PROPOSED RULE MAKING

CR-102 (June 2004)
(Implements RCW 34.05.320)
Do **NOT** use for expedited rule making

Agency: Forest Practices Board

☒ **Preproposal Statement of Inquiry was filed as WSR 05-20-097; or**
☐ **Expedited Rule Making--Proposed notice was filed as WSR _____; or**
☐ **Proposal is exempt under RCW 34.05.310(4).**

☒ **Original Notice**
☐ **Supplemental Notice to WSR _____**
☐ **Continuance of WSR _____**

Title of rule and other identifying information: (Describe Subject)
Achieving Desired Future Conditions in Riparian Management Zones. This rule proposal amends WAC 222-30-021 to change timber harvest and leave tree requirements in riparian management zones adjacent to Type S and F Waters as defined in WAC 222-16-030. It pertains to forest lands in Western Washington.

Hearing location(s):
Holiday Inn
3105 Pine Street, Everett / 425.993.2000
Date: Tuesday, March 18, 2008 Time: 6:00 p.m.

Natural Resources Building, Room 172
1111 Washington Street SE
Olympia / 360.902.1400
Date: Thursday, March 20, 2008 Time: 6:00 p.m.

Submit written comments to:
Name: Patricia Anderson, DNR Forest Practices Division
Address: 1111 Washington Street SE
PO Box 47012
Olympia, WA 98504-7012
e-mail forest.practicesboard@wadnr.gov
fax (360) 902-1428 by March 21, 2008

Assistance for persons with disabilities: Contact
Forest Practices Division at (360) 902-1400 by March 10, 2008, TTY (360) 902-1125

Date of intended adoption: May 14, 2008
(Note: This is **NOT** the **effective** date)

Purpose of the proposal and its anticipated effects, including any changes in existing rules: WAC 222-30-021 provides prescriptions and options to harvesting trees in forested "riparian management zones" as defined in WAC 222-16-010.

Pursuant to RCW 76.09.370, the Forest Practices Board incorporates a scientific-based adaptive management process to determine the effectiveness of forest practices rules in aiding Washington's salmon recovery effort. Under this adaptive management process, a scientific study was completed by the Forest Practices Board's Cooperative Monitoring, Evaluation, and Research Committee. The study, entitled *Validation of the Western Washington Riparian Desired Future Condition (DFC) Performance Targets in the Washington State Forest Practices Rules with Data From Mature, Unmanaged, Conifer-Dominated Riparian Stands*. The study's findings were that basal areas per acre of mature, unmanaged conifer-dominated riparian stands are greater than the values used in the rule (see WAC 222-20-021(1) for values in existing rule).

The Board is considering two alternative rule amendments to respond to the study findings. The effects of both would increase the basal area retained in riparian management zones, thereby decreasing allowable harvest.

- The first would increase the target basal area per acre (325 sq. ft. for all site classes) that a forest stand is projected to reach at 140 years from the year of harvest in the riparian management zone.
- The second would increase the target basal area per acre the same as the first alternative rule amendment, and also change the methods of thinning trees in the inner zones – see WAC 222-30-021(1)(b)(ii)(B)(I) and (II)

Reasons supporting proposal: The proposed rule changes are based on recommendations resulting from the scientifically based adaptive management process outlined in WAC 222-12-045. Through this process, the Board has determined that the forest practices rules should be adjusted to ensure that appropriate riparian buffers are maintained on forest land covered by the Forest Practices Act.

Statutory authority for adoption:
RCW 76.09.040 and RCW 76.09.370(6)

Statute being implemented:
N/A

Is rule necessary because of a:

Federal Law?	☐ Yes	☒ No
Federal Court Decision?	☐ Yes	☒ No
State Court Decision?	☐ Yes	☒ No

If yes, CITATION:

CODE REVISER USE ONLY

OFFICE OF THE CODE REVISER
STATE OF WASHINGTON
FILED

DATE: October 16, 2007
TIME: 3:23 PM

WSR 07-21-081

DATE
October 4, 2007

NAME
Victoria Christiansen

SIGNATURE Victoria Christiansen

TITLE
Chair

(COMPLETE REVERSE SIDE)

Agency comments or recommendations, if any, as to statutory language, implementation, enforcement, and fiscal matters:

Name of proponent: (person or organization)
Forest Practices Board

☐ Private
☐ Public
☒ Governmental

Name of agency personnel responsible for:

	Name	Office Location	Phone
Drafting.....	Marc Engel	1111 Washington Street SE, Olympia	(360) 902-1390
Implementation....	Gary Graves	1111 Washington Street SE, Olympia	(360) 902-1483
Enforcement.....	Lenny Young	1111 Washington Street SE, Olympia	(360) 902-1744

Has a small business economic impact statement been prepared under chapter 19.85 RCW?

☒ Yes. Attach copy of small business economic impact statement.

A copy of the statement may be obtained by contacting:
Name: Gretchen Robinson
Address: PO Box 47012
Olympia, WA 98504-7012

phone (360) 902-1705
fax (360)902-1428
e-mail gretchen.robinson@dnr.wa.gov

☐ No. Explain why no statement was prepared.

Is a cost-benefit analysis required under RCW 34.05.328?

☒ Yes A preliminary cost-benefit analysis may be obtained by contacting:
Name: Gretchen Robinson
Address: PO Box 47012
Olympia, WA 98504-7012
phone (360) 902-1705
fax (360)902-1428
e-mail gretchen.robinson@dnr.wa.gov

Note: The small business economic impact statement and the preliminary cost-benefit analysis are combined in the document, *Preliminary Economic Analysis, Forest Practices Rule Making, Affecting Timber Harvest in Riparian Zones in Western Washington..*

☐ No: Please explain:

PRELIMINARY ECONOMIC ANALYSIS
Forest Practices Rule Making
Affecting Timber Harvest in Riparian Zones in Western Washington
By Donald Krug, Economist, Department of Natural Resources
September 2007

OBJECTIVES

The Forest Practices Board will be considering permanent rule making that will affect timber harvest in riparian management zones in Western Washington. The objectives of this economic analysis are to determine whether the benefits of the proposed rules exceed the costs, and whether the compliance costs of the proposed rules will disproportionately affect the state's small businesses.

The Administrative Procedure Act (chapter RCW 34.05)[1] requires completion of a Cost-Benefit Analysis (CBA) prior to rule adoption that demonstrates that probable benefits of the proposal exceed its probable costs and that it is the most cost-effective means of achieving the goal of the rule change. A Small Business Economic Impact Statement (SBEIS) is required by the Regulatory Fairness Act (chapter RCW 19.85)[2] to consider the impacts of state administrative rules on small businesses, defined as those with 50 or fewer employees. An SBEIS compares the costs of compliance for small businesses with the cost of compliance for the ten percent of businesses that are the largest businesses required to comply with the proposed rules.

This economic analysis combines the SBEIS and the CBA and complies with the legislative requirements for these analyses as part of the rule making process.

HISTORICAL CONTEXT

The Forests and Fish negotiations resulted in rules that manage timber harvest in riparian zones, one of the objectives of which is to reach Desired Future Conditions (DFC). The DFC of a riparian forest is a timber stand that demonstrates the characteristics of mature, unmanaged riparian stands at age 140[3]. One of the target metrics chosen to create these characteristics was basal area per acre at age 140 (bapa-140), with targets varying by site class.

As part of the adaptive management process, the Riparian Scientific Advisory Group (RSAG) of the Cooperative Monitoring, Evaluation and Research Committee (CMER) commissioned a study of mature, unmanaged riparian forest stands in Western Washington (Schuett-Hames et al., 2005)[4]. One of the objectives of this study was to determine whether the bapa-140 targets in the forest practices rules were appropriate. The study concluded that the basal area targets are incorrect, but did not provide alternative target values. The study also concluded that there is no statistical difference for basal area targets between site classes.

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[1] For CBA requirements, see Chapter 34.05.328 RCW - The Washington State Legislature.
[2] For SBEIS requirements, see Chapter 19.85.040 RCW - The Washington State Legislature.
[3] See Forest Practices Rules - Title 222 WAC for details.
[4] This study is available at http://www.dnr.wa.gov/forestpractices/adaptivemanagement/cmer/publications/CMER_05_507.pdf

PROPOSED RULES SUMMARY

This rule proposal changes the DFC target basal area at year 140 (bapa-140). The Forest Practices Board is considering using one value for all site classes, and to use the median value for total live basal area per acre of the Schuett-Hames et al. study data, which is 325. The Board is also considering an alternative proposal developed by the timber industry.

ECONOMIC ANALYSIS

To comply with the Administrative Procedure Act and Regulatory Fairness Act this analysis identifies potentially affected industries, defines small and large businesses and determines if there is a disproportionate economic impact on small businesses.

Potentially Affected Industries

The rule-complying community affected by the proposal is businesses that own or control the cutting rights on forestland or those with the right to dispose of the timber.

Small Businesses Versus Large Businesses

The Regulatory Fairness Act defines a "small business" as one with 50 or fewer employees. Forest ownership acreage is generally a more appropriate metric for characterizing small businesses in the timber industry. Small businesses are identified in this economic analysis as those meeting the state's eligibility criteria for small forest landowner status in the Forestry Riparian Easement Program; generally those who harvest less than two million board feet per year. All other private landowners are categorized as "large businesses" for purposes of this analysis.

Benefits and Costs Included in the Analysis

The costs of the rule change are measured as the potential loss of timber revenue, based on an estimate of the timber volume that is annually affected by the rule making. The benefits are related to the value of protecting habitat for fish and wildlife. These benefits cannot be quantified in this analysis because there is no known research applicable to Washington that quantifies the marginal benefits of protecting riparian habitat. Methodology is further discussed below.

Involvement of Concerned Stakeholders

This rule making is the result of the Forests and Fish adaptive management process described in WAC 222-12-045. This is a formal process including scientists and policy makers who represent stakeholders of Washington forest practices: Landowners of large and small forest land acreage, environmental and conservation organizations, tribal organizations, federal and state natural resource agencies, and Washington counties.

In reaction to the findings of the Schuett-Hames report, Forests and Fish Policy petitioned the Forest Practices Board to consider rule making responsive to the findings of the study. DNR's Forest Practices Division held nine stakeholder meetings from May 2006 to November 2006 to develop a rule proposal that would be responsive to the study results. Stakeholder agreement was

not reached on what changes should be made to the basal area targets, and the Board is considering using the study's median value of 325 square feet per acre for all site classes.

METHODS OF ANALYSIS

This analysis includes the following:

- The effects of a change in bapa-140 targets to 325 (median value from Schuett-Hames report) for all site classes
- For comparison purposes, the effects of a change in bapa-140 targets to 341 (mean value) for all site classes
- The effects of a proposal to change bapa-140 targets to 325 and modify other provisions of existing rules ("industry proposal").

These scenarios are analyzed for two harvest options as appropriate. Please refer to WAC 222-30-021(1)(b)(ii)(B)(I)(II), and Section 7 of the Forest Practices Board Manual for existing rules and information pertaining to riparian zone harvest.

The industry proposal's option 1 is a simplified thinning option that requires a minimum number of leave conifers in the inner zone, based on average diameter. These range from 65 trees per acre (tpa) for 18-inch conifers (dbh) to 100 trees per acre averaging 8 inches in diameter. Besides this, the proposal differs from existing regulations and from the 325 and 341 scenarios in the following ways:

- All site classes and stream widths have an RMZ width of 100 feet with a 50 foot core zone and a 50 foot inner zone.
- There is no outer zone.
- Thinning does not have to be "from below"— the largest trees do not have to be left.

The industry proposal's option 2 is similar to the bapa-140 of 325 scenario, except:

- The 20 tpa leave trees that must be left in the cut portion of the inner zone can be credited to meeting the bapa-140 target of 325.
- There are no minimum no-cut floors in the inner zone.
- All harvest sites, regardless of stream size and site class, are eligible to use option 2.

The changes included in the industry proposal necessitate a more complicated approach to the analyses than would have been the case if proposed changes were limited to changing bapa-140 targets. This analysis estimates changes in the tree inventory that would be left in the inner and outer zones under existing regulations as well as the three scenarios listed above.[5] The effects on annual harvest in riparian zones for the three scenarios can then be calculated using existing regulations as the base case.

These estimates are based on a statewide extrapolation of the data set used by McConnell et al. in the draft CMER report, *An Analysis of Forest Practices Applications: DFC Model Projected Core and Inner Zone Basal Areas at Stand Age 140 for FFR Riparian Prescriptions and the*

[5] Outer zone trees are included in the analyses to ensure the comparability of the scenarios, to account for the industry proposal's option 1, which has no outer zone.

Relative Effect of Rule Components on the Results Obtained. The data set consists of 150 randomly selected Forest Practices Applications (FPAs) from 2003 and 2004 that proposed timber harvesting from within the inner portion of the riparian zone in Western Washington.

The data set includes applicant-provided information as well as outputs from the model utilized to determine harvest requirements in riparian zones. The applicant provides stand characteristics, including an inventory of standing trees, both conifers and hardwoods. The model calculates basal area per acre (bapa) and projected bapa-140 without harvest, as well as bapa and projected bapa-140 attained by following the harvest regime that can take place utilizing the two options available. The harvest regime provided by the DFC model takes into account additional constraints: trees per acre minimums (for option 1) and minimum inner zone floor widths (for option 2).

The DFC model determines the change in post-harvest basal area per acre from the time of harvest to year 140 based on the interaction of a number of stand factors, including stand age, species mix, trees per acre (tpa), current basal area, and site class. The model was designed using existing bapa-140 targets, and because these bapa-140 targets are hardwired into the model, it does not have the flexibility needed to change these bapa-140 targets. Given these circumstances, this analysis estimates the effects of changing these targets by calculating the additional conifers that need to be left in order to meet DFC, assuming that the model's growth projections hold at higher bapa-140 targets.

The estimation of the number of conifers that need to be left to meet the proposed rule is calculated differently for option 1 and option 2. For option 1, Forest Practices rules require the largest conifers be left to meet DFC. The model calculates the diameter at breast height (dbh) of the first tree that can be cut in the inner zone (marginal tree dbh) after existing DFC constraints have been met, and this is the size of tree that is used in this analysis to determine the tree volume that needs to be left to meet bapa-140 under existing rules, bapa-140 of 325 and bapa-140 of 341 for each FPA. This is actually a "tree-equivalent" measure, because for some FPAs in the data set, meeting bapa-140 will necessitate leaving larger numbers of smaller trees once the supply of trees sized at the marginal tree dbh is exhausted. This analysis thus calculates the additional trees needed to meet changes in bapa-140 targets separately for each FPA in the data set.

For the industry proposal option 1, conifer inventory data is used to determine if the harvest site meets proposed dbh/tpa targets. If the site meets the relevant target, the minimum number of trees necessary to meet the target is calculated in two ways: assuming that the average dbh is maintained, and assuming that the minimum dbh target that can be met on the site is attained.

Option 2 assumes that conifer inventory is evenly spaced throughout the inner area of the riparian zone, and is therefore not sensitive to tree inventory distribution by dbh in the inner zone. The inner zone no-cut floor is calculated based on the relative contributions of the core and inner zones to meeting bapa-140, crediting cut-area leave trees for the industry proposal. Under option 2, harvesters that are constrained by the minimum floor area may harvest up to one-half of the trees in the outer riparian zone on a basal area for basal area basis (maintaining a minimum of 10 trees per acre), reported as a basal area credit. Increasing bapa-140 targets will affect this

credit, but since the model provides insufficient information to calculate this, these trees have been ignored for this analysis.

Option 1 or Option 2?
In existing rules, applications for harvest in riparian areas in Site Class I, II, or on small streams in Class III have two options for harvest. Others must use option 1. Of the 150 FPAs in the data set, 108 may use option 2. All but six of these FPAs chose option 2 as their harvest regime. This appears to be more a reflection of ease of operations than harvest level, since option 2 generally results in more leave trees than option 1. For this reason, this analysis does not attempt to choose the option that results in the largest inner-zone harvest for each FPA. The scenarios analyzed may affect the relative attractiveness of options 1 and 2, particularly for the industry proposal.

Estimating the value of the additional trees that need to be left in order to meet higher bapa-140 targets.
To meet the requirements of a cost-benefit analysis, the change in the number of leave trees under each scenario were calculated for each FPA under options 1 and 2. Although different combinations of scenarios and options result in different average tree diameters, the average tree diameter of the data set was used, which is 14 inches. Timber volume was converted to stumpage values using 2007 DNR timber sales data for Western Washington.

ANALYSIS OF COSTS

Estimating the number of leave trees under each scenario.

McConnell et al's report provides information generated by running the DFC model on the 150 sample FPAs, as well as additional information that was calculated from the model outputs. The following data from McConnell et al's data set was used in this economic analysis:

- Site characteristics: site class, stream size, major species (Douglas Fir or Western Hemlock), core and inner zone acreage, stand age
- Tree inventory data
- Attributes calculated from these data: core and inner zone trees per acre (tpa), current basal area per acre (bapa), projected no-cut basal area per acre at age 140 (bapa-140), outer zone leave trees
- Attributes following model-generated prescription (reported for core and inner zones as appropriate): current bapa, bapa-140, size of first tree that may be cut (marginal tree dbh), tpa (option 1), no-cut floor (width of no-cut portion of inner zone, option 2).

A critical assumption is made in order to estimate the number of additional trees that would need to be left to meet higher bapa-140 targets -- that the relationship between bapa and bapa-140 holds at higher target bapa-140 levels. Further analysis on this issue would help illuminate the effects of the proposed rule change on policy objectives.

The process used was as follows for option 1:

1. For each FPA, the difference between bapa-140 under current rules and bapa-140 targets of 325 and 341 was calculated. The result is the amount of additional bapa-140 that needs to be added back in order to meet higher bapa-140 targets.
2. A "growth factor" was calculated for each FPA, representing the relative change in bapa (from time of harvest to age 140) after instituting the model-generated thinning prescription.
3. The difference calculated in step 1 above was adjusted to account for this growth, and converted into a count of trees by dividing by the basal area for the marginal-size tree for each individual FPA.
4. For the industry proposal, each FPA was checked against the appropriate dbh/tpa benchmark. If it met the benchmark, leave tree volume was calculated using two methods: assuming stand inventory dbh was maintained, and assuming the minimum dbh-category benchmark was met, given the existing tree inventory.

For option 2, the following process was used:

1. The basal area at age 140 (ba-140) contribution of the core zones and inner zones were calculated.
2. The amount of excess core zone plus inner zone ba-140 was calculated (if any).
3. The proportion of the inner zone that could be harvested while meeting ba-140 targets was determined, crediting the 20 tpa that must be left in the cut portion of the inner zone (for the industry proposal only).
4. The no-cut floor was calculated.
5. For the 42 FPAs that are not eligible to use option 2, option 1 results are substituted in the summary statistics except for the industry proposal, which allows option 2 for these FPAs.

For each FPA in the data set, this results in a count of the leave trees for each scenario. These calculations were checked against the inventory of trees available for harvest in the inner zone under current rules to ensure that sufficient trees were available to leave. The average dbh of leave trees varies among FPAs and between scenarios; to simplify the presentation of the findings, the average diameter conifer in the 150 FPA data set is used (14 inches).

Table 1 compares the constraints among the scenarios. Highlights include:

- Using option 1, about half the FPAs are constrained by bapa-140 of 325, and 62% are constrained by bapa-140 of 341, compared to five percent constrained by current bapa-140 targets. The others are constrained by the 57 trees per acre provision.
- Using option 2, about three-quarters of FPAs are constrained by bapa-140 of 325, and 89% are constrained by bapa-140 of 341, more than double the number constrained by current targets. The others are constrained by minimum no-cut floors.
- Higher bapa-140 targets preclude inner zone harvesting of conifers in considerably more FPAs under option 2 than under option 1.
- Eight of the 150 FPAs do not meet the dbh/tpa benchmarks under industry proposal option 1, and would not be able to harvest in the inner zone.

- 17% of the FPAs would not be able to harvest conifers in the inner zone under industry proposal option 2, similar to the rate for bapa-140 target of 325.

Table 1
Bapa-140 and Harvest Constraints

	Option 1				Option 2			
	Existing rules	325	341	Industry proposal	Existing rules	325	341	Industry proposal
Constrained by bapa-140	8/150	74/150	93/150	NA	40/108	83/108	96/108	NA
Percent	12%	49%	62%	NA	37%	77%	89%	NA
No conifers harvested in inner zone	3/150	7/150	13/150	8/150	1/108	17/108	31/108	26/150
Percent	2%	5%	9%	5%	1%	16%	29%	17%

Table 2 on the next page summarizes the number of trees that would be left in the inner and outer zones for each scenario for the 150 sample FPAs. **These are reported as 14 inch tree-equivalents in order to facilitate comparison.** The actual average diameter of leave trees varies, from 19 inches (option 1 – existing regulations) to 11 inches (industry proposal option 1, assuming minimum diameter trees are left). To account for the 42 FPAs that cannot use option 2 under the existing regulations, bapa-140 of 325 and bapa-140 of 341 scenarios, option 1 results are substituted in the analysis.

Table 2
Leave Tree Data for Harvest Option Scenarios

	Inner Zone and Outer Zone 14-inch Leave Conifers	Inner Zone	Outer Zone	Percent of Inner Zone Conifers Left	Change in Leave Trees from Existing Rules
Option 1					
Total inventory conifers	NA	46,202	NA		
Existing rules	26,245	22,553	3,692	49%	
325 proposal	29,702	26,010	3,692	56 %	3,457
341 proposal	31,402	27,710	3,692	60%	5,157
Industry proposal @ average dbh	17,634	17,634	-	38%	(8,611)
Industry proposal @ minimum dbh	16,053	16,053	-	35%	(10,192)
Option 2					
Total inventory conifers	NA	44,679	NA		
Existing rules	33,760	29,971	3,789	67%	
325 proposal	38,145	34,356	3,789	77%	4,385
341 proposal	40,166	36,377	3,789	81%	6,406
Industry proposal	38,676	34,887	3,789	78%	4,916

Comparison between options 1 and 2. Option 2 leaves considerably more trees for each scenario. Under existing regulations, for example, half of the inner zone conifer inventory is left under option 1, and two-thirds is left under option 2.

Option 1 results. Changing the bapa-140 targets to 325 and 341 results in an additional 3,457 and 5,157 inner zone leave conifers, respectively, corresponding to increases of seven and eleven percent of total conifer inventory.

Industry proposal option 1. Assuming that the inner zone conifer average diameter is maintained, an additional 11 percent of the conifer inner zone volume is harvested above that permitted by existing regulations, along with 3,692 outer-zone conifers, corresponding to 8,611 additional trees harvested. Because harvesters are not required to maintain inner zone average conifer diameter, and the dbh/tpa combinations at lower diameters have lower basal area, we can assume that some harvests will be made at lower average diameters if the smaller trees are available in the inventory. To analyze whether this could significantly affect leave tree volume, the minimum diameter dbh-tpa benchmark was calculated for each FPA, accounting for conifer inventory. While the average diameter assumption results in leaving 17,634 trees averaging 14 inches in diameter, the minimum diameter assumption results in leaving 21,388 trees averaging 11 inches in diameter. This corresponds to 16,053 14-inch leave conifers, a decrease of 1,579 leave trees from the average diameter assumption.

Comparison of industry proposal option 1 with proposed option 1 bapa-140 of 325. The industry proposal leaves a similar number of conifers as the bapa-140 of 325 proposal, but impacts the average diameter of leave trees. The bapa-140 of 325 proposal leaves 21,886 trees averaging 19 inches in diameter, and the industry proposal leaves 21,388 trees averaging 11 inches in diameter (assuming the dbh/tpa benchmark is attained by leaving the smallest trees available).

Option 2 results. Changing the bapa-140 targets to 325 and 341 results in an additional 4,385 and 6,406 inner zone leave conifers, respectively, corresponding to increases of ten and fourteen percent of total conifer inventory.

The industry proposal option 2 may be used by all harvesters, whereas the existing regulations and the 325 and 341 proposals restrict site class 3-large streams and site class 4 and 5 riparian harvest sites to option 1. The total number of leave conifers under the industry proposal is about 5,000 higher than is left under existing regulations, and similar to that of bapa-140 of 325, reflecting higher leave tree requirements to meet option 2 than to meet option 1. This increased number of leave trees from the 42 FPAs that would no longer be precluded from using option 2 counterbalances the additional trees that would be harvested due to the elimination of minimum no-cut inner zone minimum floors, and the crediting of 20 leave trees per acre in the cut portion of the inner zone to bapa targets. Eliminating minimum floors and allowing harvesters to credit these leave trees decreases the no-cut floor by an average of 2 feet.

Statewide extrapolation

The data set used in McConnell et al. was randomly selected from all of the FPAs that included riparian inner-zone harvest in 2003 and 2004. The draft report mentions that some FPAs were dropped for various reasons, and that in cases where there was more than one “stream reach”, the first stream reach was chosen. For the purposes of extrapolation, these additional stream reaches are the equivalent of additional FPAs. There are 348 stream reaches in the 150 sample FPAs, or 2.32 stream reaches per FPA. There were 391 FPAs that included riparian zone harvest in 2003, and 444 in 2004, for an average of 418. There are, therefore, an estimated 970 stream reaches where riparian zone harvest activity is proposed annually, approximately 6.5 times more riparian area harvest activity per year than is found in the 150 survey FPAs. Table 3 adjusts the findings in Table 2 to a statewide extrapolation.

Table 3
Statewide Extrapolation: Leave Tree Data for Harvest Option Scenarios

	Inner Zone and Outer Zone 14-inch Leave Conifers	Inner Zone	Outer Zone	Percent of Inner Zone Conifers Left	Change in Leave Trees from Existing Rules
Option 1					
Total inventory conifers	NA	300,313	NA		
Existing rules	170,593	146,596	23,996	49%	
325 proposal	193,063	169,067	23,996	56%	22,471
341 proposal	204,113	180,117	23,996	60%	33,521
Industry proposal @ average dbh	114,621	114,621		38%	(55,972)
Industry proposal @ minimum dbh	104,345	104,345		35%	(66,248)
Option 2					
Total inventory conifers	NA	290,414	NA		
Existing rules	219,440	194,814	24,626	67%	
325 proposal	247,943	223,317	24,626	77%	28,503
341 proposal	261,079	236,453	24,626	81%	41,639
Industry proposal	251,394	226,768	24,626	78%	31,954

Calculating timber volume and stumpage value
The most accurate estimate of timber volume would calculate basal area for each FPA based on diameter (dbh) as well as site characteristics (site class, stand age, and species). Given time constraints, a simpler approach was used in this analysis, based on the following tables in the USFS Foresters Field Handbook:

- Westside Douglas Fir 50-Year Site Index table (to estimate tree height from site index and stand age)
- Board foot volume table for young Douglas Fir Scribner Log Rule.

The average tree height (119 feet) was estimated based on the average stand age (52) and average site index (116) of the data set. Volume was then calculated for a 14 inch diameter Douglas Fir of this height -- 218 board feet per tree. Stumpage value was calculated based on recent DNR timber sales in western Washington. The stumpage price used was $400/mbf, appropriate for 12 to 18 inch diameter trees. This is net of costs, assumed to be $150 per thousand board feet (mbf). This results in a stumpage value of $87.20 per tree.

Table 4 presents leave conifer timber value for each scenario. Increasing the bapa-140 target to 325 results in an annual stumpage value loss of $2.0 million under option 1 and $2.5 million under option 2; increasing the bapa-140 target to 341 results in losses of $2.9 million and $3.6

million, respectively. Industry proposal option 1 results in an annual gain of between $4.9 and $5.8 million over existing regulations, while option 2 results in a loss of $2.8 million.

Table 4
Stumpage Value

	Inner Zone and Outer Zone 14-inch Leave Conifers	Inner Zone	Outer Zone	Change in Leave Trees from Existing Rules
Option 1				
Total inventory conifers	NA	$26,187,294	NA	
Existing rules	$14,875,666	$12,783,202	$2,092,464	
325 proposal	$16,835,094	$14,742,630	$2,092,464	$1,959,428
341 proposal	$17,798,654	$15,706,190	$2,092,464	$2,922,988
Industry proposal @ average dbh	$9,994,951	$9,994,951		($4,880,715)
Industry proposal @ minimum dbh	$9,098,840	$90,98,840		($5,776,826)
Option 2				
Total inventory conifers	NA	$25,324,057	NA	
Existing rules	$19,135,168	$16,987,806	$2,147,362	
325 proposal	$21,620,586	$19,473,224	$2,147,362	$2,485,418
341 proposal	$22,766,089	$20,618,727	$2,147,362	$3,630,921
Industry proposal	$21,921,557	$19,774,195	$2,147,362	$2,786,389

Small Business Impacts
The 150 FPAs in the sample were not identified as to Small Forest Landowner status. Anecdotal evidence suggests that non-industrial harvesters are less likely to consider harvesting in riparian zones, due to the complicated nature of following the rules, such as the requirement to inventory each tree by two-inch diameter class. Those that choose to harvest may be more likely to utilize option 2, which is simpler to set up, in spite of the fact that option 1 usually allows more harvesting than option 2. Under these circumstances, we estimate that the effects on small business are similar to the industry as a whole for the bapa-140 of 325 and 341 scenarios.

The industry proposal's option 1 scenario facilitates the setting up of timber harvests compared to existing regulations, and therefore may induce more harvesters to thin riparian area inner zones. Small forest landowners would likely benefit to a relatively greater extent than industry.

BENEFITS

The benefits of the proposed rule change cannot be reasonably estimated because they occur at the margin, and marginal benefits of protecting riparian areas haven't been studied. That said, the major benefit of limiting harvest in riparian areas is to reach DFC, particularly the improved

recruitment of large woody debris to the adjoining stream. There was a significant amount of discussion during the Forest and Fish negotiations as to how much thinning was appropriate to facilitate meeting DFC.

In 20 of the 150 sample FPAs, bapa-140 increased after the prescribed thinning compared to bapa-140 without a thinning. On the other hand, none of the 108 eligible FPAs increased bapa-140 after an option 2 treatment. The fact that the vast majority (102 out of 108) of FPAs in the sample chose option 2 over the thinning option even though more trees are left under option 2, and the large standard deviation in the mature stands reported by the Schuett-Hames study, suggest that the current regime may be counterproductive for stands that would benefit from thinning but cannot meet bapa-140 targets. Increasing bapa-140 targets may exacerbate the situation.

The benefits of industry proposal option 1 are even more difficult to analyze. If the proposal meets bapa-140 targets, it offers improved efficiencies in doing so, and would be simpler to implement. However, near-term riparian function may be affected if harvesters choose to reduce the average dbh of the riparian zone through thinning.

CONCLUSION

This economic analysis estimates the costs of the proposed rule making on an annual basis. Costs are defined as the annual statewide decrease in timber harvest revenue resulting from the proposed rule change.

The annual stumpage value of trees not harvested due to increasing the basal area per acre at age 140 to 325 is $2.0 million under option 1 and $2.5 million under option 2. The industry proposal analyzed here allows the harvest of an additional $4.9 million of stumpage value annually under option 1. Under option 2, an additional stumpage value of $2.8 million is not harvested annually.

As discussed in the report, this analysis necessitated making a number of assumptions that were not field tested. These findings should therefore be considered at best as providing an indication of the scale of the effects of the proposed rule change.

Benefits are identified but not quantified due to the lack of relevant information. While we can generally conclude that the benefits of protecting riparian areas are considerable, of perhaps greater concern are outstanding questions related to whether increasing basal area-140 targets are in fact improving the chances of meeting Desired Future Conditions. Consideration should also be given to the distribution of costs and benefits.

While the benefits accrue generally, the costs are borne by a limited number of Forest Practices applicants. The effects on individual applications vary considerably. About half of the FPAs are unaffected by changing the bapa-140 target to 325 or 341, because they have more than sufficient basal area, and would still be constrained by the 57 trees-per-acre requirement. On the other hand, as mentioned previously, one third of the FPAs would be precluded from option 2 harvesting at a bapa-140 target of 325, and almost half at 341, because they are unable to meet bapa-140 in the core plus inner zones (which is narrower under option 1 than option 2 for some

combinations of site class and stream size). Industry proposal option 1 is generally more favorable to higher site classes than existing regulations, due to smaller inner zone widths.

AMENDATORY SECTION (Amending WSR 05-12-119, filed 5/31/05, effective 7/1/05)

WAC 222-30-021 *Western Washington riparian management zones. These rules apply to all typed waters on forest land in Western Washington, except as provided in WAC 222-30-023. RMZs are measured horizontally from the outer edge of the bankfull width or channel migration zone, whichever is greater, and extend to the limits as described in this section. See the board manual section 7 for riparian design and layout guidelines.

*(1) **Western Washington RMZs for Type S and F Waters** have three zones: The core zone is nearest to the water, the inner zone is the middle zone, and the outer zone is furthest from the water. (See definitions in WAC 222-16-010.) RMZ dimensions vary depending on the site class of the land, the management harvest option, and the bankfull width of the stream. See tables for management options 1 and 2 below.

None of the limitations on harvest in each of the three zones listed below will preclude or limit the construction and maintenance of roads for the purpose of crossing streams in WAC 222-24-030 and 222-24-050, or the creation and use of yarding corridors in WAC 222-30-060(1).

The shade requirements in WAC 222-30-040 must be met regardless of harvest opportunities provided in the inner zone RMZ rules. See the board manual section 1.

(a) **Core zones.** No timber harvest or construction is allowed in the core zone except operations related to forest roads as detailed in subsection (1) of this section. Any trees cut for or damaged by yarding corridors in the core zone must be left on the site. Any trees cut as a result of road construction to cross a stream may be removed from the site, unless used as part of a large woody debris placement strategy or as needed to reach stand requirements.

(b) **Inner zones.** Forest practices in the inner zone must be conducted in such a way as to meet or exceed stand requirements to achieve the goal in WAC 222-30-010(2). The width of the inner zone is determined by site class, bankfull width, and management option. Timber harvest in this zone must be consistent with the stand requirements in order to reach the desired future condition targets.

"Stand requirement" means a number of trees per acre, the basal area and the proportion of conifer in the combined inner zone and adjacent core zone so that the growth of the trees would meet desired future conditions. The following table defines basal area targets when the stand is 140 years old.

Site Class	Desired future condition target basal area per acre (at 140 years)
I	((~~285~~)) 325 sq. ft.
II	((~~275~~)) 325 sq. ft.
III	((~~258~~)) 325 sq. ft.
IV	((~~224~~)) 325 sq. ft.
V	((~~190~~)) 325 sq. ft.

Growth modeling is necessary to calculate whether a particular stand meets stand requirement and is on a trajectory towards these desired future condition basal area target. The appropriate growth model will be based on stand characteristics and will include at a minimum, the following components: The number of trees by diameter class, the percent of conifer and hardwood, and the age of the stand. See the board manual section 7.

(i) **Hardwood conversion in the inner zone.** When the existing stands in the combined core and inner zone do not meet stand requirements, no harvest is permitted in the inner zone, except in connection with hardwood conversion.

(A) The landowner may elect to convert hardwood-dominated stands in the **inner zone** to conifer-dominated stands. Harvesting and replanting shall be in accordance with the following limits:

(I) Conversion activities in the **inner zone** of any harvest unit are only allowed where all of the following are present:

- Existing stands in the combined core and inner zone do not meet stand requirements (WAC 222-30-021 (1)(b));
- There are fewer than 57 conifer trees per acre 8 inches or larger dbh in the conversion area;
- There are fewer than 100 conifer trees per acre larger than 4 inches dbh in the conversion area;
- There is evidence (such as conifer stumps, historical photos, or a conifer understory) that the conversion area can be successfully reforested with conifer and support the development of conifer stands;
- The landowner owns 500 feet upstream and 500 feet downstream of the harvest unit;
- The core and inner zones contain no stream adjacent parallel roads;
- Riparian areas contiguous to the proposed harvest unit are owned by the landowner proposing to conduct the conversion activities, and meet shade requirements of WAC 222-30-040 or have a 75-foot buffer with trees at least 40 feet tall on both sides of the stream for 500 feet upstream and 500 feet downstream of the proposed harvest unit (or the length of the stream, if less);
- If the landowner has previously converted hardwood-dominated stands, then post-harvest treatments must have been performed to the satisfaction of the department.

(II) In addition to the conditions set forth above, permitted conversion activities in the **inner zone** of any harvest unit are limited by the following:

- Each continuous conversion area is not more than 500 feet in length; two conversion areas will be considered "continuous"

unless the no-harvest area separating the two conversion areas is at least half the length of the larger of the two conversion areas.

● Type S and F (Type 1, 2, or 3) Water: Up to 50% of the inner zone area of the harvest unit on one side of the stream may be converted provided that:

♦ The landowner owns the opposite side of the stream and the landowner's riparian area on the opposite bank meets the shade requirements of WAC 222-30-040 or has a 75-foot buffer of trees at least 40 feet tall or:

♦ The landowner does not own land on the opposite side of the stream but the riparian area on the opposite bank meets the shade requirements of WAC 222-30-040 or has a 75-foot buffer of trees at least 40 feet tall.

● Not more than 25% of the inner zone of the harvest unit on both sides of a Type S or F Water may be converted if the landowner owns both sides.

(III) Where conversion is allowed in the **inner zone**, trees within the conversion area may be harvested except that:

● Conifer trees larger than 20 inches dbh shall not be harvested;

● Not more than 10% of the conifer stems greater than 8 inches dbh, exclusive of the conifer noted above, within the conversion area may be harvested; and

● The landowner must exercise reasonable care in the conduct of harvest activities to minimize damage to all residual conifer trees within the conversion area including conifer trees less than 8 inches dbh.

(IV) Following harvest in conversion areas, the landowner must:

● Reforest the conversion area with **conifer** tree species suitable to the site in accordance with the requirements of WAC 222-34-010; and

● Conduct post-harvest treatment of the site until the conifer trees necessary to meet acceptable stocking levels in WAC 222-34-010(2) have crowns above the brush or until the conversion area contains a minimum of 150 conifer trees greater than 8 inches dbh per acre.

● Notify the department in writing within three years of the approval of the forest practices application for hardwood conversion, if the hardwood conversion has been completed.

(V) **Tracking hardwood conversion.** The purpose of tracking hardwood conversion is to determine if hardwood conversion is resulting in adequate enhancement of riparian functions toward the desired future condition while minimizing the short term impacts on functions. The department will use existing or updated data bases developed in cooperation with the Washington Hardwoods Commission to identify watershed administrative units (WAUs) with a high percentage of hardwood-dominated riparian areas and, thus have the potential for excessive hardwood conversion under these rules. The department will track the rate of conversion of hardwoods in the riparian zone: (1) Through the application process on an annual basis; and (2) at a WAU scale on a biennial basis as per WAC 222-

30-120 through the adaptive management process which will develop thresholds of impact for hardwood conversion at the watershed scale.

(ii) **Harvest options.**

(A) No inner zone management. When the existing stands in the combined core and inner zone do not meet stand requirements, no harvest is permitted in the inner zone. When no harvest is permitted in the inner zone or the landowner chooses not to enter the inner zone, the width of core, inner and outer zones are as provided in the following table:

No inner zone management RMZ widths for Western Washington

Site Class	RMZ width	Core zone width (measured from outer edge of bankfull width or outer edge of CMZ of water)	Inner zone width (measured from outer edge of core zone)		Outer zone width (measured from outer edge of inner zone)	
			stream width ≤10'	stream width >10'	stream width ≤10'	stream width >10'
I	200'	50'	83'	100'	67'	50'
II	170'	50'	63'	78'	57'	42'
III	140'	50'	43'	55'	47'	35'
IV	110'	50'	23'	33'	37'	27'
V	90'	50'	10'	18'	30'	22'

(B) Inner zone management. If trees can be harvested and removed from the inner zone because of surplus basal area consistent with the stand requirement, the harvest and removal of the trees must be undertaken consistent with one of two options:

(I) **Option 1. Thinning from below.** The objective of thinning is to distribute stand requirement trees in such a way as to shorten the time required to meet large wood, fish habitat and water quality needs. This is achieved by increasing the potential for leave trees to grow larger than they otherwise would without thinning. Thinning harvest under option 1 must comply with the following:

- Residual trees left in the combined core and inner zones must meet stand requirements necessary to be on a trajectory to desired future condition. See board manual section 7 for guidelines.
- Thinning must be from below, meaning the smallest dbh trees are selected for harvest first, then progressing to successively larger diameters.
- Thinning cannot decrease the proportion of conifer in the stand.
- Shade retention to meet the shade rule must be confirmed by the landowner for any harvest inside of 75 feet from the outer edge of bankfull width or outer edge of CMZ, whichever is greater.
- The number of residual conifer trees per acre in the inner zone will equal or exceed 57.

Option 1. Thinning from below.

Site class	RMZ width	Core zone width (measured from outer edge of bankfull width or outer edge of CMZ of water)	Inner zone width (measured from outer edge of core zone)		Outer zone width (measured from outer edge of inner zone)	
			stream width ≤10'	stream width >10'	stream width ≤10'	stream width >10'
I	200'	50'	83'	100'	67'	50'
II	170'	50'	63'	78'	57'	42'
III	140'	50'	43'	55'	47'	35'
IV	110'	50'	23'	33'	37'	27'
V	90'	50'	10'	18'	30'	22'

(II) **Option 2. Leaving trees closest to the water.** Management option 2 applies only to riparian management zones for site class I, II, and III on streams that are less than or equal to 10 feet wide and RMZs in site class I and II for streams greater than 10 feet wide. Harvest must comply with the following:

- Harvest is not permitted within 30 feet of the core zone for streams less than or equal to 10 feet wide and harvest is not permitted within 50 feet of the core zone for streams greater than 10 feet wide;
- Residual leave trees in the combined core and inner zone must meet stand requirements necessary to be on a trajectory to desired future condition. See board manual section 7 for calculating stand requirements;
- A minimum of 20 conifers per acre, with a minimum 12-inch dbh, will be retained in any portion of the inner zone where harvest occurs. These riparian leave trees will not be counted or considered towards meeting applicable stand requirements nor can the number be reduced below 20 for any reason.
- Trees are selected for harvest starting from the outer most portion of the inner zone first then progressively closer to the stream.
- If (II) of this subsection results in surplus basal area per the stand requirement, the landowner may take credit for the surplus by harvesting additional riparian leave trees required to be left in the adjacent outer zone on a basal area-for-basal area basis. The number of leave trees in the outer zone can be reduced only to a minimum of 10 trees per acre.

Option 2. Leaving trees closest to water.

Site class	RMZ width	Core zone width (measured from outer edge of bankfull width or outer edge of CMZ of water)	Inner zone width				Outer zone width (measured from outer edge of inner zone)	
			stream width ≤10'	stream width ≤10' minimum floor distance	stream width >10'	stream width >10' minimum floor distance	stream width ≤10'	stream width >10'
			(measured from outer edge of core zone)	(measured from outer edge of core zone)	(measured from outer edge of core zone)	(measured from outer edge of core zone)		
I	200'	50'	84'	30'	84'	50'	66'	66'
II	170'	50'	64'	30'	70'	50'	56'	50'
III	140'	50'	44'	30'	**	**	46'	**

**Option 2 for site class III on streams >10' is not permitted because of the minimum floor (100') constraint.

(iii) **Where the basal area components of the stand requirement cannot be met** within the sum of the areas in the inner and core zone due to the presence of a stream-adjacent parallel road in the inner or core zone, a determination must be made of the approximate basal area that would have been present in the inner and core zones if the road was not occupying space in the core or inner zone and the shortfall in the basal area component of the stand requirement. See definition of "stream-adjacent parallel road" in WAC 222-16-010.

(A) Trees containing basal area equal to the amount determined in (iii) of this subsection will be left elsewhere in the inner or outer zone, or if the zones contain insufficient riparian leave trees, substitute riparian leave trees will be left within the RMZ width of other Type S or F Waters in the same unit or along Type Np or Ns Waters in the same unit in addition to all other RMZ requirements on those same Type S, F, Np or Ns Waters.

(B) When the stream-adjacent road basal area calculated in (iii) of this subsection results in an excess in basal area (above stand requirement) then the landowner may receive credit for such excess which can be applied on a basal area-by-basal area basis against the landowner's obligation to leave trees in the outer zone of the RMZ of such stream or other waters within the same unit, provided that the number of trees per acre in the outer zone is not reduced to less than 10 trees per acre.

(C) When the basal area requirement cannot be met, as explained in (iii) of this subsection, the shortfall may be reduced through the implementation of an acceptable large woody debris placement plan. See board manual section 26 for guidelines.

(iv) If a harvest operation includes both yarding and harvest activities within the RMZ, all calculations of basal area for stand requirements will be determined as if the yarding corridors were constructed prior to any other harvest activities. If trees cut or damaged by yarding are taken from excess basal area, these trees may be removed from the inner zone. Trees cut or damaged by

yarding in a unit which does not meet the basal area target of the stand requirements cannot be removed from the inner zone. Any trees cut or damaged by yarding in the core zone may not be removed.

(c) **Outer zones.** Timber harvest in the outer zone must leave 20 riparian leave trees per acre after harvest. **"Outer zone riparian leave trees"** are trees that must be left after harvest in the outer zone in Western Washington. Riparian leave trees must be left uncut throughout all future harvests:

Outer zone riparian leave tree requirements

Application	Leave tree spacing	Tree species	Minimum dbh required
Outer zone	Dispersed	Conifer	12" dbh or greater
Outer zone	Clumped	Conifer	12" dbh or greater
Protection of sensitive features	Clumped	Trees representative of the overstory including both hardwood and conifer	8" dbh or greater

The 20 riparian leave trees to be left can be reduced in number under the circumstances delineated in (c)(iv) of this subsection. The riparian leave trees must be left on the landscape according to one of the following two strategies. A third strategy is available to landowners who agree to a LWD placement plan.

(i) **Dispersal strategy.** Riparian leave trees, which means conifer species with a diameter measured at breast height (dbh) of 12 inches or greater, must be left dispersed approximately evenly throughout the outer zone. If riparian leave trees of 12" dbh or greater are not available, then the next largest conifers must be left. If conifers are not present, riparian leave trees must be left according to the clumping strategy in subsection (ii) below.

(ii) **Clumping strategy.** Riparian leave trees must be left clumped in the following way:

(A) Clump trees in or around one or more of the following **sensitive features** to the extent available within the outer zone. When clumping around sensitive features, riparian leave trees must be 8 inches dbh or greater and representative of the overstory canopy trees in or around the sensitive feature and may include both hardwood and conifer species. Sensitive features are:

(I) Seeps and springs;

(II) Forested wetlands;

(III) Topographic locations (and orientation) from which leave trees currently on the site will be delivered to the water;

(IV) Areas where riparian leave trees may provide windthrow protection;

(V) Small unstable, or potentially unstable, slopes not of sufficient area to be detected by other site evaluations. See WAC 222-16-050 (1)(d).

(VI) Archeological or historical sites registered with the

Washington state ((~~office~~)) department of archeology and historic preservation. See WAC 222-16-050 (1)(g); or

(VII) Sites containing evidence of Native American cairns, graves or glyptic records. See WAC 222-16-050 (1)(f).

(B) If sensitive features are not present, then clumps must be well distributed throughout the outer zone and the leave trees must be of conifer species with a dbh of 12 inches or greater. When placing clumps, the applicant will consider operational and biological concerns. Tree counts must be satisfied regardless of the presence of stream-adjacent parallel roads in the outer zone.

(iii) **Large woody debris in-channel placement strategy.** A landowner may design a LWD placement plan in cooperation with the department of fish and wildlife. The plan must be consistent with guidelines in the board manual section 26. The landowner may reduce the number of trees required to be left in the outer zone to the extent provided in the approved LWD placement plan. Reduction of trees in the outer zone must not go below a minimum of 10 trees per acre. If this strategy is chosen, a complete forest practices application must include a copy of the WDFW approved hydraulics project approval (HPA) permit.

(iv) **Twenty riparian leave trees must be left after harvest** with the exception of the following:

(A) If a landowner agrees to implement a placement strategy, see (iii) of this subsection.

(B) If trees are left in an associated channel migration zone, the landowner may reduce the number of trees required to be left according to the following:

(I) Offsets will be measured on a basal area-for-basal area basis.

(II) Conifer in a CMZ equal to or greater than 6" dbh will offset conifer in the outer zone at a one-to-one ratio.

(III) Hardwood in a CMZ equal to or greater than 10" dbh will offset hardwood in the outer zone at a one-to-one ratio.

(IV) Hardwood in a CMZ equal to or greater than 10" dbh will offset conifer in the outer zone at a three-to-one ratio.

*(2) **Western Washington protection for Type Np and Ns Waters.**

(a) An **equipment limitation zone** is a 30-foot wide zone measured horizontally from the outer edge of the bankfull width of a Type Np or Ns Water where equipment use and other forest practices that are specifically limited by these rules. It applies to all perennial and seasonal streams.

(i) On-site mitigation is required if any of the following activities exposes the soil on more than 10% of the surface area of the zone:

(A) Ground based equipment;

(B) Skid trails;

(C) Stream crossings (other than existing roads); or

(D) Cabled logs that are partially suspended.

(ii) Mitigation must be designed to replace the equivalent of lost functions especially prevention of sediment delivery. Examples include water bars, grass seeding, mulching, etc.

(iii) Nothing in this subsection (2) reduces or eliminates the

department's authority to prevent actual or potential material damage to public resources under WAC 222-46-030 or 222-46-040 or any related authority to condition forest practices notifications or applications.

(b) **Sensitive site and RMZs protection along Type Np Waters.** Forest practices must be conducted to protect Type Np RMZs and sensitive sites as detailed below:

(i) A 50-foot, no-harvest buffer, measured horizontally from the outer edge of bankfull width, will be established along each side of the Type Np Water as follows:

Required no-harvest, 50-foot buffers on Type Np Waters.

Length of Type Np Water from the confluence of Type S or F Water	Length of 50' buffer required on Type Np Water (starting at the confluence of the Type Np and connecting water)
Greater than 1000'	500'
Greater than 300' but less than 1000'	Distance of the greater of 300' or 50% of the entire length of the Type Np Water
Less than or equal to 300'	The entire length of Type Np Water

(ii) No timber harvest is permitted in an area within 50 feet of the outer perimeter of a soil zone perennially saturated from a headwall seep.

(iii) No timber harvest is permitted in an area within 50 feet of the outer perimeter of a soil zone perennially saturated from a side-slope seep.

(iv) No timber harvest is permitted within a 56-foot radius buffer patch centered on the point of intersection of two or more Type Np Waters.

(v) No timber harvest is permitted within a 56-foot radius buffer patch centered on a headwater spring 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 222-16-030(3) and 222-16-031.

(vi) No timber harvest is permitted within an alluvial fan.

(vii) At least 50% of a Type Np Waters' length must be protected by buffers on both sides of the stream (2-sided buffers). Buffered segments must be a minimum of 100 feet in length. If an operating area is located more than 500 feet upstream from the confluence of a Type S or F Water and the Type Np Water is more than 1,000 feet in length, then buffer the Type Np Water according to the following table. If the percentage is not met by protecting sensitive sites listed in (b)(i) through (vii) of this subsection, then additional buffers are required on the Type Np Water to meet the requirements listed in the table.

Minimum percent of length of Type Np Waters to be buffered when more than 500 feet upstream from the confluence of a Type S or F Water

Total length of a Type Np Water upstream from the confluence of a Type S or F Water	Percent of length of Type Np Water that must be protected with a 50 foot no harvest buffer more than 500 feet upstream from the confluence of a Type S or F Water
1000 feet or less	Refer to table in this subsection (i) above
1001 - 1300 feet	19%
1301 - 1600 feet	27%
1601 - 2000 feet	33%
2001 - 2500 feet	38%
2501 - 3500 feet	42%
3501 - 5000 feet	44%
Greater than 5000 feet	45%

The landowner must select the necessary priority areas for additional 2-sided buffers according to the following priorities:

(A) Low gradient areas;

(B) Perennial water reaches of nonsedimentary rock with gradients greater than 20% in the tailed frog habitat range;

(C) Hyporheic and ground water influence zones; and

(D) Areas downstream from other buffered areas.

Except for the construction and maintenance of road crossings and the creation and use of yarding corridors, no timber harvest will be allowed in the designated priority areas. Landowners must leave additional acres equal to the number of acres (including partial acres) occupied by an existing stream-adjacent parallel road within a designated priority area buffer.

(c) None of the limitations on harvest in or around Type Np Water RMZs or sensitive sites listed in (b) of this subsection will preclude or limit:

(i) The construction and maintenance of roads for the purpose of crossing streams in WAC 222-24-030 and 222-24-050.

(ii) The creation and use of yarding corridors in WAC 222-30-060(1).

To the extent reasonably practical, the operation will both avoid creating yarding corridors or road crossings through Type Np Water RMZ or sensitive sites and associated buffers, and avoid management activities which would result in soil compaction, the loss of protective vegetation or sedimentation in perennially moist areas.

Where yarding corridors or road crossings through Type Np Water RMZs or sensitive sites and their buffers cannot reasonably be avoided, the buffer area must be expanded to protect the sensitive site by an area equivalent to the disturbed area or by providing comparable functions through other management initiated

efforts.

Landowners must leave additional acres equal to the number of acres (including partial acres) occupied by an existing stream-adjacent parallel road within a Type Np Water RMZs or sensitive site buffer.

AMENDATORY SECTION (Amending WSR 05-12-119, filed 5/31/05, effective 7/1/05)

WAC 222-30-021 *Western Washington riparian management zones. These rules apply to all typed waters on forest land in Western Washington, except as provided in WAC 222-30-023. RMZs are measured horizontally from the outer edge of the bankfull width or channel migration zone, whichever is greater, and extend to the limits as described in this section. See ((~~the~~)) board manual section 7 for riparian design and layout guidelines.

*(1) **Western Washington RMZs for Type S and F Waters** have three zones: The core zone is nearest to the water, the inner zone is the middle zone, and the outer zone is furthest from the water. (See definitions in WAC 222-16-010.) RMZ dimensions vary depending on the site class of the land, the management harvest option, and the bankfull width of the stream. See ((~~tables for~~)) management options 1 and 2 below.

None of the limitations on harvest in each of the three zones listed below will preclude or limit the construction and maintenance of roads for the purpose of crossing streams in WAC 222-24-030 and 222-24-050, or the creation and use of yarding corridors in WAC 222-30-060(1).

The shade requirements in WAC 222-30-040 must be met regardless of harvest opportunities provided in the ((~~inner zone~~)) RMZ rules. See ((~~the~~)) board manual section 1.

(a) **Core zones.** No timber harvest or construction is allowed ((~~in~~)) within the fifty-foot core zone except operations related to forest roads as detailed in subsection (1) of this section. Any trees cut for or damaged by yarding corridors in the core zone must be left on the site. Any trees cut as a result of road construction to cross a stream may be removed from the site, unless used as part of a large woody debris placement strategy or as needed to reach stand requirements.

(b) **Inner zones.** Forest practices in the inner zone must be conducted in such a way as to meet or exceed stand requirements to achieve the goal in WAC 222-30-010(2). The width of the inner zone is determined by site class, bankfull width, and management options as described in this section. Timber harvest in this zone must be consistent with the stand requirements in order to reach the desired future condition targets.

"Stand requirement" ((~~means a number of trees per acre, the basal area and the proportion of conifer in the combined inner zone and adjacent core zone so that the growth of the trees would meet desired future conditions. The following table defines basal area targets when the stand is 140 years old.~~

~~Site Class~~	~~Desired future condition target basal area per acre (at 140 years)~~
~~I~~	~~285 sq. ft.~~
~~II~~	~~275 sq. ft.~~
~~III~~	~~258 sq. ft.~~
~~IV~~	~~224 sq. ft.~~
~~V~~	~~190 sq. ft.~~

~~Growth modeling is necessary to calculate whether a particular stand meets stand requirement and is on a trajectory towards these desired future condition basal area target. The appropriate growth model will be based on stand characteristics and will include at a minimum, the following components: The number of trees by diameter class, the percent of conifer and hardwood, and the age of the stand. See the board manual section 7~~)) is the minimum size, number and proportion of conifer trees per acre as listed in the retention standards described in inner zone management options 1 and 2, and the desire future condition basal area target of three hundred twenty-five square feet per acre at age one hundred forty. The growth modeling program provided by the department must be used to calculate whether a particular stand meets the stand requirement and is on the trajectory towards the desired future condition basal area target.

The retention standard for option 1 is expressed as the minimum number of residual conifer trees per acre by average stand diameter class in the inner zone as provided in the table for option 1 located in (b)(ii)(B)(I) of this subsection. The core zone must have a conifer dominated overstory to use this option. Every ten years, the department shall evaluate and report to the board the effectiveness of the thinning guidelines in meeting the target stand characteristics of desired future condition.

The retention standard for option 2 is expressed as the minimum number and size of conifer trees in the combined core and inner zones required to meet the basal area target as calculated by the desired future condition growth modeling program. The growth model is based on the stand characteristics of a site: The number of trees by diameter class, the percentage of conifer trees in the stand, and the age of the stand. See board manual section 7 for guidance on the proper use of the growth model.

(i) **Hardwood conversion in the inner zone.** When the existing stands in the combined core and inner zone do not meet stand requirements, no harvest is permitted in the inner zone, except in connection with hardwood conversion.

(A) The landowner may elect to convert hardwood-dominated stands in the **inner zone** to conifer-dominated stands. Harvesting and replanting shall be in accordance with the following limits:

(I) Conversion activities in the **inner zone** of any harvest unit are only allowed where all of the following are present:

● Existing stands in the ((~~combined core and~~)) inner zone do not meet ((~~stand requirements~~)) retention standards listed in (((~~WAC 222-30-021 (1)~~))) (b)(ii)(B)(I) of this subsection (option 1));

● There are fewer than ((~~57~~)) fifty-seven conifer trees per acre ((~~8~~)) eight inches or larger dbh in the conversion area;

● There are fewer than ((~~100~~)) one hundred conifer trees per acre larger than ((~~4~~)) four inches dbh in the conversion area;

● There is evidence (such as conifer stumps, historical photos, or a conifer understory) that the conversion area can be successfully reforested with conifer and support the development of conifer stands;

● The landowner owns ((~~500~~)) five hundred feet upstream and ((~~500~~)) five hundred feet downstream of the harvest unit;

● The core and inner zones contain no stream adjacent parallel roads;

● Riparian areas contiguous to the proposed harvest unit are owned by the landowner proposing to conduct the conversion activities, and meet shade requirements of WAC 222-30-040 or have a ((~~75~~)) seventy-five-foot buffer with trees at least ((~~40~~)) forty feet tall on both sides of the stream for ((~~500~~)) five hundred feet upstream and ((~~500~~)) five hundred feet downstream of the proposed harvest unit (or the length of the stream, if less);

● If the landowner has previously converted hardwood-dominated stands, then post-harvest treatments must have been performed to the satisfaction of the department.

(II) In addition to the conditions set forth above, permitted conversion activities in the **inner zone** of any harvest unit are limited by the following:

● Each continuous conversion area is not more than ((~~500~~)) five hundred feet in length; two conversion areas will be considered "continuous" unless the no-harvest area separating the two conversion areas is at least half the length of the larger of the two conversion areas.

● Type S and F (Type 1, 2, or 3) Water: Up to ((~~50%~~)) fifty percent of the inner zone area of the harvest unit on one side of the stream may be converted provided that:

♦ The landowner owns the opposite side of the stream and the landowner's riparian area on the opposite bank meets the shade requirements of WAC 222-30-040 or has a ((~~75~~)) seventy-five-foot buffer of trees at least ((~~40~~)) forty feet tall or:

♦ The landowner does not own land on the opposite side of the stream but the riparian area on the opposite bank meets the shade requirements of WAC 222-30-040 or has a ((~~75~~)) seventy-five-foot buffer of trees at least ((~~40~~)) forty feet tall.

● Not more than 25% of the inner zone of the harvest unit on both sides of a Type S or F Water may be converted if the landowner owns both sides.

(III) Where conversion is allowed in the **inner zone,** trees within the conversion area may be harvested except that:

● Conifer trees larger than ((~~20~~)) twenty inches dbh shall not be harvested;

● Not more than ((~~10%~~)) ten percent of the conifer stems greater than ((~~8~~)) eight inches dbh, exclusive of the conifer noted above, within the conversion area may be harvested; and

● The landowner must exercise reasonable care in the conduct

of harvest activities to minimize damage to all residual conifer trees within the conversion area including conifer trees less than ((~~8~~)) eight inches dbh.

(IV) Following harvest in conversion areas, the landowner must:

- Reforest the conversion area with **conifer** tree species suitable to the site in accordance with the requirements of WAC 222-34-010; and
- Conduct post-harvest treatment of the site until the conifer trees necessary to meet acceptable stocking levels in WAC 222-34-010(2) have crowns above the brush or until the conversion area contains a minimum of ((~~150~~)) one hundred fifty conifer trees greater than ((~~8~~)) eight inches dbh per acre.
- Notify the department in writing within three years of the approval of the forest practices application for hardwood conversion, if the hardwood conversion has been completed.

(V) **Tracking hardwood conversion.** The purpose of tracking hardwood conversion is to determine if hardwood conversion is resulting in adequate enhancement of riparian functions toward the desired future condition while minimizing the short term impacts on functions. The department will use existing or updated data bases developed in cooperation with the Washington Hardwoods Commission to identify watershed administrative units (WAUs) with a high percentage of hardwood-dominated riparian areas and, thus have the potential for excessive hardwood conversion under these rules. The department will track the rate of conversion of hardwoods in the riparian zone: (1) Through the application process on an annual basis; and (2) at a WAU scale on a biennial basis as per WAC 222-30-120 through the adaptive management process which will develop thresholds of impact for hardwood conversion at the watershed scale.

(ii) **Harvest options in the inner zone.**

(A) No inner zone management. When ((~~the existing stands in the combined core and inner zone do not meet stand requirements~~)) retention standards cannot be met by either option 1 or 2, no harvest is permitted in the inner zone. When no harvest is permitted in the inner zone or the landowner chooses not to enter the inner zone, the width of core, inner and outer zones are as provided in the following table:

No inner zone management RMZ widths for Western Washington

Site Class	Total RMZ width	((~~Core zone width~~ (~~measured from outer edge of bankfull width or outer edge of CMZ of water~~)))	Combined core and inner zone width (measured from outer edge of ((~~core zone~~)) bankfull width or outer edge of CMZ)		Outer zone width (measured from outer edge of inner zone)	
			stream width ≤10'	stream width >10'	stream width ≤10'	stream width >10'
I	200'	((~~50'~~))	((~~83'~~)) 133'	((~~100'~~)) 150'	67'	50'
II	170'	((~~50'~~))	((~~63'~~)) 113'	((~~78'~~)) 128'	57'	42'
III	140'	((~~50'~~))	((~~43'~~)) 93'	((~~55'~~)) 105'	47'	35'

Site Class	Total RMZ width	((~~Core zone width~~ (~~measured from outer edge of bankfull width or outer edge of CMZ of water~~))	Combined core and inner zone width (measured from outer edge of ((~~core zone~~)) bankfull width or outer edge of CMZ)		Outer zone width (measured from outer edge of inner zone)	
			stream width ≤10'	stream width >10'	stream width ≤10'	stream width >10'
IV	110'	((~~50'~~))	((~~23'~~)) 73'	((~~33'~~)) 83'	37'	27'
V	90'	((~~50'~~))	((~~10'~~)) 60'	((~~18'~~)) 68'	30'	22'

(B) Inner zone management. ((~~If trees can be harvested and removed from the inner zone because of surplus basal area consistent with the stand requirement, the harvest and removal of the trees must be undertaken consistent with one of two options:~~))

(I) **Option 1. ((~~Thinning from below.~~))** The objective of this thinning option is to distribute ((~~stand requirement~~)) trees in the inner zone in such a way as to shorten the time required to meet large wood, fish habitat and water quality needs. This is achieved by increasing the potential for leave trees to grow larger than they otherwise would without thinning. The total RMZ width under this option is one hundred fifty-three feet comprised of a fifty-foot wide no-harvest core zone, a sixty-foot wide inner zone and a forty-three foot wide outer zone. Thinning harvest under option 1 must ((~~comply with~~)) result in the following retention standards:

((~~● Residual trees left in the combined core and inner zones must meet stand requirements necessary to be on a trajectory to desired future condition. See board manual section 7 for guidelines.~~

~~● Thinning must be from below, meaning the smallest dbh trees are selected for harvest first, then progressing to successively larger diameters.~~

~~● Thinning cannot decrease the proportion of conifer in the stand.~~

~~● Shade retention to meet the shade rule must be confirmed by the landowner for any harvest inside of 75 feet from the outer edge of bankfull width or outer edge of CMZ, whichever is greater.~~

~~● The number of residual conifer trees per acre in the inner zone will equal or exceed 57.~~

~~**Option 1. Thinning from below.**~~

~~Site class~~	~~RMZ width~~	~~Core zone width~~ (~~measured from outer edge of bankfull width or outer edge of CMZ of water~~)	~~Inner zone width~~ (~~measured from outer edge of core zone~~)		~~Outer zone width~~ (~~measured from outer edge of inner zone~~)	
			~~stream width ≤10'~~	~~stream width >10'~~	~~stream width ≤10'~~	~~stream width >10'~~
~~I~~	~~200'~~	~~50'~~	~~83'~~	~~100'~~	~~67'~~	~~50'~~
~~II~~	~~170'~~	~~50'~~	~~63'~~	~~78'~~	~~57'~~	~~42'~~
~~III~~	~~140'~~	~~50'~~	~~43'~~	~~55'~~	~~47'~~	~~35'~~

Site class	RMZ width	Core zone width (measured from outer edge of bankfull width or outer edge of CMZ of water)	Inner zone width (measured from outer edge of core zone)		Outer zone width (measured from outer edge of inner zone)	
			stream width ≤10'	stream width >10'	stream width ≤10'	stream width >10'
IV	110'	50'	23'	33'	37'	27'
V	90'	50'	10'	18'	30'	22'))

● A minimum number of residual conifer trees per acre greater than six inches dbh as shown in the table above for option 1.

Option 1. Residual Conifer Trees Per Acre

Average Conifer Tree Diameter	Minimum Residual Conifer Trees Per Acre
22" and greater	57
20"	60
18"	65
16"	70
14"	75
12"	80
10"	90
**8"	100

**Average tree conifer diameter is based on two-inch diameter classes. For example, the eight-inch diameter class represents an average diameter between 7.0 and 8.9 inches diameter at breast height.

● The average residual stand tree diameter is the same or larger than the average stand diameter before harvest.

● The distance between the residual conifer trees is no greater than fifty feet.

● The same proportion of conifer trees is present in the stand as before harvest.

In addition to the standards listed above, the landowner must confirm that shade retention is achieved according to WAC 222-30-040 for any harvest within seventy-five feet from the outer edge of bankfull width or the outer edge of the CMZ, whichever is greater.

Hardwoods may be harvested in the inner zone when the preharvest stand does not meet the retention standards listed in the table above for option 1 and contains the required stand conditions listed above in (b)(i) of this subsection regarding hardwood conversion in the inner zone.

(II) **Option 2.** ((~~**Leaving trees closest to the water.** Management option 2 applies only to riparian management zones for site class I, II, and III on streams that are less than or equal to 10 feet wide and RMZs in site class I and II for streams greater than 10 feet wide. Harvest must comply with the following:~~

~~● Harvest is not permitted within 30 feet of the core zone for streams less than or equal to 10 feet wide and harvest is not permitted within 50 feet of the core zone for streams greater than 10 feet wide;~~

~~● Residual leave trees in the combined core and inner zone must meet stand requirements necessary to be on a trajectory to desired future condition. See board manual section 7 for calculating stand requirements;~~

~~● A minimum of 20 conifers per acre, with a minimum 12-inch dbh, will be retained in any portion of the inner zone where harvest occurs. These riparian leave trees will not be counted or considered towards meeting applicable stand requirements nor can the number be reduced below 20 for any reason.~~

~~● Trees are selected for harvest starting from the outer most portion of the inner zone first then progressively closer to the stream.~~

~~● If (II) of this subsection results in surplus basal area per the stand requirement, the landowner may take credit for the surplus by harvesting additional riparian leave trees required to be left in the adjacent outer zone on a basal area-for-basal area basis. The number of leave trees in the outer zone can be reduced only to a minimum of 10 trees per acre.~~)) The objective of this option is to retain an RMZ width that will maintain current riparian functions. The retention standards in this option provide sufficient residual conifer trees in the combined core and inner zones to reach the target basal area of three hundred twenty-five square feet per acre at age one hundred forty.

Inner zone harvest may occur under option 2 if the projected future basal area within the combined width of the core and inner zones exceeds the target basal area. The combined core and inner zone width must be determined using the leaving trees closest to the water table below; the future basal area must then be calculated using the growth model program provided by the department. The model will produce a minimum inner zone floor width. (The minimum floor width extends outward from the outer edge of the fifty-foot core zone.) In the event the model produces a minimum floor width less than the minimums shown in the leaving trees closest to the water table, the appropriate widths shown in the table must be used.

Harvest is permitted under option 2 in the following order:

● If the projected basal area within the combined core and inner zones exceeds the target basal area, an even-age harvest may occur in the area between the outer edge of the minimum inner zone floor and the outer edge of the inner zone.

Harvest must start at the outermost portion of the inner zone and progress to the inner zone floor edge.

In any portion of the inner zone where an even-age harvest method occurs, at least twenty conifer trees with a minimum dbh of twelve inches must be retained. The basal area of these trees will be counted towards meeting applicable stand requirements.

● If the projected basal area within the combined core and inner zones still exceeds the target basal area, the surplus conifer may be harvested. Harvest must be accomplished sequentially as follows until either the surplus is exhausted or the limits on harvest are reached, whichever occurs first.

♦ Conifer trees otherwise required to be left in the outer zone may be harvested on a basal-area-for-basal-area basis;

however, only a maximum of ten conifer trees per acre may be harvested in the outer zone. (Tree counts, minimum size and placement of outer zone trees are specified below in (c) of this subsection.)

♦ If surplus conifer trees remain, inner zone trees may be thinned within the portion of the inner zone that is more than twenty-five feet from the outer edge of the core zone. Thinning must result in all of the following conditions:

The appropriate number of residual conifer trees per acre according to the inner zone thinning table for option 1, all greater than six inches dbh;

An average stand diameter equal to or greater than the average stand diameter before thinning; and

The distance between the residual conifer trees is no greater than fifty feet.

Option 2. ((~~Leaving trees closest to water.~~)) Riparian Management Zone Widths

Site class	Total RMZ width	((~~Core zone width~~ ~~(measured from outer edge of bankfull width or outer edge of CMZ of water)~~))	Combined core and inner zone width (measured from outer edge of bankfull width or outer edge of CMZ)				Outer zone width (measured from outer edge of inner zone)	
			stream width ≤10'	stream width ≤10'	stream width >10'	stream width >10'	stream width ≤10'	stream width >10'
			Core and inner zone width	minimum floor ((~~distance~~)) width	Core and inner zone width	minimum floor ((~~distance~~)) width		
			((~~(measured from outer edge of core zone)~~	~~(measured from outer edge of core zone)~~	~~(measured from outer edge of core zone)~~	~~(measured from outer edge of core zone)~~))		
I	200'	((~~50'~~))	((~~84'~~)) 134'	((~~30'~~)) 80'	((~~84'~~)) 134'	((~~50'~~)) 100'	66'	66'
II	170'	((~~50'~~))	((~~64'~~)) 114'	((~~30'~~)) 80'	((~~70'~~)) 120'	((~~50'~~)) 100'	56'	50'
III	140'	((~~50'~~))	((~~44'~~)) 94'	((~~30'~~)) 80'	((~~**~~)) 105'	((~~**~~)) 80'	46'	((~~**~~)) 35'
IV	110'		74'		83'	80'	36'	27'
V	90'		61'		68'		29'	22'

((~~**Option 2 for site class III on streams >10' is not permitted because of the minimum floor (100') constraint.~~))

(iii) **Where the basal area components of the stand requirement cannot be met** within the sum of the areas in the inner and core zone due to the presence of a stream-adjacent parallel road in the inner or core zone, a determination must be made of the approximate basal area that would have been present in the inner and core zones if the road was not occupying space in the core or inner zone and the shortfall in the basal area component of the stand requirement. See definition of "stream-adjacent parallel road" in WAC 222-16-010.

(A) Trees containing basal area equal to the amount determined in (iii) of this subsection will be left elsewhere in the inner or outer zone, or if the zones contain insufficient riparian leave

trees, substitute riparian leave trees will be left within the RMZ width of other Type S or F Waters in the same unit or along Type Np or Ns Waters in the same unit in addition to all other RMZ requirements on those same Type S, F, Np or Ns Waters.

(B) When the stream-adjacent road basal area calculated in (iii) of this subsection results in an excess in basal area (above stand requirement) then the landowner may receive credit for such excess which can be applied on a basal area-by-basal area basis against the landowner's obligation to leave trees in the outer zone of the RMZ of such stream or other waters within the same unit, provided that the number of trees per acre in the outer zone is not reduced to less than ((~~10~~)) ten trees per acre.

(C) When the basal area requirement cannot be met, as explained in (iii) of this subsection, the shortfall may be reduced through the implementation of an acceptable large woody debris placement plan. See board manual section 26 for guidelines.

(iv) If a harvest operation includes both yarding and harvest activities within the RMZ, all calculations of basal area for stand requirements will be determined as if the yarding corridors were constructed prior to any other harvest activities. If trees cut or damaged by yarding are taken from excess basal area, these trees may be removed from the inner zone. Trees cut or damaged by yarding in a unit which does not meet the basal area target of the stand requirements cannot be removed from the inner zone. Any trees cut or damaged by yarding in the core zone may not be removed.

(c) **Outer zones.** Timber harvest in the outer zone must leave ((~~20~~)) twenty riparian leave trees per acre after harvest. **"Outer zone riparian leave trees"** are trees that must be left after harvest in the outer zone in Western Washington. Riparian leave trees must be left uncut throughout all future harvests:

Outer zone riparian leave tree requirements

Application	Leave tree spacing	Tree species	Minimum dbh required
Outer zone	Dispersed	Conifer	12" dbh or greater
Outer zone	Clumped	Conifer	12" dbh or greater
Protection of sensitive features	Clumped	Trees representative of the overstory including both hardwood and conifer	8" dbh or greater

The ((~~20~~)) twenty riparian leave trees to be left can be reduced in number under the circumstances delineated in (c)(iv) of this subsection. The riparian leave trees must be left on the landscape according to one of the following two strategies. A third strategy is available to landowners who agree to a LWD placement plan.

(i) **Dispersal strategy.** Riparian leave trees, which means conifer species with a diameter measured at breast height (dbh) of ((~~12~~)) twelve inches or greater, must be left dispersed

approximately evenly throughout the outer zone. If riparian leave trees of ((~~12"~~)) twelve inches dbh or greater are not available, then the next largest conifers must be left. If conifers are not present, riparian leave trees must be left according to the clumping strategy in subsection (ii) below.

(ii) **Clumping strategy.** Riparian leave trees must be left clumped in the following way:

(A) Clump trees in or around one or more of the following **sensitive features** to the extent available within the outer zone. When clumping around sensitive features, riparian leave trees must be ((~~8~~)) eight inches dbh or greater and representative of the overstory canopy trees in or around the sensitive feature and may include both hardwood and conifer species. Sensitive features are:

(I) Seeps and springs;

(II) Forested wetlands;

(III) Topographic locations (and orientation) from which leave trees currently on the site will be delivered to the water;

(IV) Areas where riparian leave trees may provide windthrow protection;

(V) Small unstable, or potentially unstable, slopes not of sufficient area to be detected by other site evaluations. See WAC 222-16-050 (1)(d).

(VI) Archeological or historical sites registered with the Washington state ((~~office~~)) department of archeology and historic preservation. See WAC 222-16-050 (1)(g); or

(VII) Sites containing evidence of Native American cairns, graves or glyptic records. See WAC 222-16-050 (1)(f).

(B) If sensitive features are not present, then clumps must be well distributed throughout the outer zone and the leave trees must be of conifer species with a dbh of 12 inches or greater. When placing clumps, the applicant will consider operational and biological concerns. Tree counts must be satisfied regardless of the presence of stream-adjacent parallel roads in the outer zone.

(iii) **Large woody debris in-channel placement strategy.** A landowner may design a LWD placement plan in cooperation with the department of fish and wildlife. The plan must be consistent with guidelines in ((~~the~~)) board manual section 26. The landowner may reduce the number of trees required to be left in the outer zone to the extent provided in the approved LWD placement plan. Reduction of trees in the outer zone must not go below a minimum of ((~~10~~)) ten trees per acre. If this strategy is chosen, a complete forest practices application must include a copy of the WDFW approved hydraulics project approval (HPA) permit.

(iv) **Twenty riparian leave trees must be left after harvest** with the exception of the following:

(A) If a landowner agrees to implement a placement strategy, see (iii) of this subsection.

(B) If trees are left in an associated channel migration zone, the landowner may reduce the number of trees required to be left according to the following:

(I) Offsets will be measured on a basal area-for-basal area basis.

(II) Conifer in a CMZ equal to or greater than ((~~6"~~)) six inches dbh will offset conifer in the outer zone at a one-to-one ratio.

(III) Hardwood in a CMZ equal to or greater than ((~~10"~~)) ten inches dbh will offset hardwood in the outer zone at a one-to-one ratio.

(IV) Hardwood in a CMZ equal to or greater than ((~~10"~~)) ten inches dbh will offset conifer in the outer zone at a three-to-one ratio.

*(2) **Western Washington protection for Type Np and Ns Waters.**

(a) An **equipment limitation zone** is a ((~~30~~)) thirty-foot wide zone measured horizontally from the outer edge of the bankfull width of a Type Np or Ns Water where equipment use and other forest practices that are specifically limited by these rules. It applies to all perennial and seasonal streams.

(i) On-site mitigation is required if any of the following activities exposes the soil on more than ((~~10%~~)) ten percent of the surface area of the zone:

(A) Ground based equipment;

(B) Skid trails;

(C) Stream crossings (other than existing roads); or

(D) Cabled logs that are partially suspended.

(ii) Mitigation must be designed to replace the equivalent of lost functions especially prevention of sediment delivery. Examples include water bars, grass seeding, mulching, etc.

(iii) Nothing in this subsection (2) reduces or eliminates the department's authority to prevent actual or potential material damage to public resources under WAC 222-46-030 or 222-46-040 or any related authority to condition forest practices notifications or applications.

(b) **Sensitive site and RMZs protection along Type Np Waters.** Forest practices must be conducted to protect Type Np RMZs and sensitive sites as detailed below:

(i) A 50-foot, no-harvest buffer, measured horizontally from the outer edge of bankfull width, will be established along each side of the Type Np Water as follows:

Required no-harvest, 50-foot buffers on Type Np Waters.

Length of Type Np Water from the confluence of Type S or F Water	**Length of 50' buffer required on Type Np Water (starting at the confluence of the Type Np and connecting water)**
Greater than 1000'	500'
Greater than 300' but less than 1000'	Distance of the greater of 300' or 50% of the entire length of the Type Np Water
Less than or equal to 300'	The entire length of Type Np Water

(ii) No timber harvest is permitted in an area within ((~~50~~)) fifty feet of the outer perimeter of a soil zone perennially saturated from a headwall seep.

(iii) No timber harvest is permitted in an area within ((~~50~~)) fifty feet of the outer perimeter of a soil zone perennially saturated from a side-slope seep.

(iv) No timber harvest is permitted within a ((~~56~~)) fifty-six-foot radius buffer patch centered on the point of intersection of two or more Type Np Waters.

(v) No timber harvest is permitted within a ((~~56~~)) fifty-six-foot radius buffer patch centered on a headwater spring 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 222-16-030(3) and 222-16-031.

(vi) No timber harvest is permitted within an alluvial fan.

(vii) At least ((~~50%~~)) fifty percent of a Type Np Waters' length must be protected by buffers on both sides of the stream (((~~2~~)) two-sided buffers). Buffered segments must be a minimum of ((~~100~~)) one hundred feet in length. If an operating area is located more than ((~~500~~)) five hundred feet upstream from the confluence of a Type S or F Water and the Type Np Water is more than ((~~1,000~~)) one thousand feet in length, then buffer the Type Np Water according to the following table. If the percentage is not met by protecting sensitive sites listed in (b)(i) through (vii) of this subsection, then additional buffers are required on the Type Np Water to meet the requirements listed in the table.

Minimum percent of length of Type Np Waters to be buffered when more than 500 feet upstream from the confluence of a Type S or F Water

Total length of a Type Np Water upstream from the confluence of a Type S or F Water	Percent of length of Type Np Water that must be protected with a 50 foot no harvest buffer more than 500 feet upstream from the confluence of a Type S or F Water
1000 feet or less	Refer to table in this subsection (i) above
1001 - 1300 feet	19%
1301 - 1600 feet	27%
1601 - 2000 feet	33%
2001 - 2500 feet	38%
2501 - 3500 feet	42%
3501 - 5000 feet	44%
Greater than 5000 feet	45%

The landowner must select the necessary priority areas for additional 2-sided buffers according to the following priorities:

(A) Low gradient areas;

(B) Perennial water reaches of nonsedimentary rock with gradients greater than ((~~20%~~)) twenty percent in the tailed frog

habitat range;

(C) Hyporheic and ground water influence zones; and

(D) Areas downstream from other buffered areas.

Except for the construction and maintenance of road crossings and the creation and use of yarding corridors, no timber harvest will be allowed in the designated priority areas. Landowners must leave additional acres equal to the number of acres (including partial acres) occupied by an existing stream-adjacent parallel road within a designated priority area buffer.

(c) None of the limitations on harvest in or around Type Np Water RMZs or sensitive sites listed in (b) of this subsection will preclude or limit:

(i) The construction and maintenance of roads for the purpose of crossing streams in WAC 222-24-030 and 222-24-050.

(ii) The creation and use of yarding corridors in WAC 222-30-060(1).

To the extent reasonably practical, the operation will both avoid creating yarding corridors or road crossings through Type Np Water RMZ or sensitive sites and associated buffers, and avoid management activities which would result in soil compaction, the loss of protective vegetation or sedimentation in perennially moist areas.

Where yarding corridors or road crossings through Type Np Water RMZs or sensitive sites and their buffers cannot reasonably be avoided, the buffer area must be expanded to protect the sensitive site by an area equivalent to the disturbed area or by providing comparable functions through other management initiated efforts.

Landowners must leave additional acres equal to the number of acres (including partial acres) occupied by an existing stream-adjacent parallel road within a Type Np Water RMZs or sensitive site buffer.