams or lakes — such as drainage and irrigation ditches; farm, stock and log ponds; and pump chances — are not considered wetlands.

Be aware that wetlands may dry out in the summer and have different sizes and shapes. If you're unsure about an area, check with the Oregon Department of Forestry (ODF) or seek specialized assistance.

WHERE TO FIND WETLANDS

- natural drainages or swales
- low areas with high-water tables
- flat valleys or depressions with poorly drained soils
- near streams, rivers and lakes
- lower slopes where springs or seeps emerge
- mountain meadows watered by snowmelt

Three classes of wetlands

- Significant wetlands include those greater than 8 acres, as well as estuaries, bogs and certain eastern Oregon springs of any size.
- Stream-associated wetlands are smaller than 8 acres and located next to streams.
- Other wetlands are smaller than 8 acres and include seeps and springs.

IMPORTANT WETLAND FUNCTIONS

- store surface water and groundwater
- maintain or improve water quality
- reduce flood impacts
- provide habitat for aquatic plants, fish and wildlife
- provide recreational opportunities, such as wildlife viewing

Protecting wetlands during forest operations

Oregon Forest Practices Act requirements are intended to provide protections for important wetland functions. Different classes of wetlands have slightly different protections based on their defining features, sizes and locations. Note that these same protections apply across all regions and sizes of forestland. Except around stream-associated seeps and springs, there is no small forestland owner minimum option.

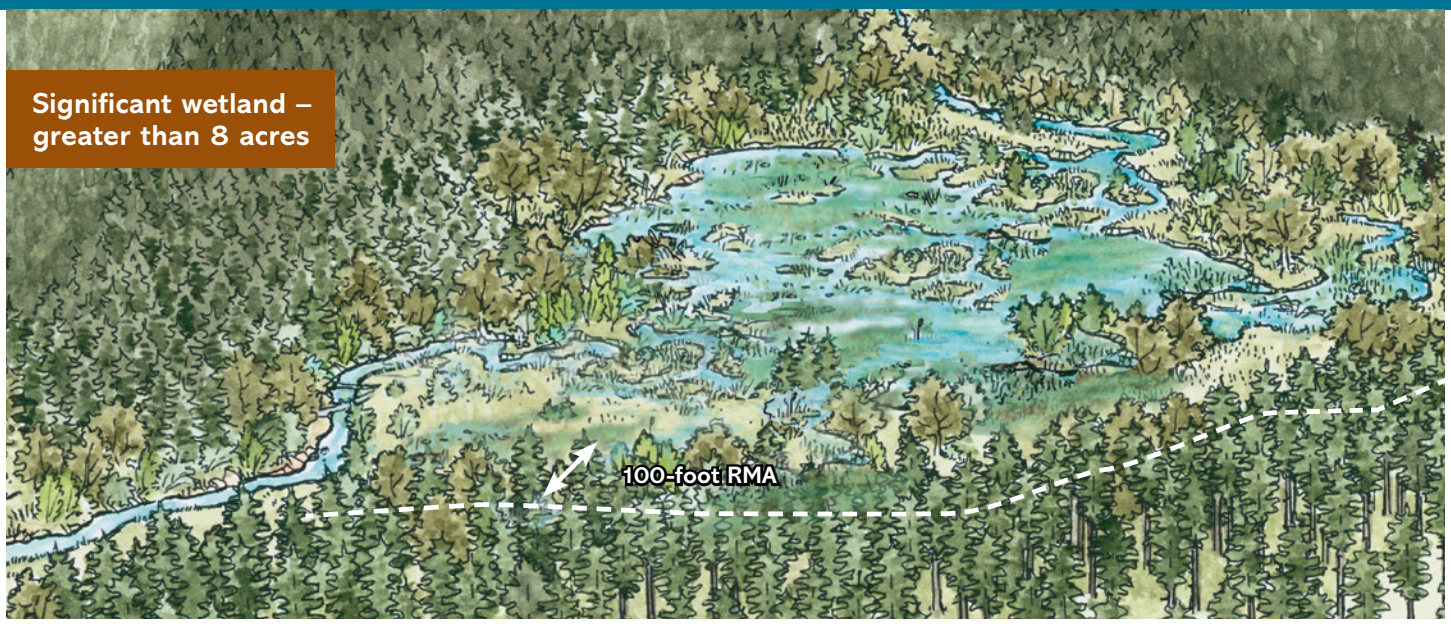
Generally, follow these practices when operating in or near wetlands:

- When possible, avoid operations in wetlands and retain blocks of intact vegetation in and around them. If trees are removed, consider how reforestation will be accomplished.
- Minimize impacts to soil and understory vegetation, refraining from any disturbance that alters wetland function.
- Ground equipment must not cause rutting, soil compaction or sedimentation, or affect water quality.
- Successful logging operations may occur during dry or frozen conditions. Cable harvesting is an alternative, where appropriate.
- Converting or draining a wetland is not allowed, even for the purpose of establishing trees.

Details for the protection of different wetland classes are detailed below. (See Table 3-8 for a summary of the specifics for each wetland type.)

Significant wetlands

- A resource site evaluation by ODF is required for proposed logging operations within 300 feet of significant wetlands, followed by a written plan, if the operations conflict with the significant wetland or if machines will be operated within the wetland.
- Significant wetlands receive a tree retention riparian management area (RMA) of a width determined by ODF during the resource site evaluation. This width is measured from the edge of the wetland. (See Table 3-8.)
- All understory plants, snags and down wood, and one-half of the trees by species and size, must be left in the RMA.
- All trees at the immediate edge of the wetland must be retained.



Stream-associated wetlands

Give these areas the same protections required for the stream type they're associated with.

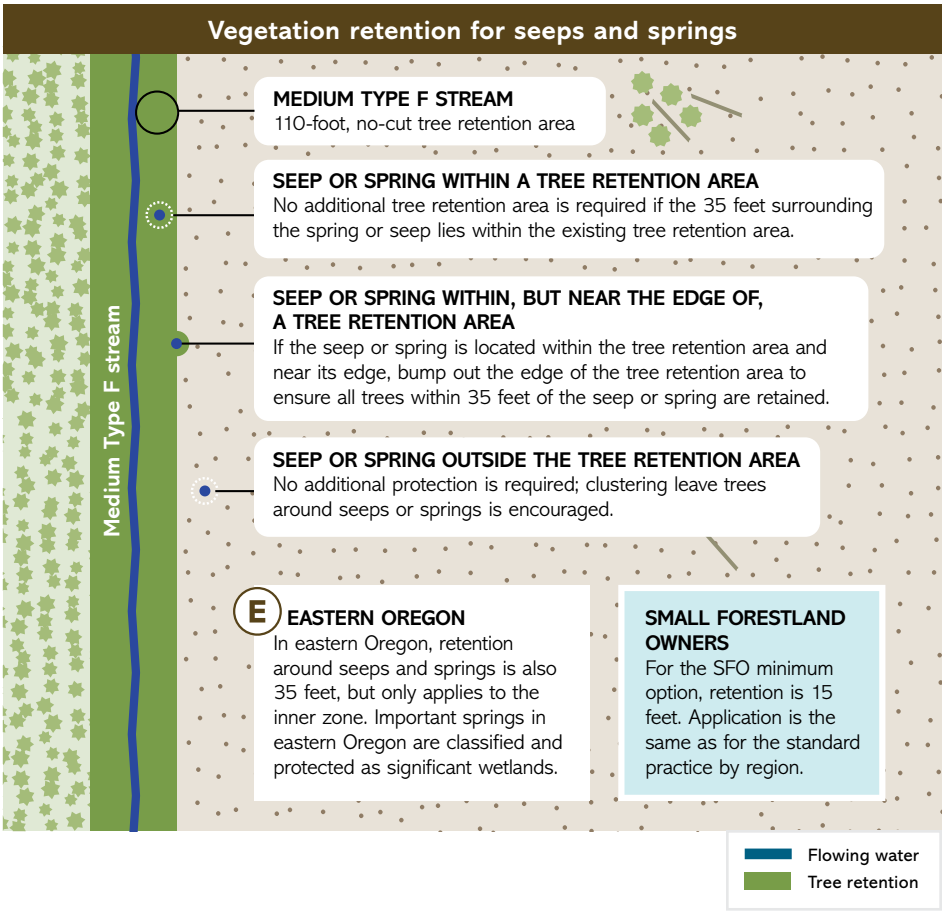
If a stream-associated wetland lies at the edge of or extends beyond the tree retention area of the stream, expand the tree retention area to entirely include the wetland plus at least 25 additional feet (see illustration, page 91). This requirement is the same across all regions, regardless of forestland size.

Other wetlands, including seeps and springs

- Apart from those associated with streams, there is no RMA required for other wetlands, seeps and springs.
- In a wetland larger than one-quarter acre, snags and down trees must be left standing. Snags felled for safety or fire risk must be left unyarded. Snags and downed wood left within a wetland can count toward wildlife and downed wood requirements for Type 2 and Type 3 harvests. Refer to the Wildlife chapter for further discussion of wildlife tree and downed wood requirements.

Stream-associated seeps and springs

Specific protection for seeps and spring-adjacent streams varies by region, size of forestland and chosen practice. The intent is to ensure that trees are retained around each seep or spring that occurs within the width of a tree retention area. If the seep or spring lies near the edge of the stream's tree retention area (or the inner zone in eastern Oregon), this effectively bumps out the overall width of the stream's tree retention area.



W Standard practice for western Oregon

- Where a seep or spring occurs in a tree retention area, all trees within 35 feet of the seep or spring must be retained.
- If the seep or spring is at the edge of the tree retention area, the width of the tree retention area should be expanded to include the seep or spring, plus 35 feet.
- Logging operators are encouraged to retain trees that meet wildlife leave tree requirements within timber harvest Type 2 or Type 3 units immediately adjacent to seeps and springs.

E Standard practice for eastern Oregon

- Where a seep or spring occurs within the inner zone, retain all trees within 35 feet of the seep or spring.
- If the seep or spring is at the edge of the inner zone, the width of the tree retention area should be expanded to include the seep or spring, plus 35 feet.
- Important springs in eastern Oregon are classified and protected as significant wetlands.

Small forestland owner (SFO) minimum option

For both regions

- The landowner must submit a standardized form to ODF when using the SFO minimum option around seeps or springs.
- If the tree retention area contains side channels and wetlands that extend beyond the riparian management area, the tree retention area should be expanded to entirely include any side channels and wetlands, plus at least 25 additional feet. Note that this requirement is the same across all regions and sizes of forestland.

W Western Oregon

- Where a seep or spring occurs in a tree retention area, retain all trees within 15 feet of seeps and springs.
- If the seep or spring does not lie fully within the tree retention area, the width of it should be expanded to include the seep or spring, plus 15 feet.
- Trees immediately adjacent to seeps or springs that otherwise meet wildlife leave tree requirements within timber harvest Type 2 or Type 3 units may be retained.

E Eastern Oregon

- Where a seep or spring occurs in the inner zone of a tree retention area, retain all trees within 15 feet of seeps or springs.
- If the seep or spring does not lie fully within the inner zone of the tree retention area, the width of it should be expanded to include the seep or spring, plus 15 feet.
- Trees immediately adjacent to seeps or springs that otherwise meet wildlife leave tree requirements within harvest Type 2 or Type 3 units may be retained.

A stream-associated wetland and its 25-foot RMA.

Applies to small forestland owners only

Table 3-8 Wetland protection requirements

Class of wetland	Riparian management area (feet)	Area protection required (both wetland & its RMA)
Significant (greater than 8 acres; or estuaries, bogs and certain eastern Oregon springs)	Estuaries 100-200[1] Bogs 50-100[1] Eastern Ore. springs 50-100[1] Wetlands 100	Leave understory plants, all snags and downed wood, and 50% of the trees by species and size[2]
Stream-associated (next to a stream)	Stream RMA goes around it[3]	Included in stream RMA
Other (fewer than 8 acres)	No RMA	If more than 1/4 acre, leave snags and down wood[4] If less than 1/4 acre, no leave tree or vegetation retention requirements
Other (seeps and springs adjacent to streams)	Bump out stream RMA if at the edge	Included in stream RMA

1. Determined by ODF at the time of resource site review.
2. Leave 50% of the original live trees, by species, in each of the following size classes:
   - 6-10 inches DBH
   - 11-20 inches DBH
   - 21-30 inches DBH
   - greater than 30 inches DBH

   Leave trees should be well distributed. All snags and down wood in the wetland and RMA must be left. Snags felled for safety reasons must be left on the ground and cannot be counted toward snag and live-tree requirements in clearcuts.
3. Where wetlands or side channels extend beyond a tree retention RMA, expand the RMA to include the wetland or side channel, plus 25 additional feet. This applies to all streams or stream segments with tree retention requirements.
4. These can be counted toward requirements to leave snags and down logs in clearcuts.

Other wetlands larger than one-quarter acre, such as this one, do not require a tree retention area, but all snags must be left standing and down wood retained within the wetland.

OTHER RIPARIAN-ASSOCIATED CONSIDERATIONS

Pond construction

Many landowners are interested in developing a pond on their forest property, if one doesn't already exist, both for practical uses and amenity values. On forestland, a pond can attract unique aquatic and wildlife species, and can provide a valuable water source if a wildfire occurs.

Constructing a pond requires a permit application and approval from the Oregon Water Resources Department (OWRD). There is a base permit application fee and an additional fee that varies with the planned size of the pond. Be aware that construction of large ponds (i.e., those with dams over 10 feet high and storage levels over 9.2 acre-feet) requires that a more detailed and costly application, including a design by a licensed engineer, be approved.

Pond development also requires good planning and coordination between the application process and construction work, due to the many details and the amount of time involved. Key steps and timing for the application and permitting process include:

- landowner submits an application and pays the base fee, plus pond-size fees
- OWRD posts a public notice of the application within 60 days
- after this posting, there is a 60-day public comment period
- OWRD issues a permit decision within 180 days

Ponds are an attractive and often useful feature on forestland. Their construction requires an application and permit from the Oregon Water Resources Department.

Placing large wood pieces in streams to improve fish habitat

Many fish-bearing (Type F or SSBT) streams in Oregon can be improved by the placement of large pieces of wood that enhance spawning and rearing habitat for fish. Landowners are generally encouraged to make such improvements, and the forest practice rules allow for some flexibility to conduct them.

The purpose of placing large wood in streams is to simulate down trees falling into the stream due to windthrow and other natural processes. The goal is to maintain and restore stream habitat with relatively stable features, although some reconfiguration of the wood is expected with changes in natural stream flow. Stream wood placement projects are often most efficient when combined with other forest operations, and they must meet all applicable forest practice rule requirements, including preparation of a written plan and/or a plan for an alternate practice.

Projects placing large wood in streams should be designed and implemented to:

- rely on the size of wood for stability, and exclude the use of any type of artificial anchoring
- emulate large wood delivery configurations that occur from natural riparian processes over time
- restore and maintain natural aquatic habitat over time, rather than rely on constructed habitat structures
- meet the standards established in *Guide to Placement of Wood, Boulders and Gravel for Habitat Restoration*, developed January 2010 by the Oregon Department of Forestry, Oregon Department of Fish and Wildlife, Oregon Department of State Lands, and Oregon Watershed Enhancement Board, January 2010

See OAR 629-643-0200.

ALTERNATIVE VEGETATION RETENTION PRESCRIPTIONS

Alternative vegetation retention prescriptions apply in situations where the existing riparian stand is not expected to meet desired future conditions for streamside areas, because of stand composition or damage from catastrophic events. Using prescriptions designed for these circumstances, along with a written plan, management is permitted within the otherwise no-cut tree retention areas to facilitate achievement of desired future conditions.

Mortality resulting from events like pine beetle outbreaks (top) and damaging ice storms (bottom) may justify the use of an alternative vegetation retention prescription.

Alternative vegetation retention prescriptions are described for two different situations:

1. catastrophic events, such as fire, wind, snow and ice, or insect and disease outbreaks
2. hardwood-dominated sites that are capable of growing conifers

If your streamside stand meets these conditions, you can submit a written plan explaining the use of the applicable prescription and how it will help achieve the desired future conditions.

Seven geographic areas are specified in the forest practice rules with corresponding basal area tables.

You may use the rules outlining alternative vegetation retention prescriptions if your riparian area meets the conditions. Note that changes to this section of the rules are expected through the post-disturbance harvest rulemaking process, which will conclude no later than Nov. 30, 2025.

For specifics on using alternative vegetation retention prescriptions in your riparian area, refer to the most current version of OAR 629-643-0300 and discuss it with your stewardship forester.

IMPORTANT NOTE

Significant changes to OAR 629-643-0300, Alternative Vegetation Retention Prescriptions, have been proposed, but had not been adopted by the Board of Forestry at the time of printing. Verify that you are working with the current rule before proceeding with harvest planning and layout.

Desired future conditions for streamside areas

For streamside areas that require forested buffers, the goal is for average conditions across the landscape to be similar to those of mature streamside stands.

Mature stands generally:

- reach maturity around 80 to 200 years of age (varies by trees species and site)
- comprise of multi-aged trees of appropriately varied density, and contain native tree species well suited to the site, a mature overstory, snags, and downed wood

These mature streamside stands provide:

- ample shade over the channel
- abundant large wood in the channel
- channel-influencing root masses along the edge of the high-water level
- regular input of nutrients through litter fall

Alternative riparian vegetation retention prescriptions allow more flexibility in high mortality situations like after a fire to manage the riparian area toward desired future conditions.

SITE-SPECIFIC VEGETATION RETENTION PRESCRIPTIONS

Site-specific vegetation retention prescriptions provide opportunities for restoring or enhancing riparian management areas (RMAs) through active management within otherwise no-cut tree retention areas when the vegetation retention goals and desired future condition for streamside areas can be met or accelerated. Landowners or operators must submit a plan for an alternate practice (PFAP) explaining the management prescription and how it meets the vegetation retention goals for streamside areas. A stewardship forester must review and approve these plans before logging operations can begin.

Placing logs in streams can help enhance riparian management areas to provide better fish habitat.

Site-specific vegetation retention prescriptions can be used if:

- The potential of the streamside stand to achieve conditions similar to mature forest stands in a timely manner is questionable.
- In-stream conditions are impaired due to inadequate large wood or other factors.
- The site-specific prescription would result in less environmental damage than the standard practice.

For details on using site-specific vegetation retention prescriptions in your riparian area, refer to OAR 629-643-0400 and discuss it with your stewardship forester.

A plan for alternate practice will be approved if:

- When properly executed, the alternate plan will have no significant or permanent adverse effects
- Vegetation goals are met or exceeded in a more timely manner than if the plan were not implemented
- Long-term benefits of the plan are greater than short-term detrimental effects or
- The plan will result in less environmental damage than if the standard practice were followed.

Factors used for evaluating the alternate plan include:

- potential of existing streamside stand to achieve mature streamside forest characteristics
- the long-term supply of woody debris
- survival of newly established trees or shrubs
- fish and wildlife species' sensitivity to changes in water temperature and water quality
- the potential for sedimentation
- the stability of wood debris placed in aquatic areas
- the State Forester's ability to monitor the direct effects of proposed practices.

Site specific basal area targets are provided as guidelines for designing alternate practices in each geographic area. Refer to the table for your region and stream type when writing your plan for alternate practice.

Geographic areas

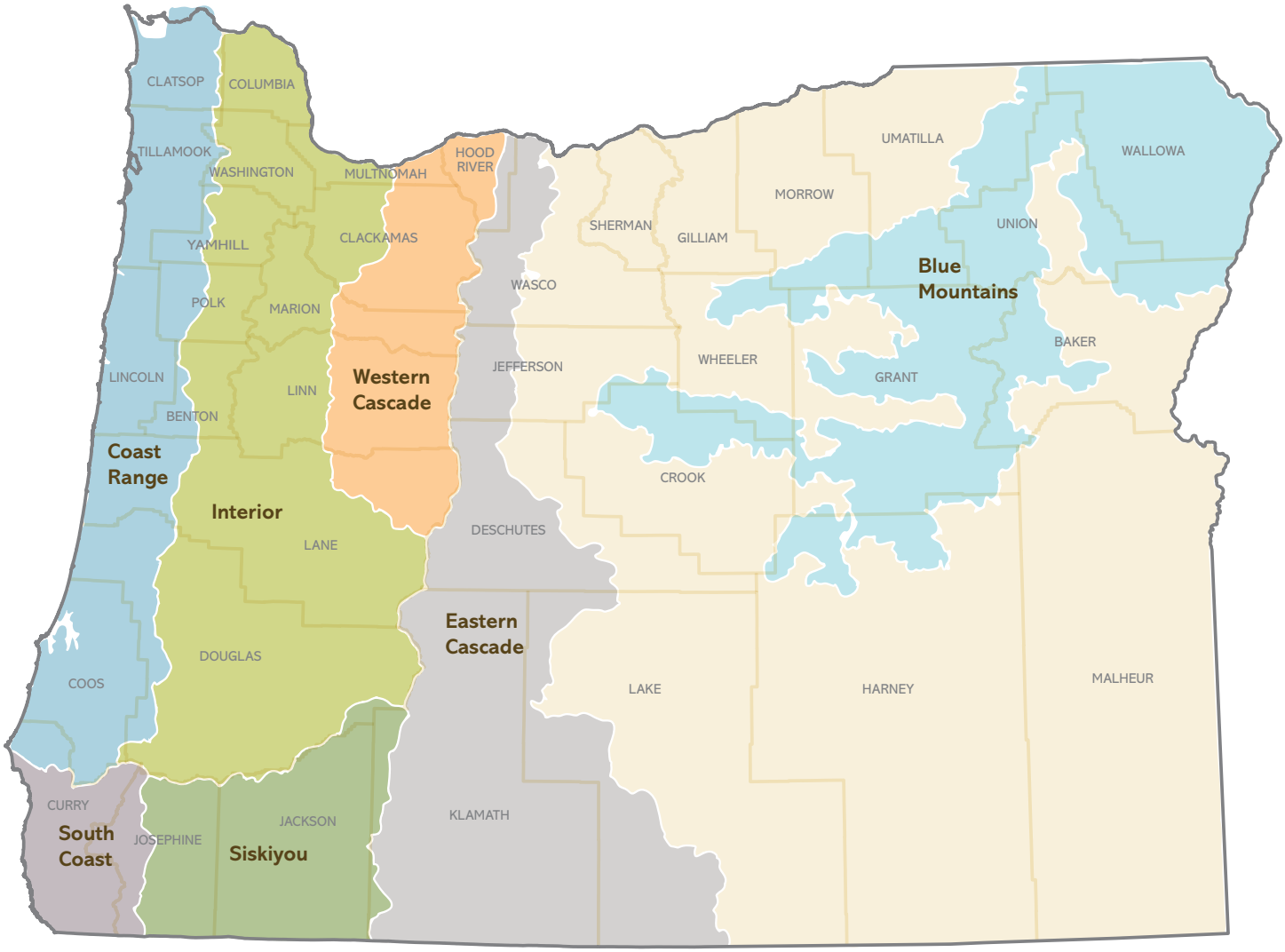


Table 3-9 Site specific basal area targets			
Geographic areas	Square feet of basal area per 1000 feet of stream each side		
	LARGE TYPE F	MEDIUM TYPE F	SMALL TYPE F
	RMA = 110 feet	RMA = 110 feet	RMA = 100 feet
Coast Range, S. Coast	253	253	230
Interior & W. Cascades	297	297	270
Siskiyou	242	242	220
	RMA = 30 feet	RMA = 30 feet	RMA = 30 feet
Eastern Cascade & Blue Mountain	51	51	51

STREAM SURVEYS

To apply appropriate riparian protection measures, streams need to be classified and identified on the ground in accordance with forest practice rules. The required information that informs riparian management area (RMA) layout, including fish presence and stream perenniality (see pages 61 and 101 to learn more about perenniality), is available through the Oregon Department of Forestry's (ODF) Forest Practices Act (FPA) Streams and Steep Slopes viewer and in FERNS.

The option to correct modeled information via field surveys will be retained. ODF provides information on the features and classifications against which protections will be enforced, unless surveys are conducted in advance of an operation and in consultation with an ODF stewardship forester. Even once all modeled features are available, it is a good idea to walk the riparian features on your property or harvest unit and decide whether you want to conduct any surveying in advance of operations. The modeled features may not suitably represent what exists on the ground. Changes to stream classification may be made through procedures described in the Oregon Forest Practices Act (OFPA) rules. ODF will provide written notice of stream classification changes if your property immediately adjoins portion(s) of water that will be reclassified.

Use a field survey:

- to validate or revise modeled fish presence
- to determine perenniality before the model is released
- after the perennial model is released:
  - > to correct the modeled end of perenniality
  - > to determine perenniality for a single operation

Field survey types

FISH STREAMS

All streams statewide have been classified for fish use using an approved fish distribution model. Lay out RMAs according to the published stream information in the stream viewer or FERNS. Approved field surveys for fish presence can revise the end of fish use location. Read the following if you have qualifying surveys that are not yet reflected in ODF's stream mapping, or if you would prefer to have a stream field-surveyed for fish habitat and distribution in advance of an upcoming operation. Note that in order to be used for stream classification in the OFPA rules, all field surveys for fish use must be conducted according to the protocol in *Surveying Forest Streams for Fish Use*, jointly published by ODF and Oregon Department of Fish and Wildlife (ODFW).

Field surveys conducted prior to the Private Forest Accord (PFA) enactment

Surveys conducted prior to the PFA enactment may still be included in ODF's streams viewer and in FERNS, if they meet certain criteria. These qualifying field surveys were included in the July 2023 statewide stream layer update.

Field surveys conducted prior to Jan. 1, 2023, and not yet accepted by ODF for purposes of informing compliance with the forest practice rules:

- may be submitted to ODFW until Jan. 1, 2028
- must meet the requirements of the survey protocol in effect as of the date of the survey
- will be incorporated into ODF's stream mapping and FERNS within 90 days, if not disqualified for failure to meet survey criteria

Field surveys conducted prior to May 1, 2023, and accepted by ODF for informing compliance with forest practice rules:

- may be submitted to ODFW until Jan. 1, 2028
- must meet criteria in PFA report (Feb. 2, 2022)
- will be incorporated into ODF's stream mapping and FERNS within 90 days, if not disqualified for failure to meet PFA criteria

Field surveys conducted after PFA enactment

Field surveys conducted after May 1, 2023, will be entered into ODF's stream mapping and FERNS if:

- the survey is submitted to ODFW and not disqualified within 21 days for failure to satisfy ODFW protocols for fish-use field surveys
- the survey is reviewed and approved by ODFW

Field surveys conducted after May 1, 2023, will be removed from ODF's stream mapping and FERNS:

- if not approved within 21 days for failure to meet requirements of survey protocol in effect as of the date of the survey
- if a forest operation is notified prior to disapproval of the survey, the survey may be used for a notified forest operation that relies on it

If surveys conflict, the survey considered to be higher confidence by ODFW will be used within ODF's reporting and notification system.

Streams initially classified as fish-bearing based on the model released July 1, 2023

The fish presence model will be used to lay out OFPA protections, unless a fish presence survey is conducted.

- Surveys by either the landowner or ODF must be conducted according to the protocol in *Surveying Forest Streams for Fish Use*, jointly published by ODF and ODFW.
- An operator may request a fish presence survey, from ODF 12 to 24 months before an operation's scheduled start date.
- ODF will make a good faith effort to conduct the survey, and landowners who do not have financial or technical resources to conduct surveys will be prioritized.
- ODFW will approve or object to surveys conducted by ODF within 21 days. If no objection occurs, the survey will be accepted, and fish-use designation updated in FERNS.
- If approved by ODFW, the ODF stewardship forester may use other information to determine the upstream extent of fish use.

Exceptions may be made for Type F stream classification above an artificial obstruction to fish passage:

- if documented by a field survey as the end of fish use
- where the obstruction is likely to continue to prevent fish passage for longer than it takes to grow trees that can introduce large wood into the stream system
- Classification above the artificial obstruction will be either Type D or Type N as appropriate, and vegetation retention will be required upstream (see page 75 for an inline example, and page 85 for Type D designation).

SALMON, STEELHEAD AND BULL TROUT STREAMS (TYPE SSBT)

Streams inhabited by salmon, steelhead and bull trout (Type SSBT) are broadly defined as streams with SSBT fish use. The process to determine or update SSBT use is found in OAR 629-635-0200(12-13). The addition of SSBT-specific protection was part of an update to the OFPA rules effective July 1, 2017, and the definition of an SSBT stream was updated as part of the PFA in 2022. Classification of SSBT streams in your Area of Inquiry may have changed as a result of PFA updates, so be sure to review ODF's streams mapping.

FLOW DURATION OR PERMANENCE ("PERENNIALITY")

Flow duration or permanence, also known as "perenniality," is now an important component of stream typing and laying out protection on small Type N streams (Type Ns and Type Np). Determination of the key points that define timber harvest unit layout will require field surveys until a modeled end of perenniality is added to ODF's stream maps. During Phase 1, landowners must either survey streams according to an operational field protocol or apply the highest level of protection for small Type N streams, essentially treating all small Type N streams as perennial (Type Np). Note that if you are not planning a harvest, there is no need to survey your streams. The information gathered during a flow duration or permanence survey is specifically used to lay out RMA protections during a timber harvest. Phase 2 will begin when the model of perenniality is released.

Example of a seasonally dry stream channel with distinct scour bed and banks.

Phase 1 – Initial mapping

During Phase 1, high-resolution data from the U.S. Geological Survey (USGS) National Hydrography Dataset (NHD) is used to map streams. Flow duration is included in ODF streams mapping, but there is no modeled end of perenniality (EOP). This means that within the ODF FPA Streams and Steep Slopes Viewer, stream segments are labeled as seasonal or perennial, but these labels are for information only. Until modeled EOP is available (Phase 2), or a survey is conducted that shows otherwise, all small Type N streams will be treated as perennial during harvest layout.

Operational field surveys can be conducted during Phase 1 without advance notification to ODFW. They can also be conducted at any time of the year, but it is most practical to complete them during low flow season in mid-to-late summer. Surveys completed during the low flow period established by ODFW may be incorporated into the flow duration modeling for Phase 2.

Operational field surveys may be completed using low or geospatial-based precision:

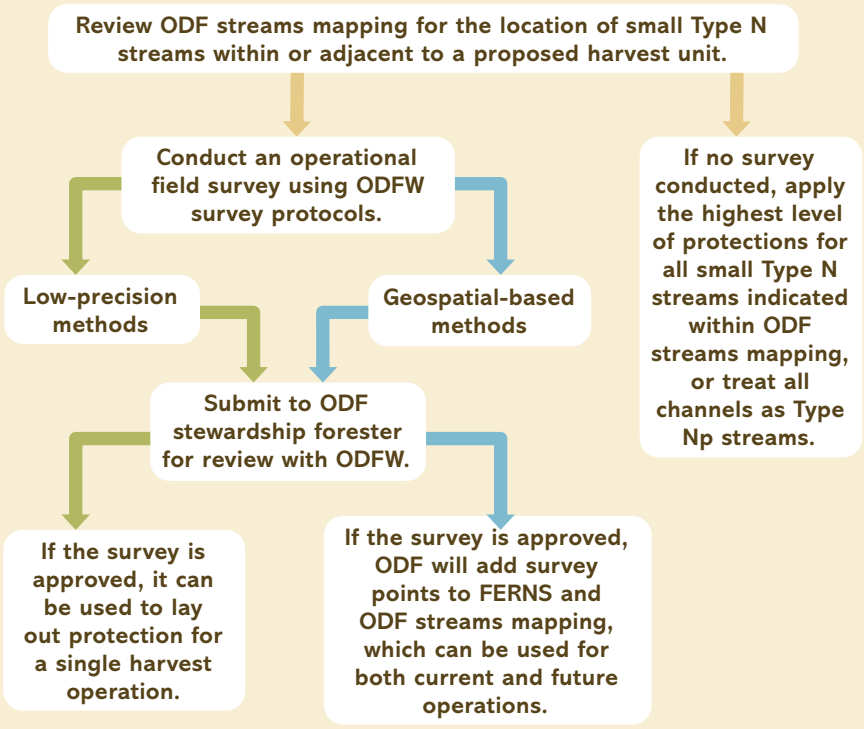
- Low precision requires a set of points located and marked on the ground to be recorded in a spreadsheet that is submitted to ODF.
- Geospatial-based surveys do not require additional field effort, but you will need to submit geospatial file formats (e.g., shapefiles, kmz/kml, etc.) with the required spreadsheet information as file attribute tables to ODF.

Lower-precision data is allowed in Phase 1, but may only be used to lay out protections for a single operation and will not be included in ODF's streams mapping or FERNS. In addition to being used to lay out the current harvest boundary, data collected using geospatial methods will be used to update ODF's streams mapping and FERNS and, if collected during the low flow period, may be used to inform development of modeled EOP.

Completed operational field surveys (flow permanence surveys) need to be submitted by email to your ODF stewardship forester, including all the necessary attachments and files containing attributes and information required by the survey protocol. Stewardship foresters consult with ODFW to review all operational field surveys. Approved low-precision surveys and any surveys not receiving a review within 21 days may be used to lay out protections for a single harvest unit. Only approved surveys using geospatial-based methods will be added into ODF's streams mapping and FERNS, and used to lay out riparian protections in the future.

The flow feature extent (FFE), shown appropriately marked according to the survey protocols (permanent tree marking paint optional), is the upstream end of flowing water greater than 25 feet in length within a distinct stream bed and banks. In Phase 1, the only FFE point required is at the uppermost FFE, which is considered the end of perenniality.

Phase 1 process simplified



Terms to know:

When a Type Ns stream becomes a Type Np stream

Between the Forest Practices Act rules, Forest Practices Technical Guidance, and stream survey protocols, there are several ways of referring to the point at which a Type Ns stream becomes a Type Np stream. This point is consequential because it determines the application of RMA protections. Here are some key terms to know when it comes to referencing changes in stream type:

END OF PERENNIALITY – the point at which water that flows year-round in a channel ends; discussed in the sidebar on page 61

VERIFIED END – a modeled end that is field-verified by ODFW during Phase 2

MODELED END – a point identified using a model of stream perenniality. Availability of modeled end data in FERNS marks the beginning of Phase 2.

OPERATIONAL FIELD-SURVEYED END – a point established through a field survey conducted by a landowner according to ODFW protocol

UPPERMOST FLOW FEATURE WITHIN THE AREA OF INQUIRY – a point used specifically for and located during an operational field survey conducted according to ODFW protocol

UPPERMOST FLOW FEATURE EXTENT – the top or end of the farthest upstream flow feature, which is marked "FFE" in the ODFW operational field survey protocol

FLOW DURATION OR FLOW PERMANENCE – another way of referring to perenniality, which means the duration of stream flow throughout the year

Phase 2 – Model

Phase 2 begins when the flow permanence model becomes available. During Phase 2, operational field surveys will no longer be required to identify the end of perenniality (EOP). Key points to lay out riparian area protections will be available within ODF's streams mapping and FERNS. Landowners may still choose to conduct a survey as a routine practice in advance of harvesting, or if the stream model does not accurately reflect field observations in a planned harvest unit.

Updated survey protocols will be published once Phase 2 is implemented, with additional restrictions based on data collected in drought or abnormally wet years. During drought years, the uppermost upstream flow feature within the Area of Inquiry (AOI) will be the longer of the modeled end or the uppermost flow feature within the AOI. In an abnormally wet year, the AOI stops at the modeled stream end.

Right: The channel initiation point (CIP), visible in the lower right-hand corner of the the image and shown appropriately marked according to the survey protocols (permanent tree marking paint optional), is the most upstream location where a discernable channel with a stream bed and banks is observed, whether it contains flowing water or not.

Approved surveys will be used to update the modeled end with the operational field-surveyed EOP. ODFW may conduct field surveys in Phase 2 to verify the modeled end (creating a verified end), but these are distinct from operational field surveys.

The protocol is provided by ODFW for Phase 1 until modeled flow permanence information is available through ODF. Refer to *Small Type N Stream Guidance and Flow Permanence Field Survey Protocol*, which is available on **KnowYourForest.org/manual-links**.

Tips for operational field surveys:

- When beginning a stream survey, start from the farthest downstream point on the property or within the timber harvest unit and proceed upstream. While it may be most convenient to survey a stream from top to bottom (usually due to the access point or steepness of the unit), protections are laid out upstream from a confluence. You can end up finding a channel or water above the Area of Inquiry and spending time on a stream segment that is not consequential to laying out RMA protections.
- If a confluence with a Type F or Type SSBT stream does not occur within your unit, but is inside your property, starting a survey there makes the most sense for laying out protections. If the confluence is on a neighboring property, it is worth asking for permission to begin a survey there.
- If the harvest unit you are surveying for is only around small Type N streams that are more than 1,150 feet (westside) or 750 feet (eastside) upstream from a confluence with a Type F or Type SSBT stream, the streams within the unit do not require a tree retention area. A survey in this case only establishes perenniality (EOP) to determine whether an equipment limitation zone (ELZ) or retention-equipment limitation zone (R-ELZ) is required on the small Type N stream segments. If you have multiple planned harvest units to survey, this unit would be a lower priority.
- Small Type Np streams flowing into medium or large Type N streams are not included in the definition of the Area of Inquiry and thus are not required to be surveyed. Protections on these streams is only an ELZ. This is true even if the cumulative upstream distance (including the medium or large Type N segment) from a Type F or SSBT stream is less than the RH max.
- A specific color of flagging or marking paint is not indicated in the survey protocol, but the best practice is to make it uniform across harvest units and distinct from all other marking used for property boundaries and harvest unit layout.
- For geospatial-based surveys, ODFW created a template geodatabase to facilitate the collection of data that can be used to update the model. It can be downloaded at ODFW's Private Forest Accord web page. and used as a template for submission to ODF/ODFW.
- For low-precision surveys, ODFW created a template Excel spreadsheet that can be used to report flow permanence on streams for a single operation. It can be downloaded at ODFW's Private Forest Accord web page and used as a template for submission to ODF/ODFW.
- Flow features may be found above the Area of Inquiry (AOI). If a flow feature is found above the AOI, it does not require additional protection (R-ELZ or tree retention) beyond an ELZ. Perennial stream protections are only required around flow features found within the AOI (within 250 feet of the last flow feature). The uppermost point of the last flow feature within the AOI becomes the EOP, and the stream above it is considered seasonal, even if there are some apparently perennial stretches above the 250 feet of non-flowing stream bed.
- It will be helpful to discuss, and possibly set up a site visit, with your stewardship forester to review any unclear field situations and ensure you are meeting the forest practice rule requirements.
- If you have multiple harvest units to survey, prioritize those that will be impacted most by survey results. This would include harvest units with Type F or Type SSBT streams within or near the unit, Type N streams that become fish-bearing at a point within or near the unit, and all non-fish-bearing streams entering a fish stream at a confluence.
- Recall that protections for small Type N streams are laid out upstream beginning at a confluence between two different stream types. This includes inline stream type changes. Even if a harvest unit contains no fish-bearing streams, a type change or confluence that is downstream but nearby — within 1,150 feet (westside) or 750 feet (eastside) slope distance — could impact layout of stream protections in the unit.

Examples of perennial stream flow within subtle-but-distinct scour bed and banks with hydrologic connectivity to perennial or fish-bearing streams.

STEEP SLOPES

APPLICABLE OREGON FOREST PRACTICES RULES

Shallow, rapidly moving landslides and public safety

629-623-0000: Purpose
629-623-0100: Screening for high landside hazard locations and exposed population
629-623-0200: Exposure categories
629-623-0250: Shallow, rapidly moving landslide impact rating
629-623-0300: Public safety risk levels
629-623-0400: Restriction of timber harvesting – substantial public safety risk
629-623-0450: Restriction of road construction – substantial public safety risk
629-623-0500: Timber harvesting – intermediate public safety risk
629-623-0550: Road construction – intermediate public safety risk
629-623-0600: Protection along debris torrent-prone streams
629-623-0700: Written plants to evaluate public safety risk
629-623-0800: Hazard mitigation and risk reduction projects

Harvesting

629-630-0150: Ground-based harvesting on steep or erosion prone slopes
629-630-0500: Harvesting on high landslide hazard locations
629-630-0800: Yarding; ground-based equipment near waters of the state
629-630-0900: Western Oregon harvests; slopes model
629-630-0905: Western Oregon harvesting; standard practice; designated debris flow traversal areas
629-630-0910: Western Oregon harvesting; standard practice; designated sediment source areas and slope retention areas
629-630-0915: Statewide harvesting; standard practice; stream-adjacent failures
629-630-0920: Small forestland owner minimum option; harvesting on features identified in the slopes model and stream-adjacent failures
629-630-0925: Written plans to evaluate harvesting on features identified in the slopes model

The new steep slopes model features do not replace the high landslide hazard locations (HLHLs) determined to have downslope public safety risk that applies to all landowners (division 623 rules). Information about HLHLs is first in this chapter. Then, steep slope rules follow.

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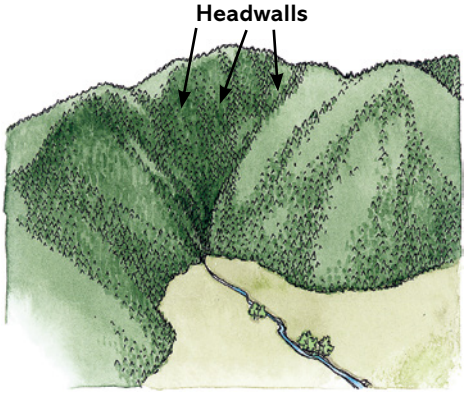
HIGH LANDSLIDE HAZARD LOCATIONS

Very steep slopes can be prone to rapidly moving landslides, and timber harvesting and road construction can affect how frequently these landslides occur. In addition to their potential soil and water impacts, they can pose significant threats to public safety.

Locations

High landslide hazard location (HLHL) refers to a steep area that is likely to become the starting point of a rapidly moving landslide. These locations may include:

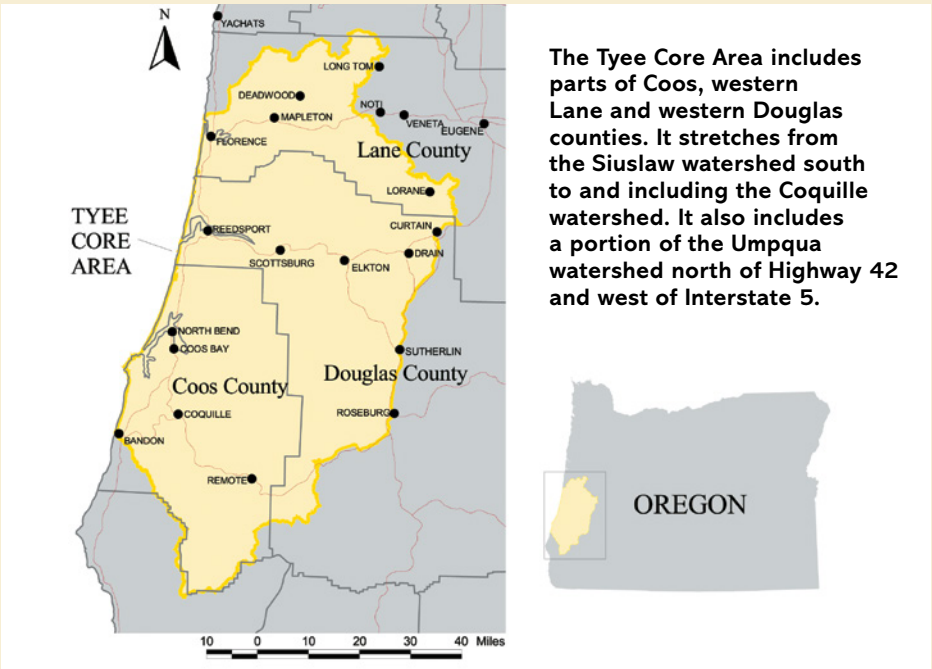
- any slope in western Oregon steeper than 80%, except in the Tyee Core Area where it is any slope steeper than 75% (see illustration)
- headwalls or draws in western Oregon steeper than 70% or steeper than 65% in the Tyee Core Area (see illustration)
- a steep slope in any part of the state that has a landslide hazard equivalent to either of the previous bullets, as determined in the field by a geotechnical specialist and confirmed by the Oregon Department of Forestry (ODF)



Very steep slopes and steep headwalls or draws are prone to landslides

The Tyee Core Area

The Tyee Core Area is a portion of Oregon where the geology consists of thick sandstone beds with few fractures. These sandstone beds decompose rapidly and can concentrate water in shallow soils that can become waterlogged, creating higher shallow rapidly moving landslide hazards. Geotechnical specialists may find regions within the Tyee Core Area that don't have these susceptible characteristics and are not subject to the Tyee slope restrictions.



The Tyee Core Area includes parts of Coos, western Lane and western Douglas counties. It stretches from the Siuslaw watershed south to and including the Coquille watershed. It also includes a portion of the Umpqua watershed north of Highway 42 and west of Interstate 5.

Table 4-1 Operations in high landslide hazard locations	
Downslope public safety risk level	Restrictions
High	Harvesting or new road construction is not allowed
Intermediate	• Limits on how much area can be harvested • Road construction must be directed by a geotechnical specialist.
Low or no risk	• No ground-based equipment, skid roads or serious ground disturbance • Avoid roads in these locations; direct drainage water away from them

Table 4-1 describes major restrictions for the different levels of downslope public safety risk. You may need a written plan and, in some cases, assistance from a geotechnical specialist to assess and plan the operation. See below and next page for examples of some important factors that can determine local risks.

Timber harvest or road construction project located near a high landslide hazard location

Landowners and operators are responsible for identifying high landslide hazard locations (HLHLs) in the activity area. They're also required to identify roads, homes and other structures below the activity area and to evaluate the level of risk to public safety. A geotechnical report is required when, after deciding that structures or roads are in a further review area, a determination of impact rating is needed. ODF will review and verify the submitted information to make a final determination about public safety risk. Table 4-1 describes landowner restrictions depending on the level of risk.

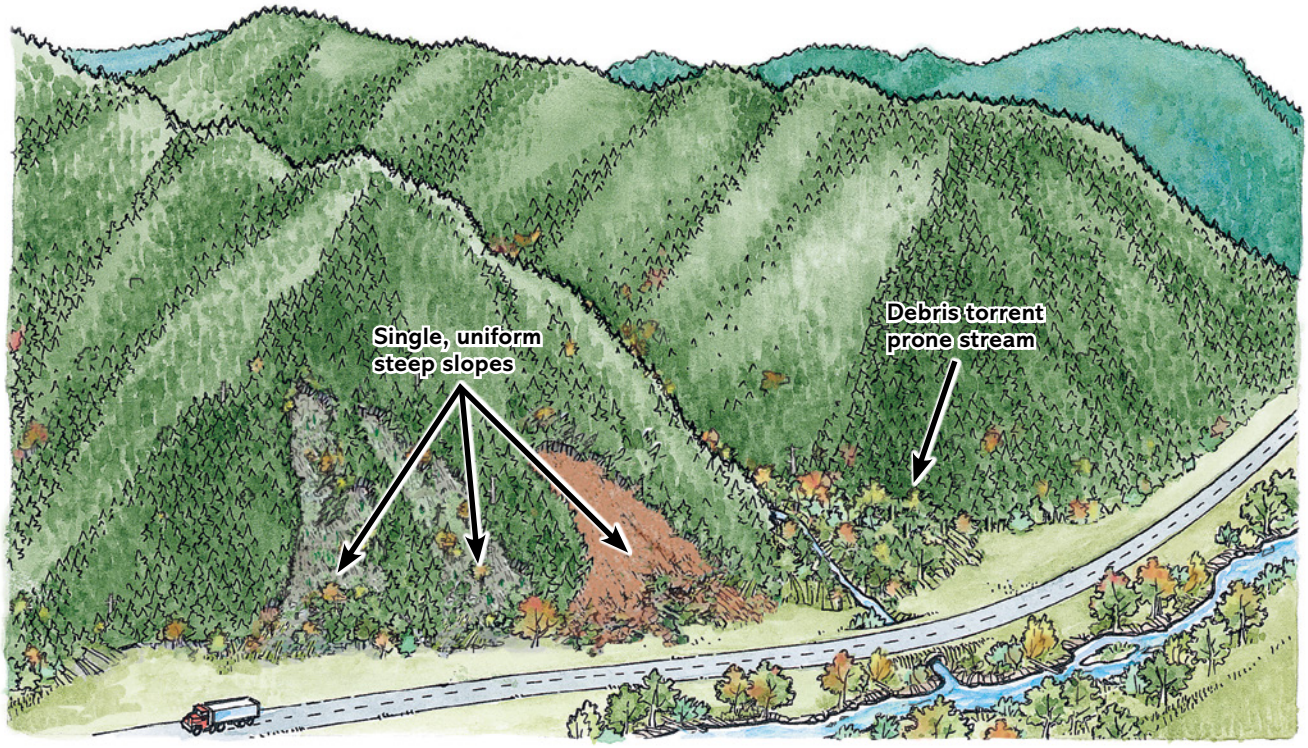
Determining public safety risk is complex and sensitive work. It is extremely important to work closely with ODF to address concerns related to landslide safety as soon as your start planning a timber harvest or road construction project. (see the High Landslide Hazard Locations PDF and Landslide Impact Rating PDF at **KnowYourForest.org/manual-links**)

Streams in high hazard landslide locations can affect risk

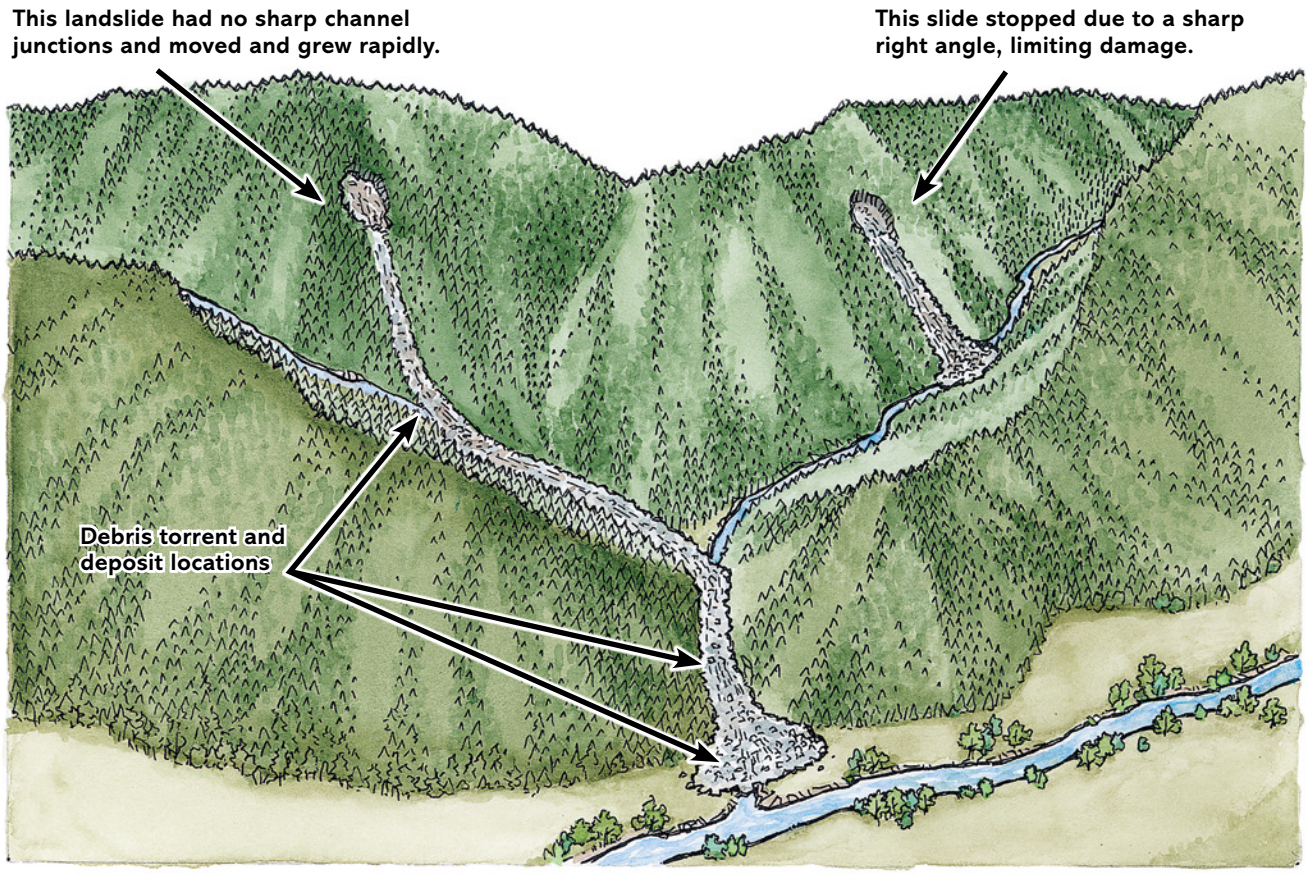
Streams that drain HLHLs can be prone to debris torrents – especially when they're squeezed into narrow channels with steep sideslopes, which is common. When large quantities of debris from a landslide reach such a channel, the torrent can become even more damaging as it scours additional material from the channel and moves rapidly downstream.

Leaving large live trees along streams can help slow debris torrent movement when narrow channels pose a public safety risk –and doing so is frequently required. Even where public safety isn't a concern, it's a good idea to leave trees around these channels to provide a source of large wood for fish habitat.

Landslide deposits in stream channels that contain large woody debris can benefit fish by improving spawning and rearing habitat. When a Type 2 or Type 3 timber harvest area larger than 25 acres contains a stream that is subject to rapidly moving landslides, landowners must leave some or all green trees and snags within 50 feet of the stream channel, for the first 300 feet upstream. Downslope public safety requirements can supersede this direction, and operators may propose alternate practices to meet the same objective. Contact ODF for further details and assistance.



The debris fan at the base of a debris torrent-prone stream is susceptible to landslides originating in the canyon behind it. It is at higher risk than the the area below a single, uniform steep slope.



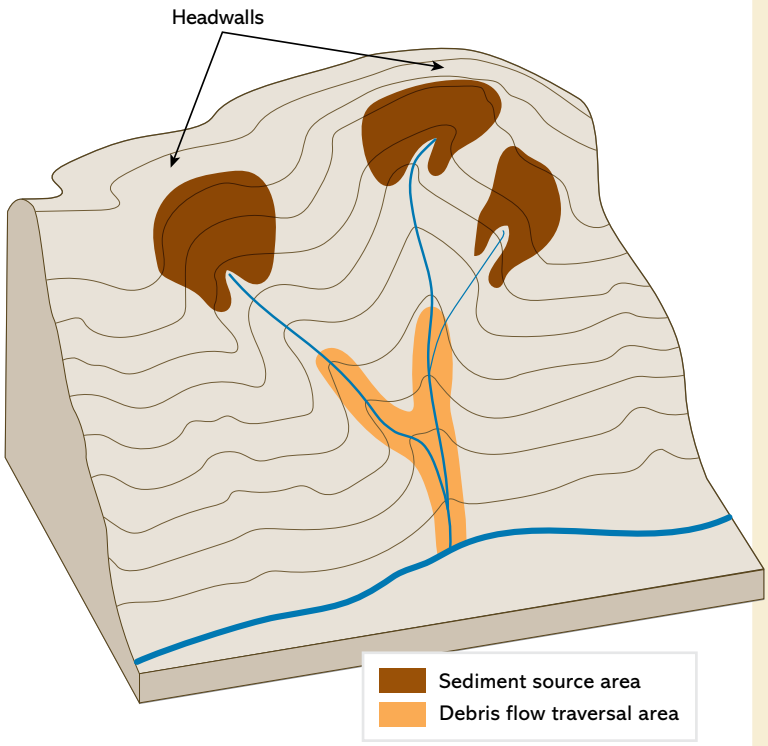
This illustration shows the action of two landslides. Landowners who conduct operations on slopes need to evaluate landslide risk, keeping in mind that many locations prone to rapidly moving landslides don't show obvious evidence of prior landslides.

STEEP SLOPES

An overarching purpose of the steep slopes harvesting rules is to retain trees in designated areas to provide the beneficial elements of naturally occurring landslides – such as the potential to contribute large wood to fish-bearing streams – while mitigating the potential negative effects of forest management activities on unstable slopes. TerrainWorks developed a slopes computer model to identify areas on forestlands in western Oregon with a higher probability of initiating landslides and debris flows that deliver to fish-bearing streams.

These rules apply to all large landowners in western Oregon and include certified steep slopes training requirements for landowner representatives. Harvesting on steep slopes requires a written plan, and wildlife leave trees may count in these areas.

Small forestland owners (SFOs) are exempt from some rules and ODF will assist SFOs in identifying designated debris flow traversal areas (DDFTAs) and stream-adjacent failures (SAFs).



This illustration shows features of the slopes model on a topographic map.

Terms to know

Designated sediment source areas (DSSAs): the slopes model identifies these areas as most likely to experience landslides that initiate debris flows to Type F or Type SSBT streams. These areas, as identified by the slopes model, may or may not contain trigger sources. The slopes model identifies the hillslope areas greater than ¼ acre in size within debris flow traversal area sub-basins that provide the top 33% of the landslide-derived sediment to Type F or Type SSBT streams.

Designated debris flow traversal areas (DDFTAs): areas that the slopes model identifies as most likely to deliver debris flows to Type F or Type SSBT streams. These have a probability of traversal in the upper 50%, calculated consistent with the methods described in the slopes model. The length of the DDFTA, as determined by the slopes model, is whichever of the following is longer:

- the entire length of the DDFTA that has a probability of traversal in the upper 20%, or
- a maximum of 1,000 feet upstream of a Type F or Type SSBT stream confluence for a DDFTA that has a probability of traversal between 20% and 50% alone or in combination with a DDFTA that has a probability of traversal in the upper 20%

Slope retention areas (SRAs): at a minimum, 50% of designated sediment source areas in each harvest unit that will be left unharvested

Headwalls: steep, concave slopes that can concentrate subsurface water, which can lead to increased landslide susceptibility. They are typically located at the head of stream channels, draws or swales. Headwalls have slope gradients of 65% or greater in the Tyee Core Area and 70% or greater in the rest of the state, as measured in the axis of the headwall. Landslides that occur in headwalls are more likely to initiate channelized debris flows that can travel down streams (also known as debris torrents) than landslides that occur in other areas of the slope.

Trigger sources: areas within DSSAs that the slopes model identifies as most likely to trigger a high-volume debris flow. These areas have the top 20% probability of triggering a top 33% high-volume debris flow.

Certified steep slopes training

Landowner representatives who are delineating final boundaries for slope retention areas for commercial timber harvests on steep slopes in western Oregon must complete ODF certified steep slopes training. This training introduces rules regarding designated sediment source areas (DSSAs) and slope retention areas (SRA) and reviews technical guidance relative to those rules (see the Harvesting on Steep Slopes PDF at **KnowYourForest.org/manual-links**). Attendees will learn about how to identify steep slopes and delineate final SRA boundaries.

The training is required for:

- landowners who do commercial timber harvesting on steep slopes in western Oregon and own more than 5,000 acres of forestland
- ODF foresters who administer the Oregon Forest Practices Act (OFPA) in those areas

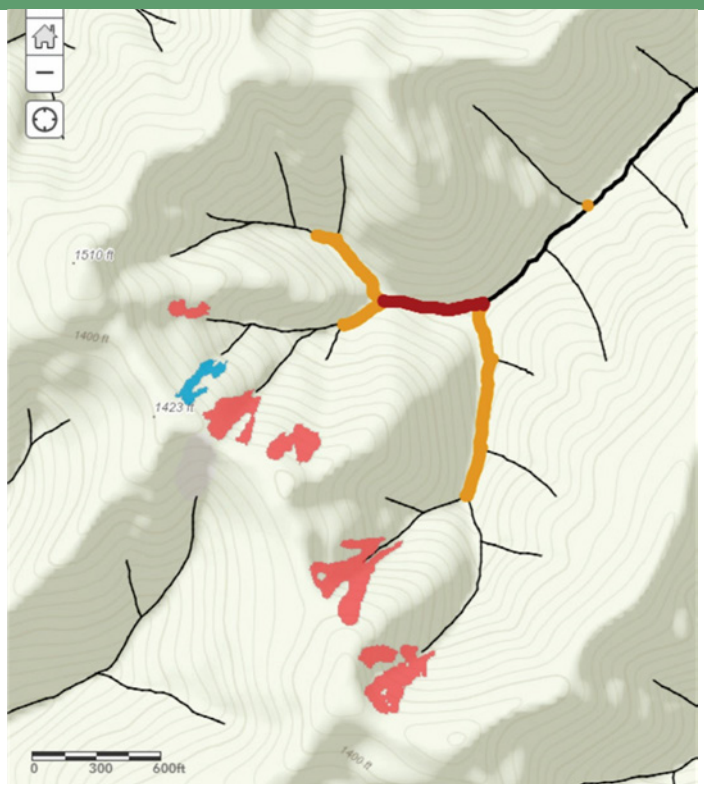
See the PDF to register for the training at **KnowYourForest.org/manual-links**.

SFOs are exempt from the rules for timber harvesting on DSSAs.

Slopes model for western Oregon

A slopes model available through ODF identifies areas on forestlands in western Oregon with a higher probability of initiating landslides and debris flows that could enter fish-bearing streams (TerrainWorks 2022). The slopes model shows where DDFTAs and DSSAs are located and identifies DSSAs that contain trigger sources, which are more likely to cause a high-volume debris flow than those that don't contain trigger sources. The slopes model designations can be viewed on ODF maps and while submitting an electronic Notification of Operation through ODF's Forest Activity Electronic Reporting and Notification System (FERNS).

The slopes model will not immediately change when there are stream classification changes. Certified training will provide more information about the process of SRAs.



DSSAs are shown in red (trigger source) and blue (non-trigger source) slope polygons, while DDFTAs appear as long stream corridors in red and yellow. They cannot be changed based on field work (e.g., water typing or geo-review). FERNS maps show where these designated areas are located.

Designated debris flow traversal areas

In western Oregon, do not harvest timber in designated debris flow traversal areas (DDFTAs). Retain all trees within 25 feet slope distance from either side of the active channel, or from the center of the draw if no channel is present for areas identified by the slopes model as DDFTAs.

Logging operations:

- must submit a written plan (see page 115) for timber harvest units containing DDFTAs
- may use cable yarding, which may require cutting but not removing trees, through DDFTAs
- must design the number, size, and location of yarding corridors to minimize impacts to the integrity of DDFTAs
- must not remove trees cut for yarding corridors, unless these are deemed safety hazards

Changes in stream classification, based on field surveys for fish use, will not change ODF's maps for notifications of operations that identify DDFTAs.

Designated sediment source areas and slope retention areas

Slope retention areas (SRAs) encompass field-identified headwalls. ODF has published Forest Practices Technical Guidance to explain how to implement this rule in further detail (see PDF at **KnowYourForest.org/manual-links**). In addition, landowner representatives need to complete certified steep slopes training before delineating the final SRA boundaries.

In general, landowner representatives should follow a four-step process to identify SRAs prior to commercial harvesting on certain steep slopes. All modeled DSSAs are marked on department maps and identified with a trigger source (red slope polygon) or without a trigger source (blue slope polygon).

Table 4-2 Summary table of technical guidance: Identifying slope retention areas (SRAs)

Only applies to large forestland landowners in western Oregon.

Steps	Trigger source	No trigger source
1. Map-based review of DSSAs		
Identify modeled DSSAs	Red slope polygons represent trigger source.	Blue slope polygons do not have trigger sources.
Slopes model	Areas most likely to trigger a high-volume debris flow that delivers material to a fish-bearing stream.	Areas less likely to trigger a high-volume debris flow.
2. Initial selection of DSSAs		
Establish SRAs	Select at least 50% of DSSAs for each harvest unit to become SRAs. If an odd number count, add one then divide by two.	
Selection priorities for DSSAs	Red slope polygons prioritized over blue. Larger-sized slope polygons prioritized over smaller.	
Eligible adjustments to the selection priorities	Adjust if selection priorities for DSSAs clearly reduce worker safety or cause more resource impacts. Must justify in written plan.	
Yarding corridors in SRAs	Not allowed in SRAs with trigger sources.	Permitted in SRAs without trigger sources; must retain cut trees unless a safety hazard.
3. Final selection of SRAs		
ODF foresters	Will train the landowner representative to identify and flag SRAs boundaries in the field.	
SRA adjustment	Trained landowner representative will adjust the SRAs to include the headwall and smooth the boundary edges.	
Field identification and flagging	Trained landowner representative will mark the SRAs in the field.	
4. Written plan		
Plan must include: • Name of person who identified and flagged SRAs. • Harvest unit map showing DSSAs, flagged SRAs and location of yarding corridors relative to DSSAs and SRAs. • Documentation and rationale for SRA selection and any eligible adjustments to the selection priorities. • Number, size and location of yarding corridors and rationale for design to minimize increasing slope instability.		

Use this list to determine what is allowed and not allowed under the slopes model.

Table 4-3 Slopes model reference guide

Activity	Allowed?	Notes
Harvesting in SRA	✗	Exception: Cutting trees for cable yarding corridors is allowed in an SRA with no trigger sources;* felled trees are not to be removed
Cable yarding in slopes model features*	✗	SRA containing trigger sources
	✓	DDFTA
	✓	SRA without trigger sources
Building skid or haul road through SRA	✗	None is allowed

*The number, size and location of yarding corridors shall be designed to minimize 1) soil and vegetation disruptions that may increase slope instability in SRAs, and 2) impacts to the integrity of the DDFTA or SAF feature. Do not remove trees cut for yarding corridors, unless these are deemed safety hazards.

Stream-adjacent failures

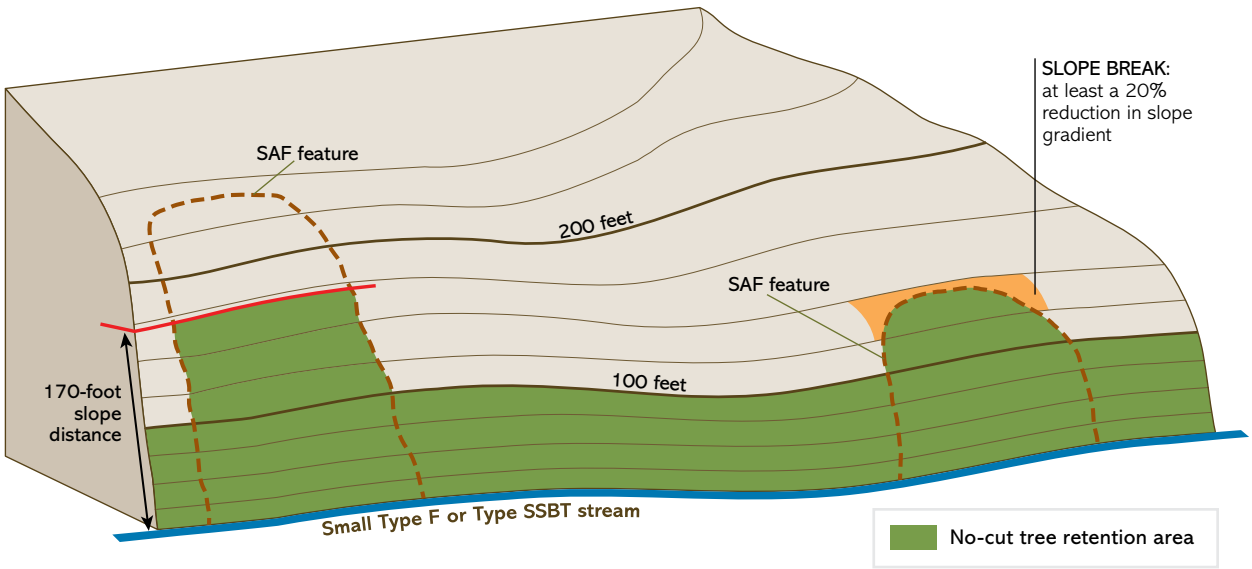
Stream-adjacent failures apply only to Type F and Type SSBT streams. SAFs mean all slopes greater than 70% that are either:

- actively failing and delivering sediment, where erodible material and exposed soils are present, and prone to continued shallow-rapid slope instability, with active features such as tension cracks, scarps, ground surface shearing, and oversteepened toes, or
- unstable due to the toe interacting directly with erosive forces of a stream, so a slope failure extending beyond the standard width of the riparian management area (RMA) is likely

Extend the RMAs on all identified SAFs. The RMA must encompass the perimeter of the SAF. Make all RMA width measurements using the slope distance and measure from the edge of the active channel or channel migration zone. RMA width must only extend to the lesser of:

- 170 feet from the edge of a Type F or Type SSBT channel, or
- the distance to the slope break, at least a 20% reduction in slope gradient

Submit a written plan (described on page 115) for timber harvest units where yarding is planned within SAFs.



Example of stream-adjacent failures relative to limits imposed on RMA width extension on Type F and Type SSBT streams.

SMALL FORESTLAND OWNER (SFO) MINIMUM OPTION

Timber harvesting on slopes model-identified features and stream-adjacent failures

In western Oregon, SFOs may not harvest timber within 50% of the length of the designated debris flow traversal area (DDFTA) for each harvest Type 1, 2 or 3 unit. ODF will assist SFOs in determining these areas in a planned harvest unit and in prioritizing vegetation retention requirements for Type SSBT streams over Type F streams. SFOs are exempt from the DDFTA requirements for harvest Type 4 units. SFOs must:

- retain all trees within 25 feet slope distance on either side of the active channel, or center of the draw, if no channel is present, for areas identified by the slopes model as DDFTAs
- submit a written plan (described on page 115) for timber harvest units containing DDFTAs, except for harvest Type 4 units

DESIGNATED SEDIMENT SOURCE AREAS (DSSAs) IN WESTERN OREGON. Forestlands in western Oregon that are managed under the SFO minimum option are exempt from the requirements for timber harvesting in DSSAs and slope retention areas (SRAs).

STREAM-ADJACENT FAILURES (SAFs) STATEWIDE. Extend the RMAs on all identified SAFs. The RMA must encompass the perimeter of the stream adjacent to the failure. The width of the RMA should only extend to the lesser of:

- 30 feet from the outer edge of the RMA width (SFO minimum option), or
- the distance to the slope break, defined as 20% or greater reduction in slope gradient

SFOs must submit a written plan (described on page 115) for timber harvest units where yarding is planned to occur within SAFs, and describe how the number, size and location of yarding corridors were selected to minimize impacts to the integrity of SAFs. Make all RMA width measurements using the slope distance, and measure them from the edge of the active channel or channel migration zone.

ODF's Forest Practices Technical Guidance can assist operators in identifying channel migration zones.

Small forestland owners are exempt from certain forest practice requirements on steep slopes.

Applies to small forestland owners only

WRITTEN PLANS

Forest operators must submit a written plan that describes how timber harvesting will be conducted when harvest units contain features identified by the slopes models, or yarding corridors that may pass through stream-adjacent failures (SAFs). Provide sufficient detail to allow the ODF forester to evaluate and comment on the likelihood that the operation will comply with Oregon Forest Practices Act.

At a minimum, the written plan must include the following:

- a unit map including, where applicable:
  - > locations of slopes model DDFTAs
  - > locations of slopes model DSSAs and those selected as SRAs
  - > identification of approximate yarding corridors relative to the first two bullets (or if they pass through SAFs)
- rationale and appropriate documentation, where applicable, for:
  - > selection of 50% of the length of the DDFTAs for western Oregon forestlands that are managed under the SFO minimum option
  - > selection of SRAs, including justification for choosing areas to satisfy the minimum 50% DSSA requirement
  - > how yarding corridors (number, size and location) were designed to minimize impacts to the integrity of the DDFTAs and SAFs
  - > how yarding corridors (number, size and location) were designed to minimize soil and vegetation disruptions that may increase slope instability in SRAs
- additional administrative information related to the operation as required by individual rules, or as requested by the ODF forester

Some items are waivable and others are not. Consult with your ODF forester for more specifics.

Written plans for timber harvesting must provide enough detail for the ODF forester to determine if the operation will likely comply with the Oregon Forest Practices Act.

HARVESTING

APPLICABLE OREGON FOREST PRACTICES RULES

Harvesting

629-630-0000: Purpose
629-630-0150: Ground-based harvesting on steep or erosion-prone slopes
629-630-0300: Drainage systems
629-630-0600: Felling – removal of slash
629-630-0700: Yarding – cable equipment near waters of the state
629-630-0800: Yarding – ground-based equipment near waters of the state

Fire prevention

629-043-0005: Snag falling
629-043-0015: Spark arresters
629-043-0020: Water supply and equipment for fire suppression
629-043-0023: Additional water supply and equipment
629-043-0025: Fire tools and fire extinguishers
629-043-0026: Operation area fire prevention
629-043-0030: Fire watch service
629-043-0036: Power saws
629-043-0040: Burning permits
629-043-0050: Slash hazard release
629-043-0070: Operation closedown
629-043-0076: Permits to use fire or power-driven machinery
629-043-0080: Additional fire hazard

Chemical and other petroleum product rules

629-620-0000: Purpose
629-620-0100: Preventing, controlling and reporting leaks and spills of chemicals and other petroleum products
629-620-0200: Protection of water quality during mixing of chemicals
629-620-0300: Locations of mixing, transfer and staging areas for chemicals and other petroleum products
629-620-0400: Protection of the waters of the state and other resources when applying chemicals
629-620-0500: Disposal of chemical containers
629-620-0600: Daily records of chemical applications
629-620-0700: Chemical and other petroleum product rules: effectiveness-monitoring and evaluation
629-620-0800: Notification of community water system managers when applying chemicals

Harvesting timber is integral to forest management. Though it produces wood products for everyday use, it also causes temporary disturbances to the forest environment.

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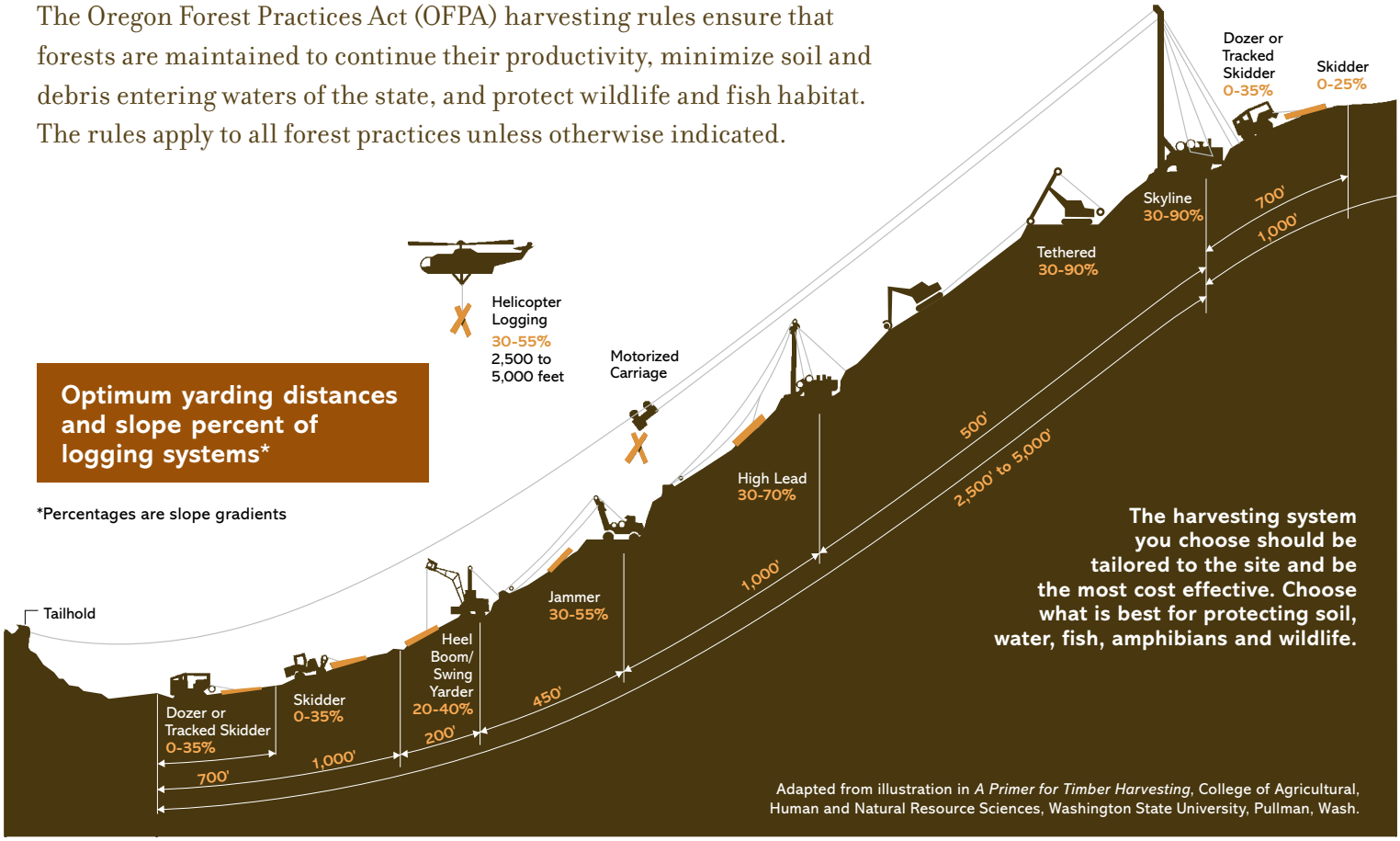
TIMBER HARVESTING

The Oregon Forest Practices Act (OFPA) harvesting rules ensure that forests are maintained to continue their productivity, minimize soil and debris entering waters of the state, and protect wildlife and fish habitat. The rules apply to all forest practices unless otherwise indicated.



Timber harvesting subject to state worker safety regulations

In Oregon, timber harvesting is subject to Oregon Occupational Safety and Health Administration (OR-OSHA) regulations, which can be found in OAR 437, Division 7, Forest Activities. The rules in Division 7 establish safety and health practices for all forest activity operations, including chipping, forest road construction, log hauling, prescribed fire, wildland fire suppression and many others. The rules address how the chosen type of operation should occur to ensure the safety of all workers and are described in detail based on the operation chosen by the company, independent contractor and forest operator.

If using mechanized logging is chosen to harvest the timber, the loggers would follow the regulations found in Subdivision H-Machines Used in Forest Activities, Subdivision J-Yarding, Processing, Signaling, Communications and others that apply to the specific operation being carried out.

Timber harvesting is also subject to the federal Occupational Health and Safety Administration (OHSA) Logging Operations Standard (29 CFR 1910.266). The standards address safety hazards in any type of logging operation, including felling trees, cutting branches off trees and logs, cutting felled trees into logs, chipping branches, and moving felled trees and logs. The tools and equipment used to perform these functions pose hazards, too, as do dangerous environmental conditions such as severe weather, rough terrain and remote work sites.

Logging equipment limitation zones

Oregon's forest protection regulations require forest operators to minimize disturbances from logging equipment near streams to maintain soil function, retain understory vegetation, and protect habitat for fish, amphibians and other wildlife. OFPA rules now require an equipment limitation zone (ELZ) around all stream channels.

For more information about ELZs, see the Riparian Management chapter.

FIRE PREVENTION DURING FOREST OPERATIONS

Preventing unwanted fire is required during logging activity and all other forest operations in Oregon, and it's important to understand the many ways this can be achieved. This section will help you comply with fire season requirements; further details and other fire prevention measures are available from the Oregon Department of Forestry (ODF).

Below: Only a small percentage of wildfires are caused by forest operations, but fire prevention measures help reduce the risk of major resource damage and economic loss.

Oregon's Fire Protection Program

Oregon's complete and coordinated Fire Protection Program is composed of strong, collaborative efforts among forest landowners, contract operators, Oregon Department of Forestry (ODF), Keep Oregon Green, local forest protection districts and forest protective associations, as well as an effective set of fire prevention requirements.

The forest landowner's fire protection responsibility is met by following fire prevention requirements, and by paying a forest patrol assessment (included in annual property taxes) to the local forest protection district. A forest landowner and operator has the responsibility to a) immediately report all fires to ODF and b) control a wildfire that starts on an operation. If the landowner or operator has insufficient personnel or equipment to control a fire, ODF or a forest protective association will conduct needed firefighting. Due to the inherent fire risk of forest operations, the law specifies that the party responsible for certain types of fires will pay a portion ("limited liability") of the firefighting costs over and above budgeted district costs not covered by the assessment. However, negligent operations are subject to covering full firefighting costs ("total liability").

Importance of fire prevention during forest operations

Because forest operations pose a variety of risks for starting wildfires, Oregon's Fire Protection Program includes a comprehensive set of fire prevention rules. Enforced during fire season, these operation rules help keep wildfire losses to a minimum in forests.

Although industrial operations cause a small share (less than 5%) of total human-caused fires on state-protected lands, the potential firefighting cost is much greater for such wildfires. This is due to the remoteness of most timberland, access, accumulated slash, terrain, fuel conditions and timber values to protect on those lands.

Responsibility for fire prevention measures

Preventing wildfires is the responsibility of forest landowners and everyone involved with forest operations. The goal of Oregon's fire protection program is reducing resource loss, firefighting costs, environmental damage and financial liability.

Liability if the requirements are met

If everything is done correctly in readiness and response to a forest operation fire, the liability for the suppression cost is limited to the first $300,000. If "willful, malicious or negligent" actions or a lack of preparedness is determined by a subsequent investigation, liability for the suppression cost is unlimited.

Terms to know

FIRE SEASON means the legally-declared period of time, determined each summer by the Oregon state forester, when forest operations are subject to forest fire prevention requirements and restrictions. The state is divided into local areas, so fire season and fire restrictions can be tailored by ODF on a daily basis to match local fire hazard conditions.

FORESTLAND means any woodland, timberland, grazing land or clearing that contains enough forest growth or slash to constitute a fire hazard, regardless of how the land is zoned or taxed.

LANDOWNER means any individual, combination of individuals, partnership, corporation or association that holds an ownership interest in forestland, including the state and any political subdivision.

OPERATION means any industrial or commercial activity on forestland inside or within one-eighth mile of a forest protection district, including but not limited to timber harvest, land clearing, use of power-driven machinery, and prescribed burning as a management tool (excludes agricultural crop activities). Examples include forest thinning, road construction or repair, herbicide spraying and prescribed burning of logging slash.

OPERATOR means any person who, either personally or through employees, agents, representatives or contractors, conducts any operation, as defined above.

PRESCRIBED BURN means the deliberate burning of wildland forest fuels under carefully managed conditions of weather, fuel moisture, wildfire hazard, proximity to designated populated areas, and time of day. Reasons for using controlled burning may include fire-hazard reduction, reforestation success, habitat improvement, invasive or unwanted vegetation control, and aesthetic enhancement.

Permits

Obtain a Permit to Use Fire or Power-Driven Machinery (also called a PDM permit) from ODF prior to starting any operation. PDM permits are not required for routine road maintenance such as grading, cleaning ditches or culverts, spot rocking or mechanical brushing alongside roads to maintain visibility. A PDM permit can be waived by an ODF stewardship forester, but fire prevention requirements must still be followed. Permits to use fire or PDM permits may be further regulated or prohibited during fire season.

Personal chainsaw use

Using a power saw for personal or recreational purposes does not require a permit. However, it does require following the fire prevention practices described under "Power saw requirements" on page 124.

Equipment and resources required for an operation

Firefighting equipment required on an active operation can vary depending on the size of operation and time of year; check with ODF for specific details.

Basic requirements include:

- a water source, pump, hose and nozzle with specific capacity
- specific firefighting capability of heavy equipment and crew
- specific hand tools, extinguishers and spark arrestors
- an on-site fire watch person who is ready to take action to report and begin to suppress a fire after daily shutdown

See page 124 for more detailed requirements.

Exceptions to the fire prevention requirements

ODF districts or forest protective associations may waive any fire prevention requirement, with landowner approval, when they determine the operation or proposed alternate preparedness measures would eliminate or reduce fire risk. Written waivers may also be granted for alternate methods or equipment proposed by the operator when those methods provide equal or better fire prevention. All waivers must be requested by the landowner as the ultimate responsible party. A waiver may require additional prevention resources (e.g., water, hose). Conversely, ODF or the landowner may require additional requirements based on the nature and risk of the operation.

Be prepared if a fire starts

Under Oregon law, forest landowners and operators are responsible for controlling and extinguishing wildfires that occur on their land. Be prepared with equipment and personnel to control and extinguish:

- any fire that starts in an active operation area
- any fire that results from an operation activity
- any fire that spreads from burning activities

These actions are required by law and are termed as providing "every reasonable effort." The specific level of effort required by the landowner or operator is based on the amount and type of resources available. ODF or the local fire protection association will respond to every fire, but firefighting resources must be available and in use at the operation site. Without this effort, additional liability falls to the landowner and operator.

Uncontrolled fire

Any fire on Oregon forestland is considered a public nuisance when it is burning uncontrolled and threatens life, forest resources or property, and when proper action to prevent its spread is not taken. This "uncontrolled fire declared nuisance" designation can dramatically increase landowner and operator liability.

Liability for an uncontrolled fire

Depending on the circumstances of an uncontrolled fire, a landowner or operator may be subject to either limited or total liability for firefighting costs.

Limited liability happens when a forest operation causes a fire, and an investigation finds that all applicable regulations were fully followed. In this case, the landowner or operator may be required to reimburse up to $300,000 of state-provided fire suppression costs. This liability limit for suppression costs applies only if all required prevention measures are met, and no "willful, malicious or negligent" actions caused the fire. If the official investigation identifies a fire cause unrelated to the operation, the landowner or operator may have no liability.

Total liability occurs when a fire investigation determines that the party responsible for the fire was "willful, malicious or negligent." In this case, they may be liable for all firefighting costs. If an investigation reveals that the rules were not followed — not meeting fire watch requirements or failing to file for a PDM permit — the landowner or operator may be billed for the total costs provided by the state to put out the fire. Liability for large wildfires can be millions of dollars.

Fire precaution levels affect forest operations

During legally-declared fire seasons, forest operations west of the Cascade Range are subject to different levels of fire prevention restrictions; the restrictions can change daily, depending on local wildfire potential within each regulated use area. Landowners and operators engaged in active forest projects must check the local closedown level — known as "industrial fire precaution level" or "IFPL" — daily, to follow the proper fire prevention restrictions.

Western Oregon: Four IFPL closedown levels are used during the fire season for lands under ODF fire protection in western Oregon. IFPL closedown levels are based on fire danger, current fire activity and available resources in each local regulated use area. Check with your local ODF office for specific equipment closedown times, locations and requirements.

Eastern Oregon: The IFPL system does not apply to ODF-protected forestlands east of the summit line of the Cascade Range. However, additional fire prevention measures may be required by the district forester through a written order. Landowners and operators should always consult ODF for current requirements in their local district. Operators on federal lands in eastern Oregon should be aware that the IFPL system is used by the U.S. Forest Service and Bureau of Land Management in that region.

Log on to **gisapps.odf.oregon.gov/firerestrictions/ifpl.html** for specific industrial fire restrictions in your area.

Four industrial fire precaution levels

LEVEL I: FIRE SEASON

ODF announces this initial level of fire hazard, putting fire season requirements (water, tools, spark arresters, etc.) into effect. A fire watch is required at this level and higher, unless waived by ODF.

A fire watch is required for up to three hours during breaks, and after power-driven machinery has been shut down for the day. This fire watch must conduct a continual visual observation of the operation area where machinery was used.

If the fire watch detects any fire in the operation area, first he or she must report the fire, summon assistance and describe intended fire suppression actions, and determine safety zones and escape routes, before proceeding to extinguish the fire consistent with firefighting safety and training. The fire watch must have adequate transportation and communications to summon assistance.

LEVEL II: LIMITED SHUTDOWN

In addition to the Level I requirements, the following activities are allowed between the hours of 8 p.m. and 1 p.m. only (local time):

- power saws (except at loading sites, where they may operate all day)
- feller-bunchers with rotary head saws
- cable yarding
- blasting
- welding, cutting or grinding of metal

LEVEL III: RESTRICTED SHUTDOWN

In addition to the Level II requirements, cable yarding is prohibited. Gravity-operated logging systems using non-motorized carriages or approved motorized carriages may operate between 8 p.m. and 1 p.m., when all blocks and moving lines are suspended 10 feet above the ground, except for the line between the carriage and the chokers, and during rigging.

The following are permitted to operate between 8 p.m. and 1 p.m. when mechanized equipment capable of constructing a fire line is immediately available to quickly reach and attack a fire start:

- ground-based operations
- power saws on ground-based operations
- rotary head saw feller-bunchers with a continuous fire watch
- non-rotary head saw feller-bunchers
- tethered logging systems

In addition, the following are permitted to operate between the hours of 8 p.m. and 1 p.m.:

- power saws at loading sites
- mechanized loading or hauling of any product or material
- blasting
- welding, cutting or grinding of metal
- any other spark-emitting operation not specifically mentioned

LEVEL IV: COMPLETE SHUTDOWN

All operations are prohibited.

Note: Where hauling involves transit through more than one shutdown/regulated use area, the precaution level at the loading site shall govern the level of haul restriction, unless otherwise prohibited by factors other than the IFPL system. Under IFPL III, all trucks must be loaded and leaving the loading site no later than 1 P.M.

Summary of key requirements during the fire season

In addition to restrictions under the daily local fire precaution level described above, landowners/operators are required by law to follow the basic fire prevention measures summarized below during a legally declared fire season. ODF can provide more detailed information and guidance.

Permit for power machinery/ tools: A permit to use fire or power-driven machinery (PDM) must be obtained from the local ODF office before starting any operation that uses motorized equipment or tools.

Fire watch after daily operations: For up to three hours after power-driven machinery — including saws — has been shut down for the day, a fire watch must continually observe the area where the motorized equipment was used. If a fire is detected, the fire watch must immediately summon firefighting assistance from ODF and must also try to safely control the fire. A fire watch is required throughout fire season. Each ODF district may reduce the fire watch time requirement through a blanket waiver based on IFPL west of the Cascades, or fire danger east of the Cascades. Check with the local ODF district or protective association office for more information.

Water supply and pump on-site: A water supply is required for all operations using power-driven machinery (see chainsaw exception below). A water tank, delivery pump, hose and nozzle must be maintained and ready for immediate firefighting use. The water supply tank must contain at least 300 gallons of water for a self-propelled fire truck, or at least 500 gallons of water for a non-propelled tank or trailer. The pump must be capable of releasing at least 20 gallons per minute at 115 psi at pump level. Additionally, the required water supply must include enough serviceable hose, with at least a 3/4-inch inside diameter, to reach from the water supply to any location in the operation area affected by power-driven machinery, or be 500 feet long, whichever is greater. The water supply, pump, at least 250 feet of hose, and the nozzle must be maintained as a connected operating unit and kept ready for immediate use.

Firefighting hand tools on-site: Operations with five or more workers must have a toolbox containing a number of firefighting tools equal to or greater than the number of people working on the operation. Workers on operations with four or fewer workers are not required to have a fire toolbox but must have a shovel suitable for firefighting.

Fire extinguishers on motorized equipment: Equipment (other than chainsaws) powered by an internal combustion engine must be equipped with a five-pound chemical fire extinguisher with a minimum rating of 2A, 10BC or equivalent protection. The extinguisher must be approved by a nationally recognized testing laboratory, be fully charged and equipped with a pressure gauge or other measuring device, and be ready for immediate use.

Fire tools and extinguishers on trucks: Each truck used on an operation must be equipped with a five-pound fire extinguisher, as described above, for motorized equipment. Trucks must also have a round-pointed shovel with an eight-inch face and a handle longer than 26 inches, and a Pulaski or axe with a handle longer than 26 inches. All equipment must be ready for immediate use.

Engine exhaust spark arrester: Engines must be equipped with a spark arrester. (Exceptions are allowed for fully turbocharged engines, for engines under 51-cubic-inch displacement and for trucks and pumps used exclusively to fight fire.) Excepted engines must be equipped with a muffler and exhaust in good operating condition.

Power saw requirements: Power saws must be equipped with exhaust screens meeting the requirements listed in the most recent edition of the U.S. Forest Service's *Spark Arrester Guide*. Additionally, the following must be immediately available to the power saw operator: an eight-ounce or larger container of fire suppressant and a round-pointed shovel with an eight-inch face and a handle longer than 26 inches. Power saws must be powered off during fueling and moved at least 20 feet from the fuel supply before restarting. A water supply is not required for operations using only a chainsaw.

Cable logging precautions: Operations using cable logging systems must conduct additional fire precautions, including clearing flammable debris from near blocks, having a water supply and shovel stationed at each block, and preventing cables from rubbing on rock or woody material.

Flammable debris removal: Power-driven machinery must be kept free of excess flammable material such as needles, bark or slash, which may create a fire risk.

Hazard snags: ODF may issue a written order that certain snags, which are a fire hazard, be felled before or concurrent with the operation.

Waiver for alternate methods: The ODF district may provide a written waiver for alternate methods or equipment proposed by the operator when those methods provide fire prevention equal to or better than other requirements.

No smoking: Smoking is not allowed while working in or traveling through an operation.

Immediate control of any unwanted fire: The landowner and operator must act immediately to control and extinguish any fire started in an operation while that operation is active; any fire that results from operation activity; and any prescribed burn that has escaped control.

Questions: If you have questions about operation requirements during fire season, contact ODF or your local forest protective association.

Doing more to prevent a wildfire

Several voluntary practices have proven effective in minimizing accidental fire starts and the spread of an unwanted fire. Landowners and operators are encouraged to consider such added fire preparedness and prevention measures, which go beyond those required by law.

Voluntary measures that can be taken during critically dry or hazardous fire periods include:

- early shutdown of operations when low relative humidity is measured or when high winds occur
- minimizing tracked-vehicle operation in rocky areas to avoid creating sparks
- providing additional water volume and hose length to reach all operation areas
- extra precautions tailored to site and job conditions
- conducting fire drills to ensure crew preparedness for a potential wildfire

Oregon Department of Forestry fire protection webpages

General page for public and industrial restrictions during fire season:
oregon.gov/ODF/Fire/Pages/Restrictions.aspx

Industrial fire restrictions map:
gisapps.odf.oregon.gov/firerestrictions/ifpl.html

Permit information

Provide the following information to ODF when applying for a fire or power driven machinery (PDM) permit:

- name of county where operations will take place
- name and/or the identifying number of a timber sale to be harvested
- telephone number of the operator
- telephone number of the landowner
- name, mailing address and telephone number of the timber owner
- description of the primary activities to be conducted
- description of the primary methods to be used
- estimated size of the operation area
- estimated amount of timber to be harvested
- estimated start date
- estimated end date

FELLING, BUCKING AND LIMBING TREES NEAR WATER

Fell, buck and limb trees to minimize disturbance to channels, soils and retained vegetation in riparian management areas (RMAs), streams, lakes and wetlands greater than one-quarter acre. Minimize slash accumulations in channels, significant wetlands and lakes.

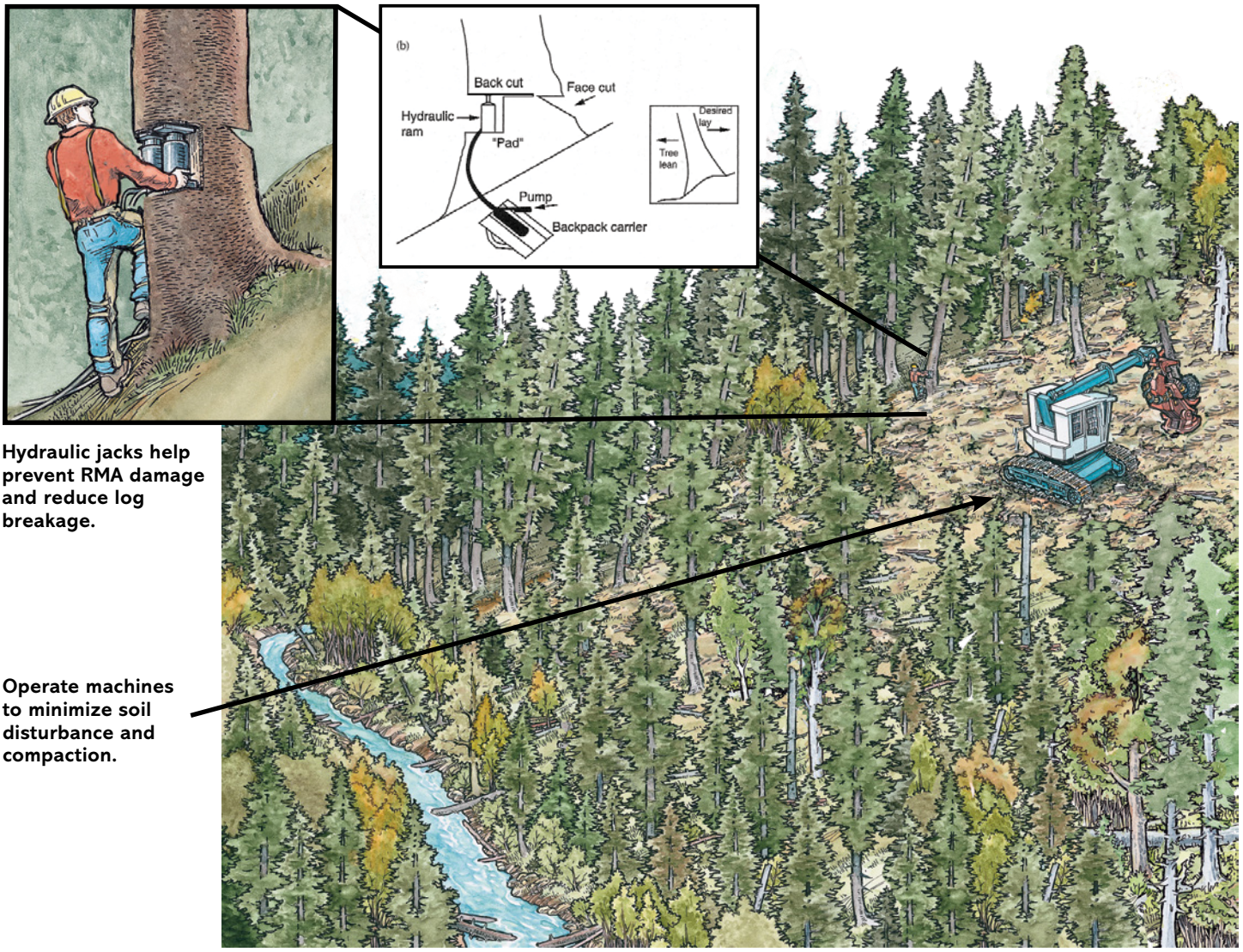
These requirements are designed to protect:

- stream channels and banks
- water quality (by keeping slash out of streams)
- soil in RMAs and vegetation left in the RMA

Possible damage from felling, bucking and limbing

These requirements are in place because tree felling, bucking and limbing have the potential to:

- gouge or break down stream banks
- damage or bury remaining vegetation
- leave slash in the stream channel or within the high-water level
- cause trees to roll, crushing and breaking remaining vegetation
- disturb soil and damage vegetation with mechanical felling equipment



Hydraulic jacks help prevent RMA damage and reduce log breakage.

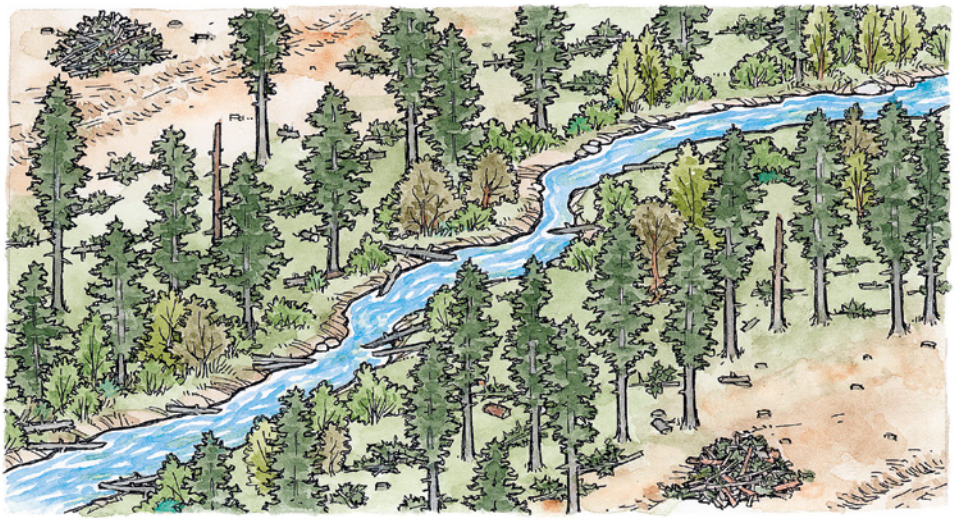
Operate machines to minimize soil disturbance and compaction.

Felling and removing slash

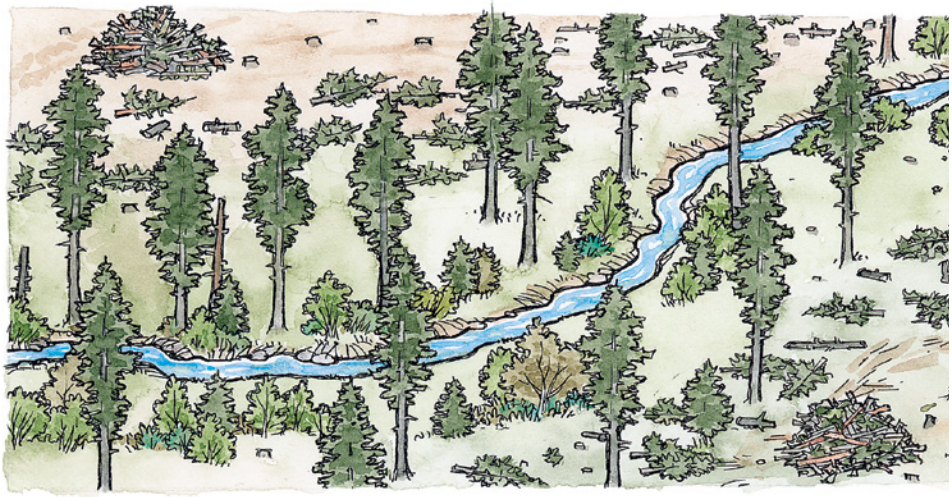
To minimize disturbance and avoid harm to water, soils and vegetation during felling operations:

- Fell conifer trees away from RMAs, streams, lakes and significant wetlands, with the exception of trees felled for stream improvement projects.
- Use felling practices on steep slopes: jacking, line-pulling, high stumps, and whole tree yarding or stage-cutting when necessary and feasible to prevent damage to vegetation retained in RMAs, soils, streams, lakes and significant wetlands.
- Buck and yard hardwoods that must be felled into or across streams, lakes or significant wetlands to minimize damage to beds, banks and retained vegetation. Yard away from the water when limbing.
- Minimize the effects of slash that may enter water bodies during felling, bucking, limbing or yarding:
  - > Remove slash from Type F, Type SSBT and Type D streams, large or medium Type Np streams, small Type Np streams within the RH Max (see the Riparian Management chapter), lakes and significant wetlands within 24 hours of the material entering the stream during the timber harvest operation.
  - > Avoid slash accumulation in Type Ns streams and small Type Np streams upstream of the RH Max, lakes or wetlands in quantities that threaten water quality or increase the potential for mass debris movement.
  - > Place any slash removed from streams, lakes or wetlands above high-water levels where it will not enter waterways.

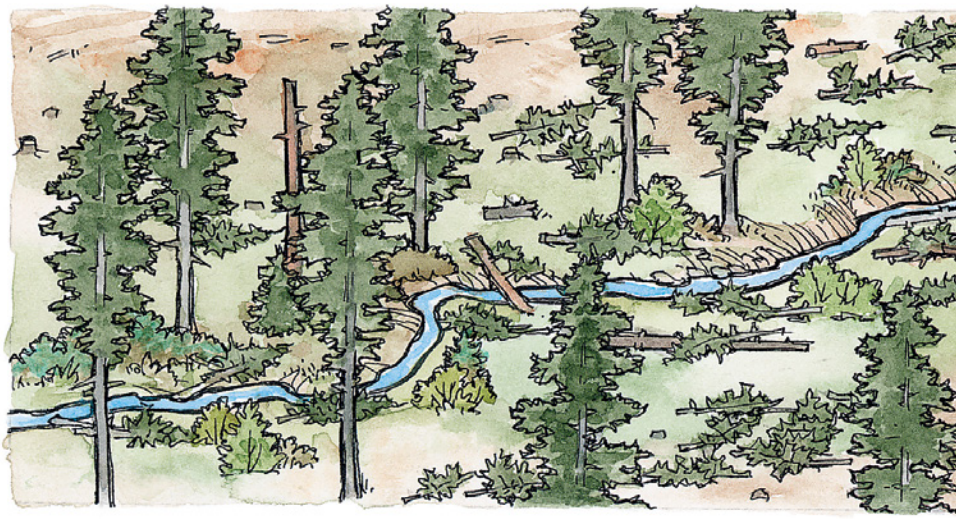
How much and what size slash should be removed?



Type F and Type SSBT streams: Leave slash too big for hand removal to become large woody debris. This requires a written plan approved by ODF. Plans must show a benefit of slash, or that removing it would create a greater ecological impact.



Type D streams: All slash should be removed from below the high-water level.



Type N streams: Banks and streambed should be generally free of slash.

GROUND-BASED LOGGING NEAR WATER

After trees are cut, limbed and bucked into logs, they are transported on a skid trail to a collection site (landing) by skidders, tractors or shovels, and loaded onto trucks. Oregon's forest protection laws restrict such ground-based logging activities near water.

Timber harvesting within tree retention areas is not allowed in western Oregon, except under certain conditions, such as road construction, temporary stream crossings, yarding corridors and for stream improvement projects. In eastern Oregon, harvesting is allowed in the outer zone (see the Riparian Management chapter). Along all streams, including areas where tree retention is not required, disturbance to soils and vegetation must be limited through application of equipment limitation zones.

Road construction and temporary stream crossings (see the Roads and Water Crossings chapter) may be needed to yard logs to a landing across a stream. These activities are regulated by Oregon law, because they have the potential to disturb riparian soils and vegetation, thereby reducing their ability to limit sedimentation and protect water quality. The construction, use and removal of temporary crossings can also disturb tree retention areas, wetlands and lakes.

THESE RULES PROTECT:

- fish passage on Type F and Type SSBT streams
- stream channels and banks
- vegetation left in the RMA
- RMA soils that control runoff and keep sediment out of water

Equipment limitation zones

For all streams channels, logging operators must follow the rules for equipment limitation zones (ELZs).

ODF developed Forest Practices Technical Guidance for ELZs to assist operators in identifying problem areas and selecting appropriate corrective measures. See **KnowYourForest.org/manual-links**

ELZs are also discussed on page 137 and in detail in the Riparian Management chapter.

Skid trails and riparian areas

Skid trails are routes used by logging equipment to transport felled trees to landings. It is important that an adequate vegetation filter exists between skid trails and water, so that sediment can be filtered from the skid trail runoff water. Tree removal within tree retention areas is restricted except when removal is needed for road construction, temporary stream crossings, yarding corridors and stream improvement projects. These are the only situations where skid trails may be allowed within tree retention areas to assist with the tree removal.

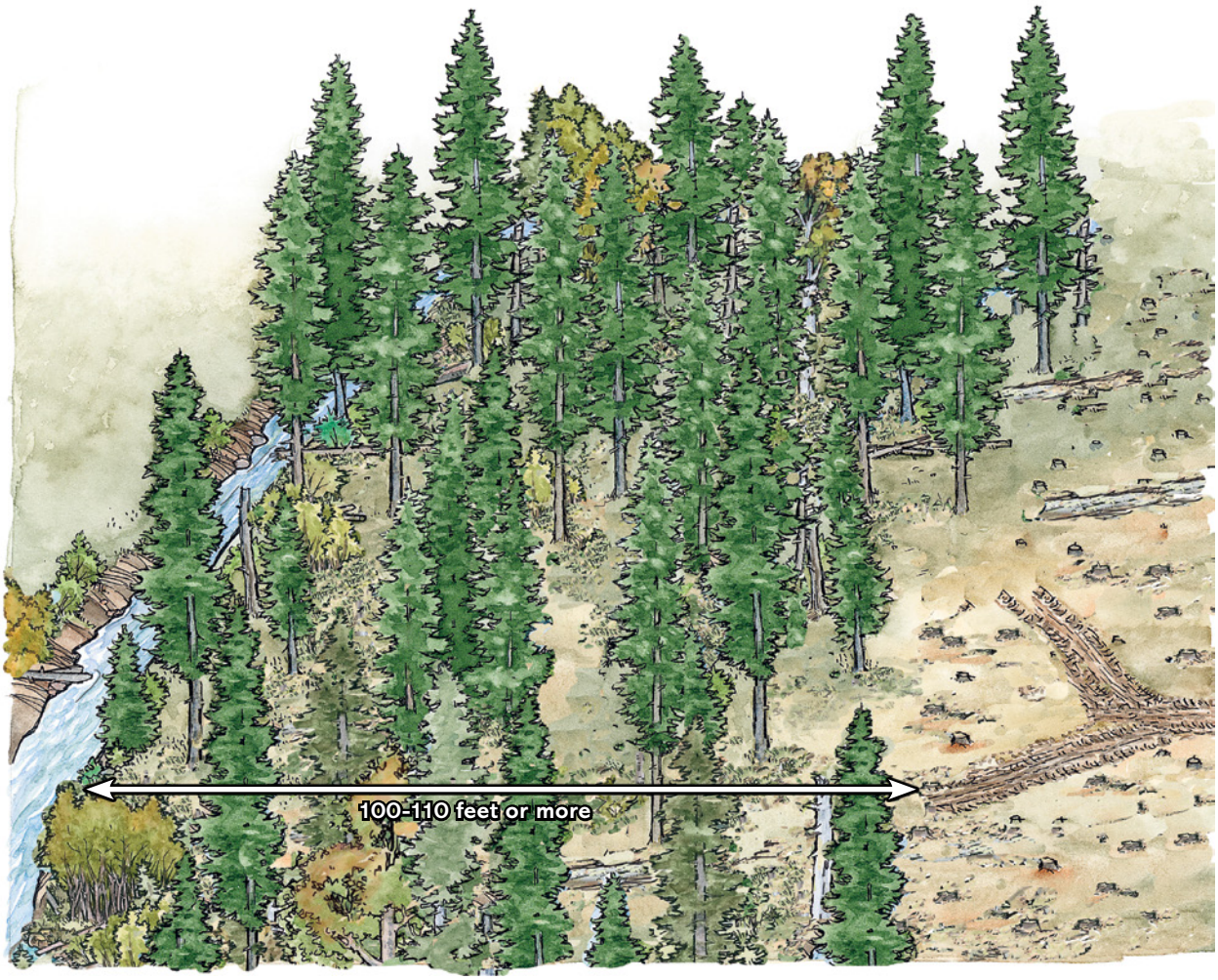
Skid trails are defined as:

- an area where logging equipment constructs a trail by excavating and filling
- an area used by equipment where visible ruts are formed

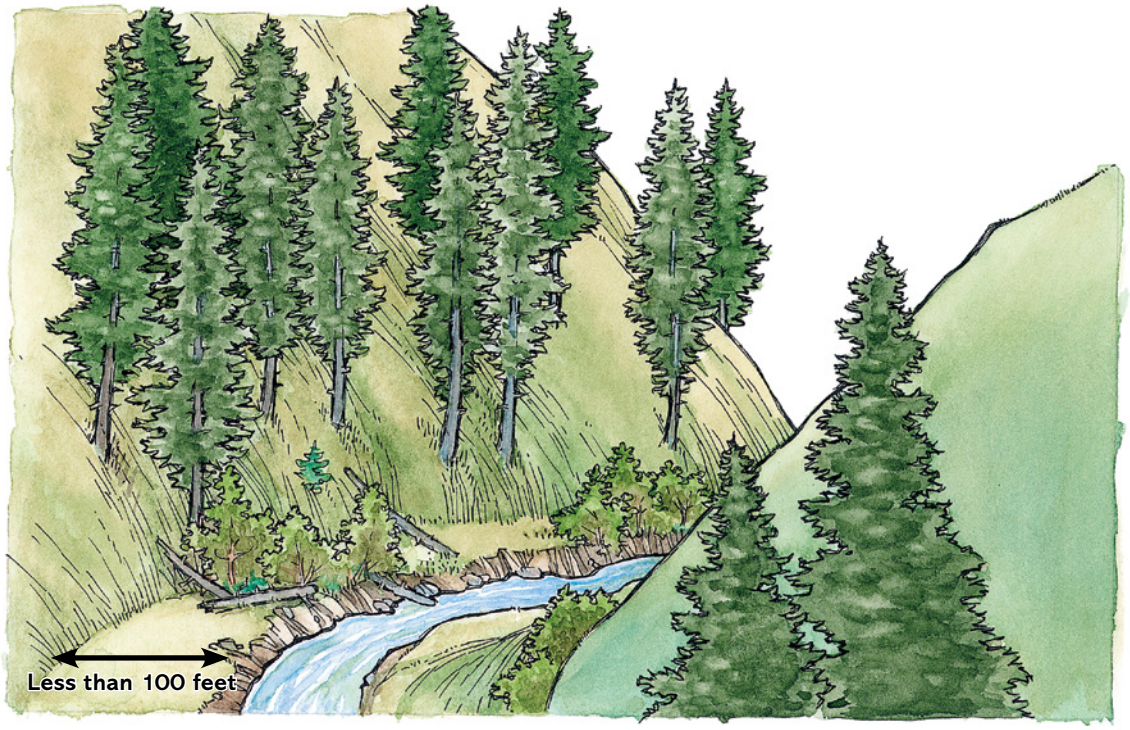
Do not use any of the following as skid trails:

- **A stream channel**. Restrictions also apply when the stream channel is dry, and to Type N streams located in the logging operation unit.
- **Type F and Type SSBT streams in steep, narrow canyons.**
- **Skid trails built at a constant grade next to a stream.** These can become a channel during floods. Use grade reversals where feasible. High water may reach the skid trail but cannot flow along it.

Except for stream crossings, do not locate skid trails within a minimum of 110 feet of Type F or Type SSBT streams. Be sure an adequate vegetation filter exists between skid trails and water to allow sediment to be filtered from skid trail water runoff. Minimize exposed soil from skid trails in RMAs.

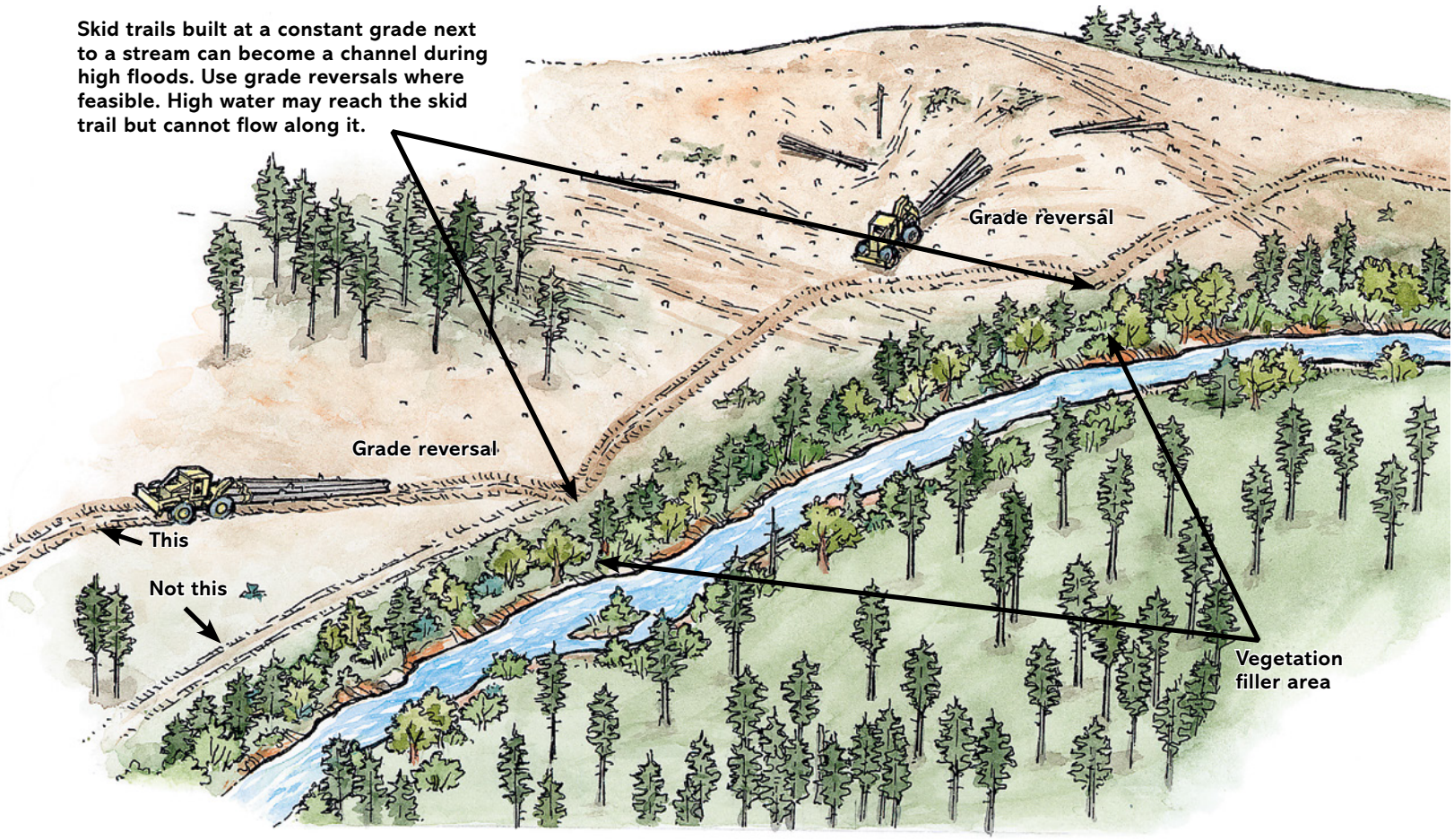


A minimum of 100-110 feet of slope distance is required between skid trails and the high-water level of Type F and SSBT streams. Only stream crossings are allowed closer to streams. Approaches to stream crossings must be designed to get skid trails out of this portion of the RMA as quickly as possible.

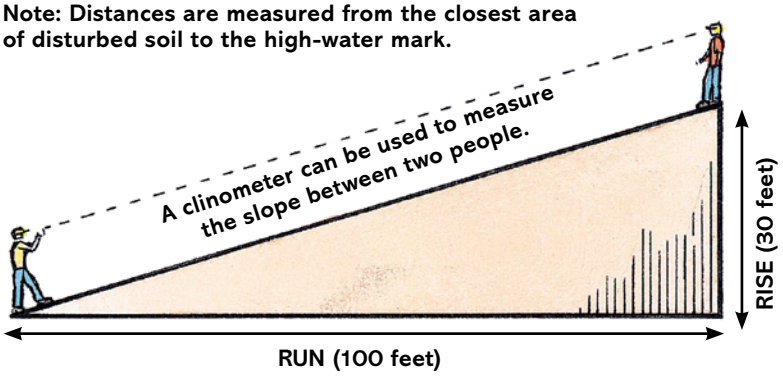


In steep, narrow canyons, the distance from the high-water level to the steep canyon slope is generally less than 100 feet for Type F, SSBT and D streams. An alternative logging system (cable or helicopter) must be used.

Skid trails built at a constant grade next to a stream can become a channel during high floods. Use grade reversals where feasible. High water may reach the skid trail but cannot flow along it.



How to measure slope in percent: RISE divided by RUN = SLOPE percentage. For example, a rise of 30 feet divided by a run of 100 feet equals a 30% slope. Note: Distances are measured from the closest area of disturbed soil to the high-water mark.



Construct skid trails to avoid stream diversion during high flows

Locate and construct skid trails so that, when high flows occur, water from the stream will not flow onto the skid trail. Skid trails constructed in a floodplain run the risk of diverting water from the stream and becoming temporary streams that cause serious erosion.

Avoid the possibility of channel diversion by keeping skid trails well above the stream high-water level. Skid trails below the high-water level must have frequent grade reversals or large rolling dips. Grade reversals are essential when skid trails are parallel to channels (see illustration above).

GROUND-BASED LOGGING

Steeper ground increases the potential for erosion when using ground-based logging.

Generally, skid trails should follow slope contours rather than go up and down the slope. Avoid ground skidding on unstable, wet or easily compacted soils and on steep slopes, unless it can be done without damage to soil productivity through soil disturbance, compaction or erosion.

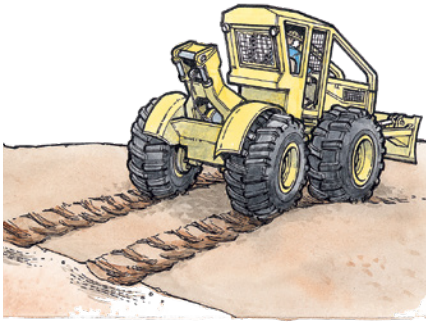
Locate skid trails where sidecasting of soil is kept to a minimum, because the practice removes productive soils, replacing them with less productive subsoils.

A sidecast depth of three feet or more is considered excessive on slopes of 50% to 65%. Two feet or more is excessive on slopes greater than 65%. Know your soil type – some are more prone to failure when placed on steep slopes.

Guidance

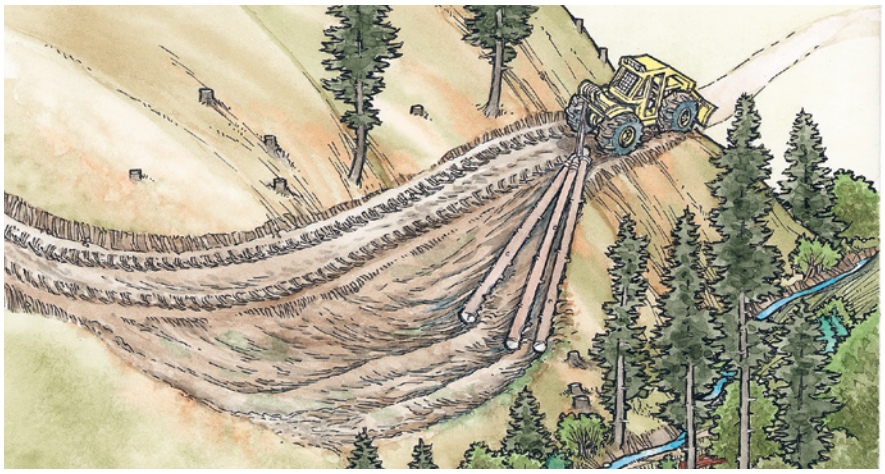
If more than 20% of the timber harvest unit has major soil displacement, deep compaction or extensive erosion, the logging operation is considered damaging and is not in compliance with Oregon law. There is an additional risk of sidecast material sliding and creating problems well below the skid trail. Use the following guidelines to help avoid these issues:

- Minimize soil disturbance by fitting skid trails to the topography and avoid sidecast buildup.
- Don't cover productive soil with sidecast for a significant percentage of the unit, as it is likely to cause landslides and remove soil from the slope. Any combination of slopes covered by sidecast, slides from sidecast and excavated skid trails should not exceed more than 20% of the ground in any five-acre portion of the unit.
- Pull back sidecast and place it in the skid trail after the timber harvest and before the rainy season.



Deep compaction from the pressure and vibration of heavy equipment can decrease tree growth and cause runoff and erosion on slopes.

Major soil displacement is the lateral movement of soil, which often produces ruts that can change natural drainage and increase erosion.



Both logs and logging equipment can cause excessive soil disturbance, especially on steep slopes.

Locations not stable for skid trails

Avoid excavating skid trails on slumps or slides. Instead, locate skid trails on stable areas. Minimize the risk of materials entering the waterways. Carefully consider drainage and potential impacts to nearby streams and other waters, and whether or not a soil failure might occur.

Slumps and slides indicate less stable soils. Constructing skid trails on these features or in other potentially unstable locations can change drainage and steepen or load the slope. Any unstable features can increase the chance of soil movement and resource damage from erosion and sedimentation.

Avoid constructing skid trails in these areas:

- actively-moving landslides
- high landslide hazard locations (see the Steep Slopes chapter)
- slopes steeper than 70%
- slopes greater than 60% on non-cohesive soils (sands, decomposed granite soils and ash)
- areas impacted by intense wildfire

Suggestions for skid trail layout

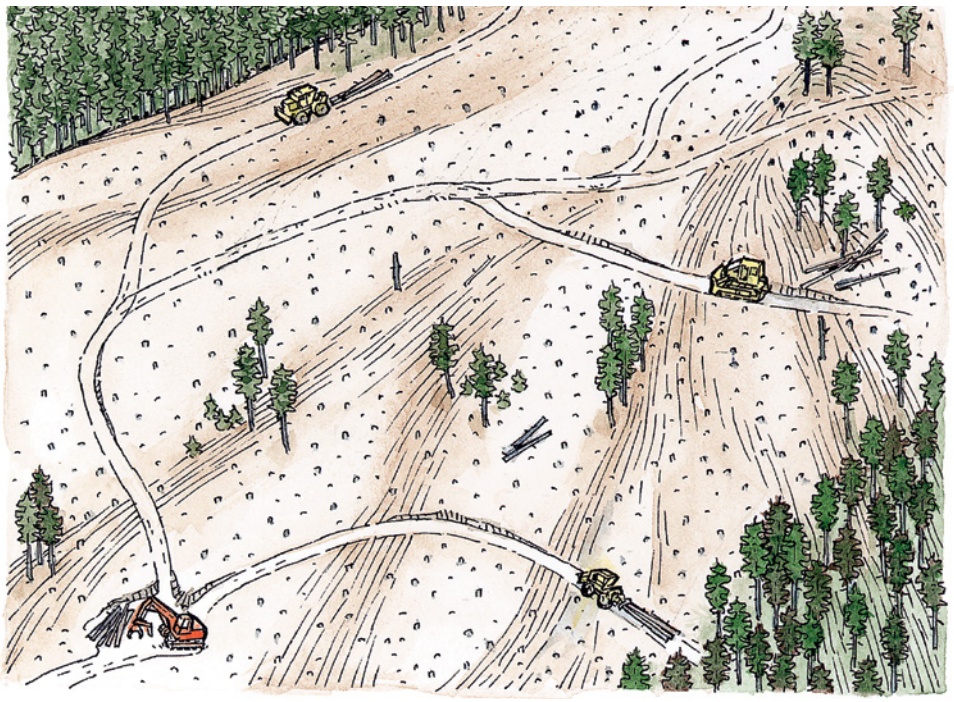
Advance planning can minimize the impact of skid trails on soil and the amount of ground occupied by skid trails. Pre-planned skid trails can become permanent parts of a logging unit and be used for other management activities and future timber harvests.

There are two common patterns for pre-planned skid trails: branching and parallel (see illustrations).

Shovel logging

Shovel logging, a unique logging method, uses a tracked vehicle to move and accumulate logs throughout the harvest area with few or no constructed skid trails. Similarly, logging with feller-bunchers or grapple-skidders requires traffic throughout the harvest unit. See the Appendix for more information about these systems.

With logging systems that use few or no skid trails, take care to limit soil disturbance and compaction, and to control drainage (see next page) where there is excavation, filling or rutting in traffic areas.



On gentle slopes, the branching skid trail pattern has one or more main trails from which other trails branch off to provide access to the area.

On steeper slopes, the parallel skid trail pattern attempts to parallel the land's natural contours.

Control drainage from skid trails

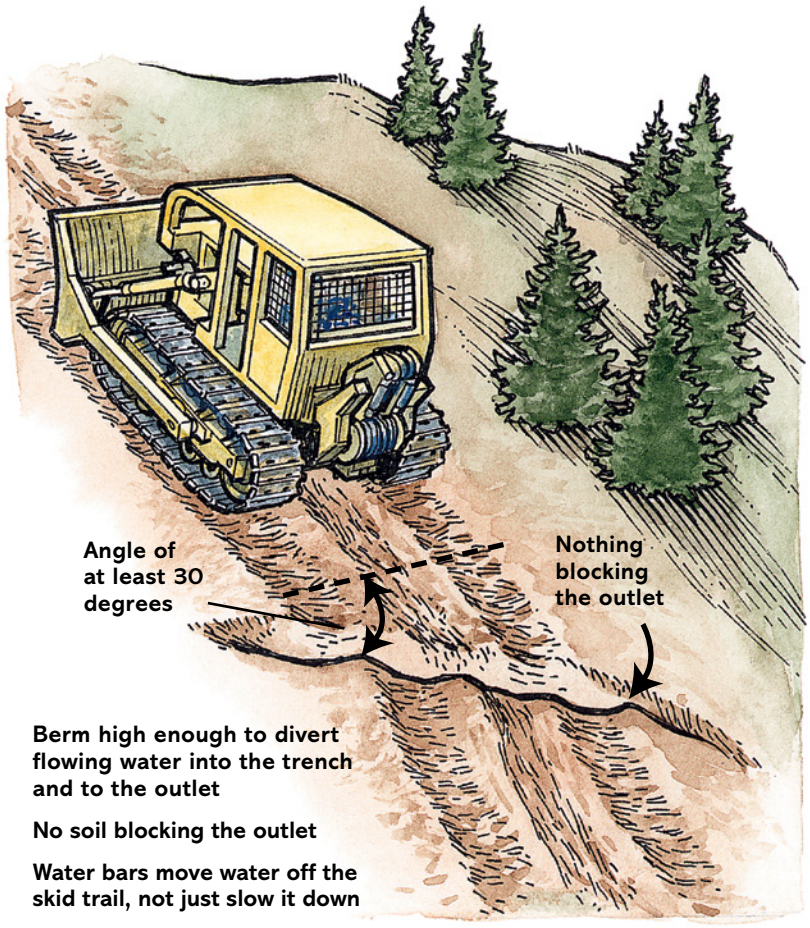
Construct drainage dips, grade reversals or other effective water diversions in skid trails as necessary to minimize soil displacement and ensure filtration of runoff water before it enters water. Material eroded from skid trails must not enter any water bodies.

For guidance on constructing drain dips, see the Roads and Water Crossings chapter.

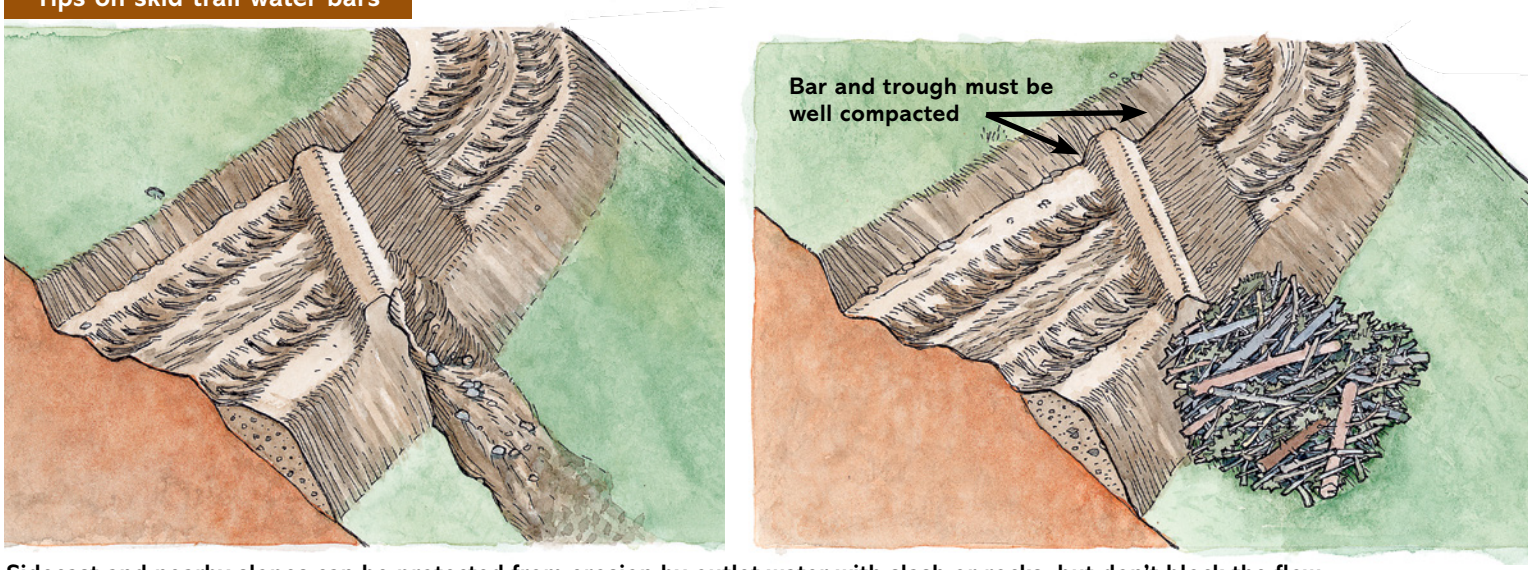
For guidance on constructing grade reversals, see page 130.

Drain skid trails by water barring or other effective means immediately after completion of the operation and at all times during the operation when runoff is likely. Skid trails with too few grade changes can concentrate water and erode the slope.

Stabilization of skid trails must be permanent. Water bars must be able to handle or prevent erosion from all potential uses and storm events, including unauthorized recreational traffic.



Tips on skid trail water bars



Sidecast and nearby slopes can be protected from erosion by outlet water with slash or rocks, but don't block the flow. (See more information on water bars in the Roads and Water Crossings chapter.)

Determining water bar spacing

Table 3-2 offers a guide to minimum water bar spacing on skid trails. Narrower spacing, especially on steep slopes, can significantly reduce the erosive power of runoff and provide extra protection.

Table 3-2 Minimum water bar spacing on skid trails

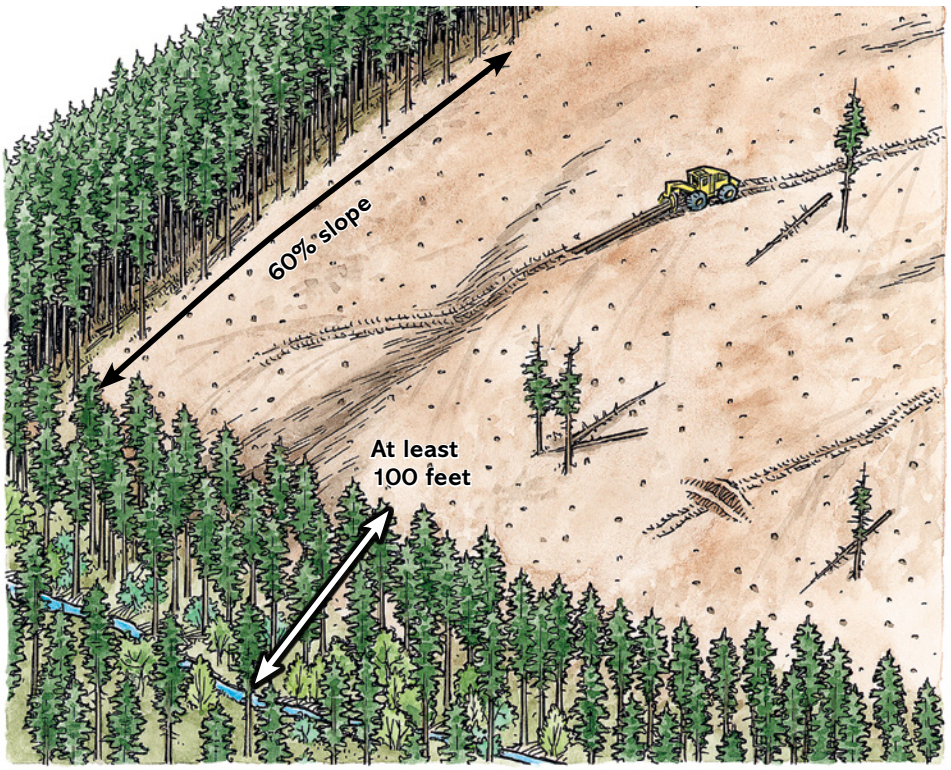
Slope of skid road by percent (see Appendix)	Soil description	
	Sensitive soils (silts, granitics)	Normal forest soils (loam, gravel, cobble)
5 to 15	150 ft.	300 ft.
15 to 35	100 ft.	200 ft.
35 to 50	50 ft.	100 ft.
Over 50	25 ft.	50 ft.

Steep slope requirements

Ground skidding on steep slopes, or those likely to erode, can cause soil damage and allow sediment to enter streams; therefore, there are some unique requirements to protect streams during skidding activities on such slopes.

Slopes of more than 35% have unique requirements for ground skidding. It is never allowed in high landslide hazard locations, which typically have more than 70% to 80% slopes, depending on Tyee Core Area requirements (see the Steep Slopes chapter).

The requirements also apply to slopes of more than 40% with decomposed granite soils. These soils are most common in southwest Oregon. They have been identified and mapped on county soil surveys.



Steep-slope skidding is allowed. However, skid trails must be at an angle to the slope. Never use skid trails up and down steep slopes.

Care must be taken when using ground skidding on steep slopes or slopes likely to erode to avoid delivering sediment to streams. The requirements are:

- Do not construct skid trails straight up and down the slope, because water can flow back onto the skid trail, even when water bars are installed.
- Skid at an angle to the slope (see illustration above).
- Keep skid trails at least 100 feet from stream channels.
- Plan spacing and location of trails carefully — no more than 10% of the steep slope area should be disturbed.

Begin construction of the skid trail cross ditch at the far edge of the skid trail.

Cut an extra-deep cross ditch at an angle greater than perpendicular to the skid trail, and be sure the ditch is open so that water can drain out.

The finished skid trail cross ditch should be deep. This is more than a water bar.

Build steep-slope skid trail cross ditches

While similar to water bars, steep-slope skid trail cross ditches should be deeper (see photo sequence at left).

For information on

TEMPORARY STREAM CROSSINGS,

see the Roads and Water Crossings chapter.

CABLE LOGGING NEAR WATER

When cable logging near water, maintain vegetation in the riparian management area (RMA) and minimize disturbance to the beds and banks of streams, lakes and wetlands more than one-quarter acre, as well as vegetation retained during cable yarding operations. Minimize the yarding of logs across streams, lakes, significant wetlands and wetlands greater than one-quarter acre, especially when timber harvesting can be done using existing roads or other practical alternatives.

Cable yarding across streams, wetlands or lakes is a good harvesting choice when it results in less road construction, and if the logs can be suspended above the RMA and through narrow corridors that are widely spaced. Cable yarding corridors may be used through retained trees only if the yarding corridors are minimized in number and width.

Written plans

Written plans are required when cable yarding over the following types of waterways:

- Type F streams
- Type SSBT streams
- Type D streams
- large or medium Np streams
- small Type Np or Type Ns streams located within designated debris flow traversal areas
- lakes
- significant wetlands

In addition, yarding over aquatic or riparian areas must be accomplished by swinging the yarded material above the ground. Written plans for cable yarding over water must be submitted to the ODF stewardship forester.

Minimize disturbance to water, stream channels and streamside vegetation

Cable yarding across streams classified as Type Ns, small Type Np stream-associated wetlands, designated debris flow traversal areas, seeps and springs, or wetlands greater than one-quarter acre, must minimize disturbances to the stream channel or wetland and retained streamside vegetation. This includes the use of one-end log suspension where feasible.

Minimizing disturbance from cable yarding near streams helps maintain soil function, retain understory vegetation, and protect habitat for fish, amphibians and other wildlife.

Equipment limitation zones (ELZs)

For all stream channels, as described in Division 643, Water Protection Rules, of the Oregon Forest Practices Act (OFPA), logging operators must follow the rules for equipment limitation zones (ELZs). These are designated areas near streams where disturbance from equipment must be minimized. A retention-equipment limitation zone (R-ELZ) is required around Type Np streams and trees less than 6 inches in diameter at breast height (DBH) and shrub species must be retained where possible.

The required ELZ width depends on where the stream is located:

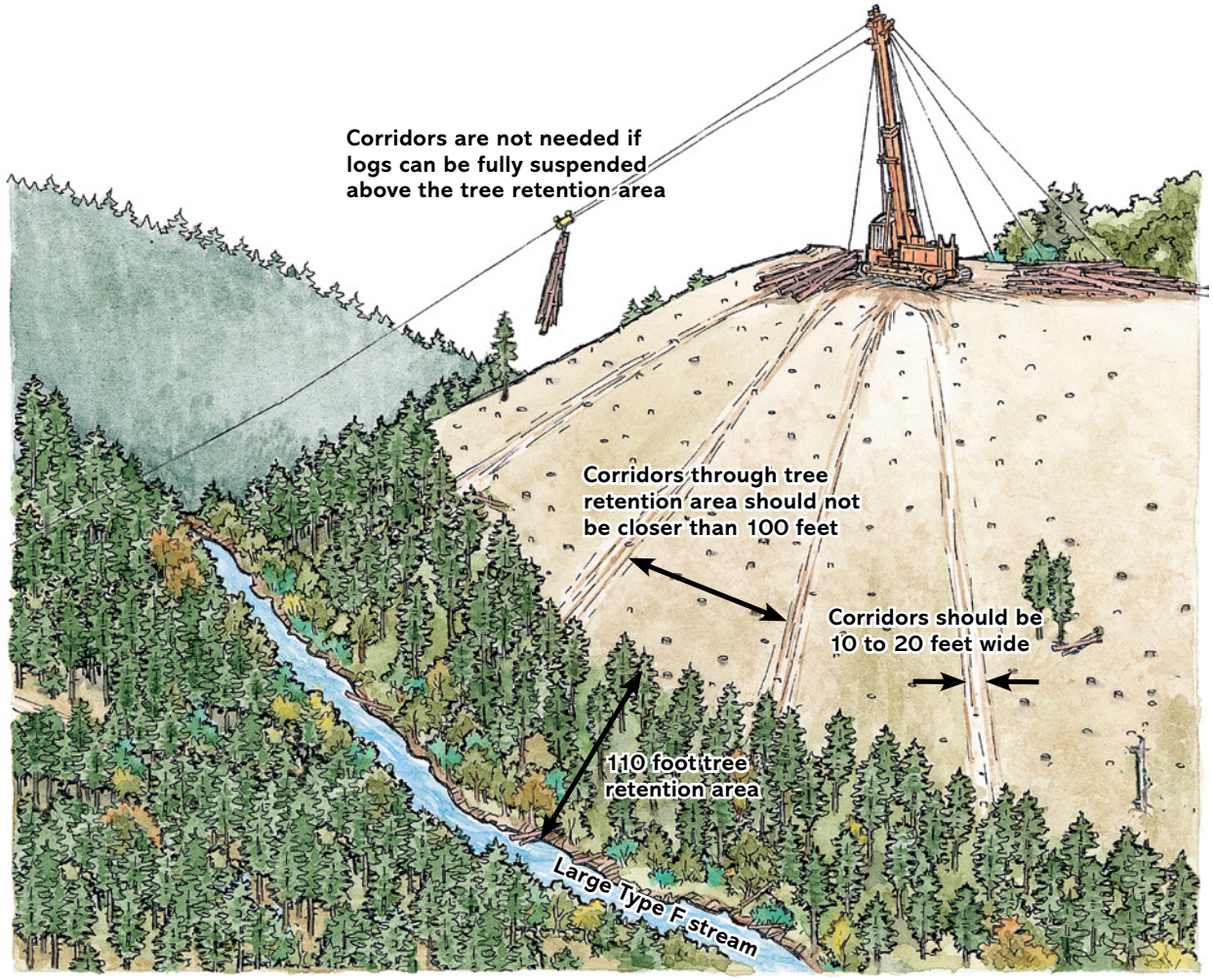
- western Oregon = 35 feet
- eastern Oregon = 30 feet

Oregon law requires corrective action(s) when soil disturbance from yarded logs exceeds 20% of the total area within any ELZ or R-ELZ within the cable-logged portions of a harvest unit, or when ground-based equipment causes soil disturbance that exceeds 10%. Corrective action(s) must be designed to replace the equivalent of lost functions in consultation with the stewardship forester. Examples of corrective actions include, but are not limited to, water bars, grass-seeding, logging slash, mulching and downed log placement. Preferably, these should use on-site materials.

Use yarding corridors through tree retention areas as long as the number and width of these corridors are minimized. Trees outside the corridor must be left with adequate crowns to provide canopy cover.

ODF developed Forest Practices Technical Guidance for ELZs to assist operators in identifying problem areas and selecting appropriate corrective measures. See **KnowYourForest.org/manual-links**.

ELZs are also discussed in more detail in the Riparian Management chapter.



LOG LANDINGS

During a logging operation, logs are yarded from the location where trees are felled in the timber harvest unit to openings located near roads in the forest called "landings."

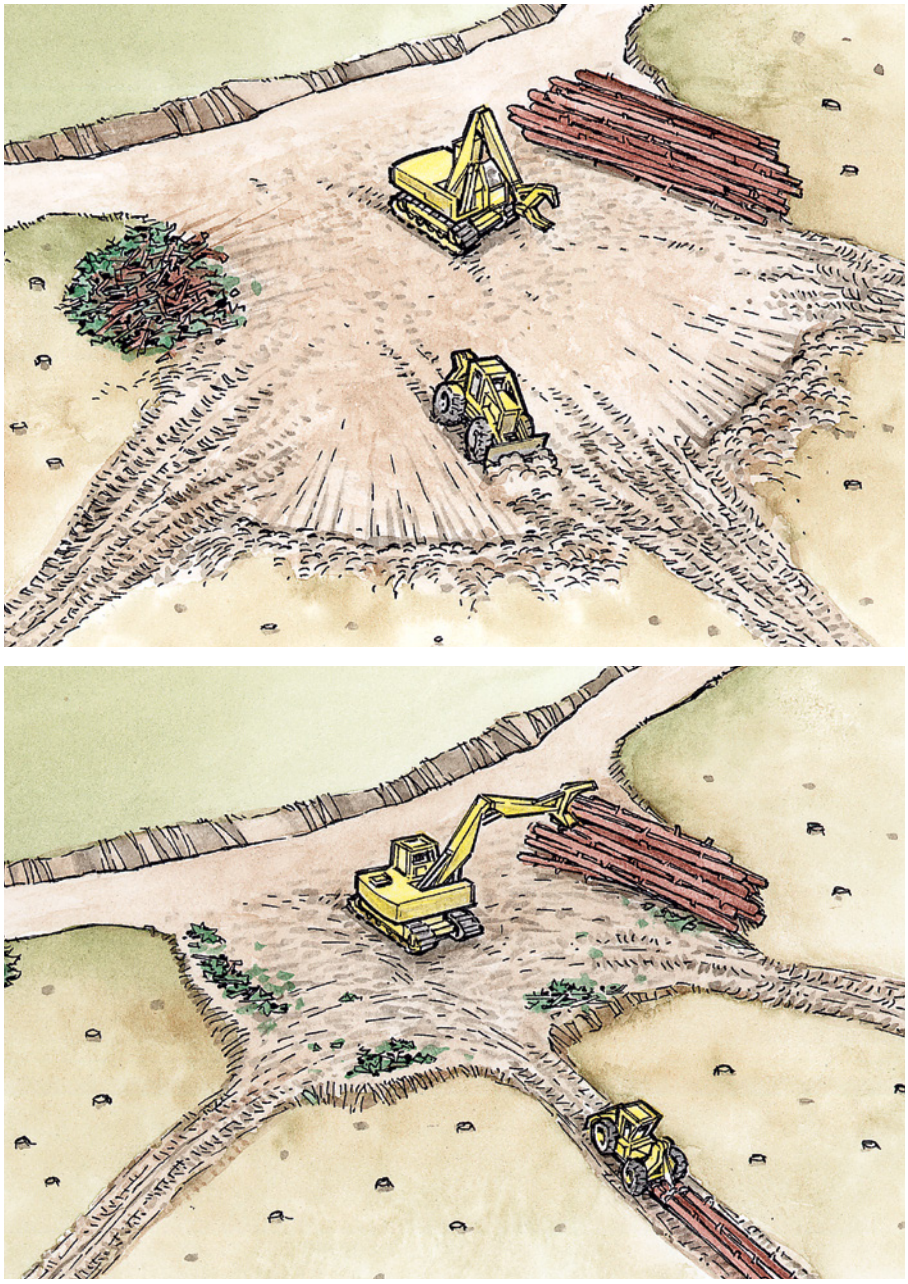
The logs are stored and eventually loaded onto trucks at these landings for delivery to a mill or other location. Because they are built on cleared ground that is often compacted, landings are potential sources of runoff and erosion and tend to expand in size (explained below). Keep them small, drained and well-located. Minimize the size of landings to that necessary for safe operation.

Oversized landings take forestland out of production, and sediment from them can move to waterways. Generally, landings more than one-quarter acre (about 100 feet by 100 feet) are larger than necessary. In many situations, smaller landings will meet safety and operational needs, but sizes and shapes will vary based on the logging system used and other needs.

Landings must provide enough space for the skidding, yarding, loading and trucking equipment, as well as the logs that are expected to accumulate prior to hauling from the site. Different logging systems and equipment, along with the slope of the land and density of trees in the area, influence the number and size of landings needed.

Whole-tree harvest systems, whether ground-based or cable, require larger landings.

Helicopters require large landings, but fewer are usually needed. Mobile cable yarding machines can operate on narrow sections of road with little more than a turnout required if truck loading is frequent. Tower yarders may require that a separate "yarder pad" be constructed on a spur road above the main road where logs are landed and then loaded onto trucks.



Right: Ground-based logging requires moderate-size landings, which can grow larger than needed. When several skid trails enter a landing, equipment, logs and debris can converge, resulting in a tendency to actively expand the landing. Instead, trails should converge before they reach the landing. Pile debris where it does not impede traffic, but can be burned, chipped or used later.

Locate landings on stable areas that minimize the risk of material entering water

Any part of a landing on a slope steep enough to pose a risk of fill or sidecast entering water bodies violates the Oregon Forest Practices Act (OFPA). This is also true when landing fill or excavation occurs in such a way that an old landslide (often appearing as a slump) may be reactivated. Also, landing fill must not be placed in a high landslide hazard location.

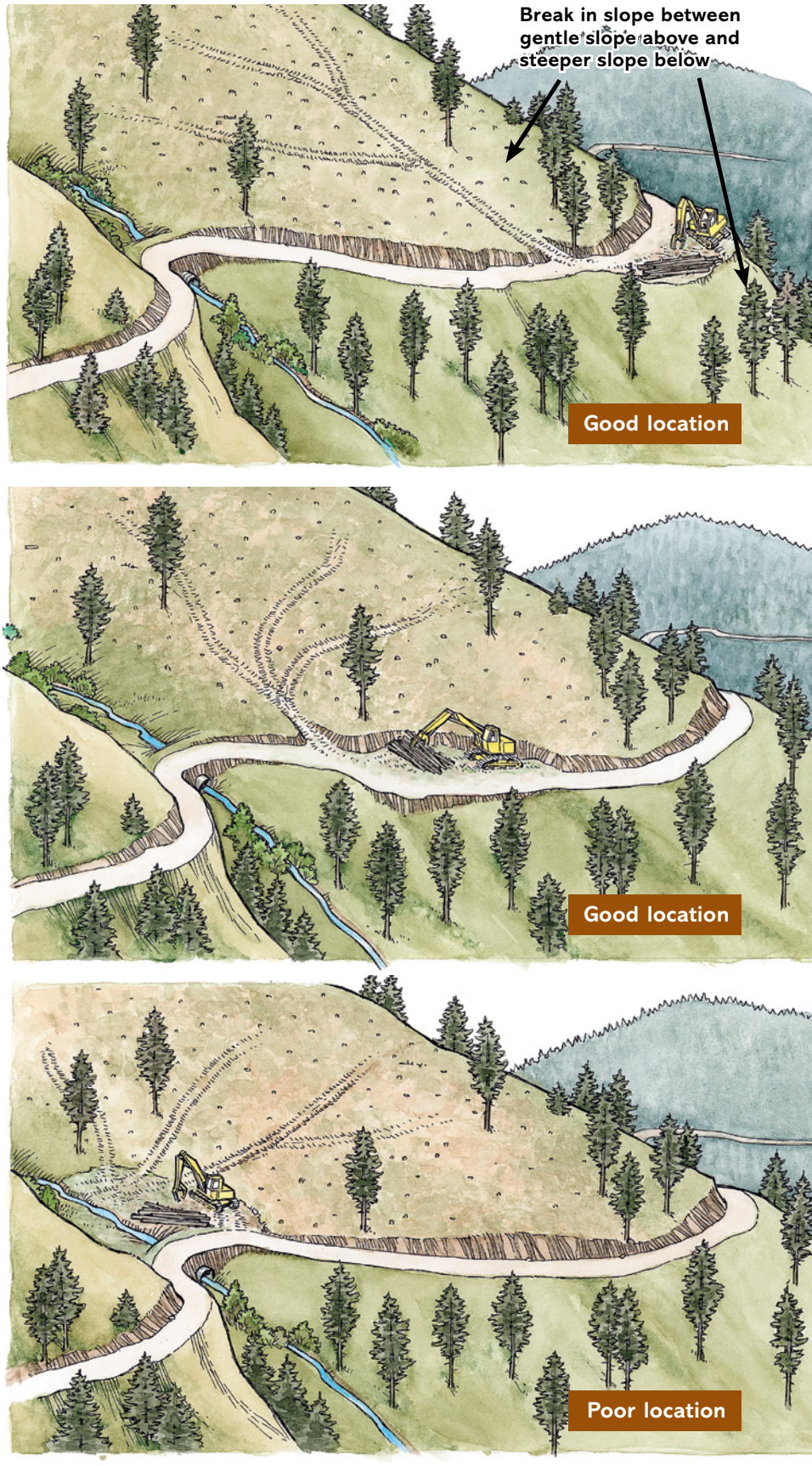
Follow these guidelines when choosing a landing location:

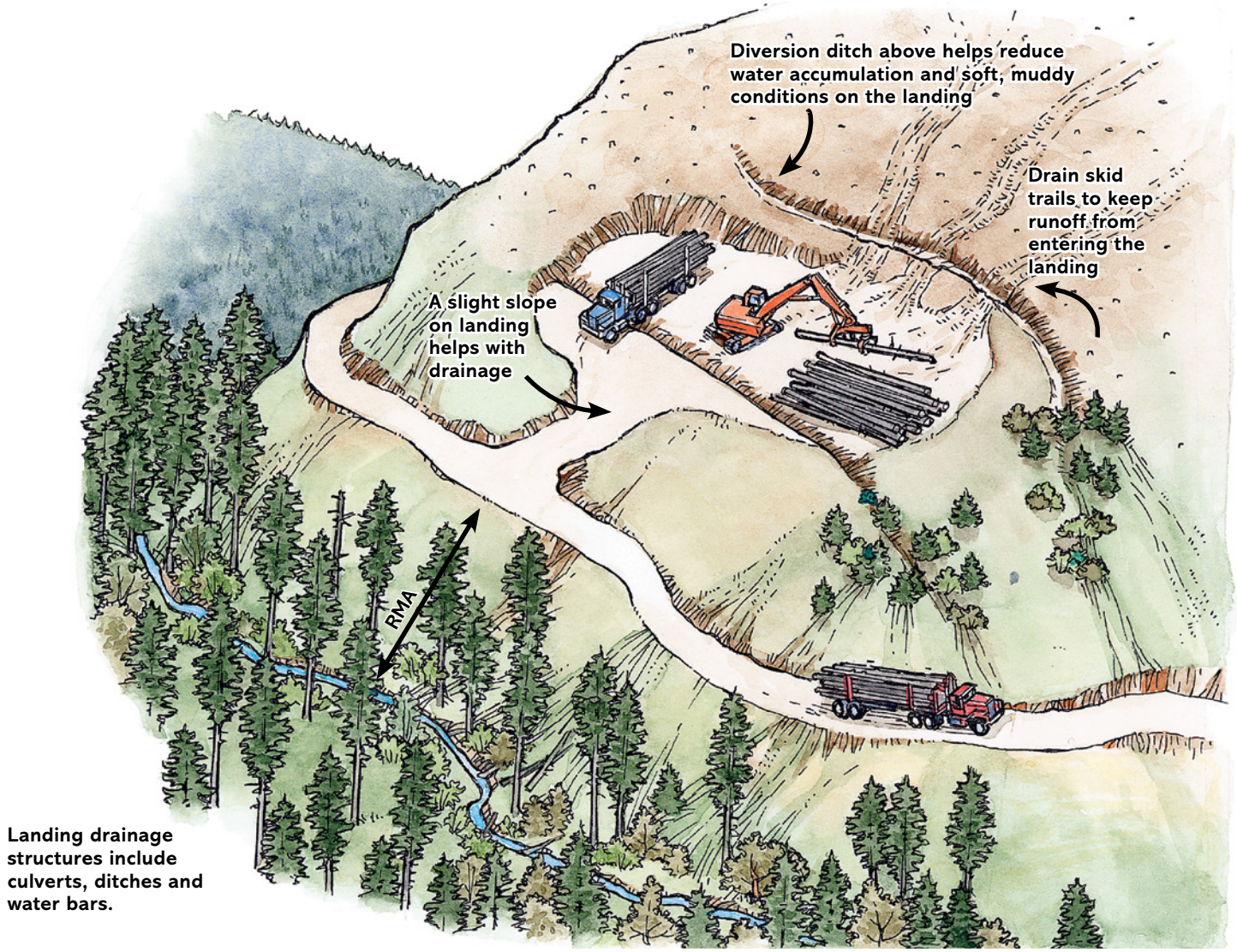
- Avoid landings in RMAs. If there is no alternative, you must submit a written plan to ODF for review. This advice applies even when a portion of a landing may be in an RMA. Even if the landing is outside the RMA, a nearby location may be a poor choice because of the chance of sediment entering water.
- Do not incorporate slash, logs or other large quantities of organic material into landing fills. When this material decomposes, landing fills can slide downslope. Also, buried slash may become a fire hazard.
- Organic material in landing fills should generally be avoided but is the most potentially hazardous on slopes of more than 50% and when landings are within 100 feet of a water body.
- A landing constructed in a way that allows material to enter water bodies may be in violation of the OFPA.
- Put excess material from landing construction in stable locations well above the high-water level. End-hauling to a stable location may be necessary. Excess soil, rock and debris must be placed in stable locations, and never below major storm flow levels.
- Establish effective drainage on landings during and after use.

Do not:

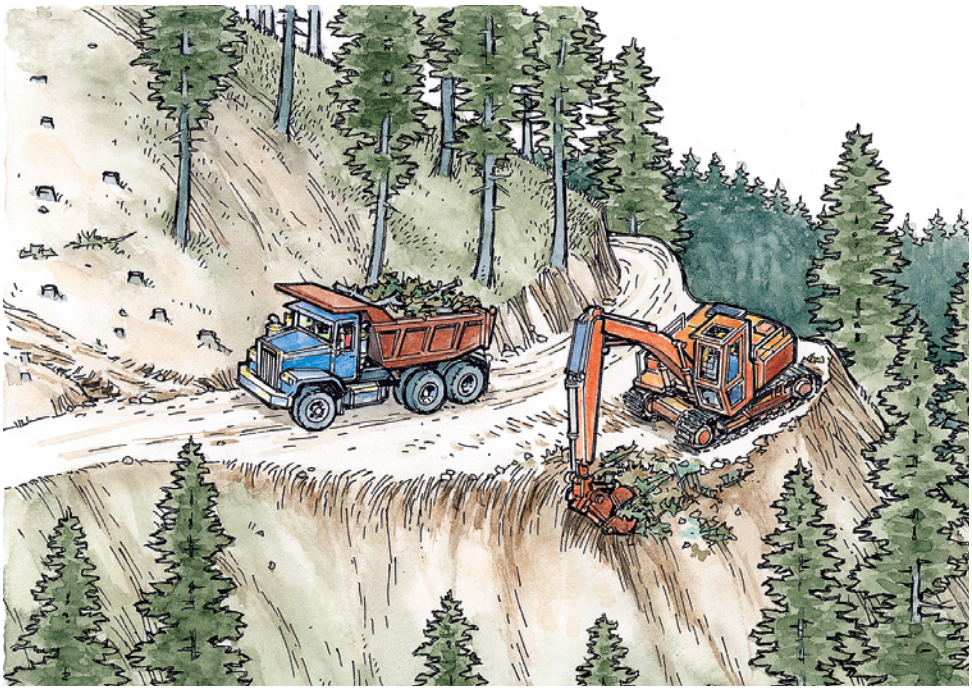
- build a landing in a stream channel
- skid logs into a stream channel
- drop logs into a stream channel while cable logging

Ridge noses above the break in slope (often formed on steep slopes) can be a good location for landings.





Landing drainage structures include culverts, ditches and water bars.



Remove excess material from landings, and place it in stable locations.

PETROLEUM PRODUCTS

Forest operations often involve machinery and vehicles that require petroleum products and other non-pesticide chemicals. Careful handling and use of these products can reduce the risk of spills and help protect the environment. Sources of potential petroleum product leaks and discharges include heavy equipment, service trucks, crew vehicles, saws, fuel tanks, fuel supply trucks, fuel transfer, fuel or lubricant containers, waste oil storage, improper equipment repair methods, equipment malfunctions, vehicle accidents and vandalism.

If a spill occurs when using petroleum products, landowners and operators must follow specific rules for handling the spill. The Oregon Department of Forestry (ODF) oversees most petroleum product handling and use and spill regulations for forest operations.

Types of petroleum products subject to forest practice requirements

Petroleum products frequently present on forest operations and subject to the forest practice rules include engine fuels, gasoline, hydraulic oil, lubricating oils and greases. (The rules distinguish between "other petroleum products" and "chemicals.") Refer to the Site Preparation chapter for more information about the proper use of forest chemicals such as herbicides or pesticides, as well as agencies that regulate their use on forestlands.

Actions to prevent and deal with leaks and spills

Adequate precautions are required to prevent leaks, minor discharges or "reportable spills" from entering and causing a visible sheen on streams, rivers, lakes or wetlands. Planned forest operations should be in place to keep petroleum products from entering such waters. Be aware that uncontrolled ditch water can be a source of contamination.

Petroleum containers and handling equipment must be maintained in a leak-proof condition, including machinery used for transportation, on-site storage or application of chemicals. If there is evidence of a leakage, the equipment must not be used until it is repaired (see the Site Preparation chapter). If an accidental leak or spill occurs, immediate action should be taken to stop and contain it, and the event must be reported promptly (see box/sidebar), especially when the spill from a large amount of petroleum products directly threatens water sources.

If a spill occurs

OREGON'S REQUIREMENTS FOR PETROLEUM PRODUCTS AND OTHER CHEMICALS

Operators must take immediate and appropriate action to stop and contain leaks, minor releases or "reportable spills." This includes taking the following required actions based on the severity of the incident and type of chemical involved:

- Any "reportable spill" of petroleum product — exceeding 42 gallons onto land or any amount delivered to waters — must be reported within 24 hours to the Oregon Emergency Response System (OERS).
- Any "reportable spill" of pesticide — exceeding 25 gallons (or 200 lbs.) onto land or any amount delivered to water bodies — must be reported within 24 hours to the OERS. Smaller quantities (less than the gallon amounts stated above) discharged onto soil should be stopped, contained and prevented from future delivery into waterways.
- If a spill enters water, operators must report it to the nearest ODF office immediately. This reporting does not exempt the operator from requirements to notify other agencies. The first response to a "reportable spill" incident should be to call 9-1-1. Once notified, local public safety agencies should call OERS at 800-452-0311.

For more information, contact ODF, the Department of Environmental Quality (DEQ) or Oregon Department of Agriculture (ODA), or visit the OERS webpage: **oregon.gov/oem/emops/pages/oers.aspx**.

Minimize risk through voluntary prevention

Forest landowners and contractors can assure a reduced likelihood of an operational petroleum discharge occurring or escaping into water through voluntary means.

Common non-regulatory preventative actions include:

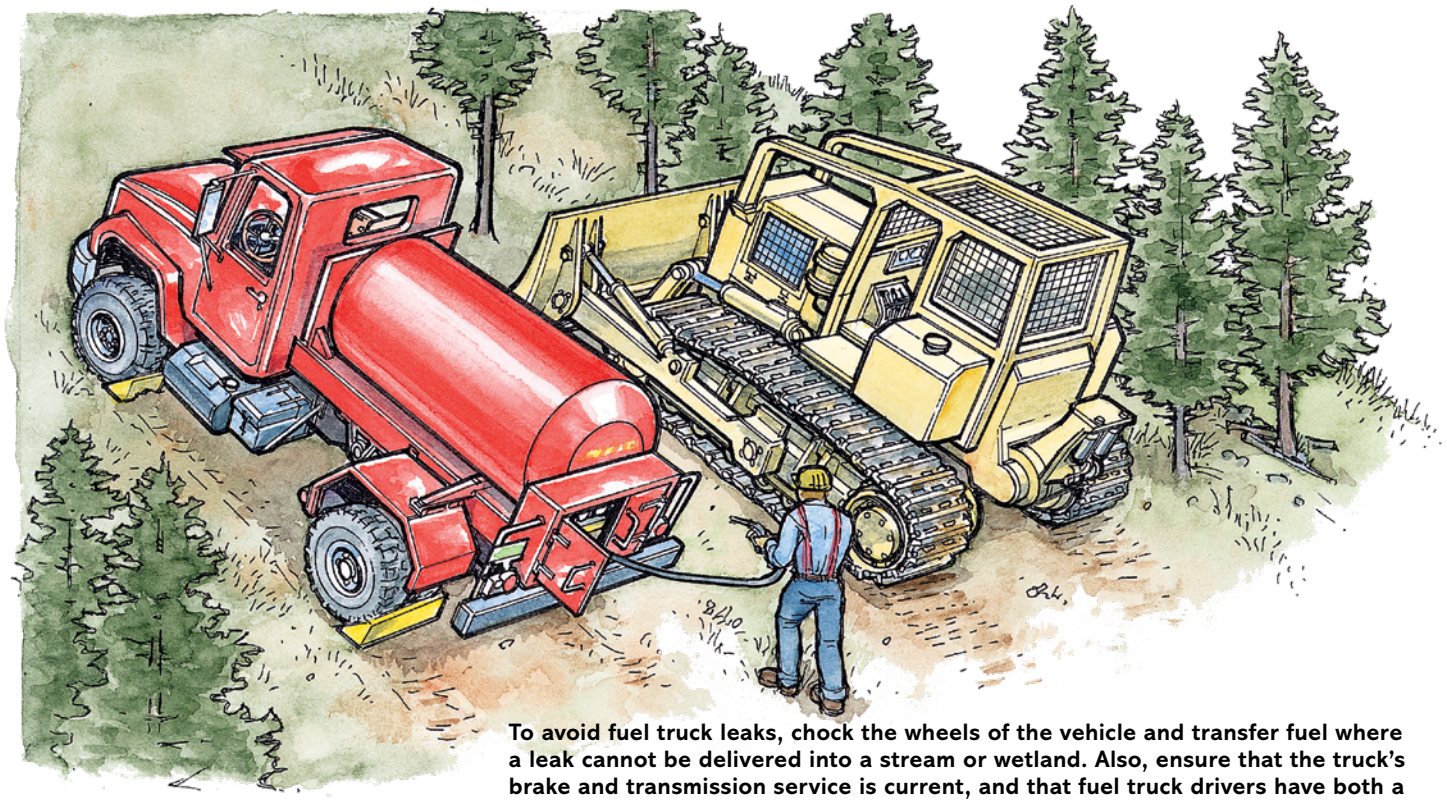
- Minimizing exposure to spills through effective storage, transport, equipment maintenance and housekeeping practices.
- Preparing a company spill plan that identifies prevention and response actions.
- Equipping each jobsite and vehicle with a spill kit, which includes spill absorbents and response instructions.
- Training supervisors and crew about petroleum spill prevention and response.

BEST PRACTICES FOR PREVENTING SPILLS AND UNWANTED DISCHARGES

- Remove and dispose of used containers and other waste.
- Inspect the job site regularly for risky materials and situations.
- Store fluids in rigid, properly labeled containers.
- Store fuel and other chemicals securely.
- Refuel equipment and transfer petroleum or chemicals in locations where spills or discharges cannot enter water.
- Inspect heavy equipment for leaks.
- Secure equipment to avoid damage and leakage.
- Perform necessary maintenance to prevent leaks or discharges, and drain engine oil changes into a container.
- Remove used fluids from the forest for proper disposal or recycling.

Preparing to handle a spill or unwanted discharge

- **Planning**. Make a plan in advance for how to deal with a discharge or spill, including identifying a responsible person(s) who will be in charge in the event of a spill and how to evaluate the discharge, deploy containment measures, respond to the discharge volume or type of chemical, and handle communications and recordkeeping.
- **Spill kits**. Provide spill response kits to jobsites. Kits should contain absorbent supplies (pads, socks, booms) for immediate spill containment, cleanup and communication.
- **Employee training**. Provide training for supervisors and key employees, including information for proper spill prevention, planning and responses.



To avoid fuel truck leaks, chock the wheels of the vehicle and transfer fuel where a leak cannot be delivered into a stream or wetland. Also, ensure that the truck's brake and transmission service is current, and that fuel truck drivers have both a commercial driver's license and hazardous materials transport license.

Disposal of waste from petroleum products

Proper disposal of waste from petroleum and other chemical products includes:

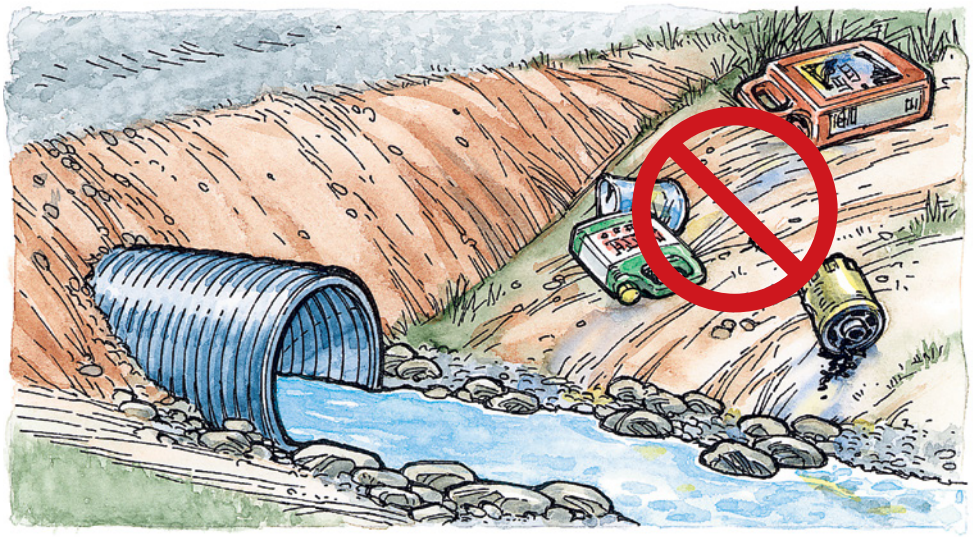
- Removing all petroleum product waste, including crankcase oil, filters, used hydraulic oil, grease and oil containers from the forest.
- Placing absorbent supplies (rags, pads, socks, booms) used to clean up petroleum leaks in plastic bags and removing them from the forest to an approved waste disposal site.
- Disposing of all other mechanical debris (e.g., machine parts, old wire rope, used tractor tracks) so nothing enters water.

Contamination sources

Take precautions to prevent leaks or spills of petroleum products from entering water.

Common sources of contamination by other petroleum products include:

- vehicle fuel tanks
- fuel supply trucks
- waste oil storage containers
- service lubricant supplies
- diesel used for pesticide mixtures



Never dispose of used motor oil or containers in a pit or near water.

Know the requirements and who to contact

In addition to the forest practice rules, landowners and operators who use petroleum products should know when other requirements and state agency oversight may apply. Forest operations involving such products may also be subject to:

- pesticide control laws administered by the ODA (see the Site Preparation chapter)
- hazardous waste laws administered by the DEQ
- hazard communication rules administered by the Oregon Seismic Hazard Database (OSHD)
- water use laws administered by the Oregon Water Resources Department (OWRD)

Waste disposal requirements

All petroleum product waste, including crankcase oil, filters, grease and oil containers, must be removed from the forest.

Dispose of all other debris (e.g., machine parts, old wire rope, used tractor tracks) properly so nothing enters water.

SITE PREPARATION

APPLICABLE OREGON FOREST PRACTICES RULES

Fire control

629-042-0005: Forest protection plans
629-042-0100: Liability of forestland owner or operator, further defined
629-042-1000: Purpose
629-042-1005: Definitions
629-042-1010: Intent
629-042-1015: Certified burn manager certification requirements
629-042-1045: Certified burn manager prohibited actions and activities
629-042-1050: Limitations on the use of certified burn managers
629-042-1055: Landowner required and prohibited actions

Smoke management

629-048-0010: Purpose
629-048-0200: Alternatives to burning
629-048-0210: Best burn practices; emission reduction techniques
629-048-0230: Burn procedures
629-048-0300: Registration of intent to burn
629-048-0320: Reporting of accomplishments

Treatment of slash

629-615-0000: Purpose
629-615-0100: Maintenance of productivity and related values
629-615-0200: Mechanical site preparation near waters of the state
629-615-0250: Protection of soil productivity during mechanical site preparation
629-615-0300: Prescribed burning

Chemical and other petroleum product rules

629-620-0000: Purpose
629-620-0100: Preventing, controlling and reporting leaks and spills of chemicals and other petroleum products
629-620-0200: Protection of water quality during mixing of chemicals
629-620-0300: Locations of mixing, transfer and staging areas for chemicals and other petroleum products
629-620-0400: Protection of the waters of the state and other resources when applying chemicals
629-620-0500: Disposal of chemical containers
629-620-0600: Daily records of chemical applications
629-620-0700: Chemical and other petroleum product rules: effectiveness-monitoring and evaluation
629-620-0800: Notification of community water system managers when applying chemicals

By law, new trees need to outgrow weeds and brush to survive their first few years. Site preparation is integral to making this happen.

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CONTROLLING VEGETATION

Forest landowners and managers may choose to use various chemicals, including pesticides and fertilizers, to help grow healthy and productive forests. Among the most commonly used chemicals in forestry are herbicides, a type of pesticide used to control the growth of weeds and other unwanted plants while a new forest is being planted and established after a timber harvest.

But, if not handled and applied properly, including following the directions on the product label, these chemicals can be a health hazard for people and aquatic life. This section describes the Oregon Forest Practices Act (OFPA) requirements to ensure safe use of these products.

Pest control requirements

Oregon's pest control requirements ensure that:

- Products are not found in the soil, air or water in quantities that could damage water quality, animals or aquatic life.
- Plants in riparian management areas (RMAs) and sensitive resource sites are protected from potential harm from chemicals.

Pest control chemicals

Pest control chemicals are called pesticides. There are several broad classes, and some are used in the forest more than others. Common pesticides include:

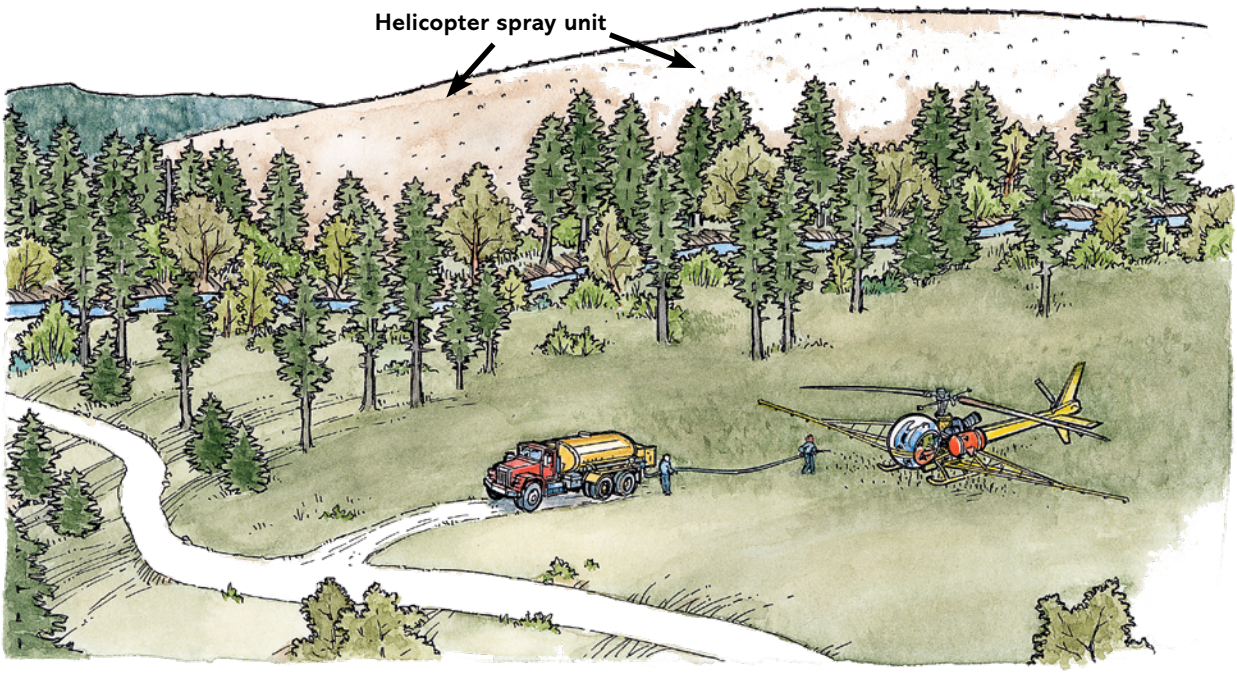
- **herbicides**, which are chemicals used to control plants
- **insecticides**, which are chemicals used to control insects
- **rodenticides**, which are chemicals used to control rodents
- **fungicides**, which are chemicals used to control fungi

Petroleum products are discussed in the Harvesting chapter; some are used in conjunction with pest control chemicals. These products include:

- **oils**, which are sometimes mixed with and used as carriers for pesticides
- "**adjuvants**," which are mixed with pesticides to control drift and help chemicals adhere to foliage
- The state encourages forest landowners and operators to use integrated pest management (IPM) strategies. In this approach to pest and vegetation control, chemicals are just one of a variety of pest control methods available. Find out more about IPM at: **oregon.gov/oda/programs/Pesticides/RegulatoryIssues/Pages/IPM.aspx**.

Hand-operated backpack sprayers and mechanized ground equipment are widely used.

Helicopters are a cost-effective method for applying herbicides on larger forest ownerships. Drones are also becoming more common.



To avoid spills and environmental damage, care must be taken when mixing chemicals, transferring chemicals from containers to equipment, fueling aircraft or heavy equipment, cleaning tanks or equipment, and locating landing or staging areas for aircraft or equipment.

Chemical use requirements from other government agencies

It isn't enough to follow OFPA requirements — the use of chemicals and other petroleum products on forestlands is also subject to the following laws and regulations:

- The Oregon Department of Agriculture (ODA) pesticide control laws apply to commercial operators, who must be trained and licensed so that they understand and follow product label requirements. These laws include the requirement that pesticides not be applied in a faulty or negligent fashion, meaning they must not drift from the target area, resulting in harm to people, their property or the environment. ODA requires reporting pesticide use locations, chemicals, amounts and purposes, through its Pesticide Use Reporting System. Contact ODA for current requirements.
- Oregon Department of Environmental Quality (DEQ) hazardous waste laws require that chemical containers and other chemical waste be properly disposed of, and that spills be cleaned up and reported.
- Oregon Occupational Safety and Health Division (OSHA) hazard communication rules include chemical-handling requirements aimed to protect worker safety and health.
- Oregon Water Resources Department (WRD) water use laws require notifying WRD and the Oregon Department of Fish and Wildlife (ODFW) before mixing chemicals with water taken from streams and lakes by sending copies of the original Notification of Operation forms when those are submitted to the Oregon Department of Forestry (ODF).

Each agency's website can be found through the State of Oregon main website, **oregon.gov/Pages/agencies.aspx**

Importance of planning ahead for any forest chemical use

The OFPA rules require specific timeframes and requirements for chemical use in forests that cannot be modified. These include:

- No waivers are granted for the 15-day waiting period for aerial chemical application operations.
- Written plans are required for any chemical application within 75 feet of a Type F, Type SSBT or Type D stream, or within 300 feet of a specified resource site such as a wetland, special bird nesting site, etc.
- Operators must notify community water system managers at least 15 days before applying chemicals near Type F, Type SSBT or Type D streams.
- Helicopter chemical spray operators must adhere to the required unsprayed buffer distance of 300 horizontal feet from dwellings and school campuses.

Helicopter application of pesticides

Follow these steps when planning an aerial application of pesticides on forestland:

- Notify ODF of the proposed pesticide application.
- Notify those who have registered to receive notice of any proposed pesticide application near their residence. (This requires a 30-day waiting period.)
- Notify ODF one day prior to the planned pesticide application.
- Maintain 50-foot, no-spray buffers for Type N streams with flowing water.
- Maintain a 300-foot, no-spray buffer around inhabited dwellings and school campuses.
- Maintain a 300-foot, no-spray buffer around qualifying domestic water sources.
- Maintain a 75-foot, no-spray buffer for Type F and Type D streams.
- Verify completion of the pesticide application with ODF.

Locating chemical mixing, transfer and helicopter staging areas

Follow these guidelines for locating mixing, transfer and helicopter staging areas:

- Locate the above activities only where a chemical spill would not enter any water bodies.
- Avoid locating mixing, transfer and aerial staging areas within 110 feet of Type F, Type SSBT or Type D streams.

Other precautions that will help protect water and other forest resources include following the labels on chemical products, and maintaining the vegetation left along waterways in compliance with water protection requirements.

Spill kits are used to contain hazardous materials.

How to handle leaks

Avoid chemical leaks by maintaining all equipment in a leak-proof condition during transport, on-site storage and application. Take these steps if a leak occurs:

- Stop using equipment until the leak is corrected.
- Take immediate action to stop and contain leaks or spills.
- Take precautions to prevent leaks or spills from entering water.
- Report any spill that enters or may enter waterways to ODF immediately.
- Report any spill of more than 42 gallons of petroleum, or 25 gallons (or about 200 pounds of a liquid or solid) of pesticide, to the Oregon Emergency Response Center (OERS) at 800-452-0311. Also report spills of any amount that reach streams or other water bodies to the OERS.

Required practices and safe distances when mixing and applying chemicals near water

When using water from a stream or water impoundment for mixing chemicals, prevent chemicals from entering waterways by:

- providing an air gap or reservoir between the water source and mixing tank
- using pumps, suction hoses, feed hoses and check valves that are used only for water

Table 6-1 Buffer requirements for pesticide applications to forestland

	Herbicides, rodenticides and biological insecticides (and all other chemicals except fungicides, non-biological insecticides and fertilizers)			Fungicides and non-biological insecticides		
	Helicopter applications	Other aerial applications[1]	Ground applications	Helicopter applications	Other aerial applications[1]	Ground applications
Water bodies	All distances are horizontal distances from the high-water level			All distances are horizontal distances from the high-water level		
Type D streams	75 ft. or RMA width[2]	60 ft.	10 ft.	300 ft.	300 ft.	10 ft.
Type F and Type SSBT streams	75 ft. or RMA width[2]	60 ft.	10 ft.	300 ft.	300 ft.	10 ft.
Type N streams with flowing surface water at time of application	50 ft.	N/A	N/A	60 ft.	60 ft.	N/A
Type N streams with ponded surface water (not flowing) at time of application	50 ft.	N/A	N/A	50 ft.	N/A	N/A
Significant wetlands[3]	60 ft.	60 ft.	10 ft.	300 ft.	300 ft.	10 ft.
Stream-associated wetlands	Buffer according to the stream type			Buffer according to the stream type		
Large lakes (>8 acres)	60 ft.	60 ft.	10 ft.	300 ft.	300 ft.	10 ft.
Other lakes with fish use	60 ft.	60 ft.	10 ft.	300 ft.	300 ft.	10 ft.
Areas of standing open water >1/4 acre at time of application	60 ft.	60 ft.	10 ft.	300 ft.	300 ft.	10 ft.
Infrastructure and structures	All distances are horizontal distances			All distances are horizontal distances		
Water intakes[4]	300 ft.[5]	N/A	N/A	300 ft.[5]	N/A	N/A
Schools (starting at boundary of school campus tax lot)	300 ft.[6]	60 ft.[7]	N/A	300 ft.[6]	N/A	N/A
Inhabited dwellings (starting at edge of dwelling structure)	300 ft.[6]	60 ft.[7]	N/A	300 ft.[6]	N/A	N/A

All pesticide applicators must be licensed by the ODA (**oregon.gov/oda/programs/Pesticides/RegulatoryIssues/Pages/IPM.aspx**), and attend continuing education classes to maintain their license.

NOTES FOR TABLES 6-1 AND 6-2:

- Comply with pesticide labels which may require wider buffers than shown in Tables 6-1 and 6-2.
- Where two or more protected resources coincide, apply the most protective buffer.
- Direct application of pesticides and fertilizers is not allowed within the minimum buffers in the tables.

1 "Other aerial applications" includes applications by unmanned aircraft systems (drones) and fixed-wing aircraft.

2 Apply the wider of the two buffer widths, either 75 feet or the RMA width in effect on July 7, 2020, which excludes Type SBBT streams in the Siskiyou Georegion. (ORS 527.768 to 527.798.)

3 Significant wetlands include: wetlands >8 acres, estuaries, bogs and important springs in eastern Oregon.

4 Protected water intakes means, "water uses qualifying for a spray buffer" (defined in SB 1602 and ORS 527.786(4)), and identified from Oregon Water Resources Dept. and e-notification registrations.

5 Buffer is required when helicopter pesticide application unit and water intake are in the same "sixth-level hydrologic unit."

6 The landowner or school board requesting the pesticide application may choose to forego all but the inner 60 feet of this buffer.

7 Other aerial herbicide applications only, not other pesticides, ORS 527.762.

Table 6-2 Buffer requirements for fertilizer applications to forestland

	Fertilizers	
	Aerial applications	Ground applications
Waters of the state	All distances are horizontal distances from the high-water level	
Type D streams	100 ft.	100 ft.
Type F and Type SSBT streams, domestic-use portions	100 ft.	100 ft.
Type F and Type SSBT streams, non-domestic-use portions	No direct application	No direct application
Type N streams, large and medium size	No direct application	No direct application
Type N streams, small size	N/A	N/A
Significant wetlands[3]	No direct application	No direct application
Stream-associated wetlands	Buffer according to the stream type	
Large lakes (>8 acres with or without fish)	No direct application	No direct application
Other lakes with fish use	No direct application	No direct application
Areas of standing open water >1/4 acre at time of application	No direct application	No direct application
Infrastructure and structures	All distances are horizontal distances	
Water intakes	N/A	N/A
Schools (starting at boundary of school campus tax lot)	N/A	N/A
Inhabited dwellings (starting at edge of dwelling structure)	N/A	N/A

Protect water from chemicals

When applying chemicals aerially or from the ground, protect water and other forest resources by following the requirements of the chemical product label and by meeting additional protection measures required by the OFPA. Follow these guidelines to protect streams and other water bodies from harm from chemicals:

- Maintain vegetation required to be protected when applying herbicides near or within RMAs or waterways.
- Consider weather conditions such as temperature, relative humidity, wind speed, wind direction, atmospheric temperature inversions and precipitation, which may strongly affect the deposition and drift of chemicals during aerial and pressurized, ground-based chemical applications. Apply chemicals only under weather conditions that will protect non-targeted forest resources and comply with the product label and Oregon law.
- Do not directly apply chemicals by aircraft within 60 feet of the following waters, unless label requirements are more stringent:
  - > significant wetlands
  - > aquatic areas of Type F, Type SSBT and Type D streams
  - > aquatic areas of large lakes
  - > aquatic areas of other lakes with fish use
  - > other areas of standing open water larger than one-quarter acre at the time of the application
- Do not apply chemicals from the ground within 10 feet of the following waters, unless more stringent requirements apply:
  - > significant wetlands
  - > aquatic areas of Type F, Type SSBT and Type D streams
  - > aquatic areas of large lakes
  - > aquatic areas of other lakes with fish use
  - > other areas of standing open water larger than one-quarter acre at the time of the application
- Do not directly apply fertilizers within 100 feet of Type D streams, and the domestic use portions of Type F or Type SSBT streams. For other water bodies, untreated strips are not required to be left by operators when applying fertilizers. However, operators must not apply fertilizers directly to aquatic areas of other Type F or Type SSBT streams or to large and medium Type N streams; significant wetlands; aquatic areas of large lakes; aquatic areas of other lakes with fish use; or other areas of standing open water larger than one-quarter acre at the time of the application.
- Do not apply fungicides directly, or non-biological insecticides by aircraft, within 300 feet of significant wetlands; aquatic areas of Type F, Type SSBT and Type D streams; aquatic areas of large lakes; aquatic areas of other lakes with fish use; or other areas of standing open water larger than one-quarter acre at the time of the application. Do not apply fungicides directly, or non-biological insecticides by aircraft, within 60 feet of the aquatic areas of Type N streams containing flowing water at the time of application.

Term to know

BIOLOGICAL INSECTICIDE means any insecticide containing only naturally-occurring active ingredients including, but not limited to, viruses, bacteria, semiochemicals (pheromones) or fungi.

When using chemicals on forestland, it's important to read and follow the product label instructions to protect water and other natural resources.

- Submit plans for alternate practices that modify the above requirements to the ODF forester. Approval of such plans must be based on written findings by the ODF forester determining that the proposed alternative practice meets one of the following conditions:
  - > An alternative practice is essential to control a fungus or a population of an insect species to reduce damage to, and to better provide for, the overall maintenance of forest resources protected under the OFPA.
  - > Operational or weather condition constraints placed on the application by the plan for alternate practice, in addition to the requirements of the forest practice rules and the product label, will reduce the potential for the fungicide or non-biological insecticide to drift outside the operation area or to enter the water bodies.
  - > Adequate documentation is submitted indicating the potential toxicity to humans and fish populations, or to aquatic invertebrate populations, is lower than the documented toxicity of the fungicide chlorothalonil or the non-biological insecticide carbaryl, as used in forestry prior to Sept. 4, 1996.
- Ensure that aerial chemical applications are parallel to the edge of the water when applying chemicals within 100 feet of:
  - > significant wetlands
  - > aquatic areas of Type F, Type SSBT and Type D streams
  - > aquatic areas of large lakes
  - > aquatic areas of other lakes with fish use
  - > other areas of standing open water larger than one-quarter acre at the time of the application

Effectiveness-monitoring and evaluation

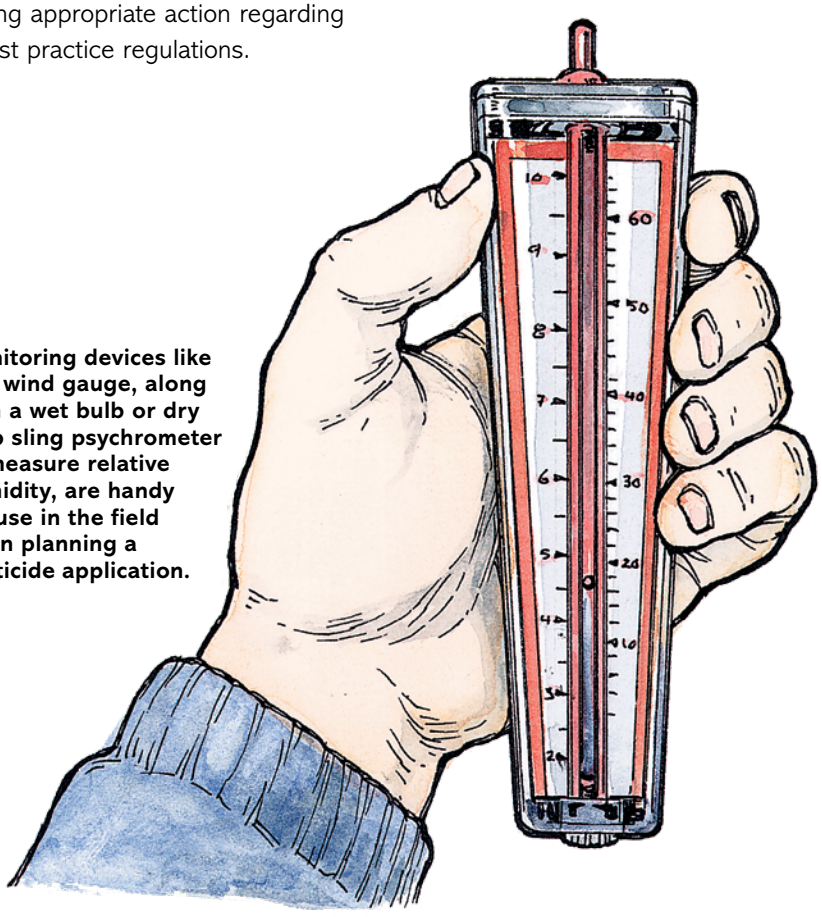
In cooperation with state agencies, landowners and other interested parties, ODF will conduct monitoring to evaluate the effectiveness, workability and operability of the chemical and other petroleum product rules. ODF and its co-operators place a high priority on assessing monitoring needs and securing adequate resources to conduct the necessary monitoring and will work with the Oregon Legislature to secure the necessary resources, funding and coordination for effective monitoring. ODF will report annually to the Oregon Board of Forestry about current monitoring efforts, and will present findings and recommendations for changes to practices in a timely manner. The Board of Forestry will consider the findings and recommendations when taking appropriate action regarding forest practice regulations.

Disposal of chemical containers

Follow DEQ requirements for the disposal of chemical containers (**oregon.gov/oda/programs/Pesticides/Water/Pages/PesticideStewardship.aspx**). The flushing solution used to clean chemical containers may be applied to the operation area.

Consider weather conditions

Temperature, relative humidity, wind speed, wind direction, temperature inversions and rainfall may affect the deposition and drift of pesticides during both aerial and pressurized, ground-based applications. Only apply chemicals when weather conditions protect non-target forest resources and comply with product labels.



Monitoring devices like this wind gauge, along with a wet bulb or dry bulb sling psychrometer to measure relative humidity, are handy for use in the field when planning a pesticide application.

Application records

Daily records must be kept for broadcast chemical applications (applied in a sweeping manner rather than directed at a specific target point) by aircraft or pressurized ground equipment (backpack sprayer or motorized tank sprayer). Templates are available on the ODF website. Information required for each day that chemicals are applied include the following:

- legal description of the area treated
- acreage of the area treated
- brand name or EPA registration number of the chemical used, carrier used and application rate
- date and time of application
- air temperature, relative humidity, and wind velocity and direction, measured within the operation area and recorded hourly for aerial applications, and at the beginning and end of the day for ground applications
- name of the applicator
- name of contractor and pilot for aerial applications
- name of contractor and employee for ground-based applications

Daily records also are required for pesticide applications other than those by aircraft or pressurized ground equipment, such as "hack and squirt" applications.

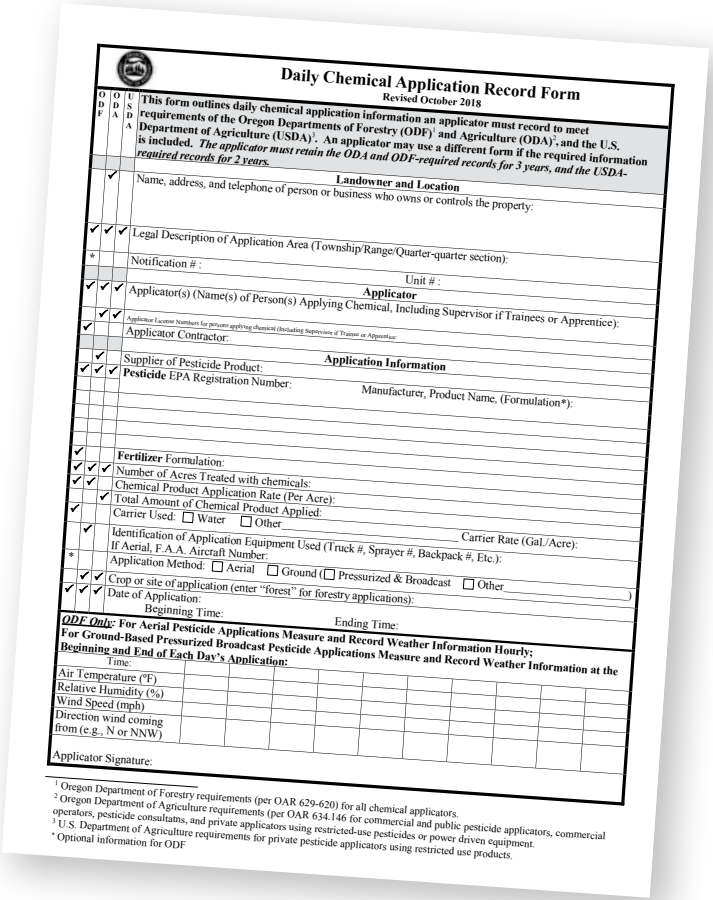
Information needed for each day that chemicals are applied in those cases includes:

- legal description of the area treated
- acreage of the area treated
- brand name or EPA registration number of the chemical used, carrier used and application rate
- date and time of the application
- name of applicator

Fertilizer applications require a record of the following:

- legal description of area treated
- acreage of area treated
- date and time of the application
- name of person making the application

All these records must be maintained by the operator for three years from the date of chemical application and available at the request of ODF.



Daily Chemical Application Record Form
Revised October 2018

ODF | ODA | USDA

This form outlines daily chemical application information an applicator must record to meet requirements of the Oregon Departments of Forestry (ODF)[1] and Agriculture (ODA)[2], and the U.S. Department of Agriculture (USDA)[3]. An applicator may use a different form if the required information is included. *The applicator must retain the ODA and ODF-required records for 3 years, and the USDA-required records for 2 years.*

Landowner and Location

✓ Name, address, and telephone of person or business who owns or controls the property:

✓✓✓ Legal Description of Application Area (Township/Range/Quarter-quarter section):

* Notification # : Unit # :

Applicator

✓✓✓ Applicator(s) (Name(s) of Person(s) Applying Chemical, Including Supervisor if Trainees or Apprentice):

✓✓ Applicator License Numbers for persons applying chemicals (Including Supervisors if Trainee or Apprentice:

✓ Applicator Contractor:

Application Information

✓ Supplier of Pesticide Product:

✓✓✓ **Pesticide** EPA Registration Number: Manufacturer, Product Name, (Formulation*):

✓ **Fertilizer** Formulation:

✓✓✓ Number of Acres Treated with chemicals:

✓✓ Chemical Product Application Rate (Per Acre):

✓ Total Amount of Chemical Product Applied:

Carrier Used: ☐ Water ☐ Other Carrier Rate (Gal./Acre):

✓ Identification of Application Equipment Used (Truck #, Sprayer #, Backpack #, Etc.):

If Aerial, F.A.A. Aircraft Number:

* Application Method: ☐ Aerial ☐ Ground (☐ Pressurized & Broadcast ☐ Other)

✓✓ Crop or site of application (enter "forest" for forestry applications):

✓✓✓ Date of Application: Beginning Time: Ending Time:

***ODF Only*: For Aerial Pesticide Applications Measure and Record Weather Information Hourly; For Ground-Based Pressurized Broadcast Pesticide Applications Measure and Record Weather Information at the Beginning and End of Each Day's Application:**

Time:										
Air Temperature (°F)										
Relative Humidity (%)										
Wind Speed (mph)										
Direction wind coming from (e.g., N or NNW)										

Applicator Signature:

[1] Oregon Department of Forestry requirements (per OAR 629-620) for all chemical applicators.
[2] Oregon Department of Agriculture requirements (per OAR 634.146 for commercial and public pesticide applicators, commercial operators, pesticide consultatns, and private applicators using restricted-use pesticides or power driven equipment.
[3] U.S. Department of Agriculture requirements for private pesticide applicators using restricted use products.
* Optional information for ODF

This form may be used for your records and is available from ODF.

Notification of community water system managers

Chemical applicators must notify water system managers of planned chemical operations at least 15 days before an operation begins when:

- Chemicals will be aerially applied within 100 feet, or ground-applied within 50 feet, of domestic portions of Type F, Type SSBT or Type D streams.
- The community water system watershed area is not larger than 100 square miles.

The water system manager may request additional information. ODF maintains a list of community water systems that must be notified.

SLASH MANAGEMENT

Often, when a timber harvest finishes, some portion of treetops, limbs and defective wood remain on the site. Called slash, this material may require treatment to ready the site for successful reforestation (site preparation), to reduce wildfire hazards or both. Piling, burning and chipping are examples of slash treatments. Slash treatment and site preparation can be done simultaneously or accomplished as a two-step process.

Slash management has many benefits: It can help reduce wildfire hazard; expose tree planting spots, making them easier to reach; and remove vegetation that will compete with newly planted seedlings.

Statutory written plan

A statutory written plan is required if burning will occur within 100 feet of protected resources. If there is potential for the burning to affect components of a riparian management area (RMA) or other site-specific resource, precautions like putting a fire line around the pile should be taken to protect the resource. This and other precautions should be spelled out in the plan.

Burn registration and procedures

Register, notify and pay registration fees to Oregon Department of Forestry (ODF) prior to burning. Once the unit has been burned, details about how much fuel burned, ignition and weather information must be reported by the next business day. Burn fee amounts depend on the completed acreage and burn type (landing pile vs. broadcast). Local ODF district staff issue approvals for ignition with assistance from state meteorologists. Oregon's highly successful Smoke Management Plan meets both air quality and landowner objectives, yet it requires understanding and patience by all parties (**oregon.gov/ODF/Fire/Pages/Burn.aspx**).

Slash after timber harvest and before treatment.

Slash treatment and site preparation

Here are some guidelines for slash management and site preparation:

- Anticipate the slash that the timber harvest is likely to generate, and how it will affect the current wildfire hazard of dead and dying trees, needles and branches on the forest floor, etc. If the harvest is not expected to raise wildfire hazard above your forest's natural wildfire hazard, slash treatment becomes less of a concern. ODF can help you determine whether or not the harvest will raise the natural wildfire hazard.
- Plan on reforestation if it's a Type 1 or Type 3 harvest (see Table 1-1 in the Planning chapter for information about different timber harvest types). The harvest site will likely require some slash treatment because Type 1 and Type 3 harvests leave enough slash to make finding suitable spots for tree planting difficult. Also, if natural forest regeneration is the plan, there may not be enough bare soil to provide a natural seedbed without some slash treatment.
- Consider increased air quality standards and visibility limitations, which can limit the days when slash burning is allowed, especially near larger communities. Plans for slash treatment and any related site preparation that involves using fire should consider the possibility of significant restrictions on burning.
- Remember that, even though onsite slash burning is the traditional treatment to reduce or eliminate slash, newer equipment and technologies provide alternatives, including chipping slash to provide material for biomass energy production. When choosing this option, proximity to biomass energy facilities and road access for chip vans should be considered.
- Minimize slash in water bodies such as streams, springs, ponds and wetlands; as slash rots, it can deplete water oxygen levels.

Reduce slash during timber harvest

Whole-tree harvesting and cut-to-length harvesting are two methods that can reduce slash on the harvest unit (see the Appendix). Because whole-tree harvesting generates significant slash at the landing as yarded trees are topped and delimbed, there may be an opportunity to chip the material and sell it as fuel for biomass energy, eliminating the need for further slash treatment.

In cut-to-length harvesting, a mobile processor cuts, tops and delimbs the tree in the same area. Often, the machine operator can drop the slash in its travel path and crush it enough to reduce the wildfire hazard while leaving openings for later tree planting.

Reduce slash accumulation

Here are some ways to reduce slash:

- Fell and buck trees carefully, to minimize breakage.
- Consider selling woody debris for biomass energy generation.
- Combine machine-crushing of limbs, along with lop and scatter through on-the-ground chainsaw work.
- Grind slash on-site when possible.

Treat slash and prepare the site for tree planting

Typically, slash is treated by machine, burning or a combination of both.

Two machines commonly used for treating slash are excavators and bulldozers equipped with a grapple. Excavators have the advantage of making cleaner slash piles for burning. Confine these ground-based machines to gentle terrain. While they are effective, both machines can cause excessive soil disturbance and water quality problems when they are not used carefully.

This crawler tractor, equipped with a grapple, picks up whole trees and moves them to a landing or roadside.

After limbs and tops are removed at the landing, this slash material is piled and then ground or burned. Whole-tree harvesting brings slash to a central location and disposes of it efficiently, leaving the forest floor ready for replanting trees.

To reduce wildfire hazard, slash can be crushed, cut or lopped, so that it lies close to the ground for rapid decay. This method is effective for light timber harvests, but usually is not adequate slash treatment for heavily harvested areas.

Slash piles free of soil burn cleaner, reduce soil erosion and protect productive topsoil.

When treating slash, stay clear of wet areas.

An excavator has the advantage of picking slash up rather than pushing it. Taller, more compact piles burn efficiently, with little soil disturbance.

The same machine that brings whole trees to the landing may carry slash back and scatter it on the forest floor. This returns nutrients and organic matter to the soil for the next forest. It also protects soil from erosion, especially in skid trails. The fire hazard is minimal because the slash is crushed and close to the ground.

Pros and cons of burning timber harvest slash

PROS

- Reduces fuel loads and related fire hazards.
- Works on steep slopes where vehicles cannot be used.
- Reduces available habitat for unwanted mountain beaver, rabbit and mice that may damage new tree seedlings.
- Controls brush that may compete with new tree seedlings.
- Provides adequate tree planting spots.
- Releases some nutrients and improves soil fertility.

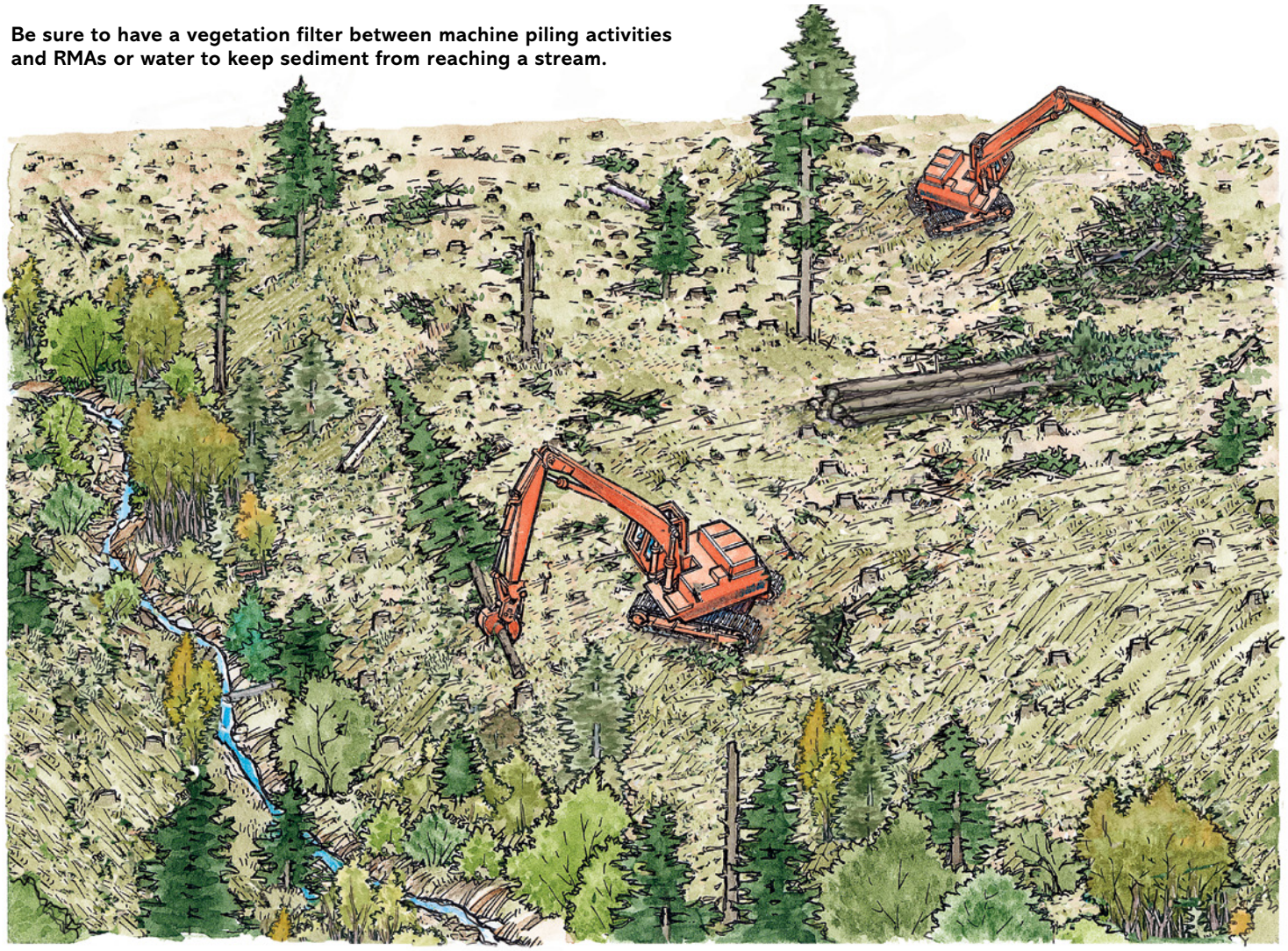
CONS

- Can be costly and risky — the landowner is liable if the fire escapes.
- Burning in winter or spring reduces risk but requires planning and flexible scheduling.
- Potentially unpopular with neighbors and communities because of the smoke generated by burning.
- Extra work and expenses are required to burn during the wet season.
- Requires initial ODF notification, plus often a burning permit, a burn plan and a fee before burning.

Tips for burning slash piles

- Use pile covers. During the dry season, cover a portion of the pile with a waterproof barrier. These covers reduce pollutants by allowing rapid ignition and more complete combustion when burning is allowed. Covered piles allow for safer burning during more desirable wet periods. Drier woody material within the pile favors more rapid and complete combustion, which has fewer pollutants and improves smoke dispersal.
- Burn only approved covers. A plastic sheet (polyethylene) is the only inorganic cover that may be burned legally with a pile. Other covers may be used to keep piles dry but must be removed prior to burning.

- Well-built piles burn better. Properly-constructed burn piles (or windrows) burn more completely, and with less smoke and air pollution. These piles are compact, tall and relatively clean of dirt. They can be constructed by a log loader, excavator or dozer with a brush blade or by hand.
- Burn under proper fuel weather conditions. Conduct burning and light piles only during weather periods approved by ODF for safe burning and good smoke management. Burning during wet weather can achieve project objectives while reducing (but not eliminating) the need for fire control measures, due to decreased risk of escape.
- Some piles may not need to be burned. Not every slash pile or downed log needs burning. Small, scattered piles of woody debris can be left unburned for use as wildlife habitat, unless mountain beaver (boomer) or other pests are a problem. Oregon forest law also requires larger clearcut harvests to retain two pieces per acre of down wood that must not be piled or burned.



Be sure to have a vegetation filter between machine piling activities and RMAs or water to keep sediment from reaching a stream.

Requirements for mechanical site preparation near water

When mechanical site preparation is necessary in RMAs or near water, conduct operations in such a way that sediment or debris does not enter water bodies. Provide adequate distance between disturbed soils and waters of the state to filter sediment from runoff.

Machine piling (see illustration above) is not allowed:

- in RMAs
- on sites with surface or gully erosion
- where subsoil may be exposed, or subsoil compaction is likely to occur

Keep slash out of streams or other waterways. Slash can deplete oxygen levels as it rots and can be a debris torrent hazard in steep reaches.

Using water to help control the slash burn

If you need to draw water from a stream, lake or other water body as part of the burn operation, you must notify both OWRD and ODFW at least 15 days before the water is drawn. Copies of the original ODF Notifications of Operation forms may be used, but specific information about the water use must be included.

Avoid burning slash and other forest fuels

A number of alternatives to burning may be used to reduce, consume or otherwise eliminate timber harvest slash and other forest fuels. These options may be attractive when considering burning costs, unpredictable timing (smoke management) and the risk of fire escape. However, the alternatives can introduce their own costs and other concerns and should be weighed carefully against the advantages of a well-planned burn project.

Non-burning alternatives to treat excess forest fuels include, but are not limited to:

- do nothing and leave woody fuels onsite if slash is light
- cut-to-length or whole-tree harvesting (see the Appendix)
- pre-commercial thinning of smaller or excess trees
- skidding or yarding of unmerchantable wood or tops to the landing
- lopping and scattering of slash on the forest floor
- chipping or grinding on-site or at the log landing
- debarking and/or chipping of pulp fiber at the landing
- mechanical crushing of slash
- cutting or digging tree planting spots prior to reforestation
- herbicide treatment to kill unwanted and competing vegetation

Use of biomass

Interest and activity in biomass is growing. Biomass utilization involves removing slash and other excess woody debris from forests and then chipping or grinding it into fuel for renewable energy generation. Find out if it's an option for you by determining if tonnage prices cover the costs (of biomass collection, processing and transport), and integrating plans for biomass utilization with other timber harvest and management objectives. With new biomass energy facilities that reduce transport costs and other related efficiencies, plus market incentives, biomass is becoming a more attractive option for landowners.

Prescribed burning with a helitorch is becoming a less common way to reduce slash as whole-tree cable harvesting and other approaches become more common.

Forest slash, also known as biomass, has many uses, including renewable energy generation.

PRESCRIBED BURNING

A controlled or prescribed burn can help achieve reforestation, maintain forest health, improve wildlife habitat and reduce fuel and wildfire hazard, as long as it follows guidelines and requirements that protect air and water quality, and fish and wildlife habitat. State regulations governing prescribed burning ensure that necessary burns are planned and managed to maximize benefits and minimize potential detrimental effects.

Prescribed burning includes burning piles, understory burning, or broadcast-burning, which entails burning slash across the entire unit. As a controlled fire, it consumes tree harvest slash, unwanted vegetation or other wildland fuels. When used under carefully monitored conditions, including local wildfire hazard, weather, fuel moisture, proximity to populated areas and time of day, it can be an efficient and effective forest management tool. Burning should be prescribed for specific purposes and conducted by professionals with experience lighting, controlling and extinguishing such fires. Prescribed burning removes fuels that could otherwise make a future wildfire far more destructive when those fuels have accumulated to hazardous levels. It can also prepare sites for reforestation by adding nutrients and removing thick logging slash and competing vegetation.

It is common for controlled burns to be integrated with mechanical thinning or tree harvest operations that redistribute and reduce excess woody fuel-loading. This keeps prescribed burning feasible and safe. Safe burning requires careful attention to forest fuel loads and the location of the planned burn. Removal of a portion of the fuels through timber harvest is a common part of an integrated management strategy.

On steep slopes, prescribed burning can be an effective way to limit soil disturbance while controlling fuels and enhancing reforestation.

Options for treating excess fuels and unwanted vegetation by burning include:

- piles at the roadside or log landing
- "jackpot" or windrow piles in the timber harvest unit
- broadcast-burning of slash in the harvest unit
- spot-burning of unpiled slash concentrations
- under-burning below a well-spaced tree canopy

Prescribed burning can be a valuable management tool, but forest landowners and operators must follow important steps to control smoke and the risk of the fire escaping and causing a wildfire.

Prescribed burns versus wildfire

Wildfires are destructive, polluting, unpredictable, dangerous and costly to control. In contrast, prescribed burning uses small, prescribed fires during ideal meterological conditions, when smoke can be reduced and kept away from communities. Prescribed burning is only allowed when weather conditions favor good fire control and smoke dispersal to maintain air quality. In areas such as central and eastern Oregon, carefully prescribed forest thinning and prescribed burning can mimic the natural, low-intensity wildfires that historically "managed" many forests. Although prescribed burning generates smoke and carries some risk of escape, the catastrophic wildfires they help to avoid by reducing fuels can cause much greater problems.

Avoid smoke problems

The Oregon Department of Forestry (ODF) regulates burning on forestlands throughout Oregon under the state's Smoke Management Plan, which is widely regarded as the most successful forest burning program in the western U.S. ODF monitors weather conditions and provides daily forecasts, and issues burning instructions to landowners who have registered to conduct burning projects. ODF coordinates thousands of burning requests statewide from private and public forest landowners and managers. ODF's strict oversight and regulation of forest burning projects help to minimize air quality impacts and smoke intrusions into populated and smoke-sensitive receptor areas.

OREGON'S SMOKE MANAGEMENT PLAN GOALS

- protect public health and reduce long-term air pollution from wildfires
- minimize burn smoke intrusions into designated cities and wilderness areas
- maximize burning opportunities while minimizing smoke emissions
- help accomplish forestry fuel reduction and reforestation objectives
- actively monitor and report accomplishments for continuous improvement
- self-fund the program with burning registration fees

ODF administers the Smoke Management Plan, including handling burn permits and fees, burn condition monitoring and approvals, and annual reporting. See **oregon.gov/ODF/Fire/Pages/Burn.aspx**.

Requirements for burning on forestlands

Prescribed burning involves some risk. A prescribed burn must be well planned and conducted under strict environmental and meteorological conditions to keep the fire fully confined. Burn managers must prevent the burn from becoming uncontrolled by using skilled burn crews, installing fire lines and ensuring containment through adequate equipment and personnel.

The potential liability for suppression costs and damage to adjoining property may deter some landowners from burning projects, since the liability from fires from other forest operations also applies to prescribed burning. In addition, allowable burning days and other restrictions can be more stringent for forestlands near population centers and locations where smoke disperses more slowly, such as the Willamette Valley and the Medford area.

Burning projects on forest lands must address the following:

- Any burning activity must be registered with the Oregon Department of Forestry (ODF) by obtaining a burning permit at least seven days before the planned ignition. A written burn plan is required in some situations.
- Fees are due with burning permit registration and are calculated on a per-acre basis that varies according to site location, burn acreage and burn type (e.g., landing, piles, broadcast).
- Burn plans and implementation must consider protection of air, water quality, and fish and wildlife habitat.
- Burning must protect trees left after timber harvest, riparian buffers and soil productivity.
- Burning must maintain vegetation required under the forest practice rules, including riparian management areas (RMAs) for streams, lakes and wetlands (see below).
- Burn area and intensity should be limited to only what is needed for reforestation or fuel hazard reduction.
- At least one day before igniting the burn, the landowner or operator must call the local ODF office for clearance to burn, which is subject to favorable conditions.
- Those requesting ignition approval should be prepared to provide specific information about the burn, including fuel load amounts and the planned ignition time.
- Ignition activity must not start — or if already begun, must be discontinued — if weather or other conditions change and are no longer within ODF-approved limits.
- Burn completion must be reported to ODF within one business day following each days ignition for all prescribed burning.

Burning near streams, lakes and wetlands

Burning near streams, lakes and wetlands involves additional resource risks, therefore a written plan is required when burning is expected within:

- 110 feet of Type F, Type SSBT and Type D streams
- 100 feet of large lakes
- 300 feet of significant wetlands
- The written plan should describe, as needed, how detrimental effects will be minimized:
- in RMAs
- on highly erodible soils
- for any required wildlife trees, snags, down logs and understory vegetation

Planning and conducting prescribed burning

Comply with the rules of Oregon's Smoke Management Plan and be sure to:

- Protect reproduction and residual timber, humus and soil surface.
- Consider possible detrimental effects of prescribed burning to RMAs, streams, lakes, wetlands and water quality, and how these effects can be best minimized.
- Lay out the unit and use harvesting methods that minimize detrimental effects to RMAs, streams, lakes, wetlands and water quality during the prescribed burning operation.
- Fell and yard the unit to minimize accumulations of slash in stream channels, and within or adjacent to RMAs.
- Minimize fire intensity and the amount of area burned to that necessary to achieve reforestation, forest health or hazard reduction needs.

Operators must describe in a written plan how detrimental effects will be minimized when burning within:

- 110 feet of Type F, Type SSBT and Type D streams
- 100 feet of large lakes
- 100 feet of wetlands larger than eight acres (non-estuaries), bogs and important springs in eastern Oregon
- 300 feet of estuaries, especially when burning on highly erosive soils such as decomposed granite soils and slopes steeper than 60%

During prescribed burning, operators must protect resources required to be retained for riparian habitat protection, such as live trees, snags, downed wood and understory vegetation. When the operator has taken reasonable protection precautions, but a detrimental effect occurs, the intent of the rule is considered to have been met if the overall integrity of the RMA is maintained. Operators must not salvage trees killed by prescribed fire in an RMA if the trees were retained for the purpose of protecting riparian habitat.

Protection requirements may be modified through a plan for an alternate practice when the need for prescribed burning outweighs the benefit of protecting components required to be left within the riparian area, aquatic area or wetland. Approval of such a plan must consider the environmental impact and cost of alternative treatments.

It is possible to practice prescribed burning and save down logs.

CERTIFIED BURN MANAGER

Oregon's Certified Burn Manager Program provides oversight of training and certification to ensure the safe and effective use of prescribed burning. Participation in the program is voluntary. Learn more at **oregon.gov/odf/fire/pages/prescribed-fire.aspx**.

Burn manager certification requirements

A burn manager certificate can only be issued to an individual. Other entities, such as partnerships, corporations and limited liability companies, are not eligible for a certificate. Burn manager certificates are subject to the following conditions:

- The individual is authorized to conduct prescribed fires as permitted by the certificate.
- The ODF prescribed fire coordinator will not issue a certificate prior to the receipt of all documents and required fees.
- The ODF prescribed fire coordinator will assign a unique identification number to each certificate issued.
- A certificate is valid for five years, unless it is revoked or surrendered sooner.
- A certificate may be renewed only after having been valid for a minimum of four years.
- A certificate may not be renewed if:
  - > It was revoked pursuant to OAR 629-042-1035(2).
  - > It has been more than six years since it was issued.
- Certificates are not transferable.

Authorized entries:

- A certified burn manager (CBM), ODF prescribed fire coordinator or training provider may document successful completion of a classroom or field training requirement when they have personal knowledge that the person has properly completed the task being documented.
- Notwithstanding the above, the ODF prescribed fire coordinator may document successful completion of a training requirement if the requirements of OAR 629-042-1025(3) have been met.

Training

The ODF prescribed fire coordinator will provide a field certification book, which an applicant must complete before applying for an initial certificate, or applying for a new certificate because the previous one was not renewed. Prior to receiving a field certification book, an individual must submit documentation to the ODF prescribed fire coordinator of successful completion of:

- classroom or correspondence training provided by an approved provider or the ODF forester
- a passing score on a test in accordance with OAR 629-042-1030

An applicant will not receive credit for training completed more than three years prior to the applicant's request for a field certification book. The ODF prescribed fire coordinator may waive this three-year limitation if the individual is applying for historical recognition.

After verification of documentation, the ODF prescribed fire coordinator will issue the applicant a field certification book, which consists of field training that the applicant must complete, including:

- general proficiencies
- pile burning proficiencies
- pile burning and broadcast burning proficiencies

To apply for a certificate to conduct pile burns and broadcast burns, all field training described in the field certification book must be verified as completed with a signature in the field certification book by a CBM or the ODF prescribed fire coordinator. The field certification book will be valid for three years after the date of issuance by the forester.

The ODF prescribed fire coordinator may consider classroom, correspondence, and field training requirements through historical recognition. In lieu of the initial training requirements above, an individual may submit one of the following to the forester:

- Completed copy of an incident qualification card. The Task Book must indicate successful performance in the planning and implementation of prescribed fire.
- Documentation that the individual holds a valid CBM certification in a state with comparable requirements to the state of Oregon.
- Evidence of experience equivalent to the initial training requirements as determined by the ODF prescribed fire coordinator. (The testing requirements must still be fulfilled.)

An individual must complete the following actions prior to applying for a renewal of a certificate:

- Sixteen hours of continuing education within the certification period. The continuing education must be related to prescribed burning and approved in advance by the forester.
  - > The ODF prescribed fire coordinator may approve training presented in a classroom, conference, correspondence course or other acceptable format.
  - > The ODF prescribed fire coordinator will not accept educational training that was completed more than five years prior to the applicant's date of application for renewal of a certificate.
- Supervision of one prescribed burn and participation in two additional prescribed burns during the certification period and prior to applying for a renewal.

Certified burn manager tests

The ODF prescribed fire coordinator will ensure the development and administration of, and set a passing score for, all tests required for burn manager certification. The same test may not be administered to an individual more frequently than once every 30 days.

Individuals taking the test must display approved, government-issued picture identification to the forester or authorized training provider before taking a test and are required to comply with all test-taking requirements established by the forester or authorized training provider. Individuals must successfully pass a test before requesting a field certification book from the ODF prescribed fire coordinator.

Individuals who are unsuccessful in passing the test may request a review of the decision by the Certified Burn Manager Advisory Committee within 30 days of receiving the test result. The committee will conduct the review at its next scheduled meeting after receiving the request for review. Following the review, the committee may either affirm or withdraw the test result by majority vote. The forester or the individual may appeal the committee's decision to the Board of Forestry. Any final resolution by the board will be prepared as a final order, and any further appeal of the final action must be made as prescribed by ORS 183.484.

Required actions and activities of certified burn managers

A CBM must complete the following activities before supervising a prescribed burn:

- Prepare or review a plan prepared in a format approved by the ODF prescribed fire coordinator prior to ignition of a prescribed burn.
- Notify ODF prior to ignition.
- Confirm that notification of a prescribed burn has been made to adjacent landowners prior to ignition.
- Be present on-site and maintain active supervision of the resources used on any prescribed burn, from ignition through mop-up.
- Be readily available to return to a prescribed burn until:
  - > the prescribed burn has achieved the conditions documented in the prescribed burn plan for transfer of responsibility to another person; or
  - > giving notice of termination of responsibility

A CBM must give notification to the local fire protection district when assuming responsibility for a prescribed burn and when those responsibilities terminate. Notification can be made by phone to the district where the burn is being conducted and must be made before ignition and within two hours of terminating responsibility.

A CBM must not permit any dangerous or adverse situation on a prescribed burn for which they have responsibility. Additionally, the burn manager must cooperate fully with any investigation undertaken by the forester pursuant to OAR 629-042-1035(1).

When reported or observed dangerous or adverse situations occur under the responsibility of a CBM, ODF will investigate, and the certificate may be revoked no sooner than 30 days from the date of notice.

Landowner responsibility when using a CBM

A landowner who uses a CBM to supervise a prescribed burn must make a genuine attempt to notify all adjacent landowners about the prescribed burn. Notification must be made not more than 90 days before ignition of the prescribed burn, and a copy of the prescribed burn plan must be provided to any nearby landowner who requests one.

Once the prescribed burn is ignited, a landowner must not terminate the CBM's responsibility unless:

- responsibility has been transferred to another CBM or the landowner
- the local fire district has been notified

Certified burn manager limitation

A CBM shall only supervise:

- prescribed burning activities as identified within an approved prescribed burn plan;
- prescribed burning they are certified to conduct; and
- prescribed burning conducted within a forest protection district, as identified in OAR 629-041-0500 through 629-041-0575.

REFORESTATION

APPLICABLE OREGON FOREST PRACTICES RULES

Planning forest operations

629-605-0140: Notification to the state forester — types of operations
629-605-0173: Plans for an alternate practice

Forest practices reforestation rules

629-610-0000: Forest practices reforestation rules
629-610-0010: Forestlands suitable for reforestation
629-610-0020: Reforestation stocking standards
629-610-0030: Natural reforestation methods
629-610-0040: Time allowed for reforestation
629-610-0050: Acceptable species for reforestation and residual stand stocking
629-610-0060: Use of non-native tree species
629-610-0070: Suspension of the reforestation rules
629-610-0080: Revegetation when reforestation is not required
629-610-0090: Exemption from reforestation for land uses not compatible with forest tree cover
629-610-0100: Exemption from reforestation for wildlife food plots

The purpose of the reforestation rules is to establish standards to ensure timely replacement and maintenance of tree cover following forest operations.

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REFORESTATION IS THE LAW

Each year, millions of new seedlings are planted in Oregon to replace harvested trees. Harvest areas that require reforestation must be replanted within two years once logging is completed. Within six years, those seedlings must be "free-to-grow" and "well-distributed." The law is clear: It is the responsibility of the landowner to establish the next generation of trees after a harvest.

"Free-to-grow" and "well-distributed"

Reforestation involves more than just planting seedlings or saving seedlings, saplings or poles on the harvest unit. To meet the requirements at the end of six years, the harvest unit must be a stand of freely growing, well-distributed trees, of acceptable species and form, with a good chance of becoming healthy and taller than neighboring, competing grass and brush.

An effort must be made to reforest the entire harvest unit. However, the unit will be considered adequately stocked and the trees well-distributed if 80% or more of the harvest unit has at least the minimum required per-acre tree stocking. No more than 10% may contain less than one-half of the minimum per-acre tree stocking required for the site class.

These allowances are not loopholes in the reforestation standards, but rather reflect the variable results that may occur even when initial plantings are well-distributed. It's usually a good idea to plant extra trees to account for those that may die or not reach free-to-grow status after six years.

Above: These ponderosa pine are free-to-grow. Right: This Douglas-fir is not free-to-grow.

Planning for reforestation goes hand in hand with timber harvest planning. The harvest activity often triggers both the need and the time limits for reforestation. Harvest machines and activities can be used in ways that promote successful reforestation. Some income from the harvest usually is budgeted for purchasing seedlings and paying for other reforestation-related expenses.

Landowners should order seedlings one to two years before they need them. The Oregon Department of Forestry (ODF) has helpful information on ordering and purchasing seedlings (see PDF at **KnowYourForest.org/manual-links**). Reforestation and seedling information is also available on **KnowYourForest.org**.

Required reforestation

Timely reforestation of forestland is essential following operations that reduce the number of trees below Oregon's established tree-stocking standards, to ensure continuous growth and harvesting of forest trees.

Reforestation is required any time tree stocking after harvest is below the minimum standards, even if harvest occurs in a riparian area. This applies regardless of what the tree stocking was before the harvest.

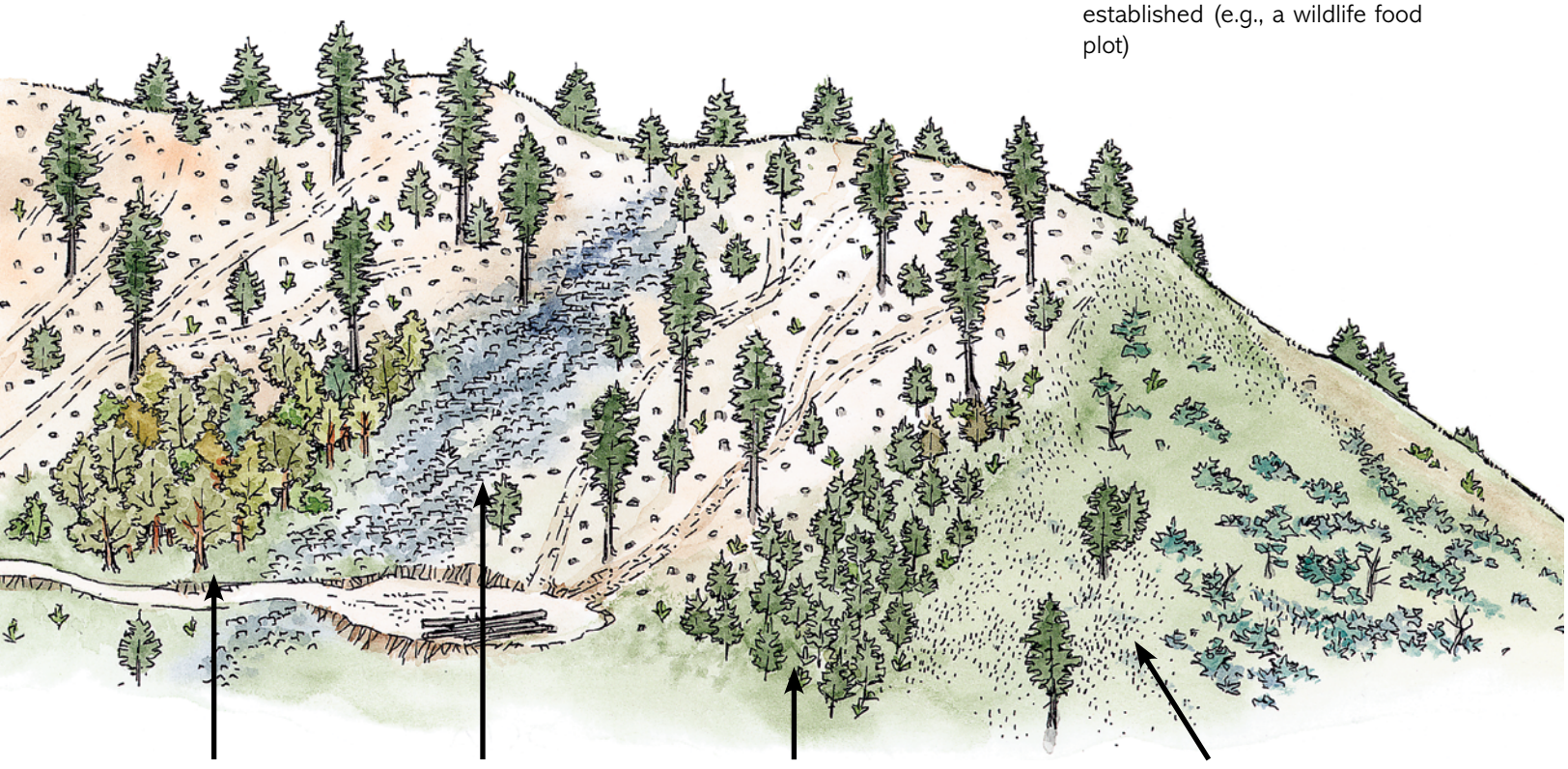
The landowner is responsible for reforestation, regardless of who cuts the trees. When the land is sold, that obligation transfers to the buyer if the reforestation requirements are not completed. By law, the seller must inform the buyer in writing of any remaining reforestation requirement. Know your legal obligations whether you're a land buyer or seller.

Any forestland of Site Class VI or lower is subject to the requirements of the reforestation rules. See the Planning chapter.

Reforestation is not always required

Reforestation is not required on these portions of the harvest area:

- where adequate free-to-grow tree stocking remains after logging is complete (Type 2 and Type 4 harvests)
- sites that are not disturbed by logging operations
- sites lower than Site Class VI
- where an approved plan for alternative action has been established (e.g., a wildlife food plot)



This harvest unit includes portions that don't require reforestation. For example, you are not required to plant areas that were not disturbed where young conifer reproduction and hardwoods are growing; areas with very shallow soils that don't support trees; and areas that are lower than Site Class VI.

Required trees per acre

Use Table 6-1 to determine the minimum stocking requirements for high-, medium- or low-elevation site class harvest units. You can meet the requirements by either planting seedlings (Column 2), leaving adequate saplings or poles (Column 3), leaving adequate basal area in trees 11 inches and larger (Column 4), or a combination of the three. Combinations are determined by using the "equivalent calculation." All these choices can and should be made when you plan your timber harvest. To learn more about calculating basal area, see page 178 at the end of this chapter.

Table 6-1 Reforestation requirements for high, medium and low site classes

Site class	Seedlings (less than 1 inch DBH) or →	Saplings & poles (1-10 inches DBH) or →	Trees 11 inches and larger
High (Site Classes I, II and III)	200 per acre, or	120 trees per acre, or	80 square ft. of basal area per acre
Medium (Site Classes IV and V)	125 per acre, or	75 trees per acre, or	50 square ft. of basal area per acre
Low (Site Class VI)	100 per acre, or	60 trees per acre, or	40 square ft. of basal area per acre

Note that these are the minimum numbers of free-to-grow trees required. As reforestation plans are developed, it's important to consider local conditions and whether all planted and residual trees can be expected to grow and thrive. In addition, the minimum stocking levels may not meet your management objectives.

Seedlings are live trees of acceptable species of good form and vigor less than 1 inch in diameter at breast height (DBH).

Saplings and poles are live trees of acceptable species of good form and vigor, with a DBH of 1 to 10 inches.

Table 6-2 Tree number and equivalent tree spacing

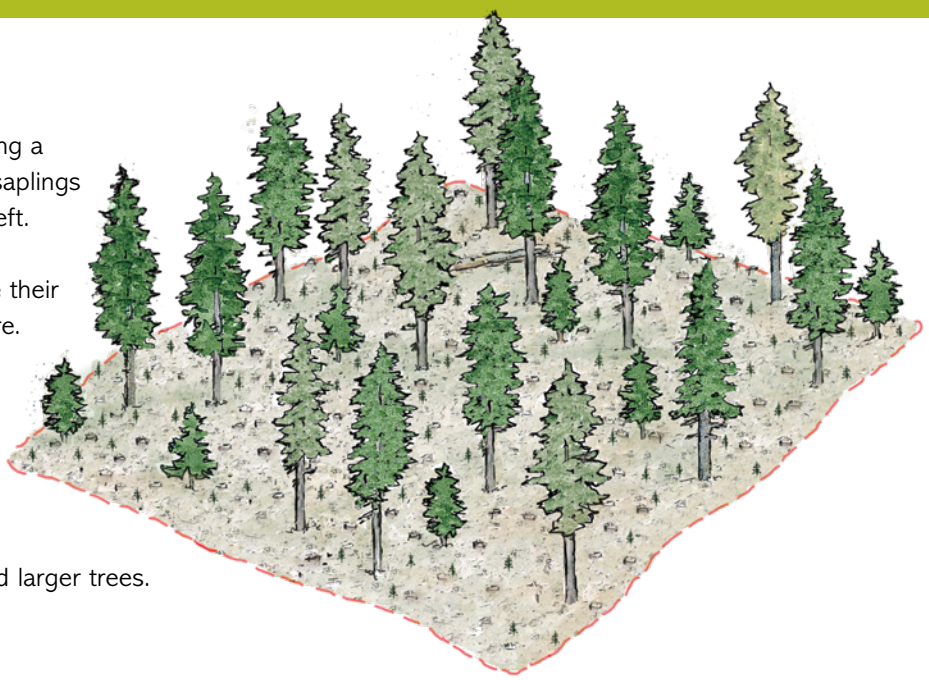
Trees per acre	Average spacing (feet)
435	10
300	12
200	15
125	19
120	19
100	21
75	24
60	27

Table 6-2 converts the number of trees per acre to average spacing. For example, if the average spacing between remaining saplings and poles on your Site Class IV harvest unit is approximately 19 feet, you have more than the required 75 trees per acre (saplings or poles, not seedlings).

Between 300 and 435 trees per acre are included in Table 6-2 because higher planting densities are often used on better sites, as well as to account for factors that affect how many trees make it to the free-to-grow stage, such as animal damage, brush competition and mortality. The first few years after harvest are critical for seedling survival and growth. Promptly planting suitable seedling stock, controlling competing brush and other measures can help ensure reforestation success. Seek out technical assistance and local expertise, if needed.

Reforestation for partial cuts

The equivalent calculation is useful if you're planning a timber harvest in which some areas of seedlings, saplings and poles, as well as healthy larger trees, will be left. Such a harvest could reduce the need for hand-planting new seedlings, but you need to determine their equivalent value. Use the calculation described here.



Note: Regardless of the site class, the following are equal to one another:

100 seedlings
= 60 saplings and poles
= 40 square feet of basal area of 11-inch DBH and larger trees.

Equivalent calculation formula

NEW TREES = RULE STANDARD – [# SEEDLINGS + (# SAPLINGS AND POLES ÷ 0.6) + (BASAL AREA ÷ 0.4)]

New trees are the minimum number of additional free-to-grow seedlings that must be established per acre to meet the Table 6-1 standard.

Rule standard is the site class seedling standard listed in Table 6-1 (200, 125 or 100 seedlings per acre, depending on site class).

 # seedlings means the number of free-to-grow seedlings per acre that were left after harvest.

 # saplings and poles means the number of free-to-grow saplings and poles per acre that were left after harvest. This is divided by the equivalent factor (0.6). This includes wildlife trees and trees left in patches.

Basal area means basal area per acre of free-to-grow trees greater than or equal to 11 inches DBH that were left after harvest. This is divided by the equivalent factor (0.4).

HERE'S AN EXAMPLE:

This Site Class IV, Type 3 harvest has the following trees remaining after the harvest.

Average seedlings per acre = 35
Average number of saplings and poles per acre = 8
Average basal area per acre of trees equal or greater than 11 inches DBH = 15

Use the equivalent calculation formula to determine seedling equivalents:

8 saplings and poles per acre ÷ 0.6	= 13 seedling equivalents
15 square feet of basal area per acre ÷ 0.4	= 38 seedling equivalents
35 + 13 + 38	= 86 seedling equivalents

Site Class IV reforestation requirements (Table 6-1) call for a minimum of 125 seedlings per acre, or equivalent larger trees. The equivalent calculation shows that stocking is not adequate. An additional 39 seedlings per acre must be planted, as shown in the calculation below.

FROM THE EQUIVALENT CALCULATION FORMULA:

125 tree standard – (35 + 13 + 38)
= 39 new seedlings to be planted per acre.

Table 6-3 Equivalent reforestation standards for trees of varying diameters							
Avg. DBH of trees 11" or greater	Basal area (ft^2) per tree	# Trees equal to 80 ft^2 BA per acre	Avg. space between trees (feet)	# Trees equal to 50 ft^2 BA per acre	Avg. space between trees (feet)	# Trees equal to 40 ft^2 BA per acre	Avg. space between trees (feet)
11	0.66	122	19	76	23	61	26
12	0.79	102	21	64	26	51	29
14	1.07	75	24	47	31	37	34
16	1.40	58	27	36	35	29	39
18	1.77	46	31	28	39	22	44
20	2.20	37	34	23	44	18	49
22	2.60	31	37	19	48	15	54
24	3.14	26	41	16	52	13	58
26	3.69	22	44	14	56	11	63
28	4.28	19	48	12	60	10	68
30	4.90	17	51	11	63	8	73
32	5.58	15	54	9	69	7	78

Reforestation standards for larger trees left on the unit

When planning a harvest in which trees 11 inches in diameter or larger will be left, the basal area of these trees determines whether the reforestation standards (Table 6-1) will be met. Table 6-3 shows the basal area (Column 2) for individual trees with diameters ranging from 11 to 32 inches DBH. For a given average tree diameter, the other columns show the number of trees per acre that equal the reforestation standards of 80, 50 or 40 square feet of basal area, and the average spacing between those trees. This helps in assessing and planning for reforestation needs.

FOR EXAMPLE:

Let's say you're planning to harvest on a Site Class III. You know from Table 6-1 that at least 80 square feet of basal area per acre of 11 inch or greater DBH trees must be left to meet the reforestation standards.

According to Table 6-3, 80 square feet of basal area could be 122, 11-inch trees with average spacing of 19 feet, or it could be 15, 32-inch trees with average spacing of 54 feet, or some other combination of average diameter and spacing for the trees you must leave.

Note the importance of site quality: Another harvest is planned on a Site Class VI area, which has a reforestation requirement of 40 square feet of basal area per acre. You would need to leave 61, 11-inch trees with an average spacing of 26 feet, or seven 32-inch trees with an average spacing of 78 feet.

In either case, if the minimum basal area can't be maintained with the expected harvest removals, you need to plan for tree planting to meet the reforestation requirements.

Above: Wildlife trees in upslope areas should be in groups of at least 15 trees. Right: One of the best places to leave wildlife trees is adjacent to riparian areas.

Wildlife trees may count toward reforestation requirements

Live trees left standing to provide wildlife habitat that meet Oregon's wildlife tree standards may be counted toward reforestation stocking requirements if they are free-to-grow. Live conifer trees 11 inches DBH and larger left standing in harvested areas to meet the wildlife tree and snag requirements will be counted toward reforestation stocking standards if the trees are free-to-grow.

To meet both reforestation and wildlife tree requirements, trees must be conifers at least 11 inches DBH, 30 feet tall and free-to-grow. The law allows these conifers to be double-counted. This is an incentive for landowners to retain free-to-grow conifers, rather than hardwoods, as wildlife trees. In general, conifers live and last longer and are used by more wildlife species.

The best place to leave these trees is adjacent to riparian areas or in upslope areas in groups of at least 15 trees. These trees can also be left to anchor important features such as seeps, springs or headwater areas.

Trees in retention areas such as riparian management areas

Tree stocking in riparian management areas (RMAs) within an operation area are considered separately from stocking in the rest of the operation area, in determining compliance with the tree stocking requirements of the reforestation rules.

Since the purpose of an RMA is water protection, it's important that RMAs are planted after harvest. You're not allowed to leave understocked openings in the RMA where harvesting has occurred. Landowners are expected to do site preparation and planting inside RMAs, and make good-faith efforts to reforest streamside areas. ODF determines if a reasonable effort has been made. However, a slightly lower level of stocking in an RMA is preferable to repeated chemical or mechanical methods to achieve full stocking.

Free-to-grow trees left in the undisturbed parts of the RMA cannot be counted toward the required stocking of the disturbed area. Similarly, reforestation is not required in understocked parts of the RMA if they were not disturbed by the operation.

Reforestation timeline

The time period begins at the completion of the harvest operation or 12 months after tree stocking has been reduced, whichever comes first.

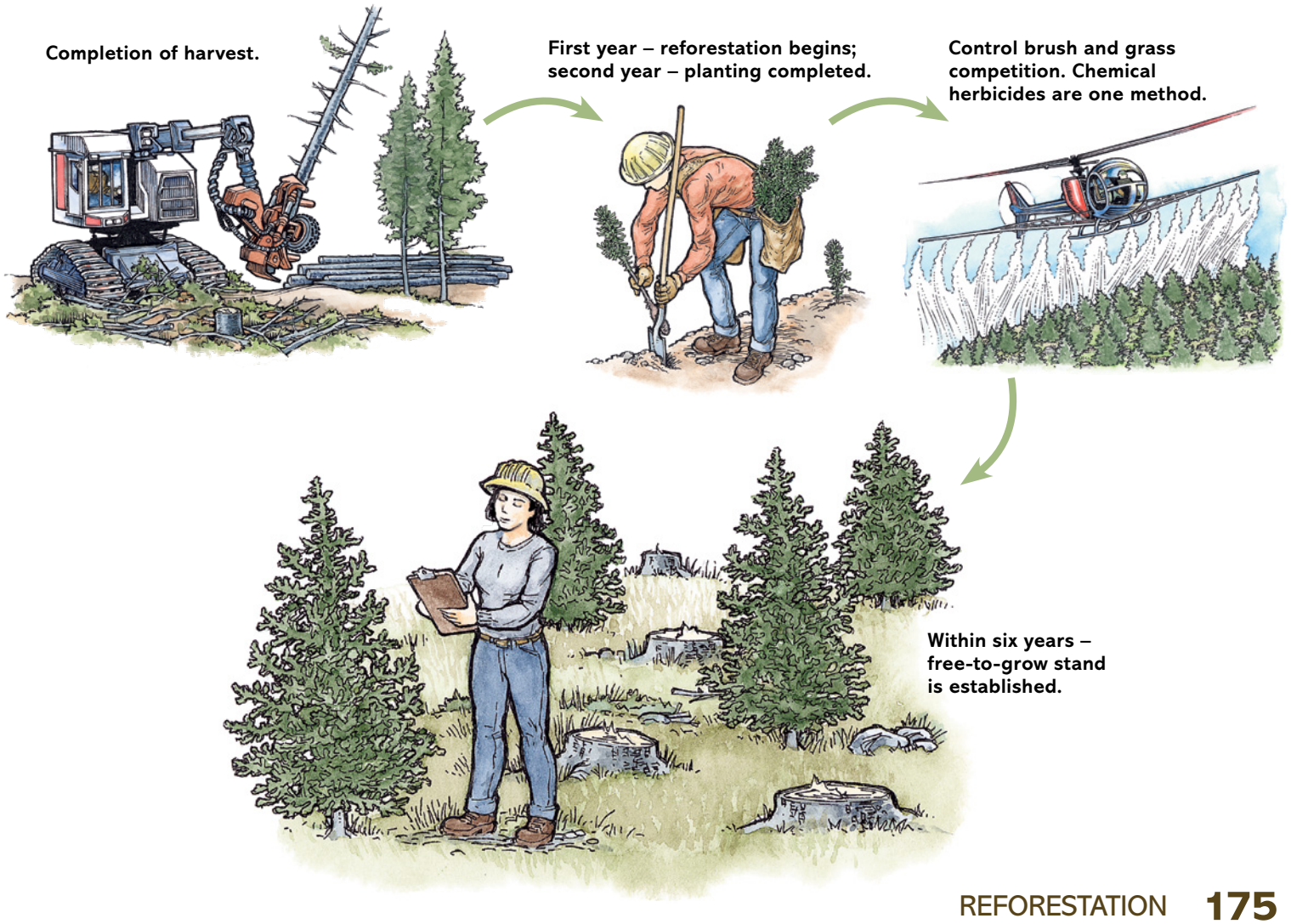
Completing the operation means the timber harvest has been completed and the harvest unit will not be disturbed again. Usually when the yarding process ends, the harvest is considered completed. To prevent delays in reforestation, the compliance schedule begins no later than 12 months after tree stocking is reduced, meaning 12 months after felling begins.

If the harvesting activity extends for a long time, reforestation may be required to begin on a finished portion of a harvest unit even though other parts are not completed.

Whether you intend to depend on natural reforestation, hand-plant seedlings or plant seed, once the clock starts, you have 12 months to start reforestation activities such as planting site preparation and ordering tree seedlings. For example, if yarding ends on May 1, you should begin site preparation and order seedlings in the next 12 months. Planting could occur during the coming winter or spring if site prep is completed and seedlings are available. Site preparation is often tied to slash treatment.

If you intend to hand-plant seedlings or plant seed, this must be done within 24 months of when logging was completed unless ODF has approved a written plan for natural reforestation. Remember, reforestation timing is critical if your timber harvest is completed in the fall. For example, if the harvest ends Oct. 1, site preparation activities such as slash burning or herbicide spraying may not be possible due to weather. The first planting season (December to April) could be lost. In this case, site preparation would have to be completed before the second planting season, so that planting could be done during that season.

An adequately stocked, free-to-grow stand must be established by Dec. 31 of the sixth year after the reforestation compliance period has started. For example, all operations completed in 2024 that depend on hand-planting seedlings or planting seed must have a free-to-grow stand established before the end of 2030. Six full calendar years are allowed to establish the next generation of trees.



Using natural reforestation can be less costly than hand-planting, but its reliability varies. A written plan is required for natural reforestation.

Natural reforestation

Natural reforestation relies on natural processes to reforest a harvest unit. It is acceptable with a written plan approved by ODF. On Site Class VI or other harvest units with poor soils or harsh climates, natural reforestation may be the best way to reforest. In the case of wetlands with high-water tables, competing vegetation and limited accessibility, natural reforestation may have greater success than hand planting.

Landowners may submit plans for alternate practices such as natural reforestation that do not conform to the reforestation stocking standards. A plan for alternate practices may be approved if ODF determines there is a high probability that the purpose of the reforestation rules will be achieved.

Landowners must submit a written plan to ODF for an alternate reforestation practice within 12 months of tree stocking reduction. The plan should describe how reforestation will be accomplished, and should include the following:

- seed sources to be used
- site preparation methods
- vegetation competition control methods
- time estimate to obtain a free-to-grow stand
- how progress will be evaluated
- what will be done if reforestation does not progress as planned

Time limits for natural reforestation may differ.

When natural reforestation is planned, the time limits for evidence of successful germination and for establishing a free-to-grow stand of trees that meets or exceeds the minimum stocking level required for the site shall be established in the approved written plan required for such methods.

A natural reforestation plan must provide specific time limits for site preparation, evidence of reforestation success, and establishment of a free-to-grow stand. The deadlines should not be shorter than six years and rarely longer than 10 years.

Reforestation extensions

Extensions are granted when reforestation cannot be accomplished within six years due to circumstances beyond the landowner's control. Those circumstances are determined by ODF and may include:

- tree nursery failure
- inadequate availability of seedlings after salvage harvesting
- extreme drought
- insect infestations
- smoke management restrictions on slash burning
- wildfire or disease damage
- severe wildlife damage that could not be reasonably anticipated or controlled

You must submit a written request for an extension to ODF as soon as you realize your reforestation effort may not meet the deadline. Extensions are granted based on evidence documenting reasonable attempts to comply. An extension will still require you to achieve stocking within a prescribed time using recognized methods.

Reforestation failure

There are several situations where reforestation failure would be considered the fault of the landowner. These include:

- failure of hand-planting success when inappropriate seedlings or seed sources are used
- natural reforestation failures due to poor natural seed crops in the years immediately following a harvest
- failures on harsh sites due to harvest unit design or competing vegetation
- wildlife damage, such as by mountain beaver, that could be reasonably expected and controlled

Reforestation is required, and reforestation failures can result in penalties. See the section on penalties described on the next page.

Acceptable tree species for reforestation

ODF determines the tree species acceptable for artificial and natural reforestation, as well as residual seedling, sapling and pole, or larger tree stocking, based on all the following criteria:

- Species must be ecologically suited to the planting site.
- Species must be capable of producing logs, fiber or other wood products for lumber, sheeting, pulp or other commercial forest products.
- Species must be marketable in the foreseeable future.

In nearly all cases, native species are considered acceptable and are preferred for reforestation. One exception could be white fir that has moved into a ponderosa pine or Douglas-fir site due to fire exclusion. On Site Classes IV, V and VI, landowners are encouraged to favor ponderosa pine and Douglas-fir to white fir.

A conifer or hardwood species that has any commercial value (even commercial firewood) will meet the second requirement above. A hardwood or mixed hardwood and conifer stand is as much a forest as a stand of pure conifers.

Tree species that are not currently marketable – or not marketable in the foreseeable future – cannot be used for tree stocking. Generally, juniper is not considered acceptable, but it often grows on poor sites (lower than Site Class VI) where reforestation is not required anyway.

Hardwood trees remaining after a harvest can meet up to 20% of the required stocking levels if they meet the three criteria above. With a plan approved by ODF, hardwoods may supply all the required stocking.

When appropriate, you can reforest with a mixture of acceptable tree species to reduce the risk of insect and disease losses, and to promote stand diversity.

Hand-planted seedlings or seeds should be genetically adapted to the site where they're planted.

Non-native tree species

Landowners wishing to use non-native tree species must submit written plans for approval by ODF. The plans are required within 12 months of tree stocking reduction, and must include:

- tree species to be used
- evidence that the species is ecologically suited to the site where it will be planted
- evidence that the species is capable of producing commercial forest products
- research or field tests that show success in similar sites

Reforestation waivers

Stand improvement harvests, e.g., pre-commerical thinning, commercial thinning, overstory removal or other partial-cut harvest, are intended to increase long-term tree growth and value if done correctly. Additional reforestation may not be required. In some cases, stand improvement harvests result in stocking slightly below the stocking standard rules. If that happens, ODF must decide if free-to-grow tree stocking will occupy the site in the long term. If so, reforestation will not be necessary.

Exemption from reforestation requirements

- Landowners may request a suspension of the reforestation rules when salvaging or converting low-value forest stands to establish forest stands that are adequately stocked and free-to-grow. There must be evidence that the landowner qualifies for incentive funding and that the harvest costs will exceed revenues.
- Where reforestation is not required, landowners must protect soil productivity and stabilization within 12 months of the operation with suitable trees, shrubs, grasses or forbs.

Land use changes

Sometimes timber harvesting is done in preparation for a land use different from forestry. For example, trees often are removed when an area is developed for home sites. Such harvesting is still a forest operation subject to ODF oversight, but requirements by other state and local agencies also will require attention:

- An operations notification to ODF is required, and the form includes a place to note a land-use change.
- If you need or want to remove trees that otherwise would be required to stay or be replaced, you must submit a written plan for approval by ODF. The plan must show that local land-use agencies (city and county, usually) have approved the land-use change and will issue the needed permits, and that the change complies with regulations of other state agencies (e.g., Oregon Department of Environmental Quality and Oregon Department of Agriculture).

Replanting after a forest fire

Penalties for inadequate reforestation

Landowners can be ordered to comply with reforestation requirements, and may be fined up to $5,000 per violation. The landowner's property tax status could also adversely change for failure to reforest or complete a conversion of forestland to a non-forest use.

UNDERSTANDING BASAL AREA

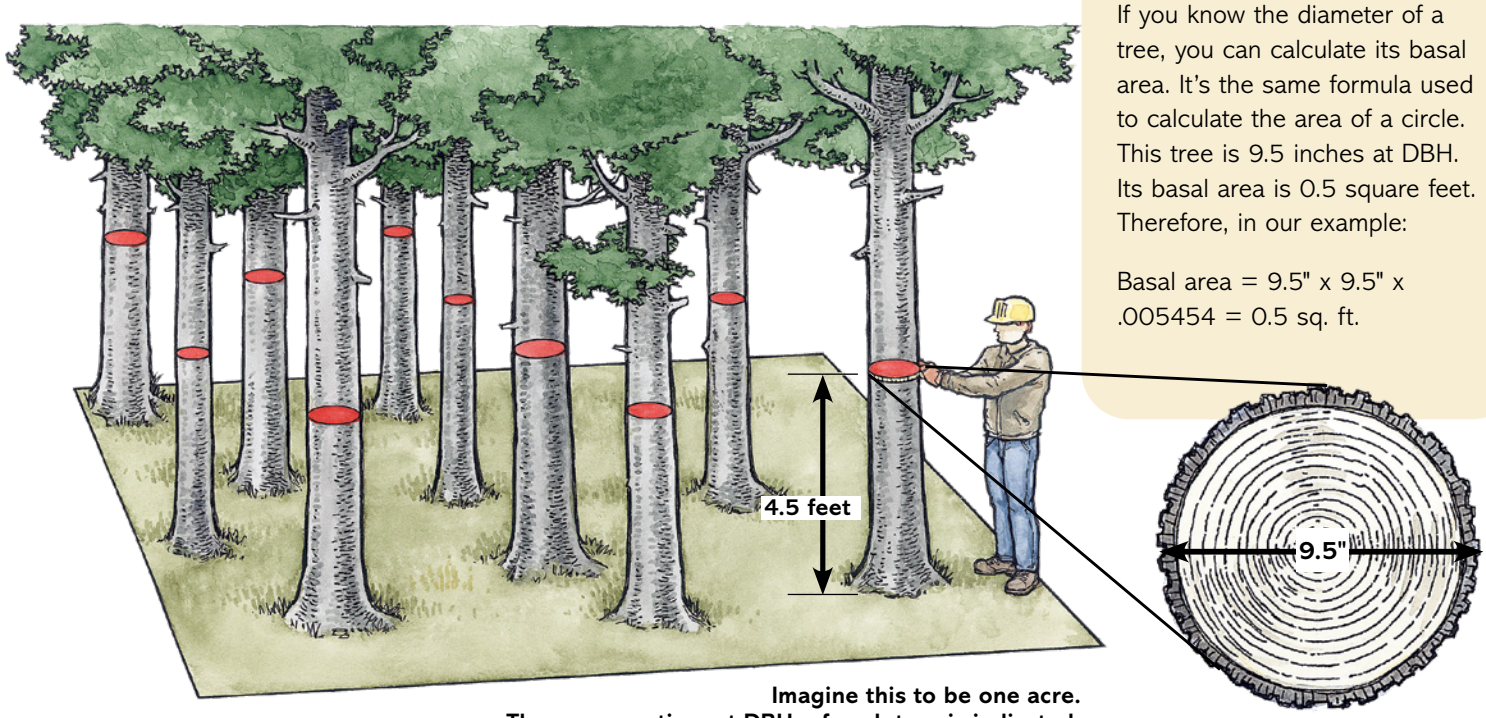
Basal area is the cross-sectional area of a tree stem at 4.5 feet above the ground. The basal area of a tree is calculated by measuring its diameter (see diagram). Tree diameter is measured at 4.5 feet above the ground on the uphill size and is referred to as the DBH (diameter at breast height). Why 4.5 feet? It provides a convenient and consistent point for measuring tree diameter.

To calculate basal area:

BASAL AREA = TREE DIAMETER^2 X .005454.

If you know the diameter of a tree, you can calculate its basal area. It's the same formula used to calculate the area of a circle. This tree is 9.5 inches at DBH. Its basal area is 0.5 square feet. Therefore, in our example:

Basal area = 9.5" x 9.5" x .005454 = 0.5 sq. ft.



Imagine this to be one acre.
The cross-section, at DBH, of each tree is indicated.

Basal area is an important measurement. When combined with the average diameter of the trees, basal area gives people involved with a timber harvest a mental picture of the forest. If you know basal area, you can calculate the number of trees per acre, which is another part of the picture.

Basal area is usually calculated on a per-acre basis. That's because we're interested in knowing how much surface area (square feet) the tree stems are occupying on each acre. Add the individual basal area of every tree on an acre and you have the basal area per acre.

Basal area is expressed in square feet per acre. Here's a simple example: 250 trees on an acre, all with diameters of 9.5 inches DBH – 0.5 square feet each – would total 125 square feet of basal area (0.5 x 250 = 125).

Measuring tree diameter at breast height (DBH)

Obtain a diameter tape or a normal household tape to measure the DBH.

A diameter tape is convenient because it measures the tree's circumference, but its scale directly converts this amount and shows the diameter in inches.

A normal tape measure can be used to determine the circumference of a tree. The circumference is converted to diameter by the formula:

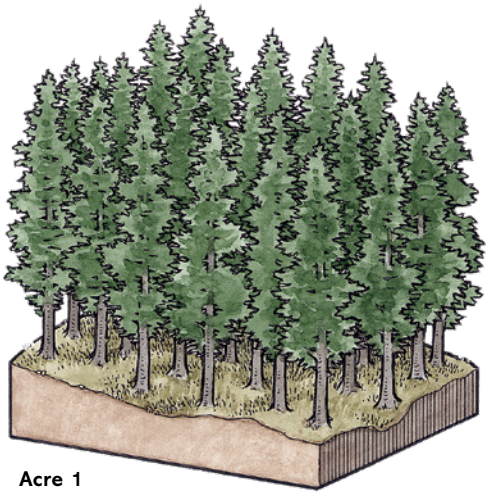
DBH = CIRCUMFERENCE (INCHES) ÷ 3.14

Trees per acre and basal area are not the same thing

Two separate acres can have the same basal area but a different number of trees. Tree diameters are an important influence on basal area.

FOR EXAMPLE:

These two acres have the same basal area but a different number of trees. Here's the interesting part: If you know the basal area per acre of a stand of trees and the average diameter of the trees, you can figure out the number of trees per acre.



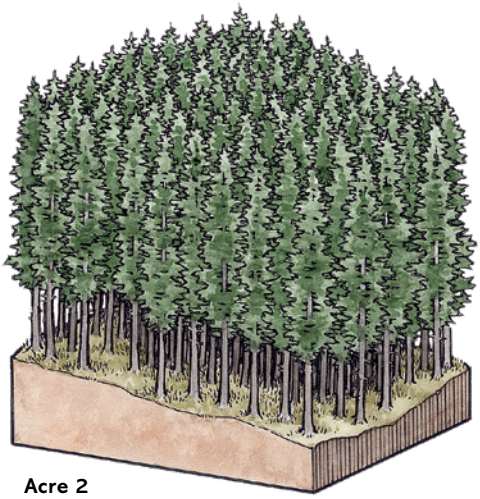
Acre 1

This acre has a BA of 78.5.

If Acre 1 has 24-inch trees and 78.5 square feet of basal area, you would need 25 trees to equal 78.5 square feet per acre.

Basal area = 24" x 24" x .005454 = 3.1

78.5 sq. ft. per acre ÷ 3.1 = 25 trees per acre (41-foot spacing)



Acre 2

This acre has a BA of 78.5.

If Acre 2 has 6-inch trees and a basal area of 78.5, you would need 392 trees to equal 78.5 square feet per acre.

Basal area = 6" x 6" x .005454 = .2

78.5 sq. ft. per acre ÷ .2 = 392 trees per acre (10.5-foot spacing)

Calculating the basal area of your harvest unit

The simplest way to determine the basal area of your harvest unit is to sample the stand with plots. Space plots evenly across the unit along compass lines. On each plot, measure the diameter and calculate the basal area of each tree. Circular, one-fifth-acre plots are commonly used.

To calculate the basal area of each tree on the plot, it's easiest to use Table 6-4. Or you may find it to your advantage to use Table 6-5, which has the basal areas for tree diameters listed in 2-inch increments. A third option is to calculate the basal area for 1-inch intervals using the basal area formula on the previous page. These added options provide greater accuracy in determining basal area. However, in meeting legal requirements you must be consistent – you can't switch back and forth between the tables and the formula.

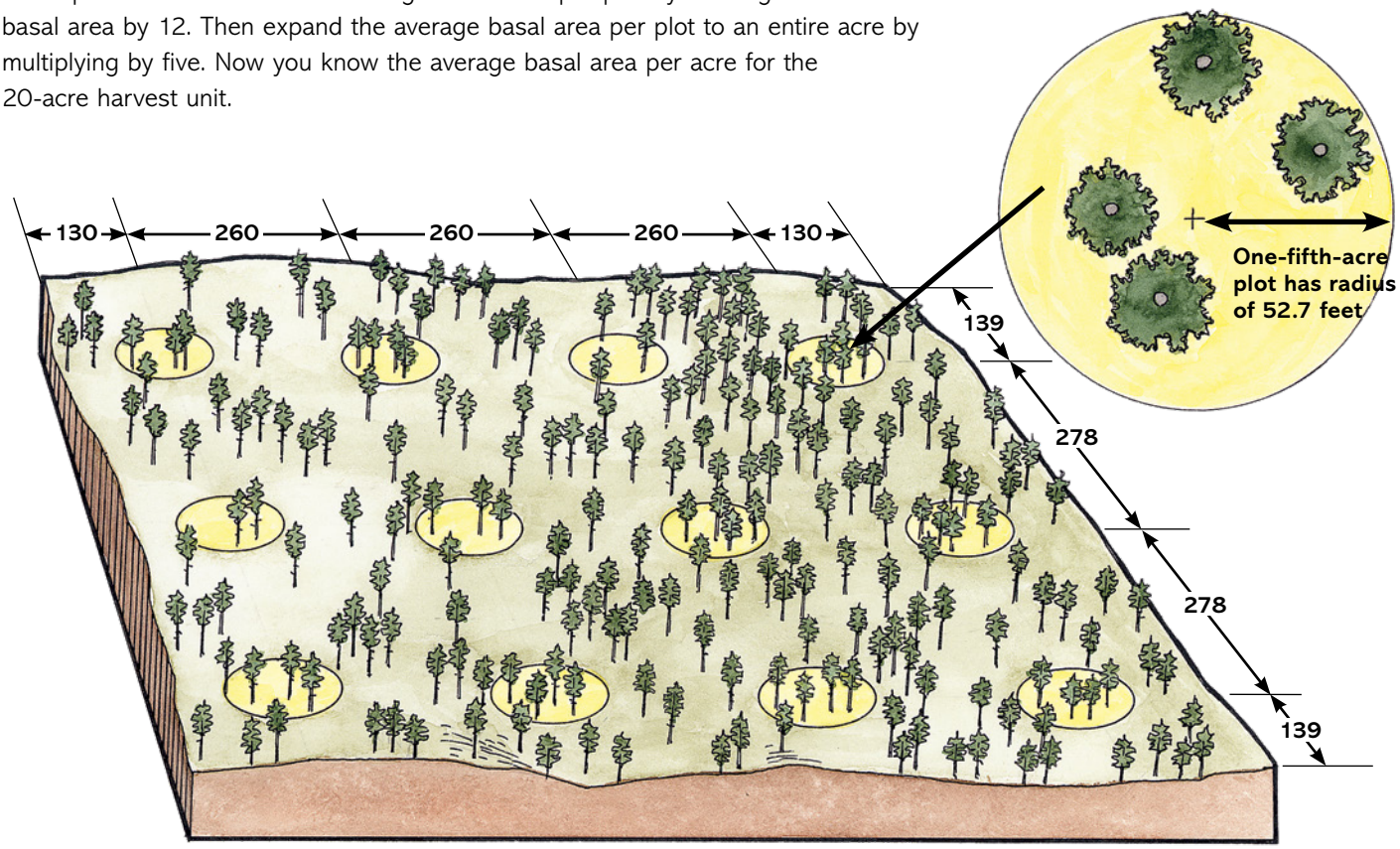
Table 6-4

DBH (inches)	Basal area (sq. ft.)
6 to 10	0.3
11 to 15	0.9
16 to 20	1.8
21 to 25	2.9
26 to 30	4.3
31 to 35	5.9
36 to 40	7.9

Table 6-5

DBH (inches)	Basal area (sq. ft.)
6	0.2
8	0.35
10	0.55
12	0.79
14	1.07
16	1.4
18	1.77
20	2.2
22	2.6
24	3.14
26	3.69
28	4.28
30	4.9
32	5.58
34	6.3
36	7.07

As an example, the illustration below shows a 20-acre site with 12 one-fifth-acre plots. First record the basal area of each plot. Then calculate the total basal area for all plots and determine the average basal area per plot by dividing the total basal area by 12. Then expand the average basal area per plot to an entire acre by multiplying by five. Now you know the average basal area per acre for the 20-acre harvest unit.



AFFORESTATION INCENTIVE

There are afforestation incentive rules, administered by ODF, that encourage landowners to convert parcels of idle, non-forested land suitable for forest cover to commercial forest use.

The incentive is a one-time exemption from most tree retention requirements under the Oregon Forest Practices Act, which applies to the entire first rotation following afforestation of a parcel. This single, specially exempted rotation can be of any length, determined by the landowner's choice of when to harvest.

The trees exempted from most retention rules include those that are planted and those that naturally regenerated within 10 years before or after the area is certified by ODF as afforested. Harvesting these trees otherwise must follow all applicable forest practice requirements, and all trees within 20 feet of most streams also must be retained.

To qualify for the incentive, tracts must be at least five contiguous acres and determined by ODF to have been idle or exclusively in non-forest uses, or in an understocked condition, since July 1, 1972. Other understocked forestland also may qualify for the incentive if the stocking was reduced or limited by causes other than a forest operation after July 1972. However, the afforestation incentive cannot be applied to any acre with 25 square feet or more of basal area.

WILDLIFE FOOD PLOTS

A landowner must have more than 10 acres but less than 5,000 acres, the area to be used for a food plot must currently be in forest use, and the food plot would otherwise be subject to reforestation rules.

A wildlife food plot is a small forestland area that is planted with vegetation capable of substantially contributing to wildlife nutrition instead of being used for growing and harvesting forest tree species.

Landowners may establish wildlife food plots within the boundaries of their land if they meet these requirements:

- cannot exceed 2.5% of the small forestland, if the small forestland is 500 acres or less in size;
- cannot exceed 2% of the small forestland, if the small forestland is more than 500 acres but not more than 1,000 acres in size; or
- cannot exceed 1% of the small forestland, if the small forestland is more than 1,000 acres in size.

A written plan is required for establishing a food plot, and any changes to the food plot or forest management, including reforestation, requires notification to ODF.

Written plans must include:

- landowner contact information
- acreage of the small forestland where the wildlife food plot will be installed, including a map showing the location of proposed and existing wildlife food plots
- a narrative that describes the target wildlife, forage expected to substantially contribute to the nutritional requirements of the target species, and activities required to maintain the wildlife food plot, along with a timeline
- a strategy for monitoring and managing plant and animal species that may make establishing the food plot difficult

Source plants for the food plot need to avoid introducing invasive species. Plants may not be on the Oregon Department of Agriculture's noxious weed list.

If a wildlife food plot is discontinued, then the landowner will be required to reforest the food plot.

Left: establishing a wildlife food plot can provide valuable nutrition for wildlife.
Right: white-tailed deer have eaten much of the available forage in this plot.

Applies to small forestland owners only

ROADS AND WATER CROSSINGS

APPLICABLE OREGON FOREST PRACTICES RULES

Forest road construction and maintenance

629-625-0100: Written plans for road construction
629-625-0200: Road location
629-625-0800: Road design
629-625-0310: Road prism
629-625-0320: Water-crossing structures
629-625-0330: Drainage
629-625-0410: Disposal of waste materials
629-625-0440: Stabilization
629-625-0600: Road maintenance
629-625-0650: Vacating forest roads and water crossings
629-625-0700: Wet weather road use
629-625-0800: Construction in wetlands
629-625-0900: Forest Road Inventory and Assessment
629-625-0910: State-led abandoned roads inventory
629-625-0920: Road condition assessment

Forest roads are essential to forest management. They contribute to providing jobs, products, tax base and other social and economic benefits.

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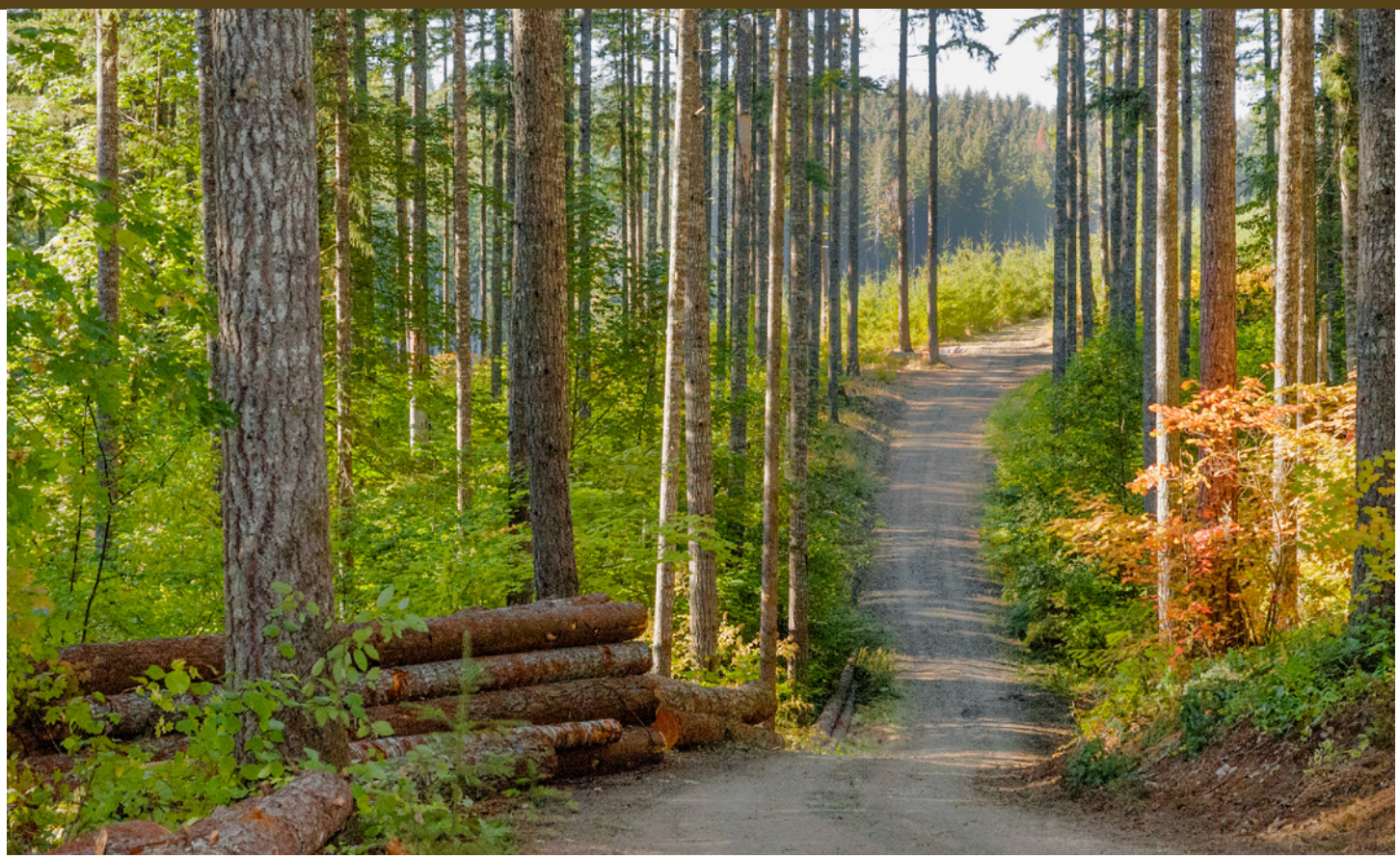


FOREST ROADS ARE ESSENTIAL

In the Oregon Forest Practices Act (OFPA), road construction and maintenance rules establish standards for locating, designing, constructing and maintaining efficient and beneficial forest roads; locating and operating rock pits and quarries; identifying active and inactive roads that have fish-passage barriers or contribute sediment to waters of the state; correcting those conditions; and vacating roads, rock pits and quarries that are no longer needed. The goal is to provide the maximum practical protection to maintain forest productivity, water quality and habitat for fish and wildlife.

All roads must be designed, constructed, improved, maintained or vacated to:

- prevent or minimize sediment delivery to waters of the state
- ensure passage for covered species during all mobile life history stages
- prevent or minimize drainage or unstable sidecast in areas where mass wasting could deliver sediment to public resources or threaten public safety
- prevent or minimize hydrologic alterations of stream channels
- prevent or minimize impacts to stream bank stability, existing stream channels and riparian vegetation
- disconnect forest roads and landings hydrologically from waters of the state to the maximum extent practicable
- avoid, minimize and mitigate loss of wetland function

These road construction and maintenance rules apply to all situations unless otherwise indicated.

NEW CONSTRUCTION

The forest practice rules recognize that roads are important to forest management because they provide access and help move people, equipment and products efficiently. Forest road construction planning should consider how the proposed road could affect nearby water systems or change the contour of the land, potentially resulting in unnecessary disturbances.

Roads should avoid HLHLs unless justified by a geotechnical engineer.

All rules in Division 625 apply to new road construction and reconstruction unless specifically noted in the rule.

Road location

Reduce duplicate road systems and associated ground disturbance by using existing stable and functioning roads when practical. If a road traverses land on another ownership, investigate options for using those roads before constructing new roads. Forest operators who submit notifications that include new road construction should affirm such options were investigated.

Locate roads in areas that minimize the risk of materials entering water. When alternatives exist, avoid locating roads on steep slopes, slide areas or high landslide hazard locations (HLHLs), and in wetlands, riparian management areas (RMAs), channels or floodplains. Minimize the number of times the road crosses streams.

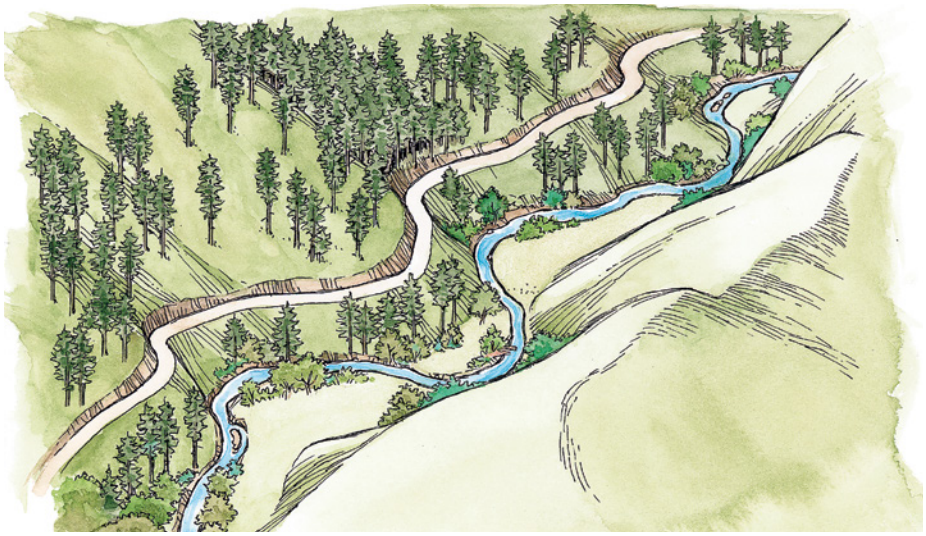
AVOID BUILDING ROADS IN CRITICAL LOCATIONS, WHICH INCLUDE:

- HLHLs – areas that are likely to be the starting point of a rapidly moving landslide
- slopes over 60% grade with decomposed granite-type soils
- locations within 50 feet of stream channels or lakes, excluding crossings and approaches to crossings
- locations within significant wetlands, stream-associated wetlands or other wetlands larger than 0.25 acres
- any active stream channels, exclusive of stream crossings
- locations parallel to or within an RMA, for a distance exceeding a cumulative 500 feet of road length measured from the first point of entry into the RMA to the last point of exit, exclusive of stream crossings
- high landslide hazard situations where rock is likely to be unstable, so a cut slope cannot be excavated
- situations where a cut slope failure may divert road surface drainage to an HLHL and could trigger a debris flow below the road, with potential for delivery to a stream
- locations that cut through the toe of active or recently active deep-seated landslide deposits and where a reactivated landslide would likely enter waters of the state
- highly dissected steep slopes where it is not possible to fit the road to the topography with full-bench end-haul construction

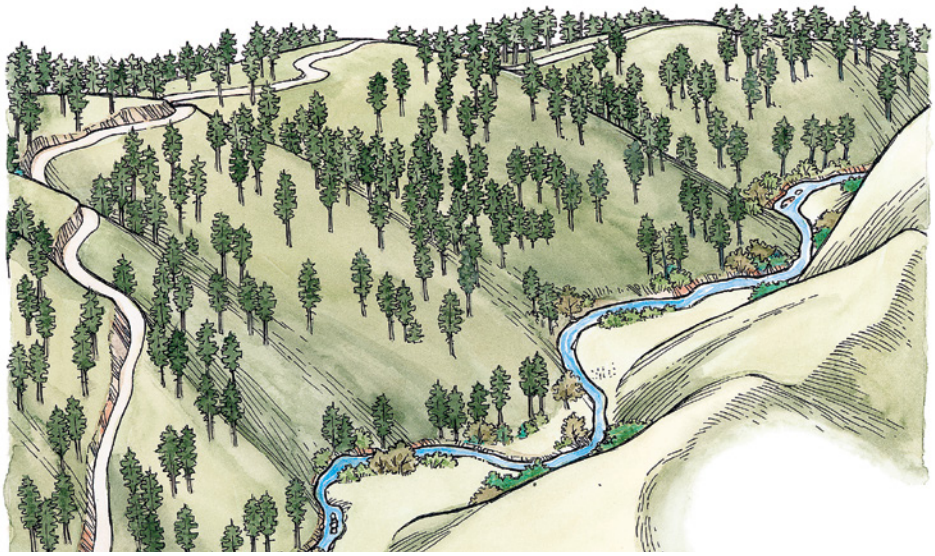
When alternate routes are not legally or physically feasible, or when they may create safety hazards or increase environmental risk, forest operators should submit a written plan to locate roads in critical locations. The plan must describe why alternative routes are not feasible or would increase environmental risk. The Oregon Department of Forestry (ODF) stewardship forester will consult with the Oregon Department of Environmental Quality (DEQ) and the Oregon Department of Fish and Wildlife (ODFW) and will have 14 days from receipt of the written plan to conduct an on-site review, if necessary. If no review happens within 14 days, the operator may continue with operations.

See Avoiding Roads in Critical Areas PDF at **KnowYourForest.org/manual-links**.

UNACCEPTABLE OPTION: Roads built or reconstructed next to a stream channel with multiple crossings are not allowed. Note: Many older roads and highways are in such locations.



ACCEPTABLE OPTION: When no other alternative exists, build roads on 45% side slopes. This option will likely be more difficult to build.



BEST OPTION: Build road on ridge top and plan for cable timber harvesting.

Road design

Design and construct roads to protect water quality by limiting the alteration of natural slopes and drainage patterns to accommodate road use and protect waters of the state. Refer to ODF's Forest Practices Technical Guidance for design specifications on how to avoid and prevent potential impacts to fish, wildlife and habitat resources.

ROAD CONSTRUCTION ON STEEP SLOPES

Rapidly moving landslides can be triggered when road fill or sidecast material is pushed or placed onto steep slopes below the road. Movement may occur with the next major storm, or it may not occur for decades. Use end-haul construction for all HLHLs and steep slopes to help prevent landslides (see illustrations, next page).

A road built on a steep slope or that crosses a fish-bearing stream (Type F or Type SSBT) requires a more complicated design that:

- minimizes disturbing erodible slopes next to stream channels
- avoids damage to side channels
- allows for large flood flows without washing out crossing structures
- provides unimpeded upstream and downstream passage at crossings for all native migratory fish
- allows fish access to side channels
- considers how steep grades (greater than 20%) can create drainage, traction and safety problems
- places cross-drain culverts away from HLHLs

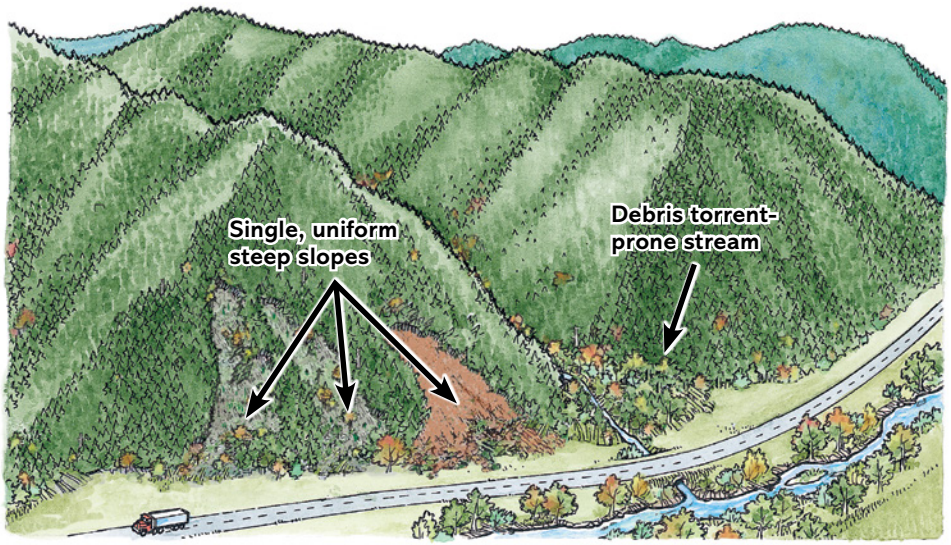
(continued on next page)

- builds roads no wider than necessary to accommodate anticipated use (see Table 7-1) while allowing for two-way traffic, using turnouts on narrow roads in strategic and stable locations
- uses full-bench and end-haul construction for all HLHLs and steep slopes
- stabilizes road fills using compaction, buttressing, subsurface drainage, rock facing or other means
- selects slope angles that are unlikely to result in landslides (consult a geotechnical specialist for roads in HLHLs)

Table 7-1 Guidelines* for road widths

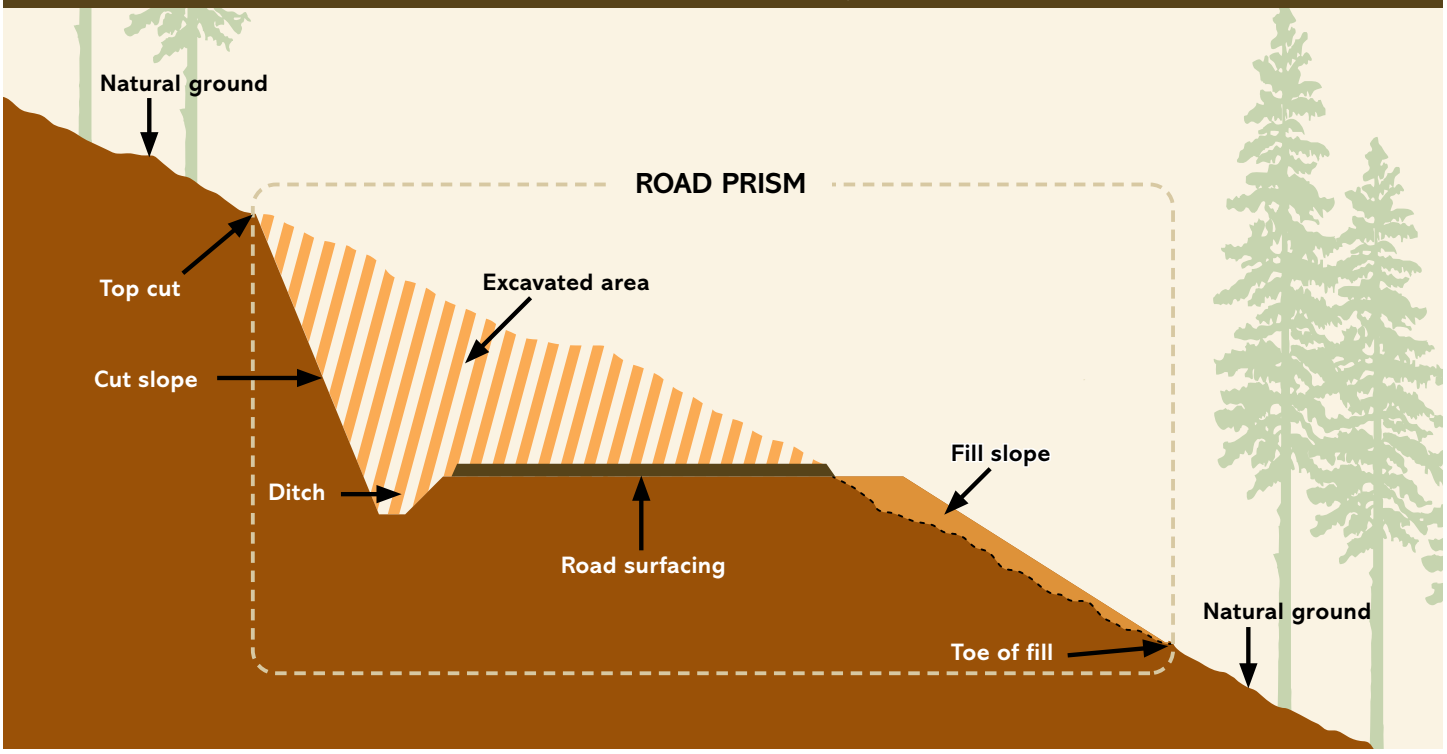
Road Use	Maximum Width	Preferred Width
Minor spur and temporary	18 ft.	12 ft.
Collector road (single lane)	20 ft.	16 ft.
Mainline haul road (double lane)	32 ft.	24 ft.

*Exclusive of ditches, plus any additional width necessary for safe operations for fill widening or on curves, turnouts and landings.



The debris fan at the base of a debris torrent-prone stream is susceptible to landslides originating in the canyon behind it. It is at higher risk than the the area below a single, uniform steep slope.

Road prism terminology



Road prism

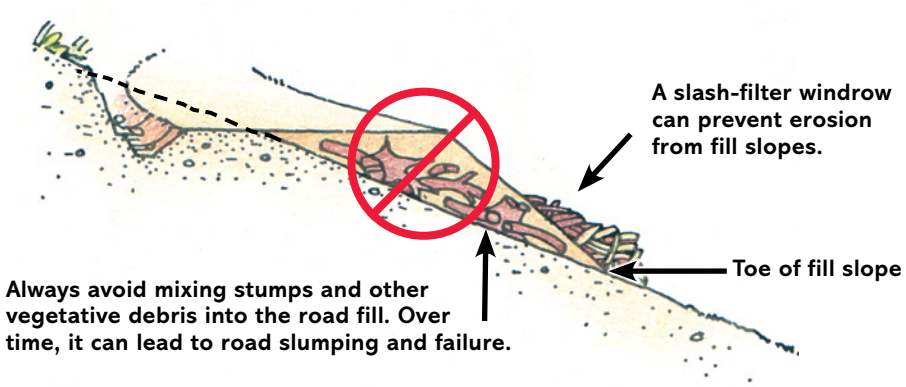
The area of ground containing the road surface, cut slope and fill slope is called the road prism. It should be designed to minimize disturbances to protected resources by avoiding steep sidehills, wet areas and potentially unstable areas. Excess material can be end-hauled to prevent landslides. Both new roads and reconstruction designs should be no wider than necessary to accommodate the anticipated use and should minimize environmental impacts to waters of the state and covered species.

The running surface width should average no more than 32 feet for double-lane roads and 20 feet for single-lane roads, excluding ditches. Additional width may be necessary for safe operations, for fill widening, or on curves, turnouts and landings. Other ways to ensure road construction minimizes potential environmental damage include:

- designing, cutting and filling slopes to minimize the risk of landslides
- stabilizing road fills as needed using compaction, buttressing, subsurface drainage, rock surfacing or other effective means to prevent fill failure and subsequent damage to waters of the state
- using end-haul construction that does not place fill within the RMA of a stream or within 75 feet of a stream channel where an RMA is not required, excluding stream crossings and approaches to crossings

Cut-and-fill construction is common for gentle terrain. Soil is taken from cuts and pushed or "drifted" to where fill is needed to build up flat areas or cover culverts. Never let sidecast or waste material enter streams, and never place it in unstable areas where it might erode or slide into an RMA or within 75 feet of any stream.

Slash-filter windrows are made of compacted logging slash installed along the base of fill slopes during road construction. Built by excavators, these 3-by-3-foot barriers are very effective at slowing surface runoff and keeping sediment from entering streams.



Water-crossing basics

- Consider vacating a water crossing first. If that's not possible, prioritize using a permanent channel-spanning structure.
- Design crossings to handle 100-year peak flows.
- Make crossing structures (e.g., culverts) passable by adult and juvenile fish for Type F and Type SSBT streams.
- Allow fish to access side channels.
- Protect the channel, any side channels and the floodplain.
- Pay attention to size restrictions for stream-crossing fills.
- Minimize the total area disturbed by road fill.
- Minimize the excavation of stream-adjacent side slopes.
- Minimize the risk of materials entering water.
- Avoid locating roads in wetlands, RMAs or floodplains if alternative locations exist.

Water-crossing structures

Forest roads that cross or come close to water can affect:

- water quality
- aquatic habitats
- fish migration
- stream and wetland characteristics
- riparian habitats

Stream-crossing structures include culverts (both closed and bottomless arch), bridges and fords. Each is designed to allow water to pass without causing erosion and to provide safe vehicle crossing. Bridges are best for streams more than 10 feet wide and those with high stream gradients. Minimize the number of stream crossings and avoid locating them in steep, narrow canyons.

If a forest road must cross a stream, consider these factors to determine what type of crossing to use:

Type F or Type SSBT streams. Bottomless arch culverts and bridges protect the natural streambed with minimal impact on fish and other aquatic wildlife.

Cost. The following stream-crossing structures are ranked in order of increasing cost for construction and maintenance:

- ford
- round culvert
- squash culvert
- bottomless arch culvert
- bridge

Length/intensity of use. Culverts provide year-round access with a rock surface. Fords suffice if crossings need occur only once per timber harvest rotation and traffic volume is low. Fords have less impact than any permanent stream-crossing infrastructures.

Soil foundation. Bedrock crossings may require bottomless arch culverts, bridges or fords.

Equipment/materials for crossings. For example:

- Culvert installation can include the use of a dozer, backhoe or excavator, portable compactor, bedding gravel, armoring material, culvert outlet downspout and sediment filter.
- Bridges sometimes require cranes, concrete truck access for abutments, piledrivers and high-service-level roads for steel or pre-stressed concrete delivery.
- Fords require armoring of approaches and stream bottom, and possibly geotextile and excavation equipment.

Consultants. ODF must review written plans for any required consultants, such as engineers and hydrologists.

DESIGN AND CONSTRUCTION:

Design and construct all water-crossing structures in all typed waters and lakes, bays, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, wetlands, inlets and canals to:

- minimize excavation of side slopes near the channel
- minimize the volume of material in the fill by restricting the width and height of the fill to the amount needed for safety
- prevent erosion of the fill and channel
- minimize hydrologic connectivity to adjacent stream
- avoid or minimize alterations or disturbances to stream channel, bed, bank or bank vegetation
- stabilize disturbed stream banks using erosion-control techniques (e.g., planting native woody species)
- ensure that stream flow is not likely to be diverted out of its channel if the crossing fails
- preserve water quality and unobstructed flow
- route and deposit temporarily turbid water from crossing projects to the forest floor in an upland area — or above the 100-year flood level, if present — to allow removal of fine sediment and other contaminants prior to discharge to waters of the state

For water-crossing structures on Type F and Type SSBT streams:

- avoid or minimize impacts to fish and their spawning and rearing habitat
- minimize the loss of fish life during the project
- ensure free and unimpeded fish passage at all flows when fish are expected to move

A written plan is required for all water crossings, with extra elements for fills more than 15 feet deep. Include a design that minimizes the likelihood of surface erosion, embankment failure and movement of materials downstream.

When the ODF stewardship forester determines that installing a water crossing in a flowing stream will cause excessive sedimentation and turbidity, divert stream flow using a bypass flume or culvert or pump the stream flow around the work area. In this situation, culverts may be installed within 0.25 miles of a Type F or Type SSBT stream or within two miles of a hatchery intake.

Best management practices for stream culvert installation:

- Develop sediment and pollution control plans and actions.
- Install during in-water work period defined by ODFW.
- Excavate the culvert bed as quickly as possible.
- Use a temporary dam, or pump stream water around installation, if the culvert bed is silt or clay material.
- Use clean gravel for the culvert bed when needed.
- Backfill around the culvert with native soil or gravel.
- Compact the backfill.
- Cover the fill with a gravel surface.

Basic stream culvert installation from start to finish

Construction of culvert stream crossings has the greatest potential to cause immediate sediment pollution. Installing culverts involves more than just placing a pipe in a stream. Complete the work promptly, at a time when the least damage will occur; the ODFW has guidelines for timing on in-water work. A portable pump can be used to carry stream water around the construction site. The channel foundation and trench walls must be free of logs, stumps, limbs or rocks that could damage the culvert pipe.

The culvert bed must conform with the natural streambed. The bed should be either rock-free soil or gravel. The culvert bedding should provide even distribution of the load across the length of the pipe. All stream crossings on Type F or Type SSBT streams must be designed to provide fish passage (see page 205).

Secure each end of the culvert with backfill. Pour backfill material on top of the pipe. This allows finer soil particles to flow around and under the culvert sides. Larger particles roll to the outside. Fine soil particles, close to the culvert, compact more easily. Once the ends are secured by backfill, the center of the culvert is covered.

Tamping fill material throughout the entire backfill process is important. The base and sidewall material should be compacted first to reduce any chance of water seepage into the fill.

Armor the culvert inlet and outlet. Rocks, logs or grass seeding can be used to protect these locations against erosion. Check the area upstream and downstream from the culvert. Clear the upstream area of woody debris that might plug the culvert and place it at the downstream end.

The road approach to the new culvert is the next phase of construction. Be sure that the culvert fill above the top of the pipe is at least 18 to 24 inches high to protect the pipe from damage by traffic.

Layers of fill are pushed into place and carefully compacted to build up and maintain a consistent road grade. The crossing should be rocked to minimize the risk of sediment washing off the road and into the stream.

Seed and mulch are required for bare soils when any sediment may reach waters of the state.

Kinds of pipes and their uses for culverts

When sizing culvert pipe, determine whether the culvert will need to provide fish passage and whether it can handle the peak stream flow without failing. The style of pipe can help minimize the amount of fill material needed and is most often dictated by site limitations and/or cost. Always provide adequate cover above culverts and other drainage structures.

ROUND CULVERTS are used for small streams, and are mostly made of corrugated metal pipes (CMPs) or corrugated polyethylene pipes (CPPs).

Advantages of CMPs:

- more crush-resistant
- fire-resistant
- more easily backfilled with a variety of backfill materials
- available in different lengths and shapes
- easily transported with one inside the other

Disadvantages of CMPs:

- heavy — larger sizes require mechanical placement
- difficult to cut without a cutting torch or power saw

Advantages of CPPs:

- lightweight — easier to transport and install
- can be cut and joined with a handsaw or chainsaw
- flexibility favors its use as downspouts (photo, bottom right)

Disadvantages of CPPs:

- susceptible to melting in a forest fire
- prone to failure if not properly backfilled and compacted
- prone to puncture if coarse material is used for backfill

ARCH (SQUASH) CULVERTS are used for stream crossings with low road clearance.

Advantages and disadvantages:

- offer fish-passage advantages due to larger bottoms
- require less road fill
- are more costly than round culverts

BOTTOMLESS ARCH CULVERTS (pictured on page 205) are three-sided structures that have sides and a top and use the natural channel for the bottom.

Advantages and disadvantages:

- are the most expensive culverts to install
- require a concrete or rock foundation for support
- leave the stream bottom undisturbed

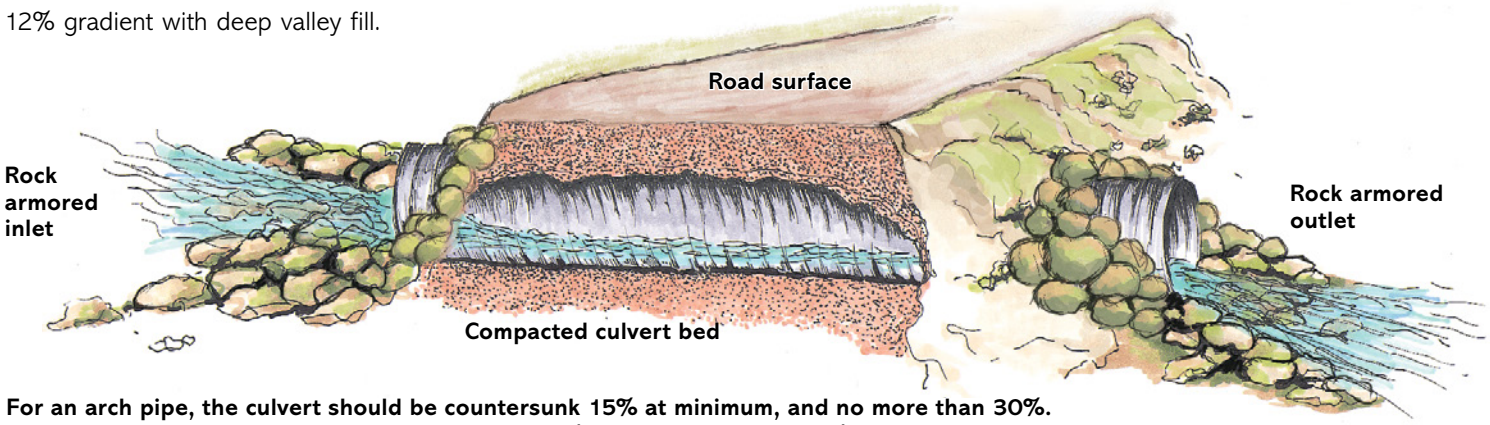
A round galvanized corrugated metal pipe sunk into the streambed to allow for fish passage.

Arch culvert on a low-clearance road, sunk into the streambed to allow for fish passage.

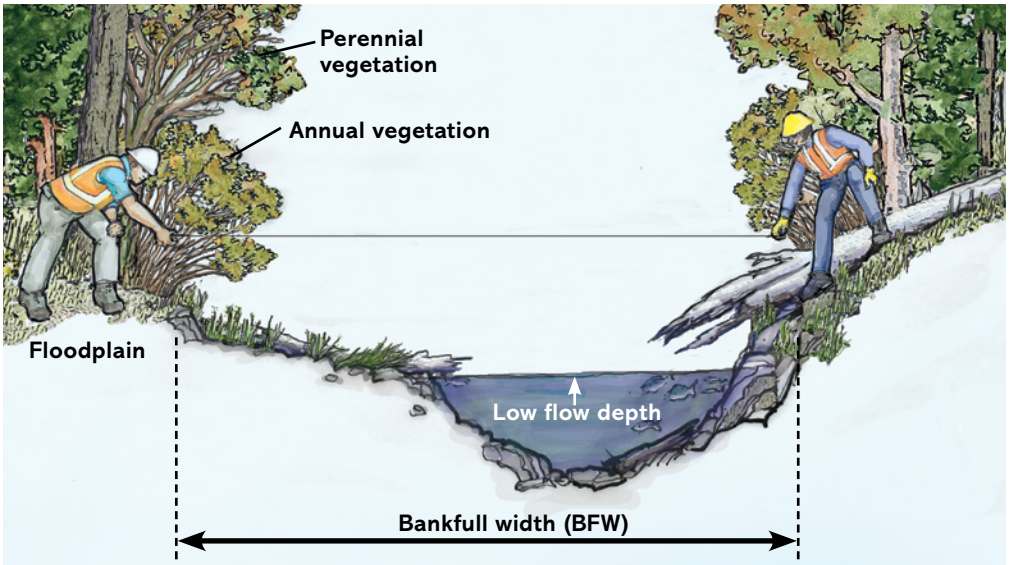
The flexibility of a plastic pipe makes it a popular alternative to a metal culvert.

Stream culvert installation details

To provide for fish passage on Type F and Type SSBT streams, one option is to sink culverts into the streambed and embed them with streambed materials. This is most appropriate for streams with up to a 12% gradient with deep valley fill.

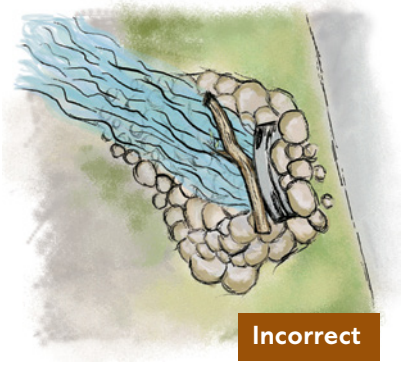


For an arch pipe, the culvert should be countersunk 15% at minimum, and no more than 30%. A round culvert should be countersunk at least 30% and no more than 50%. This partial burial of the culvert into the streambed reduces water velocity in the culvert and allows gravel to deposit in the bottom. For no-slope culverts, the effective width of the culvert should be equal to or exceed the active channel width of the stream. For all other culverts, the effective width must be at least 1.2 times the active channel width of the stream, plus 2 feet.

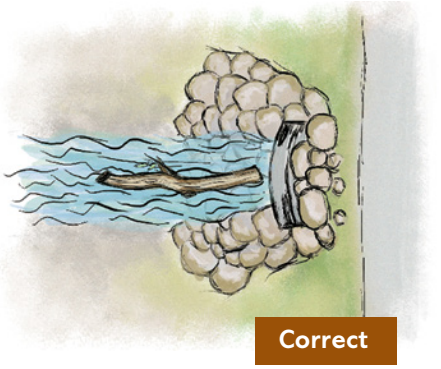


Take several evenly spaced BFW measurements and use the average for your overall BFW measurement.

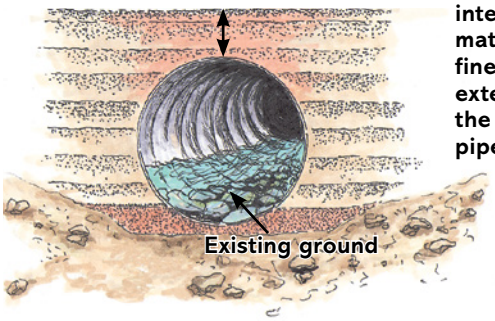
Culvert alignment



When a culvert is incorrectly aligned with a stream, floating debris accumulates and eventually causes inlet plugging (overhead views).



Road surface 2 feet or greater

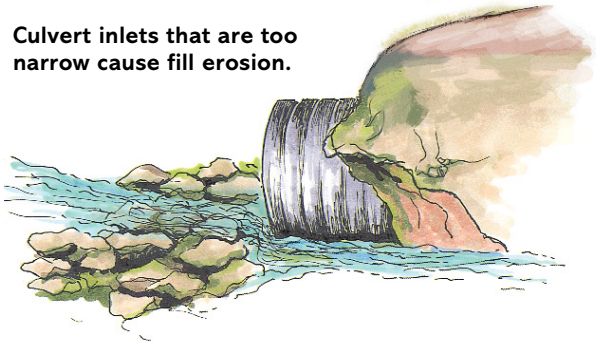


Tamp backfill material at regular intervals. Base and sidewall fill material should be compacted from finer soil particles. Fill height should extend at least 18 to 24 inches above the top of the culvert to protect the pipe from damage by traffic.

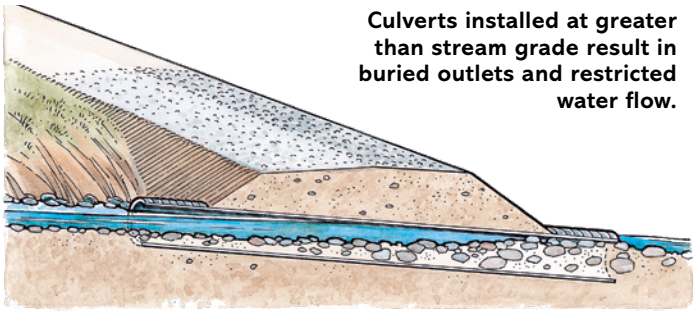
Culvert bed should be free of large rock.

COMMON CULVERT INSTALLATION PROBLEMS

Culvert alignment is critical for proper culvert function. It must fit the natural stream channel. Culverts set at an angle to the channel can cause bank erosion, and skewed culverts can develop debris problems.



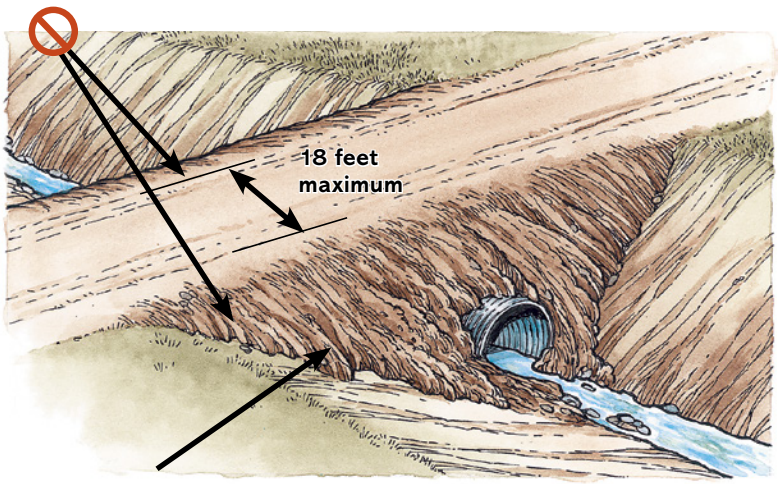
Culvert inlets that are too narrow cause fill erosion.



Culverts installed at greater than stream grade result in buried outlets and restricted water flow.

Culvert outlets that are too narrow and set too high cause water to undercut the road fill and streambed.

Never use a stream crossing to dispose of excess material. The wider road surface increases risk of this material entering the stream.



Set fill slopes at a maximum angle ratio of 1.5:1, and do not use unstable soils such as clays at this angle.

Determining the peak flow

When planning to install or replace a stream crossing, there are various factors to consider. Discuss how to determine a 100-year peak flow with your ODF stewardship forester.

ARE THERE FISH IN THE STREAM?

If yes, it's best to get help from a professional, because designing and installing a stream crossing can get complicated. Crossings must allow for fish passage, which involves multiple considerations. For example, the slope of the stream may require a different crossing design that makes the installation more costly. All stream crossings require a written plan. There are additional elements required when the fill is over 15 ft.

HOW MUCH STREAM FLOW MUST THE CROSSING BE ABLE TO HANDLE?

Forest practice rules require that a culvert or bridge crossing be sized to handle at least a 100-year peak flow (sometimes referred to as the 100-year storm or flood). Be sure the structure you're installing can handle a very large storm and its runoff. If the structure fails, damage to the stream and fish habitat below the failure can cause significant environmental harm, and road damage and washout may require inconvenient closure and costly replacement.

The 100-year peak flow refers to the local storm flow that has a 1% chance of occurring in any given year. When averaged across many years, a flow of this size occurs only about once a century.

Determining what size culvert is needed

Table 7-2 lists the flow capacities for common sizes of round culverts. Use this table to find your flow capacity and determine your culvert diameter. If your flow capacity is close to the top of the range, consider sizing up.

Example: The table shows that a 54-inch circular culvert has a capacity up to 87 cfs. With good conditions it would likely handle a flow of 83 cfs, but a larger pipe would provide an extra margin of safety.

Table 7-2 Flow capacity for circular culverts

Diameter (inches)	Capacity (cfs)
18	Less than 5
24	5-11
30	12-20
36	21-31
42	32-46
48	47-64
54	65-87
60	88-113
72	145-178

Removal-fill permits

Some projects involve the removal or filling of areas in or near a water body with large amounts of soil or rock. These activities fall outside the scope of Oregon's Forest Practices Act (OFPA). In such cases where the amount of soil or rock involved is much greater than what is normally moved during forest road and stream-crossing construction, the operation requires a removal-fill permit from the Oregon Department of State Lands (DSL).

More specifically, a removal-fill permit is typically needed for projects involving 50 cubic yards or more of alteration of streambeds, streambanks or wetlands. Moving such large quantities could be part of a major reservoir or irrigation project, or a unique construction situation (see photo below). Beyond forestland, projects located in key salmon habitat waterways or state scenic waterways require a DSL removal-fill permit for any level of alteration.

In reviewing a removal-fill permit application, DSL determines whether the project is consistent with the protection, conservation and best uses of the state's water resources. DSL also assesses whether the project would unreasonably interfere with navigation, fishing and public recreation. The following steps are part of this process:

- The landowner applies for a removal-fill permit and pays the related fee.
- Application processing and review can extend up to 120 days.
- If the application is acceptable, DSL will issue approval of an individual permit.

Projects that move a lot of material in or near a stream channel or wetland, such as this stream-crossing upgrade, may require a removal-fill permit from DSL.

Specific types of crossings

PERMANENT CHANNEL-SPANNING STRUCTURES

These structures include long- and short-span bridges and open-bottom culverts, and should be designed and constructed as follows:

- Allow at least 3 feet of clearance between the bottom of the bridge structure and the water surface at the 100-year peak flow, unless engineering justification shows a lower clearance will allow the free passage of anticipated sediment and large woody debris.
- Span the bankfull width.
- Place the bridge structure to minimize damage to the streambed.
- Tie or firmly anchor one end of each new or reconstructed permanent-log or wood bridge, if any part of the bridge structure is within 10 vertical feet of the 100-year flood level. Install only clean, sorted gravel with a geotextile lining or equivalent barrier, and install curbs of sufficient size to prevent surface material from falling into the streambed.
- Place wood removed from the upstream end of bridges at the downstream end of bridges to minimize obstruction of fish passage. Avoid significantly disturbing sediment in connection with maintenance activities.
- Ensure abutments, piers, piling, sills and approach fills do not constrict water flow to cause any appreciable increase (more than 0.2 feet) in backwater elevation (calculated at the 100-year flood level) or channel-wide scour. Align these structures to cause the least effect on the hydraulics of the watercourse.
- Excavate and place the structure's foundation and superstructure outside the ordinary bankfull width, unless the construction site is separated from the stream by an approved dike, cofferdam or similar structure.
- Cure wood or other materials treated with preservatives, as well as structures containing concrete, prior to contact with water to minimize leaching into the water or stream bed. The use of creosote or pentachlorophenol is not allowed.
- Design permanent channel-spanning structures for Type F and Type SSBT streams using stream simulation, which mimics the natural stream channel, to:
  - > avoid constricting clearly defined channels
  - > establish a low-flow channel that allows for fish movement during low-flow periods

Although not required under the rules, it is best to consult with an engineer to ensure that the bridge is designed for the proper load bearing capacity.

PERMANENT WATER-CROSSING CULVERTS

Permanent water-crossing culverts include associated embankments and fills. Follow these specifications when building permanent culverts:

- Do not scour the streambed or erode the banks in the vicinity of the project.
- Avoid the potential of stream diversion.
- Use sufficient erosion protection to withstand the 100-year peak flow. Erosion protection may include armored overflows or the use of clean, coarse fill material.
- Place wood removed from the upstream end of culverts at the downstream end of culverts to minimize obstruction of fish passage to the extent practical. Avoid significantly disturbing sediment in connection with maintenance activities.
- Limit disturbance of the bed and banks to what is necessary to place the culvert and any required channel modification. Revegetate or stabilize the affected bed and bank areas outside the culvert by filling with native woody plant species or other erosion-control techniques. Maintain native woody species for one growing season.
- Do not use culverts that are less than 18 inches in diameter.

PERMANENT WATER-CROSSING CULVERTS IN FISH STREAMS

In Type F and Type SSBT fish streams, use a stream simulation when designing and constructing culverts. Follow these specifications:

- Use minimum culvert diameters for no-slope culverts and those up to 1% gradient, which is at least equivalent to the active channel width. For other culvert installations, the minimum culvert diameter or span must be at least 1.2 times the active channel width, plus 2 feet.
- Mimic the natural flow of the stream with regards to alignment and slope. The slope of the reconstructed streambed within the culvert should approximate the average slope of the adjacent stream from approximately 10 channel widths upstream and downstream of the site where it is being placed, or in a stream reach that represents natural conditions outside the zone of the road-crossing influence.
- Bury the bottom of any culvert into the streambed, not less than 30% nor more than 50% of the culvert height for round culverts, and not less than 15% nor more than 30% of the culvert height for pipe arch culverts. For bottomless culverts, design the footings or foundation for the deepest anticipated scour depth.
- Use a channel-spanning structure when a new crossing would require a culvert longer than 150 feet, unless the site-specific design constraints preclude it.
- Use culvert bed materials with a similar composition to natural streambed materials in the channels adjacent to the road crossing in the reference reach. Follow these guidelines:
  - > Manually place culvert bed materials during bed construction on new water crossings in Type F and Type SSBT streams. Allowing the natural accumulation of current bed materials for reconstruction of water crossings is acceptable, but not a preferred method and requires monitoring.
  - > Submit required information if the culvert does not meet the natural accumulation threshold after the second winter season.
- Ensure that the maximum velocity in the culvert does not exceed the velocity on the narrowest channel cross-section.

FORDS

A ford is a stream crossing where the vehicle travels on the streambed or other installed structure and, when water is present in the stream channel, the vehicle's wheels touch the water.

Design and construct these structures to meet all the following criteria:

- Ensure a ford is designed so a limiting vehicle, like a lowboy, does not bottom out.
- Entry and exit points of a new ford should not be within 100 feet upstream or downstream of another ford on the same property ownership.
- Use fords only during periods of no or low stream flow (whether dry or frozen) to minimize sediment delivery to the stream.
- Install fords in a dry streambed only, or when a site is dewatered. The written plan must describe sediment control and flow-routing plans, and the project must meet the criteria outlined in the written plan.
- Do not dam the floodplain where substantial overbank flow occurs with approaches to the ford.
- Cross perpendicular to the channel to minimize the disturbance area and reduce post-installation maintenance.
- Minimize flow acceleration through the ford.
- For Type F and Type SSBT fish streams, any ford structure should:
  - > be no wider than 16 feet
  - > ensure scour has not created a barrier to fish passage
  - > ensure free and unimpeded fish passage at all flows when fish are expected to move through the ford

TEMPORARY WATER CROSSINGS

Design and construct these structures to conform with the following:

- Design temporary water crossings in Type N and Type D streams to pass, at minimum, the flows expected during crossing use, with a minimum culvert diameter of 18 inches.
- Use temporary water crossings in Type F and Type SSBT streams only during the in-water work period defined by ODFW.
- Identify temporary water crossings on the forest practices notification and written plan, along with a vacating date for temporary crossings.
- Use only temporary water crossings on Type N and Type D non-fish streams:
  - > in western Oregon if installed after June 1 and removed no later than September 30 of the same year
  - > in eastern Oregon if installed after July 1 and removed no later than October 15 of the same year
- Install temporary water crossings in the dry streambed or in isolation from stream flow by using a bypass flume or culvert, or by pumping the stream flow around the work area. An ODF stewardship forester may grant an exception if siltation or turbidity is reduced by placing the culvert in the flowing stream as an alternative to dewatering.
- Limit the bypass reach to the minimum distance necessary to complete the project.
- Vacate temporary crossings to the specifications outlined in OAR 629-610-0050.
- Limit the disturbance of the bed and banks when placing the temporary water crossing and any required channel modification.

OTHER DESIGN STRATEGIES

To propose alternatives to the water crossings allowed in these rules, submit design strategies to the ODF stewardship forester for approval.

Construction of water crossings

When constructing or reconstructing water crossings:

- Comply with all relevant forest road construction and maintenance rules. Nothing in this section affects existing ODFW requirements.
- Control runoff, erosion and sediment through the following actions:
  - > Complete a written plan prior to beginning work. This plan must include, but is not limited to:
    - a site plan with a description of the methods of erosion or sediment control
    - methods for confining, removing and disposing of excess construction materials
    - measures to disconnect road surface and ditch water from waters of the state
  - > Treat areas of bare soil that could deliver sediment to waters of the state. Treatments must include, but are not limited to:
    - establishing effective drainage prior to project construction, before September 30 in western Oregon and October 15 in eastern Oregon; effective drainage may be established at other times when ODF and the applicant can agree to specific dates of installation and removal, and when the extended dates result in equivalent levels of resource protection
    - mulching and/or seeding bare soil areas to reduce surface erosion, before the start of the rainy season, and no later than September 30 in western Oregon and October 15 in eastern Oregon
    - applying native seed and/or invasive species-free mulch to sites with the potential for sediment delivery upon completion of construction.
- Control pollution by doing the following:
  - > During construction, maintain a plan on site for spill prevention and response.
  - > Don't allow uncured concrete or concrete byproducts to enter waters of the state during construction.
  - > Take measures to ensure that all materials and equipment used for construction, monitoring and fish salvage are free of aquatic invasive species.
  - > Don't use wood treated with creosote or pentachlorophenol for parts of the structure over the channel, including pilings, beams, structural supports and decking.
  - > Don't allow toxic chemicals or any other harmful materials to enter waters of the state.
- Develop a written plan for in-water work, worksite isolation and dewatering for water crossings in all waters of the state. The plan should include, but is not limited to, information about fish salvage, worksite isolation and dewatering. It should address in detail all in-channel construction activities and how the activities will adhere to all relevant OFPA forest road construction requirements. For all streams, the written plan should describe:
  - > activities during the in-water work period defined by ODFW

> activities outside the in-water work period when ODF, in consultation with ODFW, and the applicant can agree to specific dates of installation and removal, and the extended dates result in equivalent levels of resource protection

> how water crossings will be constructed in compliance with ODFW's fish-passage and in-water work-period requirements

- For all water crossings in Type F and Type SSBT streams:

Worksite isolation

> Isolate any work area within the width of the bankfull channel from water in the active channel when fish are reasonably certain to be present.

> Maintain an exclusion and recovery plan to ensure safe capture and relocation of fish trapped in the work zone when stream flow has been diverted.

> Capture and relocate fish to avoid direct mortality to the maximum extent practicable prior to construction site dewatering.

> Salvage fish to the maximum extent practicable at any in-water construction site where dewatering and resulting isolation of fish may occur.

> Remove all isolation features after construction is complete, and submit a written salvage report to ODF.

Dewatering

> Do not dewater areas known to be occupied by lamprey, unless the road construction operator submits a lamprey salvage plan to the ODF stewardship forester in consultation with ODFW.

> Dewater isolated areas in a manner that prevents sediment-laden water from reentering the stream.

> Limit dewatering to the shortest linear extent of the stream practicable.

> Conduct dewatering over a sufficient period to allow species to naturally migrate out of the work area.

Monitoring

Develop and implement a monitoring program for periodic inspections of all Type F and Type SSBT stream crossings that:

- confirms the crossing is functional through visual inspection
- monitors the crossing at least once every five years

Drainage

Runoff from forest roads can carry excess sediment into waters of the state. Forest roads can also alter the distribution, storage and movement of overland and subsurface flows. All active, inactive and vacated forest roads and landings should be hydrologically disconnected from waters of the state to minimize sediment entry and reduce the potential for hydrological changes that alter the magnitude and frequency of runoff. Locate drainage structures using the priorities listed below. Each item must be addressed before moving to the next one. When they conflict, prioritize the one listed higher on the list.

- Don't install cross-drains and ditch relief culverts that may cause stream diversion.
- Don't concentrate road drainage water into headwalls, slide areas, HLHLs or steep, erodible fill slopes.
- Don't divert water from stream channels into roadside ditches.
- Install drainage structures at approaches to stream crossings to divert road runoff from entering the stream. If a single drainage structure can't be placed in a location where it effectively limits sediment from entering the stream, use additional drainage structures, road surfacing, controlling haul or other site-specific measures to limit sediment entry immediately prior to the crossing. Operators may also use best management practices to manage sediment at the outflow of the drainage structure nearest to the crossing.
- Provide drainage when roads cross or expose springs, seeps or wet areas.
- Provide a drainage system – using grade reversals, surface sloping, ditches, culverts, water bars or any combination – to minimize gully erosion development at the road prism or slopes below the road. For new road construction, use outsloping whenever possible.

ODF's Forest Practices Technical Guidance helps operators comply with road drainage rules and prevent potential negative impacts to fish, wildlife, habitat resources and waters of the state.

Disposing of road waste materials

During and after road construction, always dispose of end-haul materials in stable areas – don't put debris, sidecast, waste and other excess materials where they could enter waters of the state. Prevent overloading areas that may become unstable. Never place end-haul material, clearing and root debris, or other soil or rock where it could cause slope instability or be eroded by a flood.

Submit a written plan to ODF for any waste disposal areas that have a risk of slope failure. The weight of waste fill can trigger landslides, even when placed on a gentle slope. Before placing waste on a mid-slope bench or a slope steeper than 50%, consult a geotechnical specialist. Be cautious about using mid-slope areas that already contain waste, since additional waste can lead to a landslide.

Stabilization

Establish effective drainage and stabilize exposed material by seeding, mulching, riprapping, leaving light slash, using pullback, or other effective means. Do this as soon as practicable after completing road-building operations or prior to the start of the rainy season, in any areas with the potential for sediment delivery to waters of the state, as well as for unsurfaced road grades, cut slopes, fill slopes, ditch lines, waste disposal sites and rock pits.

During rainy periods, construct roads to prevent sediment from entering waters of the state. Do not incorporate slash, logs or other large quantities of organic material into road fills.

Excavation, fills and erosion

Minimize excavating side slopes near the channel. Use the minimum possible curve radius – about 50 feet for log trucks. Note: This may make access difficult for lowboy heavy-equipment trailer traffic, which requires more gradual curves. Future logging equipment may have to drive to the site instead of being delivered by a lowboy trailer.

Fills more than 15 feet deep present risks if they fail and fill material is carried downstream, so ODF requires written plans for deeper fills. The design must minimize surface erosion, embankment failure and downstream movement of fill material.

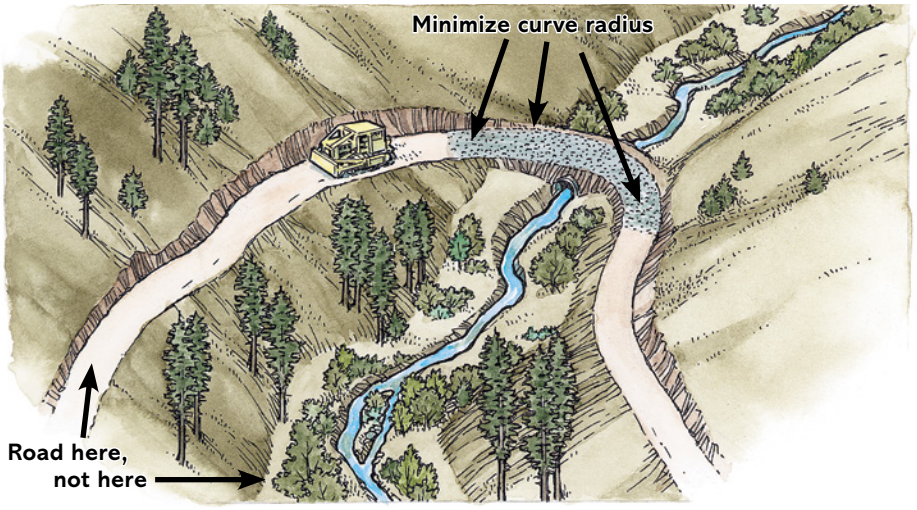
Stream crossing fills may erode and enter the stream. Prevent erosion by seeding and mulching fill slopes with appropriate species, if germination will be successful prior to the wet season. If not, use a non-erodible cover material such as clean gravel or riprap rock.

Avoid erosion of the stream channel below the culvert. Install culverts that are equal to or greater than the width of the stream to prevent water from increasing in speed as it moves through the culvert, and to protect the channel below the culvert from erosion.

EQUIPMENT RESTRICTIONS

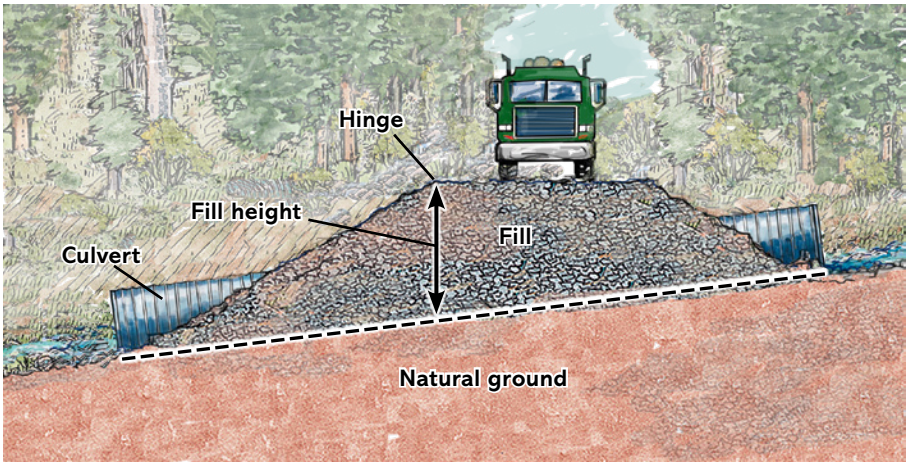
ODF must approve machine activity in Type F, Type SSBT and Type D streams, and in lakes and significant wetlands. Keep streambed machine activity to an absolute minimum. Acceptable machine activity includes crossing the stream as necessary to construct the crossing. This activity is restricted to low flow levels. Clear water and stable flows are indicators of low flow levels. Do not divert water from channels except when necessary to construct stream crossings.

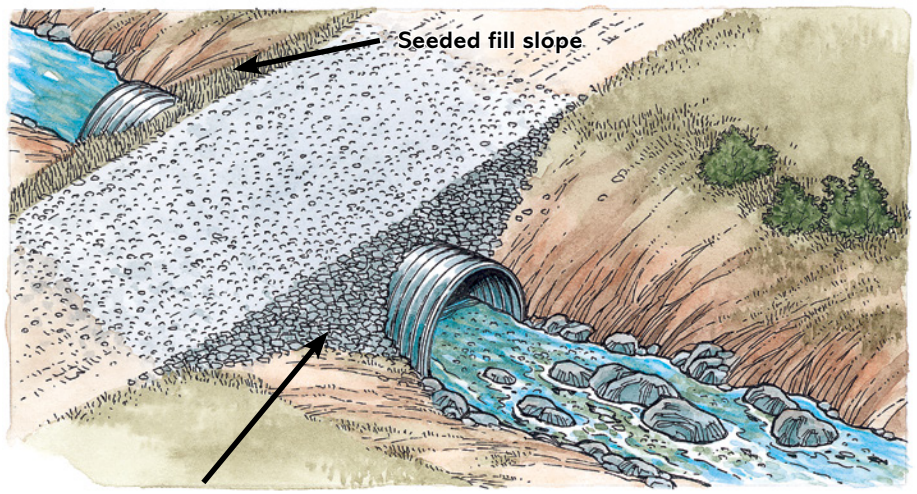
Don't exceed 18 feet of fill width at the height of the pile when crossing streams at right angles, and where it is not necessary to place a curve in the road.



Locate the road on side slopes of up to 50% grade when possible, rather than near the channel.

The hinge is the greatest depth of fill before tapering off to downstream culvert. Measure the fill height from hinge to stream bottom at the downstream side.





Use gravel cover on fill slopes if seeding may not be effective.

Fish considerations

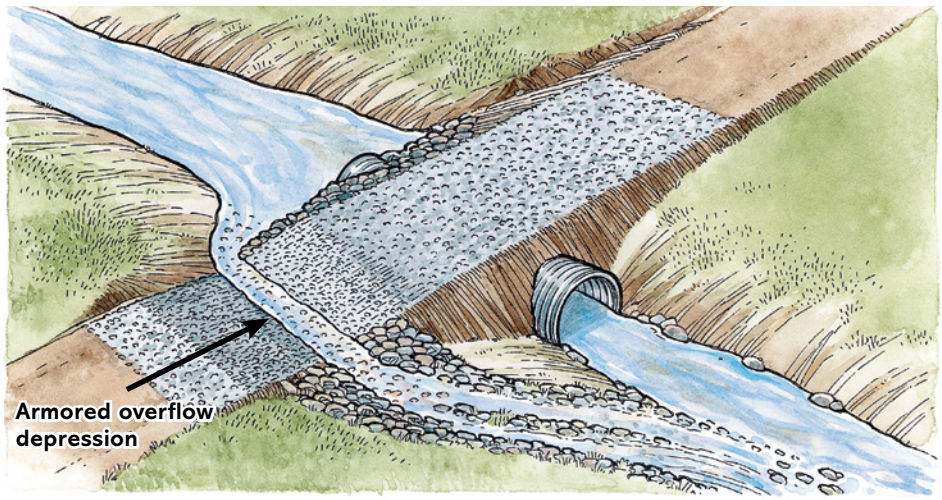
FLOW REQUIREMENTS FOR STREAM CROSSINGS

Stream crossings must be able to handle heavy storm flows and allow for fish passage. Design and construct culverts, bridges and fords to:

- pass the 100-year peak stream flow without washing out
- preclude ponding of water higher than the top of the culvert
- allow migration for adult and juvenile fish upstream and downstream during conditions when fish movement in that stream normally occurs

These requirements apply to all new road construction and reconstruction, as well as reconstruction of any partial or complete stream-crossing washout and replacement of any crossing structure.

Planning for a stream crossing must include considerations for potential flooding. When overlooked, the potential for water-quality damage is enormous. The costs of this plugged culvert road washout repair will far exceed the costs of a properly planned installation.



This vented ford is a cross between a ford and a culvert crossing. Water passes through the culvert during normal flows, but the structure can accommodate peak stream flows across a ford section during large storms. Any permanent culvert in a stream needs to be sized for the 100-year peak flow.

CULVERTS AND FISH

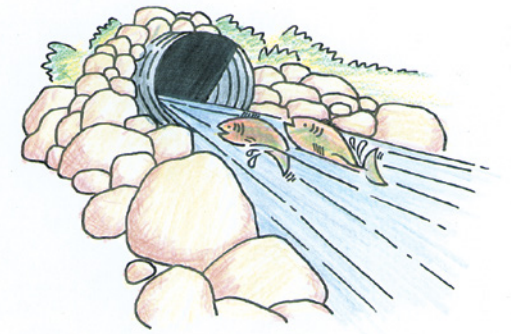
Fish move both upstream and downstream during different seasons to spawn, search for favorable water temperatures and find refuge or food during aquatic insect hatches. On Type F and Type SSBT streams, new stream crossings – or any that are reconstructed or replaced – must provide for upstream and downstream passage of both adult and juvenile fish.

If a culvert is used on a Type F or Type SSBT stream, it may be difficult to provide adequate fish passage, especially upstream against fast-flowing waters. Carefully consider how the local stream features interact with culvert pipe design and placement.

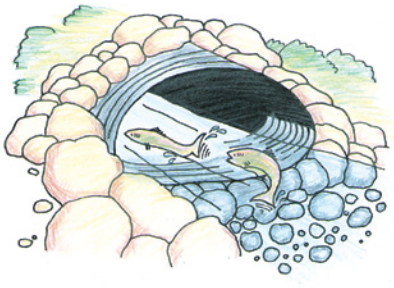
MAKE PASSAGE EASIER FOR FISH

- Don't force fish to jump to enter a culvert.
- Keep culvert openings free of debris.
- Minimize culvert length.
- Locate culverts on a straight part of the stream.
- Set culverts below stream grade so streambed gravels can naturally accumulate. (Note: A larger pipe size may be needed to accommodate a 100-year flood.)

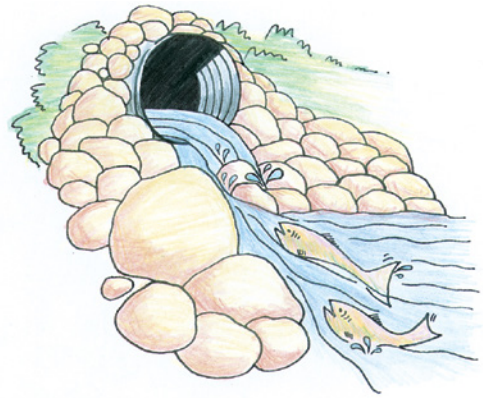
Ensure fish movement is not impeded.



Fish may not be able to swim fast enough to overcome culvert water velocity that develops in culverts narrower than the width of the stream. Rule of thumb: Water moving through a bare culvert that is turbulent (uneven water surface or whitewater) is probably a fish-passage barrier.



Water may be too shallow for fish to swim. Bare pipes frequently result in shallow water, leaving fish only partially submerged and unable to get maximum thrust from tail and body movements.



There's no pool below the inlet for fish to rest in or jump from.

Hanging culverts can be too high to jump.

Bottomless arches leave the streambed intact, so fish can pass through easily. Natural streambed roughness creates pockets of low water velocity where fish can move more freely. Arch footings should be secured to bedrock to prevent the structure from failing.

BEST OPTIONS FOR FISH PASSAGE

Each situation is unique, but this is a general ranking of methods:

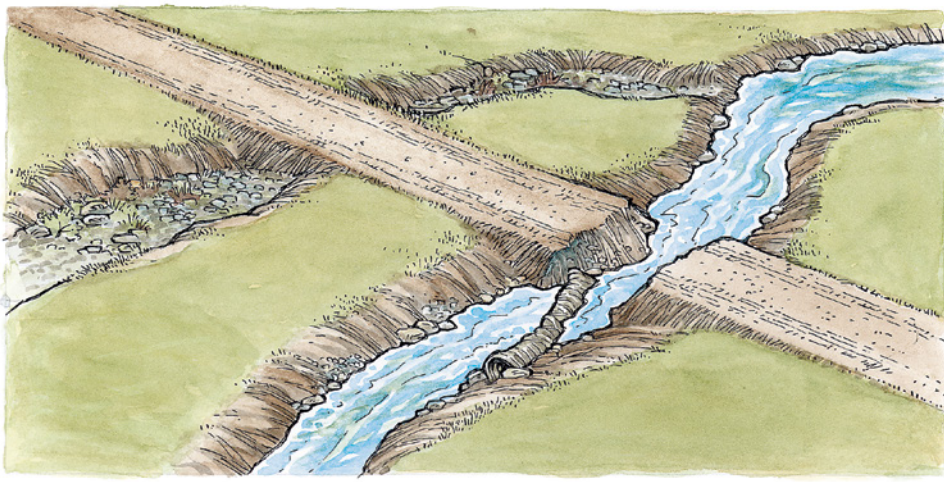
1. re-routed road (avoid/remove stream crossing)
2. channel-spanning structure (long- and short-span bridges with bottomless arches)
3. fords, which are only suitable for low-traffic roads
4. streambed simulation (sunken and embedded culverts)
5. embedded culvert placed at a zero grade (culvert at <1% gradient and sunk for backwatering)

All road projects involving construction or reconstruction work should address local needs for water flow and fish passage. Such projects include:

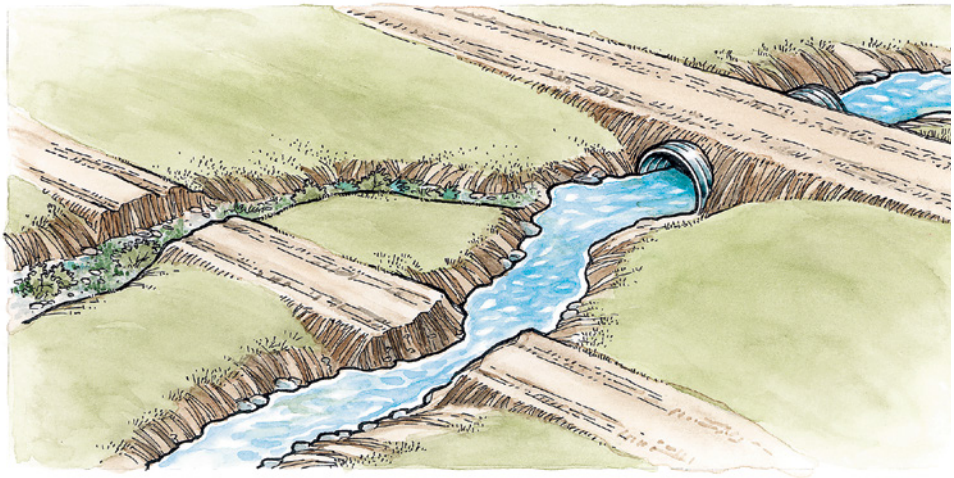
- minor road relocation
- replacement of stream-crossing structures
- any road widening
- clearing of a road closed by trees growing on its surface
- opening of any old road

CROSSING STRUCTURES ON SIDE CHANNELS

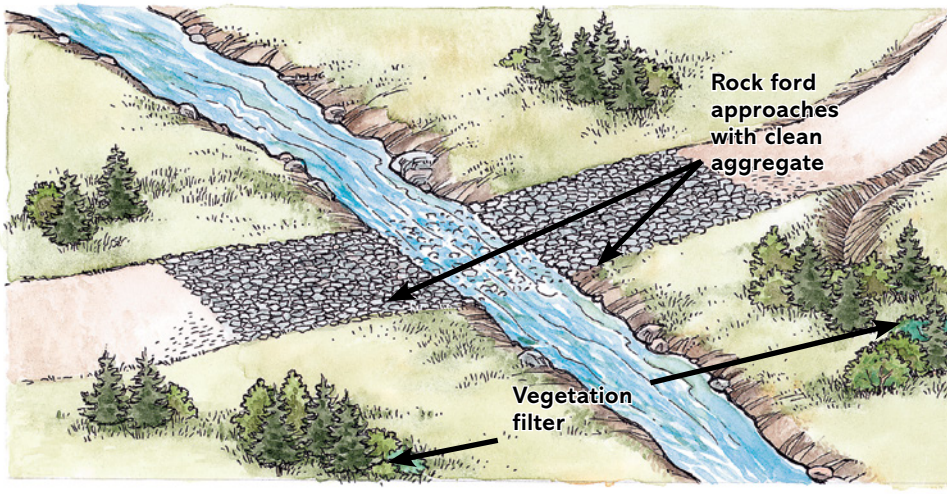
Young fish find protection in wetlands and side channels during high stream flows. When added to old roads, culverts or bridges can reconnect these fish habitats. In some cases, relocating the road can be a more effective way to reduce the number of stream crossings needed to maintain road access (see middle illustration, next page).



Early road construction techniques often filled side channels and contributed to the failure of main channel culverts during high-water events.



In this example, a minor relocation of the road prism results in only one culvert being reinstalled for road access. This reduces maintenance and allows the side channel below the new crossing to be restored to a more natural condition.



Fords with rocked approaches can be good alternatives to culverts on lightly used roads. Well-designed and located fords can greatly reduce the amount of material at risk of erosion and sediment delivery to streams during high water.

LOCATING A FORD

A ford is a stream crossing option for low-service-level roads that are private, gated and infrequently used. Access control is important to avoid damage to the ford approach when it is vulnerable to damage and erosion. Fords seldom have year-round access. A bedrock stream bottom is ideal for a ford location. Otherwise, the bottom should be armored with suitable rock.

The size and shape of existing in-stream rock can guide the minimum size of armor rock required to resist downstream movement. It should be bigger than the common rock size in the stream bottom. Angular rock is preferred because it resists movement by interlocking. Do not restrict fish passage.

Gently sloping, stable streambank approaches are preferred. Approaches should be covered in rocks to minimize erosion when driving in and out of the ford. Where practical, approaches should be at right angles to the stream. Approaches should dip into and out of the stream, creating a concave shape that ensures the stream cannot be diverted out of its natural channel and down the road.

Unimproved fords, except those on solid rock, are generally inadequate for truck traffic. Traffic breaks down stream gravels and mud is brought into the channel from vehicle tires.

OFPA requirements for locating a ford depend on how much use it will receive.

Bridges and bottomless arches

These structures are the stream crossing of choice for fish passage. They require carefully constructed abutments to avoid erosion and stream damage during high stream flows. Avoid mid-span piers if possible. They are costly, can cause channel scour and are difficult to stabilize. Use riprap rock to protect abutment fills from erosion.

Bridges are best for large streams and those plagued with floatable debris problems. Bridges and bottomless arch culverts have the least impact on fish when installed properly.

Keep road drainage under control. Even with grass cover, runoff and sediment have flowed around this abutment and drained directly into the stream.

Tips for new permanent bridges

- Size bridges to accommodate stream channel width and flood risk.
- Construct bridges and bridge approaches to minimize the amount of soil or other material that reaches the stream.
- Retain existing vegetation and organic material around stream crossings to control erosion. Cover exposed soil with slash or other protective material.
- Use abutments and wingwalls (retaining walls) to prevent material from spilling into the stream.

Consider simple bridges for small Type F and Type SSBT streams. They can be similar or lower in cost compared to large, complex culvert installations.

Advantages of temporary portable bridges

- They're useful for stream crossings on temporary, low-standard roads.
- They're useful when short-term access to forestland is cut off by a stream.
- Installation and removal are quicker, with minimal environmental impact.
- They can be re-used in different locations as needed.
- Streams can be restored to their original condition when temporary crossings are used.

A portable bridge provides access across streams less than 10 feet wide, with minimal disturbance to streambanks or bed. Place portable bridges in locations with firm soil banks, level grade and minimal vegetation.

Along with its portability, this temporary bridge is strong enough to handle logging equipment for all timber harvesting activities.

This 20-foot portable bridge was hauled on a flatbed truck and set into place in one day. The bridge cribbing that supports it is made from 10-foot-long timbers laid on the ground 4 feet from the stream bank.

A small tractor built the road approaches to this temporary bridge. Over a three-week period, the bridge carried approximately 25 truckloads of logs.

When logging was completed, this temporary bridge was removed.

Construction in wetlands

Avoid or minimize all road and landing construction near or within significant wetlands, stream-associated wetlands or wetlands greater than 0.25 acres. When impacts are unavoidable, minimize them and then mitigate for them in the following ways, listed in order of priority:

1. Select the least environmentally damaging landing location, road location and road length. Attempt to minimize road length when avoiding wetlands.
2. Build a temporary road or landing when construction cannot be avoided, and follow these steps:
   - > Minimize impacts by reducing the subgrade width, fill acreage and spoil areas.
   - > Remove temporary fills or road sections upon project completion.
3. Mitigate impacts of permanent road construction by:
   - > reducing or eliminating impacts over time by preserving or maintaining wetland areas
   - > replacing areas of the wetland affected by the road or landing by creating new wetlands or enhancing existing wetlands
4. Replace lost wetland functions and values by substituting or enhancing the road or landing construction site when more than 0.25 acres are filled or drained. The objective of substitution is successful wetland replacement on a two-for-one basis, of the same type and in the same general location. The objective of enhancing wetland function is to replace what was lost with an equivalent amount of function and value.

ODF's Forest Practices Technical Guidance publication can assist with rule compliance for road or landing construction in wetlands. It also explains how to prevent potential impacts to fish, wildlife, habitat resources and waters of the state.

TEMPORARY SKID ROAD CROSSINGS

After trees are cut, limbed and bucked into logs, they are moved (yarded) by skidders, tractors or shovels on a skid trail to a landing, where they are loaded onto trucks. Both skid road construction and temporary stream crossings may be needed to yard logs cut in the riparian management area (RMA) or to yard logs to a landing across the stream.

Temporary crossing activities have the potential to disturb RMA soils and vegetation, creating muddy runoff and sedimentation and impacting water quality. For this reason, minimize the number of temporary stream crossings.

Areas that must be protected when using temporary crossings:

- fish passage on Type F and Type SSBT streams
- channels and banks
- vegetation left in the RMA
- RMA soils that control runoff and keep sediment out of waters

Planning temporary crossings

A temporary crossing structure is needed when there is stream flow at the time of harvest, if stream flow will occur during harvest, or if streambanks are wet or fragile.

When improperly built, temporary stream crossings are a threat to streams, lakes, wetlands and fish passage. Fish may not be able to migrate upstream or downstream on Type F and Type SSBT streams. High water can erode fill materials and wash out crossing structures, creating sediment.

Do not use tractors, skidders, feller-bunchers and other logging equipment in any stream channel, except as required for temporary stream crossings. Additionally, do not straighten or shorten any stream channel.

A written plan is required when crossing Type F and Type SSBT streams, even if they are dry.

Plan crossings to affect as little of the channel, banks and riparian area as possible by:

- installing crossings only where necessary
- using existing, permanent roads as much as possible
- locating skid trails outside the RMA as much as possible
- building a maximum of one crossing per harvest
- not using crossings to straighten skid roads

Additional temporary crossings can be used when:

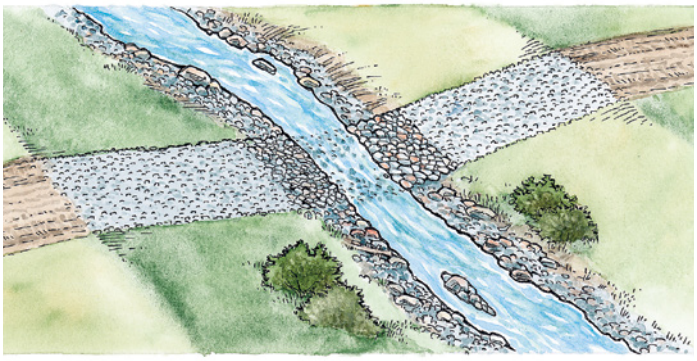
- the alternative involves crossing a landslide
- the alternative is a skid trail on a slope greater than 60% grade
- the alternative is to cross a property line, and the adjoining landowner is unwilling to have skid trails on their property
- the only alternative is a skid trail parallel to and within 100 feet of the stream
- the only alternative is a permanent crossing

Acceptable temporary crossing structures

The choice of temporary crossing structure depends on stream size, time of year, presence of fish and volume of timber moved over the crossing.

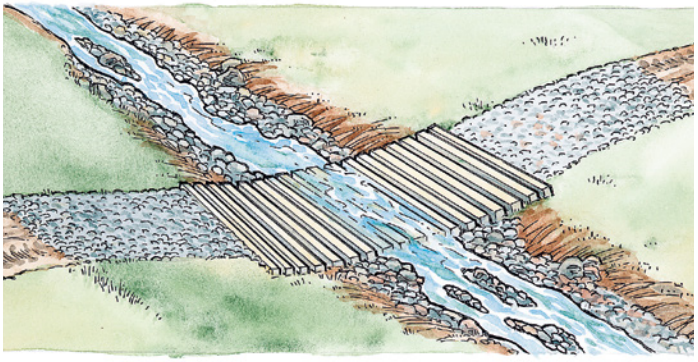
The illustrations on the next page show several temporary stream crossings. The improved mat ford and natural bottom ford are for log truck use only. Yarding across these two temporary crossings would result in sediment or wood debris entering the stream. The other three temporary crossings are for both yarding and truck use. Always remove temporary crossings once yarding is complete (see page 212).

Examples of temporary crossings



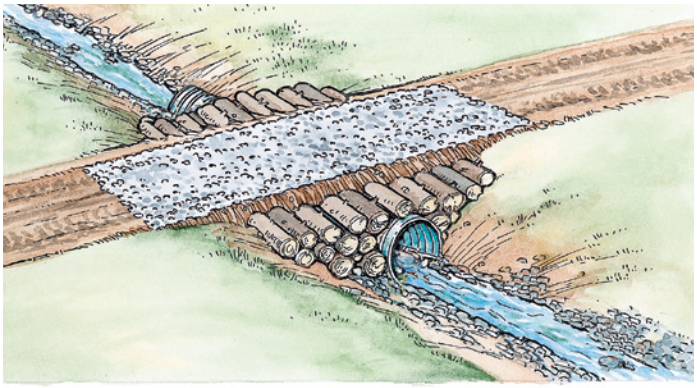
ROCK FORD

Where there is light road use, fords with rocked approaches might be an alternative to culverts. Well-designed and located rock fords need to reduce the amount of material at risk of erosion or delivery to streams during high flows.



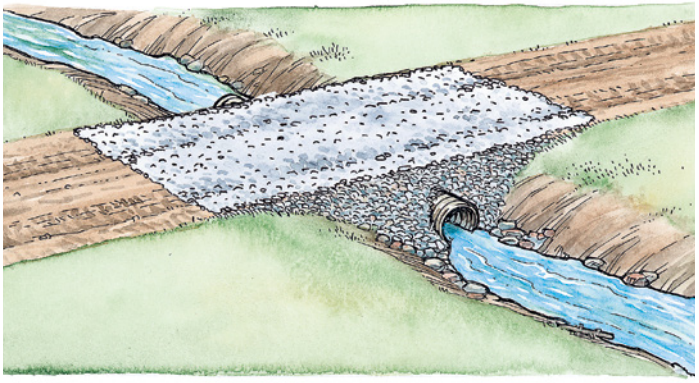
IMPROVED MAT FORD

This crossing may only be used by log trucks. It is constructed with concrete or wood planks fastened together.



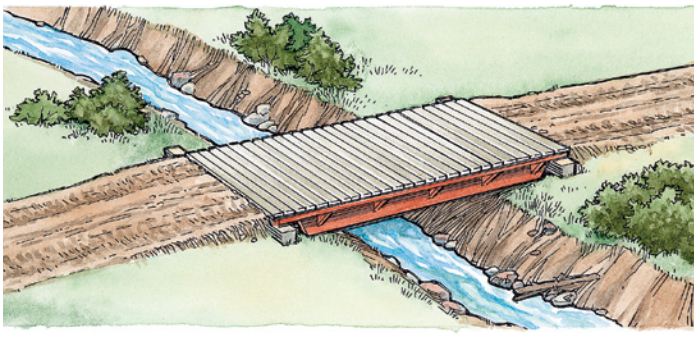
LOG CROSSING

Log crossings may only be used for Type N streams with very low flows. Use rock fill over logs, keeping fill back from ends of logs. Culverts with an 18-inch diameter are required for any stream crossing used for a haul road. This includes temporary crossings and non-fish streams.



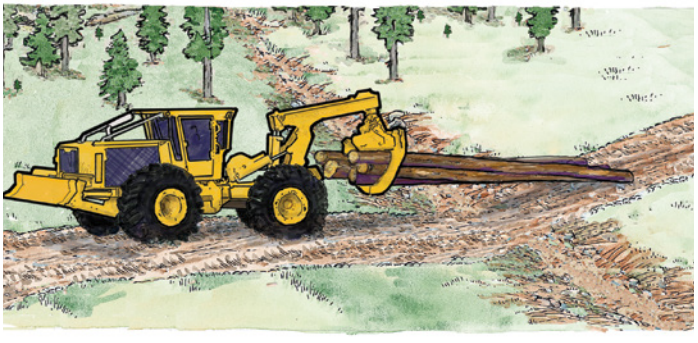
CULVERT AND ROCK FILL

Temporary stream crossings with culvert and rock fill must accommodate stream flow during use. Fills over 15 feet require a written plan (see page 225).



BRIDGE

Temporary short bridges provide the greatest stream protection. Use a portion of a rail car or reinforced concrete. Constructed abutments may not be needed; wood timbers placed on the ground some distance back from the bank may suffice.



SKID TRAIL OVER DRY BED

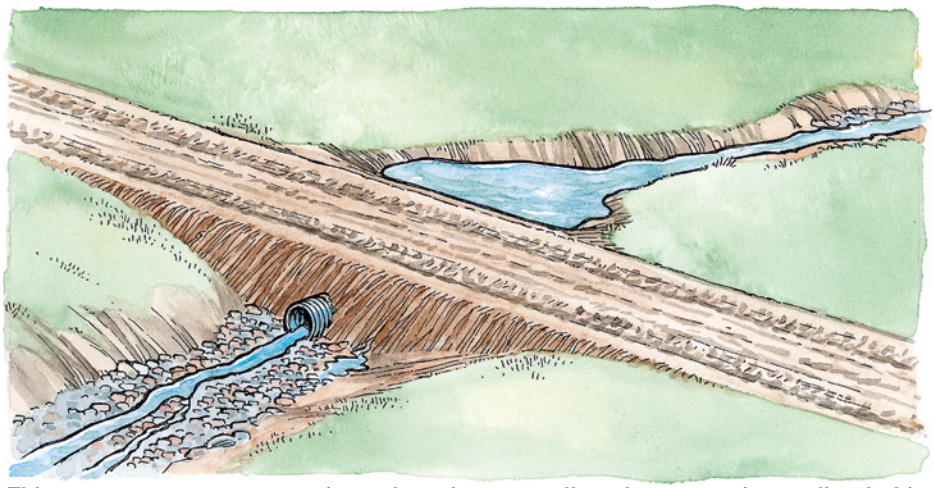
When the channel is dry and will remain dry during the operation, no temporary crossing is required as long as disturbance is no greater than what would occur if structures were constructed.

Location of temporary crossings

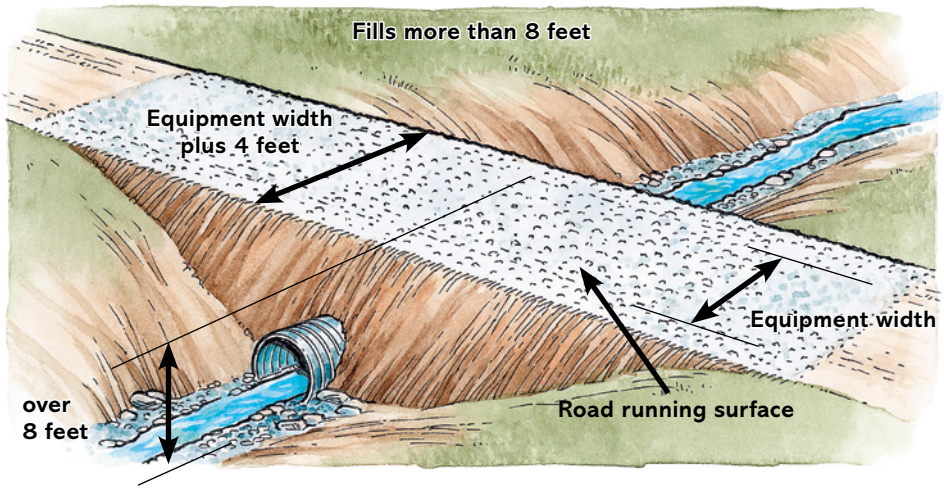
Temporary stream crossing structures such as log crossings, culverts or fords must be capable of passing stream flows likely to occur during use. Be sure the temporary stream crossing can pass the highest flow reasonably expected during the life of the structure, and can pass flows without ponding water behind the fill or saturating the fill soil.

Follow these location guidelines:

- Choose a single channel that is narrow and not deeply incised.
- Avoid multiple, braided or side channels.
- Avoid eroded areas or streambanks with exposed soils.
- Keep banks under 5 feet high; bridges are better where banks are higher than 5 feet.
- Look for rock, cobble or gravel, rather than clay, decomposed granite soils or sand.
- Avoid very wet or weak soils.
- Avoid slide areas, gullies or active erosion areas.
- Approach the crossing at a right angle and move away from the stream as quickly as possible.
- Minimize cuts, fills or other bank disturbance.
- Provide cross-drainage on nearby roads and skid trails to prevent runoff and sediment delivery to the stream.



This temporary stream-crossing culvert is too small — the stream is ponding behind the culvert and seeping through the fill. The culvert could fail, sending fill soil downstream.

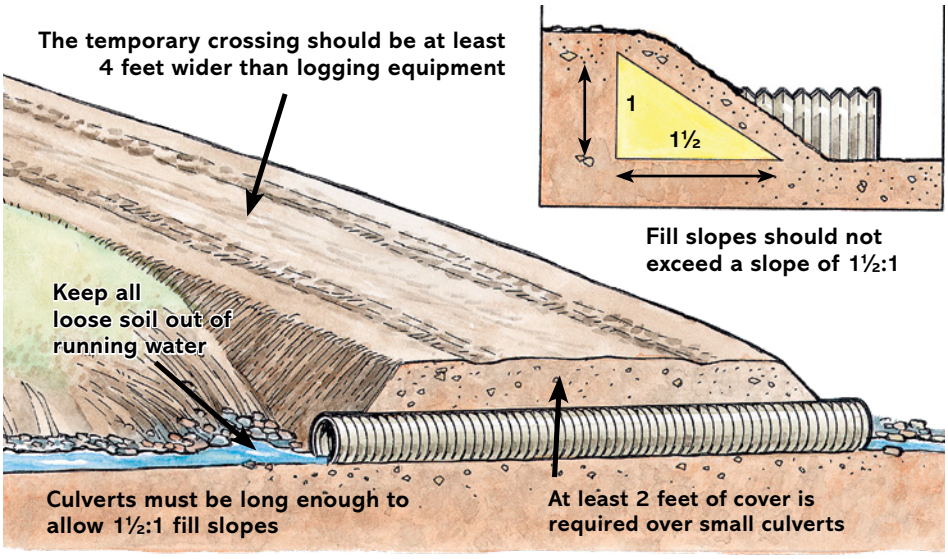


Fill depth is measured from the road running surface to the stream bottom at the downstream side. Fills more than 8 feet deep must be designed in accordance with road construction and stream crossing fill rules, except that temporary crossings are not required to withstand a 100-year flood.

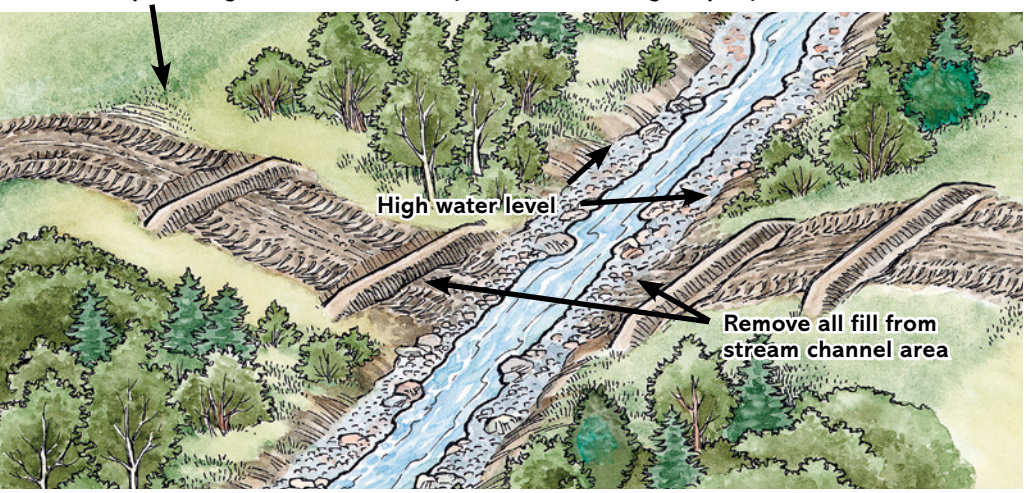
Constructing temporary structures in live streams

When building temporary structures in live streams:

- Keep equipment out of the water.
- Minimize sediment entering water. Temporary water diversions are okay during low flows and if fish are not affected. Either pump stream water around the construction site or use a temporary trench.
- Use rock instead of soil as fill for a temporary crossing, as it is easier to remove after completion.
- Protect streambed and banks from damage.
- Make sure the temporary structures can withstand erosion.



Place stream-crossing fill here. Be sure to construct water bars (see page 218) on upland segments of skid trails (see the Harvesting chapter).



Construct water bars to divert runoff from temporary stream-crossing approaches. Construct them as soon as crossing use has ended and before the rainy season.

Constructing temporary crossings in dry streams

When the channel is dry and will remain dry during the operation, no temporary crossing is required as long as disturbance is no greater than what would occur if structures were constructed.

Locate crossings where bed and banks are clean gravel, cobbles or bedrock. If wetlands or any other wet soils are present, use temporary structures.

A written plan is required when heavy equipment crosses a Type F, Type SSBT or Type D stream, even when dry.

Decommissioning a temporary crossing in a dry stream

To decommission a temporary crossing in a dry stream:

- Remove soil from the channel after the operation or before stream flows, whichever comes first. Place material where it will not enter water.
- Construct water bars, dips or other water diversions on stream-crossing approaches after the operation or prior to the rainy season.

Vacating temporary water crossings

Remove temporary stream-crossing structures after completion of the operation or prior to seasonal runoff, whichever comes first.

To vacate a temporary water crossing:

- Reestablish channel connectivity.
- Remove any potential fish-passage barrier.
- Remove all water-crossing structures and all imported fill.
- Restore the channel, banks and side slopes:
  - > Match pre-existing natural conditions as closely as possible.
  - > Make sure the side slope does not exceed a 2:1 ratio (horizontal to vertical, unless matching natural stream conditions).
  - > Incorporate large wood, if possible, to help restore the stream bed.
  - > Place erosion-control materials on the stream bank.
  - > Place all excavated material in a stable location outside of any floodplain.
  - > Disconnect any road-related water from the entire site.
  - > Plant exposed stream banks with native trees or shrubs.
- Notify the state forester that the crossing was vacated.
- Consult ODF's Forest Practices Technical Guidance for further information.

MAINTAINING ROADS

Terms to know

ACTIVE ROADS are currently used and maintained for the purpose of removing commercial timber from the forest.

INACTIVE ROADS are used for forest management purposes, but not for removing commercial timber.

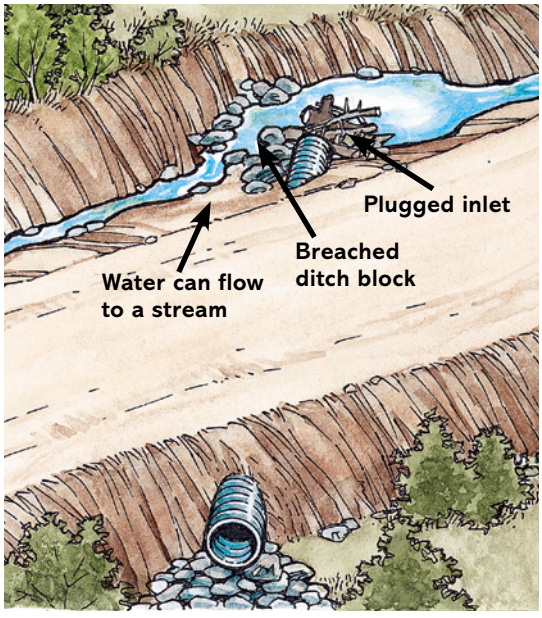
VACATED ROADS have been made impassable and are no longer used for forest management purposes or commercial timber harvesting activities.

ABANDONED ROADS were constructed prior to 1972 and do not meet the criteria of active, inactive or vacated roads. Skid trails are not included in this definition.

Maintenance of roads on forestlands is a key forest practice. Because dirt or rocked roads exist on most forest ownerships, maintenance work is a common need. Some older or heavily used roads can also benefit from improvements, including better drainage or surfacing.

Complete timely maintenance of active and inactive roads to protect water quality, and ensure the integrity of waters of the state to the maximum extent possible by:

- minimizing surface and subgrade erosion
- minimizing direct delivery of surface water to waters of the state
- minimizing sediment entry to waters of the state
- directing any groundwater that is captured by the road surface onto stable portions of the forest floor
- ensuring durable, properly functioning drainage features
- avoiding overcleaning ditch lines on existing roads with inboard ditches



This undersized ditch relief culvert resulted in a breached ditch block and sediment flowing directly into the stream. A culvert width of at least 18 inches is recommended.

Not a major sediment problem yet — but when roads become channels for drainage, major sediment pollution can result.

Watch for damaged culverts that need replacement. Repair work should be completed during dry weather.

Poor road surface drainage caused this fill-slope erosion.

Soil sloughing off a road cut.

Forest road operator responsibilities

Forest road operators are responsible for the following maintenance tasks:

- Inspect and maintain culvert inlets and outlets, drainage structures and ditches before and during the rainy season to minimize the likelihood of impeding flow and the possibility of structure failure.
- Provide effective road surface drainage – such as water barring, surface crowning, outsloping or constructing sediment barriers – prior to the rainy season.
- Plan and apply road oil or other surface-stabilizing materials to prevent entry of these materials into waters of the state.
- Maintain and repair active and inactive roads to minimize damage to waters of the state. This may include maintenance and repair of all portions of the road prism during and after intense winter storms.
- Place material removed from ditches in a stable location.
- Install drainage structures on ditches that capture groundwater.
- Maintain fish passage through water-crossing structures by:
  - > maintaining conditions so passage of adult and juvenile fish is not impaired when fish movement normally occurs
  - > keeping structures cleared of woody debris and sediment deposits that may impair fish passage
  - > protecting water quality – such as placing additional cross-drainage structures on existing active roads within their ownership, prior to hauling – as directed by an ODF stewardship forester
  - > adhering to other fish-passage requirements administered by other state agencies that may be applicable to water-crossing structures

Cut-and-fill slopes

The following are recommendations for cut-and-fill slopes:

- In steep terrain, cut-slope ravel and slides are common if soils are thick or the rock is fractured.
- Sidecast fill on steep slopes can begin to fail years after initial construction. Tell-tale signs are arc-shaped cracks along the outside edge of the road. An excavator should be used for sidecast pullback, especially if debris could move into a creek.
- Debris collects in ditches, and dense vegetation may block water flow; however, light vegetation can stabilize ditches.
- Ditch inspection should be done during storm events when problems are most obvious. Watch for blockage, overflow problems and ditch downcutting.
- Don't delay cleanup. Move soil and debris to a location where they will not create additional erosion problems.
- Reduce erosion by seeding and mulching bare cut-and-fill slopes.
- Ditch-line erosion may indicate a need for more or larger culverts, or armoring with rock (see Ditch grade basics, page 216). Haul all excess material removed by maintenance operations to safe disposal sites and stabilize these sites to prevent erosion. Avoid side-casting in locations that might become unstable, or where erosion will carry materials into a stream.

Road grading

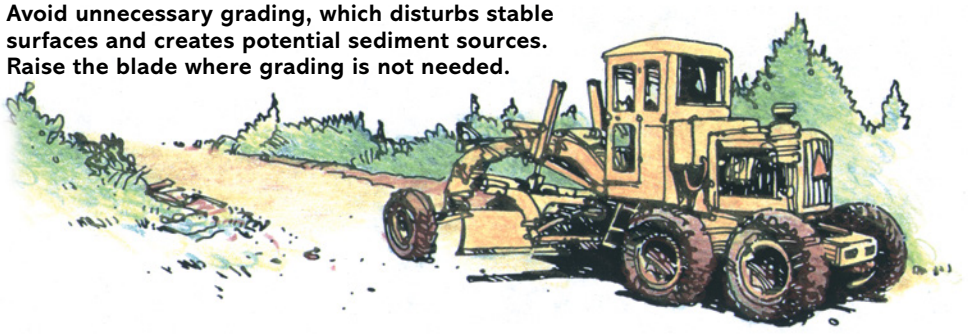
Recommendations when road grading:

- Maintain road surfaces – either outslope, in-slope or crown (see page 216).
- Maintain cross-drain structures on road surface.
- Correct road surface damage resulting from vehicle traffic and freeze-thaw cycles that reduce drainage effectiveness.
- Protect drainage on unimproved roads; this is helped further by road-use restrictions during wet weather.
- Maintain a stable running surface and adequate surface drainage.

Grading has many advantages. However, it should only be performed as necessary, keeping in mind the following precautions:

- Grade when roads are neither dusty nor muddy; moist roads are more easily shaped and compacted by grading machinery.
- Watch for steep sections or curves where added wear and rutting take place.
- Avoid cutting the toe of cut slopes when grading roads, pulling ditches or plowing snow.
- Plan and conduct the application of road oil or other stabilizing materials in a manner that prevents these materials from entering waters of the state.

Avoid unnecessary grading, which disturbs stable surfaces and creates potential sediment sources. Raise the blade where grading is not needed.



Roads receive heavy use during logging. Be aware of early signs of damage. Serious damage to road surfaces starts with excess water. Standing water is a sure sign of road-drainage problems. Ruts indicate that road strength is deteriorating.

Grader damage to inside ditch toe slopes exposes an easily erodible surface and is a source of sediment.

Slow, controlled grader operation is key to reducing culvert inlet and outlet damage. Reduce damage by keeping graders on the road running surface. Never side-cast gravel toward culvert inlets or outlets.

An operating drainage system

An operational and effective drainage system:

- moves water across or under the road before it causes erosion
- proactively identifies locations where ditches may be blocked by slides or gravel
- uses additional ditch relief culverts or changes the road surface (outslope, in-slope or crown – see next page) to carry water around the problem
- treats unanticipated problems as quickly as possible
- filters muddy runoff so minimal sediment enters waters of the state
- is inspected before and during the rainy season to diminish the likelihood of clogging and the possibility of washouts

No matter their age, forest roads need effective drainage to remain functional and avoid erosion and sedimentation problems. Roadway surfaces are normally crowned or sloped to remove surface water. Other key features of effective drainage systems include road grade changes, adequate ditches and ditch relief culverts that control drainage and ensure water quality.

Most landowners in western Oregon prefer to use crowned roads with ditches and cross-drain culverts. Outsloping is most suitable for low-service roads with gentle grades (less than 7%) and those where frequent surface grading prevents rutting.

Even for temporary or inactive roads, drainage must be provided to give the same level of water-quality protection as required of active roads. When work is stopped on road improvements or new construction and there is potential for erosion, cross-drainage with culverts, water bars, dips or other means is required (see following pages for details).

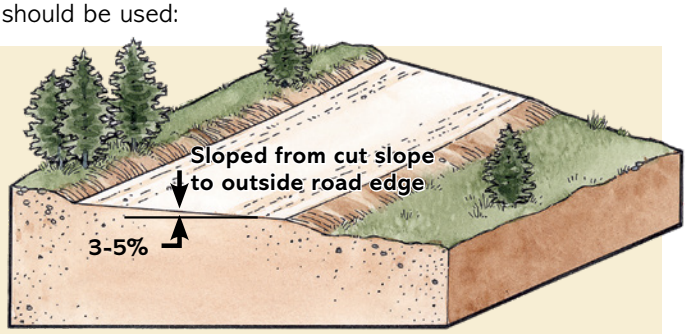
Landowners are required to take whatever reasonable action is necessary to prevent material from entering waters of the state. Road repair includes replacing or adding culverts, performing sidecast pullback and removing debris in the road. Soil and debris removed from ditches during road grading and/or cleaning should be placed in a location that does not cause slope instability, and where it will not wash back into the ditch.

Waste oil is prohibited on forest roads. Any materials applied must not enter or wash into streams, lakes and wetlands.

Here are three types of forest roads, with a description of when each should be used:

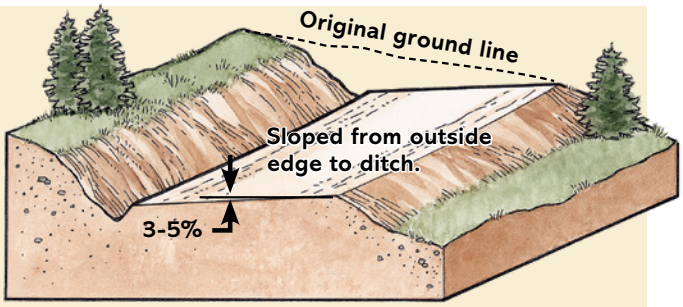
OUTSLOPE ROADS

- Road grade is gentle or flat (<7%).
- Ditch or cut slope is unstable.
- Surface can be kept smooth.
- Road is vacated.
- Rutting can be controlled.
- Road use is seasonal and traffic is light.



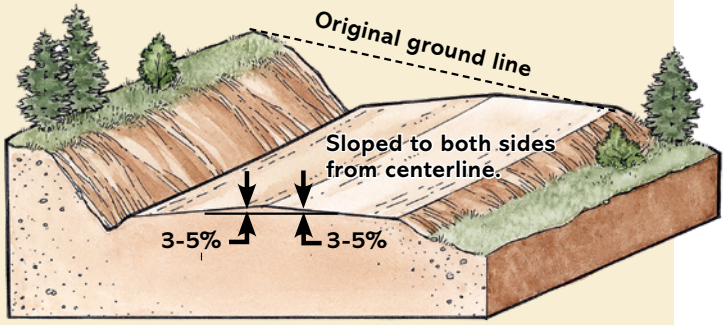
IN-SLOPE ROADS

- Road grade is steep (>7%).
- Surface drainage is carried to a ditch or surface drain.
- Outslope causes fill erosion.
- Outslope is ineffective due to ruts.
- Slippery or icy road conditions are prevalent.



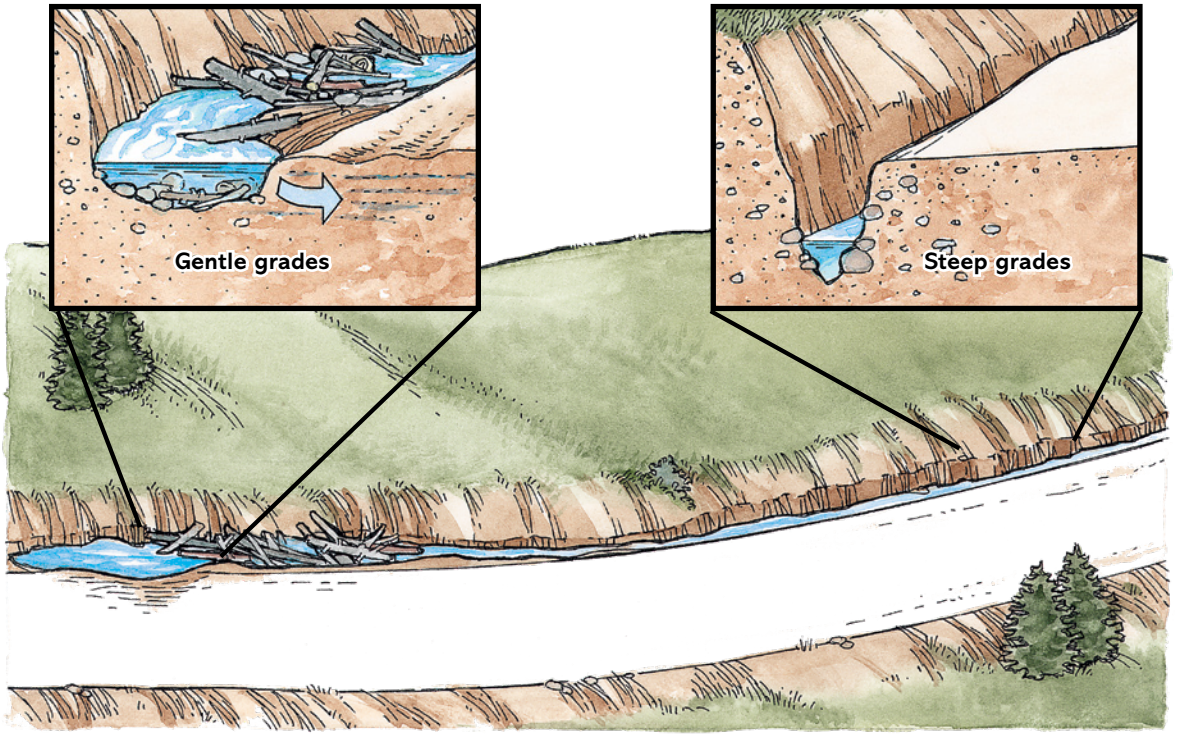
CROWN ROADS

- Road grade is flat.
- Two traffic lanes are needed.
- There is a single lane on steep grade.
- Regular maintenance of ditches, crown and cross drains is possible.
- Slippery or icy road conditions are prevalent.



Ditch grade basics

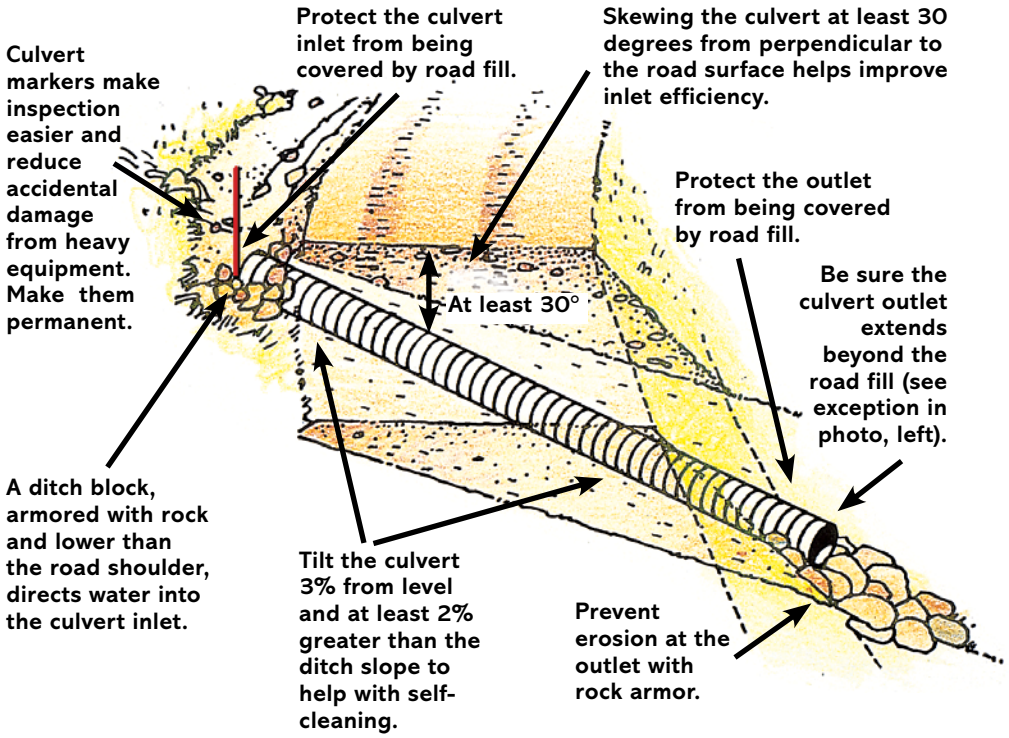
Steep ditch gradients without adequate ditch relief culverts give water too much momentum and can scour and carry sediment and debris for great distances. Where the ditch levels off, debris settles and clogs ditches. This runoff sometimes carries sediment to streams. Some steep ditches are unavoidable. Control erosion with an adequate number of ditch relief culverts, armoring ditches with rock and using a ditch block at the culvert inlet.



Ditch relief culverts

Ditch relief culverts move water from the ditch on the uphill side of the road, taking it under the road and releasing it onto a stable area on the downhill side. They prevent water from crossing the road surface and softening the roadbed. Use culverts with an 18-inch diameter where soil- and debris-plugging are a concern.

It may not always be possible to have the culvert extend beyond the fill. For steep fills, a half-round or flume should carry water beyond the fill.

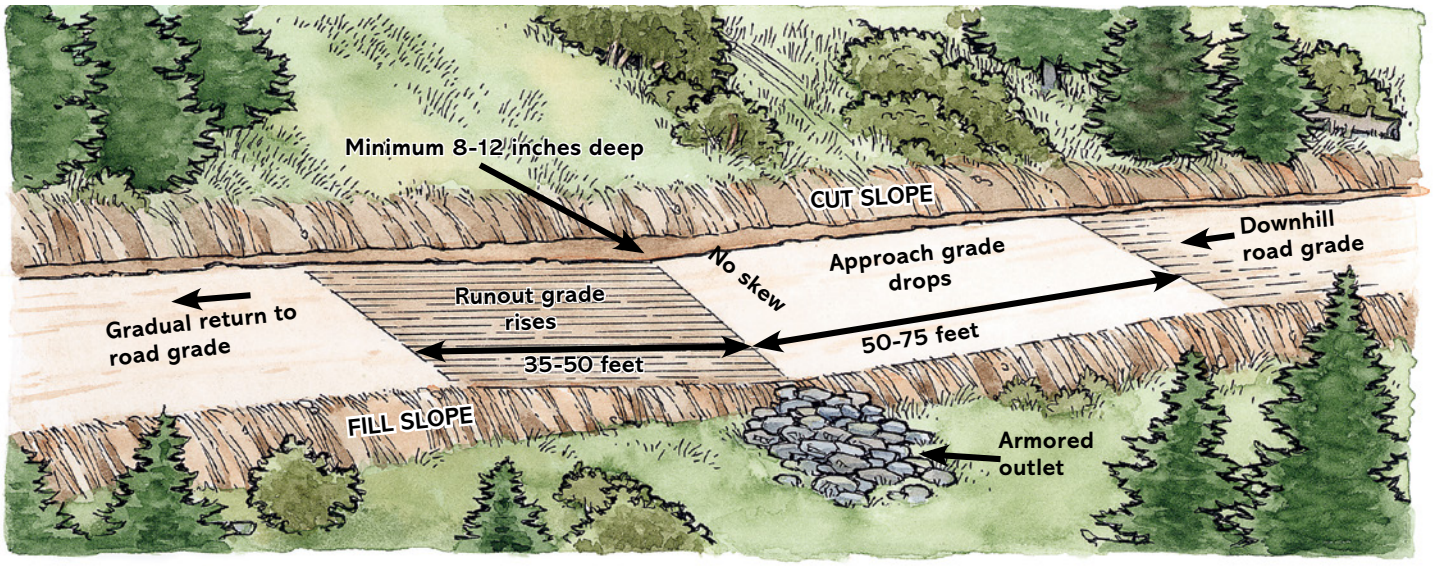


When performing culvert placement or replacement, a written plan may be required. See the written plan requirements on page 225.

Drain dips

Drain dips are gentle rolls in the road surface that are sloped to carry water to the outside, onto natural ground. They:

- provide drainage without being a driving hazard, because of their approach, depth and runout features
- are used on roads with or without ditches
- are effective on roads with gentle grades
- may be difficult to construct on steeper grades, where ditch relief culverts are preferred
- may be difficult for log trucks to negotiate because of dimensions and locations



This drain dip bottom is sloped to carry water from the inside to the outside of the road surface and onto natural ground.

Water bars

Water bars are small earth dams or humps built into the road surface that divert road surface water so it will not cause erosion. They:

- are used on inactive roads and skid trails
- are constructed with mechanical equipment (better excavation and compaction) but can be built with a shovel
- use basic spacing guidelines based on soil type and slope (see Table 7-3); other factors such as road dimensions, aspect (compass direction the hillside faces) and climate also should be considered

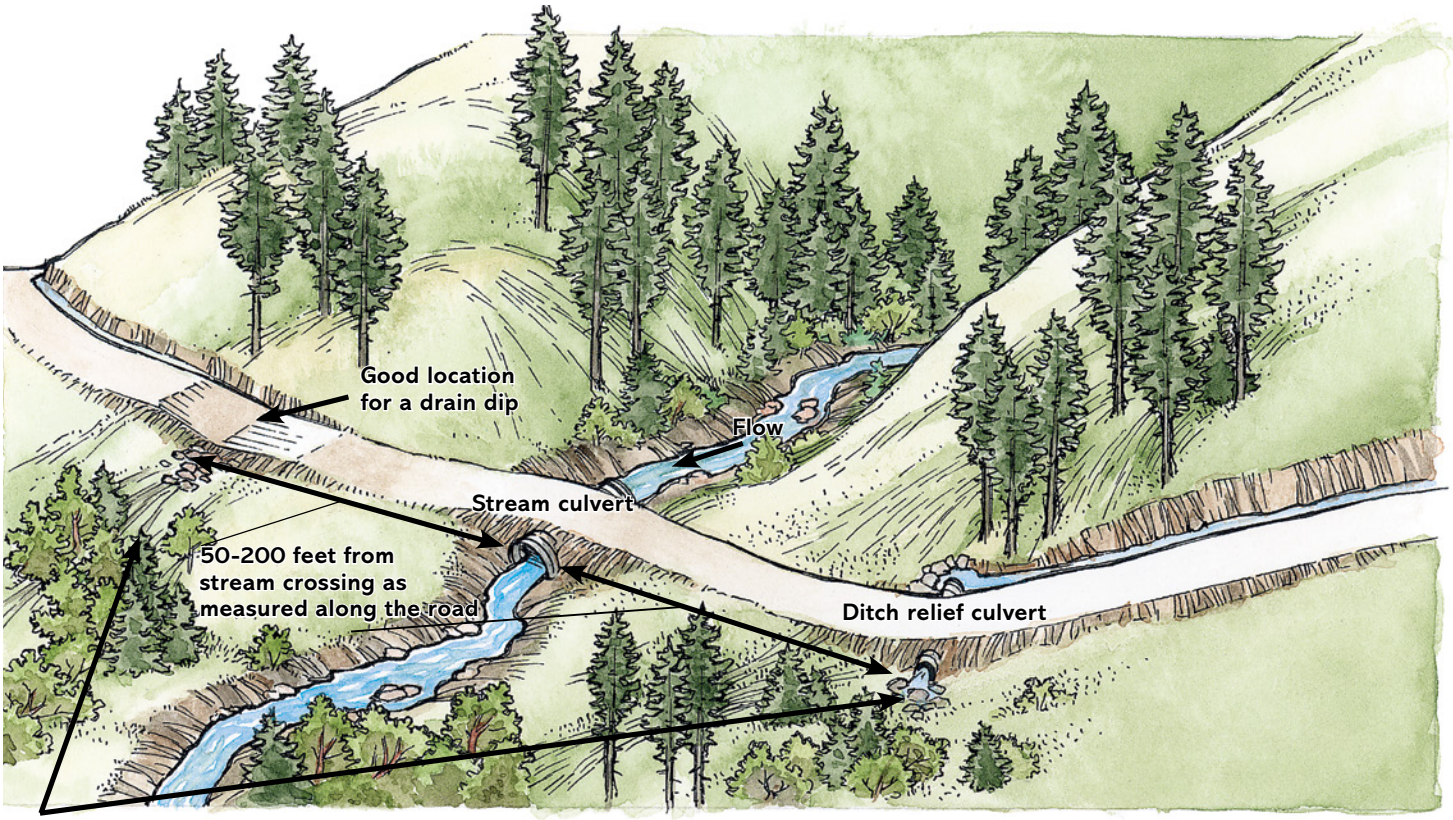
Table 7-3 Water bar spacing guidelines (feet)

Slope	Erodible Soil (sand, ash, etc.)	More Stable Soil
2-5%	400	600
6-12%	200	300
13-18%	100	200
19% and over	50	150

Responsibility for road drainage near streams

Install dips, water bars or cross-drain culverts above and away from stream crossings so road drainage water filters through ground vegetation before entering the stream. Drainage water should be directed onto undisturbed, vegetated soil.

Route ditch drainage through a filter of vegetation and undisturbed soil so sediment can be removed before water reaches the stream.



Ditch drainage should be directed into vegetation and undisturbed soil filter, and not allowed to continue flowing down the ditch and into the stream.

Cross streams at right angles to the main channel. Road grades that drop into the stream can increase sediment delivery to the stream. Grades that dip very gently or not at all toward the stream deliver less sediment. Never allow road ditches or ditch relief culvert drainage to flow into a stream. Culvert drainage and road ditches should always be directed through a vegetation filter before reaching the stream. Be aware of the risk of causing slope failure on steep slopes if water is concentrated into very steep areas or old landslides where water hasn't been flowing.

Straw bales or small heaps of slash can reduce stream sedimentation by slowing surface water and trapping sediment.

Road surfacing can double the cost of a road. However, gravel roads can provide all-weather access, reduce road maintenance costs and protect water quality by covering the soil with a weather-resistant surface.

Wet weather road use can create muddy runoff, which is a common source of fine sediment and stream water turbidity. Turbidity refers to the very small, dissolved materials that remain suspended in water and prevent light from penetrating. High turbidity levels can cause stress in fish, affect their feeding and growth rates, and impair their homing instincts. Sediment can smother fish eggs, called redds, and affect aquatic insect life.

Springs or seeps near roads

When roads cross or expose springs, seeps or wet areas, drainage must be provided to all hillslope wet areas regardless of whether they were known before construction.

Do not place road fill on top of springs. In areas with high groundwater, it may be necessary to use French drains in the ditch area, or use a free-draining fill.

Where cut slopes or road surfaces expose flowing water, roads must be graded and cross-drained to remove this water before ditch cutting occurs.

Clear channels and ditches of slash and other construction debris that can interfere with effective roadway drainage.

Road work and use generate debris that can impact both natural and constructed drainages. All floatable material should be removed from ditches for a minimum of 25 feet above ditch relief culvert inlets.

Road use during wet weather

Traffic on forest roads during wet weather can generate fine sediment that, with surface runoff, may reach and pollute streams. Wet weather is any period when rain or snowmelt normally occur. In western Oregon, this period typically extends from October through April. In eastern Oregon, this includes wet periods from both snowmelt and rainstorms.

A durable surface can resist deep rutting or the development of a layer of mud on top of the road surface. If that occurs, stop using the road. Fractured rock packs and fines (small rocks) help seal the surface from water, improving its performance. Sometimes adequate rock, called pit run, can be dug directly from quarries. In other cases, rock should be crushed, sized and mixed to provide the needed quality. Rock surfacing depth should be thick enough to prevent serious rutting.

Avoid round or weak rock. Instead, use hard, fractured rock with sharp corners, a mix of sizes and some fines (small pieces). The goal is to avoid fine sediment entering streams. Proper compaction, starting with the subgrade, will help reduce rutting and poor or unstable surfaces.

Use quality rock near stream crossings, as it can affect water quality. Use of quality aggregate can reduce sediment and water turbidity during wet weather road use (see box on page 219).

Durable rock surface on a log-hauling road during heavy rain. Notice that the water in the ditch is clean.

Roads where snow and freezing weather occur

WHAT'S THE GOAL?

Ensuring that the road surface is well-frozen or otherwise stable during use, and that it will drain properly during thaw periods. This helps protect both the road and water quality.

REASONS FOR SNOW PLOWING

- enhances deep-freezing of the road surface
- keeps water off the road during melt periods

WHEN PLOWING SNOW, PAY ATTENTION TO SNOW BERMS

- Provide breaks in snow berms to allow for road drainage.
- Locate breaks above a vegetated filter area and away from streams.
- Locate breaks away from steep fills, headwalls or landslide areas.
- Plow a snow berm along the road edge to keep runoff from flowing directly into a stream.

BE PREPARED TO SUSPEND ROAD USE

- when thawing occurs and traffic damages the road surface
- at the sign of surface rutting
- when there is potential for road runoff to reach streams

Snow berm breaks allow for drainage during snowmelt without damaging the road surface. They also serve as escape corridors for wildlife.

During snowmelt periods, water is directed through the snow berm break.

Benefits of durable surfacing

Durable material resists deep rutting and the development of a layer of mud on the road surface. Durable material may be quarry aggregate or pit run rock (see page 219). It does not include crushed sandstone, decomposed granite or similar material. Durable rock has a small percentage of fines (very small pieces) because too many fines can wash into streams (see box on page 219). Apply rock in layers. A base layer of hard, 3- to 12-inch angular rock with no fines provides for good drainage. A surface layer of hard, ¾-inch angular rock or smaller, with some fines, provides cohesion and stability. The rocks must be piled thick enough that mud can't be pumped up through them. Geotextiles can minimize pumping and reduce the need for a thick rock layer (see below).

Note that even durable surfacing may develop ruts that channel runoff and sediment toward streams, requiring grading or resurfacing. Proper compaction, starting with the subgrade, will help reduce rutting and poor or unstable surfaces.

Ceasing road use

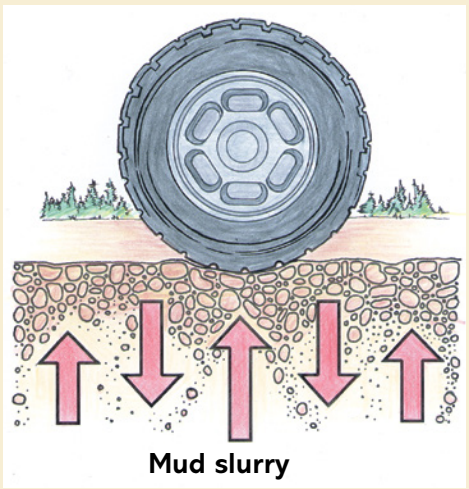
Active road use must cease when runoff from a deeply rutted or muddy surface causes a visible increase in turbidity of a Type F, Type SSBT or Type D stream. There is also cause for concern when such an increase in turbidity is seen in a Type N stream, as this could reflect inadequate road maintenance and could eventually result in sediment reaching a Type F, Type SSBT or Type D stream.

How to use geotextiles

Geotextiles are synthetic, permeable fabrics that reduce rutting, stabilize the ground and increase the load-carrying capacity of both paved and unpaved roads. They separate rock surfacing materials from subgrade soils while allowing for water passage, and are most appropriate for wet areas or weak soils.

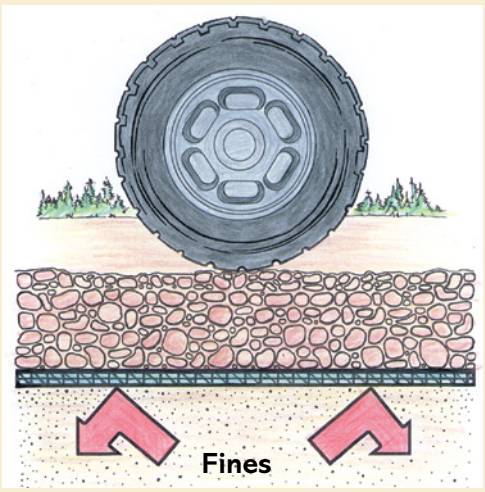
Geotextiles can reduce the amount of rock surfacing needed and reduce overall road costs.

Geotextiles reinforce subgrades by spreading the load across a larger area to reduce the chance of settling and failure. They also allow road construction across wet areas, reducing the need to remove unsuitable roadbed material.



ROADWAY WITHOUT GEOTEXTILE

**Mud slurry mixes with surface aggregate.
Mud may pump up through the rock surface.**



ROADWAY WITH GEOTEXTILE

Fines are stopped by geotextile.

Geotextiles can keep weak or wet subgrade soils from moving into the road-base rock layer and reducing its weight-carrying effectiveness.

Road closures

Forest roads remain part of the landscape long after logging, site preparation and reforestation are completed. If access is not needed after successful reforestation, roads may be temporarily closed, permanently closed or vacated. A plan for road closure should always consider local wildlife-suppression concerns.

Temporary road closure is easiest. Permanently closing or vacating a road involves specific actions described below.

Consider gates, barricades or signs to limit use of roads during wet weather. Such barriers also effectively reduce the chance of human-caused fires, vandalism and other illegal activities. Develop a plan for allowing timely access to emergency responders (e.g., firefighters or sheriff deputies).

Temporary road closures

Most commonly, they occur during wet periods when road use is likely to damage road drainage structures. Temporary closures are also useful when roads are not needed for extended periods.

Before temporarily closing a road, ensure that drainage structures are fully functional. The road surface should be crowned, outsloped, in-sloped or water-barred. Remove berms from the outside edge where runoff is channeled.

Vacating roads and water crossings

Vacating a forest road requires dismantling it to provide a stable, revegetated condition. It is more than just blocking the road from traffic. Vacating can eliminate costly road maintenance requirements, but it requires preparation. Vacated roads must be left in a condition that will not cause damage to the waters of the state.

Vacated roads must provide adequate drainage and stability without further maintenance, which requires measures such as traffic barriers, frequent cross-ditches, and scarification and/or seeding of exposed soils. Block the road to prevent continued use by vehicular traffic and take all reasonable actions to leave the road in a condition that makes road-related damage to waters of the state unlikely. Complete the following to vacate a road:

- Outslope, add water bars, or stormproof roads to leave them in a condition suitable to control erosion and maintain water movement within wetlands and natural drainages.
- Leave ditches to reduce erosion.
- Remove water-crossing structures and fills on waters of the state, unless ODF determines other measures would adequately protect public resources.

Completely and permanently remove all water-crossing structures, including bridges, culverts, fords and associated fills, to vacate water crossings. Natural drainage must be re-established with no additional maintenance required. Be sure to complete these procedures:

- Reestablish channel connectivity.
- Meet all ODFW fish-passage requirements and in-water work-period timelines.
- Ensure that vacating the road does not result in an artificial fish-passage barrier at the time of project completion.
- Restore the channel, banks and side slopes to:
  - > establish the natural streambed and banks as close to the original location as possible, to restore or enhance stream conditions and processes to an equivalent width, depth, gradient, and substrate composition as the channel segments upstream and downstream from the crossing
  - > ensure stable side slopes that do not exceed a 2:1 horizontal-to-vertical ratio, unless matching the natural stream bank or valley walls
  - > incorporate large wood, if appropriate, to expedite restoration of the channel and fish habitat
- Address sediment delivery from exposed slopes with erosion control.
- Place all excavated material in stable locations outside of the floodplain.
- Ensure zero or near-zero road-related hydrologic connectivity at the entire site.
- Plant exposed stream banks or valley walls with native trees or shrubs to help expedite development of a functioning riparian condition.

The landowner should notify the ODF stewardship forester that a road or crossing has been vacated. The ODF stewardship forester then has 30 days to determine whether the road or crossing has been vacated and to notify the landowner in writing. If the state forester does not respond within 30 days, the road is presumed to be vacated.

Roads and crossings are exempt from maintenance under this section only after all the above procedures are completed.

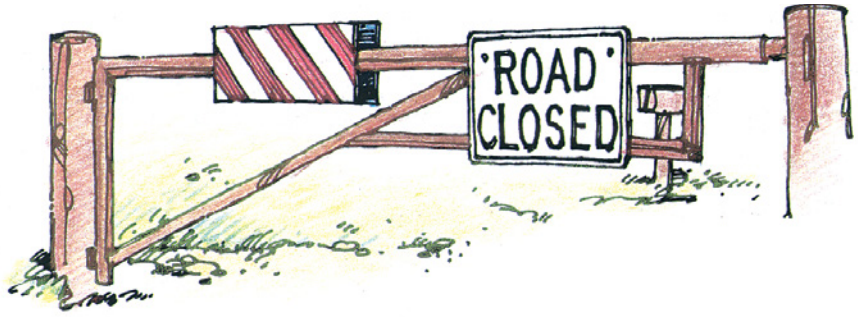
ODF's Forest Practices Technical Guidance publication can assist with rule compliance for vacating forest roads. Long-term needs for access should be carefully considered before vacating a road, because the costs of reconstruction can be substantial. However, it may be desirable to vacate a road in these instances:

- when the road no longer serves a useful purpose
- when there's a need to eliminate or discourage access
- when it's necessary to reduce erosion and sedimentation from a poorly located road
- when it will correct unstable road cuts and fills

It may be necessary to vacate only some road segments, such as recontouring a road junction and its initial stretch of road. Other segments may be stable and can be revegetated as-is.

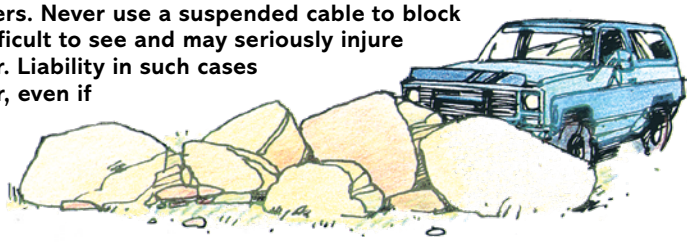
In addition to preventing traffic, culverts that might carry flowing water (including all stream-crossing culverts) should be removed, and unstable side-cast should be pulled back. Reasonable actions to vacate a forest road may include:

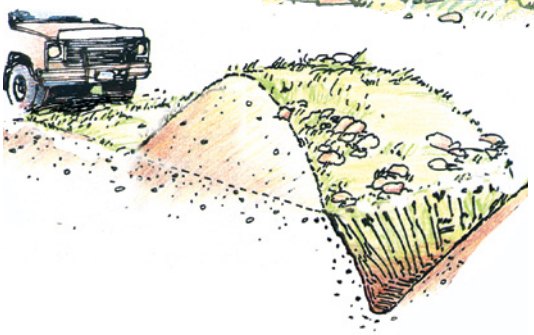
- removal of stream-crossing fills
- pullback of fills on steep slopes
- frequent cross-ditching
- vegetative stabilization



Traffic control effectively reduces road maintenance costs and provides protection for other forest resources. Traffic control can include full road closure, temporary or seasonal closure, or restriction to only light use. All traffic-control options require regular maintenance inspections.

Alternatives to gates include large berms or trenches, logs, stumps or large boulders. Never use a suspended cable to block a road, as it can be difficult to see and may seriously injure an unsuspecting visitor. Liability in such cases lies with the landowner, even if signs are displayed.





A tank trap must be deep enough and located where vehicles cannot go around it. Warning signs for the trap should be displayed in advance, preferably at a turnaround area.

It may be necessary to physically block road access. Gates provide temporary closure along with quick access if needed. To prevent vandalism, gates and other barriers must be well-anchored.

When vacating a road, removal of all stream-crossing culverts and associated fill material is required. Non-drivable water bars (cross-ditches) should be installed to drain the road surface. Space water bars more closely, because with time they may fill with sediment.

Remove all steep sidecast fill. Place removed fill and debris away from streams, and off steep slopes or old slide areas.

Restore all stream crossings to a stable, self-maintaining condition. This includes reseeding both the road surface and cut-and-fill slopes.

Road segment before vacating.

Excavator dismantling the road corridor.

Vacated road segment with large wood in place, before reseeding the surface with grass.

Rock pits and quarries

Local development, use and abandonment of quarries or rock pits/storage areas for forestland management normally follow requirements under the OFPA. However, where quarry operations on forestlands involve large quantities of commercial products sold for non-forest uses off-property, Oregon's mining regulations apply. These are administered by the Oregon Department of Geology and Mineral Industries (DOGAMI).

For rock projects related to normal forest management, forest practice rules focus on maintaining stable slopes and protecting water quality. Do not locate quarry sites in streams or channels. Prevent overburden or waste from entering waters. Stabilize banks, headwalls and other quarry surfaces to prevent surface erosion and landslides. Quarries or rock pits that may impact specially protected resource sites (e.g., sensitive bird nesting, roosting and watering sites) are subject to all related forest practice rules.

Large commercial rock-quarry operations are subject to mining regulations and DOGAMI oversight. Such operations require a fee-based permit for mining activities that exceed one acre and/or 5,000 cubic yards of new disturbance in any 12-month period, unless the excavated material stays on the property. Under these fee-based permits issued by DOGAMI, reclamation is also required, and a related security deposit must be made.

When a quarry or rock pit is inactive or vacated, stabilize banks, headwalls and other surfaces, and remove from the forest all petroleum-related waste material associated with the operation. Dispose of all other debris so those materials do not enter waters of the state.

Do you need help?

A consulting forester, road engineer or geotechnical specialist may be able to help with a difficult or complex situation involving a forest road, water crossing, rock pit or quarry. Getting such help could avoid not only a violation of the OFPA, but also damage to your property and associated repair costs.

WRITTEN PLAN BEFORE CONSTRUCTION

A properly located, designed and constructed road greatly reduces potential impacts to water quality, forest productivity, and fish and wildlife habitat. To prevent improperly located, designed or constructed roads, a written plan is required for road construction.

The written plan is required when the following are present:

- the risk of material entering water from direct placement, rolling, falling, blasting, landslide or debris flow
- machine activity in or near streams (Type F, Type SSBT, Type D or Type N), lakes or significant wetlands
- operations in an RMA
- water-crossing structures in any body of water, including wetlands
- critical locations (see road location, page 186)
- stream crossings with fills more than 15 feet deep
- placement of woody debris or boulders in a channel for stream enhancement
- HLHLs

Written plans for Type F and Type SSBT fish streams must include:

- stream name, size, type and basin
- watershed tributary area
- calculated 100-year peak flow, developed using Forest Practices Technical Guidance
- measured stream gradient
- bankfull channel width
- water-crossing structure location, type and size, including culvert diameter, rise, span, length and bridge width
- planned culvert grade or elevation change, embedment depth range and material the culvert is made from
- calculated structure flow capacity and bridge freeboard, as applicable
- road name or number and road surface type
- drainage plan, including:
  - > installation time frame and equipment access
  - > stream isolation method, including but not limited to stream diversions, bypasses or pumping
  - > expected RMA tree removal

Assess these factors:

- transportation needs, road location, road-management objectives and land ownership
- resources that may be impacted by a water crossing, including aquatic species, habitats and conditions, along with floodplain values, terrestrial species and water uses
- risk factors at the watershed scale, e.g., geologic and geomorphic hazards, event history, past and projected land management, crossing maintenance history, regional channel stability and projected watershed conditions over the life of the crossing structure
- risk factors at the site scale, e.g., channel stability, potential for blockage by debris, floodplain construction, large elevation changes across infrastructure, channel sensitivity to change, consequences of site failure, and potential stream geomorphic changes over the life of the structure
- techniques and methods to protect natural resources
- additional information required by the state forester

Submit a written plan for fills over 15 feet deep to your ODF stewardship forester. Describe the fill and drainage-structure design, and include a design that minimizes the likelihood of:

- surface erosion
- embankment failure
- downstream movement of fill material

SMALL FORESTLAND OWNER (SFO) ROAD CONDITION ASSESSMENT

Under the Oregon Forest Practices Act (OFPA), all private forest landowners are required to inspect road conditions on their properties. The requirements are different for large and small forestland owners. Instead of the forest inventory process required for large forest landowners, SFOs must complete a road condition assessment when filing notice with the state of plans to harvest timber.

The Small Forestland Owner Office, housed at Oregon Department of Forestry (ODF), will help SFOs with road condition assessments and written plans. When an SFO submits a notification of timber harvest using ODF's reporting and notification system, they will need to complete a road condition assessment for the harvest unit. Without a planned timber harvest, SFOs are encouraged, but not required, to complete the road condition assessment for all roads in their forested parcel.

The road condition assessment must include all roads in the parcel where the harvest will take place, including:

- road conditions that could contribute to active or potential delivery of sediment to waters of the state
- water-crossing locations and the status of compliance with the forest practice rules
- potential fish-passage barriers on Type F and Type SSBT streams
- abandoned roads
- roads with a perched fill that present a significant hazard to fish-bearing streams

SFOs are not required to undertake the following road improvement projects without funding by the State of Oregon:

- replacement of culverts for Type F and Type SSBT streams
- repair of abandoned roads
- reconstructing, vacating or relocating roads with a perched fill that present a significant hazard to fish-bearing streams

ODF, in consultation with ODFW, will review eligibility for state grants to improve the road conditions. If the state of Oregon, under the Small Forestland Investment in Stream Habitat (SFISH) program, fails to fund an eligible and approved road improvement project for an SFO, that action will not prevent the SFO from using the road for any purpose, except:

- when the road is actively delivering sediment to waters of the state
- when the road has one or more culverts with an imminent risk of failure

If the road condition assessment identifies necessary road repairs other than those conditions in the previous paragraph, there will be no time limit for the SFO to complete those repairs. The obligation to improve roads when used for logging remains.

See also Road Condition Assessment for Small Forestland Owners PDF at **KnowYourForest.org/manual-links**.

Applies to small forestland owners only

FOREST ROAD INVENTORY AND ASSESSMENT (FRIA)

The purpose of the FRIA requirement for large private forest landowners is 1) to reduce chronic and catastrophic sediment entry to waters of the state and 2) to ensure fish passage for covered species during all mobile life-history stages by identifying and bringing into compliance existing roads not meeting the Oregon Forest Practices Act (OFPA) rules.

FRIA does not apply to small forestland owners (SFOs), who must instead submit a road condition assessment when they notify the state of a timber harvest operation that will use forest roads to haul timber. ODF's Forest Practices Technical Guidance educates large forest landowners on how to complete this required road inventory. The inventory must be completed in three phases: pre-inventory, initial inventory and annual inventory.

Pre-inventory

Large forest landowners must submit a pre-inventory of sites with high conservation value on each road management block to the state forester no later than January 1, 2025. The pre-inventory should address the following sites:

- areas of known chronic sedimentation
- fish-passage barriers known to be of significant concern, especially where fish passage would provide the greatest benefit to native migratory fish
- ongoing stream diversions at stream crossings and areas with stream-diversion potential
- areas of known hydrologic connectivity

Then prioritize projects on high conservation value sites that:

- remove fish-passage barriers consistent with ODFW requirements
- minimize the potential for sediment delivery to waters of the state
- minimize stream diversions at water crossings
- minimize hydrologic connectivity between roads and waters of the state
- meet other relevant criteria, as determined by ODF in consultation with other state and federal agencies

Large forest landowners must meet with ODF and ODFW to review the pre-inventory list no later than January 1, 2026. Landowners must address prioritized pre-inventory projects after ODF's review no sooner than January 1, 2026, and no later than January 1, 2029.

Landowners must report annually to ODF and ODFW on the status and completion of pre-inventory projects through January 1, 2029.

Initial inventory

Large forest landowners must submit an initial inventory of all active, inactive and known vacated or abandoned roads no later than January 1, 2029. It must include three documents:

- paper or electronic maps showing the roads within each road-management block
- work matrix documenting actions necessary to bring all roads into compliance with the OFPA, including prioritization of work
- FRIA initial inventory plan describing how the landowner intends to bring the road network into compliance no later than January 1, 2044

At minimum, the FRIA initial inventory plan submission must include:

- location and length of active roads, inactive roads and vacated roads within each road-management block
- location and classification of streams within the road-management block
- known or potential road-related fish-passage barriers
- prioritization of known or potential road-related fish-passage barriers, including the location, categorization and status of all water-crossing culverts
- identification of each road segment as:
  - > meeting the forest practice rules
  - > not meeting the forest practice rules
  - > vacated
  - > abandoned

CLASSIFY EACH WATER-CROSSING CULVERT AS:

- a fully functioning culvert in a Type F or Type SSBT stream
- a fully functioning culvert in a Type N or Type D stream
- a culvert with imminent risk of failure
- a culvert with minimal risk to public resources
- undetermined status; culverts with undetermined status must be prioritized for improvement, and the status may be changed as more detailed information is gathered

Annual inventory

Beginning in the year after submitting the initial inventory, but no later than January 1, 2029, large forest landowners must submit annual inventory reports and plans until January 1, 2044, including updates to maps, the work matrix and the annual plan. Details about work completed, as well as a work forecast for subsequent years, must be provided.

Landowners will be expected to improve all road segments identified in the initial inventory as not meeting the forest practice rules so that those segments either meet the rules or are vacated no later than January 1, 2044.

STATE-LED ABANDONED ROADS INVENTORY

ODF, in consultation with the U.S. Environmental Protection Agency, will lead a cooperative effort to identify abandoned forest roads and bring them into compliance with the forest practice rules to reduce the potential that they will be a source of chronic sediment or will increase the risks of mass wasting and stream diversions.

After identifying abandoned roads, ODF and cooperators will prioritize those with a high level of risk to waters of the state or infrastructure. Results of the inventory will be provided to forest landowners no later than January 1, 2026. The following criteria will be used to order priority:

- ongoing stream diversion at stream crossings
- diversion potential at stream crossings
- likelihood of hydrologic connectivity
- comparative risk of producing chronic sediment
- risk of contribution to mass wasting
- other criteria, as determined by the department in consultation with state and federal agencies

Following the identification of high-risk abandoned road segments, ODF will coordinate with landowners to identify high-priority abandoned road segments from the list of high-risk locations.

Landowners must complete a field verification of all high-priority abandoned road segments. This work may be reviewed by ODF, DEQ and ODFW. As part of the field verification, landowners will:

- Confirm the high-priority site is on an abandoned road.
- Determine whether the segment is diverting the stream or has diversion potential.
- Determine if the segment is actively contributing sediment or has a high risk of contributing significant quantities of sediment to waters of the state, and include an analysis of net benefit for waters of the state to improve the abandoned road segment.
- Determine practicability of alternatives to improve the abandoned road segment and address risks.
- Present alternatives that may include vacating the segment, taking no action, and any other reasonable alternative; landowners must propose the most practicable alternative as part of the annual report.

Landowners must add the verified high-priority abandoned road segments to the FRIA initial inventory and improve the abandoned road segments as part of the FRIA process in consultation with ODF.

APPENDIX

APPLICABLE OREGON FOREST PRACTICES RULES

Planning forest operations

629-605-0140: Notification to the state forester — types of operations
629-605-0173: Plans for an alternate practice

Forest practices reforestation rules

629-610-0000: Forest practices reforestation rules
629-610-0010: Forestlands suitable for reforestation
629-610-0020: Reforestation stocking standards
629-610-0030: Natural reforestation methods
629-610-0040: Time allowed for reforestation
629-610-0050: Acceptable species for reforestation and residual stand stocking
629-610-0060: Use of non-native tree species
629-610-0070: Suspension of the reforestation rules
629-610-0080: Revegetation when reforestation is not required
629-610-0090: Exemption from reforestation for land uses not compatible with forest tree cover
629-610-0100: Exemption from reforestation for wildlife food plots

This chapter provides in-depth information about timber harvest systems, as well as resources that can assist forest landowners.

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COMMON TYPES OF TIMBER HARVEST SYSTEMS

Cutting trees, moving logs to a landing and loading logs for transport to a mill are all part of a timber harvest system, which supplies wood products that everyone uses. Rules are covered in the Harvesting chapter. Advantages differ between timber harvest systems, which are described below. Modifications can make them even more versatile.

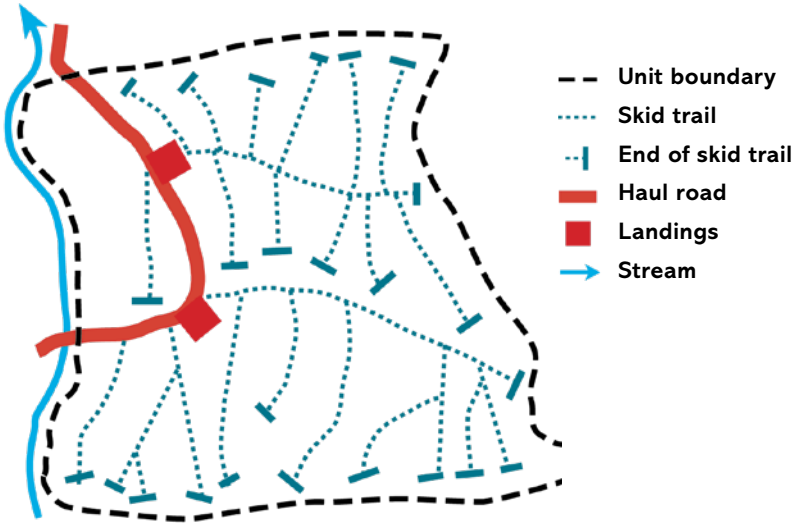
The terrain of the harvest unit will influence which logging system to use. On gentle terrain, tree processors and forwarders, excavators, tractors and skidders, and even horses, can be logical choices. On steep terrain, cable or helicopter logging systems make more sense

The harvest systems

1. conventional chainsaw and tractor/skidder harvest
2. cable logging
3. shovel logging
4. cut-to-length logging
5. whole-tree logging
6. helicopter logging
7. tethered logging

Conventional chainsaw and tractor/skidder harvest

Loggers use hand-operated chainsaws to cut, delimb and buck trees into logs at the stumps. They then use skidders or crawler tractors (dozers) to drag the logs to landings where they are loaded onto trucks.



This is a typical timber harvest layout. Skid trails should be planned and marked in advance. They often follow parallel branching patterns as shown. By winching logs across greater distances, skid trails can be located farther apart, reducing the area of skid trails and soil impacts from vehicle traffic.

A conventional timber harvest uses chainsaws for tree felling, limbing and bucking.

Advantages

- adaptable to smaller harvest locations
- generally uses less costly equipment

Equipment used

- chainsaw
- log skidder or crawler tractor (dozer)
- log loader or self-loading log truck

Topography considerations

- normally restricted to slopes less than 35%
- haul roads usually located at the bottom of the logging unit

Soil considerations

- use of designated skid trails keeps machines on planned routes to help reduce soil disturbance
- on weaker soils, heavy traffic may result in trail ruts that require more water bars after logging
- soil disturbance can be reduced with widely spaced trails and pulling a winch line farther to logs – synthetic lines and other equipment features can make this task easier
- tractors and skidders should lift the front end of logs to reduce soil gouging

Forest stand considerations

- provides flexibility with a variety of stand management goals

Slash disposal considerations

- lop-and-scatter possible with light accumulations of slash
- pile and burn is an option but requires additional steps and costs
- chipping and biomass energy use may be possible

Reforestation considerations

- yarding traffic or post-logging treatment can scarify ground and create areas for natural tree regeneration or hand-planting
- some advance regeneration may be lost or damaged by vehicle traffic

Economic considerations

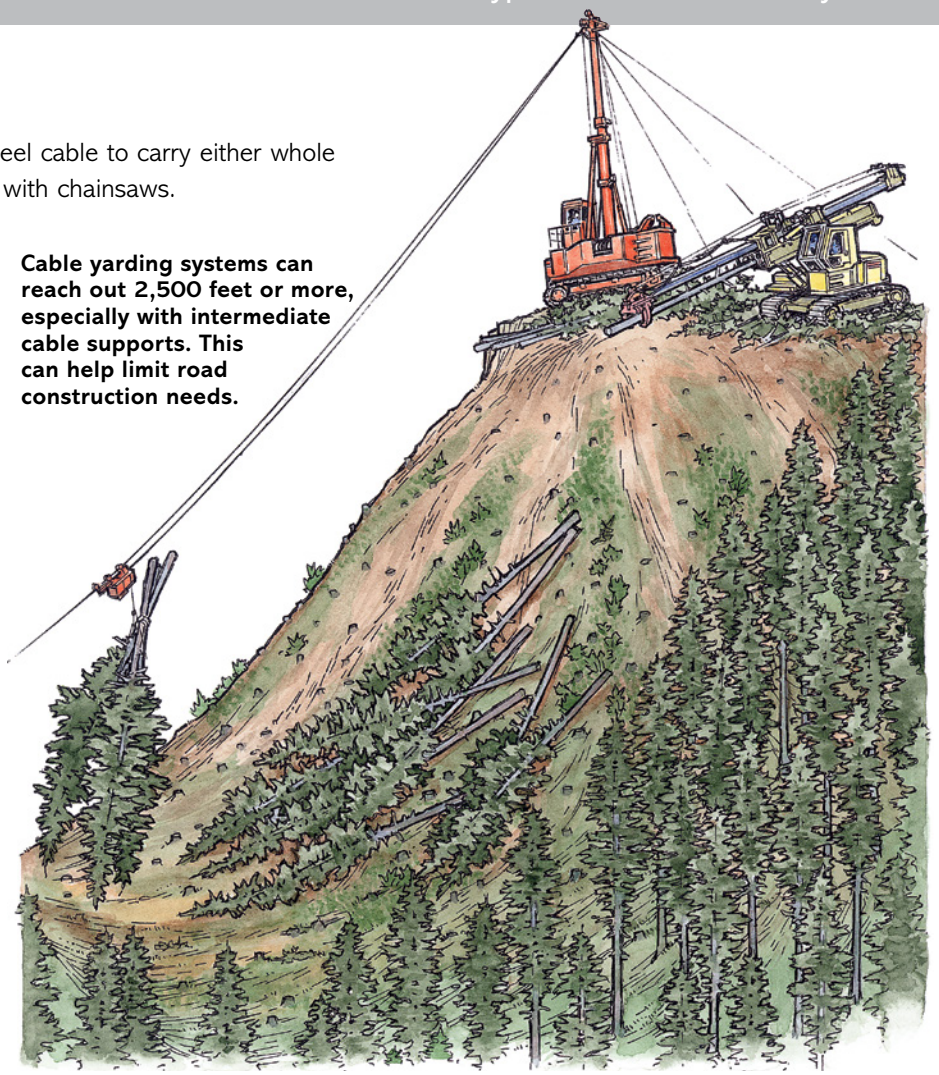
- often more labor intensive
- generally, more roads are necessary
- least expensive method if road construction is not needed or is budgeted separately

Skidders or dozers drag logs from the forest to the log landing. To reduce soil disturbance, rubber-tired skidders or crawler tractors should be kept on skid trails. Winch line and chokers pull logs to the machine.

At the landing, a log loader moves logs onto trucks for delivery to the mill.

Cable logging

On steep terrain, this logging system uses a steel cable to carry either whole trees or logs to a landing after trees are felled with chainsaws.



Cable yarding systems can reach out 2,500 feet or more, especially with intermediate cable supports. This can help limit road construction needs.

Advantages

- allows for harvesting on steep ground and other sensitive terrain
- eliminates the need for skid trails
- can reduce road construction needs
- can reduce need to build roads in less favorable locations

Equipment used

- chainsaw
- cable yarder
- delimber and log loader

Topography considerations

- well suited for slopes of 35% and greater
- concave slopes allow more cable deflection and greater system efficiency
- intermediate supports allow for log lift in uneven terrain
- haul roads usually located at the top of the logging unit

Soil considerations

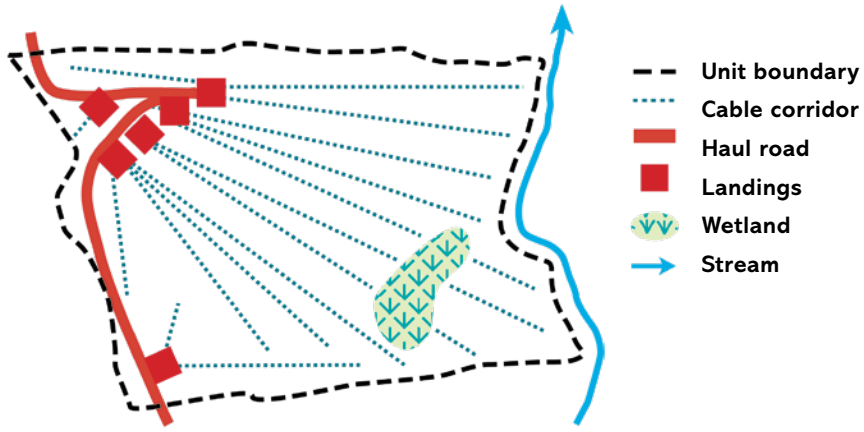
- can significantly reduce soil compaction and disturbance if logs are properly lifted
- heavy equipment is confined to roads and landings

Forest stand considerations

- primarily used with clearcuts and some partial cuts
- a more difficult method for thinning, with potential to damage residual stems

Slash disposal considerations

- if whole trees are brought to the landing, in-unit slash is minimized
- heavy slash piles at the landing must be treated or used
- if whole tree yarding is not used, prescribed burning of slash may be needed (see the Site Preparation chapter)



This is a typical cable harvest layout. Generally, logs are pulled uphill, but can also be moved downhill. With a strategic layout, logs can be lifted over perennial streams and canyons (see the Harvesting chapter).

Reforestation considerations

- may expose fewer spots making planting or natural seeding easier
- brush control needs also may be greater when scarification is reduced

Economic considerations

- can be more costly and specialized than ground-based systems
- small-scale systems can be competitive in some situations

Shovel logging

This ground-based harvest system uses a log loader (also called a shovel) to move logs rather than a skidder, tractor or forwarder. The shovel moves logs across the unit to locations near the road where they can be loaded onto log trucks. Logs are often picked up and moved ("swung") several times before reaching the road.

Advantages

- requires few people and machines
- few or no skid trails needed; existing roads may be adequate
- brush can be piled during harvest operations.

Equipment used

- chainsaw
- tracked excavator equipped with a grapple to grip and move logs

Topography considerations

- limited by slope due to machine instability on steep hillsides
- may allow for harvest of some sensitive areas, with less disturbance than other logging systems

Soil considerations

- less compaction and disturbance if machine passes are limited

Forest stand considerations

- used primarily in clearcuts or partial cuts
- requires clearing of roadsides for log decks

Slash disposal considerations

- while moving logs, the excavator can pile heavy concentrations of slash for burning, chipping or other uses

Reforestation considerations

- while, or after moving logs or slash, the excavator can prepare the site for planting or seeding

Economic considerations

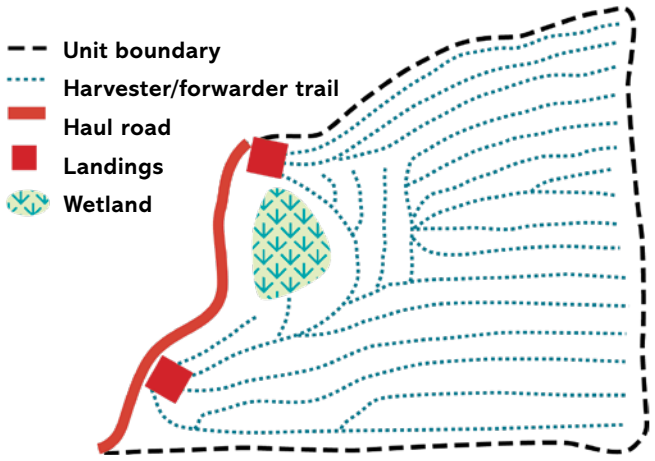
- small crew size
- one machine for multiple tasks can reduce costs
- efficiency improves with shorter yarding distances

Shovel logging starts at the nearest access point and moves logs until they are within reach of the road. From there, they can be loaded onto trucks.

Excavators equipped with grapples are common choices for handling logs and doing other useful tasks during shovel logging.

Cut-to-length logging

This ground-based system uses a mechanized harvester (tree processor) and a forwarder. The harvester severs, de-limbs and cuts each tree into logs and stacks them in the forest. The forwarder follows, picking up the logs and carrying loads to log trucks. It is also called a harvester-forwarder system.



This is a typical cut-to-length timber harvest unit layout. The designated harvester or forwarder trails are about 60 feet apart and often follow parallel patterns across the harvest units.

Advantages

- leaves slash (tree branches and tops) in the forest
- reduces the need for log landings and access roads

Equipment used

- harvester or processor (tracked or wheeled)
- forwarder (often wheeled)

Topography considerations

- normally limited to slopes less than 35%

Soil considerations

- can reduce compaction and disturbance, especially if the processor moves over duff and slash and if forwarders stay on slash-covered, designated skid trails
- slash left in the harvest unit will recycle nutrients and organic matter

Forest stand considerations

- an efficient method for commercial thinning
- typically used to move short logs out of the forest rather than long logs
- processor efficiency in dense stands is useful for forest health and fuel reduction treatments

Slash disposal considerations

- by traveling over and compacting the slash, the system can reduce wildfire hazards and may meet slash hazard control requirements with no further treatment
- equipment can be used for slash piling for burning, chipping or other uses

Reforestation considerations

- common for thinning where residual stocking does not trigger reforestation requirements
- if used for heavier cuts and slash loads, extra steps could create spots for tree planting or seeding

Economic considerations

- may not require new or improved roads
- relatively expensive and requires specialized machinery and skilled operators
- may require larger volumes or higher quality timber to improve efficiency

A single grip processor can reach out 30 feet, cut a tree, strip the limbs, cut the trunk into pre-programmed lengths and lay the logs on the ground, all in less than a minute. Ideally, these machines travel over the treetops and limbs they drop on the ground, minimizing disturbance.

A forwarder follows the harvester, picking up logs and delivering them to log trucks. They can travel long distances, reducing the need for logging roads.

Logs are offloaded from the forwarder directly onto log trucks.

A feller-buncher severs trees and lays them in bunches with limbs and tops attached. These bunches are oriented with tree trunks facing downhill.

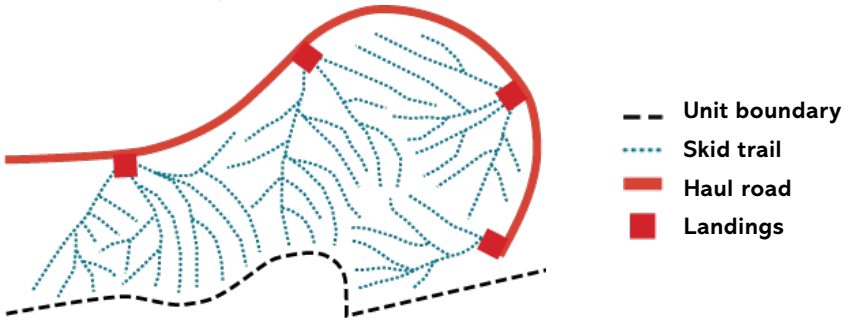
A crawler tractor or skidder with a grapple picks up the bunched trees and drags them to a landing or roadside. Some grapples can swing 180 degrees, making it easier to operate in tight spaces.

The stroke-boom de-limber operates at the landing or roadside, removing tree limbs and tops, cutting the stem into logs and stacking them.

The loader serves two needs: loading trucks and piling tops, branches and log chunks for later burning, chipping or other uses.

Whole-tree logging

This timber harvest system brings the entire tree to the landing or roadside. It can be used for both ground-based and cable applications. When used in ground applications, a feller-buncher often cuts and piles trees in the forest. Then a tractor or skidder drags the tree bundles to the landing or roadside. Finally, a de-limber converts the trees into logs.



This is a typical whole-tree timber harvest layout. The feller-buncher and grapple skidder travel over most of the unit. Confining multiple trips to primary skid trails can reduce soil disturbance.

Advantages

- can be relatively efficient, including use of smaller woody material
- slash is brought to the landing or roadside where it can be burned, chipped or otherwise used

Equipment used

- feller-buncher
- crawler tractor or skidder with grapple
- stroke-boom de-limber
- log loader

Topography considerations

- normally limited to slopes less than 35%
- with ground-based harvest, haul roads are usually at the bottom of the logging area

Soil considerations

- vehicles travel over a larger portion of the area as they cut, stack, gather and drag whole trees
- potential for more soil disturbance and compaction than other ground-based systems
- removal of tops and limbs does not recycle nutrients and organic matter near its source

Forest stand considerations

- efficient harvest and stand conversion when clearcutting
- can be used when thinning, but damage to remaining trees can be a problem

Slash disposal considerations

- slash can be piled and later burned, chipped or otherwise used
- slash returned to the harvest area can recycle nutrients and organic matter (see the Site Preparation chapter)

Reforestation considerations

- widespread traffic and large tree bundles may damage advance forest regeneration
- dragging tree bundles can expose areas for tree planting or seeding

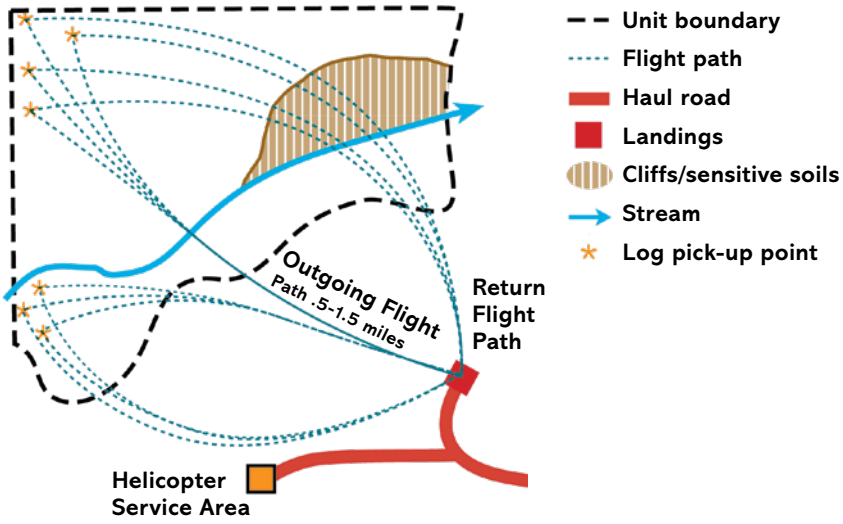
Economic considerations

- costs can increase on steeper ground or with longer skid distances
- bunching trees can help reduce the cost of handling small diameter trees.

Helicopter logging

This timber harvest system was once used exclusively for large, high-value timber. Though helicopter harvest remains a higher-cost alternative, it can be used for smaller logs when timber volumes and quality are adequate.

Typical harvest layout



This logging helicopter has a payload capacity of 6,000 pounds. Flight distances are kept to one-half to 1.5 miles. Longer distances are more costly. Planning to achieve optimum payloads of timber for each trip helps make helicopter logging operation pencil out

Advantages

- can harvest visually sensitive, inaccessible or other areas where other logging systems are unsuitable
- useful option for locations with high recreational use, special wildlife habitat, riparian areas, wetlands or geologic hazards
- may reduce or avoid new road construction, including in hazardous or sensitive locations

Equipment used

- chainsaw
- logging helicopter
- helicopter maintenance and fueling equipment
- log loader

Topography considerations

- can be used on any type of terrain with suitable landing and helicopter service area locations (i.e., adequate size, safety and efficiency)

Soil considerations

- minimizes in-unit soil disturbance and compaction because logs are fully suspended
- large landings and service areas may require extra drainage or other treatment

Forest stand considerations

- offers an efficient but costly method for commercial thinning
- large landings and service areas can locally impact forest stands

Slash disposal considerations

- lop-and-scatter methods typically are used to reduce fire hazards
- if further treatment is needed, it can be costly where road access is limited

Reforestation considerations

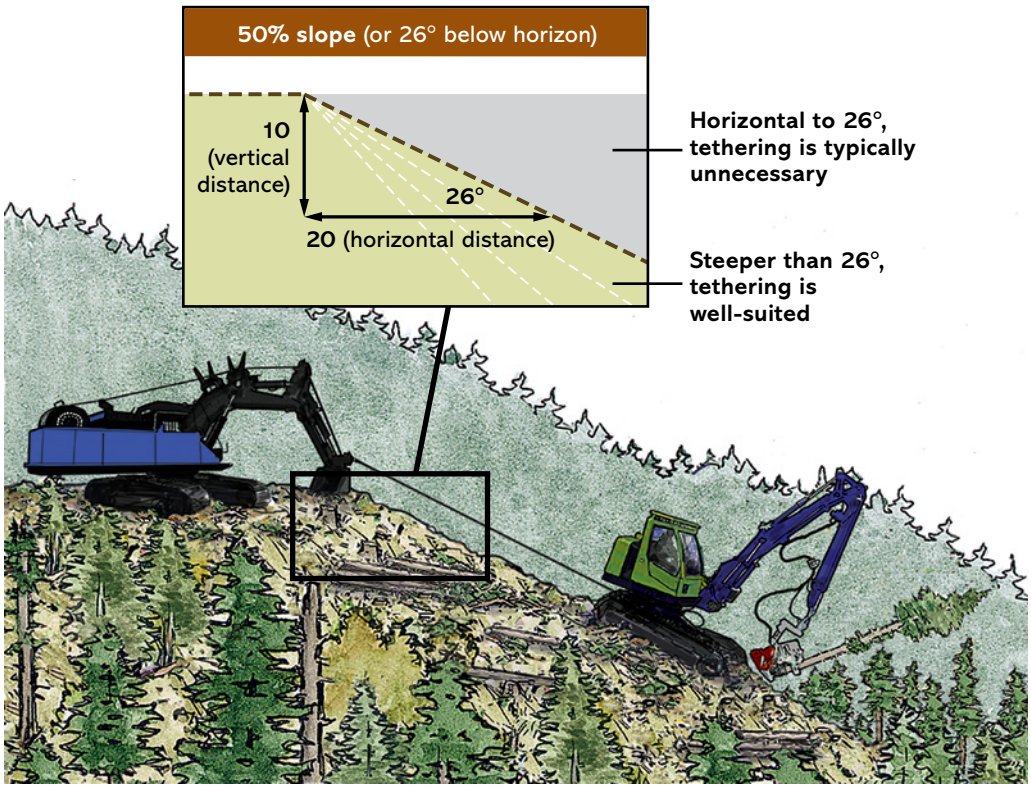
- slash left on-site and limited yarding disturbance result in fewer exposed spots for easy tree planting or natural seeding

Economic considerations

- typically the most expensive logging system
- equipment and crew needs can result in costs three to four times those of ground-based systems
- reduced road construction needs may help offset high costs
- without adequate volume of higher value logs, the harvest costs may exceed timber revenues

Tethered logging

This system uses two machines to efficiently cut and harvest trees on steep slopes: the tethering machine, which generally stays at the roadside, and the tethered machine that operates down the slope. The two machines are tied together by one or two winch cables. The tethering machine provides traction and stability assistance to the tethered machine that works on the slope.



Advantages

- allows for pre-bunching of felled timber, making easier for choker setting or bunched for grapple logging.
- increases the safety and production of the cable logging rigging crews
- replaces the use of timber fallers in steep terrain

Equipment used

- tethering machine
- self-leveling feller / buncher or skidder
- cable yarder with either a rigging crew or grapple yarding system

Topography considerations

- well-suited for slopes in excess of 50%
- generally limited to length of cable on the tethering machine, which is typically 1200' from roadside

Soil considerations

- recent studies show minimal soil impacts
- best used in loose soils or loose rock conditions
- difficult to operate on solid rock

Forest stand considerations

- primarily used in clearcut operations
- cannot fall oversize timber or work in excessively steep terrain

Slash disposal considerations

- sets up cable logging for a whole tree operation
- slash generally accumulates at the landing site, and it must be treated or used

Reforestation considerations

- whole tree logging generally removes the majority of the slash from the unit making tree planting easier

Economic considerations

- tethering system cost is higher than traditional hand falling
- reduces cable logging operating costs by pre-bunching the felled timber

CHOOSING LOGGING CONTRACTORS

These guidelines are based on information published in October 2017 by the Oregon State University Forestry & Natural Resources Extension Program. Authors: Tamara Cushing and Steve Bowers.

Choosing a logging contractor to harvest timber on your land is an important decision. Take time to select the right person for your property and your particular project.

Some of the decision making is tailored to each landowner's situation. There are some key questions about the contractor's ability to handle your specific issues that you should ask.

The questions below are not the only questions that could be asked and should not replace trusted relationships or "gut feelings." They are meant to help think through what to ask and what the contractors' responses mean.

Key questions to ask potential logging contractors

WHAT ARE YOUR QUALIFICATIONS?

Logging mistakes can be irreversible. Make sure to find a logging contractor who is appropriate for the type of work that needs to get done.

In Oregon, look for a qualified logging professional who participates in continuing education programs and keeps abreast of current forest and business regulations governing timber harvest operations in the state. Visit **oregonloggers.org/OPLDirectory** for a list of qualified logging professionals.

WHAT SERVICES DO YOU PROVIDE?

Some loggers only conduct regeneration timber harvests, while others work on both thinning and regeneration harvests.

Determine whether a contractor can address other project needs, such as log sales, harvest plans, road construction or maintenance, slash treatment, erosion control, reforestation, permitting and forest product harvest taxes.

HOW WILL I BE CHARGED FOR YOUR SERVICES?

There can be several different answers to this question. It's important to know upfront whether the charge will be on a percentage or dollar-per-unit basis. The landowner and contractor must agree on what services are included in agreed prices.

WHAT IS INCLUDED IN THE LOGGING PRICE?

It is very important to understand exactly what services will be delivered, when those services will happen and whether the services you require are included in the agreed price. The landowner and the contractor will need to agree on who is responsible (both financially and operationally) for any road improvements, installation of culverts, slash disposal, etc. Be sure to specifically agree that the price includes log trucking.

DO YOU DO ALL THE WORK YOURSELF, OR IS SOME OF IT SUBCONTRACTED?

It is normal for a logger to subcontract aspects of the timber harvest project. Find out if this is planned, and understand how the logger will manage subcontractors. It is also important that to know who is in charge, so you have a single a contact for the logging project.

DO YOU HAVE THE APPROPRIATE INSURANCE COVERAGE?

If something were to go wrong during the logging operation, both the landowner and the contractor need to be protected financially. Loggers should have sufficient insurance coverage for property damage and liability (including woods broadform liability, vehicle liability and workers' compensation). Ask to see certificates of coverage before signing a contract.

DO YOU USE A STANDARD WRITTEN CONTRACT?

Some people may operate without a written contract when there is an experienced relationship between contractor and landowner. However, it is best to have a written contract that specifies the responsibilities of both parties in the transaction. The contract is legally binding and protects both parties from painful misunderstandings and costly disputes.

IF I'M THINNING, HOW WILL YOU DETERMINE WHAT TREES TO CUT AND WHAT TREES TO PROTECT?

Both parties must agree in advance on how to determine what trees will be cut and which trees should be left standing. In thinning operations, some incidental damage to leave trees may occur. A logger should be able to discuss methods to minimize damage to the leave trees. Establish a specific measurement. For example, "Residual damage to trees will not surpass 5%." Stipulate in the contract any fines that will be charged if and when tree damage exceeds that level.

Establish realistic expectations

The landowner and logger should have frank discussions and clear agreements about the expectations of logging project results. Family forest landowners may have unrealistic expectations that conflict with the realities of logging capabilities. Logging small tracts is more expensive, time-consuming and difficult than larger commercial logging projects. Because managing a logging project is so complex, a family forest landowner may want to seek special assistance from either:

- a logging contractor whose experience is tailored to small projects or
- a forestry consultant who can plan and facilitate all contracted arrangements

Where to look for a logger

The list of individuals and firms who can handle family forest logging needs is constantly changing. Ways to find a list of potential loggers include:

- ask other landowners who they work with and trust.
  - > Oregon Small Woodlands Association: **oswa.org**
  - > Oregon Tree Farm System: **otfs.org**
- ask a forester.
  - > Society of American Foresters: **safnet.org**
  - > Association of Consulting Foresters: **acf-foresters.org**
  - > Oregon Department of Forestry: **oregon.gov/ODF/Working/Pages/FindAForester.aspx**
  - > Oregon State University Extension Service: **directory.forestry.oregonstate.edu**
- ask log buyers at local timber mills.
  - > Oregon State University Forest Industries Directory: **orforestdirectory.com**
  - > Associated Oregon Loggers, Inc.'s directory of qualified logging contractors: **oregonloggers.org/OPLDirectory**

Helpful resources

See these publications for more information about timber harvesting operations for your family forest:

- Contracts for Woodland Owners (EC 1192): **catalog.extension.oregonstate.edu/ec1192**
- Small-Scale Harvesting for Woodland Owners (EM 9129): **catalog.extension.oregonstate.edu/em9129**
- Timber Harvesting Options for Woodland Owners (EC 1582): **catalog.extension.oregonstate.edu/ec1582**
- Oregon Forest Resources Institute: **KnowYourForest.org**

CHOOSING A CHEMICAL APPLICATOR

These guidelines are based on information published in October 2017 by the Oregon State University Forestry & Natural Resources Extension Program.
Author: Brad Withrow-Robinson

Many family forest landowners depend on professional operators to help get things done on their property. This often includes the important task of weed control. Finding the right person for the job is important. Finding the right person starts with knowing what to look for when hiring.

Like most forestry practices, weed control is actually a mix of different activities. When hiring a chemical applicator, look for someone with the right mix of knowledge, skill, equipment and staff needed for the job.

It's important to get this right. Weed control is a very important step. Poor work can waste money or injure trees. Even worse, it could mean damaging the environment or neighboring crops, creating liability issues.

Choosing a chemical applicator boils down to communicating about your needs and expectations. Here are some key questions and specific things to talk about before hiring an applicator:

Key questions to ask potential applicators

WHAT ARE YOUR QUALIFICATIONS?

Before hiring anyone to apply chemicals, know that they are qualified to do the job well, and that they will do so legally, safely and without creating liability.

- Ask to see their commercial and/or consulting applicator's license and proof of business insurance. Are their license and insurance valid and current?
- Ask about the level of insurance they carry if that is appropriate for the specific job. Some applicators may be willing to list you as "additionally insured" on their insurance policy.
- Ask about their forestry application experience. Who have they worked for? What types of chemical application have they done? Will they provide references?

- Ask about their familiarity with the Oregon Department of Forestry (ODF) forest practice rules for spraying near required no-spray buffer zones, such as around schools and homes, weather restrictions, record keeping and using restricted herbicides.
- Are they up to speed on training their workers about the new U.S. Environmental Protection Agency Worker Protection Standard?
- Does their licensing and experience qualify them to develop chemical application prescriptions?

WHAT SERVICES DO YOU PROVIDE?

It's important to be clear about the services a chemical application operator offers to determine whether the operator has the knowledge, equipment and staff needed for the job.

Specific herbicides are used in many different situations, such as site preparation (before planting) or release (after planting), to control both leafy and woody plants. The herbicide application can be done in many different ways, including as a broadcast, spot or directed spray, "hack and squirt" or stump treatment. It can also be done using different tools, including backpack sprayers, vehicle-mounted sprayers or squirt bottles. The right combination and approach (generally referred to as the "prescription") depends on the season, type of weeds being targeted and crop tree species.

- Clarify what parts of the job the landowner is doing and what is being hired out, such as developing the prescription, doing the application or maybe both. Do their qualifications match the job?
- What types of chemical application can they do, and what equipment do they use?
- Who will provide the chemicals for the job?
- Who will submit the "Notice of Operation" to ODF for the application?

HOW WILL THE WORK BE DONE?

- Ask about their workforce (number and size of crews). What experience and certification does the foreperson who would oversee the job have?
- Will they be able to finish the job within the desired time frame?
- Ask how to ensure their crew understands exactly what and where to spray. What photos, maps or on-the-ground markings do they need from you?
- Will the operator provide official chemical application records in a timely manner? These include specifics on the chemicals used, location and rates at which they were applied, as well as information on weather conditions during application, etc.

HOW WILL I BE CHARGED FOR YOUR SERVICES?

There is a variety of ways to work this out. It's important that you communicate expectations and reach a clear agreement upfront. Shop around for bids and check references.

- Ask if the charge is by the acre or by the job, or if costs will be itemized.
- Ask about billing and when payment is due.
- Do they guarantee their work? Will they come back and fix something if it isn't done right? How will it be determined that service is satisfactory?
- Get a written estimate for the job.

Where to look for a chemical applicator

The list of individuals and firms who can handle chemical application needs is constantly changing. Look in these places to find a list of potential chemical applicators:

- Ask other landowners who they work with and trust.
  - > Oregon Small Woodlands Association: **oswa.org**
  - > Oregon Tree Farm System: **otfs.org**
- Ask a forester.
  - > Association of Consulting Foresters: **acf-foresters.org**
  - > Oregon State University Extension Service: **directory.forestry.oregonstate.edu**
  - > Society of American Foresters: **eforester.org**
- Oregon Department of Forestry: **oregon.gov/ODF/Working/Pages/FindAForester.aspx**
- Ask a neighboring industrial forester if they could share contacts for applicators they use.
- Ask ODF or the Oregon State University Extension Service for a list of applicators in your area. They can provide names but cannot make specific recommendations.

Helpful resources

See these publications for more information about safe herbicide use and regulations:

- Contracts for Woodland Owners (EC 1192): **catalog.extension.oregonstate.edu/ec1192**
- PNW Weed Management Handbook: **pnwhandbooks.org/weed**

CHECKLIST FOR SLASH PILE BURNING

Well-constructed slash piles that follow these guidelines will often burn for a week or more. Piles constructed with large material, stumps and dirt can burn for months. Piles that were lit in October have caused wildfires the following summer. See **KnowYourForest.org** for a video, webinar and publication on burning piles

PRE-HARVEST

- ☐ Determine if burning is an option.
- ☐ Identify sensitive resources.
- ☐ Work with the operator to agree on post-harvest conditions.
- ☐ Finalize the contract language and sign the contract.
- ☐ File a Notification of Operation with the Oregon Department of Forestry (ODF).

DURING HARVEST

- ☐ Administer the contract terms.

WEEKS BEFORE BURNING

- ☐ Estimate the tons of material to burn with fuel load estimate tools (**oregon.gov/odf/fire/pages/burn.aspx**).
- ☐ Fill out and submit a smoke management registration form and burn plan. (Smoke management forms can be found at **oregon.gov/odf/fire/pages/burn.aspx**.)
- ☐ Start monitoring the weather.

DAYS BEFORE BURNING

- ☐ Consult with ODF or the local fire department on burning opportunities.
- ☐ Watch the weather forecast.
- ☐ Obtain a burn permit or burn permission.

DAY OF THE BURN

- ☐ Follow the burn plan and burn permit instructions.
- ☐ Monitor burning.

DAYS FOLLOWING THE BURN

- ☐ Monitor the burn regularly.
- ☐ Watch the long-term weather forecast for east winds.
- ☐ Extinguish the burn if needed to prevent spread.
- ☐ Report burning accomplishments if required by your burn permit.

RESOURCES FOR FAMILY FOREST LANDOWNERS

This publication, developed by the Oregon Forest Resources Institute in cooperation with the Partnership for Forestry Education, is updated every two years, and details the many technical, financial and educational resources available to Oregon's family forest landowners, including:

- expert technical advice
- classes
- grants
- person-to-person counsel from peers
- online resources

The guidebook includes descriptions and contact information for each organization that helps forest landowners, as well as maps to find resources available in your area.

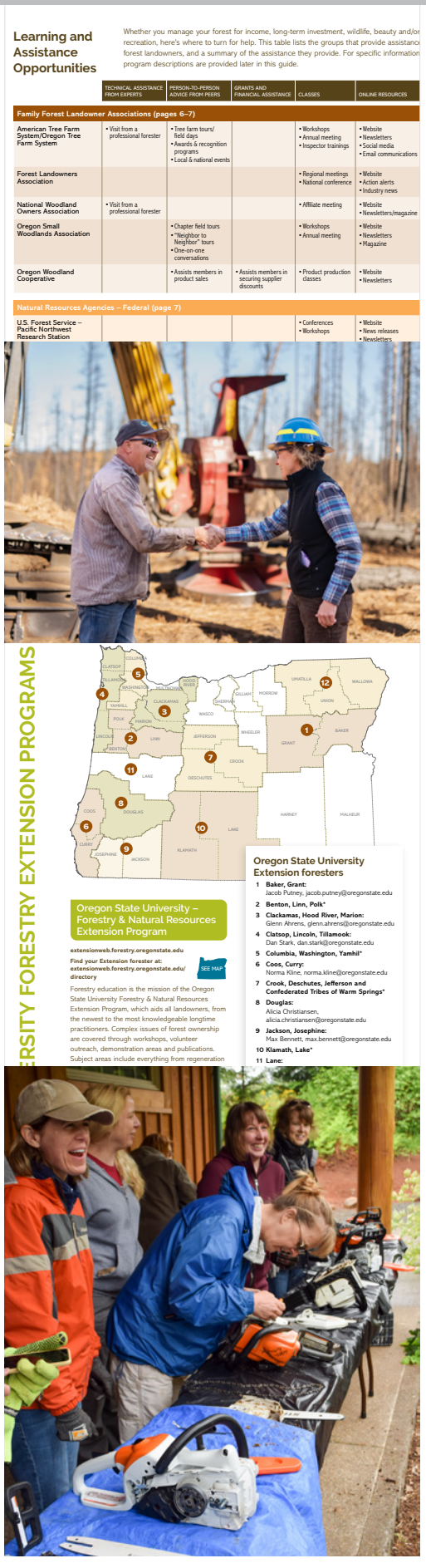
Download a digital copy:
site.OregonForests.org/media/2174

See also **KnowYourForest.org** for practical information about managing your forestland.

FOR FASTER ACCESS to items commonly referenced in this manual, bookmark this page:

KnowYourForest.org/manual-links

Verify rules with your Oregon Department of Forestry (ODF) stewardship forester before moving forward with an operation.



Learning and Assistance Opportunities

Whether you manage your forest for income, long-term investment, wildlife, beauty and/or recreation, here's where to turn for help. This table lists the groups that provide assistance forest landowners, and a summary of the assistance they provide. For specific information program descriptions are provided later in this guide.

	TECHNICAL ASSISTANCE FROM EXPERTS	PERSON-TO-PERSON ADVICE FROM PEERS	GRANTS AND FINANCIAL ASSISTANCE	CLASSES	ONLINE RESOURCES
Family Forest Landowner Associations (pages 6–7)					
American Tree Farm System/Oregon Tree Farm System	• Visit from a professional forester	• Tree farm tours/ field days • Awards & recognition programs • Local & national events		• Workshops • Annual meeting • Inspector trainings	• Website • Newsletters • Social media • Email communications
Forest Landowners Association				• Regional meetings • National conference	• Website • Action alerts • Industry news
National Woodland Owners Association	• Visit from a professional forester			• Affiliate meeting	• Website • Newsletters/magazine
Oregon Small Woodlands Association		• Chapter field tours • "Neighbor to Neighbor" tours • One-on-one conversations		• Workshops • Annual meeting	• Website • Newsletters • Magazine
Oregon Woodland Cooperative		• Assists members in product sales	• Assists members in securing supplier discounts	• Product production classes	• Website • Newsletters
Natural Resources Agencies – Federal (page 7)					
U.S. Forest Service – Pacific Northwest Research Station				• Conferences • Workshops	• Website • News releases • Newsletters

ERSITY FORESTRY EXTENSION PROGRAMS

Oregon State University – Forestry & Natural Resources Extension Program

extensionweb.forestry.oregonstate.edu

Find your Extension forester at: extensionweb.forestry.oregonstate.edu/directory

SEE MAP

Forestry education is the mission of the Oregon State University Forestry & Natural Resources Extension Program, which aids all landowners, from the newest to the most knowledgeable longtime practitioners. Complex issues of forest ownership are covered through workshops, volunteer outreach, demonstration areas and publications. Subject areas include everything from regeneration

Oregon State University Extension foresters

1 **Baker, Grant:** Jacob Putney, jacob.putney@oregonstate.edu
2 **Benton, Linn, Polk***
3 **Clackamas, Hood River, Marion:** Glenn Ahrens, glenn.ahrens@oregonstate.edu
4 **Clatsop, Lincoln, Tillamook:** Dan Stark, dan.stark@oregonstate.edu
5 **Columbia, Washington, Yamhil***
6 **Coos, Curry:** Norma Kline, norma.kline@oregonstate.edu
7 **Crook, Deschutes, Jefferson and Confederated Tribes of Warm Springs***
8 **Douglas:** Alicia Christiansen, alicia.christiansen@oregonstate.edu
9 **Jackson, Josephine:** Max Bennett, max.bennett@oregonstate.edu
10 **Klamath, Lake***
11 **Lane:**

GLOSSARY

Many of these terms are defined in the Oregon Forest Practices Act (ORS 527.620) and Rules (OAR-629-600-0100). Always verify definitions to help ensure compliance with the act and rules.

Abandoned resource site
resource site that the Oregon Department of Forestry (ODF) stewardship forester determines is not active

Abandoned roads
roads that were constructed prior to 1972 and do not meet the criteria of active, inactive or vacated roads; this does not include skid trails

Acre
land area of 43,560 square feet, in any shape; if square, it would measure approximately 209 feet per side

Active channel width
stream width between the ordinary high-water lines, or at the channel bankfull elevation if the ordinary high-water lines are indeterminate

Active resource site
resource site that the ODF stewardship forester determines was used in recent past by a listed species; resource sites that are lost or rendered not viable by natural causes are not considered active

Active roads
roads currently being used or maintained for the purpose of removing commercial forest products

Adaptive Management Program Committee (AMPC)
participates in the adaptive management program with the Independent Research and Science Team (IRST) and the Adaptive Management Program Coordinator; together, they assess how well the forest practice rules are facilitating forest conditions and ecological processes to achieve biological goals and objectives

Afforestation
planting a forest in an area where the previous vegetation or land use was not a forest

Aggregate
mechanically crushed, angular rock used for forest road surfacing

Alternatives to burning
methods to reduce or avoid the need for slash burning, e.g., lop and scatter, chipping and biomass utilization

Anadromous fish
fish that are born and reared in fresh water, move to the ocean to grow, and mature and return to fresh water to reproduce, e.g., salmon and steelhead

Aquatic area
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 freshwater ponds

Aquatic resource
species identified by the Oregon Department of Forestry, along with the resources they need; these species and resources can also be identified in a federally approved habitat conservation plan

Area of inquiry
area along a Type N stream beginning at the confluence with a Type F or Type SSBT stream and extending either:

- to the first 250 feet encountered without a flow feature (Phase 1)
- to the longer of the modeled end plus 250 feet, or beyond the modeled end to the end of the first 250 feet encountered without a flow feature (Phase 2)

Artificial reforestation
restocking a site by planting trees or through the manual or mechanical distribution of seeds

Aspect
direction that a slope faces

Backwater
part of a river with little or no current; may be caused by an obstruction, like a dam

Bald eagle *(Haliaeetus leucocephalus)*
a large sea eagle found throughout North America; associated with watery habitats; bald eagles go through several age-related plumage stages, culminating in the iconic white head and tail, and huge bright yellow bill; adult features appear around 4.5 years of age; national bird of the United States

Band-tailed pigeon *(Patagioenas fasciata)*
a wild pigeon native to western North America that is slightly larger than the introduced rock pigeon; known to seek out and use mineral sites to supplement their diet

Bankfull elevation
point on a stream bank where overflow onto a floodplain begins

Basal area
area of the cross-section of a tree stem derived from diameter at breast height (DBH)

Basal area 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 enclosures

Beaver *(Castor canadensis)*
the largest living North American rodent; textbook keystone species and ecosystem engineer; famous for ability to modify its environment by felling trees, and creating dams, lodges and channels

Best available science
standards developed by the Independent Research and Science Team (IRST) to determine best available science based on criteria set by the IRST, using a peer review process, as well as testable hypotheses

Biological goals and objectives
determined for a habitat conservation plan to meet statutory requirements

Biomass
wood product obtained by chipping or grinding all or some portion of trees, e.g., tops, limbs, unmerchantable stems and other residues, usually for renewable energy production

Blowdown
trees felled by high winds

Bog
a wetland that is characterized by the formation of peat soils and that supports specialized plant communities; this hydrologically-closed system, without flowing water, is usually saturated, relatively acidic, and dominated by ground mosses, especially sphagnum; it 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

Bull trout *(Salvelinus confluentus)*
a generally green and grayish fish in the salmon family with both resident and migratory forms; body is covered in pale or colorful spots, belly and fin edges are white; actually a species of char, thus not a true trout

Cable yarding
moving logs from the stump to the landing using an overhead system of winch-driven cables to which logs are attached with chokers

Certified steep slopes training
required training for large forest landowner representatives to determine the field delineation of the final boundaries for slope retention areas; provides evidence that trainee has demonstrated sufficient knowledge to determine the field delineation of the final boundaries for slope retention areas

Channel
a distinct bed, or banks scoured by water, that confines water and that periodically or continually contains flowing water

Channel migration zone (CMZ)
the area where the active channel of a stream is prone to move, resulting in a potential near-term loss of riparian function and associated habitat adjacent to the stream, except as modified by a permanent levee, dike, railroad lines or any public transportation infrastructure; for this purpose, near-term means the time scale required to grow a mature forest

Chemicals
includes all classes of pesticides, such as herbicides, insecticides, rodenticides, fungicides, plant defoliants, plant desiccants, and plant regulators, fertilizers, petroleum products used as carriers, and chemical application adjuvants, such as surfactants, drift control additives, antifoam agents, wetting agents and spreading agents

Clearcut
a logging and reforestation method for shade-intolerant tree species in which the entire timber stand is harvested, except for required leave trees

Coastal tailed frog *(Ascaphus truei)*
small frog with bumpy, flecked skin ranging from reddish-brown to gray; males have a short tail, even as adults; females are larger, growing up to 2 inches; lives in and around shallow, shaded, forested mountain streams with cold, clear, flowing water; habitat is usually fish-less headwaters

Cobble
specific size class of rock; 3 to 12 inches in diameter

Commercial
the exchange or buying and selling of commodities or services; this includes any forest activity undertaken with the intent of generating income or profit; this does not include cutting firewood or milling timber for personal use

Common ownership
direct ownership by one or more individuals, or by a corporation, partnership, association or other entity in which an individual owns a significant interest

Completion of the operation
point when logging operation area will not be further disturbed by timber harvest activities

Conflict
resource site abandonment or reduced resource site productivity that results from forest practices as determined by the ODF stewardship forester

Conifer
a tree with cones, often called "evergreen" because it keeps its foliage year-round (e.g., pine, spruce, fir and larch trees) and also known as "softwood" because of its wood characteristics

Covered species
species for which incidental take under the federal Endangered Species Act is authorized in an incidental take permit and covered under a habitat conservation plan

Culvert
pipe that channels water under a road

Culvert with imminent risk of failure
has some or all of these characteristics:

- actively diverts streams or ditchline runoff
- actively erodes the road prism or stream channel creating the potential to undermine the integrity of the culvert
- completely blocked, plugged, crushed or buried
- partially or completely failed fill
- high plugging potential as determined by the Stream Blocking Index or other comparable methodology, high magnitude of fill at risk, and high diversion potential in one or both directions

Culvert with minimal risks to public resources
has these characteristics:

- minimizes delivery of sediment to waterways
- has not diverted streams or ditchline runoff and does not have the potential to divert streams or ditchline runoff
- for Type F and Type SSBT streams:
  - > provides passage for all species of adult and juvenile fish
  - > provides passage of expected bed load and associated large woody material during flood events

Cut slope
the slope above a road, created by a cut into the face of a hill slope during road construction

D stream – see "Type D stream"

Debris flow
rapidly moving slurry of rock, soil, wood and water that is most often initiated by a landslide, while delivering and traveling through steep, confined stream channels

Debris flow traversal area (DFTA)
areas that the slopes model identifies as most likely to deliver debris flows to Type F or Type SSBT streams

Debris torrent-prone streams
designated by ODF to include channels and confining slopes that drain watersheds with high landslide hazard locations that are of sufficient confinement and channel gradient to allow shallow, rapid landslide movement

Deforestation
clearing a forest and putting the land into a nonforest use

Department
Oregon Department of Forestry (ODF)

Department reporting and notification system
forest activity electronic reporting and notification system operated by the Oregon Department of Forestry, used for a notification of operation and a permit to use fire or power-driven machinery, also known as the E-Notification system or FERNS

Designated debris flow traversal areas (DDFTA)
areas that the Oregon Department of Forestry slopes model identifies as most likely to deliver debris flows to Type F or Type SSBT streams; these have a probability of passing across, over or through (traversal) in the upper 50%, calculated consistent with the methods described in slopes model; the length of the DDFTA, as determined by the slopes model, is either:

- the entire length of the DDFTA that has a probability of traversal in the upper 20% or
- a maximum of 1,000 feet upstream of a Type F or Type SSBT stream confluence for a DDFTA that has a probability of traversal between 20% and 50% alone or in combination with a DDFTA that has a probability of traversal in the upper 20%

Designated sediment source areas (DSSA)
the Oregon Department of Forestry slopes model identifies these areas as most likely to experience landslides that initiate debris flows to Type F or Type SSBT streams; these areas, as identified by the slopes model, may or may not contain trigger sources; the slopes model identifies the hillslope areas greater than one quarter acre in size within debris flow traversal area sub-basins that provide the top 33% of the landslide-derived sediment to Type F or Type SSBT streams

Diameter at breast height (DBH)
the diameter of a tree outside of the bark at breast height (i.e., 4.5 feet above the ground, measured on the uphill side of the tree)

Domestic water use
the use of water for human consumption and other household human use

Down log
green tree or an existing log intentionally left on the ground after a harvest for wildlife habitat and other benefits

Downspout
an attachment (e.g., a half-round culvert section) to a culvert outlet that carries water beyond the fill slope to control erosion

Drain dip
shallow depression in the road surface to provide for surface drainage without interrupting vehicle traffic

Dry channel area
area between the inside edge of the small forestland owner minimum (SFO) option and the edge of the dry stream channel that:

- is within a surveyed dry channel portion of a small western Oregon Type Np stream that under the SFO minimum option is a required no-cut buffer
- does not have flowing water year-round
- is 100 feet or more in length

Eastern Oregon
the region east of Cascade Crest; see the map in the Riparian Management chapter

End haul
moving excavated roadway material by dump truck to another location instead of sidecasting the material next to the road

End of perenniality (EOP)
refers to a significant point on the ground that delineates between riparian protections; it refers to the modeled, verified or operational field survey EOP; for more information see the Riparian Management chapter

Equipment limitation zone (ELZ)
area where disturbance from equipment activity must be minimized

Estuary
a body of water semi-enclosed by land and connected with the open ocean where saltwater is usually diluted by freshwater; includes all estuarine waters, tidelands, tidal marshes and submerged lands extending upstream to the head of tidewater; note the Columbia River Estuary extends to the western edge of Puget Island

Every reasonable effort
actions required by the landowner or operator if a fire starts in an active forest operation; these actions maintain limited liability exposure and can vary based on amount and type of available resources

Exposure categories
used to designate the likelihood of people being present in structures or on public roads during periods when shallow, rapidly moving landslides may occur

F stream – see "Type F stream"

Filling
the deposit by artificial means of any materials, organic or inorganic

Fill slopes
result from construction of a roadway above the original ground level

Fish use
waters 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 Act

Fledgling
a young bird learning to fly

Fledging tree
a tree or trees close to a nest that the ODF stewardship forester determines is/are regularly used by young birds to develop flying skills

Flow feature
flowing water for 25 feet or more

Flowing water
continuous, visibly flowing surface water within a channel

Flush
any activity that causes a sensitive wildlife species to leave its nest, roost or perch in a tree

Forage

plant species, or other source of food, that substantially contributes, either directly or indirectly, to nutrition of the target wildlife species or guild

Ford

a type of stream crossing where a vehicle's wheels are in the streambed or other installed structure when water is present

Forest conservation area

riparian forestland area that is not harvested and may be eligible for a Forest Conservation Tax Credit; the width of the eligible area is the difference between the outermost edge of the width of the riparian management area (RMA) for the standard practice and the outermost edge of the width of the RMA for the small forestland owner (SFO) minimum option

Forest Conservation Tax Credit (FCTC)

tax credit available to small forestland owners (SFOs) who choose to follow the standard practice used by large forest landowners instead of the SFO minimum option for riparian management area widths; they can claim a tax credit for some of the value of the additional timber left standing in riparian areas on their property for habitat conservation purposes

Forestland

land that is used to grow and harvest 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

Forest practice

any operation conducted on or pertaining to forestland, including but not limited to:

- reforestation
- road construction and maintenance
- harvesting of forest tree species
- application of chemicals
- disposal of slash
- removal of woody biomass

Forest Practices Technical Guidance

advisory guidance, developed by ODF with stakeholder input, to assist landowners and resource professionals with implementing the Oregon Forest Practices Act (OFPA) and forest practice rules, including the Forest Road Inventory and Assessment (FRIA) road inventory, project planning and reporting process required of forest landowners who do not qualify to manage forestlands under the small forestland owner (SFO) minimum option

Forest tree species

any tree species capable of producing logs, fiber or other wood materials suitable for the production of lumber, sheeting, pulp, firewood or other commercial forest products, except trees grown to be Christmas trees on land used solely for the production of Christmas trees

Free-to-grow

a tree or a stand of well-distributed trees, of acceptable species and good form, that has a high probability of remaining or becoming vigorous, healthy and dominant over undesired competing vegetation; for the purpose of this definition, trees are considered well distributed if 80% or more of the operation area contains at least the required minimum per acre tree stocking and not more than 10% contains less than one-half of the required minimum per acre tree stocking

Full bench road

reserved for moderate or steep slopes, or where a road approaches or parallels a stream channel that could be impacted by sidecasting; a bench is cut into the rock or soil equal to the width of the road; no material is sidecast and soil is used to fill low areas or stream crossings along the road alignment

Fully functioning culvert in Type F or Type SSBT streams

at the time of the Forest Road Inventory and Assessment (FRIA) inspection, the culvert meets the requirements of the forest practice rules as of Jan. 1, 2022, and as described in the Forest Practices Technical Guidance for culverts existing prior to Jan. 1, 2024

Fully functioning culvert in Type N or D streams

at the time of the Forest Road Inventory and Assessment (FRIA) inspection, the culvert meets all requirements of the forest practice rules as of Jan. 1, 2022

Further review area

an area of land that may be subject to rapidly moving landslides as mapped by the Oregon Department of Geology and Mineral Industries or as otherwise determined by ODF

Geographic region

large areas where similar combinations of climate, geomorphology and potential natural vegetation occur, established for the purposes of implementing the Oregon Forest Practices Act (OFPA) water protection rules

Geotextile

synthetic fibers formed into woven or non-woven fabric used to separate, filter or reinforce; used in road surfaces to reduce rutting, stabilize the ground and increase the load-carrying capacity

Golden eagle (Aquila chrysaetos)

a large, soaring eagle associated with open, shrubby country and mountainous habitat; mostly dark brown with a lighter, golden nape; bill is smaller than a bald eagle's

Gradient

the slope of a road surface in the direction of travel, usually expressed in percent, e.g., a 10% grade equals a change along the road of 10 feet vertical in 100 horizontal feet

Granite soils (decomposed granites; granitics)

light-colored soils with a coarse texture due to particle sizes ranging from sand to small gravel; loose and highly erodible due to low clay content that does not hold particles together

Great blue heron *(Ardea herodias)*

a very common large, long-necked wading bird; grayish-blue overall, with a yellow or bi-colored bill; roosts collectively in rookeries consisting of up to hundreds of active nests

Green sturgeon *(Acipenser medirostris)*

a bottom-dwelling, migratory fish that grows up to 7 feet long; has bony plates on its back and green, sandpaper-like skin; travels along coastal waters, bays and estuaries; goes upriver to spawn and spends its first few years in the river before venturing toward the sea

Ground-based yarding

moving logs from the stump to the landing using a dozer, rubber-tired skidder or any other machine that maintains contact with the ground; logs are pulled behind the machine with chokers, or one end of the log is lifted and dragged with a grapple

Grubbing
refers to the clearing and removal of stumps and organic debris

Habitat conservation plan (HCP)
federal planning document designed to accommodate economic development, to the extent possible, by authorizing the limited and unintentional harm, "take," of listed species when it occurs incidental to otherwise lawful activities; a habitat conservation plan is designed not only to help landowners and communities, but also to provide long-term benefits to threatened and endangered wildlife species requirements as identified in the Endangered Species Act

Hardwood
a broadleaf, usually deciduous, tree, e.g., oak, maple, cottonwood, ash or madrone

Harvest Type 1
a timber harvest operation that requires reforestation but does not require wildlife leave trees; a Type 1 harvest is a logging operation that leaves a combined stocking level of free-to-grow seedlings, saplings, poles and larger trees that is less than the established stocking level and that represents adequate use of the harvest site's productivity

Harvest Type 2
a timber harvest operation that requires wildlife leave trees but does not require reforestation; a Type 2 harvest does not require reforestation because it has an adequate combined stocking of free-to-grow seedlings, saplings, poles and larger trees, but leaves:

- site-classified forest land, in terms of the capacity to grow repeated crops of wood; based on the maximum mean annual increment, in cubic feet per acre, of natural, well-stocked, even-aged stands of species suitable to the local site.
- on Site Class I, II or III, fewer than 50 trees that are 11-inch diameter at breast height (DBH), or less than an equivalent basal area in larger trees, per acre
- on Site Class IV or V, fewer than 30 trees that are 11-inch DBH, or less than an equivalent basal area in larger trees, per acre
- on Site Class VI, fewer than 15 trees that are 11-inch DBH, or less than an equivalent basal area in larger trees, per acre

Harvest Type 3
a timber harvest operation that requires reforestation and requires wildlife leave trees; the harvest unit size should not exceed 120 acres in size

Harvest Type 4
a timber harvest operation that commercially thins or spaces residual trees and does not require reforestation or retention of wildlife leave trees

Headwall
steep, concave slopes that can concentrate subsurface water, which can lead to increased landslide susceptibility; they are typically located at the head of stream channels, draws or swales; headwalls have slope gradients of 65% or greater in the Tyee Core Area and 70% or greater in the rest of the state, as measured in the axis of the headwall; landslides that occur in headwalls are more likely to initiate channelized debris flows that can travel down streams (also known as debris torrents) than landslides that occur in other areas of the slope

High landslide hazard location (HLHL)
specific site that is subject to the initiation of a shallow, rapidly moving landslide; the following criteria help to identify HLHLs:

- the presence, as measured on site, of any slope in western Oregon (excluding competent rock outcrops) steeper than 80%, except in the Tyee Core Area, where it is any slope steeper than 75%
- the presence, as measured on site, of any headwall or draw in western Oregon steeper than 70%, except in the Tyee Core Area, where it is any headwall or draw steeper than 65%
- notwithstanding the slopes specified above, field identification of atypical conditions by a geotechnical specialist may be used to develop site-specific slope steepness thresholds for any part of the state where the hazard is equivalent to the bullets above; the final determination of equivalent hazard will be made by ODF

High-water level
stage reached during a stream's 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

Hog fuel
logging debris (e.g., defective logs, chunks, branches) that is ground up at a log landing and sold to and/or used by a mill to create electricity

Hydrologic connection
the ability of water to move through a watershed; connectivity can help maintain sediment balance and sustain riparian vegetation corridors

Hydrologic disconnection
removal of direct routes of drainage or overland flow of road runoff to waterways

Hydrologic function
soil, stream, wetland and riparian area properties related to the storage, timing, distribution and circulation of water

Important springs
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

Inactive roads
roads used for forest management purposes but not to remove commercial forest products

Independent Research and Science Team (IRST)
participates in the adaptive management program with the Adaptive Management Program Committee (AMPC) and the Adaptive Management Program coordinator; together they assess how well the water-related forest practice rules are facilitating forest conditions and ecological processes to achieve the biological goals and objectives outlined in the habitat conservation plan for private and other non-federal forests (more information about IRST see the Introduction)

Independent Research and Science Team (IRST) housing agency
a public body that houses and supports the Independent Research and Science Team (IRST); Oregon State University's Institute for Natural Resources is currently the IRST housing agency

Juvenile fish
immature fish or fingerlings; stream crossings must not impede their movement up or down stream

Key components

attributes that are essential to maintain the use and productivity of a wildlife resource site over time; the key components vary by species and resource site; examples of key components include fledging or perching trees

Lake

body of year-round standing open water; for the purposes of the forest practice rules, lakes include:

- the water itself, including any vegetation, aquatic life or habitats
- beds, banks or wetlands below the high-water level that may contain water, whether or not water is actually present

note that under the forest practice rules, lakes do not include water developments

Lamprey

member of the fish genera Entosphenus or Lampetra

Landowner

any individual, combination of individuals, partnership, corporation or association that holds an ownership interest in forestland, including the state and any political subdivision

Landslide mitigation

actions taken to reduce potential landslide velocity or redirect shallow, rapidly moving landslides near structures and roads to reduce risk to people

Large lake

a lake larger than eight acres

Large wood key piece

portion of a tree's trunk, with or without the root wad attached, which is wholly or partially within the stream, that meets the length and diameter standards appropriate to stream size and high-water volumes established in the Guide to Placement of Wood, Boulders and Gravel for Habitat Restoration, developed by the Oregon Department of Forestry, Oregon Department of Fish and Wildlife, Oregon Department of State Lands and Oregon Watershed Enhancement Board, January 2010

Lateral Type Np stream

the largest Type Np stream by basin size that is immediately upstream of the end of a Type F or Type SSBT stream. (eastern Oregon region only)

Limited liability (fire suppression)

landowner or operator is responsible for fire suppression costs of no more than $300,000, given "every reasonable effort" and no willful, malicious or negligent actions were found to cause the fire

Live tree

a tree that has 10% or greater live crown

Local population

number of birds that live within a geographic area identified by ODF; for example, the area may be defined by physical boundaries, such as a drainage or subbasin

Log landing

area where logs may be collected, delimbed and loaded onto trucks

Main channel

a channel that has flowing water when average flows occur

Marbled murrelet (*Brachyramphus marmoratus*)

small, fast-flying seabird that spends most of its time in coastal waters but comes inland to nest in mature forests; their feathers have a marbled brown coloration in breeding season, and are dark gray and white in winter

Marsh

wetland formed in a shallow pond, depression, river margin or tidal area; characteristic plants include grasses, sedges, cattails and bulrushes

Modeled end

the upper-most point of perenniality on a perennial stream shown on the Oregon Department of Forestry's (ODF) maps and on its online reporting and notification system (FERNS); the modeled end may change over time in different phases or as updated by the Oregon Department of Fish and Wildlife (ODFW) pursuant to the established methods for field surveys

Mountain whitefish *(Prosopium williamson)*

a silvery, trout-like fish with a dark or bronze-colored back; distinguished from trout by small, downturned mouth; inhabits clear, cold water of many lakes and rivers

N stream – see "Type N stream"

Natural barrier to fish use

a waterfall, increase in stream gradient, channel constriction or other natural channel blockage that prevents upstream fish passage

Natural reforestation

restocking a site with self-grown trees resulting from self-seeding or vegetative means

Nest tree

tree, snag or other structure that contains a bird nest

Nesting territory

area identified by ODF that contains, or historically contained, one or more nests of a mated pair of birds

Northern goshawk *(Accipiter gentilis)*

large, nimble raptor specialized in hunting other birds; adults are mostly gray with dark eye stripes and white eyebrows; found in mature forests throughout the Northern Hemisphere

Northern spotted owl *(Strix occidentalis caurina)*

a mostly dark brown, non-migratory, medium-sized owl found in mature forests; it has dark eyes and feathers with creamy white mottling; the owl's signature call is a four-note hoot sequence, "Hoo, hoo-hoo, hoo"

Notification of Operation

a document required to be filed with the Oregon Department of Forestry 15 days prior to starting a forest operation

Operation

any commercial activity relating to establishing, managing or harvesting forest tree species, with these exceptions:

- Christmas trees on land used solely for Christmas tree growing
- hardwood timber, including but not limited to hybrid cottonwood that is:
  - > grown on land prepared by intensive cultivation methods and cleared of competing vegetation for at least three years after tree planting
  - > marketable as fiber for inclusion in the furnish for manufacturing paper products
  - > harvested on a rotation cycle 12 or fewer years after planting
  - > subject to intensive agricultural practices, such as fertilization,

cultivation, irrigation, insect control and disease control

- trees actively farmed or cultured for the production of agricultural tree crops, including nuts, fruits, seeds and nursery stock
- ornamental, street or park trees within an urbanized area
- juniper species conducted in a unit of less than 120 contiguous acres within a single ownership
- trees intended to mitigate the effects of agricultural practices on the environment or fish and wildlife resources, e.g., windbreaks, riparian filters or shade strips immediately adjacent to actively farmed lands
- approved land use change after timber harvest activities have been completed and land use conversion activities have commenced

Operator

any person, including a landowner or timber owner, who conducts an operation

Ordinary highwater line

the line on the bank or shore where the high water ordinarily rises annually during heavy rains

Osprey *(Pandion haliaetus)*

a large, highly migratory, fish-eating bird of prey; associated with watery habitats; its coloring is dark above and white below, with a black and white head; its wings are bent at a noticeable angle during flight

Other wetland

wetland that is not a significant wetland or stream-associated wetland

Outsloping

tilting the running surface of a road so it carries runoff to the downslope side of the road; outsloping is often used for roads without roadside ditches

Pacific eulachon/smelt *(Thaleichthys pacificus)*

a small, migratory fish with silvery sides and a bluish back; spends most of its life in the ocean but travels up rivers to spawn

Parcel

a contiguous single ownership recorded at the register of deeds within the county or counties where the property is located, including any parcel(s) touching along a boundary; a railroad, road, stream or utility-right-of-way may intersect the parcel; single ownership includes an individual, partnership, corporation, limited liability company, trust, holding company or other business entity, including the state or any political subdivision

Peak flow

highest stream flow from a large storm or snowmelt event; a 100-year return interval flow for stream crossing design

Perch tree

a tree identified by the ODF stewardship forester as being used by a bird for resting, marking its territory or as an approach to its nest

Perennial stream

a stream that has running water throughout the year under normal climatic conditions

Peregrine falcon *(Falco peregrinus)*

a medium-sized raptor with long, pointed wings and black masking on its face; famously recognized as the fastest animal on Earth; known to act boldly, challenging much larger raptors for prey and territory

Plan for an alternate practice (PFAP)

a document prepared by the landowner, operator or timber owner submitted to ODF for written approval describing forest practices different than those prescribed in state statute or administrative rule

Plantation

a reforested area composed primarily of trees established by planting or seeding practices

Pole

a young tree between 1 and 10 inches diameter at breast height (DBH)

Pre-existing culvert

a culvert with minimal risks to public resources that is also:

- a fully functioning culvert in a Type F or Type SSBT stream or
- a fully functioning culvert in a Type N or Type D stream.

Prescribed burn

deliberate burning of wildland fuels for the purpose of fire hazard reduction, with consideration of local weather, soil moisture, populated areas and time of day

Prior approval

formal permission from the Oregon Department of Forestry (ODF) for certain forest practices before they begin

Protected resources

Ecosystem elements with significant public value described in the Oregon Forest Practices Act that are the subject of specific practices to prevent their degradation

Pullback

the deconstruction (also known as "re-contouring" or "de-building") of the road subgrade to restore the original hillslope profile and contours

R-ELZ

a retention-equipment limitation zone in which disturbance from equipment activity should be minimized and all trees less than six inches diameter at breast height (DBH) and shrub species retained where possible

RH max

maximum distance upstream from the confluence with a Type F or Type SSBT stream that tree retention is required along a small Type Np stream

Ravel (dry ravel)

the particle-by-particle erosion of loose rock or dry soil fragments from steep slopes, driven by gravity and not water; common on road cutslopes and on steep slopes after wildfire

Reforestation

the re-establishment of forest cover either naturally or by planting or seeding trees

Relative humidity

the amount of water vapor present in air expressed as a percentage of the amount needed for saturation at the same temperature

Relief culvert

a structure to relieve surface runoff from roadside ditches to prevent excessive buildup in volume and velocity

Removal

taking or moving any amount of rock, gravel, sand, silt or other inorganic substances

Repeat violator

an operator, timber owner or landowner who ODF has found to have a history of multiple significant violations of the Oregon Forest Practices Act (OFPA), showing a pattern of willful disregard for following the OFPA rules

Replacement tree

means a tree or snag, within the nesting territory of a bird, that is identified by the ODF stewardship forester as being suitable to replace the nest tree or perch tree when these trees become unusable

Research agenda

the plan for proposed scientific research projects developed by the Adaptive Management Program Committee (AMPC); plan includes preliminary research questions and a proposal for answering the questions, as well as a timeline

Resource site

unique area used by sensitive, threatened or endangered wildlife species where protection measures are required, including nesting, roosting, watering and foraging locations such as:

- for threatened and endangered bird species, the resource site is the nest tree, and all identified key components
- for sensitive bird nesting, roosting and watering sites, the resource site is the nest tree, roost tree or mineral watering place, and all identified key components
- for significant wetlands resource sites, the wetland and the riparian management area (RMA) are identified by ODF

Retention harvest

a timber harvesting technique where stand elements such as mature trees, snags, and downed wood are retained within the harvest unit as biological legacies

Riparian area

the ground along a water body where the vegetation and microclimate are influenced by year-round or seasonal water, associated high-water tables and soils that exhibit some wetness characteristics

Riparian management area (RMA)

an area along each side of certain water bodies that requires vegetation retention and special management practices for the protection of water quality, hydrologic functions and fish and wildlife habitat

Riprapping

a layer of large stones that protects soil from erosion in areas of high or concentrated water flows; especially useful for armoring channel and ditch banks

Road management blocks

geographically distinct forest ownership blocks where a landowner is encouraged to conduct a Forest Road Inventory and Assessment (FRIA)

Road prism

the area of the ground containing the road surface, cut slope, and fill slope, e.g., the cross-section of a road between the points of excavation and fill

Rule of thumb

a simple guideline or procedure based on general concepts or experience that provides roughly correct but not strictly accurate or reliable results

Salamander

Oregon native species of salamander include:

- **Coastal giant salamander** *(Dicamptodon tenebrosus)* the largest salamander species in Oregon, growing up to 14 inches; aquatic juveniles are brown with frilly gills, and terrestrial adults are marbled tan and brown; lives in dense forest around cold and clear streams, lakes, and ponds
- **Columbia torrent salamander** *(Rhyacotriton kezeri)* a small salamander with green, brown, or gray back and sides with bright orange or yellow underside; grows up to 4 inches; lives in and around cold, clear waters, such as mountain streams, springs and seeps
- **Cope's giant salamander** *(Dicamptodon copei)* large salamander that typically remains in its aquatic form and never metamorphoses; brown with yellowish-tan patches; grows up to 8 inches; lives mostly in forested streams with cold, clear, flowing water
- **Southern torrent salamander** *(Rhyacotriton variegatus)* a small salamander with speckled brown upperparts and bright yellow underparts; lives in and around cold, clear waters, such as mountain streams, springs and seeps; has the southernmost range of all torrent salamanders

Salmon

any of the five salmon species that exist in Oregon; all are anadromous fish, migrating up rivers from the sea to spawn, except for some sockeye salmon; these species are:

- **Chinook salmon** *(Oncorhynchus tshawytscha)*, aka "king salmon," the largest of the Pacific salmon; they occasionally weigh 50 pounds, but average between 10 and 25 pounds; can be readily identified by the black gumline on their lower jaw; Oregon's state fish
- **Coho salmon** *(Oncorhynchus kisutch)*, aka "silver salmon," a medium-to-large species, rarely exceeding 15 pounds; differentiated from chinook by the white gumline on their lower jaw
- **Chum salmon** *(Oncorhynchus keta)*, aka "dog salmon" or "keta salmon," the second largest Pacific salmon species after chinook; develops a striking color pattern when returning to fresh water, becoming dark green to brown with red to purple vertical striping; spawning males also develop large canine-like fangs
- **Sockeye salmon** *(Oncorhynchus nerka)*, aka "red salmon," one of the smaller salmon species, weighing up to about 15 pounds; develops a bright red body and green head in spawning season; some sockeye spend their entire lives in fresh water and are known as "kokanee" in the Pacific Northwest
- **Pink salmon** *(Oncorhynchus gorbuscha)*, aka "humpback salmon" or "humpy," the smallest of the Pacific salmon, weighing about 5 pounds; breeding males grow a large dorsal hump

Saplings and poles

live trees of acceptable species, of good form and vigor, with a diameter at breast height (DBH) of 1 to 10 inches

Scarify

to mechanically remove competing vegetation or interfering debris and/or disturb the soil surface to improve reforestation success

Scenic highway

designated highways with special requirements for forest operations within specified distances from them

Seedlings

live trees of acceptable species of good form and vigor less than 1 inch diameter at breast heigh (DBH)

Seeps

features similar to springs, except without a well-defined point or points of groundwater surface discharge and usually very low flow

Shallow, rapidly moving landslide

any detached mass of soil, rock or debris that begins as a relatively small landslide on steep slopes and grows to a sufficient size to cause damage as it moves down a slope or a stream channel at a velocity difficult for people to outrun or escape

Shovel

excavator equipped with a grapple, used instead of a skidder or dozer to move logs

Sidecast

waste material that has been excavated or dredged to the side, rather than hauled away

Side channel

a channel other than a main channel of a stream that only has flowing water when high-water level occurs.

Significant violation

a violation of the Oregon Forest Practices Act (OFPA) that involves:

- engaging in an operation without filing the requisite prior notification
- continued operation in contravention of an order issued by ODF
- major damage to a resource for which restoration is expected to take more than 10 years

a significant violation does not include:

- unintentional operation in an area outside an operating area for which sufficient notification was filed
- continued operation in contravention of an order issued by ODF where an operator demonstrates that he or she did not receive the order or
- failure to timely notify ODF of an intent to continue an operation into the next calendar year

Significant wetlands

types of wetlands that require site-specific protection, including:

- wetlands larger than 8 acres
- estuaries
- bogs
- important springs in eastern Oregon

Site class

a grouping of site indexes that indicates their relative productivity

Site index

a measure of forest site quality based on the height of the dominant trees in a stand on that site at a specified age, usually 50 or 100 years

Site preparation

any treatment that enhances site conditions for tree plantation establishment or natural forest regeneration

Skidding

in ground-based logging, the process of dragging logs from the woods to a landing; called "yarding" in cable or helicopter logging

Slash

treetops, branches, bark and other natural debris, left after a logging operation

Slope (degrees or percent)

an incline measured as the change in surface level within a given horizontal distance, expressed in degrees or as a percentage (e.g., a rise of 2 feet that spans 100 feet is a 2% slope or an angle of 1.15 degrees)

Slope retention areas

designated sediment source areas in each timber harvest unit that should be left unharvested

Slopes model

the Oregon Department of Forestry's (ODF) computer-generated model to identify sites where specific forest practice rules must be followed when logging on steep slopes, including designated debris flow traversal areas, designated sediment source areas and trigger sources

Small forestland

forested properties held by landowners who own or have common ownership interest in less than 5,000 acres of forestland in Oregon

Small forestland owner (SFO)

a forest landowner who:

- owns, or holds common ownership in, less than 5,000 acres of forestland in Oregon
- has harvested no more than an average yearly volume of two million board feet of merchantable forest products when averaged over the three years prior to:
  - > the date the Oregon Department of Forestry (ODF) receives a timber harvest notification from the landowner
  - > if applying for a Small Forestland Investment in Stream Habitat Program (SFISH) grant, the date the landowner submits a grant application
- affirms that they do not expect to exceed an average yearly volume of two million board feet of merchantable forest products for 10 years after ODF receives the harvest notification or SFISH grant application

Small forestland owner minimum option

allows qualified small forest landowners to leave narrower no-cut tree retention areas along streams than the standard practice width required for large forest landowners

Snag

a dead tree that is still standing and has lost its leaves or needles and its small limbs

Sound snag

a snag that retains some intact bark or limb stubs

Spoil areas

places where excess material is removed or generated during road or landing construction and is not used for construction

Springs

water features where groundwater discharges to land surface or a surface water body at a well-defined point or points; spring water volumes range from small, intermittent trickles to millions of gallons per day, depending on the groundwater source and hydraulic head

Squash pipe

a type of culvert used to cross streams in areas with low road clearances or wide channels; also, can provide better conditions for fish passage

SSBT stream – see "Type SSBT stream"

State forester

Oregon's lead forester who heads the Oregon Department of Forestry (ODF) and is secretary to the Oregon Board of Forestry; he or she may delegate authorized

representatives to assist forest landowners; these representatives are stewardship foresters

Steelhead *(Oncorhynchus mykiss)*

a sea-run (anadromous) rainbow trout; grows larger than their freshwater-only counterparts; unlike salmon, steelhead can migrate and spawn multiple times during their lifetime

Stewardship foresters

an Oregon Department of Forestry (ODF) forester who is authorized by the State Forester to assist forest landowners with following the Oregon Forest Practices Act (OFPA) and enforce penalties on landowners and operators who violate the OFPA

Stocking

number of trees on a given area, as in the case of trees per acre required to be planted after a timber harvest

Stream

a channel, such as a river or creek, that carries flowing surface water during some portion of the year. For the purposes of the forest practice rules, streams include:

- the water itself, including any vegetation, aquatic life or habitats
- beds and banks below the high-water level that may contain water, whether or not water is actually present
- area between the high-water level of connected side channels
- beaver ponds, oxbows and side channels if they are connected by surface flow to the stream during a portion of the year
- stream-associated wetlands

streams do not include:

- ephemeral overland flow that does not have a channel
- road drainage systems or water developments

Stream-adjacent failures (SAF)

all slopes greater than 70% immediately adjacent to Type F or Type SSBT streams that are either:

- actively failing and delivering sediment, where erodible material and exposed soils are present and prone to continued shallow-rapid slope instability, with active features such as tension cracks, scarps, ground surface shearing, and oversteepened toes, or
- unstable due to the toe of the stream interacting directly with erosive forces of a stream, making it likely for a slope failure extending beyond the standard width of the riparian management area

Stream-associated wetland

wetland that is not classified as significant and that is next to a stream

Stream improvement

actions to improve aquatic habitat, including placing logs, trees or boulders in streams, fencing out livestock, constructing side channels, and afforestation

Structural exception

OEF determines that no actions are required to protect the wildlife resource site, meaning the entire resource site may be eliminated

Structural protection

ODF determines that actions are required to protect the wildlife resource site such as retaining a nest tree or perch tree for certain species of birds

Stumpage value

value of standing timber based on the value that would be received for the timber if harvested and delivered to a mill, minus the cost of harvest and delivery to the mill

Subgrade

layer of a roadbed on which the base or surface course is placed; on an unsurfaced road, this is the wearing surface (top layer upon which vehicles travel)

Talus

slope formed by an accumulation of rock debris, sometimes from a cliff or road cut above

Target wildlife

wildlife species or wildlife guild expected to benefit from the installation of a wildlife food plot

Temporal exception

ODF determines that no actions are required to prevent disturbance to birds during the critical period of use

Temporal protection

ODF determines that actions are required to prevent disturbance to birds during the critical period of use

Temporary crossing

stream crossing installed and used during a timber harvest and promptly removed when the logging operation is completed or prior to seasonal runoff, whichever comes first

Temporary fill

material (e.g., soil and rock) used to construct a temporary crossing that must be removed from below the high-water level of the stream at the completion of the logging operation

Terminal Type Np stream

largest Type Np stream by basin size that is immediately upstream of the end of a Type F or Type SSBT stream (eastern Oregon region only)

Threatened or endangered species

any species of plant or animal listed as in danger of becoming rare or extinct throughout all or a significant portion of its range, as defined by the Endangered Species Act of 1976

Timber owner

any individual, combination of individuals, partnership, corporation or association of whatever nature, other than a landowner, that holds an ownership interest in any forest tree species on forestland

Topography

the surface forms, elevations and contours of an area of land

Tree leaning over the channel

a tree within a riparian management area with a portion of its trunk crossing the vertical projection of the high-water level of a stream

Trigger sources

areas within designated sediment source areas that the Oregon Department of Forestry (ODF) slopes model identifies as most likely to trigger a high-volume debris flow; these areas have the top 20% probability of triggering a top 33% high-volume debris flow

Turbidity

the cloudy appearance of a water body, caused by suspended or dissolved solids, algae, etc.; can indicate natural or accelerated erosion

Tyee Core Area

location with geologic conditions that include thick sandstone beds with few

fractures; these sandstones weather rapidly and concentrate water in shallow soils, creating a higher shallow, rapidly moving landslide hazard; the Tyee Core area is located within coastal watersheds from the Siuslaw watershed south to and including the Coquille watershed, and that portion of the Umpqua watershed north of Highway 42 and west of Interstate 5; within these boundaries, locations where bedrock is highly fractured or not of sedimentary origin, as determined in the field by a geotechnical specialist, are not subject to the Tyee Core area slope steepness thresholds

Type D stream

a stream that has domestic water use, but no fish use

Type F stream

a stream with fish use, or both fish use and domestic water use

Type N stream

a stream with neither fish nor domestic water use

Type Np stream

all perennial non-fish-bearing streams that are not Type SSBT or Type F

Type Ns stream

all seasonal non-fish-bearing stream reaches that are not Type SSBT, Type F or Type Np streams

Type SSBT stream

a fish-bearing stream with salmon, steelhead or bull trout present or otherwise used by salmon, steelhead or bull trout at any time of the year

Understory vegetation

plants growing below the canopy formed by trees and other taller plants in a forest

Unit

an operation area submitted on a notification of operation to the Oregon Department of Forestry (ODF) that is identified on a map and that has a single continuous boundary; ODF uses unit size to determine the number of down logs, snags and green live trees that must be retained in the area that will be logged, and compliance with timber harvest Type 3 size limits and other applicable forest practice rules that the landowner or operator must follow

Vacated roads

impassable roads that are no longer used for forest management purposes or commercial forest harvesting activities left in a condition where road-related damage to nearby waterways is unlikely

Verified end

a stream's upper-most point of perenniality, as established pursuant to a specific process of field verification outlined in the Oregon Forest Practices Act (OFPA)

Waste disposal area

location for excess soil, rock and other debris from road construction that is stable, and is not in danger of the material entering nearby waterways

Water bar

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 necessary to cause soil movement or erosion

Watercourse

natural or artificial channel through which water flows

Water development

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 heliponds that are maintained for the intended use by human activity

Waters of the state

include lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, wetlands, inlets, canals and the Pacific Ocean, that are located within the territorial limits of the State of Oregon; 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) are included when they are wholly or partially within or bordering the state or within its jurisdiction

Western Oregon

the region of the state west of the Cascade Crest; see map in the Riparian Management chapter

Wetland

areas that are inundated or saturated by surface water or groundwater 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

Wildlife food plot

a small forestland area that instead of being used for growing and harvesting of a forest tree species, is planted with vegetation or has vegetation capable of substantially contributing to wildlife nutrition

Wildlife guild

a grouping of wildlife that has similar characteristics and fulfills similar ecological roles in the environment

Wildlife leave trees

live trees or snags that must be left standing after a timber harvest to provide habitat for wildlife

Wildlife tree

a green tree at least 30 feet tall and at least 11 inches diameter at breast height (DBH) planned to be left standing after a timber harvest to provide habitat for birds and other wildlife

Wingwalls

provide smooth entry of water into the bridge site and support and protect the embankment; wingwalls can serve as buttresses to support walls or be purely decorative

Written plan

a document prepared by an operator, timber owner or landowner that describes the plan for a proposed forest operation

ACRONYMS

AMPC	Adaptive Management Program Committee
AOI	area of interest
BA	basal area
BFW	bankfull width
BGOs	biological goals and objectives
CBM	certified burn manager
cfs	cubic feet per second
CIP	channel initiation point
CMP	corrugated metal pipes
CMZ	channel migration zone
CPP	corrugated polyethylene pipes
DBH	diameter at breast height
DDFTA	designated debris traversal area
DEQ	Department of Environmental Quality (Oregon)
DFTA	debris flow traversal area
DOGAMI	Department of Geology and Mineral Industries (Oregon)
DSL	Department of State Lands (Oregon)
DSSA	designated sediment source area
ELZ	equipment limitation zone
EOP	end of perenniality
EPA	Environmental Protection Agency (U.S.)
ESA	Endangered Species Act
FCTC	Forest Conservation Tax Credit
FERNS	Forest Activity Electronic Reporting and Notification System
FPA	Forest Practices Act (Oregon)
FRIA	Forest Road Inventory and Assessment
FSA	Farm Service Agency (U.S. Department of Agriculture)
HCP	Habitat Conservation Plan
HLHL	high landslide hazard location
IFPL	industrial fire precaution level
IPM	integrated pest management
IRST	Independent Research and Science Team
NHD	nationwide hydrologic data
NMFS	National Marine Fisheries Service (National Oceanic and Atmospheric Administration, U.S. Department of Commerce)
NRCS	National Resource Conservation Service (U.S. Department of Agriculture)
OAR	Oregon Administrative Rule
ODA	Oregon Department of Agriculture
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
OERS	Oregon Emergency Response System
OFPA	Oregon Forest Practices Act
OR-OSHA	Oregon Occupational Safety and Health (Department of Consumer and Business Services)
ORS	Oregon Revised Statutes
PDM	power-driven machinery
PFA	Private Forest Accord
PFAP	plan for an alternate practice
R-ELZ	retention-equipment limitation zone
RMA	riparian management area
SAF	stream-adjacent failure
SFISH	Small Forestland Investment in Stream Habitat Program
SFO	small forestland owner
SRA	slope retention area
SSBT	salmon, steelhead and/or bull trout (stream)
USFS	U.S. Forest Service
WRD	Water Resources Department (Oregon)

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Organization key

AOL	Associated Oregon Loggers
MSU	Michigan State University
ODFW	Oregon Department of Fish and Wildlife
ODF	Oregon Department of Forestry
OFIC	Oregon Forest Industries Council
OFRI	Oregon Forest Resources Institute
OSWA	Oregon Small Woodlands Association
OSU	Oregon State University

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This document is being provided as a resource. The official copy of the rules can be found in the Oregon Administrative Rules Database on the Oregon Secretary of State's website and the official copy of Oregon Revised Statues can be found on the Oregon Legislature's website.

For more details and links to the official state laws and rules regulating forestry practices on Oregon's private forests, including new riparian rules effective Jan. 1, 2024, please visit the Oregon Department of Forestry website: **oregon.gov/odf/pages/lawsrules.aspx**

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