

Section 21 Guidelines for Alternate Plans

This section provides guidelines for developing and analyzing alternate plans for activities that vary from specific forest practices rules. Alternate plans may be useful in a variety of situations. Examples could be:

- **Where the cumulative impact of rules disproportionately affects a landowner’s income production capability.**
- **Where a landowner’s minor on-the-ground modifications could result in significant operational efficiencies.**
- **Where site conditions have created an economically inaccessible management unit when using the forest practices rules.**
- **Where local landforms lend themselves to alternate forest management practices.**
- **Where a landowner proposes methods to facilitate landscape, riparian or stream restoration.**

In alternate plans, landowners develop management prescriptions that will achieve resource protection through alternative methods from those prescribed in the forest practices rules. Any rule prescription not changed as part of an alternate plan must be followed as outlined by rule. Alternate plans are an option for all landowners.

Approval Standard
To be approved, alternate plans must provide protection for public resources at least equal in overall effectiveness to the protection provided by the Forest Practices Act and rules.
WAC 222-12-040(1)

This Board Manual section contains three parts. Part 1 offers general guidance to small forest landowners on how to prepare a low impact alternate plan harvest. Part 2 provides a general discussion of alternate plan requirements and the riparian functions and pertains to all landowners. Part 3 provides information on alternate plan templates available for use in Western Washington for small forest landowners; and contains a template for thinning strategies in overstocked stands along Type S and F Waters and a template for fixed width riparian management zones along Type S and F Waters. Additional technical assistance and scientific information to support proposed management prescriptions is available on the DNR Small Forest Landowner Office website at <http://www.dnr.wa.gov/sflo/>.

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PART 1. GUIDANCE FOR SMALL FOREST LANDOWNERS

The Legislature recognized the increased regulatory requirements resulting from the Forest Practices Board adoption of forest practices rules based on the Forests and Fish Report (FFR) will diminish the economic viability of small forestland owners. The complexity of the FFR regulatory requirements, and the location of small forest landowners on the landscape has reduced the availability of harvestable timber within riparian forests owned by small forest landowners. The increased widths and additional layout considerations for timber harvest within the riparian management zones (RMZ) in combination with the need for significant additional technical expertise not readily available to small landowners has eroded their potential timber revenues and their willingness to keep the lands in forestry¹. These factors may reduce the overall amount of quality habitat available for salmon recovery and conservation of other aquatic resources.

Small forest landowners interested in alternate plans are encouraged to contact the Small Forest Landowner Office for assistance in preparing an alternate plan.
www.dnr.wa.gov/sflo
 1-800-523-TREE
 OneStopShop@dnr.wa.gov

The Legislature established that alternate plans will be available for small forest landowners who harvest smaller areas which have a relatively low impact on aquatic resources. These

¹ [RCW 76.13.005](#), [RCW 76.13.100](#)

timber harvest plans provide protection to public resources by alternate means which are at least equal in overall effectiveness to the protections provided by the forest practices rules, and which also lower the overall costs of the rules to small forest landowners including, but not limited to, loss in timber value, additional harvest unit layout costs, and increased operating costs².

The guidance in this Part of the manual is intended to:

- **Identify potential riparian forest characteristics on small landowners' forest where an alternate plan can be designed.**
- **Evaluate existing riparian function features which will allow a low impact alternate harvest design that will provide long term protection or enhancement of public resources within a riparian management zone.**
- **Recognition that each alternate plan proposal is uniquely designed for the site, and that the site characteristics will be considered by DNR forest practices foresters and other stakeholder reviewers in the alternate harvest plan review and approval elements.**
- **Provide criteria to assist the DNR foresters to determine whether a small forest landowner plan qualifies as a low impact alternate plan, WAC 222-12-0403(5).**

Small forest landowners may receive assistance through the Small Forest Landowner Office which was established within DNR to serve as a resource and focal point for assisting small forest landowners in preparing alternate plans appropriate to small forest landowners³, see Part 1.2. Small forest landowners interested in alternate plans are encouraged to contact the Small Forest Landowner Office for assistance in preparing an alternate plan. The office may provide technical assistance in understanding and using this Board Manual Section, developing an individualized alternate plan, and facilitation of interactions with the department, other state agencies, federal agencies, affected Indian tribes and the interdisciplinary team that may review the alternate plan.



1.1 Alternate Plan Preparation

This guidance is meant to provide direction to small forest landowners in planning timber harvest using an alternate plan. The guidance will also assist a DNR Forest Practices Forester, in consultation with other stakeholder-reviewers, to determine if an alternate plan will result in relatively low impact to aquatic resources. Assistance available to small forest landowners from DNR is described in Part 1.2.

An alternate plan is a landowner developed timber harvest prescription which will achieve protection of public resources through alternative methods to those required in the rules affected by the plan. The rules define “public resources” as water, fish, and wildlife and capital improvements of the state or its political subdivisions⁴. Most alternate plan timber harvest

² [RCW 76.09.368](#), [RCW 76.13.100](#), [RCW 77.85.180](#)

³ [RCW 76.13.110](#), [WAC 222-12-0402](#)

prescriptions are designed for harvest within the riparian management zone (RMZ) of Type S, F and Np Waters. In riparian areas the protection of public resources specifically focuses on the protections of the waters, fish, and other aquatic species through the protection of riparian functions. The rules define “riparian function” as bank stability, the recruitment of large woody debris, leaf litter fall, nutrients, sediment filtering, shade, and other riparian features that are important to both riparian forest and aquatic system conditions⁴ (see Figure 7).

To harvest under an alternate plan a small forest landowner needs to submit a forest practices application (FPA) with their alternate plan attached. The FPA for the harvest must identify the rules affected by the alternate plan, and recognition that all other applicable rules governing the harvest area must be implemented. These other rules may include the forest practices roads and reforestation rules.

Riparian Function Considerations

Within the riparian management zone, an understanding of riparian areas and the riparian functions they provide is vital to building an alternate plan.

The first step in developing the harvest prescription for an alternate plan is to identify the site-specific characteristics and extent of the riparian forest which influence each specific riparian function. A full description of riparian function considerations, including best strategies for designing a riparian forest harvest plan that will provide each riparian function, is found in Part 2.2. Proposed timber harvest plans and site-specific characteristics which may influence riparian function include but are not limited to:

- **Configuration and size of harvest unit (acres) affecting the riparian forest (Figure 1).**
- **Length of stream reach impacted by the harvest area (Figure 1).**
- **Harvest designs for one side or two sides of the stream (Figure 1).**

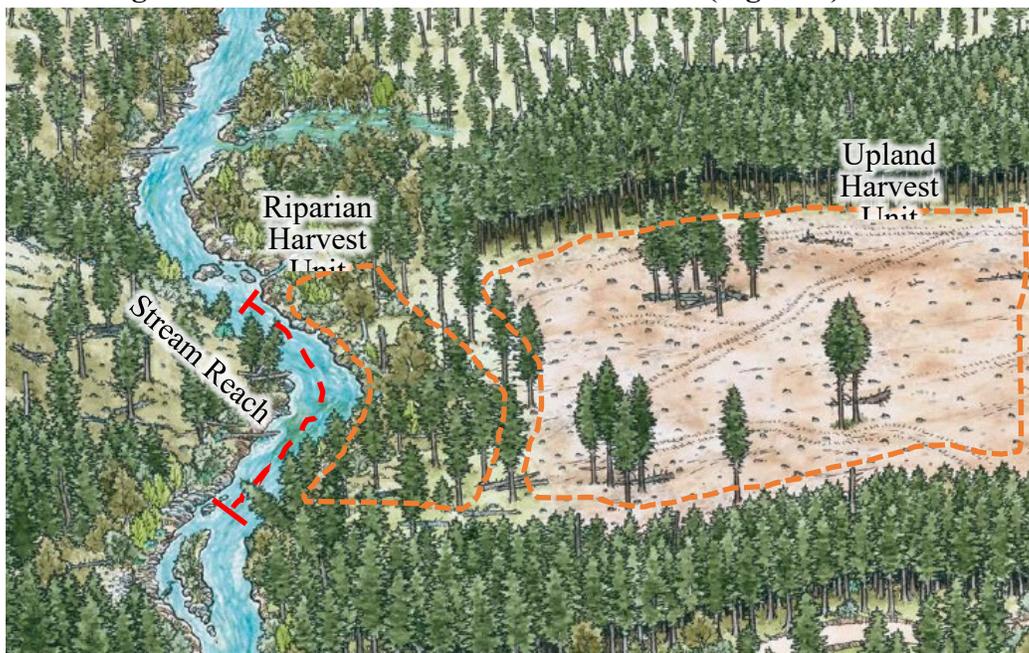


Figure 1. Configuration of stream reach, harvest unit, and harvest design

⁴ [WAC 222-16-010](#)

- Availability and/or planned placement of Large Woody Debris (Figure 2).

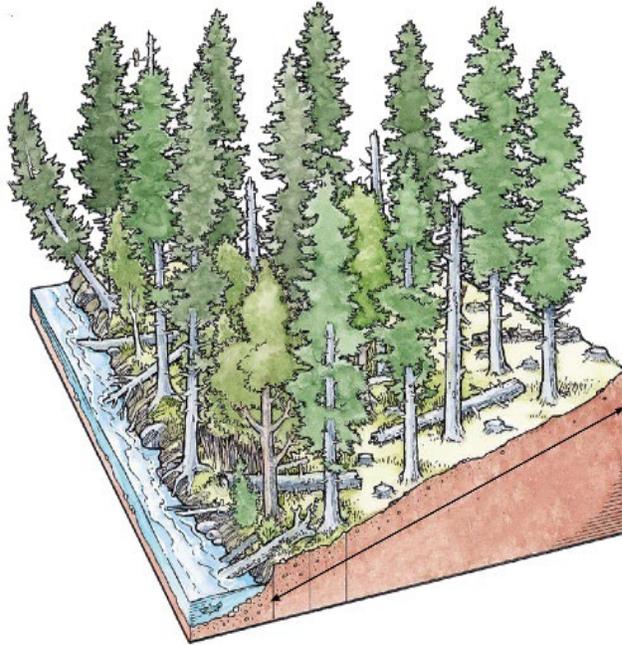


Figure 2. Stand with LWD extending into stream.

- Stream size (width) (Figure 3).



Figure 3. Measuring bankfull width

- **Stream Substrate Composition (cobble, gravel, boulder, bedrock) (Figure 4).**
- **Structure and composition of the riparian forest (understory, brush species, tree density, tree age, hardwood vs. conifer) (Figure 4).**



Figure 4. Conifer forest with stream, 40 years, 290 trees per acre (TPA), huckleberry understory

- **Stream compass direction of flow (Figure 5).**
- **Streamflow characteristics (seasonal flow, flow duration).**
- **Aspect of stream bank and associated riparian forest (Figure 5).**
- **Topography of the riparian forest (i.e., break in slope, slope steepness, eroding stream banks, direction of stream flow) (Figure 5).**
- **Contributing effects of adjacent landscape features outside of riparian forest.**

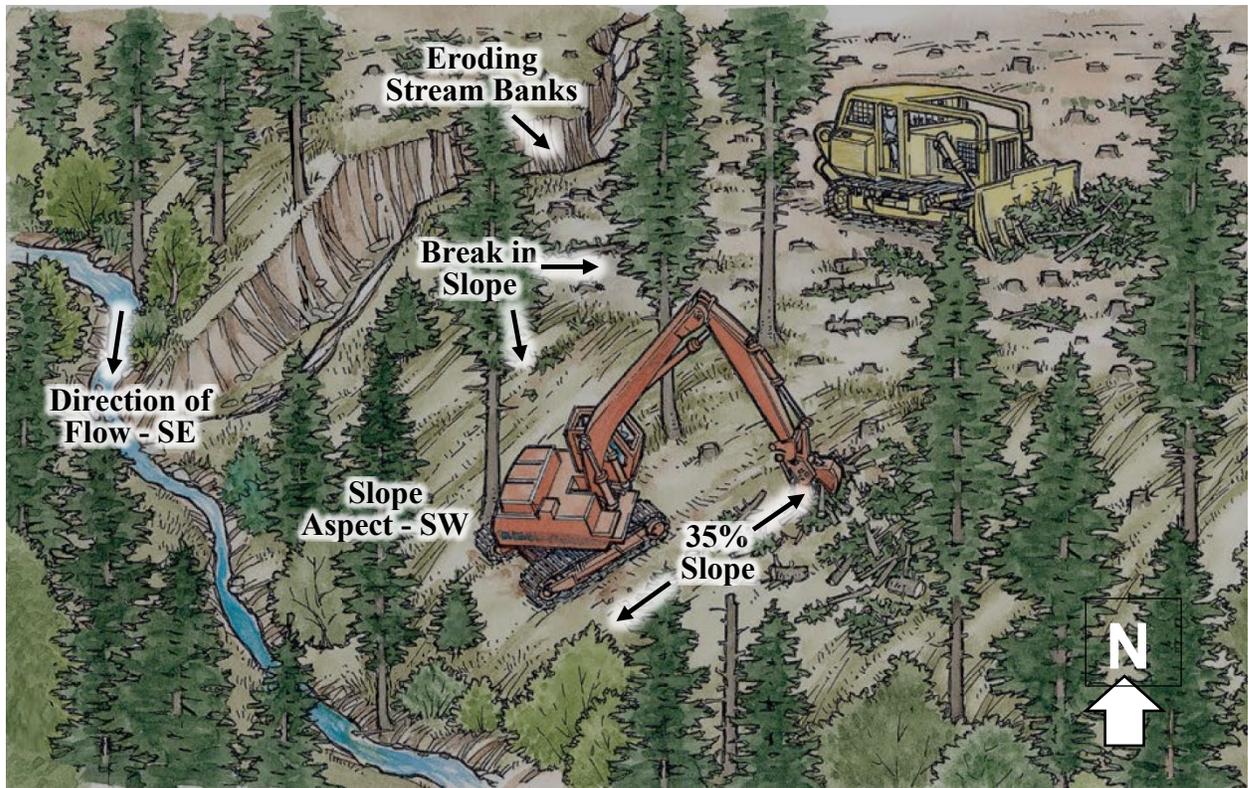


Figure 5. Riparian harvest with relevant topography labeled.

The following riparian functions that must be addressed in alternate plans are described in Part 2.2 (see Figure 7):

- **Stream Shading**
- **Stream Bank Stability**
- **Large Woody Debris Availability and Recruitment**
- **Sediment Filtering.**
- **Nutrients and Leaf Litter Fall**

When the areas of influence for each riparian function are evaluated (see Part 2.2), small forest landowners can identify those areas within the riparian management zone for which an alternate plan can be submitted as part of a forest practices application, see Part 1.1.2.

1.1.2 Evaluation of Alternative Plan Harvest Prescriptions in Riparian Areas

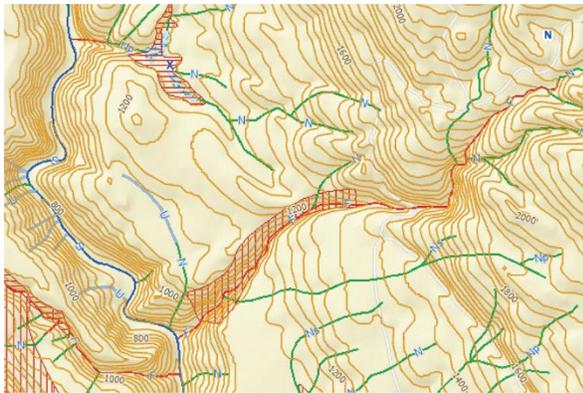
Riparian forests are often complex and feature variable tree and shrub species composition, widths, and associated terrain. A small forest landowner low impact alternate plan may be designed for riparian forest management in areas where minimum acceptable levels of riparian function can be retained through the cumulative contributions within the planned harvest area, surrounding topography, and other site features, see Part 1.1.1. These alternate plans may include:

- **Timber harvest within the riparian forest;**
- **Restoration of conifer in hardwood-dominated riparian forests;**

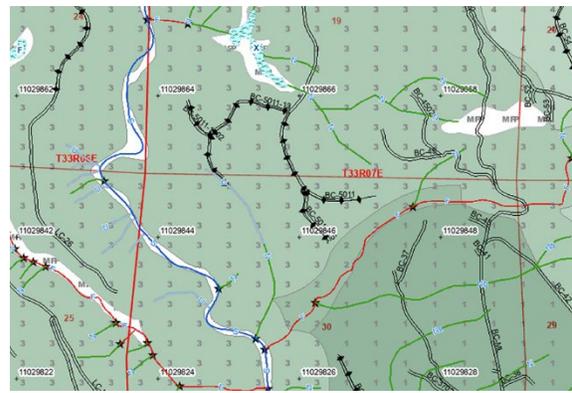
- **Rehabilitation of and/or treatment of riparian forests which may be understocked or overstocked.**

The DNR forester review of a small forest landowner low impact alternate plan needs to determine how well aquatic resources are being protected. The impacts on aquatic resources by the proposed harvest are determined by the level of riparian function, which is maintained to effectively protect public resources, per WAC 222-12-0401(6). The criteria for the evaluation include, but may not be limited to, a comprehensive review of the proposed harvest plan and the contributions of surrounding topography and on-site features to determine:

- **The extent to which each riparian function is currently found in the riparian area.**
- **Which site conditions (for example, topography, channel structure, & directionality, elevation, riparian forest site class, and soil type) affect the risks from proposed management activities (Figure 6).⁵**



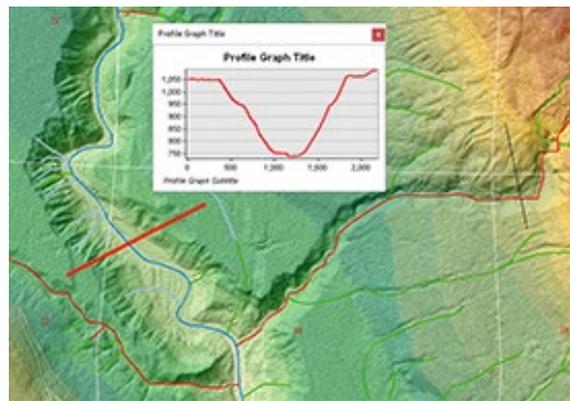
Map showing hydric and erodible soils (hashmark shading)



Map showing forest Site Class



Map topographic contour lines and LiDAR hill shade



Stream cross section showing channel structure.

Figure 6. Maps showing various site conditions of the same geographic area.

- **Whether the overall long-term benefit to riparian function after proposed management activities outweighs the potential short-term decrease in function.**

⁵ Resource maps can be viewed at FPAMT.dnr.wa.gov.

Each DNR forester needs to evaluate all proposed small forest landowner alternate plans with a consistent process and criteria where considerations include allowing for:

- **Each riparian function to be maintained or restored through application of the proposed prescriptions.**
- **Riparian function to be enhanced through rehabilitation efforts, including aggressive treatments such as replacing decadent hardwood stands, LWD placement or providing openings for desired native species.**
- **Management plans to address potential long- term forest health issues or to better position a stand to survive a fire while providing riparian function.**
- **Monitoring review of past prescriptions resulting in successful restoration of riparian function.**

Decadent Stands – stands that do not support riparian function because they stop growing - do not offer large woody debris (LWD) benefits or don't support future stand generation.

1.1.3 Elements of an Alternate Plan to be included in a Forest Practices

Application

When a small forest landowner has developed an alternate plan harvest prescription, they need to attach it to a forest practices application (FPA). Before submitting an FPA, the small forest landowner also needs to include the additional alternate plan information as outlined in Part 2.1.

1.2 Assistance Provided by DNR's Small Forest Landowner Office

The Small Forest Landowner Office has Regulation Assistance Foresters located across the state available to provide expert technical assistance to help small forest landowners prepare to conduct forest practices activities on their forestland. These foresters can help landowners understand and apply the Forest Practices Rules including providing specific support in applying small forest landowner alternate plans, alternate plan templates, long-term applications, forest road assessments and construction techniques, timber harvest techniques, and other Forest Practices Rule related issues such as the required content of an FPA including harvest under an alternate plan, see Part 2 and 2.1.

Landowners can easily find their assistance forester online on the [Find Your Forester](#) tool or contact us at 1-800-523-TREE (8733) or email at OneStopShop@dnr.wa.gov.

PART 2. ALTERNATE PLANS

The alternate plan policy is described in WAC 222-12-040. The requirement for the forest practices application process, plan preparation responsibilities, required contents and plan review procedures are described in WAC 222-12-0401.

2.1 Elements of an Alternate Plan

The forest practices rules identify the key elements of alternate plans⁶ include a map showing locations of:

⁶ [WAC 222-12-0401](#)

- **All streams and other waters, wetlands, and unstable slopes, and new or existing roads affected by the alternate plan harvest.**
- **Proposed management activities including location of proposed road construction, timber harvest, and other forest practices⁷.**

The DNR forest practices on-line forms page provides instructions on how to complete an FPA, including those with an alternate plan. To prepare for the preparation of an FPA with an alternate plan the small forest landowner needs to develop the following information:

- **Descriptions of the current conditions of the site, including upland and riparian conditions. For help in assessing riparian conditions see 1.1 Riparian Function Considerations.**
- **Descriptions of the proposed management activity, including all resource protection or enhancement activities. Make sure the scale of management descriptions fit the scope of the project. For example, the removal of a few specific riparian trees may require different protection or enhancement measures than a riparian thinning of an entire stream segment.**
- **A list of the forest practices rules that the alternate plan is intended to replace.**
- **Where applicable, a monitoring plan.**
- **Where applicable, a forest management implementation schedule.**

2.2 Riparian Function Considerations

Understanding riparian areas and riparian functions (see Figure 7) is important to building an alternate plan. Riparian areas are transitional zones between the aquatic and upland environments. (In contrast, Riparian Management Zones in the forest practices rules are minimum stream buffers.) Riparian areas contribute to overall stream health by maintaining essential riparian functions and productivity.

The forest practices rules for riparian areas are designed to protect aquatic resources and related habitat to achieve restoration of riparian function. Under the rules, “riparian function” includes bank stability, the recruitment of large woody debris, leaf litter fall, nutrients, sediment filtering, shade, and other riparian features that are important to both riparian forest and aquatic system conditions.

⁷ [WAC 222-12-0401 \(3\)\(a\)](#)

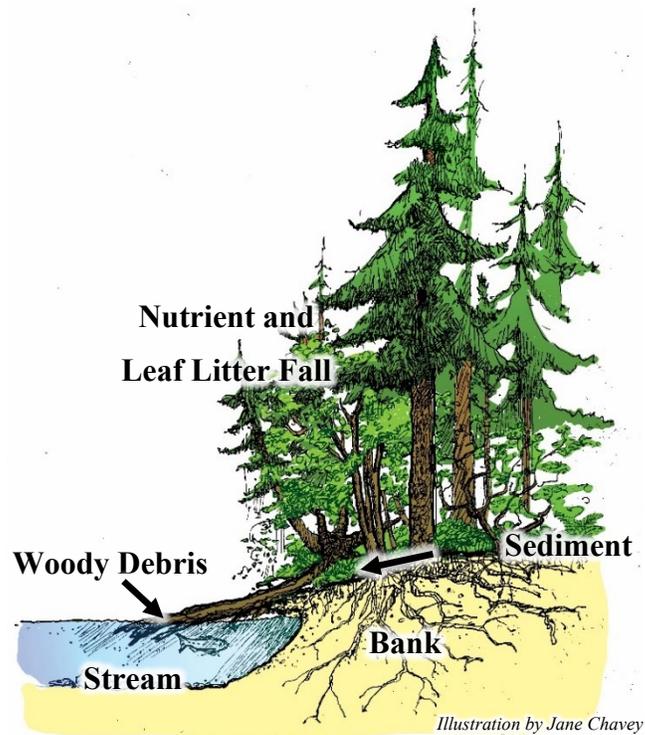


Figure 7. Riparian Functions

The goal of this guidance is to help landowners identify, restore, and maintain riparian function. This guidance focuses on:

- **Stream shading**
- **Stream bank stability**
- **Large woody debris availability and recruitment**
- **Sediment filtering**
- **Nutrients and leaf litter fall**

Landowners should understand how riparian areas contribute to overall stream health to incorporate riparian functions maintenance and/or enhancement measures into their alternate plans. Considering site-specific conditions of the riparian area allows reviewers and landowners to make informed decisions about proposed management activities. Riparian areas are dynamic and the current condition of riparian functions will vary among individual stream segments and throughout the watershed.

As planning begins, landowners should consider:

- **The makeup of the tree species within the riparian area, and the level to which the forest is currently providing the riparian functions to the stream.**
- **The potential level of the riparian functions that the forest could contribute to the stream.**
- **The potential level of functions that would be lost without management intervention.**

- **How the riparian areas could be managed to achieve sufficient levels of riparian function, and how to maintain these levels when achieved.**

Areas of Influence

Before developing alternate plan prescriptions, the landowner or forester should identify the areas of influence for each riparian function. In this manual, the “area of influence” is the area that may affect a particular riparian function. Site specific conditions determine the size of the area of influence for each riparian function.

The figure below shows the general relationship between cumulative effectiveness of various riparian functions and a distance from the stream channel. Distance from channel is expressed as a proportion of tree height. (Bank stability is shown as root strength in this figure.) The descriptions under *Assessing Riparian Functions*, in the following pages, will help determine the appropriate widths of the areas of influence for each riparian function.

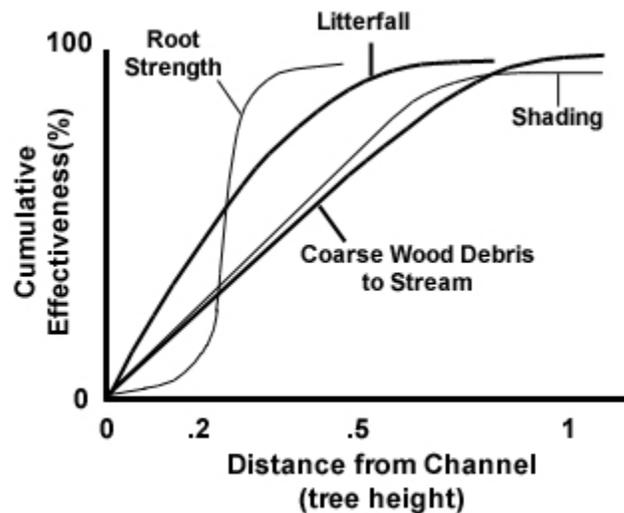


Figure 8. Cumulative effectiveness of various riparian functions
From Forest Ecosystem Management Assessment Team (FEMAT), (1993). *Forest ecosystem management: an ecological, economic, and social assessment*. Washington DC: US Government Printing Office 1993-793-071.

Assessing Riparian Functions

The following descriptions of riparian functions are intended to help landowners and foresters determine current riparian conditions and how management strategies can result in properly functioning riparian areas.

Stream Shading



The most significant influence on stream temperature, under the control of forest managers, is shade from the canopy of the adjacent riparian area vegetation. An important function of canopy cover in the riparian area is to provide shade to maintain cool stream temperatures. This is a particularly vital function for fish and amphibians.

To determine the area of influence of the shade function, consider the guidance provided in Board Manual **Section 1, *Method for Determination of Adequate Shade***

Requirements on Streams. Following the steps of this manual can help the landowner to establish the minimum width of the riparian area needed to meet the water quality standards for stream temperature. For streams within channel migration zones, additional guidance may be obtained from Board Manual **Section 2, *Standard Methods for Identifying Bankfull Channel Features and Channel Migration Zones***. The trees closest to the stream are the most important for shade. The area of influence of shade from trees usually extends for a distance of 75 feet measured from the outer edge of bankfull width (BFW) or the edge of the channel migration zone (CMZ).

When evaluating areas of influence for shade:

To understand the overall impact of management activities on the shade function, consider all the forest characteristics in the riparian areas within the stream reach to be included in the alternate plan. The level of influence the overstory riparian canopy has on water temperature depends on a variety of factors, including:

- **Stream size.** Streams less than 30 feet wide are greatly influenced by riparian shading in the summer months. In larger streams, the influence of shade on water temperature will be site-specific (see Figure 3).
- **Topography.** Local topography, such as steep hill slopes or cliffs may provide shading to the stream (see Figure 6).
- **Channel orientation.** On east-west oriented channel segments, the shade from riparian vegetation on the south side of the stream has a greater and more direct influence on the stream than vegetation on the north side of the stream (see Figure 5).
- **Understory vegetation.** Thick understory vegetation can contribute to stream shading, especially in entrenched or narrow stream channels (see Figure 4).
- **Canopy openings.** Canopy openings naturally occur from bank erosion, vegetation succession, or stream bank disturbances such as flooding, debris flow, fire, or wind (see Figure 5).

The best strategy for providing shade to protect stream temperature is to retain or develop a multi-storied riparian forest that is wide enough to minimize the impacts of solar radiation on the stream environment.

Stream Bank Stability

Maintaining stable stream banks will allow channel structure to develop naturally. Natural erosion of stream banks enhances channel function by:

- Recruiting sand, gravel, and other stream bank material needed for various in-stream habitats.
- Exposing tree root-wads on the stream bank that can provide cover for fish and eventually recruit large wood to the channel.

Maintaining stream bank vegetation is vital to maintaining stable stream banks. The roots of vegetation hold soil together, slow water velocities and facilitate deposition of sediments during high stream-flow events. Loss of stream bank vegetation can accelerate stream bank erosion which can destroy fish spawning and rearing habitats.

The area influencing stream bank stability usually extends a distance equal to ½ the average crown diameter of the dominant conifer trees closest to the outer edge of BFW or the CMZ, or to the top of the first terrace from the outer edge of BFW or the CMZ. However, streams showing evidence of channel movement may require protecting more area to accommodate future channel migration. A good reference for determining potential channel movement is Board Manual Section 2.



Determining Crown Diameter
 To determine ½ the average crown diameter, measure the crown diameters of at least 10 dominant conifer trees within 30 feet of the edge of BFW or CMZ, and divide the average of those 10 diameters by 2.

When evaluating the areas of influence for stream bank stability:

- **Look for connected root masses along the management area.**
- **Look for deeply undercut banks which indicate the channel is migrating.**
- **Anticipate which streamside trees could fall from root rot, stream undercutting, heavy lean, or susceptibility to windthrow; then consider which adjacent trees should be retained to maintain long-term bank stability.**

The best strategy is to maintain live trees and vegetation within the area of influence to provide the greatest stability to stream banks.

Woody Debris Availability and Recruitment

Ecological functions associated with large woody debris (LWD) are an important part of productive in-stream habitat. LWD provides important habitat diversity by providing structure for stabilizing streambeds, building floodplains, storing sediment, retaining spawning gravels, maintaining flow complexity, storing nutrients, and providing habitat for fish and/or stream-associated amphibians (see Figure 2). LWD should be of a size (length and width) and species to remain intact and stable for many years. See Board Manual Section 26 *Guidelines for Large Woody Debris Placement Strategies*, under “The criteria for wood placement” for more information.



Wood naturally enters streams from:

- **Fallen dead trees.**
- **Trees undercut by stream flows.**
- **Disturbance events such as debris torrents, landslides, fire, insects, disease, and windstorms.**

LWD from large trees forms pools and cascades in streams. However, many riparian areas no longer have large diameter trees available to fall into the streams. Small diameter wood may be available but is not necessarily adequate to provide optimum riparian large woody debris function. Therefore, both short-term and long-term large woody debris recruitment is desirable. Woody debris comes from the riparian forest adjacent to the stream and by water transport from areas upstream.

Any tree that has the potential to contribute wood to the stream is within the LWD area of influence. Trees closest to the stream have the highest potential to fall into the stream. To determine the width of the area influencing woody debris input and availability consider the potential tree height of the tallest (dominant) trees on the site. The area of influence for LWD recruitment may be estimated as the distance equal to 75 percent of the 100-year site-potential tree height of the dominant trees within the riparian area, measured from the outer edge of BFW or CMZ.

When evaluating the areas of influence for large woody debris recruitment consider:

- **Trees leaning towards the stream. The most likely candidate trees for entering a stream are those leaning towards the stream, and trees located on steep slopes, on the edge of the first terrace, and in inner gorges.**
- **Hardwood contribution for short-term benefit. Large woody debris from hardwood forests decomposes faster than woody debris from conifer forests.**
- **Placing large wood to enhance the near-term function. This will allow the development of long-term woody debris recruitment opportunities within the riparian forest. For**

technical guidance on in-channel woody debris placement, see Board Manual Section 26.

- **The extent and conditions of existing in-stream large woody debris adjacent to the proposed area of harvest.**
- **The productivity of the soil. Higher soil productivity will grow taller trees for future supply of large woody debris to the stream. More productive soils will have larger areas of influence.**
- **Promoting growth of existing understory conifer by releasing it from competing brush and hardwood vegetation. This may be preferable to relying on seedling growth.**
- **Extending the area of influence where there is the potential for channel migration. For guidance on the potential for channel migration, see Board Manual Section 2.**

The best strategy for large woody debris availability is to manage for the potential recruitment of LWD for the short- and long-term.

Sediment Filtering

Riparian vegetation helps to filter sediments, reduce the likelihood of landslide events, and regulate the natural erosion processes within riparian areas. Reducing the amount of fine sediment entering streams and other water bodies is a major function of the riparian area. Riparian vegetation can prevent sediment from entering the stream as a result of ground disturbance or skid trails in upland areas, and roads or road cross drains.



The width of the riparian area and the amount of riparian vegetation needed to perform filtering varies according to stream size and channel type. Large streams that connect to a floodplain at high flows require greater distances for sediment filtering than small, incised channels that rarely experience overbank flows.

Areas influencing sediment filtering are usually within 30 feet of the outer edge of BFW or CMZ, or to the top of the first terrace beyond the outer edge of BFW or CMZ. This area of influence may extend to the top of the second terrace if the first terrace is susceptible to frequent flood emersion or stream erosion.

When evaluating the areas of influence for sediment filtering consider that:

- **Management activities on exposed soils in riparian areas have the potential to deliver to streams.**
- **Management activities on steeper ground have higher potential for sediment delivery to streams.**

The best strategy to prevent sedimentation caused by management activities is to keep equipment from operating below the topographic break directly above a stream or within 30 feet of the stream.

Nutrients and Leaf Litter Fall

Riparian areas play a key role in determining the concentration of nutrients in stream water. Uptake and storage of various elements carried by overland flows and groundwater are influenced by both the width of riparian buffers and the species of vegetation present.

Organic input from riparian vegetation influences water quality and provides an important food source for aquatic organisms. The size, composition, and age of the riparian forest will determine the amount of organic material available to be deposited into the stream.

The area influencing nutrient input from litter fall is the maximum distance that leaf litter could be expected to reach the stream. This distance depends on tree species composition, understory riparian vegetation, height of the canopy, topographic features, and prevailing winds.

When evaluating the areas of influence from nutrients and litter fall consider:

- **The tree species composition of the riparian stands.**
- **The understory species composition of the riparian stands.**
- **Maintaining a portion of bank along the streams in hardwood forests.**
- **The long-term advantages of converting to conifer.**

The best management strategy for nutrients and leaf litter fall is to ensure diverse vegetation composition within the area of influence.

2.3 Alternate Plan Evaluation for Riparian Areas

Because of the complexity of riparian areas, any given riparian area may not provide the ideal characteristics for each function. To be approved, alternate plans must be designed to provide for riparian function at least equal in overall effectiveness to the protection provided by the Forest Practices Act and rules.

When evaluating alternate plans consider:

- The goal of the riparian rules which is to protect aquatic resources and related habitat to achieve restoration of riparian function, and to maintain these resources once they are restored. The rules provide for the conversion and/or treatment of riparian forests which may be understocked, overstocked or uncharacteristically hardwood-dominated while maintaining minimum acceptable levels of riparian function.
- The extent to which each riparian function is currently found in the riparian area.



- Which site conditions (for example, topography, channel structure, elevation, site class, and soil type) may impact the risks from proposed management activities?
- Whether the overall benefit to the aquatic environment after proposed management activities would provide a greater long-term benefit in function than the potential short-term decrease in function.

2.4 Alternate Plans for Restoring Riparian Function in Eastern Washington - Identifying Stands at Imminent Risk from Insects, Disease and Fire

Forested riparian areas provide critical riparian functions for fish, other aquatic species and riparian-dependent wildlife. A fully functioning riparian forest typically contains multiple tree species best adapted to the site at a range of age classes and stocking levels. Such forests face a lower risk of catastrophic losses due to wildfire or pathogens that often target specific species and age classes.

Some of eastern Washington's streams are bordered by overcrowded conifer stands. Overcrowding is a common condition that can increase the risk of mortality from insects, disease, pathogens (such as dwarf mistletoe) and wildfire. Active management of overcrowded and/or unhealthy stands can reduce forest health problems and improve long-term riparian functions.



This part of the manual provides information to:

- Help identify riparian forests where riparian functions are threatened by significant tree mortality. A riparian forest is considered to be susceptible to significant tree mortality when within 5 years due to the effects of insects, diseases, pathogens or recent fires, the riparian forest would be expected to have only 50 or fewer trees larger than 6 inches DBH per acre with healthy crowns remaining; and,
- Identify where active management prescriptions for these stands can improve riparian functions. This information will help Interdisciplinary (ID) Teams evaluate the relative value of actively managing the riparian area to gain riparian function as part of an alternate plan.



2.4.1 Management Considerations for Restoring Riparian Function



Reducing excessively high tree mortality rates from insects, disease, pathogens (such as dwarf mistletoe) and fire can help restore riparian functions. Forest management practices designed to restore naturally sustainable tree species composition and stocking levels may help reduce high tree mortality rates.

Landowners normally have little financial incentive to invest in restoring riparian function because timber harvest opportunities are limited in riparian areas. An alternate plan featuring sound management planning and restoration prescriptions can create financial incentives for a landowner to enhance riparian function and forest health.

Allowing trees at risk of imminent mortality to be harvested within riparian management zones can allow landowners to realize some economic return while:

- **Restoring riparian stand conditions to provide long-term riparian function.**
- **Creating properly stocked stands with a mix of native tree species that is best adapted to the site. Appropriately stocked mixed species stands are typically more resilient to insects and disease.**

The following information is provided to help identify riparian areas at risk of significant mortality that may benefit from active management to improve riparian functions.

2.4.2 Candidate Riparian Stands

Riparian forests susceptible to significant tree mortality and loss of riparian function may benefit from management strategies to promote forest health and enhance riparian function. Riparian stand conditions and risk of fire loss, insect attack, and disease attack vary. However, a stand is likely to be susceptible to riparian function loss when:

- **Fire has already killed the trees or mortality is likely to occur as a result of fire damage.**
- **Diseased or insect-infested stands show evidence that the disease or insect is present either within the riparian area or in adjacent stands and would be expected to cause significant mortality in the riparian area within five years. Most insects and pathogens seek specific host tree species at specific stand ages. In a mixed stand, therefore, mortality expected from all present insects and diseases would be evaluated together to determine stand eligibility for riparian function restoration work.**

A riparian forest susceptible to significant tree mortality is likely to benefit from active management to promote forest health and restore riparian function in the riparian zone when:

- Within five years, due to the effects of insects, disease, pathogens or recent fire, the riparian forest would be expected to have only fifty or fewer trees larger than 6-inch DBH per acre with healthy crowns remaining; and
- Active management would be expected to provide improved riparian function faster than the unmanaged stand while maintaining comparable, interim protection of riparian function.

2.4.3 Potential Management Prescriptions

The purpose of riparian management zones is to place riparian forests on a course toward long-term health while achieving natural rates of riparian function. This manual is intended to help identify the conditions where active management of the riparian forest would be expected to improve riparian functions and conditions. It is not intended to help prevent naturally occurring mortality. Management prescriptions need to be based on restoring riparian functions and re-establishing a healthy natural riparian forest structure and composition.

Develop prescriptions that are appropriate for the soil, climate, and risk conditions of the site to:

- **Limit riparian management to the scope of the problem (e.g., geographic area, tree species, and tree ages facing imminent mortality).**
- **Maintain healthy trees of host species within the riparian area if not within proximity to an insect or disease pathogen that may cause tree mortality within five years (proximity varies by type of disease or insect).**
- **Set the riparian stand on a significantly better trajectory towards achieving the following riparian functions:**
 - Provide for large woody debris availability and recruitment.
 - Seek opportunities for short-term shade to the stream.
 - Provide long-term shade to streams.
 - Provide bank stability.
 - Provide nutrient and litter fall.
 - Assure sediment filtration.
- **Plan for wildlife trees.**
- **Conduct good slash management practices to decrease or limit the risk of insects, disease, or fire to neighboring stands.**
- **Maintain an equipment limitation zone.**
- **Ensure proper stocking and diversity of site appropriate tree species (resistant to ongoing insect and disease mortality within the area). Consider reducing the number of stems and percentage of Grand fir composition, as this species is more prone to insects and disease.**
- **Utilize harvest methods that will restore natural forest structure and diversity or will remove species/age classes at imminent risk of mortality.**

2.4.4 Small Forest Landowner Process

Landowners who believe a riparian area is degraded due to insects, disease or fire may request assistance from trained agency staff or practitioners (see DNR Small Forest Landowner website at <http://www.dnr.wa.gov/sflo>). Landowners may also contact experts from the Department of Fish and Wildlife, Department of Ecology and affected Indian tribes who will likely participate on the alternate plan ID Team. Early contact in the planning phase can facilitate development and approval of the alternate plan. Trained experts can help the landowner determine if a riparian stand is threatened with imminent mortality.

Small forest landowners that have verified the need for restoration of riparian function can submit an alternate plan as part of a forest practices application as described in WAC 222-12-0401. The alternate plan must include management activities designed to reduce unnatural levels of tree mortality from fire, insects, and disease, and to bring riparian forests back into a structure and composition well adapted for the site. The alternate plan must also include information on the current condition of degraded riparian functions and how the proposed management prescriptions will achieve and restore the riparian functions.

PART 3. ALTERNATE PLAN TEMPLATES FOR SMALL FOREST LANDOWNERS

The Forest Practices Act and rules require developing simple, easy to apply small forest landowner options for alternate plans or alternate harvest restrictions on smaller harvest units that may have a relatively low impact on aquatic resources. These alternate plans are intended to provide flexibility to small forest landowners that will still provide protection of riparian functions based on specific field conditions or stream conditions on the landowner's property.

Small forest landowners as defined in WAC 222-21-010(13) and RCW 76.13.120(2)(c), are landowners who have harvested from their own lands in the state of Washington less than 2 million board feet per year for the three years prior to the year of application, and certify at the time of application that they do not expect to harvest more than 2 million board feet per year during the ten years following application.

Template 1. Overstocked Stand Template for Type S and F Waters for Small Forest Landowners

Background

With the 2001 Forest Practices rules, riparian management zones (RMZ) on forested streams became wider and required more leave trees than previously required under the forest practices rules. Reforestation from previous forest management activities, and in some cases natural stocking levels, has resulted in high tree densities of conifer species within riparian areas. These managed stands were densely planted with the intent to commercially thin, to promote growth of superior trees and to generate income to the small forest landowner. Without thinning, the canopies of these stands will begin to close, causing the trees to compete for resources, slowing the overall growth of the plantation, and increasing tree mortality.

Purpose

The purpose of this overstocked stand template is to increase riparian function on stands that have or will show signs of suppressed growth, and to increase the economic viability of the small forest landowner in these situations. Through commercial thinning, these stands can be managed in a manner that will establish understory vegetation and achieve larger tree diameters of the residual stands faster than would have occurred under a no thinning option.

This template provides flexibility for small forest landowners to harvest while protecting riparian functions. The harvest strategy for this template includes a no harvest zone and a thinning zone that meets or exceeds the stand requirements to achieve the goal in WAC 222-30-010(2): ". . . to protect aquatic resources and related habitat to achieve restoration of riparian function; and the maintenance of these resources once they are restored."

Process

Adherence to the strategy within this template will meet the riparian function requirements for the approval of an alternate plan as described in WAC 222-12-0401(6): "An alternate plan must provide protection for public resources at least equal in overall effectiveness to the protection provided in the Forest Practices Act and rules." An alternate plan must include the template form, available through the DNR. The form must be included with the forest practices application. This form provides the technical justification as required in WAC 222-12-0401(3)(b), (c), and (d), identifying how the alternate plan addresses the various functional requirements of the RMZ.

Qualifying Stands

Qualifying stands are stands with at least 70% conifer with a canopy that is closing, having a minimum of 300 trees per acre (TPA) at the time of stand initiation and located within an RMZ adjacent to Type S, F or Np waters. Landowners planning to thin a qualifying stand within an RMZ protected by the Shoreline Management Act (RCW 76.09.910) must consult with the county of jurisdiction and include written documentation from the county stating that the operation complies with the Shoreline Management Act. This documentation must be included with the forest practices application.

Riparian Management Zones

This template differs from standard rules by:

- **Allowing thinning of conifer within RMZs for Type S, F, and Np Waters; and**
- **Requiring an RMZ for the entire length of the Type Np Water length, not just 50% of the length.**

The total RMZ widths of Type S, F, and Np Waters are the same as in standard rules. The template separates the RMZ into three management zones (no harvest, thinning, and outer) for Type S and F Waters, and two management zones (no harvest and thinning) for Type Np Waters.

RMZ widths are measured horizontally from the outer edge of bankfull width (BFW) or the channel migration zone (CMZ), whichever is greater on Type S and F Waters or the outer edge of BFW on Type Np Waters (see Board Manual Section 2).

Harvest Prescriptions

Type S and F Water Thinning Strategy

No Harvest Zone: The width of the no harvest zone is measured horizontally from the outer edge of BFW or the CMZ and is determined according to the following criteria:

- A distance equal to half the average crown diameter of the dominant conifer trees closest to the edge of the BFW or CMZ. To determine this distance, measure the crown diameters of at least 10 dominant conifer trees within 30 feet of BFW.
- The no harvest zone must include all conifer trees within the first row nearest the outer edge of BFW or the CMZ.
- The no harvest zone must be between 14 and 30 feet from BFW or CMZ.
- Measured trees cannot be harvested to allow for compliance and monitoring. Each tree must be marked and numbered.

Thinning Zone: The thinning zone is measured from the outer edge of the no harvest zone. The combined distance of the no harvest and thinning zone, as measured from the outer edge of BFW or CMZ, can be no less than 75 feet. To determine the total widths of the no harvest and thinning zone use the following table.

<i>Site Class</i>	Combined Widths of No Harvest and Thinning Zones (Measured from the outer edge of bankfull width or channel migration zone)	
	Stream BFW width ≤ 10 feet	Stream BFW width > 10 feet
I	133 feet	150 feet
II	113 feet	128 feet
III	93 feet	105 feet
IV	75 feet	83 feet
V	75 feet	75 feet

The harvesting strategy for the thinning zone is:

- Maintain a minimum of 100 conifer trees per acre post-harvest with a maximum harvest of 65% of the trees cut in any one entry. The shade requirements must be met within 75 feet of the stream, as described in WAC 222-30-040 and Board Manual Section 1;
- Thin from below, where at the end of harvest the average stand diameter will be the same or larger than the average stand diameter before harvest. The guideline for this is $d/D < 1$.
- Follow the Large Woody Debris Placement Strategy (see below) when the thinning results in a stand less than 180 trees per acre.

- Thinning must not result in a stand with fewer than 100 well-distributed conifer trees per acre.
- Maintain an equipment limitation zone (ELZ) of 30 feet, as measured from the outer edge of BFW or CMZ.
- Soil disturbance within the ELZ cannot result in sediment delivery to the stream.
- Suspend one end of the log during yarding within the ELZ. Use directional falling away from the stream to minimize stream bank disturbance. In the thinning zone, use ground-based yarding systems only on slopes less than 35%.
- On slopes greater than 35% fully suspend all trees yarded through the thinning zone.

Outer Zone: Harvest according to the outer zone rule outlined in WAC 222-30-021(1)(c).

Type Np Waters Thinning Strategy

One of two harvesting practices can be applied along Type Np Waters, but not both in any one harvest entry. The standard RMZ buffer as outlined in WAC 222-30-021(2) may be applied or the thinning strategy as described may be applied.

Establish a 50-foot RMZ for the total length of the Type Np Water. Within this RMZ, establish a no harvest zone and thinning zone.

No Harvest Zone: Measure the width of the no harvest zone horizontally from the outer edge of bankfull width according to the following criteria:

- A distance equal to half the average crown diameter of the dominant conifer trees closest to the edge of BFW. To determine this distance, measure the crown diameters of a minimum of 10 dominant conifer trees within 30 feet of BFW.
- The no harvest zone must include all conifer trees within the first row nearest the outer edge of BFW.
- The no harvest zone must be between 14 feet and 30 feet in width.
- No allowable harvesting of measured trees. Each tree must be marked and numbered.

Harvesting must not occur within any sensitive site buffers. Sensitive sites include the 56-foot radius buffer patch centered on the point of intersection of two or more Type Np Waters, headwall seeps, sidewall seeps, headwater springs or the points at the upper most extent of Type Np Waters, or within an alluvial fan. See WAC 222-30-021(2)(b)(i) through (vi).

Thinning Zone: The harvesting strategy for the thinning zone is:

- Maintain a minimum of 100 conifer trees per acre with a maximum harvest of 65% of the trees cut in any one entry.

- Thin from below, where at the end of harvest the average stand diameter will be the same or larger than the average stand diameter before harvest. The guideline for this is $d/D < 1$.
- Follow the Large Woody Debris Placement Strategy (see below) when the thinning results in a stand less than 180 trees per acre.
- Maintain at least 100 well-distributed conifer trees per acre after thinning.
- Maintain an ELZ of 30 feet, as measured from the outer edge of BFW during all harvest activities.
- Soil disturbance within the ELZ must not result in sediment delivery to the stream.
- Suspend one end of the log during yarding within the ELZ. Use directional falling away from the stream to minimize stream bank disturbance. In the thinning zone, use ground-based yarding systems only on slopes less than 35%.
- All trees yarded through the thinning zone using cable thinning on slopes greater than 35% must be fully suspended.

To determine $d/D < 1$, first calculate the quadratic mean diameter of the trees to be cut (d), next calculate the quadratic mean diameter of the stand prior to thinning (D), then compare the ratio of d/D to assure the value is less than one.

Large Woody Debris Placement Strategy

A forest practices application with an approved forest practices hydraulic project (FPHP) is required for large woody debris placement in Type S or F Waters. See Board Manual **Section 5, *Guidelines for Forest Practices Hydraulic Projects*** for best management practices regarding woody debris placement.

Ecological functions associated with large woody debris (LWD) are an important part of productive in-stream habitat. While riparian forests mature, certain management techniques in these areas can help tree-growing conditions to achieve the overall objective of growing larger diameter trees to contribute to long term riparian and in-stream habitat function. However, if thinning results in a residual stand below 180 TPA, the addition of LWD into streams is required except when DNR, in consultation with Washington Department of Fish and Wildlife (WDFW) has granted a wood placement exemption. The LWD placement is intended to substitute for wood harvested under this template that otherwise had the potential to recruit to the stream. This strategy is intended to provide woody debris to the stream in the short term (< 50 years) until the remaining unharvested trees within the RMZ are available to naturally recruit to the stream over the long term (> 50 years). The LWD placement strategy is intended to encourage instream pool formation for fish habitat. However, woody debris placement should not create barriers to fish migration.

Large Woody Debris Placement Target

Depending on site conditions, this strategy may require the placement of up to 4 pieces of LWD per 300 lineal feet of stream (approximately 4 pieces per acre of RMZ) (see Figure 2).

Small forest landowners are encouraged to consult with the SFLO for technical assistance in identifying the preferred locations for LWD placement. Among those sites that are appropriate, different restrictions or levels of consultation may be necessary. Technical staff can determine whether it is appropriate to place wood in the stream (taking into account stream size, sediment delivery concerns, etc.), help locate the most effective stream reaches for the placement of LWD, or determine if there is any need for additional LWD to be placed into the stream. At a minimum, the following locations should be avoided:



- Channels that have a history of debris torrents and/or other mass wasting activity.
- Channels that have a near-future likelihood of a debris torrent and/or other mass wasting activity.
- Locations immediately above permanent culverts.
- Confined channels where the valley floor width is less than twice the bankfull width (see Board Manual Section 2 for identifying CMZs and bankfull channel features).

Large Woody Debris Guidelines

The small forest landowner shall follow these guidelines for LWD placement:

- The priority for LWD placement, from high to low preference, is:
 - (a) Root wads with tree boles attached.
 - (b) Tree boles with no root wad.
 - (c) Root wads without tree boles attached.
- Larger diameter wood is preferred over smaller diameter wood. However, LWD should be representative of the trees removed from the riparian stand.
- Landowners are encouraged to leave limbs and branches attached to logs that are placed.
- Trees may be felled directly into the stream.
- Trees may be bucked, and the bucked pieces may be placed in the stream.
- It is recommended that the boles of trees or rootwads be placed such that they are partially in the water and partially on the bank.
- Large woody debris should be placed so that part of it is in the water at low summer stream flows as well as during high stream flows, to create pools and cover for fish.



- The wood should not be held in place by anchoring or cabling.
- No bank excavation should occur during wood placement.
- The placement of LWD will likely need to occur when the local fish spawning populations are absent. This typically occurs during summer and fall low water flow periods.

Type of Wood and Wood Quality

For this template, LWD is the available wood found on the property of a small forest landowner. The landowner may utilize any living or dead trees for LWD except those required to provide a live root mass to maintain bank stability. The first row of living trees adjacent to the edge of BFW or the CMZ provides bank stability to the stream. Do not use these trees as LWD. Acceptable wood for LWD consists of:

- **Conifer trees or logs, such as cedar, Douglas-fir, or hemlock. These are the preferred species for LWD placement because they will remain (i.e., decay slower) and will provide woody debris over a longer period. Hardwood or pine species should be avoided.**
- **Logs from trees felled at time of harvest or downed logs with a solid core. If logs are from an upland source, they must not include downed log requirements for wildlife as described in WAC 222-30-020(11). Downed logs and standing snags already within the RMZ should be retained for wildlife habitat, floodplain function, and stand regeneration rather than moved into the channel.**
- **Trees, including root wads, harvested during road construction are a good source of LWD.**

Minimum Wood Length

The length of logs placed in the stream should be at least two times the bankfull width of the stream. If the log has a root wad attached, the log length should be no less than 1.5 times the bankfull width of the stream. The SFLO, in consultation with the WDFW or a tribal representative, shall determine if shorter wood lengths are acceptable.

Minimum Wood Diameter

The placement of large diameter woody debris is encouraged if it is available. However, LWD should be representative of the trees removed from the riparian stand. At a minimum, a piece of LWD measured at the small end must be at least 4 inches in diameter.

This strategy does not require the placement of large dimensional wood into the stream, but placement of large wood is encouraged if it is available. While it is recognized that most trees harvested under this template will not be greater than 22 inches diameter breast height (dbh), the landowner may place LWD obtained from off site. The table below from Board Manual Section 26 gives guidance for optimal LWD piece size in different sized streams.

BFW (in feet)	Minimum Diameter
< 5 feet	12 inches
> 5 and < 16 feet	16 inches
> 16 and < 32 feet	22 inches
> 32 feet	26 inches

Restrictions to Riparian Zone Disturbances

Minimize ground disturbance from machinery to reduce sediment delivery to a stream. Disturbed soils with the potential to erode and directly deliver to the stream shall be treated with erosion control measures available and appropriate for the site. Appropriate control measures may include water bars, grass seeding, mulching, hay bales or silt fences.

The ELZ is 30 feet, measured horizontally, from the outer edge of the BFW or CMZ (see Board Manual Section 2). Equipment may operate within this zone, but soil disturbance within the ELZ from ground-based equipment or cable-logging systems must not result in sediment delivery to the stream. If LWD placement activities could expose more than 10% of the soil in the ELZ, there is potential for sediment delivery to the stream and the landowner must consult with DNR a Forest Practices forester before placement.

Summary

Applying this template will allow small forest landowners to submit an alternate plan for a Western Washington overstocked conifer thinning prescription as part of a completed forest practices application (FPA). The FPA will be processed as an alternate plan as outlined in WAC 222-12-0401. The template form must be included with the forest practices application, and is available through DNR. This form provides the technical justifications, as required in WAC 222-12-0401(3)(b), (c), and (d), identifying how the alternate plan addresses the various functional requirements of the RMZ. Review of the proposed harvest may require an Interdisciplinary (ID) Team (see WAC 222-12-0401(5)). However, by adhering to the guidelines in this template, the need for an ID Team will be minimal and only necessary if specific issues arise.

Template 2. Fixed Width Riparian Management Zones Template for Type S and F Waters, for Small Forest Landowners

Background

Many small forest landowners find the forest practices process to determine if their timber stands are eligible for riparian inner zone harvest to be complex and expensive to implement. The effect can often be a loss of timber income.

Purpose

Using this template offers small forest landowners a simplified “fixed width” riparian buffer option for Western Washington Type S and F Waters. The template establishes a fixed width riparian buffer equal, on average, to the buffer widths occurring when the model is applied to meet desired future conditions as provided in WAC 222-30-021. Providing a fixed width riparian

buffer for small forest landowners using this template will also achieve the goal of WAC 222-30-010(2), “. . . to protect aquatic resources and related habitat to achieve restoration of riparian function; and the maintenance of these resources once they are restored.”

Process

Landowners submit a fixed width riparian buffer template form, available from DNR. This form provides the technical justification required by WAC 222-12-0401(3) (b), (c), and (d), explains how the alternate plan enhances riparian function and provides details of the landowner’s plan. The template form must be included with the forest practices application (FPA).

Landowners planning to conduct a harvest within a riparian management zone (RMZ) adjacent to Type S Waters (protected by the Shoreline Management Act, RCW 76.09.910) must consult with the city or county of jurisdiction to determine if the proposed activities comply with the local shoreline master plan. If a Substantial Development Permit is required, landowners must include a copy of the permit with the FPA.

As for any proposed Alternate Plan, an Interdisciplinary (ID) Team may be used to review the proposed fixed width riparian buffer (see WAC 222-12-0401(5)). However, by following the provisions in this template, an ID team will only be necessary if site-specific issues arise.

Eligible Stands

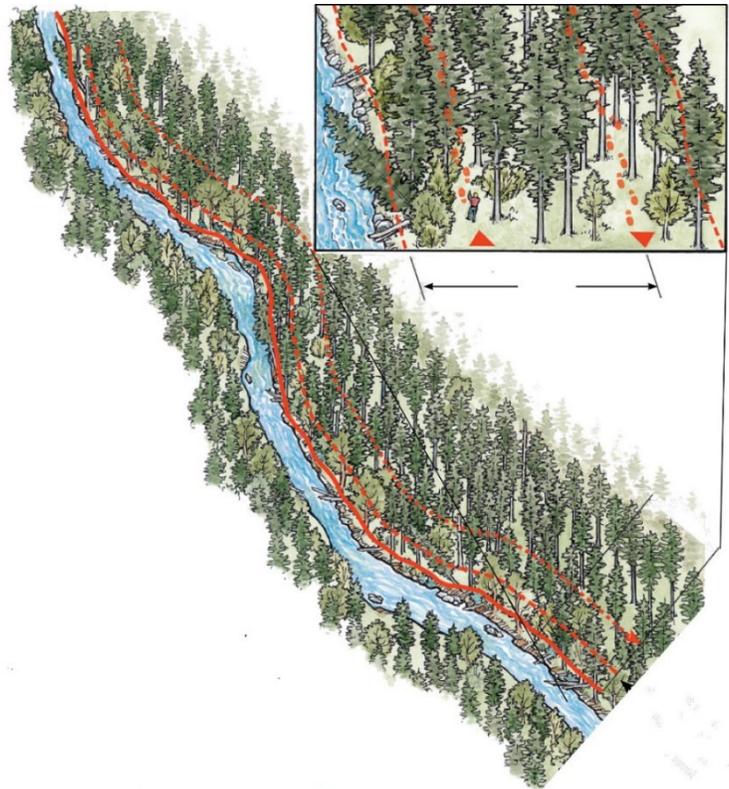
This template can be used for RMZs that are:

- Adjacent to Type S and F Waters as defined in WAC 222-16-031; and
- Located in Western Washington.

Riparian Buffer Prescription

This template establishes a fixed width, no harvest riparian buffer for Type S and F Waters. Use the following steps to determine the fixed width buffer for your stream:

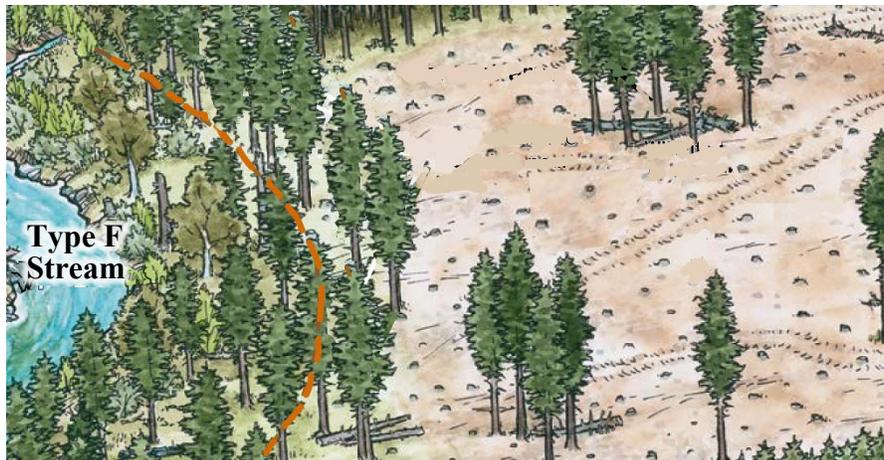
1. Determine the outer edge of bankfull width (BFW) or the channel migration zone (CMZ), see Board Manual Section 2.
2. Determine the site class for the RMZ adjacent to the stream. To determine site class, download a Forest Practices Application/ Notification activity map for your area and activate the site class layer. Go to <http://www.dnr.wa.gov/programs-and-services/forest-practices/review-applications-fpars/forest-practices-forms-and> and under the heading, “Forest Practices Application/Notification (FPA/N),” click on “ Activity Map Standards.” After navigating to the location of your activity, in the left corner of the map screen under “Map Themes”, choose Site Class from the drop-down menu. In the table of contents, click on the “Legend” button to find the site class of your activity.



3. Determine the width of the fixed width riparian zone using Table 1.
4. Establish the buffer on the ground by measuring horizontally from the outer edge of BFW or the CMZ, whichever is greater.

Table 1
Fixed Width, No Harvest Buffer Widths by Site Class

Site Class	No Harvest Zone width (Measured from outer edge of BFW or outer edge of CMZ)
I	145 feet
II	118 feet
III	101 feet
IV	82 feet
V	75 feet



PART 4. ALTERNATE HARVEST PRESCRIPTIONS FOR SMALL FOREST LANDOWNERS - UNDER DEVELOPMENT