

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 plans 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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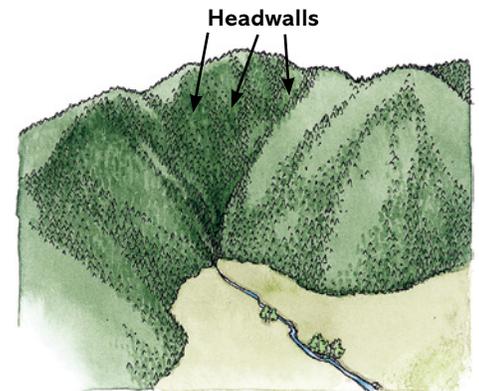
HIGH LANDSLIDE HAZARD LOCATIONS

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:

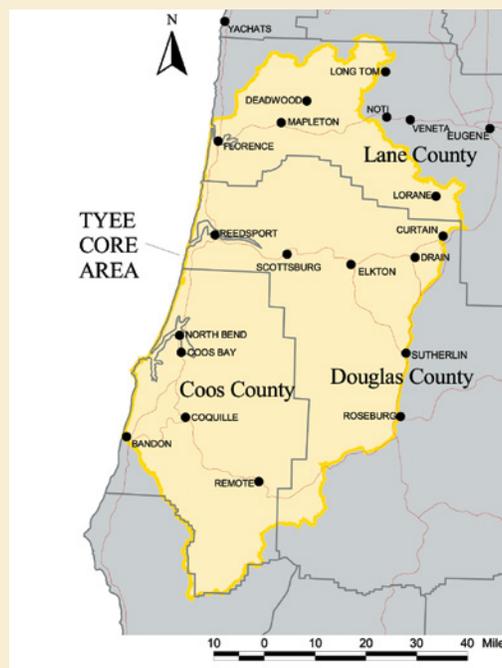
- any slope in western Oregon steeper than 80%, except in the Tyee Core Area where it is any slope steeper than 75% (see illustration)
- headwalls or draws in western Oregon steeper than 70% or steeper than 65% in the Tyee Core Area (see illustration)
- a steep slope in any part of the state that has 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	<ul style="list-style-type: none"> • Limits on how much area can be harvested • Road construction must be directed by a geotechnical specialist.
Low or no risk	<ul style="list-style-type: none"> • 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.

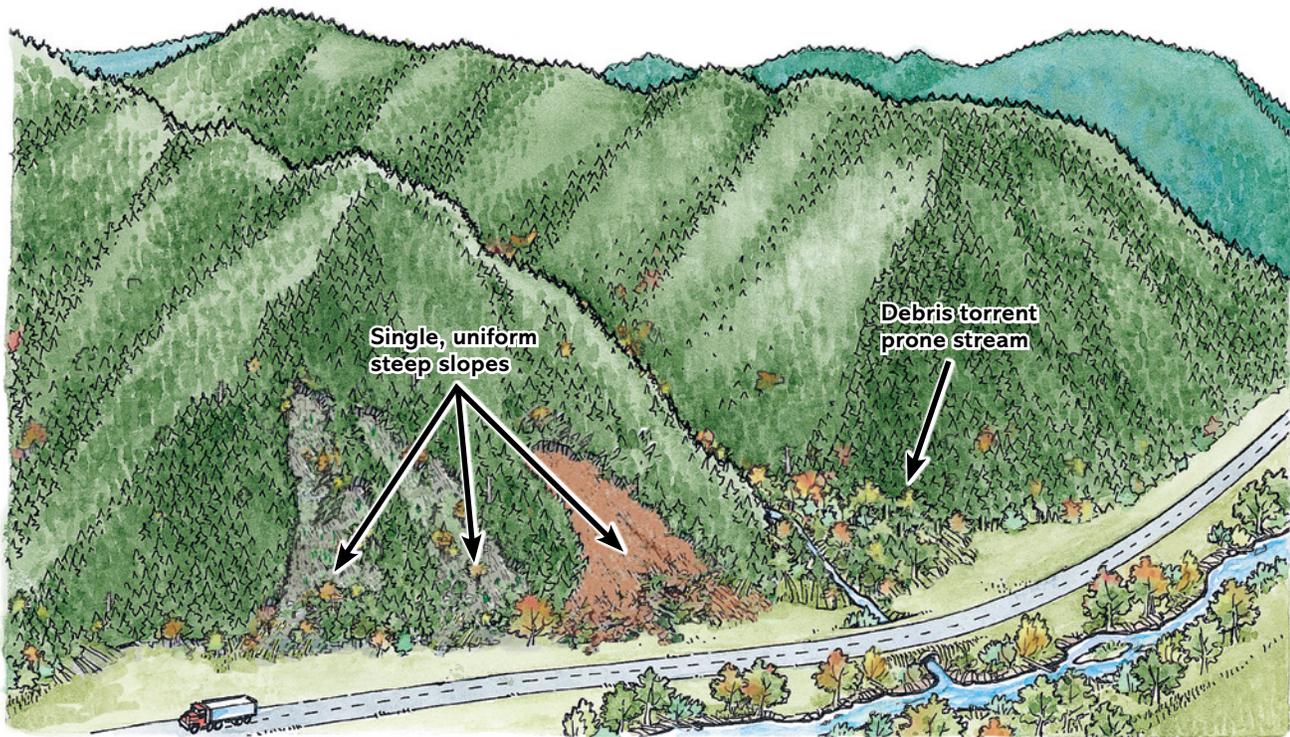
Determining public safety risk is complex and sensitive work. It is extremely important to work closely with ODF to address concerns related to landslide safety as soon as your start planning a timber harvest or road construction project. (see the High Landslide Hazard Locations PDF and Landslide Impact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

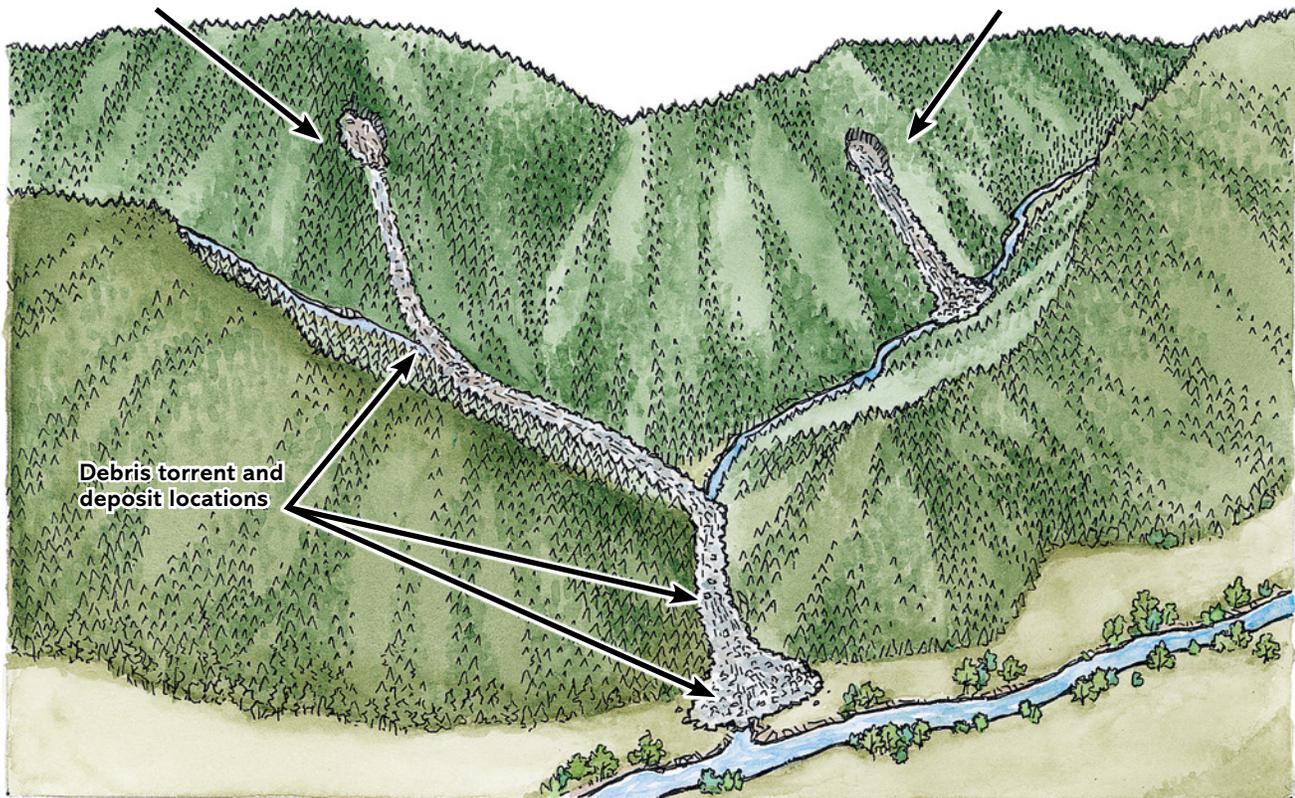
Landslide deposits in stream channels that contain large woody debris can benefit fish by improving spawning and rearing habitat. When a Type 2 or Type 3 timber harvest area larger than 25 acres contains a stream that is subject to rapidly moving landslides, landowners must leave some or all green trees 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 landslide had no sharp channel junctions and moved and grew rapidly.

This slide stopped due to a sharp right angle, limiting damage.



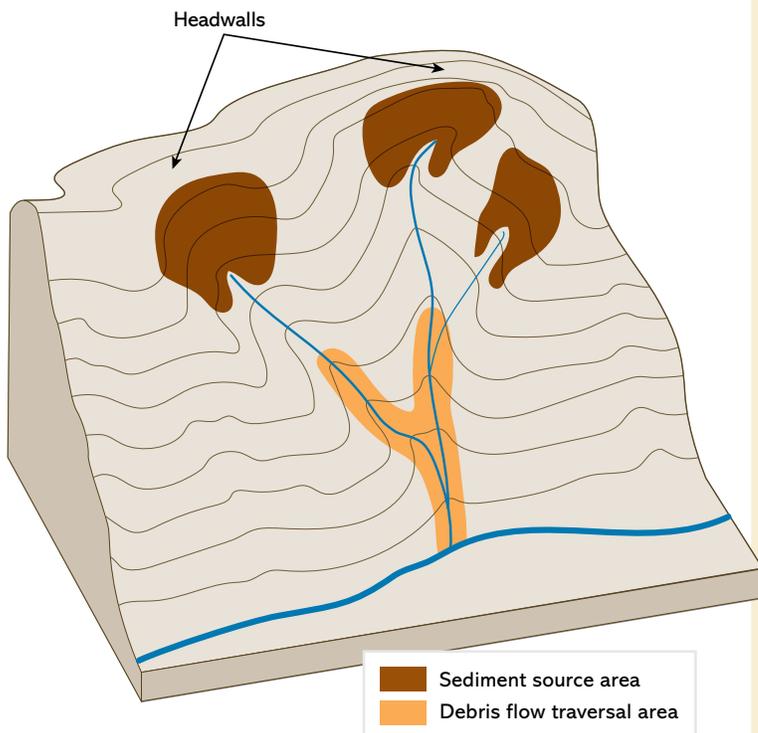
This illustration shows the action of two landslides. Landowners who conduct operations on slopes need to evaluate landslide risk, keeping in mind that many locations prone to rapidly moving landslides don't show obvious evidence of prior landslides.

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 Tye 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](https://www.oregon.gov/odf/forestry/steep-slopes/)). 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

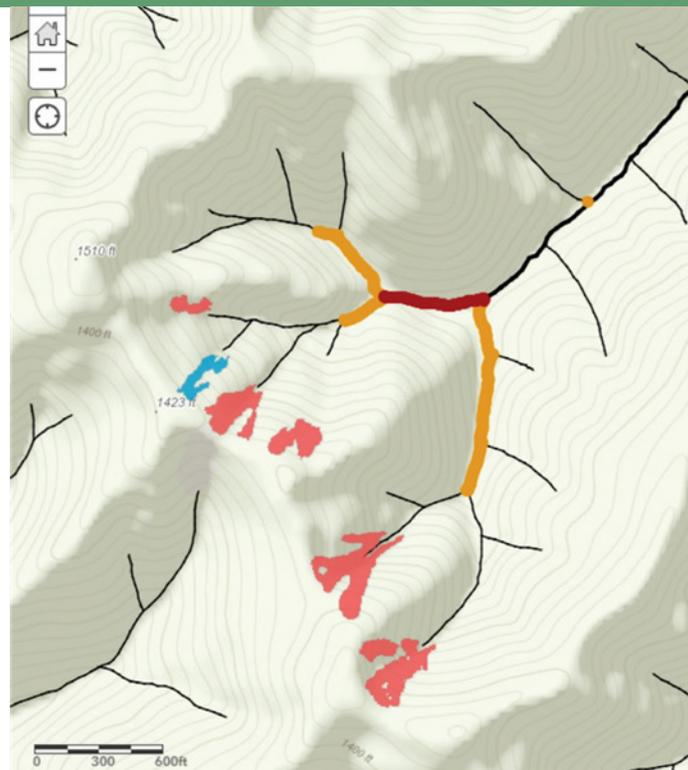
See the PDF to register for the training at [KnowYourForest.org/manual-links](https://www.oregon.gov/odf/forestry/steep-slopes/).

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:		
<ul style="list-style-type: none"> • 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

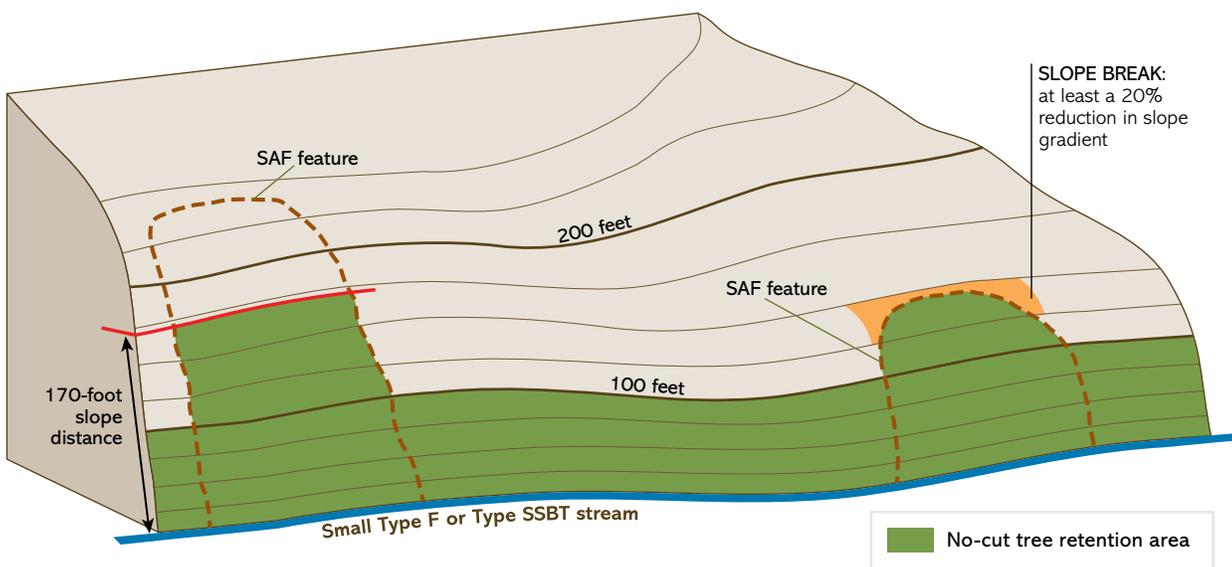
Stream-adjacent failures apply only to Type F and Type SSBT streams. SAFs mean all slopes greater than 70% that are either:

- 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.

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.

