
4c. Upland Strategy

The Upland Strategy consists of protection measures that are implemented in upslope areas outside riparian zones and wetlands. These measures are intended to limit forest practices-related changes in physical watershed processes—such as erosion and hydrology—that may adversely affect the quality and quantity of riparian and aquatic habitat lower in the watershed. The Upland Strategy includes forest practices rules, Board Manual guidance and guidance issued through the DNR Forest Practices Division related to unstable slopes and landforms; the location, design, construction, maintenance and abandonment of forest roads; and harvest-induced changes in rain-on-snow peak flows.

Because some protection measure requirements are fairly lengthy, the Upland Strategy represents a summary, rather than a complete detailing, of some strategy components. The text directs the reader to the applicable WAC chapter and/or forest practices Board Manual section where additional protection measures apply. To the extent protection measures differ from the applicable WAC and/or Board Manual section, the WAC requirements and Board Manual guidance take precedence. Further, WAC 222-50-040 states the forest practices rules contained in chapters 222-24 through 222-38 WAC—road construction & maintenance, timber harvesting, reforestation and application of forest chemicals—are automatically superseded if they are inconsistent with any applicable safety regulations, or with any orders or directives having the force of law and based on any applicable safety regulations (i.e., hazard tree removal).

Conservation Objectives

The goal of the Upland Strategy is to prevent, avoid, minimize or mitigate forest practices-related changes in erosion and hydrologic processes and the associated effects on public resources. Specific resource objectives for Upland Strategy protection measures are found in the forest practices rules; Forests and Fish Report (Appendix B); and Schedule L-1 (Appendix N). Schedule L-1, in particular, serves as a guide for both the riparian and upland strategies and is the foundation for the Adaptive Management program. It identifies functional objectives for key aquatic conditions and processes potentially impacted by forest practices. In addition, Schedule L-1 establishes the performance targets for specific forest conditions and watershed processes. The Upland Strategy supports the overall performance goals established in the Forests and Fish Report, in Schedule L-1 and later adopted in rule (WAC 222-12-045(2)(a), which states that forest practices – either singularly or cumulatively – are intended to be conducted in a manner that will not significantly impair the capacity of aquatic habitat to:

1. support harvestable levels of salmonids,
2. support the long-term viability of other covered species, and
3. meet or exceed water quality standards (including protection of designated uses, narrative and numeric criteria and antidegradation).

The Upland Strategy includes the following specific objectives to restore and maintain upslope processes that affect aquatic habitat:

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- Unstable Slopes/Mass Wasting – Prevent or avoid forest practices-related landslides (modified slightly from FFR).
 - Forest Roads – Provide for fish passage at all life stages; prevent mass wasting; limit delivery of sediment and surface runoff to all typed waters; avoid capture and redirection of surface or groundwater; divert most road runoff onto the forest floor; provide for the passage of some woody debris; protect stream bank stability; minimize the construction of new roads; and ensure that there is no net loss of wetland function (WAC 222-24-010).
 - Hydrology – Maintain surface and groundwater hydrologic regimes (magnitude, frequency, timing and routing of streamflows) by disconnecting road drainage from the stream network, preventing increases in peak flows causing scour and maintaining the hydrologic continuity of wetlands (FFR).

4c-1 Unstable slopes and landforms

While most FPHCP protection measures are prescriptive in nature, those related to unstable slopes and landforms (hereafter referred to as unstable slopes) are not. Instead, protection is provided through an outcome-based, decision-making process that is conducted in accordance with the forest practices rules and SEPA. Through this process, DNR evaluates proposed timber harvest and construction activities on unstable slopes to determine if the activities will have a “probable significant adverse impact.” The determination is based on the agency’s evaluation of the proposal—conducted in consultation with other affected agencies and tribes—as well as comments received from interested parties through the SEPA review process.

The only exception to this outcome-based, decision-making process occurs in areas where watershed analysis has been conducted and approved, management prescriptions are in place to address unstable slopes and the prescriptions are specific to the site or situation and do not call for additional analysis (WAC 222-16-050(1)(d)(iii)). In these cases, proposed timber harvest and construction activities on unstable slopes must adhere to the approved management prescriptions. If proposed activities deviate from the approved prescriptions, the forest practices application is considered an “alternate plan,” is classified as a Class IV-Special application and is subject to review under the SEPA. DNR has approved over 60 watershed analyses statewide, encompassing over 3,000 square miles of forestlands covered by the FPHCP. Nearly all of these analyses have management prescriptions related to the protection of unstable slopes.

Unstable slopes are discrete portions of the landscape with physical characteristics that make them more susceptible to mass wasting than surrounding areas. Unstable slopes are often classified according to dominant landslide type. The FPHCP recognizes four classes of unstable slopes (WAC 222-16-050(1)(d)(i)):

- 1) Landforms typically associated with debris avalanches, debris flows and debris torrents. This class includes inner gorges, bedrock hollows and convergent headwalls with slopes greater than 35 degrees (70 percent).

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- 2) Landforms susceptible to debris avalanches. This class includes toes of deep-seated landslides with slopes greater than 33 degrees (65 percent) and the outer edges of meander bends along valley walls or high terraces of unconfined meandering channels.
 - 3) Groundwater recharge areas of deep-seated landslides in glacial sediments. A change in the hydrologic regime of these landslides has the potential to accelerate a wide range of mass-wasting processes commonly associated with deep-seated landslides.
 - 4) Areas with indicators of potential slope instability that cumulatively indicate the presence of unstable slopes.

More detailed descriptions of unstable slopes are included in Board Manual Section 16.

When DNR receives a forest practices application, forest practices staff screen the application for unstable slopes. The results of the screen are forwarded to the responsible forest practices forester for review. The forest practices forester relies on the screening results and his/her own knowledge of the area to further assess unstable slopes presence. If field review confirms the presence of unstable slopes and timber harvest and/or construction is proposed in those areas, the forest practices application is classified as Class IV-Special (See Section 4a-3) and becomes subject to review under the SEPA.

The Board, through the forest practices rules, has adopted SEPA policies set forth in RCW 43.21C.020. These rules require applicants to complete an environmental checklist for Class IV-Special forest practices applications. The checklist is a detailed listing of potential environmental impacts associated with the proposed activity. The Board has established additional SEPA policies that are specific to forest practices (chapter 222-10 WAC). These policies require applicants to conduct and submit a geotechnical assessment of proposed forest practice(s). A qualified expert must prepare the assessment. The assessment must evaluate: 1) the likelihood that the proposal will cause movement on the potentially unstable slopes or contribute to further movement, and 2) the likelihood of sediment or debris delivery to any public resource or in a manner that would threaten public safety (WAC 222-10-030(1)). The assessment must also identify any measures that would mitigate the identified hazards and risks.

To be considered a *qualified expert* under the forest practices rules, an individual must have a master's degree in geology, geomorphology or related field or a significant amount of postgraduate course or thesis work or other training in geomorphology or mass movement and, in either case, an additional three years of field experience in the evaluation of relevant problems on forested lands (WAC 222-10-030(5)). In addition, Washington's Geologist Licensing Law (chapter 18.220 RCW) requires that individuals involved in forest slope stability evaluations be licensed with the state's Geologist Licensing Board (chapter 308-15 WAC).

In addition to reviewing information submitted by the applicant, DNR staff conduct their own evaluation of proposals involving unstable slopes. The evaluation often includes review by an internal technical specialist and/or interdisciplinary team. DNR technical specialists meet the forest practices definition of a "qualified expert" and are licensed under the state's Geologist Licensing Law (See Section 4a-3.2). Interdisciplinary team

members typically represent other agencies and affected tribes and often have unstable slopes expertise.

After reviewing the proposal, consulting with other affected agencies and tribes, and considering comments received from other interested parties through the SEPA review process, DNR issues a decision under the SEPA commonly known as a “threshold determination.” In making a decision, forest practices rules require DNR to consider: 1) if the proposal is likely to increase the probability of mass movement on or near the site, 2) whether sediment or debris would be delivered to a public resource or be delivered in a manner that would threaten public safety, and 3) whether such movement and delivery are likely to cause significant adverse impacts (WAC 222-10-030(2)).

If DNR determines the proposed activities are likely to have a probable significant adverse impact, a “determination of significance” is issued and the applicant must prepare an EIS in accordance with SEPA requirements. If DNR determines the adverse impacts identified in the EIS are significant and reasonable measures are insufficient to mitigate the impacts, the forest practices application is denied. If DNR determines the proposed activities are not likely to have a probable significant adverse impact, a “determination of non-significance” is issued and the forest practices application is approved. In many cases, DNR’s approval of a forest practices application contains “conditions” or additional requirements with which the applicant must comply. The conditions usually include protection measures that must be implemented to mitigate impacts associated with the proposal.

Mitigation measures range from avoiding unstable slopes to altering the methods or techniques used in timber harvest and/or construction operations. Unstable slopes avoidance is the most commonly used mitigation measure and results in the lowest hazard and risk. Where timber harvest and/or construction activities occur on unstable slopes, a variety of mitigation measures are employed to reduce the likelihood of mass wasting. Harvest-related mitigation measures typically include minimum stand density requirements to maintain rooting strength and slope hydrology, and full suspension log yarding to reduce soil disturbance and damage to residual vegetation. Construction-related mitigation measures often relate to the design and/or location of roads and landings. Full-bench end-haul (i.e., no fill or sidecast material) construction techniques are routinely required on unstable slopes. Where fill material is necessary, the use of quarried rock rather than “native” soil or fill is often required to increase the structural strength of road prisms and stream crossings. These are just a few examples of the many mitigation measures used to address unstable slopes issues. The measures used in a given situation are dependent upon the nature of the impact being mitigated.

Several programs and projects that contribute to the protection of unstable slopes on forestlands covered by the FPHCP are in place or under development. Probably the most significant is the RMAP program, in which forest landowners are required to identify and report roads with evidence of existing or potential instability that could adversely affect public resources (WAC 222-24-051). Large forest landowners are required to correct all road-related slope stability problems by the end of calendar year 2015, with the highest-risk areas being addressed first. More information on the RMAP program is included in Section 4c-2.3.

Two separate projects are underway to improve detection of unstable slopes on forestlands covered under the FPHCP. The first is the Regional Landform Identification Project. For each DNR region, this project will identify high-hazard landforms that have a history of mass wasting but which do not fit one of the current rule definitions (WAC 222-16-050(1)(d)(i)). The second project is the Landslide Hazard Zonation Project. This project maps unstable slopes statewide, using methods similar to those in the mass wasting module of watershed analysis. The results of these projects are intended to help DNR regulatory staff, forest landowners and staff from cooperating agencies and organizations identify unstable slopes during forest practices application review. Both projects are being carried out through the CMER Committee and are described in more detail in the CMER Work Plan (Appendix H).

DNR also provides unstable slopes training for DNR staff, forest landowners, and staff from cooperating agencies and organizations. The training includes topics such as landslide processes, factors affecting slope stability, indicators of slope instability and identification of unstable slopes and landforms. More information on DNR's training program can be found in Section 4a-3.3.

4c-2 Forest roads

Roads are an essential element of the forest management infrastructure, providing access for a range of activities including emergency fire control and suppression, reforestation, intermediate silvicultural treatments and harvesting. Roads may adversely affect riparian and aquatic habitats by altering hydrologic flowpaths, accelerating erosional processes and increasing sediment delivery to surface waters and wetlands. Forest practices rules are designed to minimize negative road impacts through the proper location, design, construction, maintenance and abandonment of forest roads.

4c-2.1 Road Location and Design

The first step toward limiting forest road effects is to properly locate roads. Forest practices rules require that roads be fit to the topography to minimize alteration of natural features. This includes avoiding at-risk areas such as surface waters, wetlands, channel migration zones, riparian management zones, sensitive sites and equipment limitation zones. Forest practices rules also require the use of existing roads in areas where new construction would lead to duplicative or unnecessary roads (WAC 222-24-020).

In addition to addressing forest road location, forest practices rules include road design standards (WAC 222-24-020). The design standards are mainly related to construction techniques and water management:

- Forest practices rules encourage road designs that utilize balanced cut-and-fill construction to avoid side-casting of excess fill material. In steep terrain (>60 percent slopes), rules require “full-bench” designs in which no fill material is used to construct the road prism and waste material is end-hauled or over-hauled to stable locations.

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- Water management requirements focus on maintaining hydrologic flowpaths and minimizing sediment delivery by limiting road-induced rerouting of water. Forest practices rules include design standards for culvert sizing and drainage structure spacing. Rules also require that roads be designed so that ditch water is relieved onto the forest floor to facilitate infiltration and minimize sediment delivery.

Additional guidance for forest road location and design is included in Section 3 of the Board Manual.

4c-2.2 Road Construction

Road construction requirements focus on maintaining stable road prisms and water crossing structures, and on minimizing sediment delivery to surface waters and wetlands. The requirements are also intended to limit impacts to habitat during the construction process.

Maintaining stable, intact road prisms and water crossing structures is important in controlling erosion and sediment delivery, particularly in steep terrain where mass wasting is common. Forest practices rules recognize the importance of road prism and crossing stability, and include construction measures to minimize the risk of road failure. Road prism-related measures include limiting the volume of organic matter that can be incorporated into the road prism, compacting fills, removing construction-related debris and slash from culvert inlets, installing ditches and drainage structures concurrent with construction, depositing waste materials in stable locations and preventing side-casting of excess fill material on steep slopes (WAC 222-24-030).

Measures that focus on maintaining the stability of water crossing structures require the installation of structures that pass the 100-year flow, the construction of fills and embankments to withstand the 100-year flow, and the construction of headwalls and catch basins to accommodate the 100-year flow. Forest practices rules also give DNR the authority to require the installation of larger culverts in unstable slope areas (WAC 222-24-040).

Road construction activities that affect the natural bed and/or flow of surface waters and that have a potential for adversely affecting fish life require an HPA permit from WDFW. This includes the installation, repair and replacement of water crossing structures such as culverts and bridges associated with Type S and Type F waters. Activities that require an HPA may be subject to additional conditions under the state's Hydraulic Code (WAC 220-110-030(17)).

Forest practices rules are designed to minimize sediment delivery from roads during and after construction. Requirements include limiting construction to periods of low soil moisture, end-hauling or over-hauling of waste material when side-casting would deposit sediment in areas where delivery to waters or wetlands may occur, sloping roads and landings to prevent water accumulation and stabilizing exposed soils by seeding or other techniques approved by DNR. If DNR determines that the installation of a water crossing structure would result in unacceptable water quality impacts, the agency may require flow diversion around the site during construction (WAC 222-24-040). Flow diversion may also be a requirement of a WDFW-issued HPA.

Forest practices rules are also designed to minimize impacts to riparian and in-stream habitats. Rules require that the channel bed, the stream banks and riparian vegetation be disturbed no more than necessary to construct the project. Disturbed areas must be stabilized and restored according to established schedules and procedures detailed in Section 3 of the Board Manual (Appendix F). Also, in-stream woody debris removed from the upstream end of culverts and bridges must be relocated downstream from these structures to help mitigate impacts (WAC 222-24-040).

Other construction-related forest practices rules are contained in WAC 222-24-030, 222-24-035, and 222-24-040. Guidelines for implementing certain protection measures are included in Section 3 of the Board Manual.

4c-2.3 Road Maintenance and Abandonment

Forest practices rules include a road maintenance and abandonment program to prevent sediment- and hydrology-related impacts to public resources. The rules require forest landowners to develop and implement RMAPs for roads within their ownership. Planning requirements differ for small and large forest landowners. For purposes of RMAP development and implementation, a small forest landowner is defined as a person who has harvested no more than two million board feet of timber per year, on average, during the three years prior to submitting a forest practices application or notification to DNR, and who does not plan to exceed that harvest level over the following ten years (WAC 222-16-010). A large forest landowner is anyone who does not qualify as a small forest landowner.

ROAD MAINTENANCE AND ABANDONMENT PLANNING FOR LARGE FOREST LANDOWNERS

Before July 1, 2006, large forest landowners must have all roads within their ownership covered under a DNR-approved RMAP (WAC 222-24-051). This includes all roads that were constructed or used for forest practices after 1974. An inventory and assessment of orphaned roads (i.e., forest roads and railroad grades not used for forest practices since 1974) must also be included in the RMAP. Forest practices rules allow large forest landowners to distribute the planning workload over a five-year period (2001-2006) by submitting annual plans to DNR that cover 20 percent of their roads or ownership. In areas where watershed analysis has been conducted and approved, large forest landowners may elect to follow the watershed administrative unit-road maintenance plan rather than developing an RMAP under WAC 222-24-051.

Forest practices rules require large forest landowners to prioritize road maintenance and abandonment planning based on a “worst first” principle. Road systems or watersheds where maintenance and abandonment work would produce the greatest benefit for public resources receive highest priority. Prioritization criteria include: 1) the presence of Federal or state listed threatened or endangered fish species or 303(d) listed water bodies, 2) the presence of sensitive geologic formations with a history of mass wasting, 3) the presence of planned or ongoing restoration projects, and 4) the presence of roads likely to have high future forest practices use. Within each RMAP, maintenance and abandonment work is also prioritized: 1) removing fish blockages, 2) preventing or limiting sediment delivery, 3) disconnecting the road and stream networks, 4) repairing or

maintaining stream-adjacent parallel roads, 5) restoring hydrologic flowpaths, and 6) capitalizing on operational efficiencies (WAC 222-24-051).

On the anniversary date of an RMAP submittal, large forest landowners must report work accomplished during the previous year to DNR. A detailed description of work planned for the upcoming year must also be submitted for approval including any modifications to the existing work schedule. DNR's review and approval is conducted in consultation with Ecology, WDFW, affected tribes and interested parties (WAC 222-24-051).

The RMAP process is intended to bring all roads owned by large forest landowners into compliance with forest practices standards by July 1, 2016. From July 2001 through December 2004 approximately 7,401 RMAPs were approved by DNR, that covered approximately 48,051 miles of forest road, 1,587 miles of road abandonment, and 1,944 miles of orphaned roads. The RMAP rule does not supersede DNR's authority to regulate road impacts associated with individual forest practices activities. Roads used—or proposed for use—as timber haul routes must be maintained in a condition that prevents damage to covered resources. Forest practices rules authorize DNR to require large forest landowners to address road-related impacts if the agency determines the roads have affected or will negatively affect covered resources (WAC 222-24-051).

ROAD MAINTENANCE AND ABANDONMENT PLANNING FOR SMALL FOREST LANDOWNERS

Small forest landowners have two options for meeting road maintenance and abandonment planning requirements. Small forest landowners may follow the RMAP process for large landowners described above, or they may submit a "checklist" RMAP with each forest practices application or notification (WAC 222-24-0511, RMAP Emergency Rule). Also, in areas where watershed analysis has been conducted and approved, small forestland owners may elect to follow the watershed administrative unit-road maintenance plan rather than developing an RMAP under WAC 222-24-051 or submitting a checklist RMAP under WAC 222-24-0511 (RMAP Emergency Rule). Forest landowners who own less than 80 acres of forestland in Washington and submit a forest practices application or notification for a forestland parcel that is 20 acres or less in size are not required to submit an RMAP or checklist RMAP for that parcel (WAC 222-24-0512, RMAP Emergency Rule). Unlike large forest landowners, small forest landowners are not required to submit annual reports describing work completed and planned. Proposed permanent rules (which will eventually replace the RMAP emergency rules) pertaining to road maintenance and abandonment planning requirements for small forest landowners and landowners with 20-acre exempt parcels were approved by the Board for formal public review on August 10, 2005. A Draft EIS was written and an Economic Analysis performed on the proposed permanent rules. The proposed rules (CR-102), DEIS, and economic analysis can be found at <http://www.dnr.wa.gov/forestpractices/rules/> under the "Rule-Making Activity." The Board conducted public hearings for the rules, DEIS and economic analysis in five cities across Washington State from November 17, 2005 to December 15, 2005. The public comment period ended on December 16, 2005.

The RMAP process for small forest landowners does not supersede DNR's authority to

regulate road impacts associated with individual forest practices activities. Roads used—or proposed for use—as timber haul routes must be maintained in a condition that prevents damage to public resources. Forest practices rules authorize DNR to require small forest landowners to submit a compliance schedule of work to address road-related impacts in cases where the agency determines the road has affected or will negatively affect public resources (WAC 222-24-0511(4)). In addition, DNR has 47 Forest Practices Foresters statewide involved with on-going daily enforcement of forest practices rules.

Due to the high cost often associated with correcting fish passage barriers, the 2003 Legislature allocated funds to create a DNR-administered cost-share program that provides financial assistance to small forest landowners who have barriers on their lands. The program is known as the “Family Forest Fish Passage Program” and was developed cooperatively between the SFLO and WDFW. A third agency partner, the Interagency Committee for Outdoor Recreation, is responsible for managing grant funds allocated to projects. The legislature has continued to allocate funding to the Family Forest Fish Passage Program (FFFPP). The legislature allocated \$ 2 million for the 2004-05 biennium, \$ 4 million for the 2006-07 biennium.

Under the Family Forest Fish Passage Program, the state provides 75 to 100 percent of the cost to correct fish passage barriers that were installed prior to May 14, 2003. No small forest landowner will be required to pay for any part of a fish passage barrier repair prior to submitting a forest practices application for timber harvest. Additionally, if the barrier was installed under a state permit (i.e., HPA), the state will provide 100 percent of the repair costs. If a barrier was not originally installed under an HPA, the small forest landowner will be responsible for providing approximately 25 percent of the repair costs. The 25 percent match can be in the form of cash or in-kind services (equipment, time, materials, etc.). Small forest landowners who have committed, through submittal of an application for cost sharing, to participating in the state-led cost share program are not required to correct fish passage barriers until: 1) cost share funding is available, and 2) higher priority fish passage barriers on other lands in the watershed have been repaired. A small forest landowner not participating in the cost-share program must correct any fish passage barriers on forest roads within their ownership that are covered or affected by an active forest practices application for harvest or salvage. Fish passage barrier repairs on small forest landowner lands will be ranked within each Water Resource Inventory Area (WRIA). The SFLO and WDFW are developing a method to create a ranked, statewide barrier inventory for small forest landowners based on the principle of fixing the worst first within each WRIA. Completion of the statewide inventory is not yet complete; however, annual ranking and repair of barriers owned by small landowners who apply for cost-sharing is currently occurring. The development of the statewide ranked inventory and collection of data for existing barriers is being done in cooperation with Lead Entity organizations. Lead Entities are quasi-governmental planning groups created under the state’s Salmon Recovery Act and are charged with coordinating salmon recovery efforts within each WRIA. Lead Entities often have information about fish passage issues for their geographic area. DNR and WDFW are responsible for assisting Lead Entities in acquiring the data necessary to fill any known gaps in fish blockage locations.

The FFFPP has already funded the replacement of 36 fish passage barriers in 2004 and has 27 barriers scheduled for funding in 2005. See Table 4.13 for additional information.

Table 4.13 FFFPP Accomplishments 2003-2005.

	Westside	Eastside	Statewide
# of barriers submitted to program for funding	315	100	415
# of barriers funded in 2004	32	4	36
Cost of 2004 projects	\$907,742	\$159,321	\$1.06 MM
Miles of habitat opened in 2004	53.67	4.7	58.37
# of barriers scheduled for funding in 2005	21	6	27
Anticipated Cost of 2005 projects	\$912,000	\$388,000	\$1.3 MM
Miles of habitat to be opened in 2005	54.62	19.67	74.29

Matching Federal funding supplemented the FFFPP program, allowing for expenditures over the state allocation of \$2 million for the 2004/05 biennium.

RMAP IMPLEMENTATION

Road maintenance and abandonment work carried out under a DNR-approved RMAP must meet forest practices rules standards (WAC 222-24-052). The standards require landowners to: 1) keep drainage structures functional, 2) divert captured groundwater from ditchlines onto stable portions of the forest floor, 3) maintain road surfaces to minimize erosion and delivery of water and sediment to typed waters, and 4) slope or waterbar road surfaces to prevent water accumulation. When abandoning roads, landowners are required to: 1) slope or waterbar roads to minimize erosion and maintain drainage, 2) leave ditches in a condition that minimizes erosion, 3) block roads so that vehicles cannot pass the point of closure, and 4) remove water crossing structures and fills. Road best management practices for achieving these standards are described in Section 3 of the Board Manual. More information on road maintenance and abandonment standards is contained in WAC 222-24-052.

Road maintenance and abandonment work involving the installation, removal, repair or replacement of water crossing structures on Type S and Type F waters such as culverts or bridges requires an HPA permit from WDFW. Such activities are subject to additional conditions under the Hydraulic Code (WAC 220-110-030(17)).

Although forest practices rules require landowners to inventory and assess orphaned roads, their repair or abandonment is not required. However, landowners may voluntarily

fix problems identified during the orphaned road inventory and assessment (WAC 222-24-052).

4c-3 Rain-on-snow

Forest practices rules assume the greatest likelihood for causing significant forestry-related hydrologic effects on covered resources is through the influence of timber harvest on snow accumulation and melt during rain-on-snow precipitation events (DNR 1997). Significant effects on public resources associated with changes in seasonal snowmelt, low flows and water yield are generally less likely, but may be important in certain watersheds. Forest practices rules address road-induced changes in hydrology by establishing standards for road construction, maintenance and abandonment (See Section 4c-2).

Forest practices rules address rain-on-snow effects in two ways. First, watershed analysis includes an assessment of timber harvest-induced changes in rain-on-snow generated peak flows and potential impacts to fish habitat, water quality and public capital improvements. The assessment, known as the “hydrologic change” module, is conducted for each watershed administrative unit where watershed analysis is performed. The assessment relies on the use of a quantitative model to estimate changes in snow accumulation and melt under different harvest scenarios, and the resulting effects on peak flow magnitudes. Specific management prescriptions are developed to address rain-on-snow effects in parts of the WAU where significant hydrologic change is likely to occur and resources are sensitive to those changes. Prescriptions typically involve limits on clearcut harvesting to maintain a minimum level of hydrologically mature forest cover in the watershed or sub-watershed. Once approved by DNR, the management prescriptions become the forest practices rules for the WAU. To date, over 60 watershed analyses have been completed, encompassing over 3,000 square miles or 1.9m acres (20 percent of covered lands).

Forest practices rules also address rain-on-snow effects in areas where watershed analysis has not been performed. A particular forest practices rule commonly known as the “rain-on-snow rule” gives DNR authority to set conditions on permits for forest practices applications and notifications that propose clearcut harvesting in the significant rain-on-snow zone (WAC 222-22-100(2)). The significant rain-on-snow zone includes the rain-on-snow and snow-dominated precipitation zones as defined in the Board Manual—Standard Methodology for Conducting Watershed Analysis (DNR 1997).

Under the rain-on-snow rule, DNR may limit clearcut size when it determines that peak flows have caused material damage to public resources including water, fish, wildlife and public capital improvements (WAC 222-22-100(2)). DNR has prepared conditioning guidelines for implementing the rain-on-snow rule (Appendix M). The guidelines describe the process for evaluating forest practices applications and notifications, and rely on a risk-based approach when conditioning clearcut size. Maximum clearcut size decreases as the risk of ROS effects increases. The guidelines direct applicants and DNR to consider alternatives to clearcutting in high-risk situations.

In addition to the rain-on-snow rule, a set of forest practices standards collectively known as the “green-up rule” (WAC 222-30-025) also mitigates hydrologic changes associated with timber harvest. Under the green-up rule, the size and timing of even-aged harvesting is regulated to prevent excessive levels of immature forest cover in any given geographic area. Harvest proposals that result in more than 120 acres of contiguous, even-aged harvest within a single ownership require interdisciplinary team review. Harvest proposals that result in more than 240 acres of contiguous, even-aged harvest within a single ownership are prohibited. Forest practices rules include standards for calculating even-aged harvest area; standards are based on the age, spatial distribution and extent of adjacent vegetation. More information on the green-up rule is contained in WAC 222-30-025.