

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
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- 629-043-0076: Permits to use fire or power-driven machinery
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- 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
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- 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

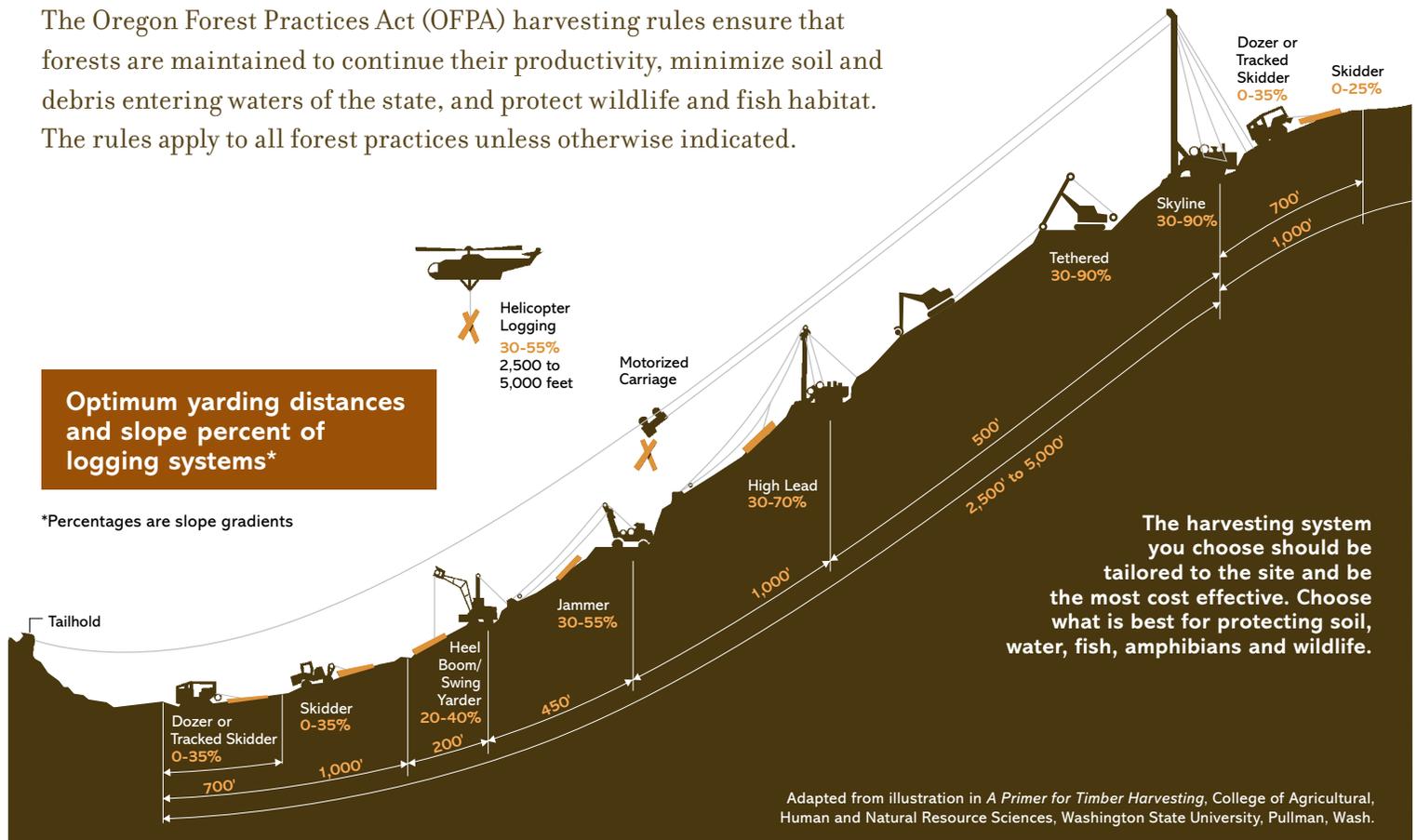
Harvesting timber is integral to forest management. Though it produces wood products for everyday use, it also causes temporary disturbances to the forest environment.

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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.

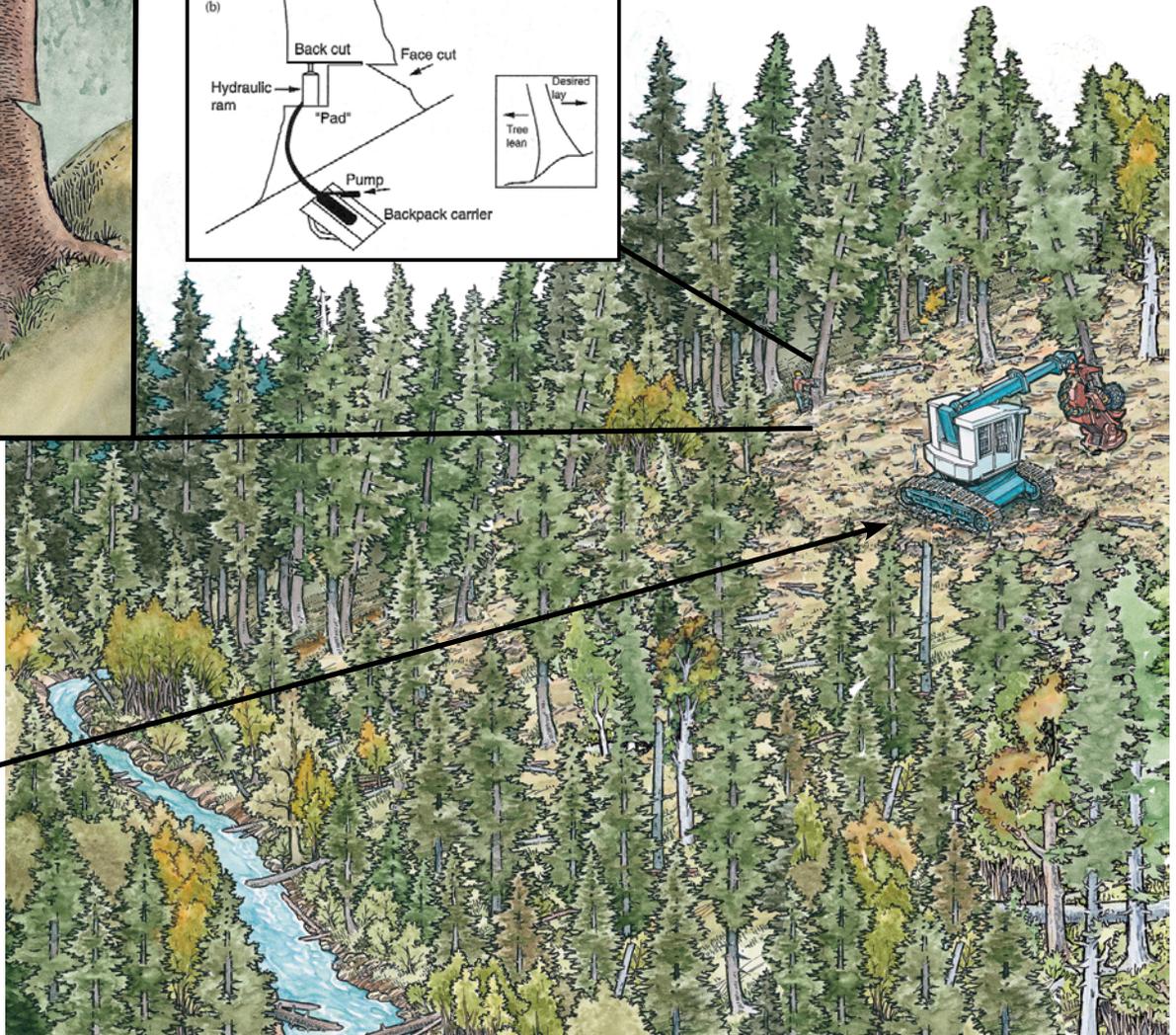
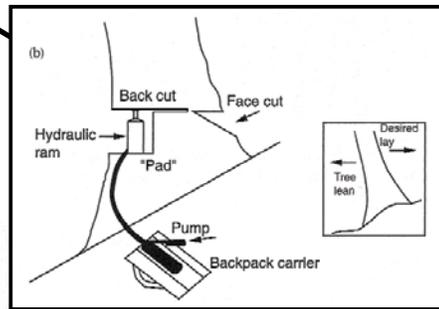
These requirements are designed to protect:

- 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.

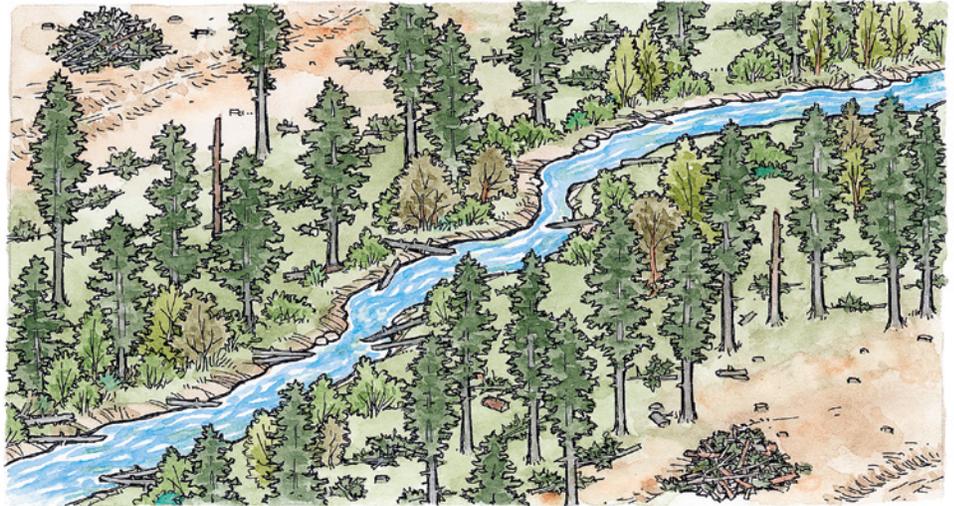
Operate machines to minimize soil disturbance and compaction.

Felling and removing slash

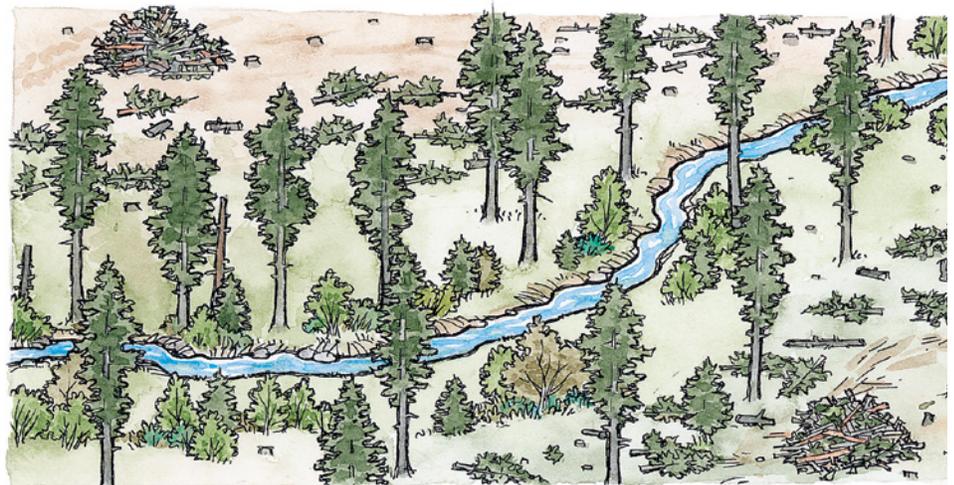
To minimize disturbance and avoid harm to water, soils and vegetation during felling operations:

- 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.

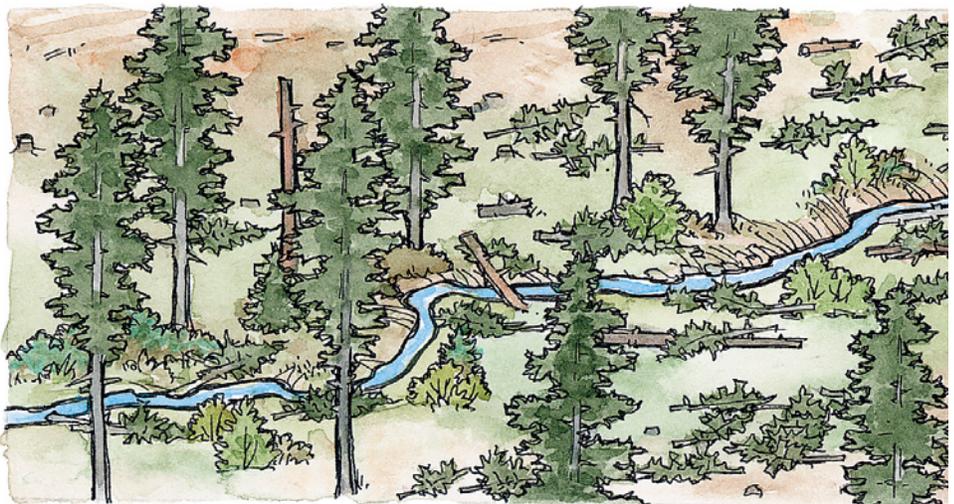
How much and what size slash should be removed?



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

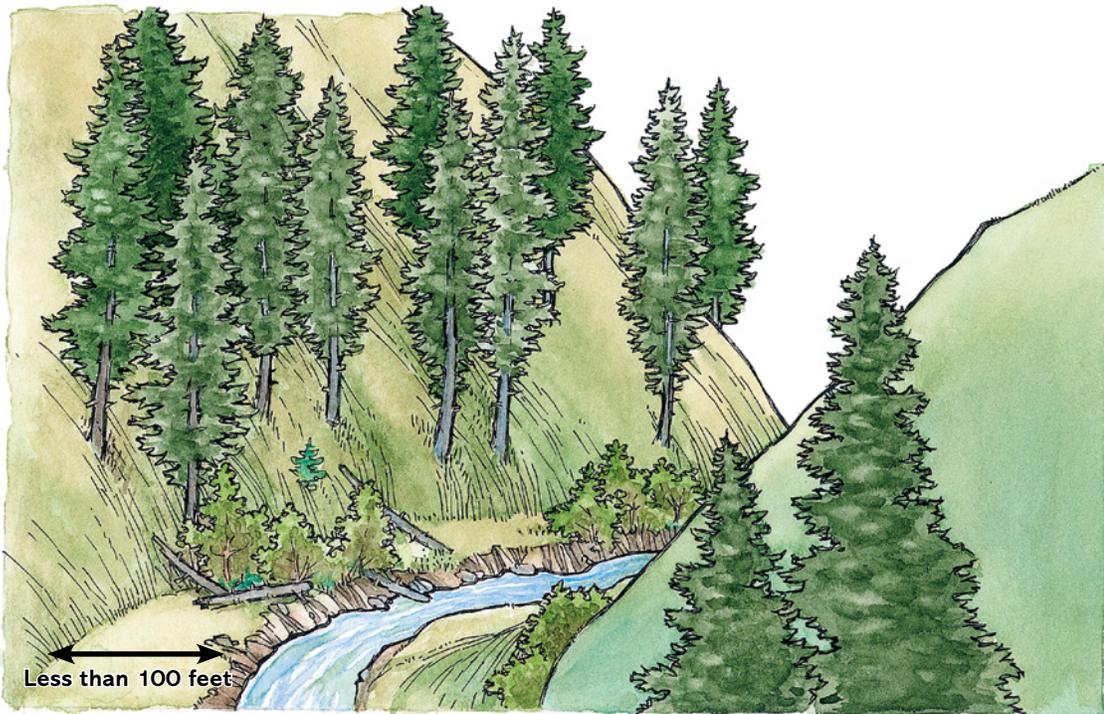
Do not use any of the following as skid trails:

- **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.

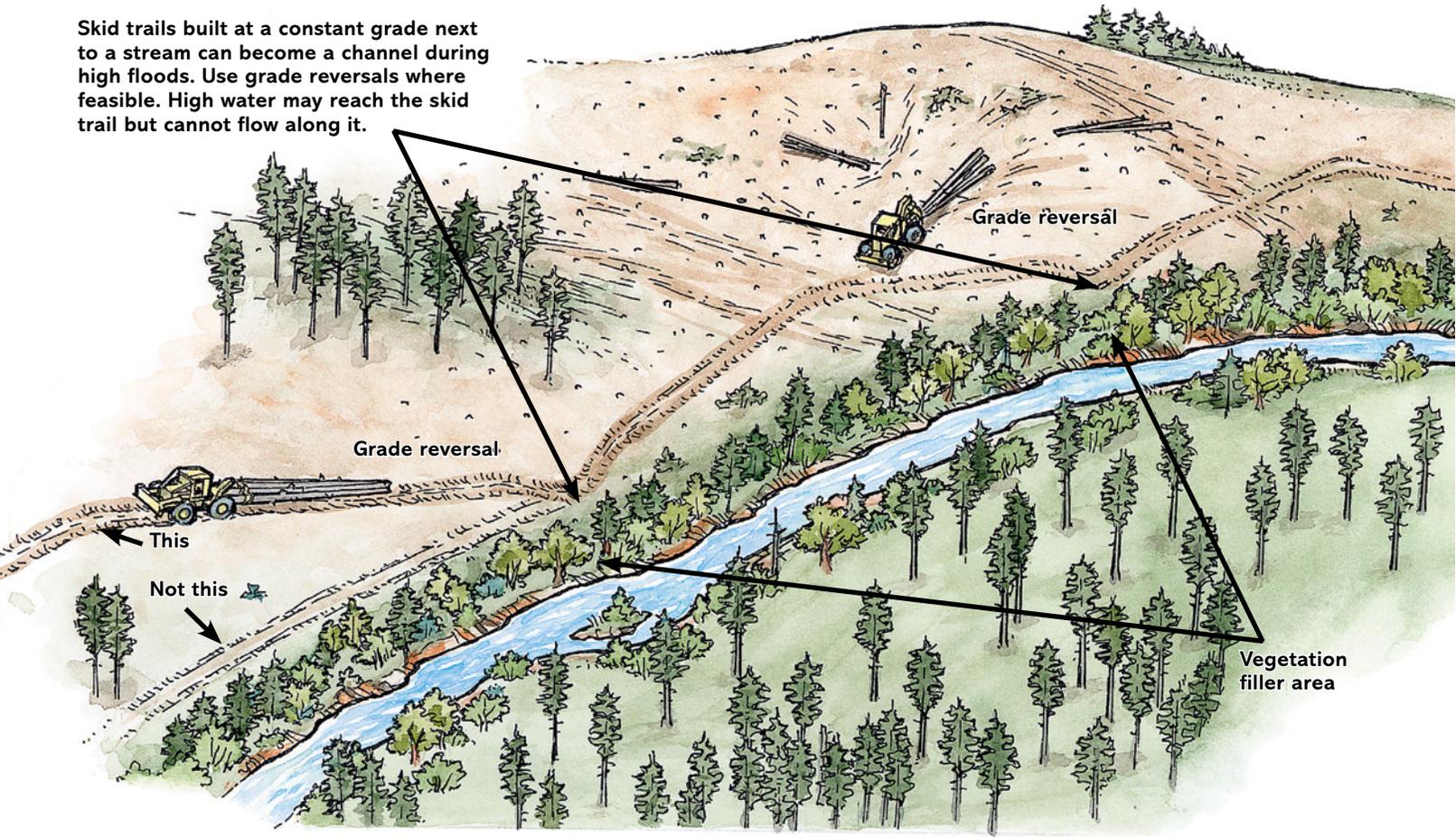


A minimum of 100-110 feet of slope distance is required between skid trails and the high-water level of Type F and SSBT streams. Only stream crossings are allowed closer to streams. Approaches to stream crossings must be designed to get skid trails out of this portion of the RMA as quickly as possible.

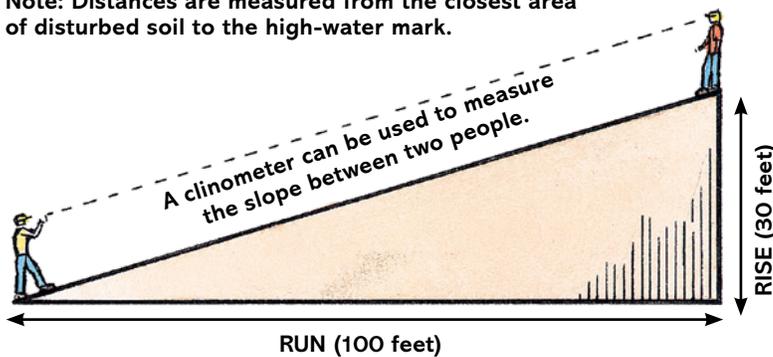


In steep, narrow canyons, the distance from the high-water level to the steep canyon slope is generally less than 100 feet for Type F, SSBT and D streams. An alternative logging system (cable or helicopter) must be used.

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:

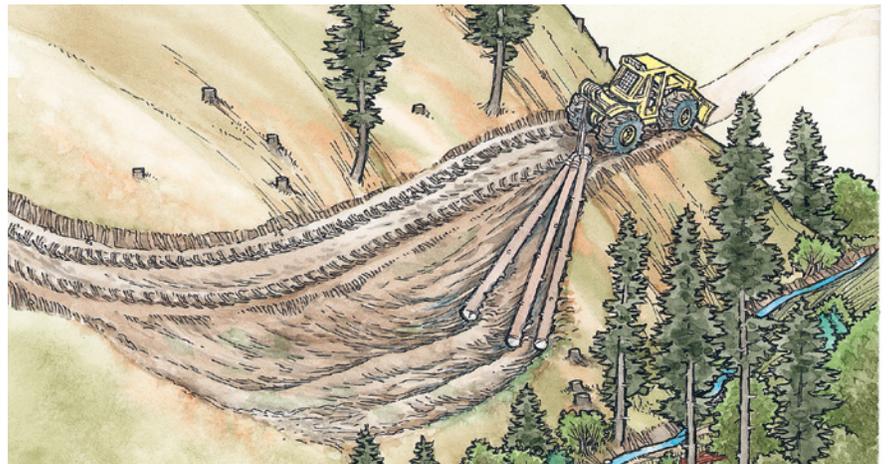
- Minimize soil disturbance by fitting skid trails to the topography and avoid sidecast buildup.
- Don't cover productive soil with sidecast for a significant percentage of the unit, as it is likely to cause landslides and remove soil from the slope. Any combination of slopes covered by sidecast, slides 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

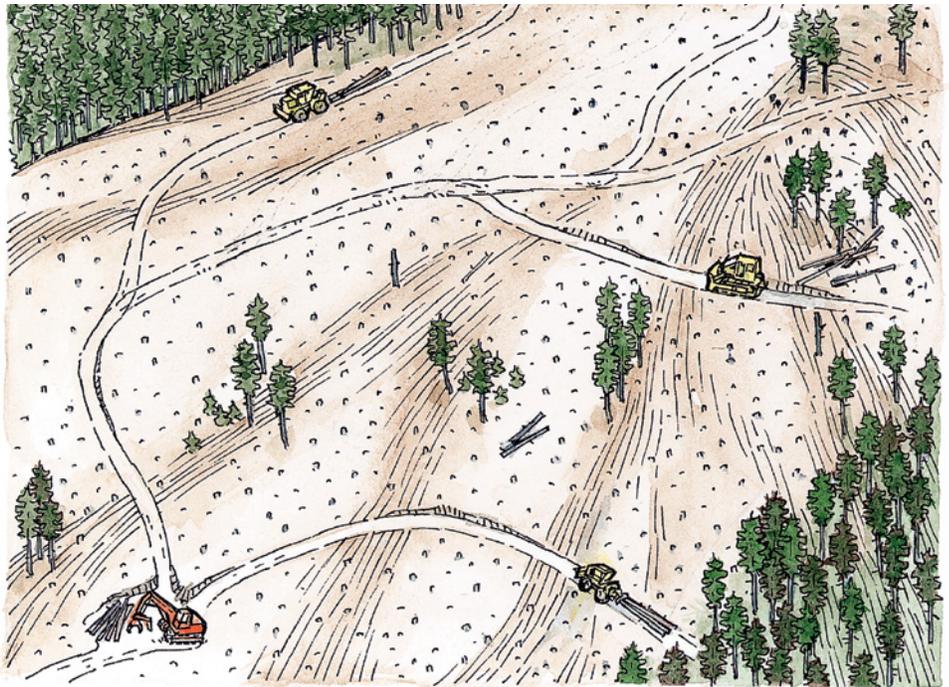
Advance planning can minimize the impact of skid trails on soil and the amount of ground occupied by skid trails. Pre-planned skid trails can become permanent parts of a logging unit and be used for other management activities and future timber harvests.

There are two common patterns for pre-planned skid trails: branching and parallel (see illustrations).

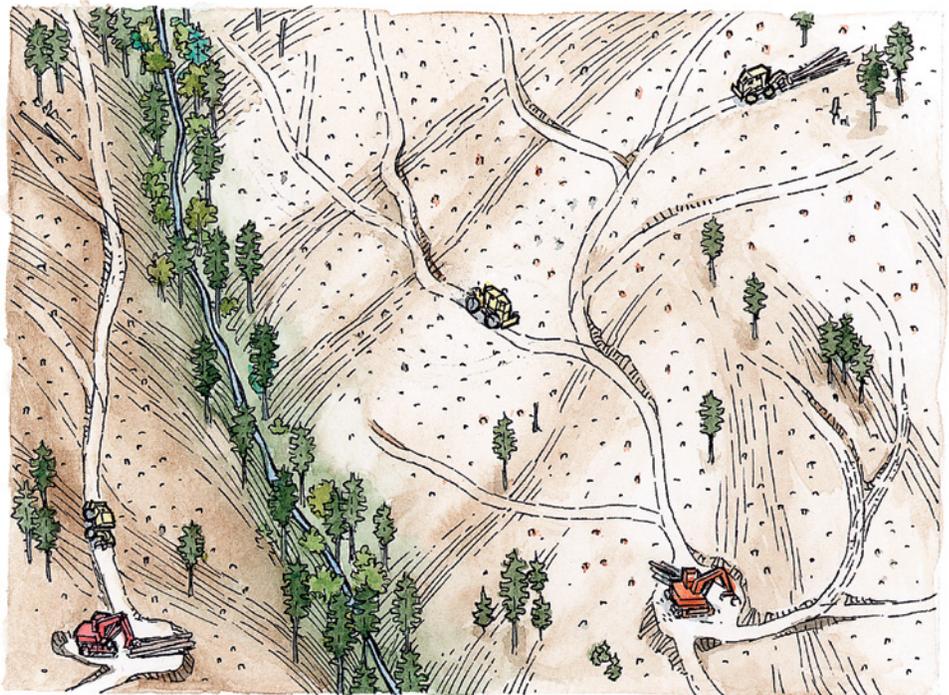
Shovel logging

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

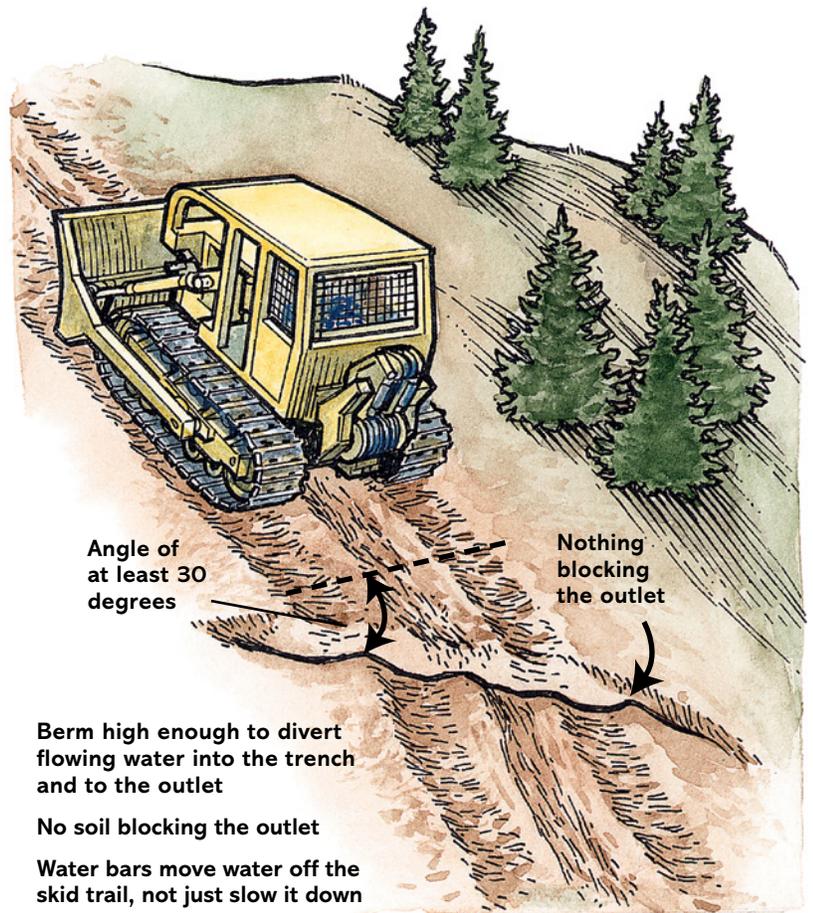
Construct drainage dips, grade reversals or other effective water diversions in skid trails as necessary to minimize soil displacement and ensure filtration of runoff water before it enters water. Material eroded from skid trails must not enter any water bodies.

For guidance on constructing drain dips, see the Roads and Water Crossings chapter.

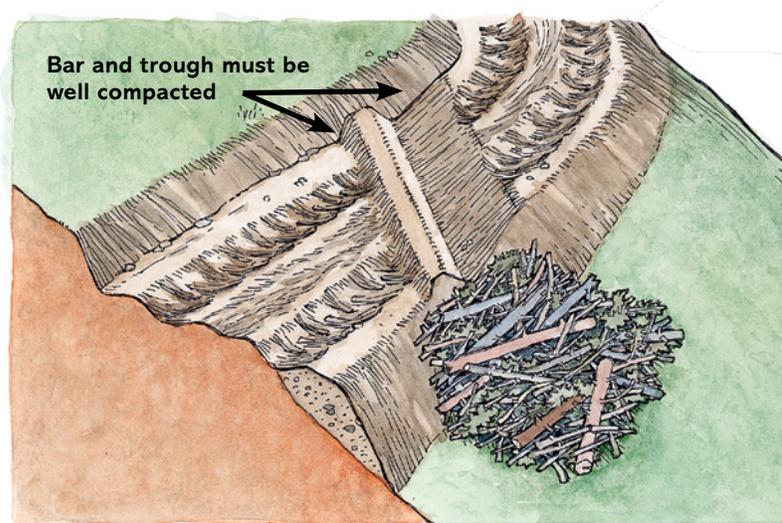
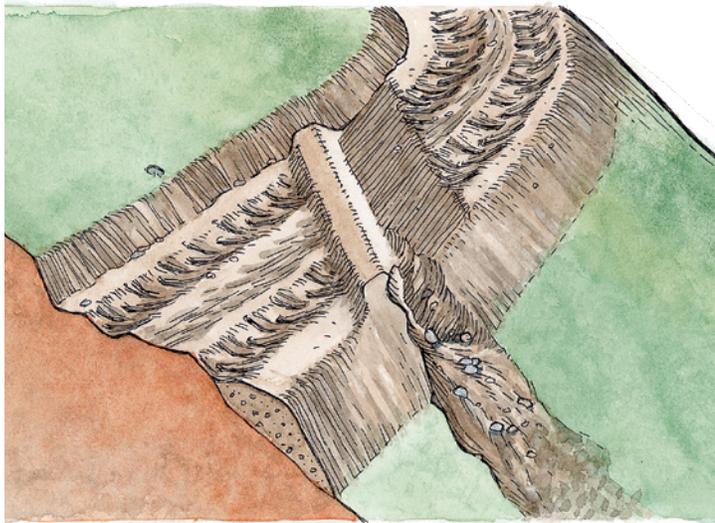
For guidance on constructing grade reversals, see page 130.

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.

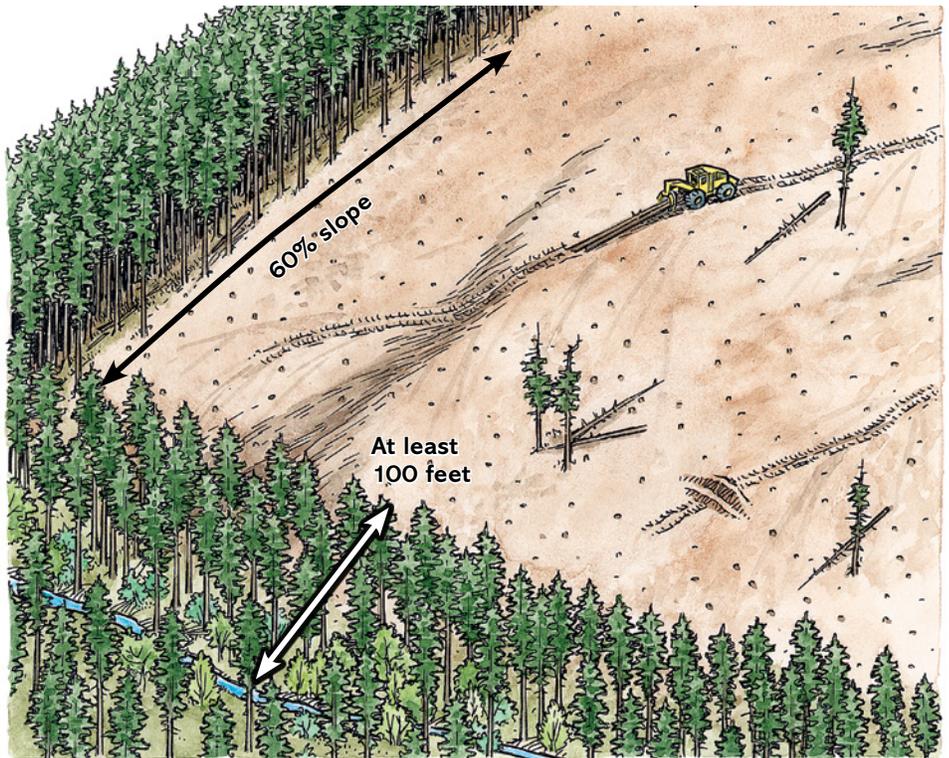
Slope of skid road by percent (see Appendix)	Soil description	
	Sensitive soils (silts, granitics)	Normal forest soils (loam, gravel, cobble)
5 to 15	150 ft.	300 ft.
15 to 35	100 ft.	200 ft.
35 to 50	50 ft.	100 ft.
Over 50	25 ft.	50 ft.

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 Tye 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.

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).



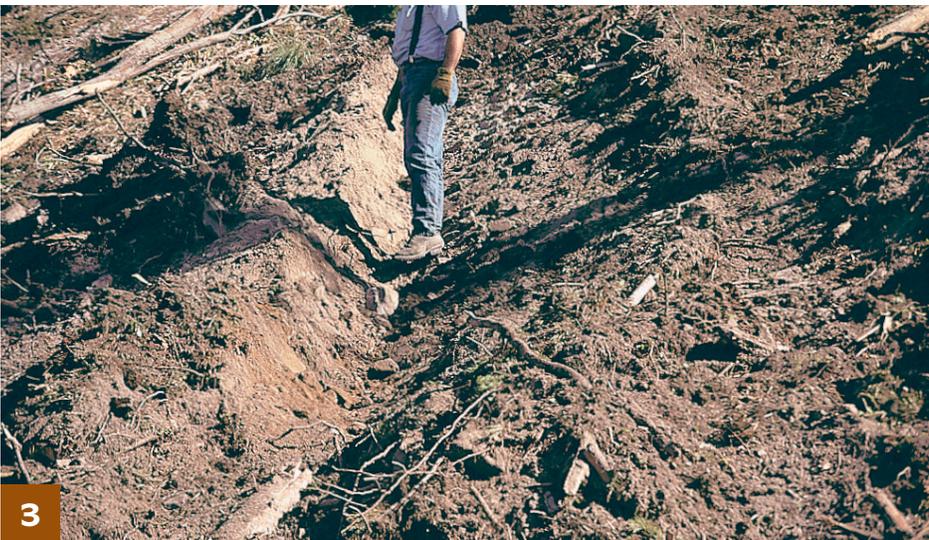
1

Begin construction of the skid trail cross ditch at the far edge of the skid trail.



2

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.



3

The finished skid trail cross ditch should be deep. This is more than a water bar.

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:

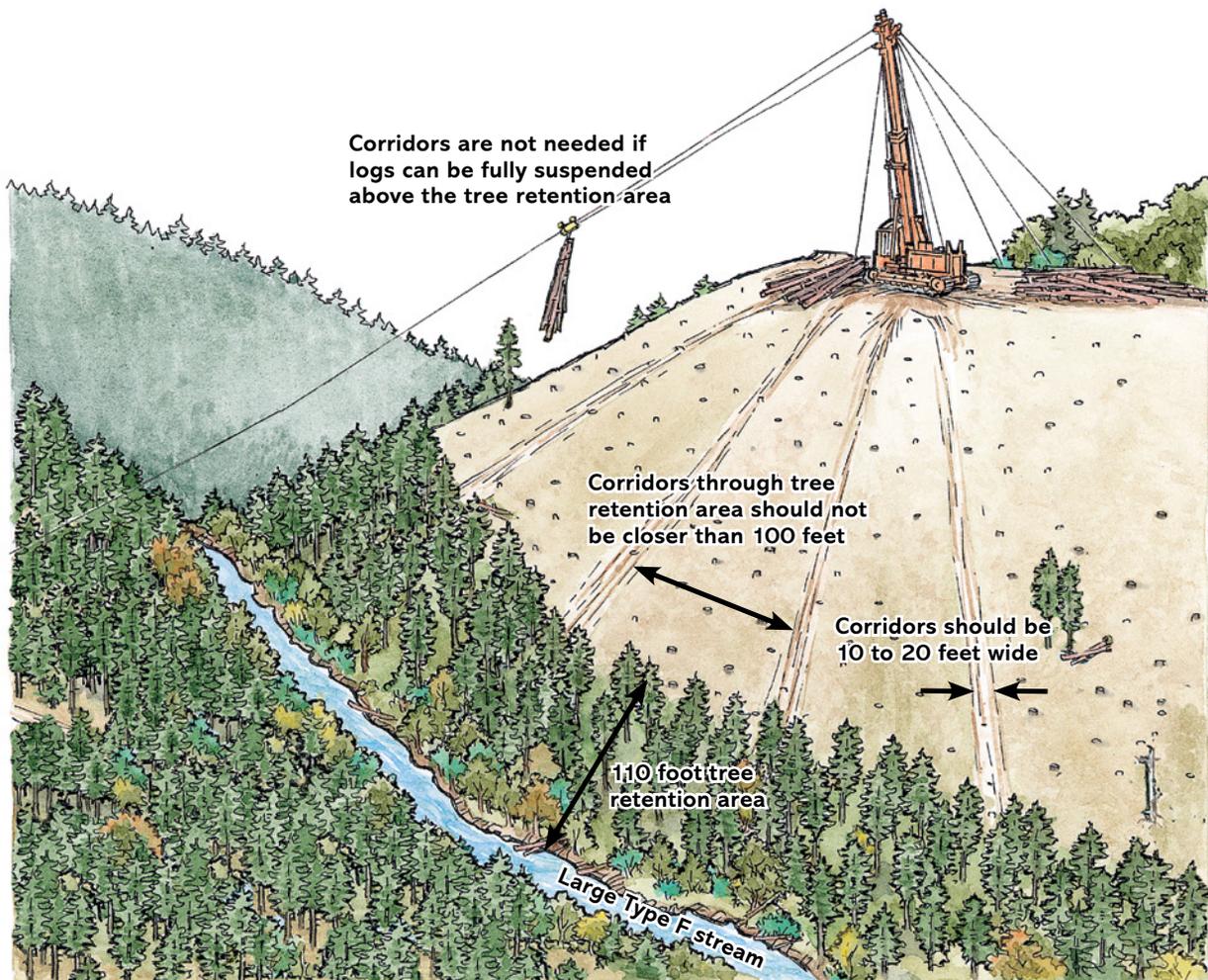
- western Oregon = 35 feet
- eastern Oregon = 30 feet

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.

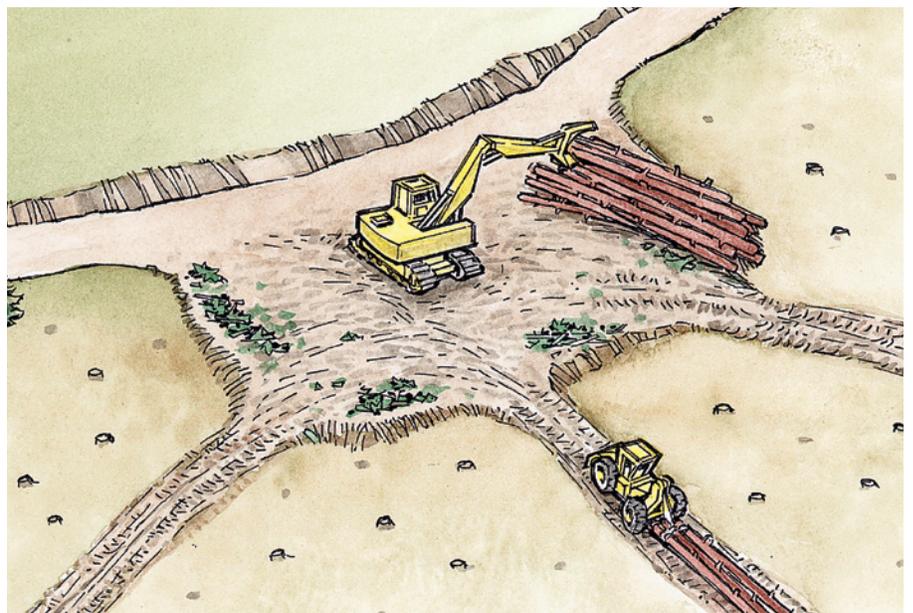
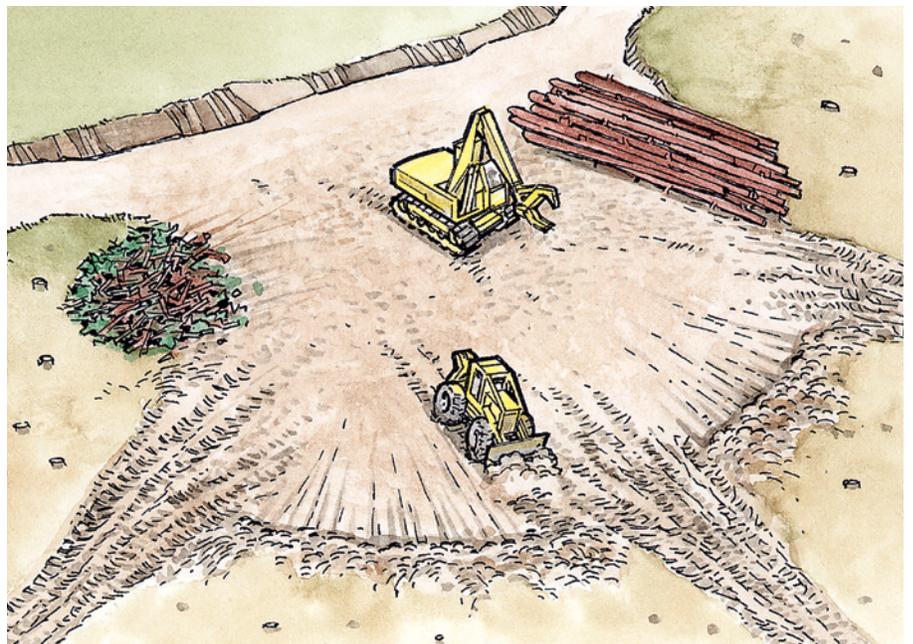
Oversized landings take forestland out of production, and sediment from them can move to waterways. Generally, landings more than one-quarter acre (about 100 feet by 100 feet) are larger than necessary. In many situations, smaller landings will meet safety and operational needs, but sizes and shapes 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.

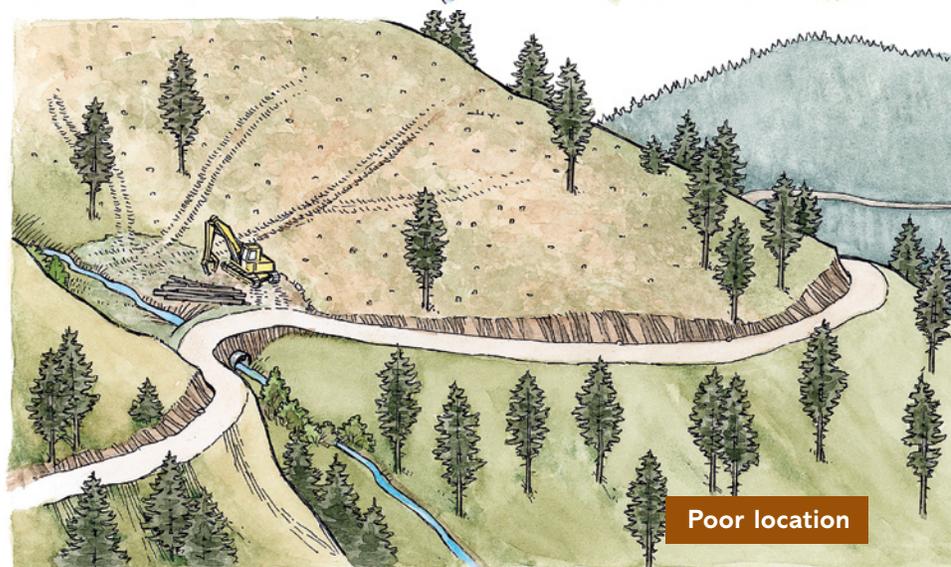
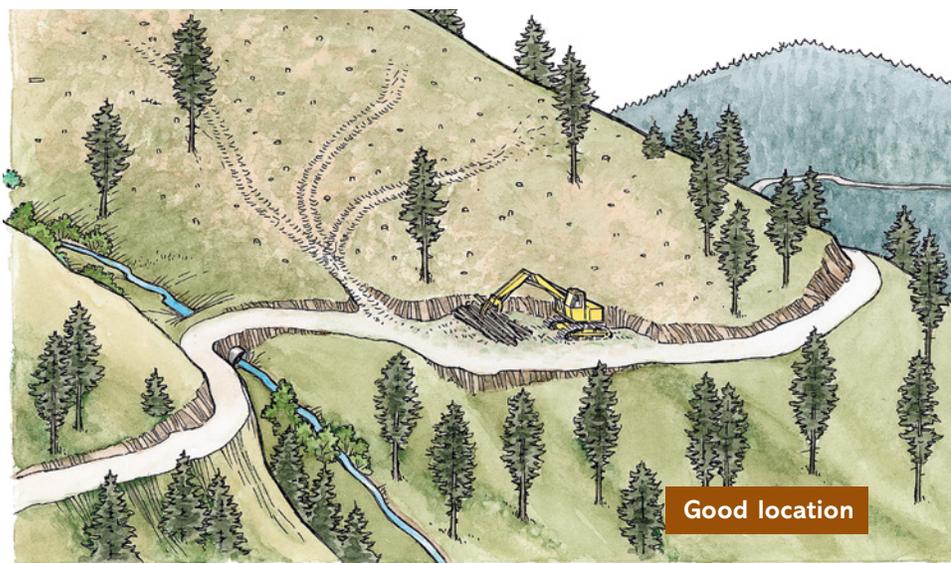
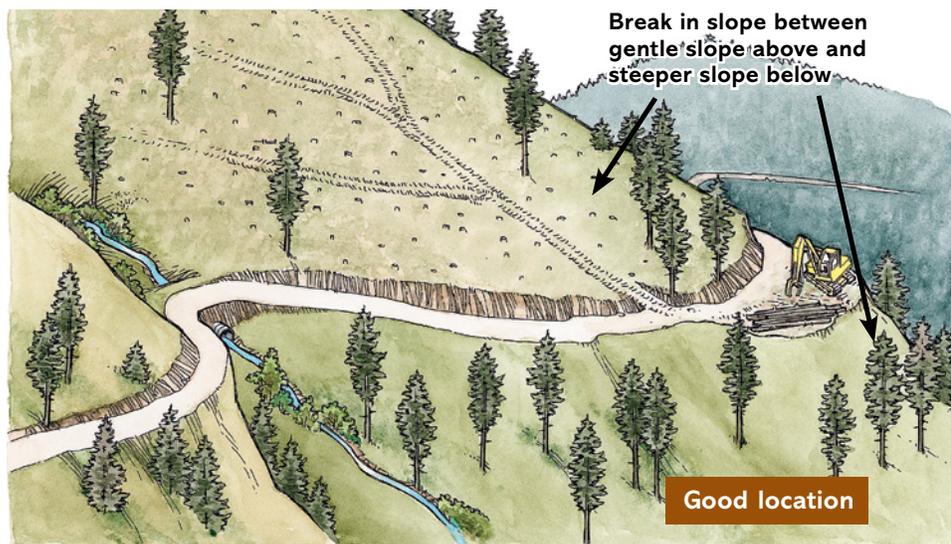
Follow these guidelines when choosing a landing location:

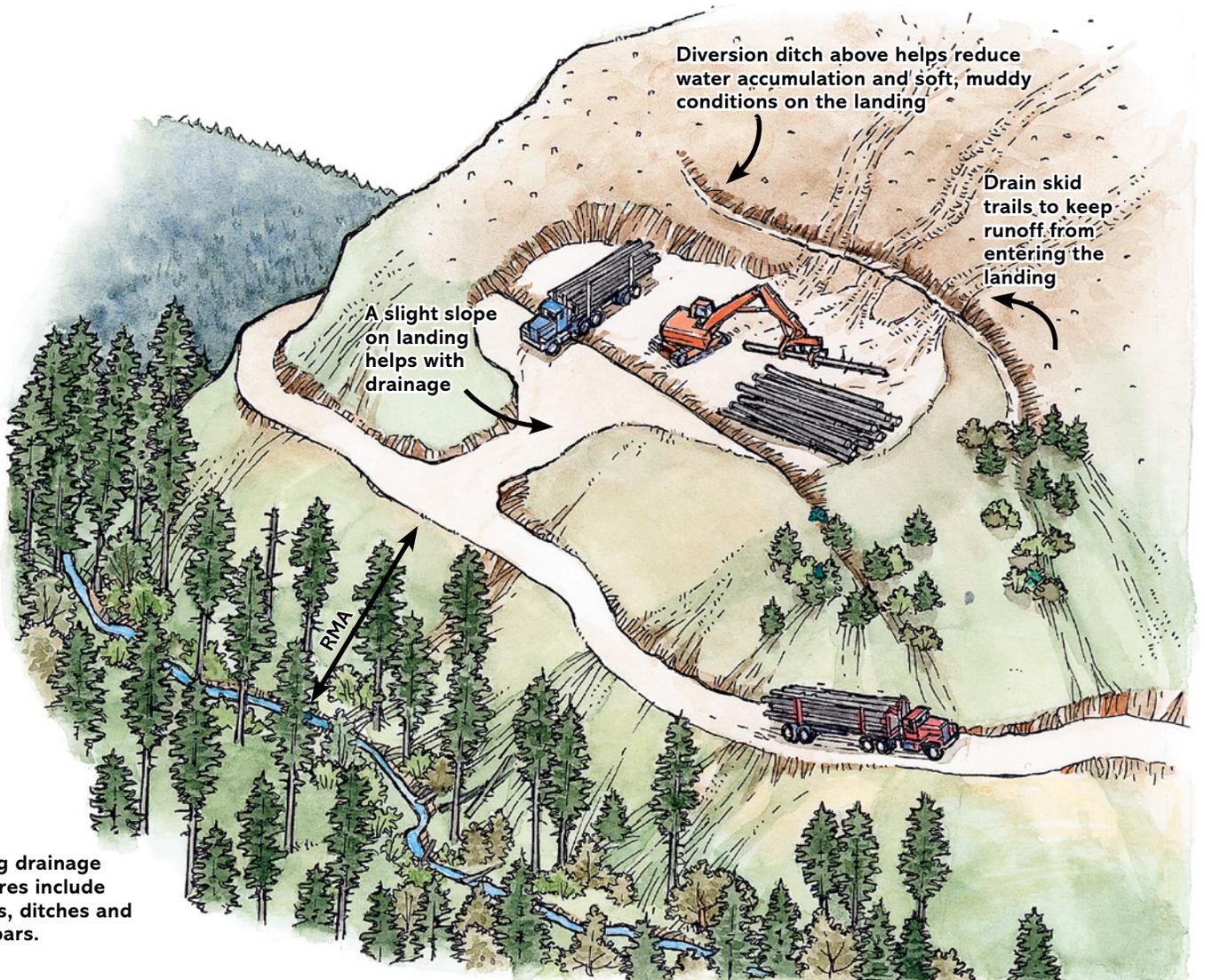
- Avoid landings in RMAs. If there is no alternative, you must submit a written plan to ODF for review. This advice applies even when a portion of a landing may be in an RMA. Even if the landing is outside the RMA, a nearby location may be a poor choice because of the chance of sediment entering water.
- 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:

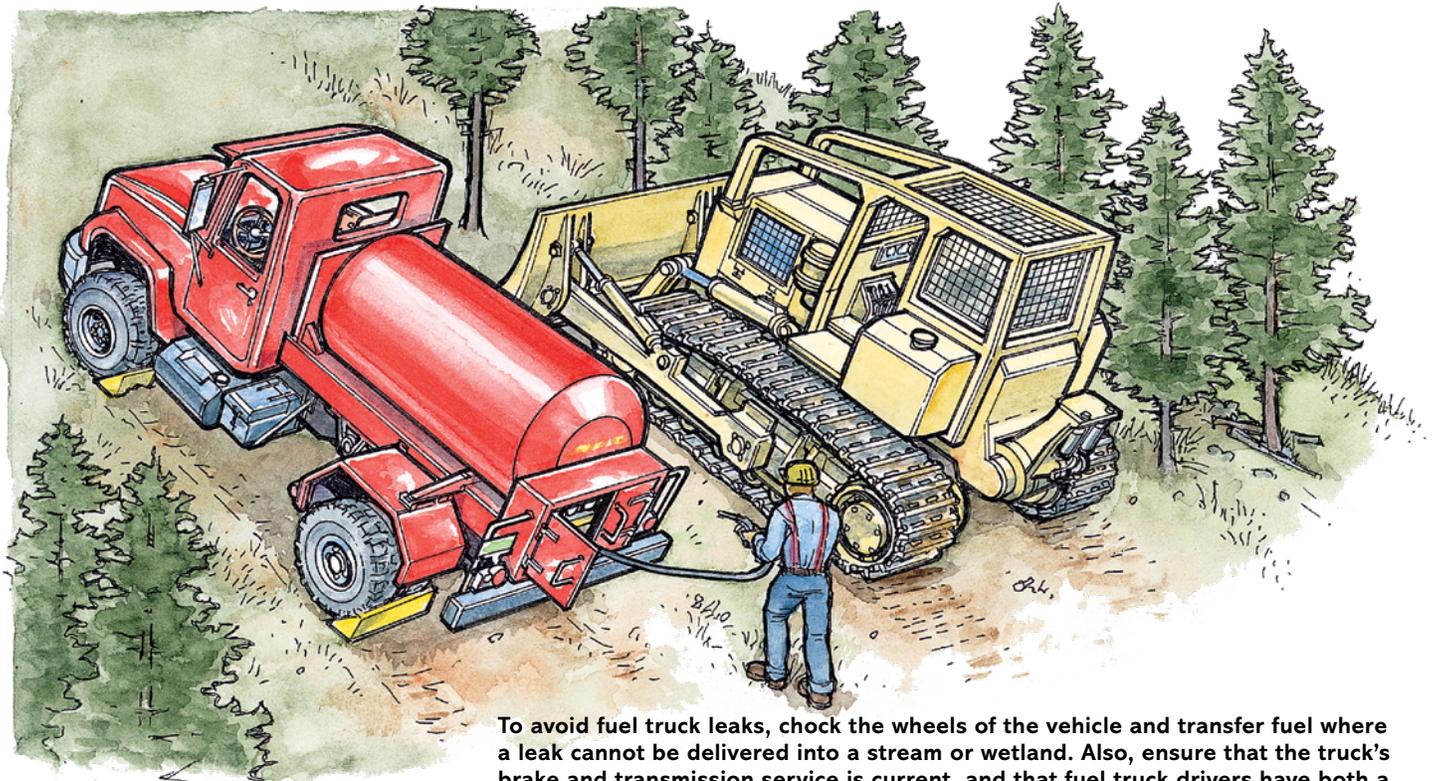
- Minimizing exposure to spills through effective storage, transport, equipment maintenance and housekeeping practices.
- Preparing a company spill plan that identifies prevention and response actions.
- Equipping each jobsite and vehicle with a spill kit, which includes spill absorbents and response 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.

