WASHINGTON STATE DEPARTMENT OF
Natural Resources

PETER GOLDMARK
Washington State Commissioner of Public Lands

MEMORANDUM

October 20, 2011

TO: Forest Practices Board

FROM: Tami Miketa, Manager, Small Forest Landowner Office, Forest Practices
Marc Engel, Assistant Division Manager, Forest Practices Policy and Service

SUBJECT: Riparian Thinning Alternate Plan Template for Western Washington Small Forest Landowners

At your November 8th meeting, DNR will request the Forest Practices Board to approve a new template for western Washington small forest landowners to be included in Board Manual Section 21 Alternate Plans (attached). DNR believes *Template 3. Small Forest Landowner Thinning Strategy for Riparian Management Zones in Western Washington* (hereafter called "Template") will provide an additional harvest opportunity that will help address the disproportionate impact of the Forests and Fish Rules on small forest landowners while maintaining riparian function. DNR also requests Board approval of additional clarifying language in portions of Section 21 for ease of use and interpretation. Those clarifications are highlighted in the document.

DNR has also re-inserted Part 1.3, *Alternate Plans for Restoring Riparian Function in Eastern Washington – Identifying Stands at Imminent Risk from Insects, Disease and Fire* into the Board Manual. Part 1.3 of Board Manual Section 21 which was developed by the Small Forest Landowner Advisory Committee (SFLAC) and DNR was approved by the Forest Practices Board on May 21, 2008. When the Board approved Template 2, *Fixed Width Riparian Buffers for Small Forest Landowners in Western Washington*, on February 10, 2010, Part 1.3 of the Board Manual was erroneously removed. Consequently re-insertion of Part 1.3 does not require a Forest Practice Board action.

Part 2, *Alternate Plan Templates for Small Forest Landowners*, of Forest Practices Board Manual Section 21, *Guideline for Alternate Plans,* provides the opportunity for small forest landowners to apply alternate plan templates on smaller harvest units having a relatively low impact on aquatic resources. Alternate plan templates provide flexibility to small forest landowners, and provide protection of riparian functions based on specific field conditions or stream conditions on the landowner's property.

In late fall of 2010, small forest landowner (SFL) representatives presented a low impact riparian strategies proposal to the DNR and members of the Small Forest Landowner Advisory Committee (SFLAC). At this meeting members of the SFLAC and interested stakeholders, raised

1111 WASHINGTON ST SE • PO BOX 47041 • OLYMPIA, WA 98504-7041
TEL: (360) 902-1250 • FAX: (360) 902-1780 • TTY: (360) 902-1125
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concerns that the SFL proposal did not maintain riparian function. As a result, it was agreed to allow the State Caucus (staff from State of Washington Department of Natural Resources, Department of Ecology, and Department of Fish and Wildlife) to create a template using the riparian thinning concepts outlined in the SFL low impact riparian strategies proposal, and addressing the concerns raised at the SFLAC meeting regarding the maintenance of riparian function.

In spring 2011, the State Caucus presented *Template 3. Small Forest Landowner Thinning Strategy for Riparian Management Zones in Western Washington* (Template) to NOAA Fisheries Service, the conservation caucus, and affected Indian Tribes. This Template was approved by all in which it was presented. In summer 2011, the Template was presented to members of the Washington Farm Forestry Association (WFFA) who agreed to allow it to be presented to the Small Forest Landowner Advisory Committee.

On October 5, 2011, a Small Forest Landowner Advisory Committee meeting was held and the Template was presented and discussed. At this meeting, committee members representing small forest landowners stated there was too much difference in prescription metrics between the SFL proposal and the Template and chose not to support continuation of the Board manual development process.

The differences in metrics between the Template and the SFL proposal centered on the eligibility requirements to use this Template for thinning within the riparian area and the actual thinning prescriptions themselves.

In summary, the Template concentrates on maintaining riparian function while conducting thinning activities in areas where appropriate. For this reason, the eligibility requirements for forested conditions in the riparian No Harvest Zone must have a combined relative density of 45 for all tree species. SFL's requested the template eligibility requirement in the No Harvest Zone be a relative density of 20 to account for void areas within the riparian zone containing no trees of any species. This was cause for concern by the State Caucus who felt that a riparian thinning template should not allow a thinning activity to be conducted adjacent to an existing No Harvest Zone that does not provide riparian function.

Thinning prescriptions in the Template concentrated on maintaining riparian function including adequate shade within the riparian area, so thinning to a relative density of 50 was required. The SFL have requested the template contain a lower eligibility requirement, requiring fewer trees in the No Harvest Zone, and a more aggressive thinning regime, to a relative density between 30 and 45, along with small clear cut harvest prescriptions within the riparian zone.

See below for a comparison of the eligibility requirements and the thinning prescriptions for the Template and the SFL proposal:

Eligibility Requirements:

1. Template 3. Small Forest Landowner Thinning Strategy for Riparian Management Zones in Western Washington (Template) Eligibility:
   Eligible stands:
   Those which meet all of the following criteria:
   (A) Owned by small forest landowners;
   (B) Meets the required tree stand density, for the No-Harvest Zone, which is the area within 50 feet of outer edge of BFW of the stream or any CMZ, whichever is greater;
   (C) Not to be harvested by yarding across the stream;
   (D) May not have stream adjacent parallel roads within the RMZ; and
   (E) The pre-harvest stand must have a live crown ratio of ≥ 30% 1.

2. SFL Proposal Eligibility:
   Eligible Stands:
   This template can be used for RMZs that are:
   - Owned by a "Small" forest owner as defined in WAC 222-21-010(13) and RCW 76.13.120(2)(c).
   - Adjacent to any Typed S, F, and Np Waters.
   - Located in Eastern or Western Washington.

Thinning Prescriptions:

1. Template 3. Small Forest Landowner Thinning Strategy for Riparian Management Zones in Western Washington (Template):
   The following conditions comprise the leave tree requirements within the harvested portion of the RMZ:
   (A) A minimum number of conifer trees based on the average stand diameter class must be left on site after thinning, and in all cases these must include 57 conifer trees per acre representing the largest stand size class available before harvest. All leave trees in excess of the required 57 largest conifer trees per acre are to be evenly spaced throughout the RMZ.
   (B) In general, tree harvest is a thinning from below, where, after harvest, the average stand diameter for all remaining trees is larger than the average stand diameter before harvest.
   (C) Some dominants and co-dominants may be harvested as long as after harvest, the average stand diameter for all remaining trees is larger than the average stand diameter before harvest.

1 Live crown ratio refers to the percentage of the tree height that includes live branching. Trees absent branching for 65% or more of their trunk will generally not respond well to thinning.

2. <u>SFL Proposal Harvest Prescriptions:</u>
   RMZ harvest prescriptions using this template may include either or both of the following:
   A. Commercial Thinning Harvests using outcome based limitations.
   B. Small Regeneration/patch (clearcut) Harvest prescriptions that do not individually exceed 500'of stream reach, and additionally:
      i. Are no closer to BFW than 30' on Type S and perennial Type F Waters, except in situations on type F waters where topography, stream orientation, brush, and hardwood trees will provide sufficient riparian function, then small regeneration harvests can occur within the 30 feet, *but only* when approved by the DNR forest practices forester in collaboration with any ID team members.
      ii. Are no closer to BFW than 20' on Seasonal Type F and Type Np Waters, except in situations where topography, stream orientation, brush, and hardwood trees will provide sufficient riparian function, then small regeneration harvests can occur within the 20 feet, *but only* when approved by the DNR forest practices forester in collaboration with any ID team members.
      iii. All combined do not exceed the greater of 500' total, or when more than 500' total do not exceed 40% (each side) of the forested stream reach in the harvest unit.
      iv. Whenever the total stream reach harvest exceeds 500' the individual small regeneration/patch harvests must be separated by forested areas at least as long as the individual stream reach regeneration/patch harvests.
      v. Where applicant owns both sides of the stream, these small regeneration/patch harvests cannot be directly across the stream from one another.
      vi. In the event large woody debris (LWD) recruitment trees are not available in the no harvest zone, a minimum of 15 of the larger trees/1,000' of stream reach that are clearly leaning towards and most apt to eventually fall into the stream naturally shall be left.
      vii. In the event DNR or WDFW determine there is a shortage of in-stream woody debris they may condition this FPA with directional falling instructions - and provide any applicable permits.
      viii. Prior to subsequent small regeneration/patch harvest activities a landowners adjacent (or directly across stream ownership) of previously RMZ harvested areas must be well stocked with an average height of dominant and co-dominant trees equal to or greater in height to bankfull width plus 6 feet. On streams that are greater than 34' in width, the average height of dominant and co-dominant trees does not need to exceed 40 feet.

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. To be approved alternate plans must provide protection ~~for~~ to public resources at least equal in overall effectiveness to the protection provided by the Forest Practices Act and rules. Alternate plans are an option for all landowners.

This Board manual section contains two parts. Part 1 provides a general discussion of alternate plan requirements and riparian function and pertains to all landowners. Part 2 provides information on alternate plan templates for small forest landowners and contains Template 1. Small Forest Landowner Western Washington Thinning ~~Strategies~~ Strategy for Overstocked Conifer-Dominated Riparian Management Zones, Template 2. Fixed Width Riparian Buffers for Small Forest Landowner's in Western Washington and Template 3. Small Forest Landowner Thinning Strategy for Riparian Management Zones, Western Washington. 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. ALTERNATE PLANS

The alternate plan policy is described in WAC 222-12-040. The requirement for the application process, plan preparation responsibilities, required contents and plan review procedures are described in WAC 222-12-0401. Key elements of alternate plans include a map showing locations of:

- Any affected streams and other waters, wetlands, unstable slopes, and existing roads.
- Proposed management activities.

Alternate plans also should include:

- 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 and adaptive management plan.
- Where applicable, an implementation schedule.

1.1 Riparian Function Considerations

Understanding riparian areas and riparian functions 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 woody debris, leaf litter fall, nutrients, sediment filtering, shade, and other riparian features that are important to both riparian forest and aquatic system conditions.

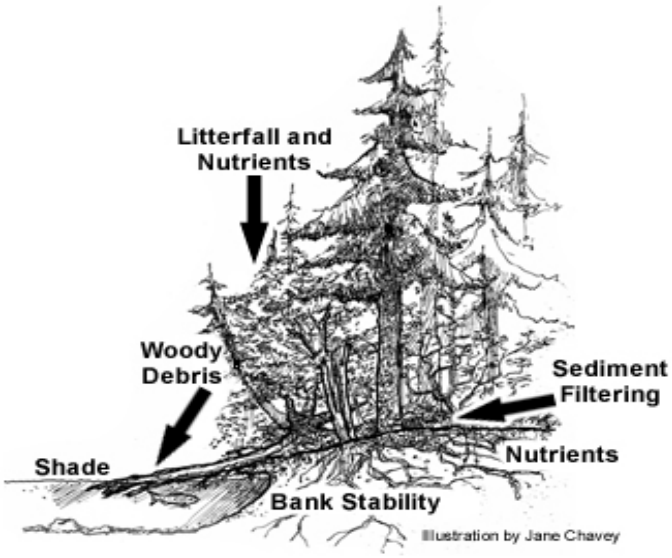

Figure 1. Riparian function.

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

- Stream shading
- Stream bank stability
- Woody debris availability and recruitment
- Sediment filtering
- Nutrients and leaf litter fall

Landowners should understand how riparian areas contribute to overall stream health in order 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.

<u>Areas of Influence</u>

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.

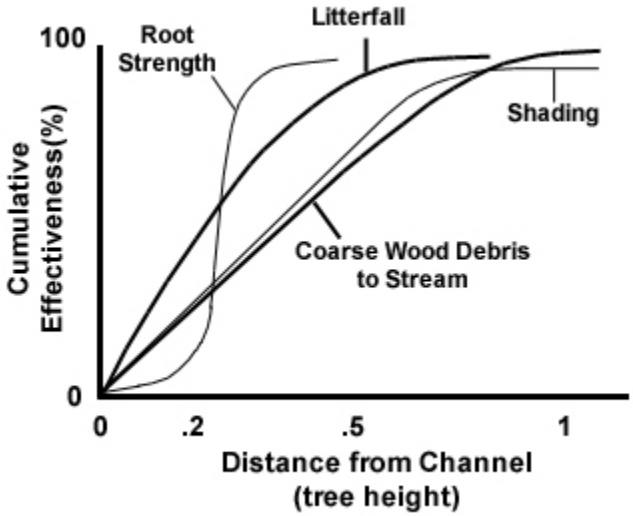

Figure 2. Cumulative effectiveness of various riparian functions.
From Forest Ecosystem Management Assessment Team (FEMAT), (1993).
Forest ecosystem management: an ecological, economic, and social assessment.
Washington DC: US Government Printing Office 1993-793-071.

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 of 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.
- Topography. Local topography, such as steep hill slopes or cliffs may provide shading to the stream.
- 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.
- Understory vegetation. Thick understory vegetation can contribute to stream shading, especially in entrenched or narrow stream channels.
- Canopy openings. Canopy openings naturally occur from bank erosion, vegetation succession, or stream bank disturbances such as flooding, debris flow, fire, or wind.

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. LWD should be of a size (length and width) and species to remain intact and stable for many years. See Board Manual Section 26 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 wind storms.

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 woody debris function. Therefore, both short-term and long-term 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 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. 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 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 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 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.

1.2 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.

Restoring 1.3 as approved by the FPB on May 21, 2008

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

Background

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 five years due to the effects of insects, diseases, pathogens or recent fires, the riparian forest would be expected to have only fifty 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.

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.

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.

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.

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.govlBusinessPermits/Topics/SmallForestLandownerOffice/Pages/fp_sflo_o verview.aspx). 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. In addition, DNR is developing technical guidance for assessing the rate of spread and mortality from forest insects and pathogens, as well as trees damaged by fire. Completed and approved guidance will be posted on the DNR Small Forest Landowner website at http://www.dnr.wa.govlBusinessPermits/Topics/SmallForestLandownerOfficelPages/fp_sflo_overview.aspx.

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 2. 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.

The following Appendices include template prescriptions designed to meet resource objectives to address common situations that are repeatedly addressed in alternate plans or strategies to simplify the development of future plans or strategies, including low impact situations and site-specific physical features.

- Appendix 1
  Template 1. Small Forest Landowner Western Washington Thinning Strategy for Overstocked Conifer-Dominated Riparian Management Zones increases riparian function on stands that have been previously planted in high tree densities that now have suppressed growth and mortality. This template also increases the economic viability of the small forest landowner. Through commercial thinning, these stands can be managed in a manner that will establish understory vegetation and achieve larger diameters of the residual stands faster than would have occurred under a no thinning option.

- Appendix 2
  Template 2. Fixed Width Riparian Buffers for Small Forest Landowners in Western Washington offers the small forest landowner a simplified "fixed width" riparian buffer option for Western Washington Type S and Type F Waters. It establishes a fixed width riparian buffer equal, on average, to the buffer widths occurring when the Desired Future Condition model is applied to meet desired future condition as provided in WAC222-30-021.

- Appendix 3
  Template 3. Small Forest Landowner Thinning Strategy for Riparian Management Zones, Western Washington provides a "thinning strategy" within the riparian management zones adjacent to Type S, F, and Np Waters. It reduces the complexity of the regulatory requirements and the need for significant technical expertise not readily available to small forest landowners, while maintaining riparian function.

Appendix A

Template 1. Small Forest Landowner Western Washington Thinning ~~Strategies~~ Strategy for Overstocked Conifer-Dominated Riparian Management Zones

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 ~~strategies~~ 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 ~~all of~~ the ~~strategies~~ 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 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.~~ 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.

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).

See Part 3. Reference material for selecting appropriate thinning prescriptions.

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 1/2 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 whichever is greater, can be no less than 75 feet. To determine the total widths of the no harvest and thinning zone use ~~the following table~~Table 1.

Table 1
Combined Widths of No Harvest and Thinning Zones
(Measured from the outer edge of bankfull width or channel migration zone)

Site Class	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 harvest~~ing~~ ~~strategies~~ strategy for the thinning zone are:

- 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.

  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.

- 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~~ Equipment ~~limitation~~ Limitation ~~zone~~ 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~~ No ~~harvest~~ Harvest ~~zone~~ Zone and thinning zone.

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

- A distance equal to 1/2 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~~ No ~~harvest~~ Harvest ~~zone~~ Zone must include all conifer trees within the first row nearest the outer edge of BFW.
- The ~~no~~ No ~~harvest~~ Harvest ~~zone~~ 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 strategies for the thinning zone are:

- 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.

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.

- 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.

Large Woody Debris Placement Strategy

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 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).

Small forest landowners are encouraged to consult with the Small Forest Landowner Office (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~~Table 2 below from Board Manual Section 26 gives guidance for optimal LWD piece size in different sized streams.

Table 2
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 whichever is greater (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 a DNR ~~a~~ Forest Practices forester before placement.

Other Permits
A Hydraulic Project Approval (HPA) review is triggered for Type F and S Waters when a forest practices application is submitted to DNR with an attached Western Washington Overstocked Stand Template Addendum that proposes to retain less than 180 trees per acre. An HPA is

required for all woody debris placement in Type F and S Waters and is issued by the WDFW to regulate construction or other activities that "*use, divert, obstruct, or change the natural flow or bed of any. . . waters of the state. . .*" (chapter 220-110 WAC).

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.

Appendix B
Template 2. Fixed Width Riparian Buffers for Small Forest Landowner's in Western Washington

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 desired future condition 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. For eligible stands in western Washington, this template replaces the riparian requirements outlined in WAC 222-30-021.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) whichever is greater, 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/BusinessPermits/Topics/ForestPracticesApplications/Pages/fp_forms.aspx, and under the heading, "Forest Practices Application/Notification", click on "Print an activity map." After navigating to the location of your activity, in the left corner under the "Select a map" button, choose Site Class Map. In the upper right corner, 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 Buffers ~~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

NEW SECTION

APPENDIX C

Template 3. Small Forest Landowner Thinning Strategy for Riparian Management Zones, Western Washington[1]

Background

The Forest Practices Act and rules require the development of small forest landowner (SFL) options for Alternate Plans including templates for smaller harvest units that characterize small forest landowner harvests that may have a relatively low impact on aquatic resources. Many small forest landowners find the process to determine if their timber stands are eligible for riparian inner zone harvest to be expensive to evaluate and complex to implement. The effect can often be a loss of timber income.

Purpose

This template provides a "thinning strategy" within riparian management zones (RMZ) adjacent to Type S, F, and Np Waters. The template also reduces the complexity of the regulatory requirements and the need for significant technical expertise not readily available to small forest landowners.

Process

Landowners submit a completed *Small Forest Landowner Thinning Strategy for Riparian Management Zones* template form, available from DNR, with their forest practices application (FPA) form. This form provides the technical justification required by WAC 222-12-0401(3) (b), (c), and (d), to explain how this Alternate Plan protects riparian function.

It is expected that a landowner using this template will have greater harvest opportunities at lesser operational costs, while still providing comparable protection to the standard forest practices rules for stream buffering. As for any proposed Alternate Plan, however, an Interdisciplinary Team may be used to review the applicability of this template to site-specific harvests (see WAC 222-12-0401(5)).

Landowners planning to conduct a harvest within a 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.

Alternate Plan Harvest Prescriptions – Stream Buffers for Small Forest Landowners

This template offers alternative prescriptions for timber harvest within the riparian forest stands owned by small forest landowners. A SFL submitting an FPA and applying all of the prescriptions of the *Small Forest Landowner Thinning Strategy for Riparian Management Zones* template will achieve the protective standards of WAC 222-30-010(11) through WAC 222-30-022.

[1] Western Washington means the geographic area west of the Cascade Crest.

(ii) Equipment Exclusion Zone Along all Streams in Western Washington
An Equipment Exclusion Zone applies within a 30-foot wide zone measured horizontally from the outer edge of bankfull width (BFW) or the channel migration zone (CMZ), whichever is greater. This requirement applies to all stream types.

2. Type Np Stream Buffers
   a. *Eligibility.* Eligible stands adjacent to Type Np Streams are those owned by small forest landowners without stream adjacent parallel roads within 50 feet of the outer edge of BFW or the CMZ, whichever is greater.
   b. *Buffering of Sensitive Sites.* Buffer all sensitive sites adjacent to Np Waters, as defined in WAC 222-16-010, WAC 222-30-021(2) and WAC 222-30-022(2), and shown in Table 1.

Table 1
Sensitive Site Buffers

Sensitive Sites	No-Harvest Zone
Headwall Seeps	Within 50 feet of the outer perimeter of the perennially saturated soil zone
Side-slope Seeps	Within 50 feet of the outer perimeter of the perennially saturated soil zone
Headwater Springs or, in the absence of a headwater spring, on a point at the upper most extent of a Type Np Water as defined in WAC 222-16-031.	Within a 56-foot radius of spring center
Intersection of Type Np Waters	Within a 56-foot radius of intersection point of the streams
Alluvial fans	No harvest directly on fan

   c. *Riparian Buffer Requirements for Np Waters.*
      (i) For the first 500 feet above the junction with any Type S or F Water, a 50-foot No-Harvest Zone is required from the outer edge of BFW or the CMZ, whichever is greater,
      (ii) For the remaining length of the Type Np Water within the area covered by this stragey, a 50-foot riparian buffer is required from the outer edge of the BFW or the CMZ, whichever is greater. The buffer is required to have a 30-foot No Harvest Zone and an adjacent 20-foot thinning zone. The harvest and retention requirements for the Type Np Water thinning zone are shown in Table 2[2].

[2] This section overrides the Forest Practices Rule requirement to leave 50% of the entire length of the Np Water or 300' whichever is greater.

Table 2

Total conifer trees per acre to be left unharvested in the Type Np Water thinning zone. See table notes.

Number of Live Conifer Trees to be Left After Harvest (RD 50)			**Conifer Even Spacing Guidelines**
Average Stand Diameter	**Trees per Acre**		**Average Spacing**
≤12	221		14
13	196		15
14	175		16
15	159		17
16	143		17
17	131		18
18	120		19
19	111		20
20	103		21
21	95		21
22	89		22
23	83		23
24	78		24
25	74		24
26	69		25
27	65		26
28	62		27
29	59		27
≥30	57		28

Table Notes:

- Landowners having management zones with more than 300 trees per acre consisting of at least 70% conifer may benefit more from using *Template 1. Small Forest Landowner Western Washington Thinning Strategies for Overstocked Conifer-Dominated Riparian Management Zones.*
- Average stand diameter classes are in inches measured at breast height.
- Only trees with a diameter ≥ 6 inches can be used in calculating average pre-harvest stand diameter class.
- All leave trees in excess of the required 57 largest conifer trees per acre are to be evenly spaced throughout the RMZ. Spacing guidelines provided in feet.

3. Thinning Riparian Forests along Type F and Type S Waters (fish-bearing streams).
   a. *Eligibility.* Eligible stands are those which meet all of the following criteria:
      (i) Owned by small forest landowners,
      (ii) Meets the required tree stand density, listed in Table 3, for the No-Harvest Zone, which is the area within 50 feet of outer edge of BFW of the stream or any CMZ, whichever is greater,
      (iii) Not to be harvested by yarding across the stream,
      (iv) May not have stream adjacent parallel roads within the RMZ, and

(v) The pre-harvest stand must have a live crown ratio of ≥ 30 percent[3].

Table 3

No-Harvest Zone must meet the required number of trees per acre by diameter class (all species) to be eligible for timber harvest within the Western Washington tree thinning zone.

Average Stand Diameter (in inches measured at breast height)	**Trees per Acre All Species**	**Average Tree Spacing** (in feet)
≤16	115	19
17	104	20
18	96	21
19	88	22
20	82	23
21	76	24
22	71	25
23	66	26
24	62	27
25	58	27
26	55	28
27	52	29
≥28	50	30

b. *Riparian Management Zone.* This stragegy uses the RMZ widths established in Template 2 *Fixed Width Riparian Buffers for Small Forest Landowners in Western Washington.* The width of the RMZ used in applying these prescriptions (Table 4) is dependent on the site class of the harvest location. RMZ width is measured horizontally from the outer edge of BFW or the outer edge of any CMZ, whichever is greater. For eligible stands, this strategy replaces the riparian requirements outlined in WAC 222-30-021.

Table 4

Fixed width, riparian thinning buffer by site class

(Use legal property description at http://fortress.wa.gov/dnr/app1/fpars/viewer.htm)

Site Class	**Width of RMZ (feet)**
I	145
II	118
III	101
IV	82
V	75

c. *No-Harvest Zone*. No harvest is permitted within the first 50 feet from the outer edge of BFW or any CMZ, whichever is greater.

[3] Live crown ratio refers to the percentage of the tree height that includes live branching. Trees absent branching for 65% or more of their trunk will generally not respond well to thinning.

d. *Tree Thinning and Retention Zone Requirements.* The following conditions comprise the leave tree requirements within the harvested portion of the RMZ (see Part 3. Reference Materials):

(ii) A minimum number of conifer trees based on the average stand diameter class (see Table 5) must be left on site after thinning, and in all cases these must include 57 conifer trees per acre representing the largest stand size class available before harvest. All leave trees in excess of the required 57 largest conifer trees per acre are to be evenly spaced throughout the RMZ.

(iii) In general, tree harvest is a thinning from below, where, after harvest, the average stand diameter for all remaining trees is larger than the average stand diameter before harvest. The guideline for this is d/D<1, see box below. The simplest way to achieve this is to paint-mark trees to be left unharvested beginning with the largest size class and working smaller until the required number of leave trees has been identified.

(iv) Some dominants and co-dominants may be harvested as long as the residual d/D<1 remains.

> 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.

e. *Down Wood Requirements*. All down wood existing prior to harvest should be left within the harvested portion of the RMZ.

Table 5
Total conifer trees per acre to be left unharvested
See table notes.

Number of Live Conifer Trees to be Left After Harvest (RD 50)		Conifer Even Spacing Guidelines
Average Stand Diameter	**Trees per Acre**	**Average Spacing**
≤12	221	14
13	196	15
14	175	16
15	159	17
16	143	17
17	131	18
18	120	19
19	111	20
20	103	21
21	95	21
22	89	22
23	83	23
24	78	24
25	74	24
26	69	25
27	65	26
28	62	27
29	59	27
≥30	57	28

Table Notes:

- Landowners having management zones with more than 300 trees per acre consisting of at least 70% conifer may benefit more from using the *Template 1. Small Forest Landowner Western Washington Thinning Strategies for Overstocked Conifer-Dominated Riparian Management Zones*.
- Average stand diameter is in inches measured at breast height.
- Only trees with a diameter ≥ 6 inches can be used in calculating average pre-harvest stand diameter class.
- All leave trees in excess of the required 57 largest conifer trees per acre are to be evenly spaced throughout the RMZ. Spacing guidelines are provided in feet.

Guidance to assist in determining the specific number of leave trees. To convert the trees per acre requirement into trees per linear distance (in feet) for ease of use, insert the appropriate RMZ Width ("Width") and required Trees Per Acre ("TPA") into the following equation along with the length ("Length") of the harvest along the stream. Trees left in RMZ harvest area per linear foot = **[(Width*Length)/43560] X TPA**

4. DNR Authority to Prevent Material Damage to Public Resources. Nothing in this strategy reduces or eliminates the department's authority to prevent actual or potential material damage to public resources under WAC 222-20-055.

PART 3. REFERENCE MATERIAL FOR SELECTING APPROPRIATE THINNING PRESCRIPTIONS.

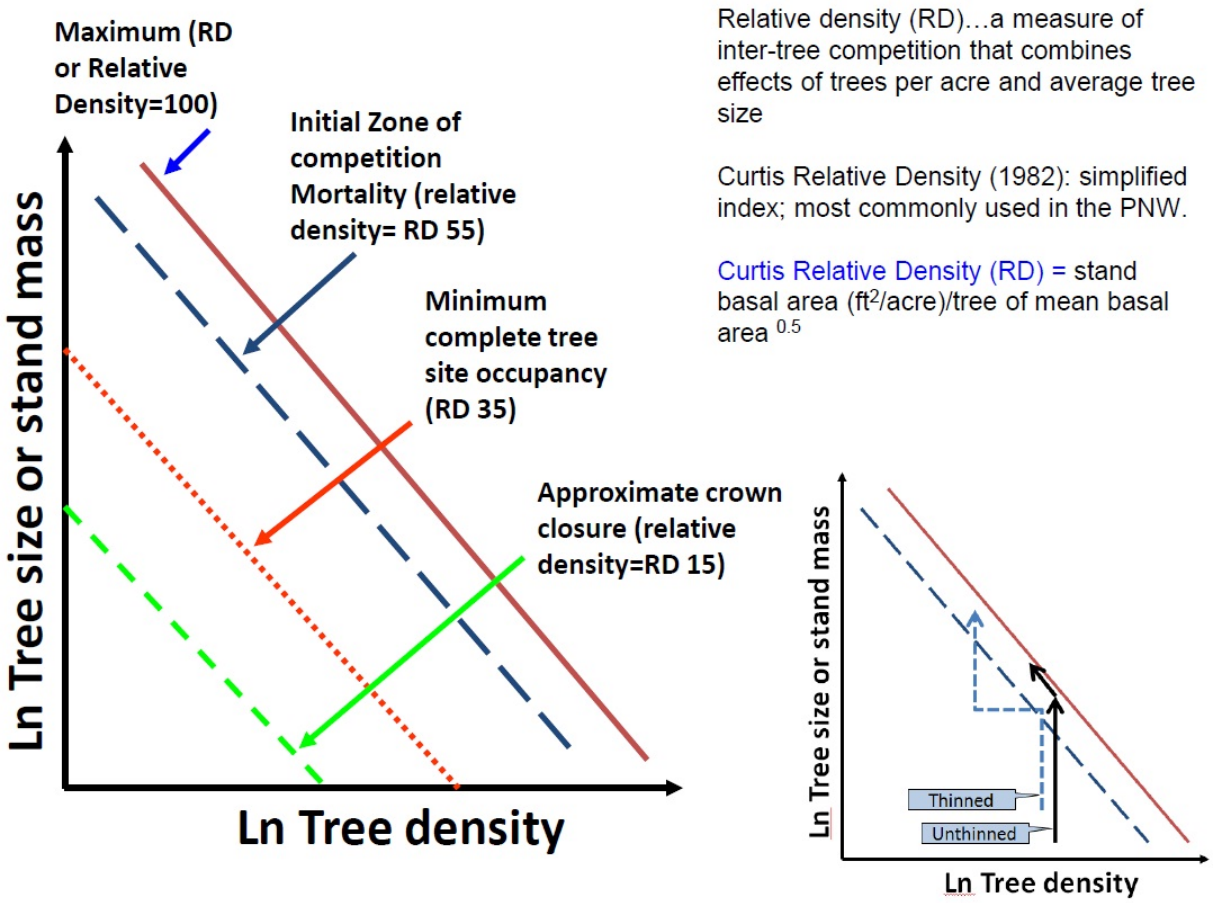

Figure 1. Relative Density and Thinning Opportunities

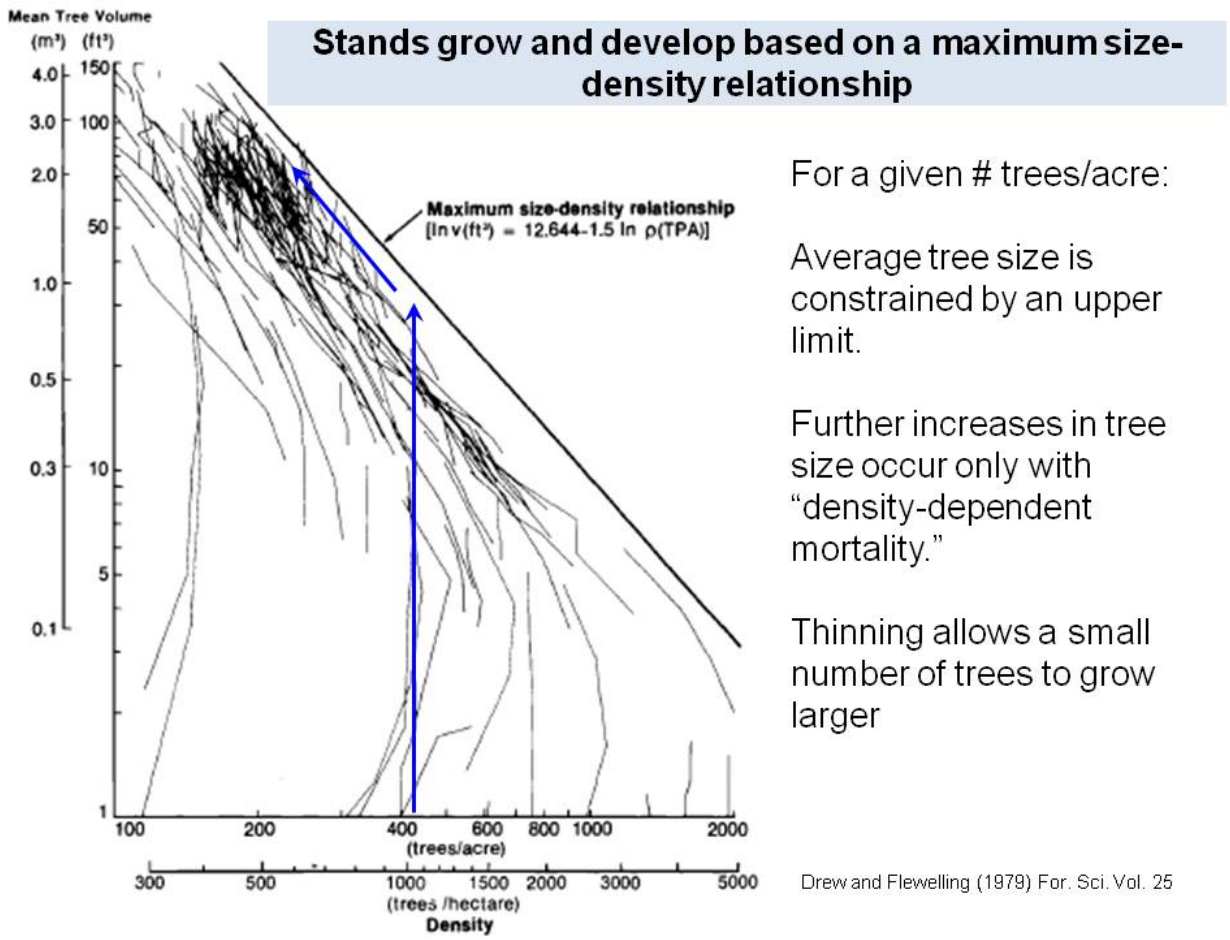

Figure 2. Density Relationship

Table 6
Sideboards on RMZ stand management

	Douglas-fir or spruce predominance	**Western hemlock, western red cedar, or true fir predominance**
Best thinning range	55 ≤ RD ≤ 60	65 ≤ RD ≤ 70
Acceptable thinning range	55 ≤ RD ≤ 80	65 ≤ RD ≤ 90
After thinning, there should be	Crown Ratio ideally ≥ 35% Height/diameter ratio < 95 Stand BA reduced by approximately 30 percent (no more than a 40 percent reduction of pre-thinning RD except when managing specific cohorts and risk has been documented as acceptable)	

Table 7
Relationship of Basal Area and Trees per Acre to Relative Density
Tree/Acre & Spacing

	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450
	42x42	30x30	24x24	21x21	19x19	17x17	16x16	15x15	14x14	13x13	13x13	12x12	12x12	11x11	11x11	10x10	10x10	10x10
40	10	11	13	14	14	15	16	16	17	17	18	18	18	19	19	19	20	20
60	13	16	17	19	20	21	21	22	23	23	24	24	25	25	26	26	27	27
80	16	19	21	23	24	25	26	27	28	29	30	30	31	31	32	33	33	33
100	19	23	25	27	29	30	31	32	33	34	35	36	36	37	38	38	39	40
120	22	26	29	31	33	34	36	37	38	39	40	41	42	43	43	44	45	45
140	25	29	33	35	37	39	40	42	43	44	45	46	47	48	49	49	50	51
160	27	33	36	39	41	43	44	46	47	49	50	51	52	53	54	55	56	56
180	30	36	39	42	45	47	49	50	52	53	54	56	57	58	59	60	61	62
200	32	38	43	46	48	51	53	54	56	57	59	60	61	63	64	65	66	67
220	35	41	46	49	52	54	56	58	60	62	63	64	66	67	68	69	70	71
240	37	44	49	52	55	58	60	62	64	66	67	69	70	72	73	74	75	76
260	39	47	52	56	59	62	64	66	68	70	72	73	75	76	77	79	80	81
280	42	49	55	59	62	65	68	70	72	74	76	77	79	80	82	83	84	86
300	44	52	58	62	66	69	71	74	76	78	80	82	83	85	86	88	89	90
320	46	55	61	65	69	72	75	77	80	82	84	86	87	89	90	92	93	95
340	48	57	63	68	72	75	78	81	83	86	88	90	91	93	95	96	98	99
360	50	60	66	71	75	79	82	84	87	89	91	93	95	97	99	100	102	103
380	52	62	69	74	78	82	85	88	91	93	95	97	99	101	103	105	106	108
400	54	65	72	77	81	85	88	91	94	97	99	101	103	105	107	109	110	112