



Final Tier II Antidegradation Analysis

**For The Washington Forest Practices
Board's Proposed Western Washington
Type Np Waters Buffer Rule**

Water Quality Program

Washington State Department of Ecology
Olympia, Washington

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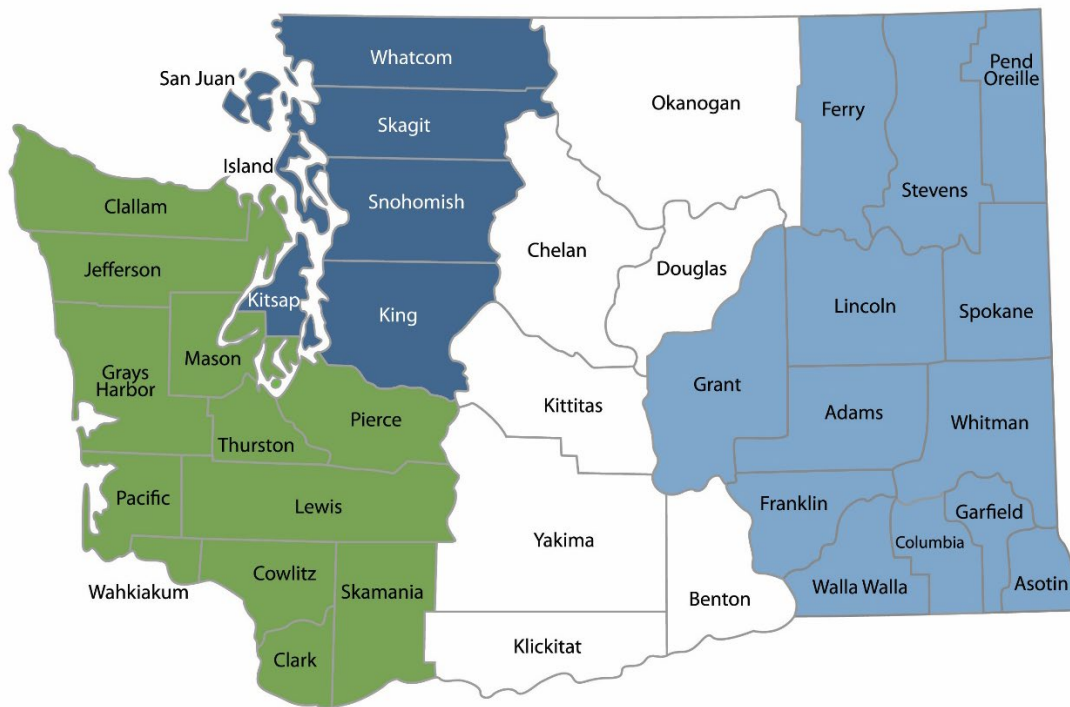
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DEPARTMENT OF
ECOLOGY
State of Washington

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Executive Summary

Ecology conducted a Tier II antidegradation analysis for the Forest Practices Board's proposed western Washington Type Np buffer rule. The proposed rule establishes continuous two-sided riparian buffers for non-fish, perennial (Type Np) waters ranging from 50-75 feet and represents a new or expanded action per Washington Administrative Code (WAC) 173-201A-320, therefore requiring a Tier II antidegradation review. We find the proposed rule is likely to result in substantial improvement to Type Np water quality in western Washington when compared to baseline conditions. For most Type Np waters across the landscape where the proposed rule would be implemented, waters are not expected to warm above the measurable change allowance of 0.3°C, which generally satisfies Tier II antidegradation rules.

Following our review of the best available science, we determined the proposed rule is likely to protect streams from measurable warming in many instances. However, the proposed rule is still likely to result in measurable warming under certain regional and site-specific conditions. In general, we anticipate streams with less topographic and riparian shade and a higher proportion of surface water are more likely to warm under the proposed rule. Conversely, we anticipate streams with more topographic and riparian shade that have more groundwater influence are less likely to warm.

After analyzing the costs and benefits of the proposed rule, including additional consideration of a less degrading 100-foot buffer alternative for illustrative purposes, we determine it is necessary and in the overriding public interest to allow the Forest Practices Board to adopt the rule as proposed. If the Board adopts the proposed rule, uncertainty related to rule effectiveness needs to be addressed through additional research by the Board's Adaptive Management Program (AMP). Additional AMP projects have the potential to further increase our understanding of stream temperature, changes in canopy cover, and amphibian use in headwater streams.

Background

Forestry is a major land use in Washington State that consists of growing and harvesting timber, forest road construction and maintenance, forest biomass removal, reforestation, brush control, and other activities. The Washington Forest Practices Board, established in the 1974 Forest Practices Act, is the agency that adopts the rules that regulate forest practices activities. Forest practices are mandated under law to meet state Water Quality Standards (Washington Administrative Code (WAC) 173-201A) and are implemented using forestry prescriptions (WAC 222) developed and refined through a science-based adaptive management program (WAC 222-12-045).

In areas applicable to the Washington State Forest Practices Habitat Conservation Plan, an established water typing system groups waters into the following classifications: Type Ns (non-fish, seasonal), Type Np (non-fish, perennial), Type F (fish bearing), and Type S (shorelines) (WAC 222-16-031). Water quality and aquatic habitat associated with these water types are protected by the implementation of forest practices rule prescriptions and best management practices, which include, but are not limited to, no-harvest and partial harvest riparian management zone stream buffers.

Laws and regulations for forestland water quality protection

State laws establish that forest practices rules must be designed to achieve compliance with state water quality standards.

- The State Forest Practices Act requires forest practices rules to achieve compliance with federal and state water pollution control laws (Revised Code of Washington (RCW) 76.09.010(2)(g)). The Act also requires rules covering aquatic resources only be adopted or changed by the Forest Practices Board where those changes are consistent with recommendations resulting from a scientifically-based adaptive management process (RCW 76.09.370).
- The State Water Pollution Control Act requires forest practices rules to achieve compliance with water pollution control laws and requires Ecology's agreement to any proposed rules pertaining to water quality before those rules are adopted by the Forest Practices Board (RCW 90.48.420(1)).
- The forest practices regulations also require rules to achieve compliance with water quality laws (WAC 222-12-010), and calls attention to the legislative requirement for Ecology to agree to any proposed rule pertaining to water quality protection prior to Forest Practices Board adoption.

Federal Clean Water Act

The Federal Clean Water Act (CWA) requires states to adopt water quality standards that consist of designated uses, water quality criteria, and an antidegradation policy. Section 303(c)(2)(A) of the CWA gives the responsibility for adopting water quality standards to states and authorized Tribes, and requires these standards to protect the public health or welfare, enhance the quality of water, and serve the purposes of the Act.

The CWA and implementing regulations require all states to adopt an antidegradation policy into their Water Quality Standards (40 Code of Federal Regulations (CFR) 131.12).² At a minimum, that policy must be consistent with the following:

1. Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
2. Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.
3. Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.
4. In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act.

Washington State Water Pollution Control Act

Water pollution control in the State of Washington is regulated under Revised Code of Washington (RCW) Chapter 90.48. This law declares that it is the public policy of the state to maintain the highest possible standard to ensure purity of waters consistent with public health, public enjoyment, and propagation and protection of wildlife, birds, game, fish, and other aquatic life (RCW 90.48.010).

² <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-131/subpart-B/section-131.12>

The State Water Pollution Control Act establishes the rulemaking authority for the Department of Ecology to promulgate rules and regulations necessary to carry out the provisions of the Act, including water quality standards for the state (RCW 90.48.035). Chapter 173-201A WAC is the Water Quality Standards for Surface Waters of the State of Washington. This chapter establishes standards for public health and public enjoyment of waters in the state and for propagation and protection of fish, shellfish, and wildlife.

Washington's antidegradation policy for surface waters is guided by Chapter 90.48 RCW, the Water Pollution Control Act, Chapter 90.54 RCW, the Water Resources Act of 1971, and 40 CFR 131.12 which are the federal regulations that implement the CWA requirements. The antidegradation policy applies three tiers of protection for surface waters of the state (WAC 173-201A-310 through -332):

- Tier I protects and maintains existing and designated uses and applies to all waters and all sources of pollution by applying numeric and narrative criteria for surface waters.
- Tier II ensures waters that are of higher quality than the assigned criteria are not degraded unless such lowering of water quality is necessary and in the overriding public interest.
- Tier III protections function to set the very best waters of the state aside from future sources of degradation entirely (Tier III(A)), or above measurable amounts (Tier III(B)). These are known as Outstanding Resource Waters.

Tier II antidegradation protections

When a water quality parameter is of higher quality than the applicable numeric criteria designated for that water, then Tier II Antidegradation protections apply. For these waters and water quality constituents, new or expanded actions that are expected to cause a measurable change in the quality of the water may not be allowed unless Ecology determines that the lowering of water quality beyond the measurable change is necessary and in the overriding public interest.

A Tier II review, including applicable public involvement, occurs for new or expanded actions associated with:

- National Pollutant Discharge Elimination System (NPDES) waste discharge permits
- State waste discharge permits to surface waters
- Federal Clean Water Act Section 401 water quality certifications
- Other water pollution control programs authorized, implemented, or administered by Ecology

A Tier II evaluation occurs at the time that a new or expanded pollution source control program is developed. The measurable change analysis determines whether these new or expanded actions have the potential to cause a measurable change in the physical, chemical, or biological quality of the water. Washington's water quality standards define measurable change as:

- Temperature increase of 0.3° or greater
- Dissolved oxygen decrease of 0.2 mg/L or greater
- Bacteria level increase of 2 CFU or MPN per 100 mL or greater
- pH change of 0.1 units or greater
- Turbidity increase of 0.5 NTU or greater
- Any detectable increase in the concentration of a toxic or radioactive substance

If an action has been determined to cause a measurable change in water quality, then an analysis is conducted to determine if the lowering of water quality is both necessary and in the overriding public interest (WAC 173-201A-320(4)). New or reissued general permits or other water pollution control programs (such as the Forest Practices rules) authorized, implemented, or administered by Ecology will undergo an analysis under Tier II at the time Ecology develops and approves the general permit or program, and individual activities (such as site-level Forest Practices Applications) will not require a Tier II analysis (WAC 173-201A-320(6)(a)). Ecology has developed supplemental guidance for implementing the Tier II Antidegradation Policy (Ecology, 2011).³

Recent history of current forest practices rules

Leading up to the current Forest Practices Rules for stream protection was the Forests and Fish Report.⁴ This 1999 document was the result of the collaboration of stakeholders including Tribes, forest landowners, local governments, and state and federal resource agencies. These diverse parties outlined ways to protect water quality and aquatic and riparian-dependent species on non-Federal, non-Tribal forestlands in Washington.

The Forests and Fish Report identified four goals:

1. Provide compliance with the federal Endangered Species Act for aquatic and riparian-dependent species on non-federal forestlands;
2. Restore and maintain riparian habitat on non-federal forest lands to support a harvestable supply of fish;
3. Meet the requirements of the Clean Water Act for water quality on non-federal forest lands; and
4. Keep the timber industry economically viable in the state of Washington.

³ <https://apps.ecology.wa.gov/publications/documents/1110073.pdf>

⁴ https://www.dnr.wa.gov/publications/fp_rules_forestsandfish.pdf

Clean Water Act assurances

In response to the strength and focus of the agreements contained in the Forests and Fish Report, the Department of Ecology in cooperation with the United States Environmental Protection Agency established the Clean Water Act (CWA) Assurances.⁵ The CWA Assurances established that the State Forest Practices Rules and programs, as updated through a formal adaptive management program, would be used as the primary mechanism for bringing and maintaining forested watersheds into compliance with water quality standards. Likewise, the rules and programs are the primary mechanism for maintaining compliance with water quality standards.

The foundation for granting the CWA Assurances was the belief that the Forest Practices Rules were a substantial step forward in environmental protection, and, when implemented, would provide the quickest and most efficient means for achieving environmental goals and compliance with the state's water quality standards. Therefore, Ecology placed a lower priority for developing CWA-mandated Total Maximum Daily Loads to serve as regulatory water cleanup tools for forested watersheds. The value of offering formal assurances is that they provide landowners and agencies with a predictable and consistent regulatory system, and in doing so, provide an additional motivation for partners to participate in the Adaptive Management Program. The Forest Practices Program has benefited from the regulatory stability provided by the CWA Assurances for over twenty-five years.

Salmon Recovery Act of 1999

Following the release of the Forests and Fish Report was passage and enactment of the Salmon Recovery Act. This Act directed the adoption of the goals of the Forests and Fish Report into the State Forest Practices Rules. Those rules are guided by the Forest Practices Board, and set standards for timber harvests, pre-commercial thinning, road construction, and other forest practices on over 10 million acres of state and private forestland.

The State Legislature found that the Salmon Recovery Act and the resulting Forests and Fish Rules, taken as a whole, constitute a comprehensive and coordinated program to provide substantial and sufficient contributions to salmon recovery and water quality enhancement in areas impacted by forest practices (RCW 77.85.180(2)). It also authorized the development of new Forest Practices Rules based on the analyses and conclusions of the Forests and Fish Report. The rules included the development of an adaptive management program to adjust forest practices rules that are not achieving resource objectives (RCW 76.09.370(7)).

These provisions for the Forest Practices Adaptive Management Program are designed to meet the goals and objectives for water quality and habitat for fish and other covered species within the jurisdiction of the program.

⁵ Schedule M-2, Forests and Fish Report p.167

Forest practices habitat conservation plan

The Forest Practices Habitat Conservation Plan⁶ (FPHCP) is a direct result of the Forests and Fish Report and Salmon Recovery Act. The FPHCP was approved in 2006 by the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service. Covering approximately 60,000 miles of stream habitat across 9.3 million acres of private and state forestlands, this 50-year agreement protects the habitat of aquatic species, supports economically viable and healthy forests, and creates regulatory stability for landowners. The FPHCP relies on the Adaptive Management Program to assist in determining if and when it is necessary or advisable to adjust the Forest Practices Rules and guidance to achieve the FPHCP's resource objectives, or to respond to monitoring results, evaluation, or research.⁷

Schedule L-1

Schedule L-1 is an appendix to the FPHCP and serves as the foundation for the Adaptive Management Program (AMP).⁸ L-1 describes the program's overall performance goals, resource objectives, functional objectives and performance targets. This schedule guides the development of research and monitoring projects described in the Cooperative Monitoring Evaluation and Research Committee's (CMER) workplan.

Overall performance goals for the AMP declare resource objectives intended to ensure forest practices, either singularly or cumulatively, will not significantly impair the capacity of aquatic habitat to:

- a) Support harvestable levels of salmonids;
- b) Support the long-term viability of other covered species; or
- c) meet or exceed water quality standards (protection of beneficial uses, narrative and numeric criteria, and antidegradation).⁹

Heat/Water Temperature is identified as a primary Resource Objective in Schedule L-1, with an associated Functional Objective to provide cool water by maintaining shade, groundwater temperature, flow, and other watershed processes controlling stream temperature. The performance target for stream temperature is the state's water quality standards.

⁶ <https://www.dnr.wa.gov/programs-and-services/forest-practices/forest-practices-habitat-conservation-plan#HCP%20Sections>

⁷ FPHCP Implementation Agreement, page 9

⁸ https://www.dnr.wa.gov/publications/bc_tfw_attachment_1_schedule_l1_021401.pdf

⁹ Schedule L-1 and WAC 222-12-045(1)(2)(a)(ii)

Forest practices adaptive management program

The Forest Practices Adaptive Management Program (AMP) is a multi-caucus program that includes representatives from state departments (Fish and Wildlife, Ecology, Agriculture, Commerce, and Natural Resources), landowners, the forest industry, county governments, the environmental community, and Tribal governments. Representatives of these caucuses participate in two key AMP committees established by the Forest Practices Board: The Timber, Fish, and Wildlife Policy Committee (TFW Policy); and the Cooperative Monitoring, Evaluation, and Research Committee (CMER).

The TFW Policy Committee considers the findings of CMER research and monitoring and makes recommendations related to Forest Practices Rules, Board Manual sections, and other guidance to the Forest Practices Board for decision. CMER reviews existing science and contributes original research to the program. This science function is designed to produce unbiased technical information for consideration by the TFW Policy Committee and the Board. Both AMP committees are consensus-based; however, if consensus cannot be reached through the adaptive management process, participants will have their issues addressed through an established dispute resolution process. If necessary, the Forest Practices Board will make the final determination regarding dispute resolution (WAC 222-12-045(2)(h)).

The Department of Natural Resources (DNR) is the lead agency for ensuring compliance with Forest Practices Rules on state and private forestlands in Washington. Ecology partners with Washington Department of Fish and Wildlife and Tribal biologists to support the implementation of Forest Practices Rules.

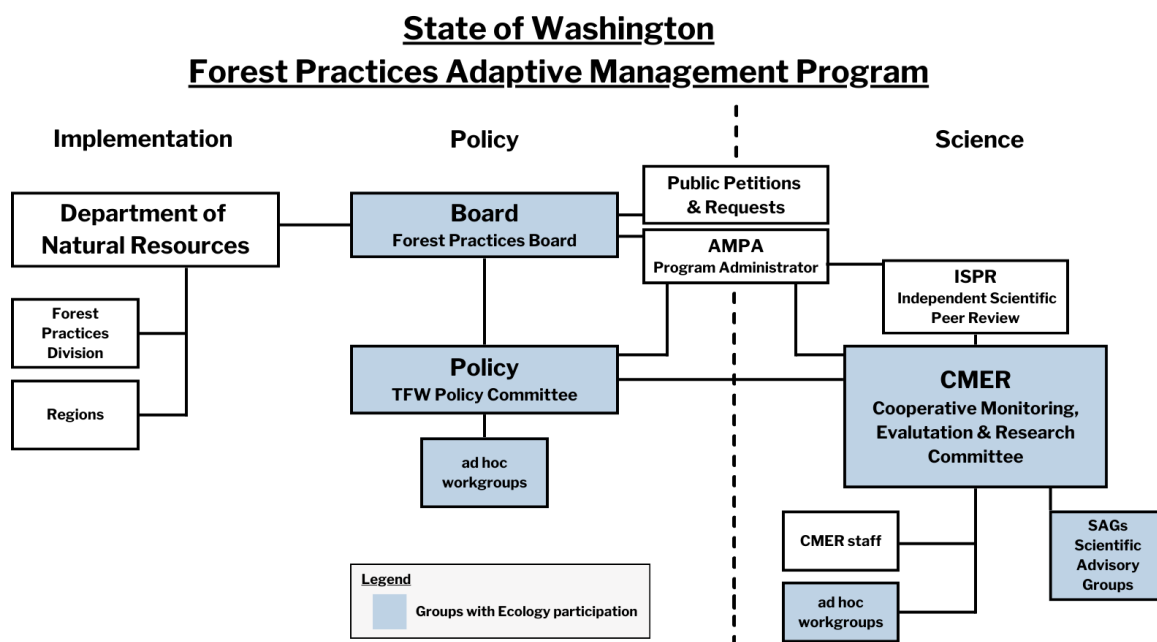


Figure 1. Forest Practices Adaptive Management Program diagram.

Forests and fish western Washington Type Np buffer rule

Type Np waters are defined in WAC 222-16-031*(4)¹⁰ as “...all segments of natural waters within the bankfull width of defined channels that are perennial nonfish habitat streams. Perennial streams are flowing waters that do not go dry any time of a year of normal rainfall and include the intermittent dry portions of the perennial channel below the uppermost point of perennial flow.”

The existing Forests and Fish buffer rule for western Washington Type Np waters (WAC 222-30-021*(2)) was adopted in 2001 as part of the Forests and Fish Report and Salmon Recovery Act rule package. The rule consists of:

- 50-foot no-harvest buffers on both sides of perennial non-fish waters for 50% of the water’s length, except for Type Np water segments 300 feet or less in length which require 100% of the water’s length to be buffered with 50-foot no-harvest buffers on both sides of the stream.
- 50-foot no-harvest buffers for sensitive sites associated with Np streams, including headwall and side slope seeps.
- 56-foot no-harvest buffers are for the intersection of two or more Type Np waters, for headwater springs, and uppermost points of perennial flow.
- In addition to the existing Np buffer rule, additional no-harvest buffers are often applied adjacent to Np waters where the presence of adjacent rule-identified potentially unstable landforms warrants the need for additional resource protection. These buffers are applied to protect the stability of inner gorges, bedrock hollows, convergent headwalls, and other landforms.

¹⁰ Forest Practices Rules marked with an asterisk (*) pertain to water quality protection and have been adopted or amended by the Forest Practices Board with agreement from the Department of Ecology per WAC 222-12-010.

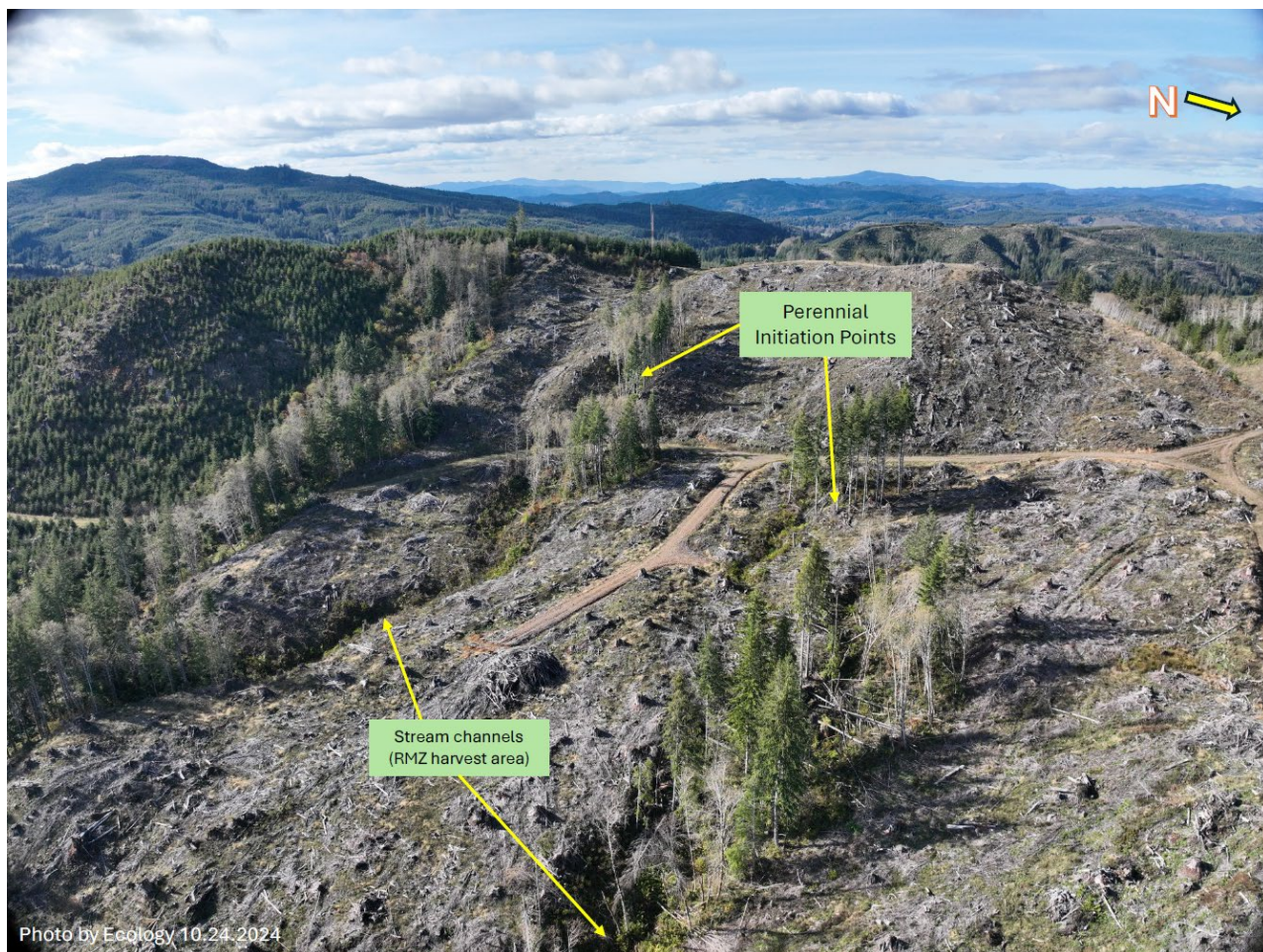


Figure 2. Example application of Forests and Fish western Washington Type Np buffer rule prescription.

Despite concerns with respect to the uncertainty and effectiveness of the Forests and Fish western Washington Type Np rule when it was under review, Ecology agreed to the overall Forests and Fish rule package as it represented a substantial step forward in environmental protection, and when implemented would provide the quickest and most efficient means for achieving environmental goals and compliance with the state’s water quality standards. Key to Ecology’s support of the Forests and Fish rule package was the Adaptive Management Program function to test the effectiveness of the rules and drive rule revisions when necessary to meet water quality standards.

The FPHCP Environmental Impact Statement Responses to Public Comments recognized uncertainty with the Forests and Fish protection measures for Type Np waters and acknowledged that results of CMER studies will allow the Forest Practices Board to assess Type Np protection measures and adapt where necessary to meet FPHCP objectives.¹¹

In 2002, the CMER Committee ranked the AMP's effectiveness monitoring and extensive status and trend monitoring programs by asking two questions:

1. How certain are we of the science and/or assumptions underlying the rule?
2. How much risk is there to aquatic resources if the science or assumptions underlying the rule are incorrect?

Out of sixteen effectiveness/validation programs, two of the three highest ranked programs were centered around uncertainty and aquatic resource risk in Type N streams. At the top of the list was the Type N Buffer Characteristics, Integrity Function program, and third from the top was the Type N Amphibian Response program. The Type N Buffer Characteristics, Integrity, Function Project was ranked as urgent.¹² Following this priority ranking, studies to evaluate Type N streams and the effectiveness of the existing western Washington Type Np rule were chartered, scoped, designed and implemented. These included:

- Buffer Integrity – Shade Effectiveness (Amphibians) Project
- Westside Type N Buffer Characteristics, Integrity and Function Project (BCIF)
- Experimental Riparian Buffers on Perennial Non-fish-bearing Streams on Competent Lithologies in Western Washington (Hard Rock), Study Phases I and II;
- Extensive Riparian Status and Trends Monitoring – Temperature, Type F/N (Westside and Eastside) Project
- Effectiveness of Forest Practices Buffer Prescriptions on Perennial Non-fish-bearing Streams on Marine Sedimentary Lithologies in Western Washington Study (Soft Rock)

Hard Rock and Soft Rock studies

Two studies were designed and implemented by CMER to test the effectiveness of riparian buffers on non-fish-bearing perennial streams in western Washington. The design for the Effectiveness of Experimental Riparian Buffers on Perennial Non-fish-bearing Streams on Competent Lithologies in Western Washington (Hard Rock) was approved by CMER consensus in 2005. Part of that study design included limiting the site selection to streams with attributes that are known to influence stream associated amphibian distribution, to ensure presence at the sites (McIntyre et al., 2018). One of the site selection criteria was competent stream

¹¹ FPHCP EIS Responses to Public Comments pages 3-75, 3-76

¹² FPHCP Appendix H. CMER Work Plan, pages 5-9. Urgent projects are effectiveness and extensive monitoring projects that received the highest priority ranking because they are critical elements of a credible Forests and Fish Report Adaptive Management Program, and immediate implementation is desirable. The urgent projects address the key scientific uncertainties in the underlying assumptions of the Forests and Fish Report agreement.

lithology, which McIntyre et al. (2018) defined as potentially producing long-lasting coarse grain sizes. This left large swaths of western Washington with incompetent lithology, defined by Ehinger et al. (2021) as likely to produce fine-grained stream substrate, out of the scope of inference. In response, CMER added a companion study, Effectiveness of Forest Practices Buffer Prescriptions on Perennial Non-fish-bearing Streams on Marine Sedimentary Lithologies in Western Washington (Soft Rock), to assess the effectiveness of buffer prescriptions in more highly erodible Type N watersheds. The study design for Soft Rock was approved by consensus in 2011. Once study designs were approved, data collection began in 2006 for Hard Rock and in 2012 for Soft Rock.

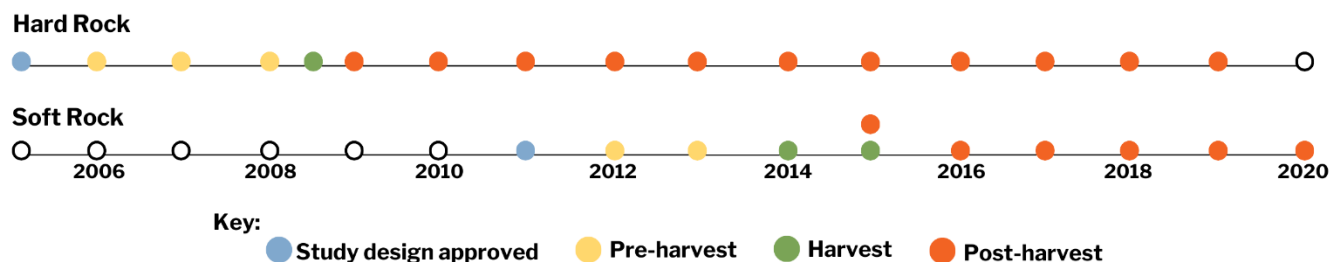


Figure 3. Timeline of the Hard Rock and Soft Rock studies.

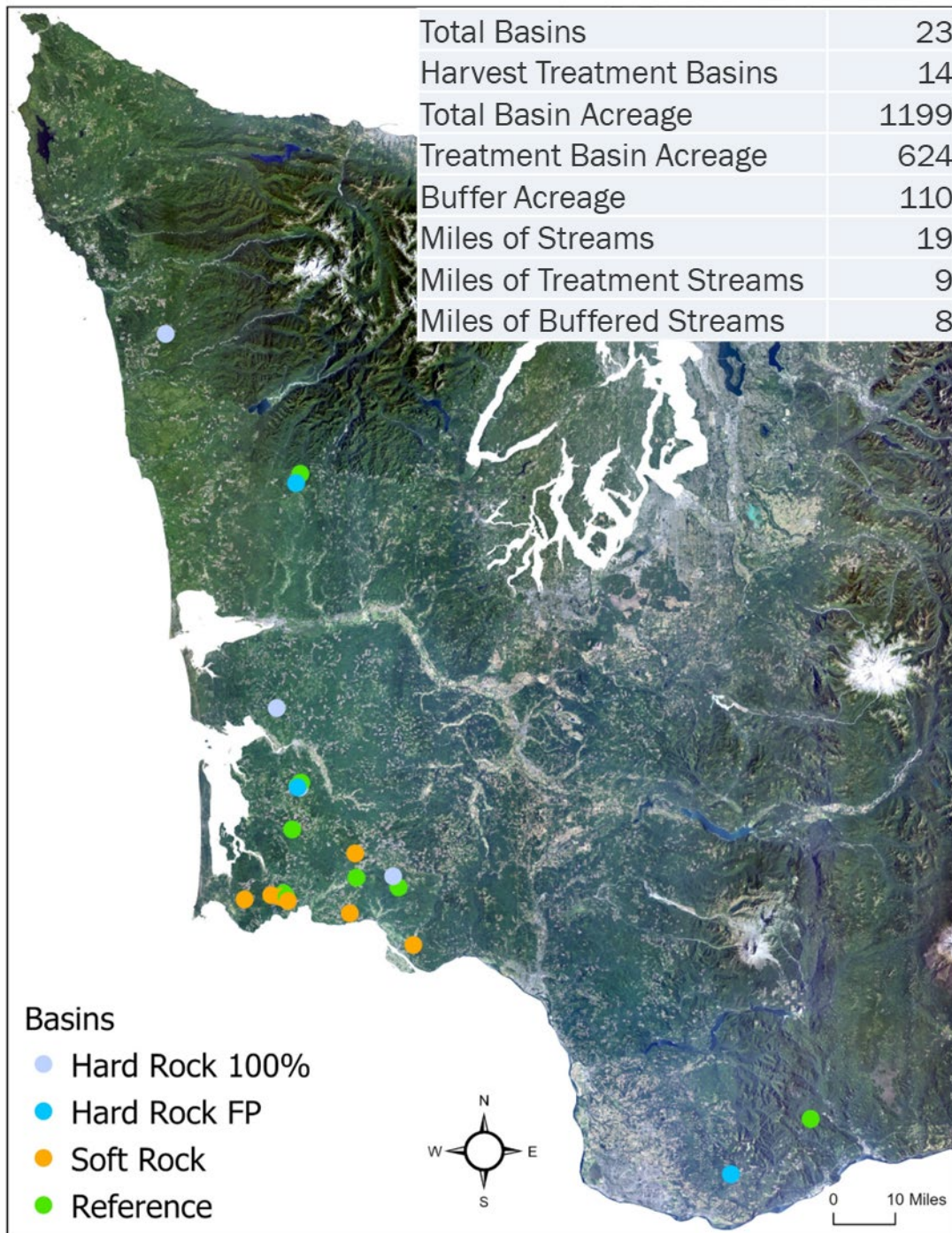


Figure 4. Sites for Hard and Soft Rock studies.

Three reports were published from these studies: Hard Rock Phase I (McIntyre et al. 2018); Hard Rock Phase II (McIntyre et al. 2021); and Soft Rock (Ehinger et al. 2021). Phase I of the Hard Rock report covered the first two years post-harvest in accordance with the original study design. Due to a significant stream temperature response in the first two years post-harvest, the Forest Practices Board decided to continue post-harvest monitoring (McIntyre et al. 2021).

The authors of Phase II note that by continuing to monitor through post-harvest year nine, they would be able to evaluate the trajectories of variables, like stream temperature, that changed after harvest. They would also be able to detect potential lag effects for stream associated amphibians, which didn't initially show a response to the harvest. The Soft Rock report covers the first two years post-harvest with an additional Chapter 4 addendum that reports on stream temperature and canopy cover through post-harvest year six. Unlike Hard Rock, there was no amphibian component to Soft Rock, so that delayed response was not necessary to estimate.

All three reports were approved by CMER and sent to an Independent Scientific Peer Review (ISPR) panel, administered through the University of Washington. Edits and suggestions from ISPR were incorporated (or a justification for leaving the text unchanged was provided) by the authors, approved by CMER consensus, and published by the AMP in 2018 (Hard Rock Phase I) and 2021 (Hard Rock Phase II and Soft Rock). The final Findings Report, including the final reports and answers to the CMER/Policy Interaction Framework Six Questions document, for Hard Rock (Phase I and II) and Soft Rock was sent to TFW Policy for consideration.

Timber, fish, and wildlife policy committee response to study findings

Identified below are actions and activities by the TFW Policy Committee following receipt of the Hard Rock Phase I findings report.¹³ Upon receipt of completed CMER projects, the TFW Policy Committee has up to 180 days to develop a decision and make a recommendation to the Forest Practices Board. Policy recommendations can include a formal petition for rulemaking, a non-rulemaking alternative action, or a recommendation to take no action.¹⁴

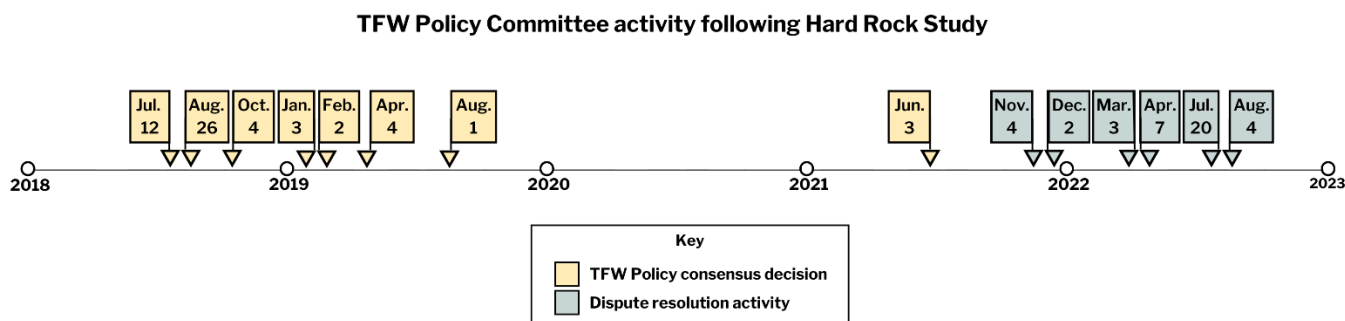


Figure 5. TFW Policy Committee activity following Hard Rock Phase I Study.

- July 12, 2018. TFW Policy by consensus accepted the Hard Rock Phase I findings report.
- August 26, 2018. TFW Policy by consensus agreed that the Hard Rock Phase I findings report merited action, and that action alternatives would begin to be developed.
- October 4, 2018. TFW Policy by consensus approved the Type N Alternative Workgroup Charter.

¹³ TFW Policy Committee activity is documented in meeting minutes and posted on DNR's website at <https://www.dnr.wa.gov/about/boards-and-commissions/forest-practices-board/tfw-policy-committee/tfw-policy-committee-past>

¹⁴ Forest Practices Board Manual Section 22, part 3.4

- January 3, 2019. TFW Policy by consensus accepted the Type Np Alternative Workgroup Charter.
- February 2, 2019. TFW Policy by consensus accepted the proposed plan to determine membership of the Type Np Alternatives Workgroup.
- April 4, 2019. TFW Policy by consensus approved inclusion of \$200,000 for the Type Np Alternatives Workgroup for the 2019-2020 fiscal year.
- August 1, 2019. TFW Policy by consensus approved a ranking system for participation in the Technical Type Np Prescriptions Workgroup.
- June 3, 2021. TFW Policy by consensus accepted the Type Np Technical Workgroup's final report and agreed to define a vetting process and timeline to include consideration of the Hard Rock Phase II and Soft Rock studies.
- November 4, 2021. The Conservation Caucus representative invoked the dispute resolution process on Hard Rock Phase I. This dispute became known as the Hard Rock Type N Action Development Timeline Dispute.
- December 2, 2021. The Conservation Caucus representative presented a description of the dispute, declaring that more than 150 days had passed since TFW Policy had received the Type Np Technical Workgroup's final report, and that the Forest Practices Board Manual guidelines allow for 150 days for TFW Policy to decide on an action alternative for recommendation to the Board following receipt of a report. A lack of meaningful progress towards a consensus decision was emphasized. The Conservation Caucus also shared a vision for successful resolution: A consensus alternative recommendation for a formal rulemaking petition to the Forest Practices Board for western Washington Type Np streams.
- March 3, 2022. The Conservation Caucus representative invoked stage 2 of the dispute resolution process for the Hard Rock Type N Action Development Timeline Dispute.
- April 7, 2022. The three-month timeline for Stage 2 of the Hard Rock Type N Action Development Timeline Dispute was started.
- July 20, 2022. Stage 2 of the Hard Rock Type N Action Development Timeline Dispute ended without consensus.
- August 4, 2022. The DNR representative announced that following the end of Stage 2, majority/minority reports now need to be completed, and these reports will be presented to the Forest Practices Board at their November 2022 quarterly meeting.
 - Majority TFW Policy caucuses were identified as the Westside Tribes, Eastside Tribes, Conservation, and State Departments of Fish and Wildlife and Ecology.
 - Minority TFW Policy caucuses were identified as Large Industrial Forest Landowners, Small Forest Landowners, and Washington State Association of Counties.

Forest Practices Board actions and resolution of TFW policy dispute

Identified below are actions and activities taken by the Forest Practices Board regarding Type Np rulemaking and resolution of the Type Np TFW Policy Committee dispute. Adaptive Management Program disputes that are not resolved at the conclusion of the TFW Policy dispute resolution process are presented to the Forest Practices Board as majority/minority reports. The Board makes the final determination in resolving all disputes.

- November 10, 2021. Forest Practices Board directs staff to file a CR-101 Pre-Proposal Statement of Inquiry with the Washington State Code Reviser's Office. The CR-101 is filed on November 30, 2021, notifying the public that possible rulemaking may occur for Type Np riparian management zone buffers in Chapter 222-30 WAC.
- November 9, 2022. The Forest Practices Board resolved the Hard Rock Type N Action Development Timeline Dispute by voting to approve the majority TFW Policy recommendations¹⁵ and to advance the proposal forward for rulemaking consideration.¹⁶ The majority recommendation included a new western Washington Type Np waters buffer rule derived from the recommendations included in the Type Np Technical Workgroup's Final Report.
- August 9, 2023. The Forest Practices Board rescinded their November 9, 2022, vote due to alleged Open Public Meetings Act process concerns. The Board then held a new vote on the majority/minority TFW Policy Type Np recommendations, again approving the majority TFW Policy recommendation for advancement in the rulemaking process.¹⁷ This decision provided a final determination on the Hard Rock Type N Action Development Timeline Dispute.

¹⁵ Type Np Action Development Dispute, Majority Recommendations.

https://www.dnr.wa.gov/publications/bc_fpb_meeting_packet_20221109.pdf

¹⁶ November 9, 2022, Forest Practices Board Meeting Minutes.

https://www.dnr.wa.gov/publications/bc_fpb_mtgminutes_20221109_10.pdf

¹⁷ August 9, 2023, Forest Practices Board Meeting Minutes.

https://www.dnr.wa.gov/publications/bc_fpb_mtg_minutes_20230809.pdf

Forest Practices Board's Proposed Rule

The Forest Practices Board's CR-101 Pre-Proposal Statement of Inquiry states that, "The Board's adaptive management program is in the process of completing a series of six studies on the adequacy of current riparian buffers on Type Np streams. The adaptive management program is developing alternative recommendations, based upon the results of all of the Type Np studies, to present to the Board. These recommendations may result in changes to the riparian management zone buffers associated with Np stream segments to ensure the buffers protect water quality and other aquatic resources from potential temperature increases."¹⁸

The Board's approved TFW Policy Majority caucus recommendations contain new prescriptions for Type Np waters in western Washington covered by the Forest Practices Habitat Conservation Plan in a proposed new rule section, WAC 222-30-0211 *Western Washington Type Np water riparian management zones and Type Ns water riparian protections. These draft rule prescriptions include riparian management zone buffer protections that vary by basin size, bankfull width, and harvest strategy selected by the proponent. Proposed rule language¹⁹ and illustrations²⁰ can be found below and would be under WAC 222-30-0211(3):

- a) When the topographic basin in which harvest will occur is larger than 30 acres and 85% or more of the basin is planned, or reasonably expected, to be harvested within a five-year period the landowner must designate a two sided 75-foot no-harvest buffer along the entire stream reach of each Type Np Water.

¹⁸ https://www.dnr.wa.gov/publications/bc_fpb_typnp_cr101_20211110.pdf

¹⁹ https://www.dnr.wa.gov/publications/bc_fpb_typnp_proposal_20240509.pdf

²⁰ Majority Proposal Illustrations, pages 44-45.

https://www.dnr.wa.gov/publications/bc_fpb_mtg_packet_20221031.pdf

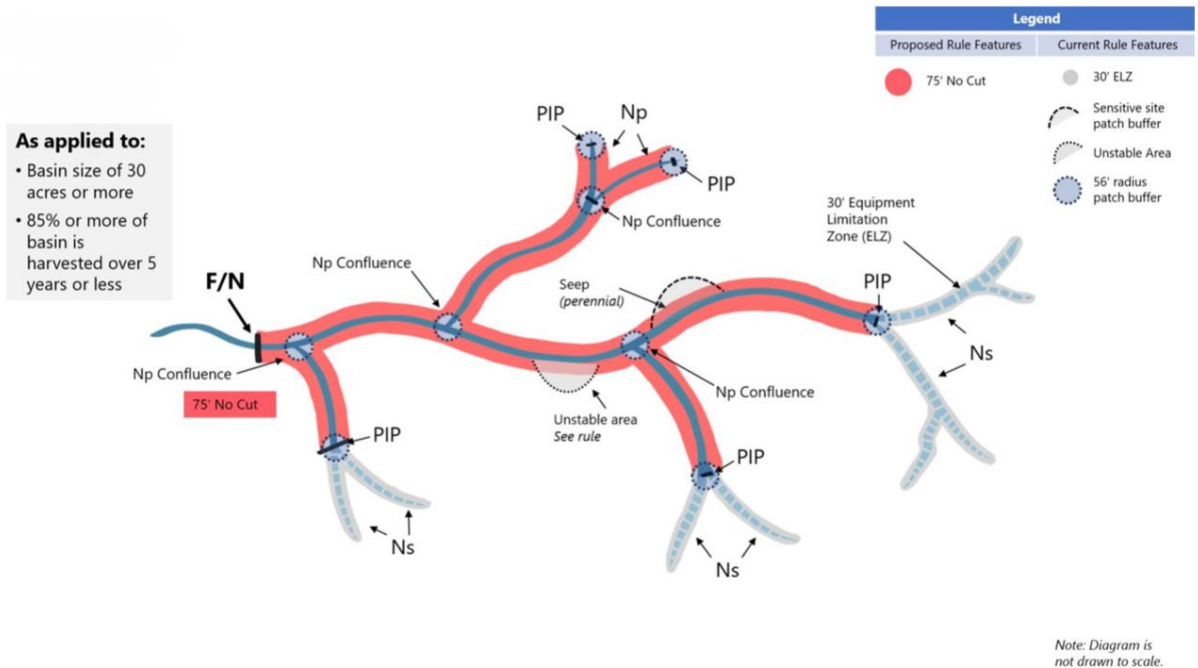


Figure 6. Option 2 from Majority TFW Policy Recommendations.

- b) For all other topographic basins and harvests, a 75-foot no-harvest buffer will be established along both sides of the Type Np Water for the first 600 feet upstream from the confluence of Type S or F Water or, for Type Np streams without an above-ground confluence to a Type S or F Water, the lowest 600-foot length of the isolated stream. Upstream of the first 600 feet of a Type Np Water, the RMZ will be established based on stream bankfull width, as follows:
- (i) For each Type Np stream three feet bankfull width or greater, the landowner must identify either a partial management strategy or no cut strategy:
 - A. For partial management strategy, the landowner must designate a two-sided seventy-five-foot RMZ along the stream reach in the harvest unit, and establish:
 - (I) A no-harvest buffer fifty feet wide measured from outer edge of bankfull width, and;
 - (II) A managed zone, twenty-five feet wide measured from outer edge of the no harvest buffer, where:
 - Up to 50 percent of the trees may be harvested with an evenly-spaced distribution of leave trees; and
 - Leave trees shall be representative of diameters found within the managed zone, and shall be representative of the tree species distribution within the outer zone.
 - B. For no cut strategy, the landowner must designate a two-sided sixty-five foot no-harvest buffer along the entire stream reach in the harvest unit.

- (ii) For each Type Np stream less than three feet bankfull width, the landowner must designate a two-sided no-harvest fifty-foot buffer along the entire stream reach in the harvest unit.

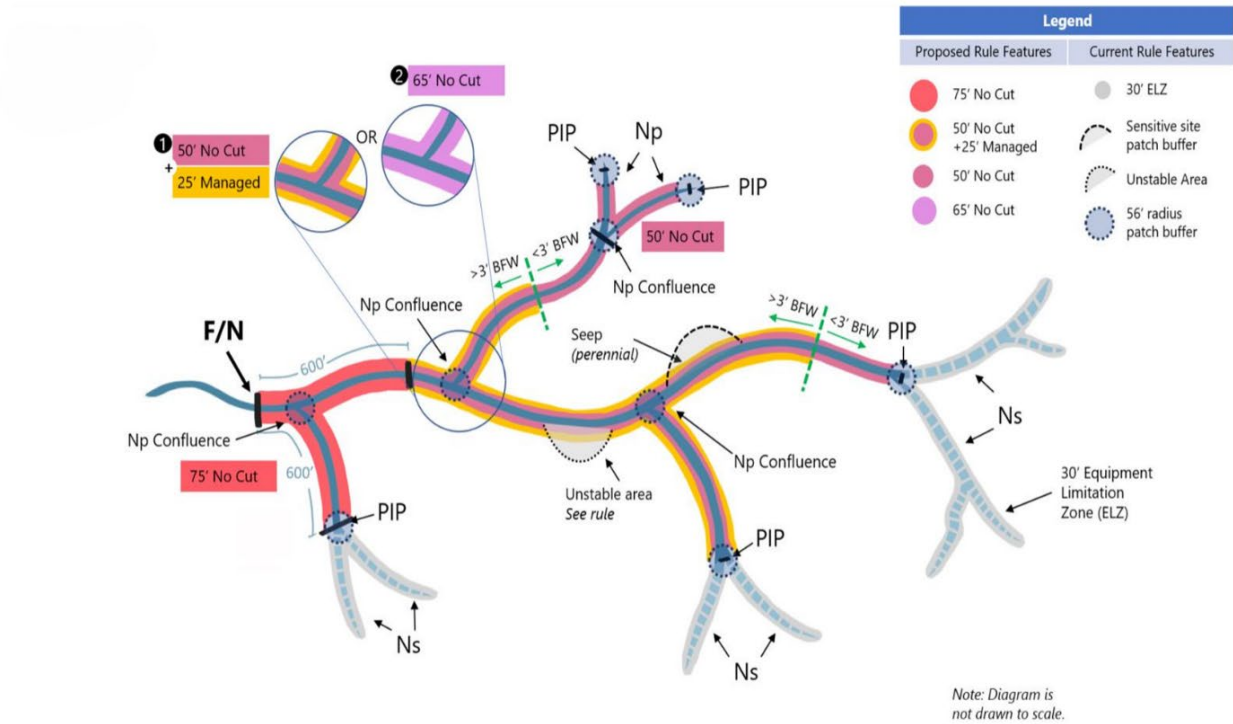


Figure 7. Option 1 from Majority TFW Policy Recommendations.

Tier II Antidegradation Analysis For Proposed Western Washington Type Np Waters Buffer Rule

This document presents Ecology's Tier II Antidegradation Analysis findings for the Forest Practices Board's proposed western Washington Type Np waters buffer rule. We evaluated:

- 1) Whether the proposed rule will cause exceedances of applicable water quality criteria,
- 2) Whether the proposed rule will cause a measurable change in waters that are currently of higher quality than the applicable criteria, and
- 3) If the proposed rule will cause a measurable change, whether there is a necessary and overriding public interest for the proposed rule.

New or expanded action discussion

As stated in WAC 173-201A-320(2), a Tier II review occurs for new or expanded actions associated with:

- National Pollutant Discharge Elimination System (NPDES) waste discharge permits
- State waste discharge permits to surface waters
- Federal Clean Water Act Section 401 water quality certifications
- Other water pollution control programs authorized, implemented, or administered by Ecology

The Washington State Forest Practices Rules (WAC 222) fall under the "Other water pollution control programs" category in the state antidegradation policy (WAC 173-201A-320(2)(d)) and are therefore subject to Tier II review when a new or expanded pollution source control program is developed. The Tier II rule specifies:

WAC 173-201A-320(6) "General permit and water pollution control programs are developed for a category of dischargers that have similar processes and pollutants. New or reissued general permits or other water pollution control programs authorized, implemented, or administered by the department will undergo an analysis under Tier II at the time the department develops and approves the general permit or program."

In the context of nonpoint pollution and forest practices, the Forest Practices Board's proposed western Washington Type Np buffer rule is equivalent to a "reissued" general permit for the following reasons: 1) The proposed rule functions to protect Type Np water quality across all FPHCP lands in western Washington, and 2) the proposed rule revises the existing Forests and Fish Type Np rule.

Ecology's Supplemental Guidance on Implementing Tier II Antidegradation addresses Washington's Forest Practices Rules, stating:

The forest practices system in Washington is specifically designed to meet the requirements of the Clean Water Act and the state water quality standards. Forest practices must be conducted so as to meet the state's narrative and numeric water quality standards and the Tier II antidegradation requirements. These requirements are monitored through the comprehensive Forest and Fish Adaptive Management Program, which includes compliance, validation, and effectiveness monitoring.

This adaptive management program uses the findings of scientific investigations to periodically update forestry requirements. These updates are designed to ensure that compliance with the forest practice rules also results in compliance with the state surface water quality standards, including the Tier II antidegradation requirements. This expectation should remain true so long as: 1) the adaptive management program continues to be adequately funded, functional, and scientifically robust; and, 2) an antidegradation evaluation is conducted as part of any rule making affecting water quality related requirements in the forest practices system.²¹

Tier I protections

Type Np streams are generally considered waters of higher quality; however, they remain subject to Tier II protections in streams with lower temperature regimes than the numeric standards protected under Tier I. The ability of the proposed buffer rule to help prevent streams from warming will be vital in streams that maintain narrow margins before numeric temperature thresholds are exceeded. For example, if a Type Np stream naturally flows near 15.8°C in a stream with an assigned numeric criterion of 16°C, the application of the proposed buffer rule under site-level conditions will play an important role in helping to prevent the stream from warming beyond 16°C. Based on our analysis, we find that on average across the landscape the proposed rule is not likely to cause exceedances of applicable water quality numeric criteria, although we acknowledge that the effectiveness of each buffer scenario will vary due to regional differences and site-specific factors contributing to water temperature. Additional Adaptive Management Program effectiveness monitoring studies are likely to provide increased certainty on the ability of the proposed buffer rule to prevent waters from warming beyond applicable numeric criterion.

²¹ Ecology publication no. 11-10-073, pages 5-6

Measurable change analysis

The Hard and Soft Rock studies reported on both temperature and turbidity response following timber harvest treatments. The focus of the follow up action by the TFW Policy Committee and the Forest Practices Board is in response to the temperature response observed following the study treatments. For this reason, the focus of this Tier II antidegradation analysis is limited to temperature.

We found that there are likely to be minor temperature increases in some Type Np streams after adjacent timber harvest under the proposed rule's buffer prescriptions. On average, the majority of streams should be protected from a 0.3°C increase in temperature after adjacent timber harvest. However, there are some specific situations, identified below, that will likely lead to an increase in temperature even under the proposed buffer prescriptions.

In general, streams with less topographic and riparian shade (i.e., north-south oriented, gently sloped valley walls, 50ft buffers) and a higher proportion of surface water (i.e., competent lithologies) are more likely to warm under the proposed rule. Conversely, streams with more topographic and riparian shade (i.e., east-west oriented, steep valley walls, 65-75ft buffers) and have more groundwater influence (i.e., incompetent lithologies) are less likely to warm.

This measurable change determination was achieved through an analysis that included:

- An aggregation of Hard and Soft Rock temperature and shade data
- An analysis of site-specific conditions that may make streams more susceptible to warming
- An estimation of how those conditions are distributed across the landscape

Aggregated Hard Rock and Soft Rock findings

Stream temperature increased in both the Hard and Soft Rock studies after harvest across all treatment types (100% continuous buffers and partial cut FP buffers)²². This temperature response was highly variable among and within the treatment sites. On average, temperatures remained elevated (0.3°C – 1.2°C), relative to reference conditions, for 7 years in the Hard Rock FP treatment, 4 years in the Soft Rock FP treatment, and 2 years in the Hard rock 100% treatment (Figure 8). Even though the authors of the Hard Rock report note that none of the buffer treatments prevented significant increases in stream temperature, they do report that the 100% treatment was more effective than the FP treatment in preventing long-term temperature increases. The authors also report that the primary driver of this increase was due to the loss of riparian cover.

²² Hard Rock also included a 0% buffer treatment that was not included in this analysis. For all other studies discussed in this section that included a full clearcut of the riparian area, that treatment was left out as well.

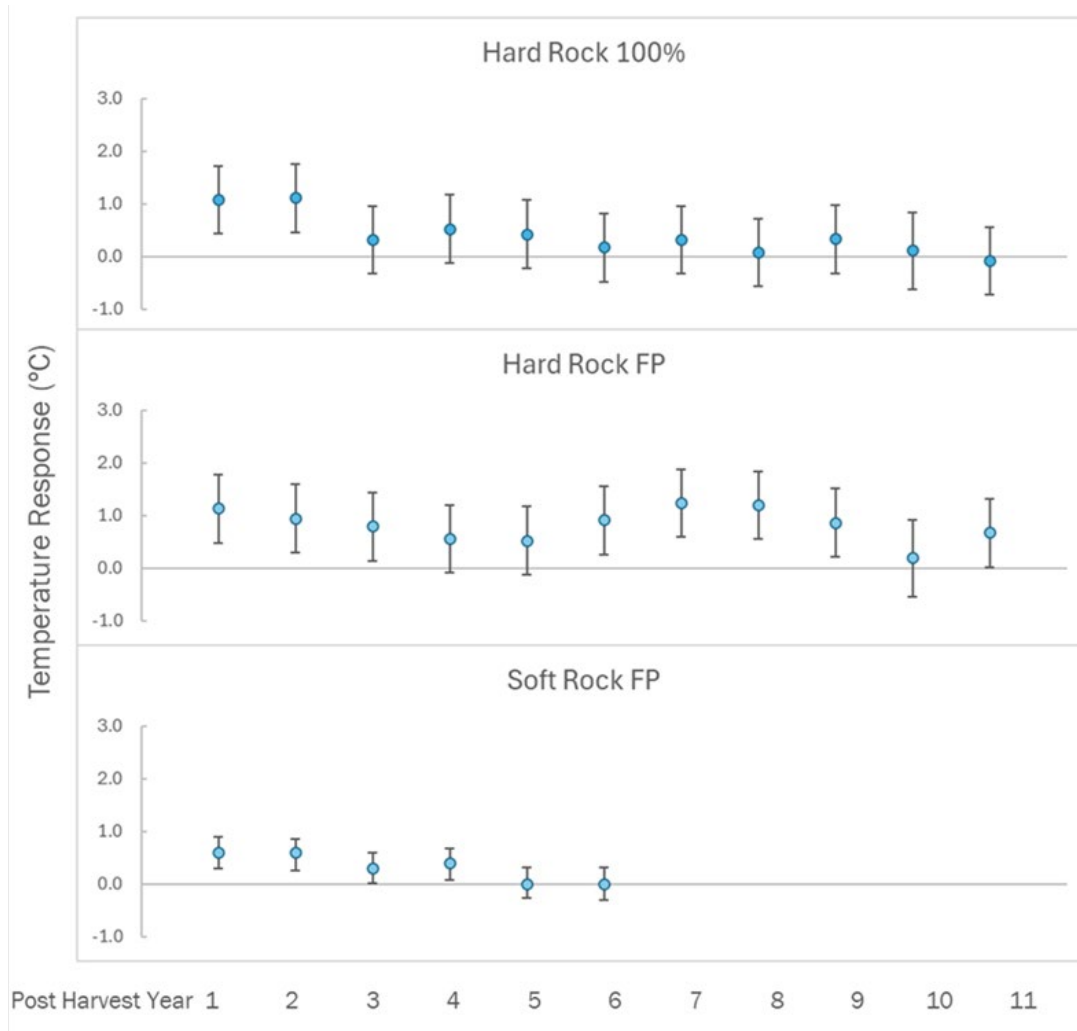


Figure 8. Average temperature response of the Hard and Soft Rock treatments, relative to the reference conditions. Confidence intervals that do not cross the zero line (reference conditions) are considered statistically significant. 7DTR is the seven-day average temperature response.

The Soft Rock FP treatment also saw temperature increases from shade loss. The initial temperature increases (0.6°C) seen in Soft Rock was less than both Hard Rock treatments. However, the Soft Rock FP treatment recovered quicker than the Hard Rock FP treatment. The authors note that this was likely due to the additional unstable slope buffers (4 sites >90% buffered) and groundwater influence in the more permeable soft rock (marine sediment) lithology. Looking at the combined 14 treatment sites (9 miles of stream) of these studies, it's clear that buffer area and the shade that it provides influences stream temperature. Other studies have found similar results and relationships to buffer area (Table 1), but only Groom et al. (2011) tested a similar amount of treatment sites and stream miles (33 sites, 6.2 miles of stream).

Table 1. Studies that tested buffer effectiveness on stream temperature. Only studies that tested a clear-cut harvest with an unharvested buffer were included. The Partial Cut buffer types are variable length buffers (not all studies reported the actual lengths of the buffer).

Study	Number of Treatments	Buffer Type	Average Buffer Width (ft)	Max Temperature Response (°C)	Duration of Response (years)
Gomi 2006	2	Continuous	98	0.0	0
Groom 2011	15	Continuous	98	0.0	0
Wilkerson 2005	3	Continuous	75	0.0	0
Groom 2011	18	Continuous	59	0.7	2
Hard Rock	4	Continuous	50	1.1	2
Bladon 2018	4	Continuous	45	1.2	4
Janisch 2012	6	Continuous	41	1.1	2
Wilkerson 2005	3	Continuous	36	0.0	0
Gomi 2006	1	Continuous	32	0.0	0
Soft Rock	7	Partial Cut	54	0.6	4
Hard Rock	3	Partial Cut	50	1.2	7
Bladon 2018	2	Partial Cut	26	3.3	4

The authors of the Hard Rock report state that, “The loss of riparian cover was the dominant factor in the increased summer stream temperatures observed in the first four years after harvest.” A similar response was seen in the Soft Rock study. Figure 9 shows the loss of riparian cover in both studies, with similar responses and trajectories based on treatment type. In this graph, Soft Rock was averaged by sites that were <60% buffered and sites that were >90% buffered to compare with the FP and 100% buffered Hard Rock treatments. The authors in both studies note that the continued decline in riparian cover after the first-year post-harvest was due to tree mortality from windthrow. This additional loss of shade likely contributed to the extended temperature response, especially in the Hard Rock FP treatment (as noted in the Hard Rock report).

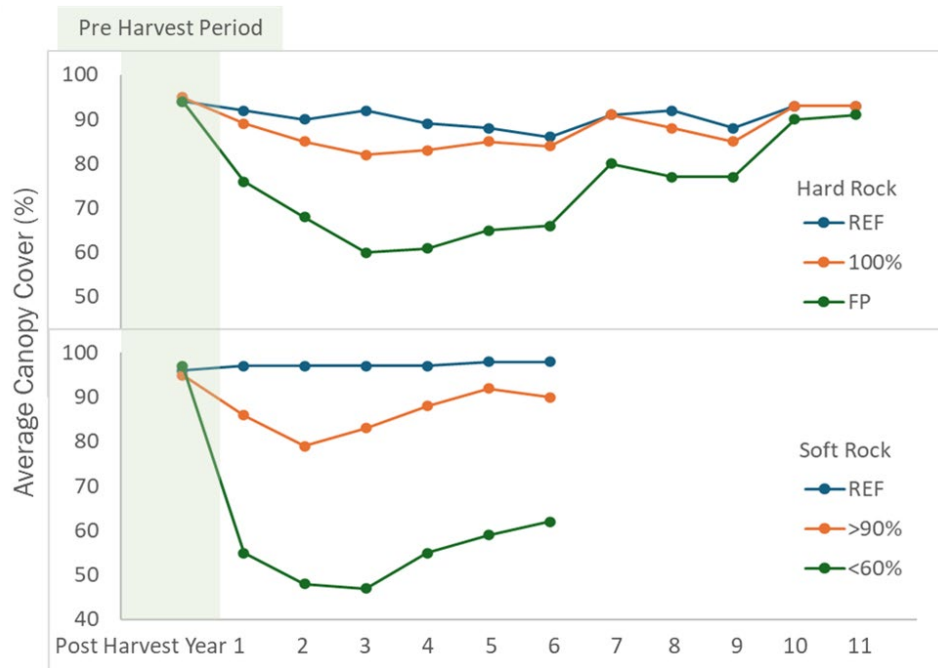


Figure 9. The average percent canopy cover broken out by treatment type. The average of the 100% continuous and 50% (FP) buffer treatments compared to the average of the reference sites. Soft Rock sites were averaged by sites with buffers greater than 90% and less than 60% compared to the average of the reference sites. Data pulled from Table 4A-1 (Hard and Soft Rock) of the reports.

In addition to reporting on the overall treatment response of stream temperature, the authors of both Hard and Soft Rock studies also provided additional measurements taken within the individual treatment sites. These were reported as the Mean Monthly Temperature Response (MMTR), which also used the 7-day average daily maximum (7DADM) at the temperature stations. Every one of the 75 temperature stations recorded at least 1 increase in the MMTR, relative to reference conditions, over the course of the studies. There were 3,713 instances of temperatures increasing greater than 0.5°C at the treatment sites (Figure 10). This represents temperature increases for over half of the post-harvest temperature readings. This same level of temperature increase was not seen at the reference sites (Figure 10). However, the temperature increases seen in the treatment sites were not distributed evenly across the seasons or the locations within or between the sites.

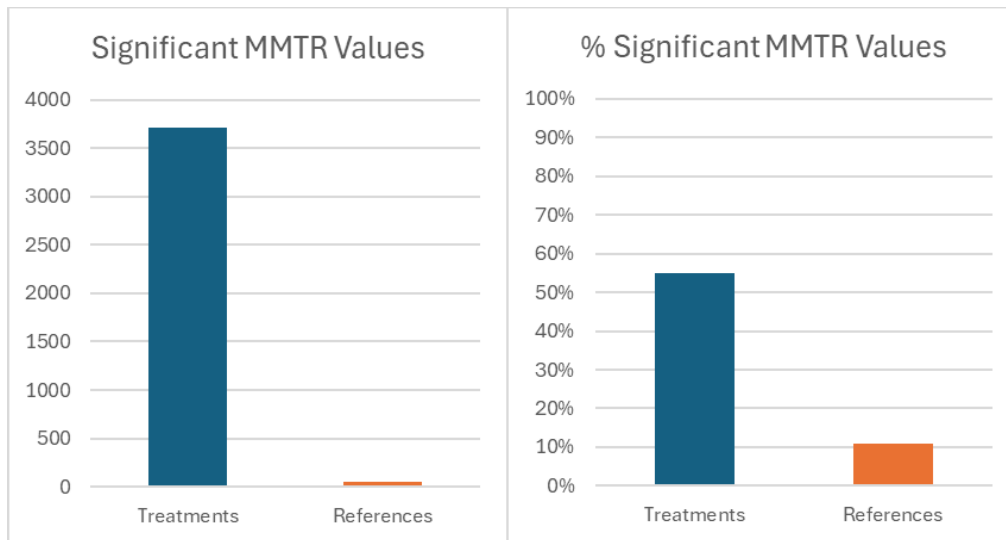


Figure 10. Left: The number of times that the mean monthly temperature increased at the treatment temperature stations ($>0.5^{\circ}\text{C}$, relative to reference conditions) as reported in the MMTR tables of Hard Rock Phase II and Soft Rock (Appendix Table 4A-5 and 4A-2, respectively), compared to the increase as seen at the Hard Rock reference stations. Right: The percentage of times there was an increase in mean monthly temperature compared to the reference stations.

While most of the average monthly temperature increases were in the spring, approximately 600 of the seasonal MMTR values (35%) were in the summer months when temperatures are already elevated (Figure 11). The temperature increases in the spring are an interesting response but do not have the same potential to impact in-stream biota as the increases in summer temperatures.

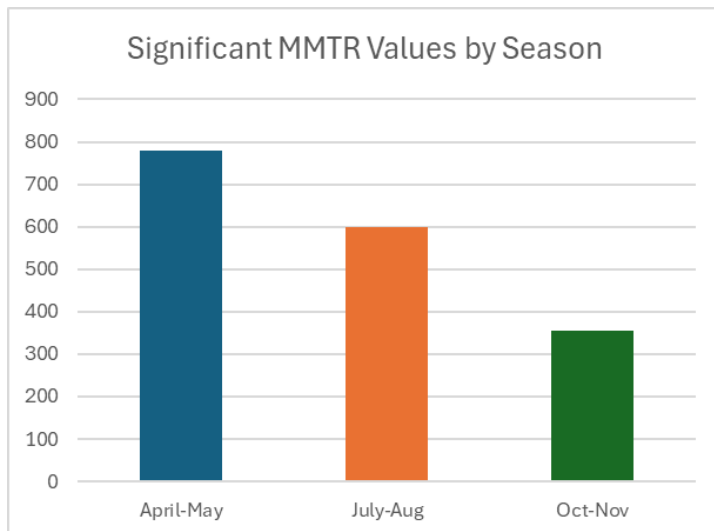


Figure 11. The number of times a mean monthly temperature increase of $>0.5^{\circ}\text{C}$ was reported from a Hard or Soft Rock treatment temperature station, by season. Spring, summer, and fall bins are consistent with how seasons were reported in Hard Rock and Soft Rock.

The MMTR values were used to investigate site specific factors, in addition to shade, that may have influenced the temperature response at the Hard and Soft Rock sites. The Hard Rock authors reported a tendency for higher July MMTR in the south-facing sites, however this was not the case for Soft Rock (only one south-facing site). The authors did note that the lower amounts of flowing water in the Soft Rock streams may have been one reason why there was less of a temperature response compared to the Hard Rock treatments. The reduced flow at the Soft Rock sites may have been a byproduct of the underlying marine sediment lithology which is more permeable than the volcanic substrate of Hard Rock. This more permeable substrate can allow for more groundwater influence which could reduce the influence of air temperature on the surface water of the stream²³. Blanden et al. (2018) also reported smaller temperature responses in sites with more permeable lithology. In addition to the lower flows, Soft Rock also reported steep incised valley walls with an average slope of 60% compared to a 45% average across the Hard Rock sites. The authors note that, in addition to the shading provided by the unstable slope buffers, these steep valley walls also provide topographic shading.

Below, Figures 12 and 13 display the average monthly temperature response measured at the temperature stations in the 14 treatment sites included in this analysis. These are grouped by sites that more closely align with the current forest practice rule (~50% buffered) and by sites that are fully buffered or almost fully buffered (>90%). Even though Soft Rock only tested the current forest practices buffers, the additional unstable slope buffers that were left at some of the sites increased the buffer area (63-163%) to the point that some streams (TRT4 – 7) were almost continuously buffered.

While individual sites cannot be used to find specific causal mechanisms that may influence the magnitude and longevity of a temperature response, they can be useful in assessing areas that may be more susceptible to temperature increases after harvest.

Site Specific Conditions

- Figure 14, SR TRT2 and HR Casc-FP sites show no summer temperature response at the outlet of the watershed (T1 sensor).

Between the T1 sensor and the next sensor upstream (T2) at both sites was a persistent dry section of stream that likely reduced the warming trends seen upstream of this dry section. These discontinuous portions of Type Np streams are common and can cause irregular patterns of warming and cooling throughout Np stream networks by changing ratio of groundwater to surface water.

- Of the sites that saw the most canopy reduction in Figure 14, the sites that saw the highest and most persistent temperature response (TRT1, OLYM-FP, WIL1-FP) also experienced the greatest amount of windthrow (e.g., Figure 12).

²³ Process known as hyporheic exchange and that area of influence is called the hyporheic zone.



Figure 12. An example of windthrow in the riparian buffer at the Soft Rock TRT1 site.

There was already shade loss at these sites due to the 50% harvest of the stream length; however, as mentioned above, the additional shade loss due to windthrow could have exacerbated, and likely prolonged, the temperature response. Hard Rock reported that the continued shade loss in the riparian areas throughout the post-harvest period was due to tree mortality associated with windthrow. This was also the case for Soft Rock; however, the windthrow was less widespread and instead concentrated in a few highly susceptible areas. One example is TRT1 which, despite having a north-facing aspect, lost a lot of the buffer due to windthrow, likely because of the winds coming up from the Columbia River valley (Figure 13). The Perennial initiation Point (PiP, also known as the uppermost point of perennial flow) buffers near the top of the watershed were the most susceptible (71% mortality, due to wind).



Figure 13. PiP buffer at Soft Rock TRT1 with Columbia River valley in the background.

- Most concerning are the high and persistent average temperature responses throughout the continuously buffered watersheds of WIL3-100% and OLYM-100% shown in Figure 14.

WIL3-100% has a south-facing aspect that saw a 0.5-2.5°C temperature increase that persisted through post-harvest year 11 at some locations. This result was consistent with the overall findings of Hard Rock. The sensor at the PiP and the next sensor downstream were still elevated 1.3 and 1.1°C in post-harvest year 10, respectively.

The other main difference at this site was the gentle topography. The average valley slope of this site was only 20% compared to 49-83% at the other sites in Figure 15. This resulted in a lack of topographic shading compared to other steeper sites.

OLYM-100% on the other hand is a north-facing basin with greater topographic shading (average valley slope of 60%) and additional wider buffers. However, the majority of the wider buffers were on the north side of the basin, with narrower buffers to the south, which also coincided with some gently sloped valley walls. It's also possible that because the southern tributaries flow south to north, they are not providing as much topographic shade in the summer months when the sun is at its highest point in the sky.

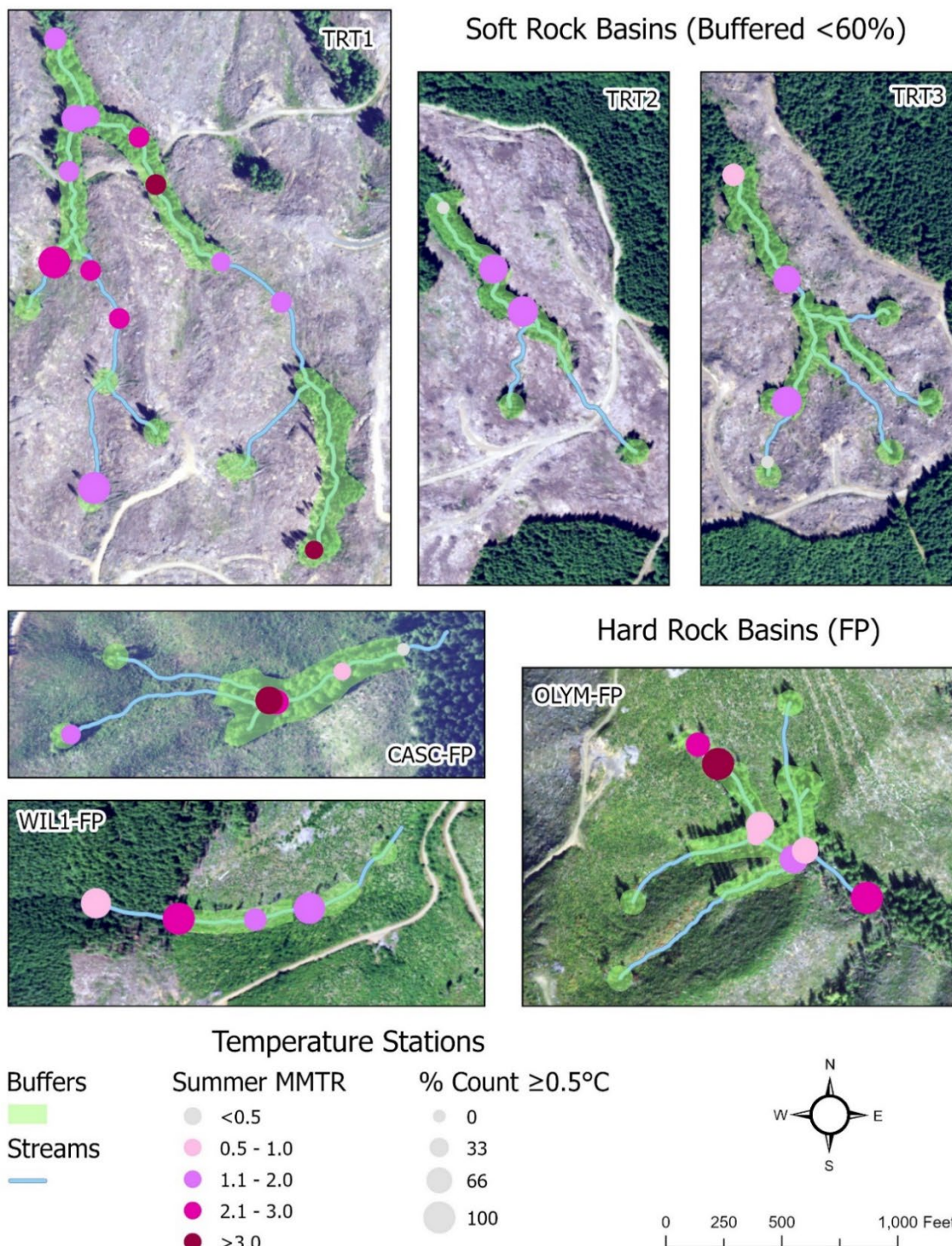


Figure 14. Maps of the summer maximum Mean Monthly Temperature Response (MMTR) at the Forest Practice (FP) buffered Hard Rock sites and the Soft Rock sites with 50 – 60% stream length buffered. The size difference in the points (% Count) represents how many years that station recorded a temperature response greater than 0.5°C (The larger the point, the more years that station had an elevated stream temperature).

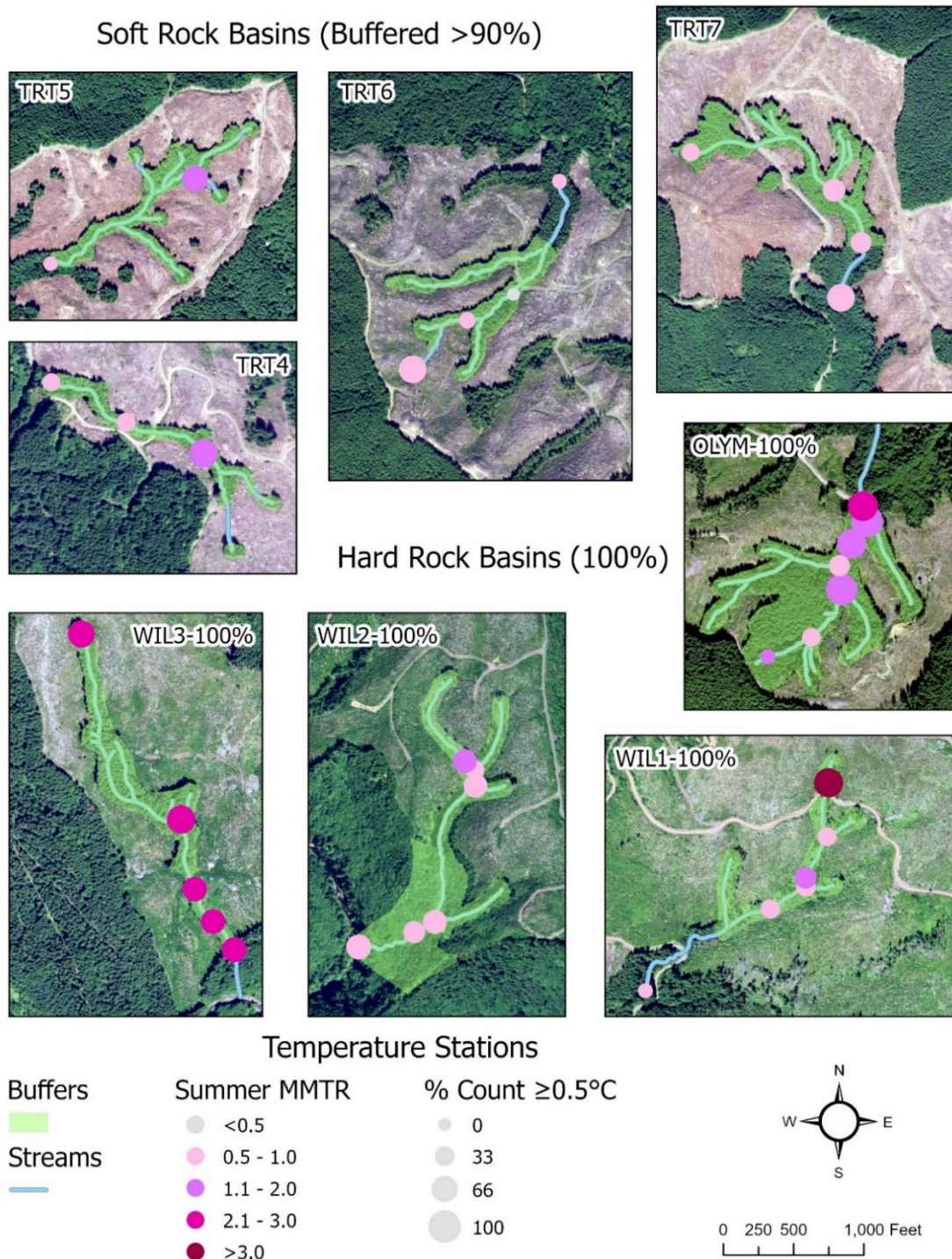


Figure 15. Maps of the summer maximum Mean Monthly Temperature Response (MMTR) at the 100% buffered Hard Rock sites and the Soft Rock sites with 90 – 100% stream length buffered. The size difference in the points (% Count) represents how many years that station recorded a temperature response greater than 0.5°C (The larger the point, the more years that station had an elevated stream temperature).

These site-specific differences, which may have influenced how certain treatment sites responded to harvest and buffer configurations, illustrate the complexity of thermal sensitivity in small headwater catchments.

As noted above, there is considerable variability in how temperature in Type Np streams may respond to upland harvest under different buffer configurations. However, because the Hard Rock study included a 100% buffer treatment and one of the Soft Rock sites was fully buffered, we can use these sites as test cases for what the proposed rule may look like and how these specific sites may, or may not, respond differently. Figure 16 shows the 100% buffered sites with an additional 25ft added to represent a full length 75ft buffered which would have been applied under the proposed rule (had it been in effect during the time of harvest). Table 2 indicates that the increase in area that the additional buffer width would provide is relatively small (1.1 – 1.6 acres). While this may reduce the risk of windthrow closer to the stream, it seems unlikely that this would have drastically reduced the temperature response at the sites that saw the greatest temperature response (e.g., WIL3-100%, OLYM-100%).

Table 2. Buffer Acreage left after harvest at the 4 Hard Rock 100% treatment sites and the 1 fully buffered Soft Rock site (TRT7), the total acreage of a 75ft buffer at each of the sites, and the percent increase from the current rule to the proposed rule's 75ft option. The "65ft Increase" is the increase in buffer area had a 65ft buffer been applied.

Basin	Buffer Acreage	75ft Buffer Acreage	Percent Increase	65ft Increase
OLYM-100%	21.2	22.5	5.9%	4%
WIL1-100%	8.0	9.2	14.3%	8%
WIL2-100%	18.6	20.2	8.7%	5%
WIL3-100%	10.9	12.4	13.4%	6%
TRT7	10.3	11.7	12.9%	13%

The sites in Figure 16 can also be used as case studies for the 65ft buffers proposed under the new rule. This buffer prescription would have added less than an acre in all but one site (TRT7 – 1.4 acres). Had only the upper half of these watersheds been harvested, then a 65ft buffer would have been applied under the proposed rule due to these streams all being, on average, greater than 3ft in bankfull width (BFW). The other option would be to harvest in the outer 25ft of a 75ft buffer. However, both of these options would provide less shade than the full 75ft no-cut buffer described above. This would likely have less of a chance of preventing the temperature increase seen at the sensors in the upper half of the watersheds.

Hard Rock and Soft Rock Basins (100% Buffered)

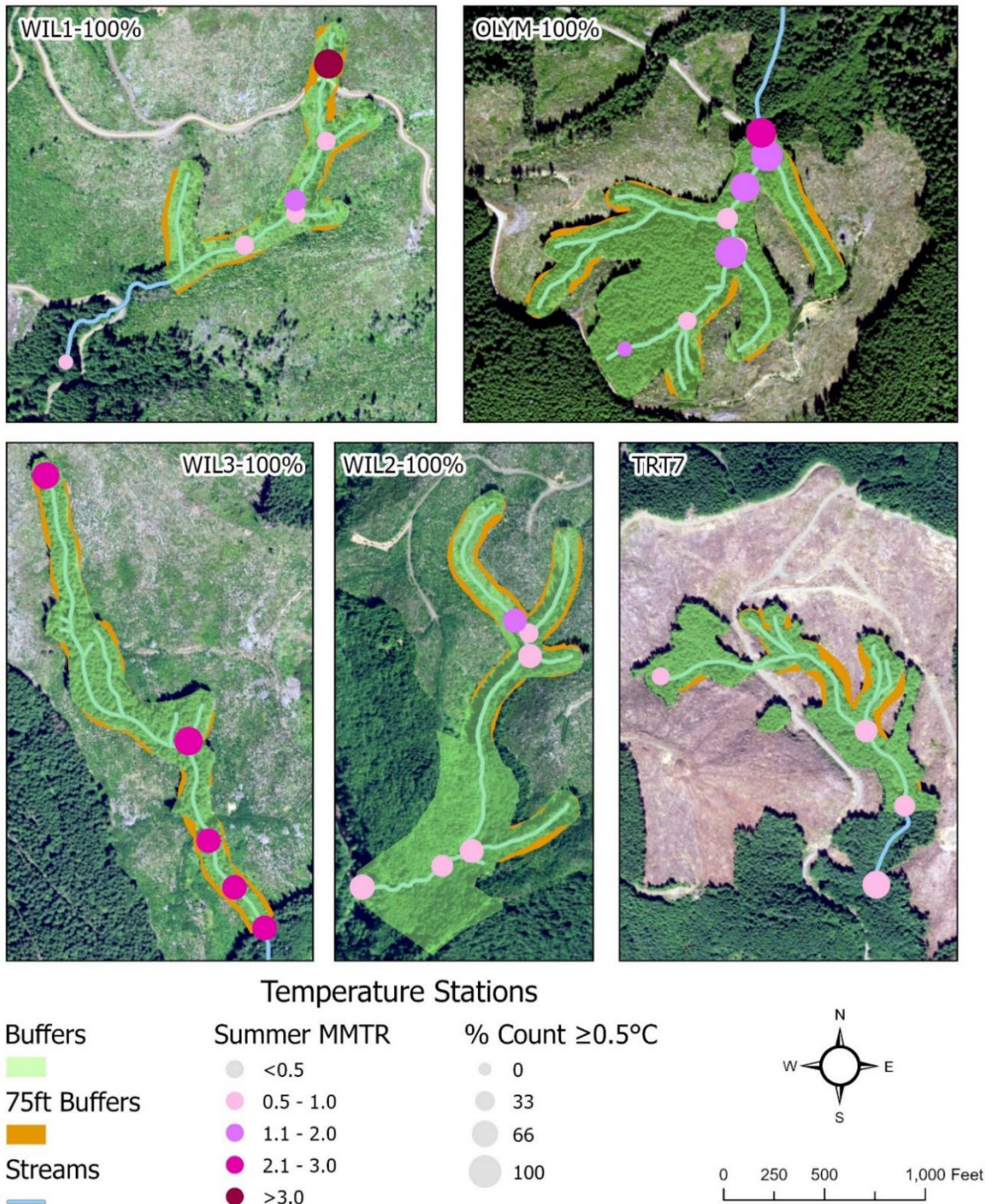


Figure 16. Maps of the summer maximum MMTR at the 100% buffered treatment sites (including Soft Rock TRT7). The size difference in the points (% Count) represents how many years that station recorded a temperature response greater than 0.5°C (The larger the point, the more years that station had an elevated stream temperature). The additional orange (75ft) buffers show how much the proposed rule would have increased the buffers at these sites.

Unfortunately, none of the fully buffered treatment sites from Hard and Soft Rock had average BFWs under 3ft in the upper areas of the watersheds, where a 50ft buffer would have likely been applied under the proposed rule. Some of the 100% treatments in Figure 16 may have tributaries that could have met the requirements for the 50ft prescription, but BFWs were not measured in the Hard Rock tributaries. Only 1 of the 14 treatment sites had an average BFW of less than 3ft (Soft Rock TRT5); this site was buffered along 95% of the stream length with some sections narrower than 50ft (3 acres less than a continuous 50ft buffer). Also, many of the Soft Rock tributaries, or at least portions of them, were less than 3ft in BFW, but not fully buffered, so none would be good case studies for the proposed rule. Since this is the option likely to provide the least amount of shade, it would then also be least likely to prevent temperature increases. However, this is also the area in the watershed most likely to have discontinuous surface flow. As noted above, dry sections of the channel can have a cooling effect on the downstream flowing portions of the channel due to the higher proportion of groundwater to surface water.

Instead, we can look at the predicted relationship between temperature and buffer widths presented in Groom et al. (2018) and adapted for horizontal buffer widths in Barnowe-Meyer et al. (2021). Figure 17 shows that an approximately 0.8°C increase in temperature is still likely with a 50ft continuous buffer. This model represents the best available science for the Type Np Technical workgroup (Barnowe-Meyer et al. 2021) at the time. However, this model was developed using data from studies testing the effectiveness of buffers on state and private lands in Oregon, so there is some uncertainty around how well this model translates to FPHCP lands in western Washington.

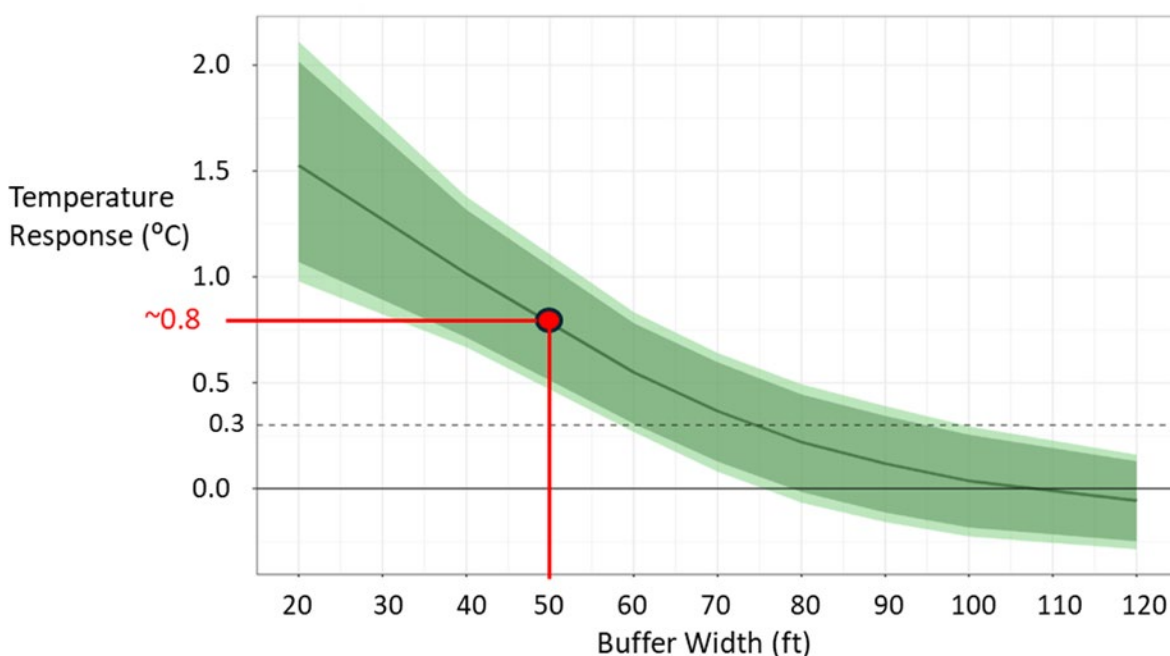


Figure 17. “Predicted relationship between two-sided buffer width and stream temperature increase post-harvest. This prediction was based on the data and analysis approach of Groom et al. (2018)” (Barnowe-Meyer et al. 2021).

The final area of concern are streams that are naturally warmer due to site-specific conditions. As mentioned above, in the Tier I section of the antidegradation portion of the water quality standards, if warming occurs in a stream that is already near the criteria, it's more likely to have exceedances. This situation occurred at two sites, one each from Hard and Soft Rock (Figure 18). As shown below, these sites were naturally warmer pre-harvest (2007 for Hard Rock, 2012 and 2013 for Soft Rock), then increased above 16°C (numeric criteria for these sites) for multiple years post-harvest. This contrasts with the remaining treatment sites (grayed-out in Figure 18), which were cooler in the pre-harvest period and did not exceed the numeric criteria at the outlet of the watersheds.



Figure 18. The two sites (Hard Rock WIL3-100%, Soft Rock TRT1) that exceeded the numeric criteria (16°C) at the outlet of the watersheds (Summer 7DADM). The other twelve Hard and Soft Rock sites are represented in gray. Data is from Tables 4A-4 (Hard Rock) and 4A-7 (Soft Rock) of the reports.

Scope of Inference

The authors of Hard Rock state that the spatial scope of the study is comprised of Type Np stream networks of similar lithology, basin size, stand age, and presence of amphibians. The Soft Rock authors similarly conclude that inference is limited to similar site conditions but can be informative to other situations depending on variable of interest and the characteristics of the site in question. It is important to note that the authors of the Hard Rock report mention that there is an upcoming report from the Soft Rock study and that, "In combination, the two studies will allow for broader inferences about FP rule effectiveness." The purpose of the above section was to assess the results of both studies in combination. This increases the number of treatments, lithology type, geographic coverage, and variation in site-specific conditions broadens the scope of inference. However, it is important to note that this only applies to the

broader treatment effects. The investigation into site-specific conditions that may have influenced temperature response is more limited.

Landscape Scale Distribution

The section below explores how the site-specific conditions (lithology, aspect, valley slope, stream size) that may influence a temperature response are distributed across the landscape. Data was aggregated from two separate studies that used a Generalized Random Tessellation Stratified survey design to select stream reaches across Washington for sampling.

The Extensive Riparian Status and Trends (ERST) project was a CMER study that monitored stream temperature and riparian conditions in 2008 and 2009, the results from western Washington were published by Ehinger et al. (2019). Seven-day average daily maximum temperature, BFW, and aspect data were pulled from the report. The valley slope and lithology data were extracted from LiDAR and a shapefile (used in the Soft Rock site selection process) using Esri (2024).

The Watershed Health Monitoring (WHM) program is a status and trends monitoring program at the Department of Ecology that collects data on both instream and riparian conditions. The program and sampling design are detailed in the Quality Assurance Project Plan by Cusimano et al. (2006) with additional information located on the Habitat Monitoring Methods²⁴ website. The aspect and BFW data from a subset of these sites were extracted from the Department of Ecology's Environmental Information Management (EIM²⁵) database. Valley slope and lithology data were also extracted using the same process described above. Continuous temperature data is not collected as part of the WHM program. An alternate method for estimating Maximum Weekly Maximum Temperature (also known as 7DADM) was used with a temperature index based on benthic macroinvertebrate assemblages found in streams in the Pacific Northwest.

The Macroinvertebrate Thermal Tolerance Index (MTTI) was developed by Hubler et al. (2024) using data from the WHM program along with other regional sampling efforts. The authors describe their work as adding to previous efforts to identify and classify macroinvertebrate taxa that could be used as thermal indicators. Once they identified the temperature preferences of certain taxa (324 individual taxa, mostly at the genus level, with some species and family groupings), they could then evaluate the relationship between those taxa and stream temperatures across Oregon and Washington. Using the NorWeST²⁶ temperature model, the authors found a strong relationship between the 7DADM and the MTTI model ($R^2 = 0.68$). MTTI uses the same metric used in Washington and Oregon water quality standards and should be comparable to the 7DADM values reported in the ERST, Hard Rock, and Soft Rock studies.

²⁴ <https://ecology.wa.gov/Research-Data/Monitoring-assessment/River-stream-monitoring/Habitat-monitoring/Habitat-monitoring-methods>

²⁵ <https://ecology.wa.gov/research-data/data-resources/environmental-information-management-database>

²⁶ <https://www.fs.usda.gov/rm/boise/AWAE/projects/NorWeST.html>

To verify the comparability of MTTI values to the temperatures seen in Hard Rock, Soft Rock, and the ERST project, WHM staff generated MTTI values from the Soft Rock macroinvertebrate data. Since the Soft Rock project had both macroinvertebrate and continuous temperature data collected at the same location, we were able to plot both MTTI and 7DADM values by year in Figure 19. While the MTTI values appear to be close in range to the continuous temperature data from year to year, these modeled values seem to predict slightly warmer temperatures than were measured. Around 50% of the MTTI values were within 1°C of the sites summer 7DADM measured at the outlet of the watershed. While these MTTI values are estimates, they do provide additional randomly selected streams with similar temperature profiles to help understand regional implications of the proposed rule.

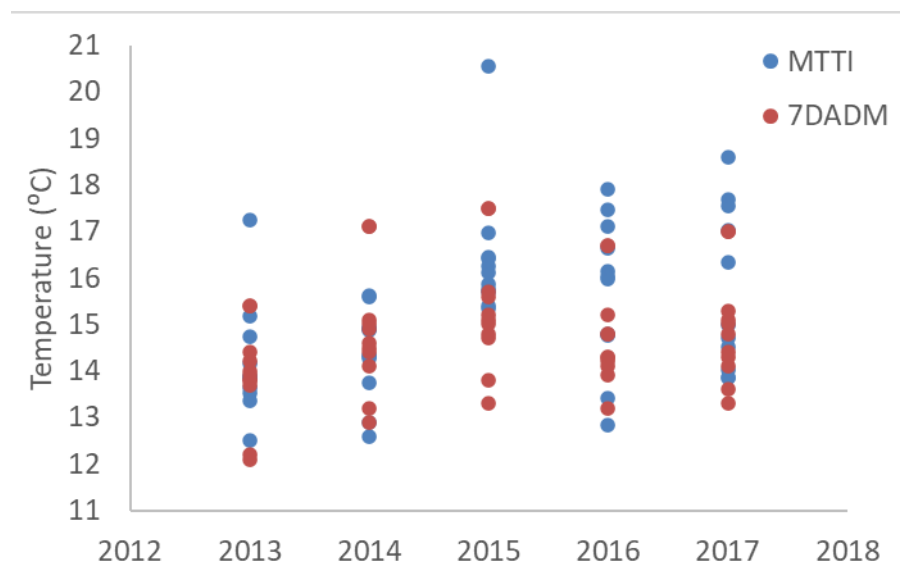


Figure 19. MTTI and 7DADM values for Soft Rock sites during the years macroinvertebrates were collected near the outlet of the watersheds.

Temperature data from the two randomly selected monitoring programs (ERST and WHM) were plotted along with the 7DADM temperature data collected at the outlets of the Hard and Soft Rock sites in Figure 20. Only data from small streams (<4m in BFW) without fish presence from ERST and WHM were included in this analysis. Figure 20 shows that most Type Np streams on FPHCP lands in western Washington are likely between 10.5°C and 18°C (90% of temperatures fall within this range). Hard Rock sites tended to be slightly cooler than Soft Rock sites (also noted by the Soft Rock authors), but both studies fall well within this range, indicating that the Hard and Soft Rock streams are likely typical streams of this region. As noted above, one area of concern are streams near the numeric criteria (mostly 16 or 17.5°C on FPHCP lands) (WAC 173-201A-200(1)(c)). The data from Figure 20 suggests that around 8% of streams are within 0.5°C of the numeric criteria.

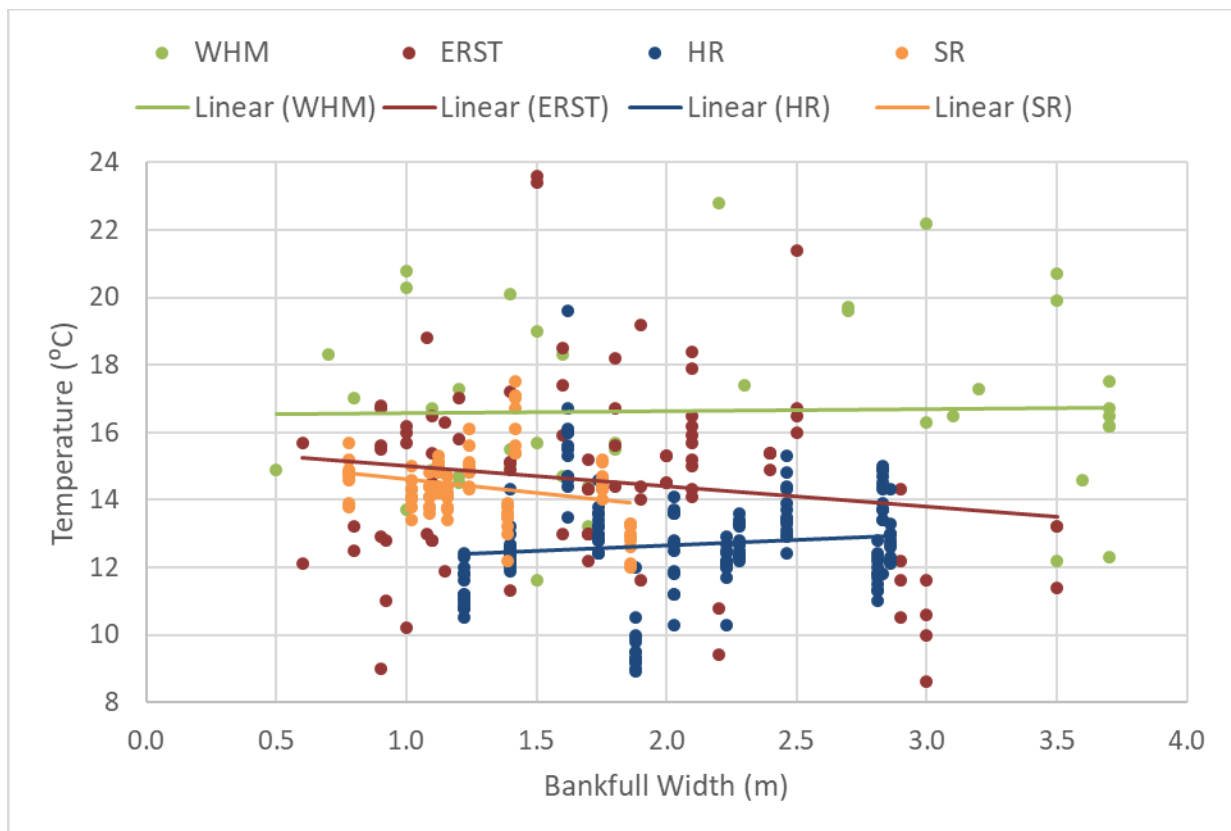


Figure 20. Average maximum summer temperatures for the Watershed Health Monitoring (WHM), Extensive Riparian Status and Trends (ERST), Hard Rock (HR), and Soft Rock (SR) sites plotted against average BFWs. ERST, HR, and SR are the 7-day average daily maximums from Tables E-3 (Ehinger et al. 2019) for ERST, 4A-4 (Hard Rock), and 4A-7 (Soft Rock) of the reports. WHM are Macroinvertebrate Thermal Tolerance Index (MTTI) values calculated by the Watershed Health Monitoring Unit at the Department of Ecology. Hard and Soft Rock reference sites are included. Linear trendlines show no correlation between average BFW and stream temperature and how the different studies compare to each other.

Together the Hard and Soft Rock sites appear to be somewhat well distributed across the landscape and categories of lithology of western Washington. Figure 21 shows the WHM, ERST, Hard Rock and Soft Rock sites along with temperature ranges represented in different shades of pink (darker colors are higher) and bigger points being streams with larger BFWs. The majority of sites from all studies are clustered in the southwest corner of the state, which coincides with high concentration of FPHCP lands in this region. A smaller group of Hard Rock and random sites are clustered on the Olympic Peninsula and only a handful of random sites are distributed along the north and central Cascades. The lack of sites from the Hard and Soft Rock studies in these areas of the Cascades, and on a smaller scale the Kitsap Peninsula, is the biggest gap in our understanding of the regional impacts of the proposed rule. There is also a slight over representation of the competent lithology in the random sites and slightly in the Hard and Soft Rock studies (Hard Rock had more total sites). Competent lithologies represent 29% of the FPHCP landscape compared to the 67% that are likely incompetent.

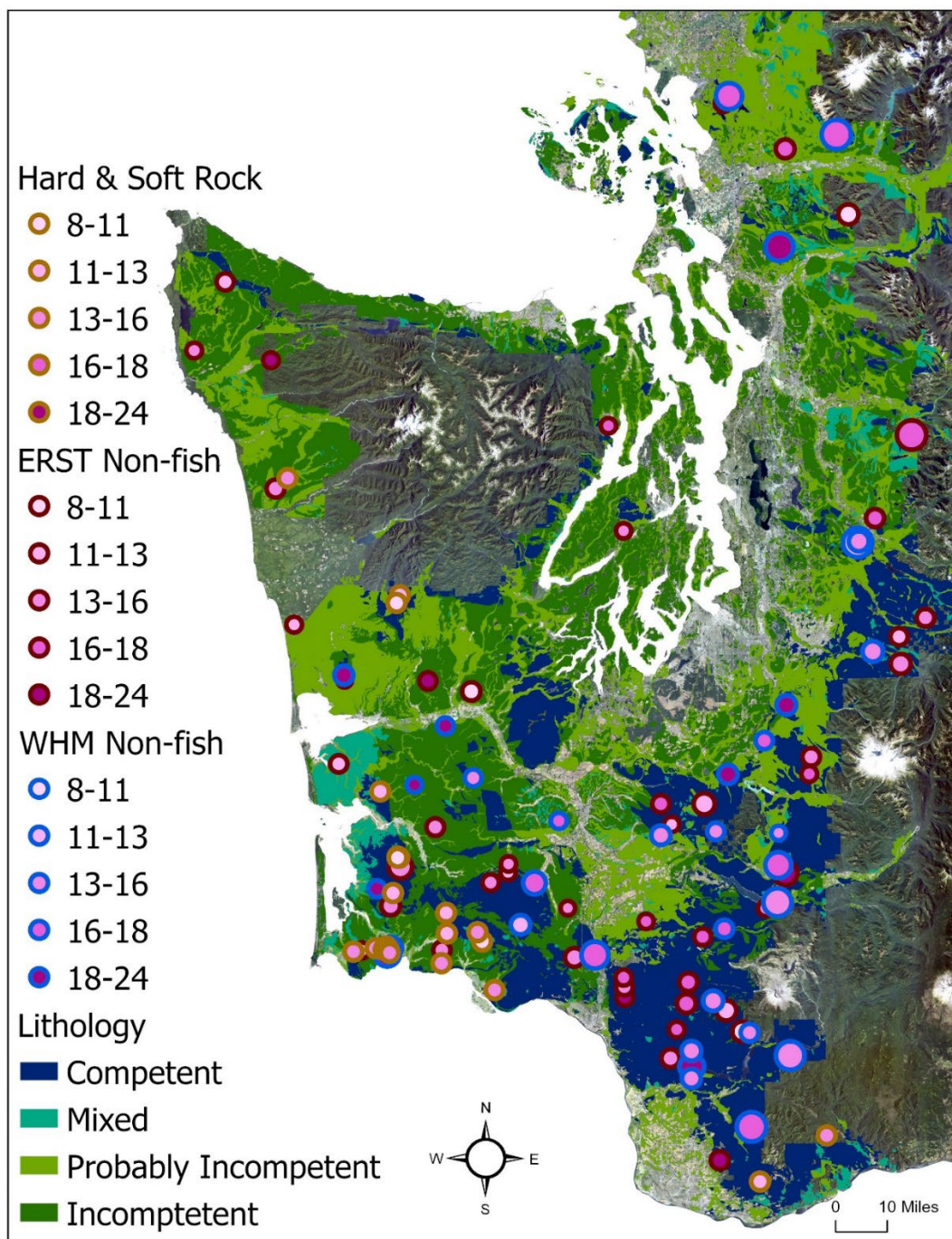


Figure 21. Overview of Hard and Soft Rock sites alongside randomly selected sites from the Extensive Riparian Status and Trends (ERST) and Watershed Health Monitoring (WHM) studies. Temperature is the summer 7DADM ($^{\circ}\text{C}$) separated into bins ranging from 8-24 $^{\circ}\text{C}$ (same bins for each study). Points increase in size relative to the average BFW of the stream. Lithology identified using geologic layers in Esri (2024), with the categories (competent and incompetent) used in the Hard and Soft Rock studies. Mixed lithology likely contains both competent and incompetent in a single feature class.

The categories of lithology are based on how the underlying geology of an area was grouped for the purposes of selecting sites for Hard Rock (competent lithology) and Soft Rock (incompetent lithology). The competent geologic group is comprised mostly of volcanic with some metamorphic rock. Incompetent lithology is sedimentary rock. The probably incompetent group is mostly glacial outwash, which has been included in the incompetent category for the rest of this analysis.

Site-specific characteristics

As mentioned above lithology, aspect, valley wall slope, and BFW were identified, from the Hard and Soft Rock 100% buffered sites, as site-specific characteristics that may influence stream temperature. Tables 3 and 4 are aggregated data from randomly selected sites (WHM and ERST) compared to the effectiveness study sites from the Hard and Soft Rock studies. This data can be used to identify what percent of Type Np streams on FPHCP lands that may be more susceptible to temperature increases.

Lithology

Hard Rock sites tended to be cooler than both the Soft Rock sites and the randomly selected streams. However, it appears that they also may be more susceptible to temperature increases based on the average treatment effect being around 0.5°C warmer and lasting longer than the Soft Rock treatments (Figure 8). Bladen et al. (2018) also found that stream reaches with less permeable (competent) lithology had higher post-harvest stream temperatures compared to streams with higher permeability (incompetent). This is likely because the proportion of groundwater in a stream increases in areas with more permeable geology (Bladen et al. 2018, Hale & McDonnell, 2016; Tague & Grant, 2004). The data from Table 4 suggests that streams with higher permeability are roughly 50% of the Type Np streams on FPHCP lands.

While the Hard Rock sites tended to be more susceptible to temperature increases, the Soft Rock sites tended to be slightly warmer (Figure 20). This leaves less of a margin for temperature to increase after harvest and not exceed the numeric criteria. As mentioned above, around 8% of streams are within 0.5°C of the numeric criteria (16 or 17.5°C).

Aspect

Streams with a south-facing aspect receive more sun exposure and warming due to an increase in short and long-wave radiation (Hard Rock, Moore et al. 2005). This is consistent with the reported July MMTR being higher in Hard Rock sites with a southerly aspect. The fully buffered stream with the highest and most persistent temperature response (WIL3-100%) was also south-facing. Because stream networks will likely have a mixture of south, southeast, and southwest reaches, the S Aspect column in Tables 3 and 4 includes all three categories. Based on the randomly selected set of Type Np sites, and consistent with the percentage of Hard and Soft Rock sites with a south aspect (41%), approximately 37% of streams are likely to be south facing.

A separate category of north facing streams was included due to the increase in stream temperature at a fully buffered Hard Rock stream (OLYM-100%) with north facing tributaries (Figure 15). Moore et al. (2005) also reported that streams oriented north-south tend to have less shading. Even though this is describing large streams with canopy gaps, the same concept could apply to a reduction in topographic shade in streams that flow north. For this reason, the N Aspect category was added, but only includes streams with an exclusively north aspect as this would be the most susceptible to the topographic shade reduction. It is likely that around 10% of Type Np streams flow north (Table 4).

Valley Wall Slope

Headwater streams that are deeply incised with steep valley walls have more topographic shading than streams within a more gently sloped valley. The Soft Rock sites tended to have steeper valley walls (60% slope) than the average of the Hard Rock sites (45% slope) (Soft Rock report). The authors of the Soft Rock report speculated that the incised valleys present at the Soft Rock sites might have been a contributing factor to the smaller temperature response, compared to Hard Rock. Also, the fully buffered site with the greatest and most persistent temperature response and the Soft Rock site with the greatest temperature response had the lowest valley gradient, 20% and 44% respectively. There were likely other factors, in addition to canopy cover, (e.g., aspect, windthrow) that contributed to the significant and persistent warming throughout the stream network.

Bankfull width (BFW)

This category was included because of the proposed rule allowing for 50ft buffers on streams less than 3ft in BFW (above the first 600ft). As noted above, this is the part of the Type Np stream network that we know the least about. This is also the most difficult part of the stream to measure water temperature due to the shifting patterns of dry reaches and extremely shallow depths. This provides a unique challenge for keeping temperature sensors fully submerged for the long periods of time that are needed to track temperature response after harvest. Only 2 Soft Rock sites and 9 random sites had average BFWs under 3ft. This represents a 10% distribution of streams with BFWs under 3ft.

Table 3. Total number of randomly selected sites from western Washington (ERST, WHM), between 0 and 4m in width, and the total number of Hard and Soft Rock sites, including references. From those totals, the number of sites with certain characteristics that may influence stream temperature (Lithology, aspect, Valley Slope, and BFW) and with readily available data.

Studies	Total Sites	Competent	Incompetent	North Aspect	South Aspect	Valley Slope ≤20%	BFW <1m
ERST	45	20	24	9	18	8	6
WHM	42	22	17	0	14	11	3
HR	12	12	0	2	5	1	0
SR	10	0	10	1	4	0	2

Table 4. The percentage of the randomly selected sites (the average of WHM and ERST) with site characteristics that may influence stream temperature compared with the percentages from Hard Rock (HR) and Soft Rock (SR). HR and SR averaged together, including reference sites.

Studies	Competent	Incompetent	North Aspect	South Aspect	Valley Slope ≤20%	BFW <1m
Random Sites	48%	47%	10%	37%	22%	10%
HR and SR	55%	45%	14%	41%	5%	9%

Measurable change determination

There are likely to be minor temperature increases in some Type Np streams after adjacent timber harvest under the proposed rule's buffer prescriptions. On average, the majority of streams should be protected from a 0.3°C increase in temperature after adjacent timber harvest. However, there are some specific situations, identified above, that will likely lead to an increase in temperature even under the proposed buffer prescriptions. These situations are summarized below, along with the estimated distribution of Type Np streams across FPHCP lands in western Washington.

Lithology

- Competent – 48% of Np streams
 - Areas could be more susceptible to warming, especially if some of the below conditions are also present. Tend to be cooler streams, so likely to have more of a margin of safety before exceeding numeric criteria.
- Incompetent – 47% of Np streams
 - Less susceptible to warming. Tend to be warmer streams, which reduces the margin of safety before temperature increases exceed the numeric criteria.

Temperature margins

- Within 0.5°C of numeric criteria (16 or 17.5°C) – 8% of Np streams.
 - More susceptible to exceeding the numeric criteria, especially if other site-specific characteristics are present within the watershed.

Aspect

- Southern facing – 37% of Np streams
 - Potentially more susceptible to warming, likely in combination with other topographic features such as gently sloped valley walls. Probably a wide range of variability.
- North facing – 10% of Np streams
 - Potentially more susceptible to warming, almost certainly in combination with gently sloped valley walls and stream gradient.

Valley Wall Slope

- Less than or equal to an average of 20% slope – 22% of Np streams
 - Potentially more susceptible to warming, either in combination with other topographic features or possibly as the only warming feature present.

Bankfull width

- Less than 3ft – 10% of Np streams
 - Likely more susceptible to warming due to the narrower 50ft buffers that have been widely documented to not be protective of temperature increases of over 0.3°C. Higher degree of uncertainty from the minimal amount of research on these smaller sized streams.

In general, streams with less topographic and riparian shade (i.e., north-south oriented, gently sloped valley walls, 50ft buffers) and a higher proportion of surface water (i.e., competent lithologies) are more likely to warm under the proposed rule. Conversely, streams with more topographic and riparian shade (i.e., east-west oriented, steep valley walls, 65-75ft buffers) and have more groundwater influence (i.e., incompetent lithologies) are less likely to warm.

Overall, the proposed buffer prescriptions should result in minimal temperature increases after harvest and likely only under certain conditions. Based on the results of the Hard Rock 100% buffer treatment, the shade-temperature model (Figure 17), and other best available science, these minimal increases (~0.0-1.0°C) should be temporary, likely no longer than 2 years post-harvest.

Necessary and overriding public interest analysis

Before a lowering of water quality can be authorized under the Tier II antidegradation rules, that lowering of water quality must be demonstrated to be necessary and in the overriding public interest. The necessary and overriding public interest determination follows the regulations at WAC 173-201A-320(4), and Ecology has written supplemental guidance for implementing the Tier II Antidegradation Policy (Ecology, 2011).²⁷ Information of necessity must include information that identifies and selects the best combination of site, structural, and managerial approaches that can be feasibly implemented to prevent or minimize the lowering of water quality. Of note, the Tier II rule language identifies the establishment of buffer areas with effective limits on activities as an example of a managerial approach to prevent or minimize the lowering of water quality (WAC 173-201A-320(4)(b)(vii)). Information for the overriding public interest determination must include an assessment and statement of the costs and benefits of the social, economic, and environmental effects associated with the lowering of water quality (WAC 173-201A-320(4)(a)).

²⁷ Ecology Tier II Supplemental Guidance. <https://apps.ecology.wa.gov/publications/documents/1110073.pdf>

As discussed in the “Measurable Change Determination” section of this report, Ecology has determined that while the proposed Type Np buffer rule is significantly more protective than the existing rule, and is anticipated in many cases to prevent or minimize the lowering of water quality under site-level conditions in particular regions of western Washington, there remains a possibility of measurable change in water quality parameters – specifically a temperature increase of greater than or equal to 0.3°C to some Type Np waters. In this section, we discuss our consideration of additional protections that would be likely to provide a higher degree of certainty in meeting Tier II temperature protection requirements, and their relative impact on the environment and public.

The figure below depicts an overview of our considerations in determining whether the remaining risk of lowering water quality is necessary and in the overriding public interest. Considerations include understanding what set of rule requirements would prevent or minimize the lowering of water quality with greater certainty than the proposed rule, and what additional impacts such requirements would create. In other words, what costs would be avoided under the proposed rule by allowing some measurable lowering of water quality, compared to a more protective alternative that ensures no measurable change to temperature thereby not requiring an overriding public interest analysis. Those potential impacts are considered relative to one another, in the context of baseline regulations and economic variables, and with an understanding of existing scientific uncertainty, variability, and data gaps. These factors are used to determine whether the remaining risk of measurable warming would be necessary and in the overriding public interest.

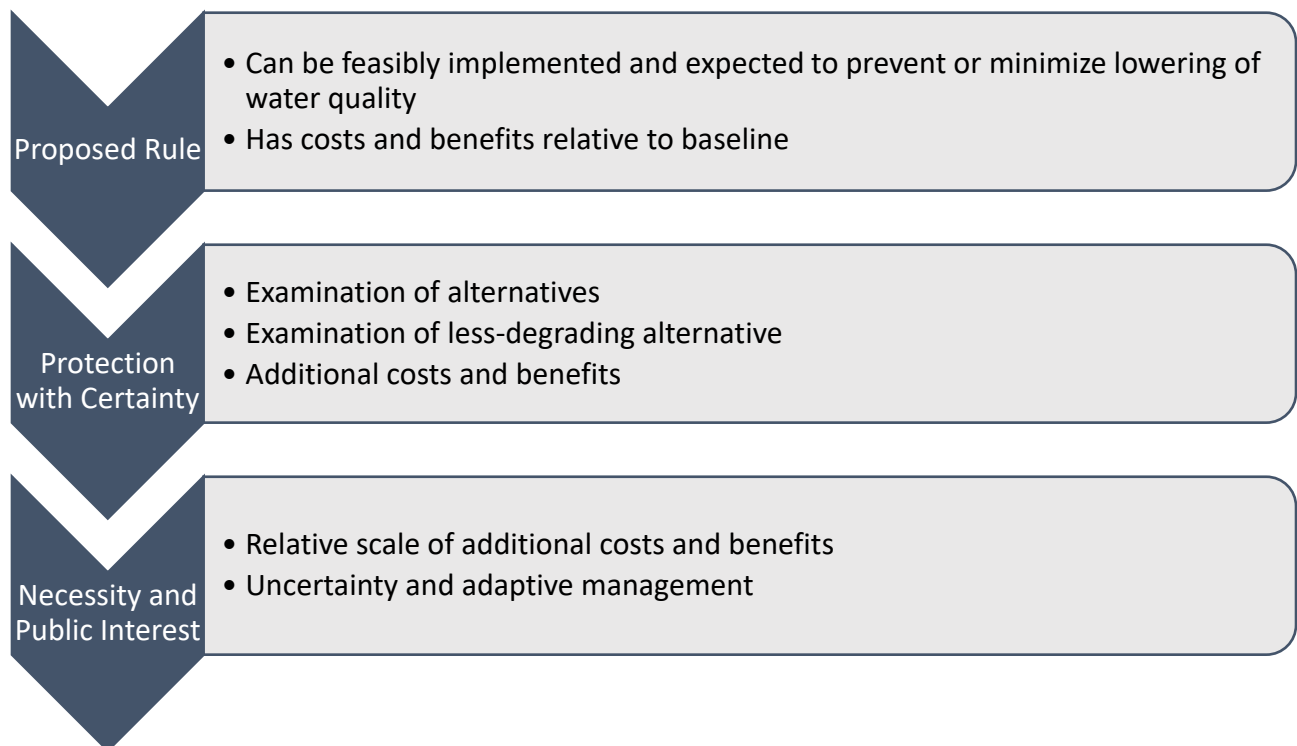


Figure 22. Necessary and Overriding Public Interest flow chart.

Costs and benefits of proposed rule

As part of the Forest Practices Board’s rule proposal, DNR’s consultant IEc has assessed likely costs and benefits of the proposed rule as required under the Administrative Procedure Act (APA; RCW 34.05.328(1)(d)) and Regulatory Fairness Act (RFA; Chapter 19.85 RCW).²⁸ The APA requires the agency proposing a rule to determine that the likely benefits of the rule are greater than the likely costs, accounting for quantitative and qualitative impacts. The RFA requires comparison of relative compliance cost burden on small businesses as compared to the largest affected businesses, as well as assessment of impacts to revenues and employment, and mitigation of disproportionate impacts so far as is legal and feasible. The table below summarizes costs and benefits of the proposed rule as compared to the baseline (existing laws and rules), as identified in IEc’s analysis.²⁹

²⁸ IEc, 2025. Washington State Type Np Water Buffer Proposed Rule, Final Preliminary Cost-Benefit Analysis. April 23, 2025.

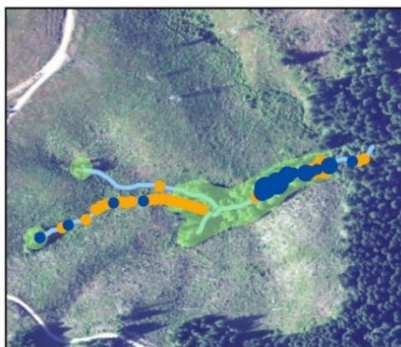
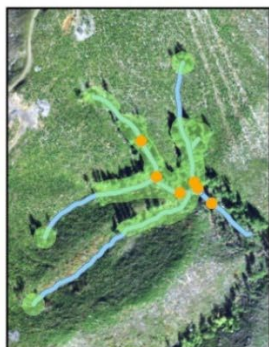
²⁹ Information taken from IEc, 2025, Table ES-3.

Table 5. IEC summary of Probable Costs and Benefits of the Proposed Np Buffer Rule.

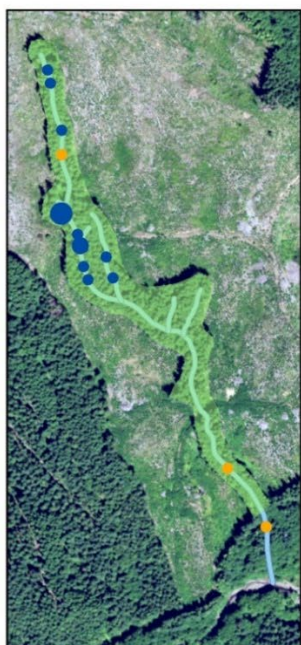
Incremental Costs	Incremental Benefits
Major costs - Decreased forestland values - Total present value losses of \$320 million to \$1.0 billion, reflecting added harvest restrictions on 1.1 to 2.9 percent of Forest Practices HCP land in western Washington - On an annualized basis, these losses are equivalent to \$11 million to \$35 million assuming a 2% discount rate (alternatively, annualized costs are \$17 million to \$54 million assuming a 4.5% discount rate) - These costs are concentrated among forestland owners in western Washington Minor costs - Increased forest harvest operating costs - At most 16 percent of Np streams abut slopes where cable harvest may become more costly - Increased costs per thousand board feet are uncertain but likely minor where the rule widens existing buffers, and moderate for areas where buffers do not exist with the current rule and would be required under the proposed rule - These costs are incurred by a sub-set of forestland owners	Moderate to major benefits - Reduced risk of stream temperature increases - Existing evidence and expert review demonstrate that longer and wider buffers are necessary to minimize the risk of stream temperature increases associated with harvest near Np streams - Economics literature consistently demonstrates that people value improvements in water quality, regardless of whether they directly use the resource (e.g., for drinking or recreation) - Improved habitat conditions for terrestrial riparian wildlife 67,000 to 170,000 additional acres with harvest restrictions, representing 0.4 to 0.9 percent of all forest habitat in western Washington (regardless of owner) - Economic valuation literature identifies that the public, including Washington State households, hold substantial value for species conservation and restoration, including through habitat protection Minor to moderate benefits - Improved habitat conditions for stream-associated amphibians 19,000 to 44,000 Np stream miles with requirements for wider or longer buffers that will protect species from stream temperature increases and improve general habitat quality Additional benefits - Tribal cultural values: As described in Section 4.4 [of the Preliminary Cost-Benefit Analysis], the cultural importance of these ecosystems to Tribes are best communicated by the Tribes. Negligible to minor benefits - Increased habitat conditions for fish downstream of Np streams - Increased delivery of organic matter, macroinvertebrates, nutrients, and cooler water, although improved conditions do not persist far downstream - Increased carbon sequestration - Likely positive effect in reducing atmospheric carbon, although significant uncertainty exists regarding magnitude of this benefit due to influence of timber management practices and uses of the harvester timber on carbon budget - On the order of 220,000 to 3.3 million MT CO₂e increase in total carbon sequestered relative to active timber rotation over the first 45 years of rule implementation - Reduction in annual atmospheric carbon represents between 0.005 percent and 0.07 percent of all emissions in the state - Avoided climate damages associated with increased carbon sequestration experienced at a global level

To further understand the benefits of the proposed rule for stream-associated amphibians, we examined evidence from the Hard Rock study. The figure below identifies locations of torrent salamanders and giant salamanders in areas of the study that used baseline buffer and 100 percent buffer treatments.

Hard Rock Basins (FP)



Hard Rock Basins (100%)



Salamanders



Species

- Torrents
- Giants

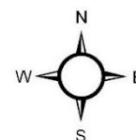
Count

- 1
- 5
- 10
- 26

Buffers



Streams



0 250 500 1,000 Feet

Figure 23. Distribution of torrent (Rhyacotriton) and giant (Dicamptodon) salamanders in the Hard Rock streams, from the initial survey in 2006. Larger points had greater numbers of individuals found at that specific location.

Regarding impacts to employment, industry, and taxes, IEc identified the impacts summarized in the following tables.

Table 6. IEc Estimated Annual Regional Economic Impacts by Ecoregion (number of job-years).

Ecoregion	Direct Job-years Low	Direct Job-years High	Total Job-Years Low	Total Job-Years High
Cascades	77	351	208	946
Coast Range	29	127	72	314
North Cascades	19	118	45	282
Puget Lowland	25	102	59	242
Willamette Valley	3	10	8	31
Total	153	709	392	1,816
% western WA	0.5%	2.1%	0.5%	2.2%

Table 7. IEc Estimated Annual Regional Economic Impacts by Ecoregion (millions of \$ per year).

Ecoregion	Total Wages Low	Total Wages High	Revenue Low	Revenue High	Stumpage Taxes Low	Stumpage Taxes High
Cascades	\$11.9	\$54.0	\$70.2	\$318.9	\$0.1	\$0.5
Coast Range	\$5.2	\$22.5	\$31.7	\$138.6	\$0.1	\$0.5
North Cascades	\$2.6	\$16.4	\$16.7	\$104.0	\$0.0	\$0.1
Puget Lowland	\$3.4	\$14.0	\$22.1	\$91.1	\$0.0	\$0.1
Willamette Valley	\$0.4	\$1.7	\$2.2	\$9.0	\$0.0	\$0.0
Total	\$23.5	\$108.6	\$143.0	\$661.6	\$0.3	\$1.2
% western WA	0.5%	2.2%	0.5%	2.2%	0.5%	2.5%

The above impacts are based on a comparison of the proposed rule to the baseline of the existing rule and other regulations affecting stream buffers and forest management. We note that the high end of each range above does not exclude some aspects of the baseline, such as the assumption that all regulated forestland is likely to be harvested, and underrepresentation of baseline requirements related to unstable slope protections. Additionally, overestimation of affected acres results from the inclusion of lands unaffected by the proposed rulemaking, including private lands associated with individual Habitat Conservation Plans with different water typing systems and associated protection measures for waters of the state compared to those found in the Forest Practices Habitat Conservation Plan.

We acknowledge that data and modeling limitations prompted the approaches taken in the Preliminary Cost-Benefit Analysis to mitigate various uncertainties. Ecology believes the likely impacts of the proposed rule would be toward the lower end of the ranges above, based on potential to overestimate acreage affected specifically by the proposed rule over and above baseline.

Clean Water Act assurances discussion

As mentioned earlier in this report, the CWA Assurances issued by Ecology and EPA established that the State Forest Practices Rules and programs, as updated through a formal adaptive management program, would be used as the primary mechanism for bringing and maintaining forested watersheds into compliance with water quality standards. The agreement to rely on the forest practices rules in lieu of developing separate Total Maximum Daily Load (TMDL) allocations or implementation requirements remains conditioned on maintaining an effective adaptive management program.

The CWA Assurances were originally granted for a 10-year period in 1999. In 2009, Ecology published a review of Washington's Forest Practices Program and conditionally extended the Assurances for another 10 years to allow for program improvements and research development.³⁰ In 2019, Ecology extended the Assurances for another two years based on the completion or near completion of several key Type N research projects that provided enough information for the Forest Practices Board to consider new rulemaking regarding riparian buffers on Type Np waters. In 2021 Ecology extended the Assurances for an additional year, on condition that the Board direct staff to develop a Type Np rule package and prepare a CR-102. In 2022 Ecology extended the Assurances pursuant to progress related to the Type Np CR-102 development and indicated that if progress on a new Type Np buffer rule stalls, or parties abandon a continued commitment to the Adaptive Management Program, Ecology will consider withdrawing the Assurances and pursuing alternatives to achieve water quality protection under the Clean Water Act.³¹

IEc notes in the final preliminary CBA Appendix B that "If withdrawn, there would likely be costs associated with TMDL development and implementation. However, the extent and scale of these potential costs are significantly uncertain. Determining the likelihood and outcomes of the Forest Practices Program no longer receiving CWA assurances is beyond the scope of this CBA."³²

³⁰ <https://apps.ecology.wa.gov/publications/documents/0910101.pdf>

³¹ November 30, 2022, Ecology letter to Forest Practices Board.

³² Appendix B. IEC, 2025. Washington State Type Np Water Buffer Proposed Rule, Final Preliminary Cost-Benefit Analysis. April 23, 2025.

We agree that the extent and scale of costs to landowners and the state related to the potential withdrawal of Assurances are uncertain. However, it is critical to draw attention to the regulatory stability the Assurances have afforded the Forest Practices Program over the last 25 years. When compared to the baseline rule, the Board’s proposed Type Np buffer rule and the associated improvements to water quality it provides align with the intent of the Assurances. If advanced in the rulemaking process, the proposed rule would likely position the Forest Practices Program to continue receiving the regulatory stability afforded by the Assurances (subject to approval by Ecology’s Director), and because of this, we recommend the likely potential of retaining CWA Assurances be considered an additional probable benefit of the proposed rule. Due to the uncertain scope, timing, and ultimate requirements of any agency actions taken in the absence of the Assurances, we acknowledge it is not possible to confidently quantify or monetize this benefit. For additional discussion on Clean Water Act Assurances and the Board’s proposed Type Np rulemaking, see Appendix C.

Examination of alternatives

Considering alternatives is a key component of Tier II antidegradation analysis. Ecology retains discretion to require examination of specific alternatives or provide additional information (WAC 173-201A-320(4)(b) and (5)). The Administrative Procedure Act also requires the Forest Practices Board to consider alternative versions of the rule, and that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve general goals and specific objectives (RCW 34.05.328(1)(e)).

Alternatives the Forest Practices Board is considering for this rulemaking include:

1. The current Forests and Fish Type Np rule found in WAC 222-30-021*(2). This represents the “no-action” alternative, and;
2. Proposed buffer prescriptions as identified in the draft Type Np buffer rule language.³³ This alternative represents the “action alternative,” and consists of continuous 50-75 foot no-harvest buffers for Type Np waters. Specific buffer width is dependent on basin size, harvest planning, and bankfull width of the Np water.

While these are the primary alternatives the Board is considering, we find it important to provide broader context in the Tier II analysis to reflect the Forest Practices Adaptive Management Program’s considerable time and resources spent on developing and refining a suite of alternatives before providing final recommendations to the Board for consideration. Following receipt of the Type Np Technical Workgroup’s recommendations, the TFW Policy Committee evaluated numerous iterations of buffer prescriptions for a new Type Np buffer rule over the course of approximately eighteen months, with the Forest Practices Board approving the majority TFW Caucus buffer recommendations for rulemaking advancement on August 9, 2023.

³³ Proposed Type Np rule language. https://www.dnr.wa.gov/publications/bc_fpb_typenp_proposal_20240509.pdf

Adaptive Management Program alternatives

Type Np Technical Workgroup

The Type Np Technical Workgroup was assembled by the Timber, Fish, and Wildlife (TFW) Policy Committee and approved by the Forest Practices Board in response to the results of the CMER Type Np Hard Rock Study, Phase I. TFW Policy agreed that the Hard Rock Phase I study found there was a water temperature increase associated with the treatments tested, including the existing Forests and Fish Type Np buffer rule. The workgroup was instructed to consider other relevant studies associated with Type Np waters and to develop western Washington Type Np water buffer alternatives for TFW Policy consideration. The Workgroup Charter states:

“The purpose of the Workgroup is to develop proposed RMZ buffer prescriptions for perennial, non-fish bearing (Type Np) streams in western Washington that meet the following objectives:

- Protect water temperatures to meet the rule (WAC 173-201A-200, -300, -320);
- Are repeatable and enforceable;
- Are operationally feasible;
- Provide wood to the stream over time;
- Account for windthrow;
- Consider options that allow for management (e.g., selective harvest) in the RMZ; and
- Minimize additional economic impact.”³⁴

In the Workgroup’s final report, seven alternatives were evaluated using a Structured Decision Making process (Gregory et al. 2012).³⁵ The Workgroup’s final recommendation was for TFW Policy to consider three of the alternatives evaluated (C, E, and F), and further recommended TFW Policy, “...consider the adoption of a combination of the three alternatives.” All three recommended alternatives employed a continuous buffer from the Type F/N water break, where the regulatory stream classification changes from fish to non-fish, to the upper-most point of perennial flow.

³⁴ https://www.dnr.wa.gov/publications/bc_tfw_typencharter_20190710.pdf?0z3ica

³⁵

https://www.dnr.wa.gov/sites/default/files/publications/bc_tfw_policy_type_n_workgroup_review_final_052021.pdf

Table 8. Summary of Type Np Technical Workgroup Alternatives.

Alternative	Description	Estimated Ability to Prevent Temperature Increase of 0.3°C, on Average	Economic Impact Score (1-5, with 1 best avoiding landowner economic impact)
A	WAC 222-30-021*(2). Baseline Forests and Fish Western Washington Type Np buffer rule.	Across the landscape, and immediately post-harvest, very unlikely to meet measurable change standards.	1
B	100% buffer, 50' wide, both banks.	Sites are expected to exhibit warming above measurable change standards for approximately one to two years post-harvest but return to pre-harvest temperature ranges after two years. We are fairly certain this prescription will not meet the measurable change standards, but we are not 100% certain.	3
C	100% buffer, 75', both banks. First 50' of buffer is an unmanaged zone. The outer 25' beyond the unmanaged zone can include harvest of economically valuable trees. Removal of 50% of the basal area within the managed zone, removing the largest trees first, will result in the retention of at least 50% of the trees in this zone. Tree retention will be evenly distributed.	With a 75' no-cut buffer we would expect, across the landscape, that immediately following harvest sites will not warm beyond the measurable change standards amount. The inclusion of a 25' managed zone may reduce the efficacy of the buffer, but we do not know to what extent.	3.5-4
D	100% buffer, 100', both banks.	We expect, with high certainty, that sites with buffers of this size will not warm beyond the measurable change standards amount for any given year post-harvest.	5
E	Site-specific buffer. Based on the Headwater Stream Smart Buffer Design Project (Martin and Romey 2020). The portion of the riparian buffer that will provide effective shade to the stream is retained. At a minimum, for both stream banks,	We expect this prescription to have a reasonable chance of meeting the measurable change standards for the first two years following harvest and for the measurable change standards to	2.5

Alternative	Description	Estimated Ability to Prevent Temperature Increase of 0.3°C, on Average	Economic Impact Score (1-5, with 1 best avoiding landowner economic impact)
	all streamside, merchantable trees (those within 10' of the bankfull width) will be retained. Operators are encouraged to leave non-merchantable trees within 30'.	be met beyond two years post-harvest.	
F	Aspect-based buffer. East-west oriented portions of the Np stream system have a 75' south-sided buffer and a 25' north-sided buffer. North-south oriented portions of the Np system have 65' buffers on both banks.	We expect this prescription to have a reasonable chance of meeting the measurable change standards for the first two years following harvest and a high probability of meeting the standard in subsequent years.	3
G	Variable-width two-sided buffer. The buffer width is determined by the stream bankfull width, evaluated in 200' sections. Np streams < 1' wide receive a 25' two-sided buffer while 1' to 5' wide streams receive 50' two-sided buffers. Np streams > 5' width have 50' no-management ("core") buffers, with an added 25' outer managed zone. Removal of 50% of the basal area within the managed zone of 25', removing the largest trees first, will result in equal to, or greater than, 50% of the trees in this zone retained. Tree retention will be evenly distributed.	Since most Np streams fall within the first two width categories (i.e., less than 5' wide), we expect this prescription on average to fail to meet the measurable change standards, with probabilities of success falling between Alternatives A and B.	2

TFW Policy Response to Type Np Technical Workgroup recommendations

The TFW Policy Committee evaluated the recommendations provided by the Type Np Technical Workgroup, and after completing a two-stage dispute resolution process, the committee was unable to agree on a final package of Type Np rule recommendations.³⁶ Majority and minority recommendations were finalized and presented to the Board for a final determination, in accordance with Forest Practices Rule WAC 222-12-045(2)(h) and Board Manual guidance³⁷.

Minority TFW Policy caucuses, including Large Forest Landowners, Small Forest Landowners, and the Washington State Association of Counties recommended a package of new Type Np riparian buffer prescriptions³⁸. The Board considered these prescriptions; however, in the end voted not to advance the proposal in the rulemaking process.

³⁶ Final Report for Type Np buffer Alternative Dispute.

https://www.dnr.wa.gov/publications/bc_fpb_mtg_packet_20221031.pdf

³⁷ Forest Practices Board Manual Section 22, part 5. Dispute Resolution.

³⁸ Minority TFW Policy Caucus Proposal. https://www.dnr.wa.gov/publications/bc_fpb_mtg_packet_20221031.pdf

Table 9. Minority TFW Policy Caucuses Type Np Buffer Recommendations.

Np Prescription	Description
A - Area Control	Type Np stream basins greater than 30 acres and 85% or more harvested over a five-year or less period require a 75-foot wide, two-sided, unmanaged continuous buffer from the confluence of a Type S or F water to the upper point of perennial flow.
B - 1,000-foot Buffer	In all other circumstances, harvest adjacent to Type Np streams require a 75' wide, two-sided, unmanaged buffer for 500' upstream from the confluence of a Type S or F water and a 50' wide, two-sided, unmanaged buffer for the next 500' for a total of 1,000'. Landowners are encouraged to leave non-merchantable trees, understory, and shrubs within the 30' equipment limitation zone (ELZ) upstream of the no-cut buffered areas to the upper point of perennial flow. Like the current rule, the objective is to provide a minimum of 50% buffering of the total Np stream length (inclusive of the 1000' of continuous buffer from F/N break). If an operating area is located more than 2,000' upstream from the confluence of a Type S or F stream and the Type Np stream is more than 2,000' in length, and if the 50% stream length buffered objective is not met by protecting sensitive sites, potentially unstable landforms, and/or other buffered leave areas, then additional 50' buffers are required to meet the objective of 50% of the Np stream length buffered.
Small Forest Landowner Option	The small forest landowner option is the same as prescription A and B above, except the buffer configuration is a 50' wide, two-sided buffer with the outer 25' manageable at the landowner's option. Small landowners who choose to manage within the outer 25' buffer may remove half the available volume in a "thin from above" approach.

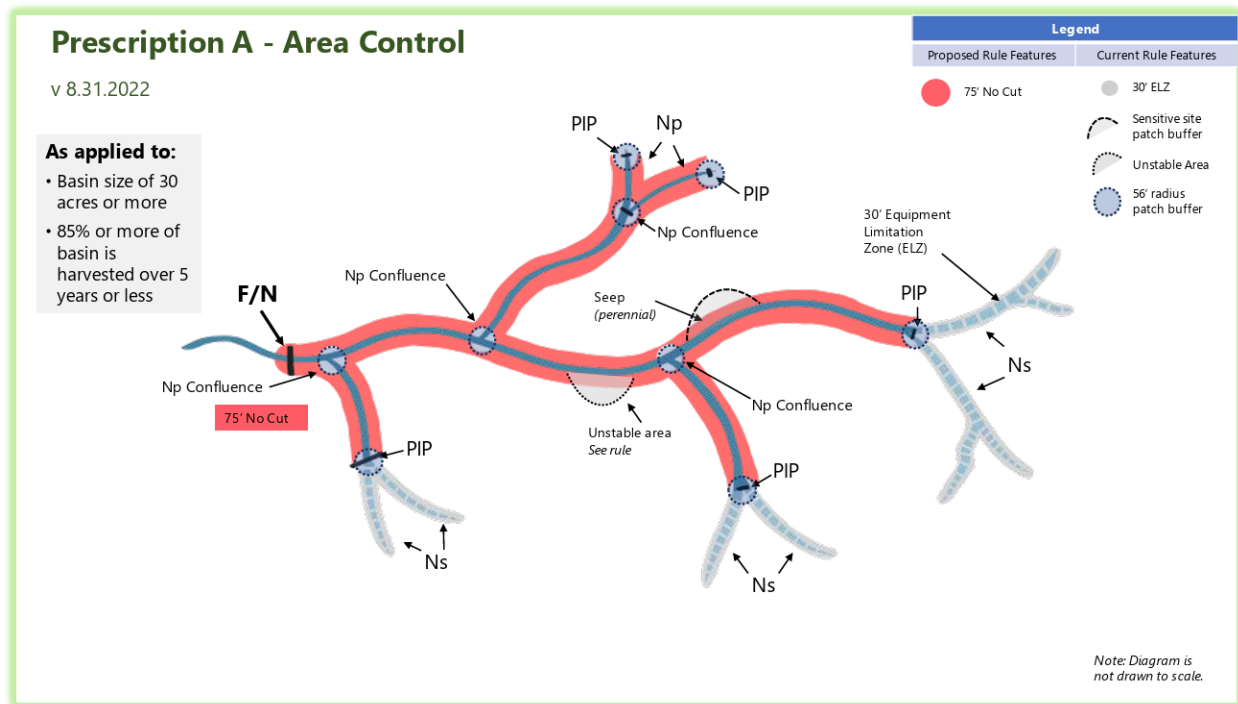


Figure 24. Prescription A – Area Control, from Minority TFW Policy recommendations.

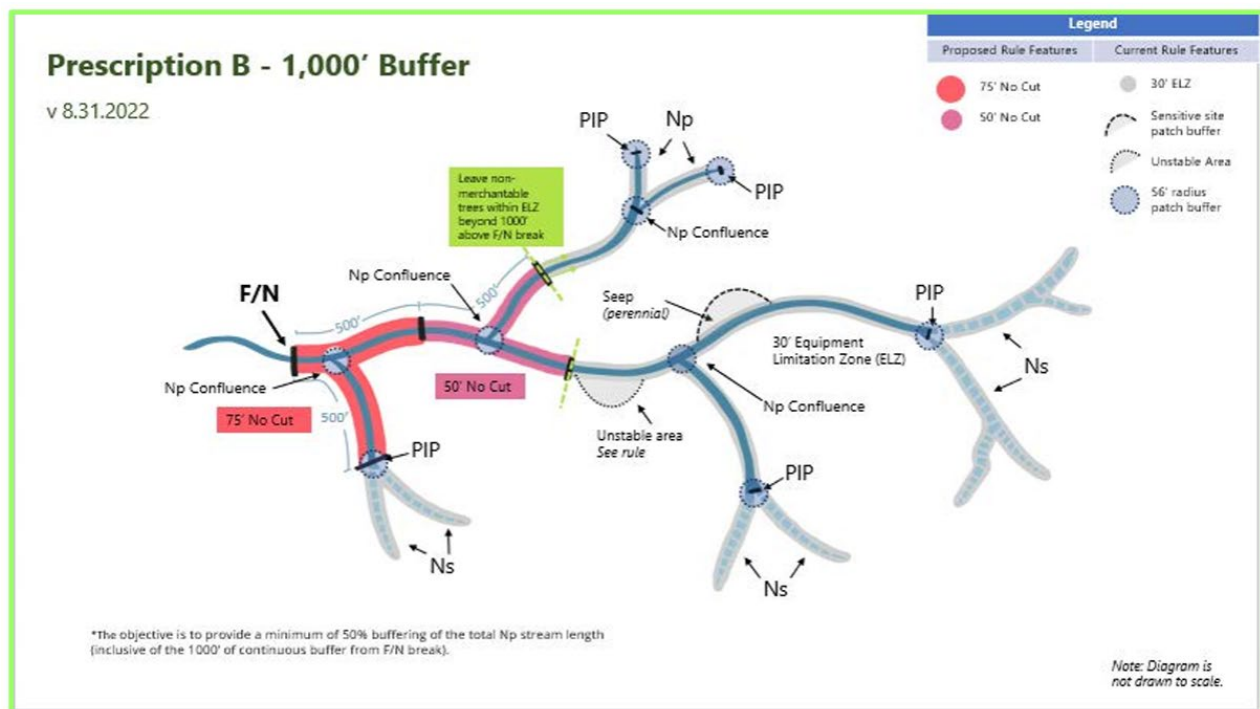


Figure 25. Prescription B – 1,000' Buffer from Minority TFW Policy recommendations.

Majority TFW Policy caucuses, including Western Washington Tribes, Eastern Washington Tribes, the Conservation Caucus, and the State Departments of Fish and Wildlife and Ecology also produced a package of Type Np buffer recommendations. The recommended prescriptions were based on two of the Type Np Technical Workgroup recommended alternatives, C “100% buffer, 75 feet, both banks” and F “Aspect-based buffer.” Option 2 of the majority proposal is identical to the Prescription A – Area Control recommendation in the minority proposal and represented a consensus recommendation. The Board held a final vote to advance the majority proposal for rulemaking on August 9, 2023.

Table 10. Majority TFW Policy Caucuses Type Np Buffer Recommendations.

Np Prescription	Description
Option 1	All Type Np streams are buffered by a two-sided 75’ no harvest buffer for the first 600’ upstream from the F/N break, or for the lowest 600’ for isolated Type Np streams which have no downstream confluence. Upstream from the first 600’ of a Type Np stream, the two-sided buffer width is determined by the bankfull width of the stream (BFW). Where Type Np streams have a 3’ BFW or greater, one of the following prescriptions is required: 1) Two-sided 75’ buffer where the inner 50’ management zone is no harvest, and the outer 25’ zone can be managed using an evenly spaced thinning strategy, such as by diameter class or relative density, 50% of the trees must be retained; or a 2) Two-sided 65’ fixed-width no harvest buffer. Where Type Np streams average less than 3’ BFW, a two-sided 50’ fixed-width no harvest buffer is required. All existing equipment limitation zones, sensitive sites, forest practices hydraulic project, roads, yarding corridors, and unstable slope rules will continue to be applied to the full length of all Type Np waters.
Option 2	This prescription is applied when 85% or more of a Type Np stream basin greater than 30 acres is to be harvested within a five-year period. The prescription requires the Type Np streams to be buffered with a two-sided 75’ wide no harvest buffer for the entire length of the Type Np stream.

Option 1

v 9.8.2022

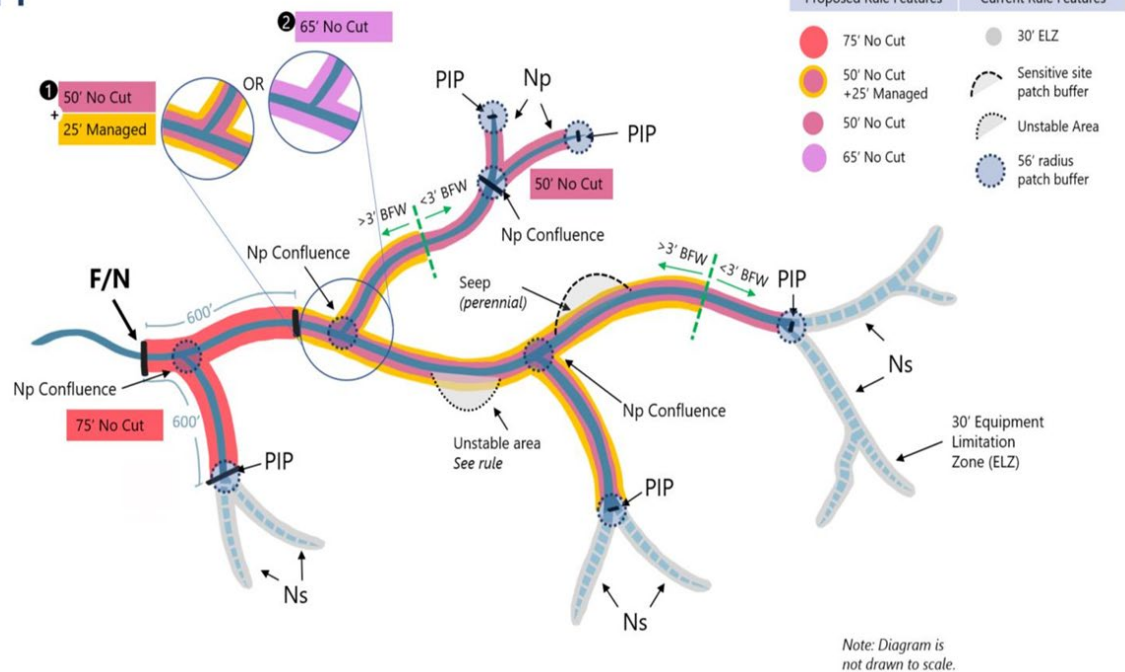


Figure 26. Option 1 from Majority TFW Policy recommendations.

Option 2

v 8.31.2022

As applied to:

- Basin size of 30 acres or more
- 85% or more of basin is harvested over 5 years or less

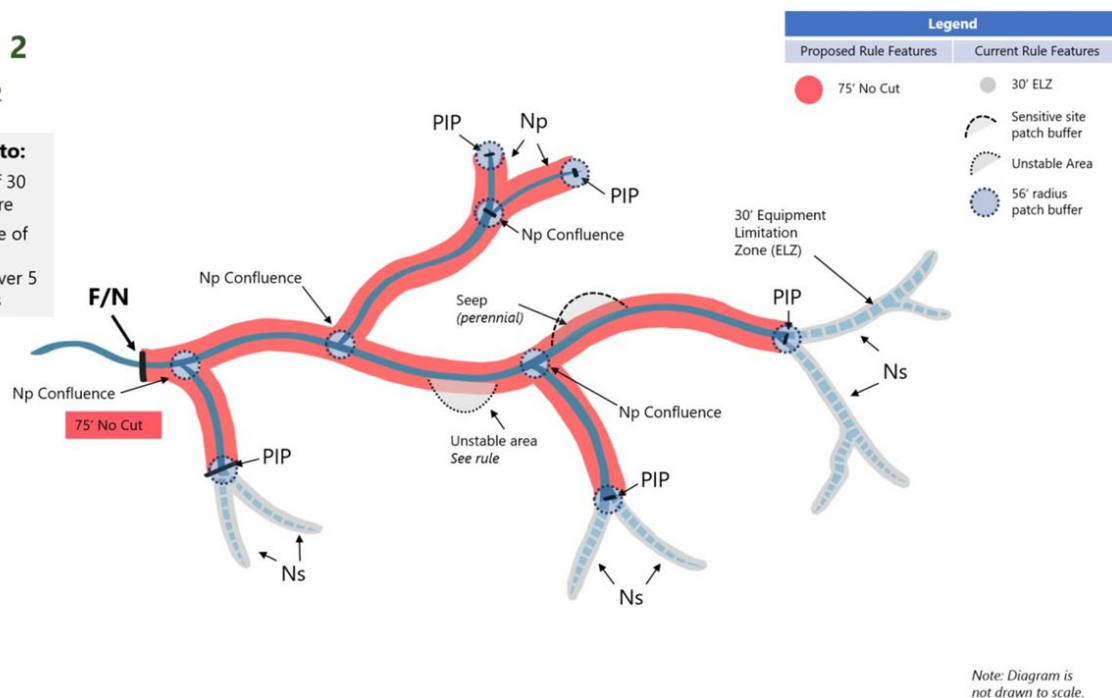


Figure 27. Option 2 from Majority TFW Policy recommendations.

Costs and benefits of a less degrading alternative

Given the proposed rule is likely to cause measurable change in certain Type Np streams, it is important to examine an alternative where there is a higher degree of certainty that no warming beyond 0.3°C will occur. The Type Np Technical Workgroup identified a continuous 2-sided 100-foot buffer (Table 8, Alternative D) as being most likely to meet measurable change standards. The authors state that:

We expect, with high certainty, that sites with buffers of this size will not on average warm beyond the measurable change standards amount for any given year post-harvest. Uncertainty is moderate since some individual sites will likely exhibit temperature warming above the measurable change standards because of factors related or unrelated to harvest. However, these sites are expected to fall strongly in the minority.

The Type Np Technical Workgroup also qualitatively identified this alternative as having the highest impact to industry, based on best professional judgement.

We decided to select this option as our less degrading alternative for assessing incremental costs and benefits compared to the proposed rule. (By allowing the proposed rule's risk of exceeding Tier II protections on some streams, these costs would be avoided, and benefits would be foregone.) This represents the most protective option considered by the Type Np Technical Workgroup and also represents the upper limit of the shade to temperature response model reported in Quinn et al. (2020)³⁹. Below is an analysis of the costs and benefits of this more protective alternative, compared to the proposed rule and to the baseline.

Additional stream miles and acreage impacted by 100-foot buffers

In their Preliminary Cost-Benefit Analysis, IEC identified multiple sources of uncertainty in identifying Type Np streams likely to be impacted by the proposed rule and how riparian buffers on those streams affect temperature. These are summarized in the table below, taken from the Preliminary Cost-Benefit Analysis.

³⁹ We did not select the full 200-year site potential tree height buffer, as recommended by WDFW in volumes 1 and 2 of the Riparian Ecosystems report, as that encompasses all riparian functions on streams of all sizes. The focus of this Tier II analysis is on impacts to temperature in small headwater streams.

Table 11. IEC's Sources of Uncertainty in Assessment of Changes in Extent of Type Np Buffers.

Key Assumption or Source of Uncertainty	Direction of Potential Bias	Likely Effect of the Uncertainty on Results
All other areas are harvestable absent the rule.	Overestimate number of affected acres	Potentially major
WC Hydro correctly "types" streams.	Unknown	Likely minor
All forestland outside of Federal, Tribal, and HCP land is subject to the proposed rule.	Overestimate number of affected acres	Likely minor
The proposed rule is unlikely to result in management changes on unstable slopes, areas within select areas of Northern Spotted Owl (NSO) habitat, and on conservation land, and available geospatial areas accurately identify these locations.	Overestimate number of affected acres	Likely minor
The Four Peaks sample provides a reasonable basis for extrapolating across all western WA.	Underestimate number of affected acres	Likely minor
Pleus and Goodman (2003) provide an approach for determining which portion of Nu streams in WC Hydro are Np streams.	Unknown	Likely minor
Outside of basin >30 acres and >85% harvest planned within a five-year period (proposed rule scenario 2 in the Four Peaks data), the partial harvest and no-cut management strategies are likely to be employed with equal probability.	None	Insignificant

To estimate the scale of additional streams that would be impacted by an alternative 100-foot buffer requirement, we initially considered performing additional impacted acreage modeling to extend the methodologies used in the Preliminary Cost-Benefit Analysis. This approach would inherently bear the uncertainties listed in the above table, as well as carrying through assumptions about the baseline, and add additional considerations such as potential for wider buffers to intersect one another. Uncertainties would also be compounded by any subsequent extension to estimating additional impacts on stream temperature, habitat, or carbon sequestration.

Recall, also, that Ecology believes the impacts of the proposed rule are likely to be toward the lower end of the acreages and stream miles (and resulting aggregate cost and benefit estimates) estimated in the Preliminary Cost-Benefit Analysis, due to factors discussed in the previous section.

Additional costs of 100-foot buffers

In their Preliminary Cost-Benefit Analysis, DNR identified unit costs associated with property value reductions associated with reduced ability to harvest timber in newly buffered areas. These included (in 2023-dollars):

- \$4,590 to \$5,907 per acre reduction between harvestable and unharvestable areas
- \$2,345 to \$3,003 per acre reduction between harvestable and partially harvestable areas.

They also identified various ranges of ground-based, cable-based, and helicopter-based harvest costs, per million board feet of timber. While the analysis was not able to fully quantify and monetize the additional operating costs associated with the proposed rule, it did identify a:

- Minor increase in cable harvest costs among buffers that widen.
- Moderate increase in cable harvest costs among stream miles with new buffers.

The Preliminary Cost-Benefits analysis concluded that, “The available information summarized above suggests that while individual landowners may experience significant harvest cost increases, the aggregate social welfare cost is expected to be minor.” (IEC, 2025. Page 32)

As we were not able to confidently quantify the additional acres likely impacted by extending the proposed rule requirements to 100-foot buffer requirements, we chose to scale the findings of IEC’s Preliminary Cost-Benefit Analysis. We made a range of simplifying assumptions to examine the scale of impacts under 100-foot buffer requirements:

1. Low cost: Assuming 50-foot baseline buffer width, increasing to 75 feet under the proposed rule, and to 100 feet under our alternative. Assuming an incremental increase in the minimum 50-foot buffers to buffers twice as wide under the alternative 100-foot buffer requirement would double incremental costs estimated by IEC. This approach resulted in the addition of \$320 million to \$1.0 billion to the cost of the proposed rule, a doubling of costs estimated in the Preliminary Cost-Benefit Analysis, or an overall range of \$640 million to \$2.0 billion in present value over 45 years as compared to the baseline.
2. High cost: Assuming 50-foot baseline buffer width, increasing to an average of 62.5 feet under the proposed rule, and to 100 feet under our alternative. Assuming an additional incremental increase of 37.5 feet over the proposed rule would quadruple incremental costs over the baseline. This approach resulted in the addition of \$960 million to \$3 billion to the cost of the proposed rule, or an overall incremental cost range (compared to the baseline) of \$1.3 billion to \$4 billion in present value over 45 years.

From a distributional standpoint, IEC's Preliminary Cost-Benefit Analysis (Section 6.3.1) estimates that 11 percent of land value losses due to the proposed rule would be experienced by small forest landowners (SFL). Applying this distinction to our scaled estimates from above for 100-foot buffers, we estimate that SFL's alone may experience an additional \$35 million to \$330 million to the cost of the proposed rule due to expanding buffer widths from the proposed rule's requirements, or an overall cost range compared to the baseline of \$70 million to \$440 million in present value over the 45 years compared to the baseline.

We acknowledge that these scaling approaches are likely to:

- Underestimate costs, where:
 - o Existing buffers mitigate the impacts of the proposed rule.
 - o Larger buffers result in a greater proportion of land shifting to unharvestable than assumed in the Preliminary Cost-Benefit Analysis.
 - o Larger harvest restrictions result in broader changes to forestland purchase and management behavior (e.g., in geographies where economies of scale are significantly reduced across multiple parcels).
- Overestimate costs where:
 - o The lowest 600 feet of Np streams has a 75-foot buffer under the proposed rule.
 - o Larger buffers result in a smaller proportion of land shifting to partially harvestable than assumed in the Preliminary Cost-Benefit Analysis.
 - o Larger buffers may be more likely to intersect with one another and result in double-counting.
 - o Larger buffers originating on SFL land may intersect with non-SFL boundaries, inflating SFL proportions.

Recall that Ecology believes likely impacts are toward the lower end of ranges of impacts estimated in the Preliminary Cost-Benefit Analysis (see discussion under above "Proposed Rule: Costs and Benefits" section). From this starting point, a scaled increase in costs under either approach would move likely total costs from nearer IEC's low-end estimate of \$320 million toward approximately \$640 million to \$1.3 billion under 100-foot buffer requirements. This would be an upward movement through the overall range of quantified costs estimated in the Preliminary Cost-Benefit Analysis for the proposed rule. While Ecology supports IEC's determination that the likely benefits of the rule exceed the likely costs, accounting for both qualitative and quantitative impacts, and having identified the additional likely benefit of avoided withdrawal of CWA Assurances subject to Ecology director's decision, we acknowledge the resulting impacts of high-end costs would have more impact on local employment, revenues, and taxes. We also acknowledge that the public and decision-makers may benefit from examination of both low-end and high-end impacts under our scaling scenarios. We therefore considered the impacts and context of scaling up the overall range of cost estimates from the Preliminary CBA.

Context of Additional Costs

In their Preliminary Cost-Benefit Analysis, IEc identified proportional impacts of the proposed rule as shown in the following table (for incremental totals and breakdown by ecoregion, see Table 6 and Table 7 above).

Table 12. IEc's Estimated Annual Regional Economic Impacts by Ecoregion (percent of western WA levels; proposed rule compared to baseline).

Direct Job-years Low	Direct Job-years High	Total Job-Years Low	Total Job-Years High	Total Wages Low	Total Wages High	Revenue Low	Revenue High	Stumpage Taxes Low	Stumpage Taxes High
0.5%	2.1%	0.5%	2.2%	0.5%	2.2%	0.5%	2.2%	0.5%	2.5%

Scaling the above impact ranges under 100-foot buffer requirements could result in additional reductions between 0.5% and 7.5% depending on relevant category (employment, wages, revenue, and stumpage taxes), and scenario, or between 1% and 10% overall compared to the baseline. As costs increase, however, impacts to these economic outcomes may become increasingly nonlinear – in other words, market responses to higher costs could become disproportionately larger as costs increase. This could occur if at some cost threshold within either estimated range, the forestry and forest products markets begin to reduce infrastructure or become less competitive than forest products markets unaffected by new buffer requirements, impacting demand as well as supply. Under these conditions, market pressure to further consolidate businesses and forestland ownership are more likely to exceed implicit incentive thresholds for participation in forestry or associated markets for some businesses or owners, or in certain regions. This means eventual impacts could be larger than the range above for the 100-foot buffer alternative.

We also considered an alternative scenario in which we assume likely costs of the proposed rule are at the lower end of the range presented in the Preliminary Cost-Benefit Analysis (based on our observations of likely overestimation of impacted acreage under high-end assumptions, which include assuming all forestland is harvestable, and so capturing baseline requirements as well as proposed rule requirements; see discussion above under “Additional Streams and Acreage Impacted by 100-Foot Buffers”). This would mean a 100-foot continuous buffer requirement would move costs toward the higher end of the range estimated in the Preliminary Cost-Benefit Analysis, which is associated with overall 2.1% to 2.5% impacts to employment, wages, revenue, and stumpage taxes.

It is difficult to confidently identify the degree to which the above impacts pose a risk to the continued function and profitability of industry or programs supported by taxes, and there is no universal measure or threshold for the larger relevance of these impacts for industry function. To better understand the context in which these cumulative impacts would occur, we looked to the current state of economic and social variables related to the forest products industry in Washington.

In the following sections we categorically apply scalars from within the range given above (i.e. jobs, revenue, tax specific) to publicly available economic data. This allows us to estimate the additional impacts of expanding the proposed rule to a 100-foot continuous buffer requirement. Where relevant, we also present total impacts, which include impacts of the proposed rule plus expansion to a 100-foot continuous buffer.

We note that the economic data discussed below differs from the numeric results (e.g., the specific number of job-years) and data underlying models used in the Preliminary Cost-Benefit Analysis. These differences potentially occur because of factors such as different occupations being included (e.g., administrative, managerial, or other business activities) or different scope of revenue classifications at firms owning and operating on affected lands. Nonetheless, these allow us to consider the relative size of potential impacts under a 100-foot continuous buffer requirement.

Employment

In terms of direct employment in the industry, the US Bureau of Labor Statistics identifies five primary occupation types active specifically in the forestry and logging subsector, with corresponding nationwide employment summarized in the table below⁴⁰. (US Bureau of Labor Statistics, 2023)

Table 13. Surveyed employee counts by occupation; Forestry and logging sector, United States.

Data series	Employment, 2023
Fallers	2,960
First-line supervisors/managers of farming, fishing, and forestry workers	2,460
Logging equipment operators	18,120
Sawing machine setters, operators, and tenders, wood	550
Truck drivers, heavy and tractor-trailer	7,740

Focusing in on Washington state, the WA Employment Security Department reports 2023 Occupational Employment and Wage Estimates for the state as a whole, as well as by metropolitan statistical area and nonmetropolitan areas. (WA Employment Security Department, 2023) The occupations above are only captured in statewide and nonmetropolitan areas, but the data also includes additional related occupation classes. The table below summarizes estimated employment and wages in Western Washington.

We note that for the “Heavy and Tractor-Trailer Truck Drivers” class, the data captures employment across all industries in the state, and is likely an overestimate of this type of employment as it relates specifically to the forest products industry. “Fallers” were also not listed in the Western Washington nonmetropolitan data, but were captured in the statewide

⁴⁰ <https://www.bls.gov/iag/tgs/iag113.htm>

data. Understanding that truck drivers and fallers are likely overestimated in the above data, we may still consider the relative scope of potential direct impacts to the industry as a whole.

Table 14. Western WA employment counts and wages, forestry and logging sector.

Western WA Nonmetropolitan Area (NMA) occupational title	Estimated employment	Average hourly wage	25th percentile hourly wage	50th percentile hourly wage	75th percentile hourly wage	Annual wage
First-Line Supervisors of Farming, Fishing, and Forestry Workers	98	\$30.34	\$22.96	\$30.00	\$33.92	\$63,110
Foresters	120	\$35.89	\$29.43	\$36.31	\$41.06	\$74,660
Heavy and Tractor-Trailer Truck Drivers (all industries)	1,727	\$28.12	\$23.43	\$26.55	\$30.95	\$58,480
Logging Equipment Operators	438	\$29.66	\$28.50	\$29.28	\$30.26	\$61,700
Logging Workers, All Other	241	\$29.02	\$28.77	\$28.78	\$28.93	\$60,370
Sawing Machine Setters, Operators, and Tenders, Wood	425	\$23.59	\$18.91	\$23.75	\$27.61	\$49,060
Fallers (statewide)	228	\$41.92	\$24.57	\$40.88	\$46.32	\$87,190

Compared to the proposed rule, a 100-foot buffer alternative could result in an additional 0.5% to 6.3% reduction in job-years, or the equivalent of 16 to 206 of the above total 3,277 employees' work. In total compared to the baseline, this amounts to an approximate 1.0% to 8.4% reduction in job-years, or the equivalent of 33 to 275 of the above total 3,277 employees' work. It is important when looking at job-year impacts to know they are not necessarily losses of whole positions, but rather consist of multiple smaller reductions (a simplified example would be that 10 job-years could be 10 full-time employees, 20 employees shifting to half-time, or hundreds of employees reducing work hours by a small percentage).

The WA Employment Security Department also publishes establishment size (facility-level or location-level) by industry subsector (WA Employment Security Department, 2024). It lists the Forestry and Logging subsector as having 377 establishments and 3,101 employees (March 2024). The table below summarizes the distribution of establishments in the industry and employment by size. To prevent disclosure of identifiable information for locations with greater than 50 employees, the data for 10 additional facilities with a total of 772 employees is not broken out by size.

Table 15. Distribution of businesses in the forestry and logging sector, by number of employees at location.

	1 - 4 Employee es	5 - 9 Employee es	10 - 19 Employee es	20 - 49 Employees	50 - 99 Employees	100 - 249 Employees
Number of establishmen ts	230	63	45	29	*	*
Total employment	422	410	571	926	*	*

* Withheld to prevent disclosure of individually identifiable data.

If we apply the 1.0% to 8.4% total reduction in direct employment compared to the baseline to the 3,101 employees in this dataset, the corresponding employment losses would be between 31 and 260 job-years in total, between 16 and 195 of which are associated with scaling to a 100-foot buffer alternative from the proposed rule's buffer requirements. If these total impacts were focused on the smallest establishments in the dataset that make up the majority of establishments in this data (1 to 4 employees), the high-end impacts would be the equivalent of about half of employment at those businesses, which employ an average of approximately 2 people. If the smallest businesses were to be most affected by 100-foot buffer requirements and would have difficulty continuing to operate with such reductions in force – particularly at the upper end of the impact range – these more-stringent requirements could result in market pressure to further conglomerate operations into fewer, larger establishments.

Business revenues

We were able to identify US sales volumes for 597 businesses located (headquartered or with an office or similar physical location or address) in Washington that were listed as being in the forestry and logging subsector (D&B, 2025). These businesses had a total US sales volume of over \$374 million annually, when considered at the local level. Many of these businesses have parent companies, indicating that some may have a greater ability to adjust to costs over time, depending on internal business structure and planning. The total US sales volume of independent businesses and relevant parent companies was over \$281 billion annually.⁴¹

Total impacts (of a 100-foot buffer requirement compared to the baseline) of approximately 1.0% to 8.8% to revenues associated with local establishments in this dataset would be between \$3.7 million and \$32.9 million, \$1.9 million to \$24.7 million of which is attributed to the expansion from the proposed rule to a 100 foot buffer.

⁴¹ We note that establishment counts and sales values are likely underestimated due to missing data for small establishments on account of recently changed addresses, unresponsiveness to surveys, or unpublished investor, regulatory, and other sales information the database relies on.

Stumpage tax revenues⁴²

Regarding stumpage tax revenues, the Preliminary Cost-Benefit Analysis notes that, “In 2024, Washington counties received \$35.5 million through the timber excise tax fund. Of that total, roughly \$32.9 million went to counties in western Washington.” It also presents the map below, of the distribution of forest excise tax revenues by county. While it varies by county revenue and budget plans, a total impact of 1.0% to 10.00% to these revenues in total from a 100-foot buffer (compared to the baseline) would be more likely to impact counties that rely more heavily on forest excise tax revenues or target them to specific programs in their budgets, as compared to the impacts of the proposed rule.

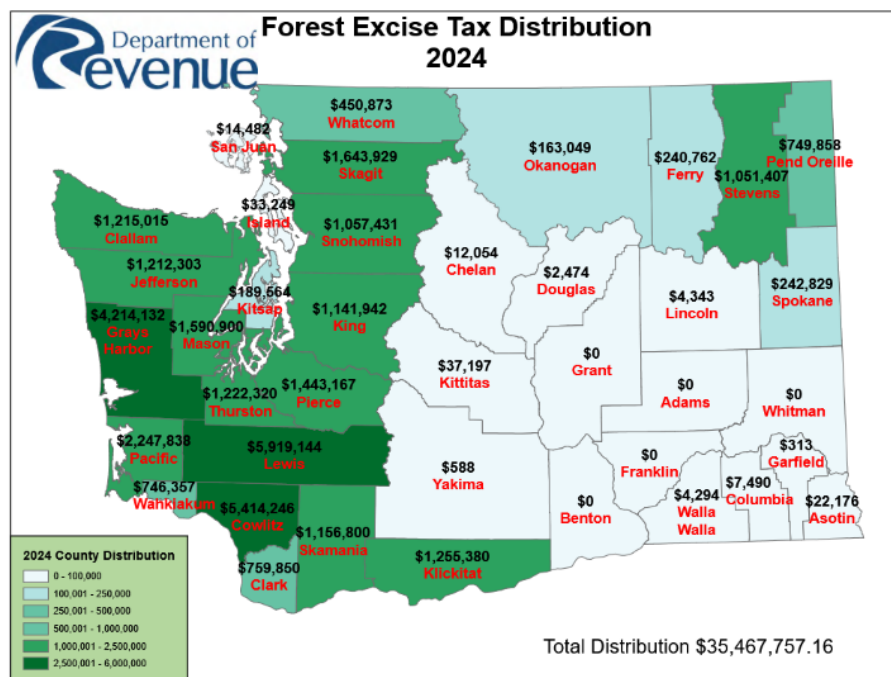


Figure 28. Forest Excise Tax Distribution by County in 2024. Source: DOR (2024).

In discussion of the per-acre costs of the proposed rule, the Preliminary Cost-Benefit Analysis also notes that, “Geospatial analysis presented in IEc (2024) found that 16 percent of the acres abutting streams that may be typed in the future in western Washington are owned by [small forest landowners]. For these acres, the land value losses may be better represented by the high end of our [per-acre cost] range, although we expect the values to fall within our range.” In this way, additional revenue losses from buffer expansion beyond the rule may trend towards the higher end of the aforementioned range.

⁴² During the public comment period for our Draft Western WA Type Np Tier II Antidegradation Analysis, commenters expressed concern about impacts on timber excise taxes and on county revenues and budgeting. To add clarity about county-level impacts of a less-degrading alternative (100-foot buffer requirements), and about data limitations, we have expanded this section in our final analysis.

In previous sections we estimated that increasing the required buffer width to 100-foot buffers, which would provide high certainty in preventing measurable change to water quality, could at least double the costs of the rule (compared to the baseline). In the context of stumpage taxes, counties with more acreage affected by the proposed rule (i.e., where buffer widths on Np streams were modeled to increase, thereby reducing harvest) would experience similarly scaled losses, but not in a way that is easily scaled to the county level. Identifying the actual impacts by county and their relative importance is difficult due to the following analytic factors:

- Counties do not smoothly overlap with the boundaries of ecoregions for which impacts were modeled in the Cost-Benefit Analysis for the rule. This means some ecoregion impacts cross county borders, and would need to be correctly scaled by impacted acres in each county. Other counties may overlap with multiple ecoregions (see Figure 29).
- Impacts of the rule (and therefore any scaling up to reflect impacts of a more-protective alternative) are not uniform across ecoregions. This means the distribution of impacts in an ecoregion may occur in some overlapping counties more than others.
- Impacts of the rule are not uniform within ecoregions, as they depend on the number and locations of Np streams. This means counties that overlap with an ecoregion but not with acreage in that ecoregion that is impacted by the amended rule would be less affected than counties containing more of the impacted Np streams.
- The relative importance of timber excise tax revenues will vary by county. This means smaller impacts to timber excise tax revenues in a county that relies more heavily on these funds may have more significant relative spending impacts than in counties where timber excise taxes are a smaller proportion of revenues.

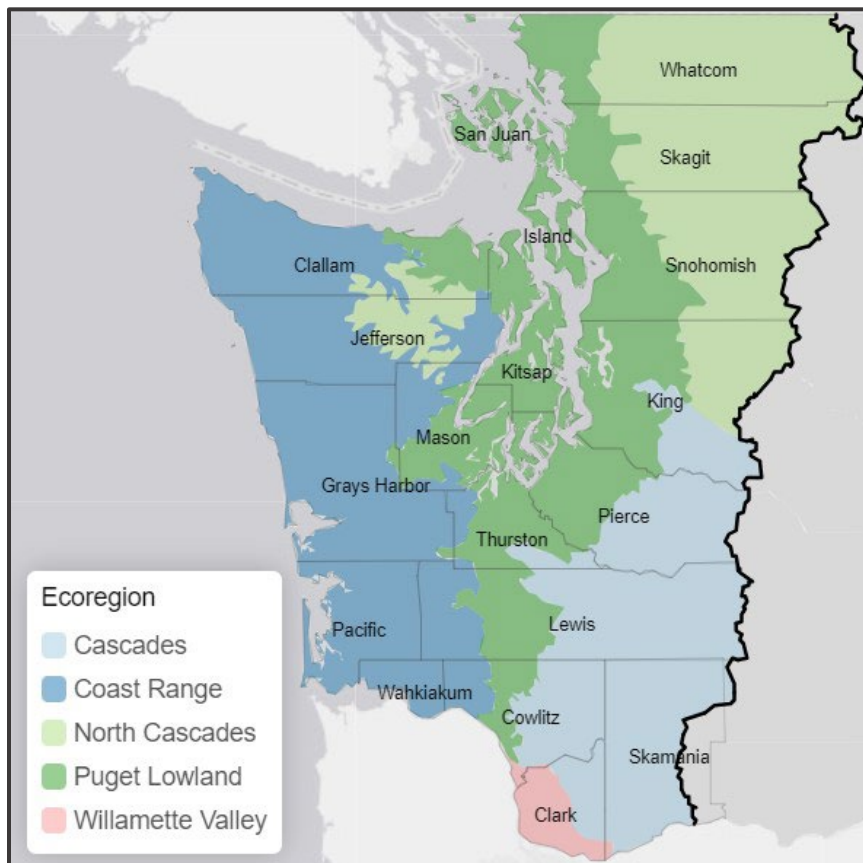


Figure 29. Ecoregions by County in Western Washington.⁴³

In all, the above factors mean that scaling timber excise taxes by ecoregion (see Table ES-5 in the Cost-Benefit Analysis) down to the county level is not as straightforward as, e.g., scaling by relative timber acreage or relative past excise tax revenues. What we can identify, based on available data, regarding the impacts of a more-protective 100-foot buffer alternative, is that:

- A less-degrading requirement for 100-foot buffers could at least double reductions in timber excise taxes (compared to the impacts of the proposed rule itself).
- Losses in timber excise taxes would be relatively higher in counties where:
 1. Estimated impacts in the overlapping ecoregion(s) are larger (e.g., in the Cascades and Coast Range), and
 2. Overlapping areas of the county contain more Np streams than the average for the ecoregion(s).
- Impacts to county budgets could be more significant in counties more dependent on timber excise taxes in proportion to their total revenues. We note also that where

⁴³ Note: For illustration. DNR's East/West dividing line (in bold) is shown for the purpose of implementing Forest Practices Rules (WAC 222-16-010). <https://geo.wa.gov/datasets/wadnr::east-west-dividing-line-forest-practices-regulation/about>

these revenues may be dedicated funds for specific programs, those programs could be more at risk, depending on county budgeting decisions.

Infrastructure and supply chain

We were not able to identify data on the specific relationship between forest harvest and its co-reliance with local inputs (e.g., labor) and purchasers of its products further down the supply chain (e.g., sawmills), in terms of what minimum sustainable local levels of activity would be. Ecology uses the REMI E3+ model to examine dynamic impacts of interrelationships between economic factors such as output, labor, prices, and trade over time and across industry sectors, the public sector, and regions. The model optimizes by allowing all variables to adjust over time. An underlying aspect of the model is an input-output matrix (a static element that does not account for price, wage, or population changes). The matrix presents the amount that is spent on intermediate inputs to an industry to produce one dollar of output from that industry. We examined that data to better understand the relationship between forestry and the associated industries further along the supply chain.

The forestry and logging sector:

- Spends 72 cents on labor and capital inputs combined, to produce a dollar of output.
- Other significant contributors to production include: within-industry spending, support activities and wholesale trade.

The sawmill and wood preservation sector:

- Spends more on forestry and logging products (25 cents per dollar of output) than on either labor or capital.
- Other significant contributors to production include: within-industry spending, wholesale trade, other wood products manufacturing, and truck transportation.

The veneer, plywood, and engineered wood product sector:

- Spends 44 cents on labor and capital inputs combined, to produce a dollar of output.
- Spends 14 cents on the forestry and logging sector to produce a dollar of output.
- Other significant contributors to production include: within-industry spending; wholesale trade; resin, synthetic rubber, and artificial synthetic fibers and filaments; and other wood products manufacturing.

The other wood products sector:

- Spends 45 cents on labor and capital combined, to produce a dollar of output.
- Spends 3 cents on the forestry and logging sector to produce a dollar of output.
- Other significant contributors to production include: sawmills and wood preservation; other wood products; wholesale trade; veneer, plywood, and engineered wood products; and truck transportation.

The pulp, paper, and paperboard mill sector:

- Spends 34 cents on labor and capital combined, to produce a dollar of output.

- Spends 7 cents on forestry and logging to produce a dollar of output.
- Other significant contributors to production include: wholesale trade; sawmills and wood preservation; basic chemical manufacturing; converted paper; fuels; within-industry spending; management; machinery; and truck transportation.

Based on its higher relative spending on forestry and logging, and on the significant contribution of truck transportation (which is also a significant contributor to overall forestry and logging sector employment), we focused further on the sawmill and wood preservation sector. We identified 123 businesses in Washington with sales and employment data in the sector. Their total US sales were valued at \$878 million per year and they have local employment of 4,881. (D&B, 2025) Again, this data may omit businesses that did not respond to surveys or have available publications or reports including sales and employment. Accounting for those with parent companies, this total US sales value across independent and parent businesses rises to over \$114 billion.

A 100% to 300% increase in revenue losses in the forestry and logging sector under a 100-foot buffer requirement, compared to the impacts of the proposed rule, would likely more heavily impact the above closely related industries. Based on inter-sectoral financial relationships above, this could particularly be the case in the sawmill and wood preservation sector. The significance of these larger impacts would be determined not only by complex sectoral and individual business relationships, but at higher cost levels could be compounded by geographic factors (e.g., regional availability of timber and locations of sawmill operations) and their interaction with not only timber costs but transportation costs.⁴⁴ To the extent these factors combined with at least double the incremental costs would make it more profitable for businesses in the sector to shift business relationships outside current regions, or to seek additional economies of scale, given the economics of alternative options, a 100-foot buffer requirement could put additional pressure on infrastructural shifts within these sectors.

Additional benefits of 100-foot buffers

⁴⁴ Depending on the interaction between impacts to travel distances, product volumes, and resulting transportation changes, this may include changes to net emissions associated with mill location and size, equipment access, and travel distances.

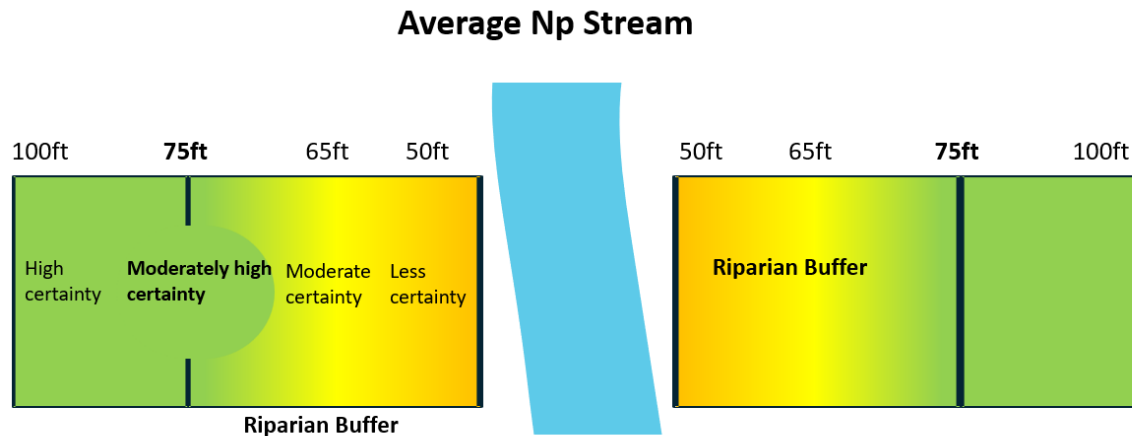


Figure 30. Simplified depiction of relative uncertainties in ability of buffer widths to protect Type Np streams from temperature increases of 0.3°C or greater on average across western Washington. We expect the effectiveness of each buffer scenario to vary due to regional differences and site-specific factors.

While benefits of 100-foot continuous buffer requirements would also increase as compared to the proposed rule, we believe there would be diminishing marginal returns to additional buffer width when it comes to some benefit categories.

Recall that the Preliminary Cost-Benefit Analysis identified the following benefits of the proposed rule:

- Moderate to major reductions in risk of stream temperature increases.
- Moderate to major improvements to habitat conditions for terrestrial riparian wildlife.
 - 67,000 to 170,000 additional acres with harvest restrictions, representing 0.4 to 0.9 percent of all forest habitat in western Washington (regardless of owner).
 - Economic valuation literature identifies that the public, including Washington State households, hold substantial value for species conservation and restoration, including through habitat protection.
- Minor to moderate improvements to habitat conditions for stream-associated amphibians:
 - 19,000 to 44,000 Np stream miles with wider or longer buffers that will protect species from temperature increases and improve general habitat quality.
- Negligible to minor benefits of improved habitat conditions for fish downstream of Np streams:

- Increased delivery of organic matter, macroinvertebrates, nutrients, and cooler water, although improved conditions do not persist far downstream.
- Negligible to minor benefits of increased carbon sequestration:
 - Likely positive effect in reducing atmospheric carbon, although significant uncertainty exists regarding magnitude of this benefit due to influence of timber management practices and uses of the harvested timber on carbon budget.
 - On the order of 220,000 to 3.3 million MT CO₂e increase in total carbon sequestered relative to active timber rotation over the first 45 years of rule implementation.
 - Reduction in annual atmospheric carbon represents between 0.0005 percent and 0.07 percent of all emissions in the state.
 - Avoided climate damages associated with increased carbon sequestration experienced at a global level.
- Tribal cultural values.

Recall Ecology has also identified the likely benefit of avoided withdrawal of CWA Assurances, subject to Ecology Director's decision.

While a requirement for 100-foot continuous buffers would provide more certainty that Tier II temperature protections are met on Type Np waters on average, the most significant incremental benefits would likely be for a minority of streams. In regard to specific benefit categories identified for the proposed rule to achieve the objectives of this rulemaking, the benefits of expansion to 100-foot continuous buffers would likely differ in the following ways.

- **Risk of stream temperature increases:**
 - We expect that under the proposed rule, streams with less topographic and riparian shade (i.e., north-south oriented, gently sloped valley walls, 50ft buffers) and a higher proportion of surface water (i.e., competent lithologies) are more likely to warm under the proposed rule. Conversely, streams with more topographic and riparian shade (i.e., east-west oriented, steep valley walls, 65-75ft buffers) and have more groundwater influence (i.e., incompetent lithologies) are less likely to warm. It should be emphasized that within this wide spectrum there remains a highly variable landscape where the effectiveness of each buffer scenario will vary due to regional differences and site-specific factors.
 - The greatest benefit would likely be to the stream reaches with only a 50ft buffer under the proposed rule (most likely to see temperature increases). However, shade provided by canopy cover generally begins to diminish beyond approximately 75 feet from the edge of stream (Figure 17). The placement of additional riparian buffer trees beyond 75 feet may have less of an effect on maintaining stream temperatures via direct shade contribution. However, retaining trees beyond 75 feet likely increases the ability of the entire riparian buffer to better resist wind events, potentially increasing overall riparian shade effectiveness. Retaining trees

beyond 75 feet may also positively influence the microclimate of the riparian area, however the scientific literature on this is limited.

- **Habitat conditions for terrestrial riparian wildlife:** Habitat conditions would likely improve and expand, maintaining between 100% and 300% additional habitat in our scaling scenarios as compared to the proposed rule. Wider, continuous buffers would also improve a stand's resilience to disturbance events (e.g., high winds), especially higher in the watershed where the smaller 50ft buffers are more likely to be present. There is uncertainty, however, in whether or how these beneficial returns may diminish as buffer width increases.
- **Habitat conditions for stream-associated amphibians:** The greatest benefit would likely be the reduced risk of stream temperature increases and greater terrestrial riparian habitat availability. Even though all of the amphibian species studied in Hard Rock are known to utilize cooler waters, as the authors note, the Costal Tailed Frogs (*A. Truei*) are likely to benefit the most from an expanded buffer prescription. Egg masses and larvae (tadpoles) are found in cold rocky streams (de Vlaming and Bury 1970, Karraker et al. 2006, McIntyre et al. 2021), so a doubling of the buffer width in the upper reaches would likely increase the suitable habitat for reproduction and rearing. The additional buffer width would also increase the terrestrial habitat for the highly mobile long-lived adult Costal Tailed Frogs (Daugherty and Sheldon 1982, McIntyre et al. 2021).
- **Carbon sequestration:** An increase in buffer width would inherently increase the number of trees left standing, and so would increase the carbon sequestered in the larger buffers. Assuming the distribution and composition of trees within the added buffer under a 100-foot buffer requirement is similar to the trees within the buffers required under the proposed rule, this benefit could potentially scale linearly by 100% to 300% (in the aggregate) from the findings of the Preliminary Cost-Benefit Analysis, on the order of 220,000 to 9.9 million additional MT CO₂ (compared to the proposed rule) in total carbon sequestered relative to active timber rotation over the first 45 years of rule implementation, or a total of 440,000 to 13.2 million additional MT CO₂ as compared to the baseline. Larger buffers would also be likely to increase the resilience of riparian stands to wind events, which may aid in further increasing carbon sequestration by preventing loss during these events. We note that such additional protection would be highly site-specific and event-specific.
- **Improved habitat conditions for fish downstream of Np streams:** Similarly to the direct impacts of additional riparian buffer width on stream temperature in buffered areas, the relationship between additional buffer width and downstream habitat conditions is complex and site specific. As we note in the first bullet above, stream temperature improvements generally diminish beyond the initial 75 feet of buffer width, but this additional width may contribute to stand resilience. Subsequent or collective downstream impacts would likely be consistent with findings for the proposed rule in the Preliminary Cost-Benefit Analysis.

- **Tribal cultural values:** As tribal cultural values for instream and riparian areas and the ecosystem services they provide are unquantifiable, we cannot speak to the size of any proportional change in these unquantifiable values associated with a 100-foot continuous buffer requirement compared to the proposed rule.

Context of Additional Benefits

We expect that under the proposed rule, streams with less topographic and riparian shade (i.e., north-south oriented, 50ft buffers) and a higher proportion of surface water (i.e., competent lithologies) are more likely to warm under the proposed rule. Conversely, streams with more topographic and riparian shade (i.e., east-west oriented, 65-75ft buffers) and have more groundwater influence (i.e., incompetent lithologies) are less likely to warm. As stated previously, it should be emphasized that within this wide spectrum there remains a highly variable landscape where the effectiveness of each buffer scenario will vary due to regional differences and site-specific factors. However, the proposed rule package represents a substantial improvement to water quality protection across the landscape, resulting in substantial increases in protection of temperature responses of 0.3°C or greater.

A 100-foot continuous buffer requirement or similar alternative would reduce the likelihood of degradation occurring on streams more susceptible to warming under the proposed rule. This would also likely generate additional benefits to the streams discussed above (e.g., less warming, riparian stand resilience, associated benefits to stream-associated amphibians, and potentially to downstream waters). Other benefits related to terrestrial habitat and carbon would occur on all streams with expanded buffer width, though these benefits may not be directly related to stream temperature.

It is important to note, like the authors of the Hard Rock reports did, that the study was not designed to determine the mechanism for increases or decreases in amphibians after harvest. What the authors (McIntyre et al. 2021) could say is that they, “observed a substantial negative response to timber harvest in the eight years post-harvest for some species in some buffer treatments, and for Coastal Tailed Frog in all buffer treatments.” McIntyre et al. (2021) goes on to say that: “[I]t is possible that the increased temperatures we observed in all buffer treatment streams had negative longer-term consequences that were not immediately apparent, but which may have impacted movement or reproductive success over time, especially for Coastal Tailed Frogs, which had experienced the greatest declines across all buffer treatments seven and eight years post-harvest.”

What is also clear is that the same treatment effect that caused the temperature increases at the Hard and Soft Rock sites, can also affect in-stream and riparian habitat for amphibians. McIntyre et al. (2021) reported an increase in in-channel wood loading, from windthrow and logging slash, and a retention of fine sediments in the streams. The authors report that both can have negative consequences for stream-associated amphibians. This decrease in habitat quality can also restrict movement of amphibian populations, that may utilize the stream banks or move between streams (Wahbe and Bunnell 2001, Peterman et al. 2011, McIntyre et al.

2021). The authors point to an increase in wood in the stream and gaps in riparian cover as potential barriers to in-stream and overland travel.

Whether it was an increase in stream temperature, the general degradation of riparian habitat, or a combination of both, the current buffer prescriptions did not provide enough protection for the long-term health of amphibian populations in the Hard Rock study. It is important to note that not all amphibian populations responded in the same way to the different harvest treatments and Hard Rock did not test a 100ft buffer prescription. So, it is difficult to say how much of an increased benefit an additional 25-50ft of buffer would provide stream associated amphibians. However, as with stream temperature, the increase in buffer area from the current rule to the proposed rule represents a substantial improvement to stream associated amphibian habitat. This is especially true for the upper reaches of the watersheds where riparian cover is removed and there is a substantial increase in woody debris in the stream channel.

Necessary and Overriding Public Interest Determination

The Tier II rule states that “Once an activity has been determined to cause a measurable lowering in water quality, then an analysis must be conducted to determine if the lowering of water quality is necessary and in the overriding public interest” (WAC 173-201A-320(4)). The rule also specifies that information to conduct the analysis must include information that “...identifies and selects the best combination of site, structural, and managerial approaches that can be feasibly implemented to prevent or minimize the lowering of water quality” (WAC 173-201A-320(4)(b)), and includes examples that may be considered as alternatives, including “Establishing buffer areas with effective limits on activities” (WAC 173-201A-320(4)(b)(vii)). In this case, Ecology must provide a statement of the benefits and costs of the social, economic, and environmental effects associated with the lowering of water quality (WAC 173-201A-320(4)(a)). To determine whether the potential for lowering water quality beyond Tier II measurable change thresholds under the proposed rule is necessary and in the public interest, we considered not only the relative size of costs and benefits of alternative rule requirements that provided more certainty of protecting Type Np waters from temperature increases of 0.3°C or greater, but also their feasibility within a rulemaking context, and the uncertainties inherent in stream temperature impacts in upper headwaters.

We observe that a central theme to our discussion is the level of certainty with which the proposed rule or a more protective alternative would protect Type Np streams from temperature increases of 0.3°C or greater. This does not mean degradation will occur with certainty on any given stream under the proposed rule (temperature is affected by a number of site-specific factors). Rather, the risk of degradation is necessary because requirements that would more confidently avoid it are potentially not feasible. Feasibility for rulemaking includes the likely ability to meet the Administrative Procedure Act requirement to:

Determine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection [which includes a determination that the rule is needed to achieve the general goals and specific objectives of the statute that the rule

implements; to meet cost-benefit analysis requirements; and a determination that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented] that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives [of the statute that it implements]. (RCW 34.05.328(1)(e))

The statute implemented by the proposed rule is Chapter 76.09 RCW (“Forest Practices”). The goals and objectives of the statute reflect a need to balance multiple factors, including that “a viable forest products industry is of prime importance to the state’s economy” and that, “coincident with maintenance of a viable forest products industry, it is important to afford protection to forest soils, fisheries, wildlife, water quantity and quality, air quality, recreation, and scenic beauty.” These goals are further detailed in specific objectives to create and maintain a comprehensive statewide system of laws and forest practices rules that achieve a range of forestland maintenance, industry efficiency, and comprehensive and cooperative system objectives, and to, “achieve compliance with all applicable requirements of federal and state law with respect to nonpoint sources of water pollution from forest practices.” (RCW 76.09.010(2)(g)).

As detailed in this report, additional buffer requirements that are less likely to result in degradation would likely result in increased costs. However, despite providing the greatest water quality-related benefits (i.e., related to stream temperature directly or indirectly) to a subset of streams most at risk of degradation under the proposed rule, we cannot confidently assess the scale and scope of benefits using current knowledge. Therefore, the alternative 100ft continuous buffer, which provides the highest degree of certainty to prevent degradation across Type Np waters, may not currently be able to demonstrate that it would meet the goals and objectives of the authorizing statute with the least necessary burden on those required to comply with it. If this is not possible, such a highly protective alternative would not be feasible. The remaining minor risks of lowering water quality on some waters under the proposed rule would therefore be necessary in order to meet other rule adoption requirements.

Under our simplified scaling assumptions, we observed that a less degrading 100ft alternative buffer requirement would, on average, prevent or minimize the lowering of water quality, with greater certainty than the proposed rule (i.e., on waters that the proposed rule is less certain to protect from temperature increases of greater than 0.3°C). We observed this could at least double costs in comparison to the proposed rule, including lost land values, jobs impacts, and state revenues. While an expanded buffer would prevent or minimize the lowering of water quality on average with greater certainty than the proposed rule, we could not determine that it would increase benefits as consistently based on current scientific knowledge. The scale by which temperature-related benefits would increase depends on site-specific and complex relationships between incremental buffer width, stream temperature, habitat, and affected species. The potential for lowering of water quality under the proposed rule is likely in the public interest in avoiding these increased costs and uncertainties in the size of realized benefits.

Table 15 below illustrates Ecology’s anticipated performance of buffer scenarios on average across the landscape, based on best available science and professional judgement.⁴⁵ The naming convention is reflective of IEC’s Preliminary Cost Benefit Analysis and the Type Np Technical Workgroup’s final report. If the proposed rule is implemented, we expect the effectiveness of each buffer scenario to vary due to regional differences and site-specific factors.

⁴⁵ “Baseline rule” represents the no-action Board alternative. “Proposed rule” represents the Board action alternative. “Less Degrading” represents an alternative evaluated for Ecology’s Tier II antidegradation analysis for illustrative purposes only.

Table 16. Summary of Forest Practices Board and Tier II Analysis Alternatives.

Alternative		Description	Certainty of Prescription's Effectiveness for Protecting Western WA Np Waters from Warming Beyond 0.3°C on Average, Across Landscape
Baseline Rule (no action)		WAC 222-30-021*(2)	High certainty this buffer rule is ineffective in protecting Type Np waters
Proposed Rule (action)	Scenario 2	If basin >30 acres and >85% harvest planned within five-year period: 75' no-harvest buffer for entire length of Type Np water	Moderately high certainty buffer will protect Type Np waters
	Scenario 1A	If basin <30 acres and/or <85% harvest planned within a five-year period + partial management strategy and BFW >3': 75' no-harvest buffer for lowest 600' of stream, then 50' no-harvest buffer along entire stream reach + additional 25' outer buffer representing 50% partial harvest zone	Moderate certainty buffer will protect Type Np waters
		Scenario 1A, if BFW<3': 75' no-harvest buffer for lowest 600' of stream, then 50' no-harvest buffer along remaining stream reach	Less certainty buffer will protect Type Np waters
	Scenario 1B	If basin <30 acres and/or <85% harvest planned within a five-year period + no cut management strategy and BFW >3': 75' no-harvest buffer for lowest 600' of stream, then 65' no-harvest buffer along remaining stream reach	Moderate certainty buffer will protect Type Np waters
Less Degrading	D	100% buffer, 100', both banks.	High certainty buffer will protect Type Np waters

Uncertainty associated with the proposed rule's effectiveness may be reduced by relying on additional Adaptive Management Program study. Additional study, in combination with other CMER projects, has valuable potential to increase understanding of small Type Np streams under three-foot bankfull width, which the Hard and Soft Rock CMER studies did not directly evaluate. Further studies may also increase understanding of other contributing factors to Type Np stream temperature in combination with canopy cover, such as windthrow, aspect, topography, lithology, and flow permanence.

Conclusion

Ecology highly values the work conducted by the Forest Practices Board's Adaptive Management Program (AMP) in developing Type Np buffer alternatives. As mentioned earlier in this report, shortly after the baseline Forests and Fish Type Np buffer rule was adopted, sixteen original effectiveness/validation monitoring programs were ranked by CMER, with the study of Type N waters being declared a top priority for addressing key scientific uncertainties and underlying assumptions. Over the 23 years following the original priority ranking, the AMP has spent considerable time and resources studying Type N waters, the effectiveness of the baseline western Washington Type Np buffer rule, and working to adapt to study findings. The program's science clearly illustrates that the baseline rule does not meet the requirements of the Clean Water Act for water quality or the Washington State water quality standards, and has demonstrated to be ineffective in protecting waters of the state from degradation. The action alternative the Board advanced for rulemaking meaningfully attempts to achieve compliance with the requirement to meet Washington State water quality standards while minimizing economic impact to landowners. It is critical to emphasize the significance of this profound adaptive management decision the Forest Practices Board is presented with.

Ecology focused this Tier II antidegradation analysis on the proposed Type Np buffer rule because this represents a new or expanded action per WAC 173-201A-320. We find the proposed rule is likely to result in substantial improvement to Type Np water quality in western Washington when compared to baseline rule conditions. Establishing continuous riparian buffers along Type Np waters represents a considerable step forward in water quality protection. We find that relative to baseline conditions, the proposed rule is likely to significantly improve chances of preventing warming of Type Np waters beyond 0.3°C, which is the threshold where impacts will not cause a measurable change in the physical, biological, and chemical makeup of the water. As a result, the proposed rule is also likely to significantly improve chances in preventing Type Np waters from warming beyond applicable numeric criterion in the water quality standards antidegradation Tier I protections, when compared to baseline conditions. Nevertheless, it remains critical to acknowledge the proposed rule is not anticipated to protect all Type Np waters from warming. Based on our review, following potential implementation of the proposed buffer prescriptions, we anticipate some Type Np streams will exhibit warming beyond 0.3°C following timber harvest activities due to regional and site-specific factors, likely to last no longer than two years.

It may currently be difficult to demonstrate that a less degrading alternative (100ft continuous buffer) would not be an overly burdensome rule on landowners. It would also currently be difficult to demonstrate that the potential incremental benefits of adding 25 to 50ft of buffer to the proposed rule would be commensurate with the additional incremental costs to landowners.

Ecology finds it necessary and in the overriding public interest to allow the Forest Practices Board to adopt the proposed rule, thereby continuing to incur a level of risk, and likely exceeding Tier II measurable change temperature thresholds in some areas.⁴⁶ In consideration of the alternatives rigorously developed and refined by the Type Np Technical Workgroup and TFW Policy Committee, Ecology finds the Board's proposed rule is representative of an alternative that selects the best combination of site, structural, and managerial approaches at this time that can be feasibly implemented at the landscape scale (western Washington) to prevent or minimize the lowering of Type Np water quality. The remaining level of risk of exceeding Tier II measurable change temperature thresholds in some areas is necessary and in the public interest to meet administrative requirements for rulemaking (by meeting statutory goals and objectives with least burden) and to avoid potentially significant additional costs to landowners, and resulting impacts to employees, businesses, and local governments. The cost benefit analysis developed for the proposed buffer rule, which we have established would be associated with the lowering of water quality, demonstrates the proposed rule strikes the balance in ensuring the probable benefits likely outweigh the probable costs with respect to social, economic, and environmental effects given current scientific knowledge.

If the Board chooses to adopt the proposed Type Np buffer rule, remaining uncertainty associated with rule effectiveness must be reduced by relying on additional AMP studies. Further studies may increase understanding of other contributing factors to Type Np water temperature in combination with canopy cover, such as bankfull width, windthrow, aspect, topography, lithology, and flow permanence. Following additional scientific study and analysis, additional TFW Policy Committee and Board action may be necessary.

It is important to mention that additional CMER projects are currently underway that are likely to increase our understanding of stream temperature, changes in canopy cover, and amphibian use in headwater streams, including Temperature and Amphibians in Discontinuously Flowing Np Reaches, Extensive Riparian Status and Trends Monitoring Program – Riparian Vegetation and Stream Temperature, and the Riparian Characteristics and Shade Response project. Building from previous Type N studies by further increasing our collective understanding of upper headwater streamflow processes, including temperature response to forest practices treatments, should continue to be a priority for the program.

⁴⁶ Ecology's necessary and overriding public interest determination is informed by the following statutes: RCW 76.09.040(1)(b) Forest practices rules pertaining to water quality protection shall be adopted by the board after reaching agreement with the director of the department of ecology or the director's designee on the board with respect to these rules. All other forest practices rules shall be adopted by the board. RCW 90.48.420 (1) ... Adoption of forest practices rules pertaining to water quality by the forest practices board shall be accomplished after reaching agreement with the director of the department or the director's designee on the board. Adoption shall be accomplished so that compliance with such forest practice[s] rules will achieve compliance with water pollution control laws.

The Antidegradation Policy Tier II rule recognizes that many water quality protection programs for general permits and water pollution control programs are in a continual state of improvement or development. The rule states in WAC 173-201A-320(6)(c) that “...antidegradation requirements of this section can be considered met for general permits and programs that have a formal process to select, develop, adopt, and refine control practices for protecting water quality and meeting the intent of this section.” Ecology finds that should the proposed rule be adopted, the Forest Practices Board’s AMP must be relied upon to address remaining uncertainty with regard to Type Np water quality protection. Ecology will consider antidegradation requirements met for western Washington Type Np streams subject to the Forest Practices Rules under these conditions.

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Appendix A. Public Involvement Information

The Washington State Department of Ecology (Ecology) received public comments on the Draft Tier II Antidegradation Analysis for the Forest Practices Board's proposed Western Washington Type Np Waters Buffer Rule that was published on July 7, 2025. Ecology also accepted oral testimony provided by participants at a public hearing held virtually on July 31, 2025. Fifteen people provided oral testimony at the hearing. One hundred and seven public comments were submitted prior to the close of the public comment period on August 18, 2025. Ecology has summarized these comments and identified specific topics to address. Ecology provided a written response to comments on the Draft Tier II Antidegradation Analysis and indicated where revisions were made to the final document. Revisions made to the final document are indicated by associated footnotes within the final report. Copies of all public comments are posted on [ecomments](#)⁴⁷.

List of Commenters and Response to Comments

Organization of Comment Topics

We received a total of 107 comment submissions on this draft Tier II analysis. Due to the volume of comments, we have summarized comments when appropriate and responded to summarized comments. Commenters who provided a comment related to each topic are listed before each comment summary. In some cases, we have provided a single response to more than one comment topic.

1. Water Quality Standards - Antidegradation Rules
 - a) New or expanded actions
 - b) Measurable change
 - c) Biological relevance of measurable change
 - d) Designated use numeric temperature criteria
 - e) Water pollution control programs and adaptive management
2. Tier II analysis process
 - a) Tier II analysis alternatives
 - b) Science informing Tier II analysis
 - c) Necessary and overriding public interest
 - d) Public involvement
3. Economic analyses
 - a) Forest Practices Board's economic analyses
 - b) Forestry Riparian Easement Program
 - c) University of Washington economic analysis

⁴⁷ <https://wq.ecology.commentinput.com/comment/extra?id=juMmcHx2Ff>

- d) Least burdensome alternative
- 4. Miscellaneous comments
 - a) Adaptive Management Program Type Np buffer alternatives
 - b) Ecology authority with Forest Practices Board rulemaking
 - c) RCW 90.48.420(1)
 - d) 2019 Water Quality Standards rulemaking
 - e) Forest Practices Habitat Conservation Plan's associated Biological Opinion
 - f) HEAL Act
 - g) Site specific approaches
 - h) 303(d) listings
 - i) Biological effects
 - j) Other comments
- 5. Support for the environment
 - a) General support for the environment and draft Tier II analysis
 - b) Additional riparian buffer protections
- 6. Comments on Forest Practices Board's proposed rule
 - a) Support for proposed rule
 - b) Opposition to proposed rule

List of commenters

Due to the volume of commenters, we have included a table in Appendix A-1 that contains a list of everyone who commented. Some commenters may have commented on multiple topics. Applicable commenter identifiers are provided before each comment summary.

Summarized Comments and Ecology Responses

1. Water Quality Standards - Antidegradation Rules

- a) New or expanded actions

1.a.1 - Comment IDs: JJ, PPP, TTT, UUU, XXX, ZZZ, HHHH, JJJJ, QQQQ, VVVV, WWWW

Comment Summary – Ecology's interpretation of the Forest Practices Board's proposed Western Washington Type Np Waters Buffer Rule as a new or expanded action is incorrect. The proposed rule is not a new or expanded action; therefore, a Tier II review is unnecessary. Ecology's current interpretation of the Board's proposed rule as a new or expanded action ignores years of precedent where Ecology did not consider other Forest Practices Board rulemakings as new or expanded actions. One commenter recommended the draft Tier II analysis be revised to explain the action that triggers the new Tier II review.

Response

Classifying this proposed rule as a new or expanded action is consistent with Ecology's Tier II Supplemental Guidance, which clearly articulates that an antidegradation evaluation is

conducted as part of any rulemaking affecting water quality related requirements in the forest practices system⁴⁸.

The proposed rule represents a revision of the Forest Practices Rules, which Ecology has regularly communicated is an “other water pollution control program” designed to address nonpoint pollution. Per WAC 173-201A-320(6):

General permit and water pollution control programs are developed for a category of dischargers that have similar processes and pollutants. New or reissued general permits or other water pollution control programs authorized, implemented, or administered by the department will undergo an analysis under Tier II at the time the department develops and approves the general permit or program.

For general permits and water pollution control programs, the term “reissued” may include revisions to the program. As indicated in our draft analysis:

In the context of nonpoint pollution and forest practices, the Forest Practices Board’s proposed western Washington Type Np buffer rule is equivalent to a “reissued” general permit for the following reasons: 1) The proposed rule functions to protect Type Np water quality across all FPHCP lands in western Washington, and 2) the proposed rule revises the existing Forests and Fish Type Np rule.

Reissued “other water pollution control programs” are not limited to entirely new regulatory systems, such as a completely new system of forest practices regulations encompassing all aspects of forest practices activities. Rather, other water pollution control programs may undergo Tier II analysis for new or expanded actions, as in this case. This approach is consistent with both Ecology’s 2011 guidance on implementing Tier II antidegradation and the intent of WAC 173-201A-320.

Further, Ecology’s interpretation of the Board’s proposed Type Np Buffer Rule as a new or expanded action is not unprecedented. The public record shows a Tier II evaluation previously conducted by Ecology for the Forest Practices Board’s 2006 rulemaking for Small Forest Landowner Road Maintenance and Abandonment Planning (RMAP) rule changes. The Board’s February 8, 2006, meeting minutes document Ecology staff presenting information on updates to State Surface Water Quality Standards, including antidegradation requirements and application of Tier II evaluation to the Small Landowner RMAP rulemaking⁴⁹. Relevant excerpts from those meeting minutes are included below (text bolded for emphasis):

DOE staff is working with Board staff on the Board’s rule makings. If the Board proposes a rule that potentially degrades a stream, it may be necessary for DOE to undertake Tier II analysis as part of the rule making. He said it is important that it is integrated into the process upfront to avoid any surprises at the end of the rule making process. Staff is currently undertaking such a process for the RMAP rule making process.

⁴⁸ <https://apps.ecology.wa.gov/publications/documents/1110073.pdf>

⁴⁹ https://dnr.wa.gov/sites/default/files/2025-07/bc_fp_minutes_20060208.pdf

Fox asked whether the antidegradation Tier II process is being integrated into the RMAP rule. Bernath confirmed that it is. The EIS documented that there is more risk to small forest landowners such as roads not being repaired. Fox asked whether the Board will receive a report prior to rule making. Bernath said no specific report will be developed, but it [Tier II evaluation] will include taking the information from the EIS and working with Board staff on a response. For example, the EIS documented a higher risk, which triggered Tier II analysis. However, based on legislation, no alternatives analysis was completed. The second issue pertains to public interest. There is a commitment in the legislation to follow up in 2008 and 2013. Staff is working on how to articulate to the Legislature how that risk will be minimized and how to include a process that will show progress.

Ecology provided a memo to the Forest Practices Board dated April 27, 2006, describing the risk to public resources noted in the Environmental Impact Statement for the proposed Small Landowner RMAP rule. The basis for Ecology's concurrence with the rule package was tied to DNR's commitment that compliance monitoring would proceed in a timely way and that recommendations would be proposed to the Legislature if monitoring showed that application of the Small Landowner RMAP rule was not moving toward compliance with the Clean Water Act and state water quality standards, including antidegradation. We have included this memo and the associated April 26, 2006, memo from DNR, "Strategy for Attaining Water Quality Standards and Implementing SSHB 1095," as supplementary material (see Appendix A-2). Both memos were included in the Forest Practices Board's meeting materials for their May 10, 2006, regular meeting.

At the May 10, 2006, Forest Practices Board meeting, Ecology's Board member Tom Laurie noted this was the first rulemaking Ecology has needed to evaluate for Tier II antidegradation concerns since the adoption of updated surface water quality standards, and provided the following statement regarding the proposed Small Landowner RMAP rulemaking:⁵⁰

Tom Laurie expressed the Department of Ecology's (DOE) support for adoption of the [RMAP] rule. The rule proposal meets the requirements of the Clean Water Act and state water quality standards.

Following Board member Laurie's statement, the Board unanimously voted to adopt the proposed Small Forest Landowner RMAP rule.

Ecology's approach to Tier II evaluation with the Board's 2006 RMAP rulemaking differed from the approach to Tier II evaluation with the Board's 2025 rulemaking for Type Np stream buffers for several reasons.

⁵⁰ DNR provided an audio recording of the May 10, 2006, Board meeting to Ecology which documents the discussion around Ecology's support for the Small Landowner RMAP rulemaking in more detail than was summarized in the Board's meeting minutes. https://dnr.wa.gov/sites/default/files/2025-07/bc_fp_minutes_20060510.pdf

First, the Small Landowner RMAP rulemaking was driven by the Legislature in Second Substitute House Bill 1095, which amended portions of RCW 76.09 and 76.13 to limit the burden on small forest landowners from forest road maintenance and abandonment requirements. The Board's rulemaking was therefore required because of these legislative amendments, not because of adaptive management.

Second, adaptive management studies had yet to occur demonstrating the effectiveness of forest road related rules. Seeing that the Small Landowner RMAP rulemaking was not a result of adaptive management, there was still a need to rely on the adaptive management program to inform the effectiveness of forest road best management practices. Ecology's April 27, 2006, memo also documented the need to better understand the scale of small landowner road problems.

Third, in contrast to the Small Landowner RMAP rulemaking, the Board's proposed 2025 rulemaking for Type Np stream buffers in Western Washington is the direct result of completed studies from the Board's Adaptive Management Program. The CMER and TFW Policy committees confirmed by consensus that not all Schedule L-1 performance targets (i.e., water quality standards – including protection of designated uses, narrative and numeric criteria, and antidegradation) were being met by the current Forests and Fish Type Np buffer rule and therefore (TFW Policy) recommended action be taken to adjust the rules. As illustrated by the clear differences in the underlying basis for the 2006 Small Landowner RMAP rulemaking and the 2025 Western Washington Type Np buffer rulemaking, Ecology retains and exerts discretion in navigating Tier II evaluations in accordance with WAC 173-201A-320. This discretion is necessary in order to tailor Tier II evaluations to different types of activities that potentially degrade high quality waters of the state. For example, consider the differences between the Small Landowner RMAP rulemaking, the Type Np Buffer rulemaking, the application of aquatic weed control technology, and wastewater treatment plant actions and how those activities all vary in how high quality waters might be degraded. Tier II evaluations must be adaptable to be effective in providing meaningful oversight of proposed new or expanded actions.

Since the Board's RMAP rulemaking in 2006 and prior to the Board's 2025 Type Np buffer rulemaking for Western Washington, Ecology has not determined any Forest Practices rulemakings have had potential to cause measurable changes to water quality as defined in WAC 173-201A-320(3); therefore, Tier II analyses have not been required. Additionally, since the inception of the Adaptive Management Program following the Forests and Fish report, and prior to completion of the Hard Rock Phase I study, there were no other completed AMP studies that demonstrated water quality standards were not being met by current forest practices rules.

As explained in our report, the Board's proposed Western Washington Type Np Buffer Rule represents a rulemaking that Ecology has determined is likely to cause a measurable lowering in water quality. This determination was based on review of best available science, including completed studies produced by the Board's Adaptive Management Program. This measurable change determination requires Ecology to proceed to the next step of the Tier II antidegradation evaluation, which is an analysis that the amount of water quality

degradation posed by the rule meets the necessary and overriding public interest requirement per WAC 173-201A-320(4). Due to the long history of the Board's Np buffer rulemaking process, Ecology produced publication 25-10-083 to provide a clear public record of this Tier II analysis.

b) Measurable change

1.b.1 - Comment IDs: JJ, XXX, ZZZ, BBBB, CCCC, JJJJ, KKKK, OOOO, QQQQ, RRRR, VVVV

Comment Summary – Ecology has shifted interpretations of the meaning and applicability of 0.3°C in the context of Tier II antidegradation. Ecology gave incorrect instruction to the Forest Practices Board, the TFW Policy Committee, and the Type Np Technical Workgroup that no warming is allowed in Tier II waters, then changed that position in the Draft Tier II Analysis to state that warming of Tier II waters is allowed.

Response

Ecology's interpretation of measurable change has not shifted since discussions began in the Adaptive Management Program regarding the need for action in response to the Hard Rock Phase I study. On numerous occasions, Ecology has explained to the Forest Practices Board and the Board's Adaptive Management Program participants the Tier II Antidegradation rules, including the necessary and overriding public interest determination process found in WAC 173-201A-320(4). This process allows measurable changes of water quality resulting from new or expanded actions if Ecology determines that the lowering of water quality is necessary and in the overriding public interest. The general intent of Tier II is to ensure that waters that are of high quality stay high quality as best as possible. For water temperature, this is accomplished by using the best combination of feasible approaches to prevent or minimize any warming of water expected under a new or expanded action.

As noted in our report, following Ecology's measurable change analysis, which confirmed the Board's proposed Type Np buffer rule is likely to cause a measurable change to water quality, the Tier II analysis followed the necessary and overriding public interest determination process in accordance with WAC 173-201A-320(4) and Ecology's Supplemental Guidance on Implementing Tier II Antidegradation⁵¹. As we note in our report, the necessary and overriding public interest process specifies that information to conduct the analysis must include information that "...identifies and selects the best combination or site, structural, and managerial approaches that can be feasibly implemented to prevent or minimize the lowering of water quality" (WAC 173-201A-320(4)(b)).

We have compiled the following information below which documents Ecology's consistent interpretation of Tier II antidegradation rules, including measurable change for water temperature and the necessary and overriding public interest process:

- October 1, 2018, Ecology presentation to TFW Policy Committee, *Applying the Water Quality Standards to Forestry: Temperature and Antidegradation*.⁵²

⁵¹ <https://apps.ecology.wa.gov/publications/documents/1110073.pdf>

⁵² https://fortress.wa.gov/ecy/ezshare/wq/standards/WQS_Temperature_Forestry_100118.pdf

*The temperature standards that apply to forestry include an antidegradation process and numeric temperature criteria. Antidegradation Process. Antidegradation rules overlie the temperature criteria. **Disallow warming >0.3°C unless necessary and in the OPI.** Applied at the program level for forestry under the AMP (slide 2).*

*What does Tier II require? **Measurable degradation is allowed only when necessary and in the overriding public interest. Necessary requires an alternatives analysis with an affordability test. OPI generally means not allowing the lowering of WQ would result in widespread social or economic impact** (slide 14).*

*When is degradation necessary? **The Tier II analysis for forestry would focus on whether the degradation is necessary. Must select the best combination of site, structural, and managerial approaches that can be feasibly implemented to prevent or minimize the lowering of water quality.** This includes “buffers with effective limits on activities” (slide 15).*

- December 2, 2019, Ecology presentation to Technical Type Np Prescription Workgroup, *Water Quality Standards*.⁵³

*Antidegradation requirements. Establishes three tiers of protection. Tier I: (WAC 173-201A-310) Protect existing and designated uses. All uses must be maintained and protected. **Tier II: (WAC 173-201A-320) Ensures waters of a higher quality than the criteria assigned are not measurably degraded unless necessary and in the overriding public interest. Temperature increase of 0.3°C or greater. Dissolved oxygen decrease of 0.2 mg/L or greater. Bacteria level increase of 2 CFU or MPN per 100 mL or greater. PH change of 0.1 units or greater. Turbidity increase of 0.5 NTU or greater.** Tier III: (WAC 173-201A-330) Prevents degradation of any waters formally adopted as “outstanding resource waters” (slide 6).*

- October 31, 2022, Forest Practices Board Meeting Minutes excerpt.
 - Chair smith asked what the Department of Ecology would achieve by conducting a Tier two analysis. **Austin replied there’s a number of factors that are looked at once there’s a proposed rule to determine whether the waters meet the water quality standard of 0.3 C, and if they don’t, Ecology must determine if the rise in stream temperature is necessary [and in the overriding public interest] and by how much the temperature rise will not meet the standard.**⁵⁴

- August 9, 2023, Ecology presentation to Forest Practices Board, *Ecology’s Tier II Process*.
*Antidegradation requirements. Three tiers of protection: Tier I: (WAC 173-201A-310) Protects existing and designated uses. **Tier II: (WAC 173-201A-320) Ensures***

⁵³ https://fortress.wa.gov/ecy/ezshare/wq/standards/TypeN_WorkgroupPresentation_20191002.pdf

⁵⁴ October 31, 2022, Forest Practices Board meeting minutes, p. 6.

waters of a higher quality than the criteria assigned are not measurably degraded unless necessary and in the overriding public interest. Tier III: (WAC 173-201A-330) Prevents degradation of any waters formally adopted as “outstanding resource waters” (slide 2).

- August 9, 2023, Forest Practices Board Meeting Minutes excerpt.

*Brandon Austin, Department of Ecology, presented the Tier II process for the Type Np rule making. **The Tier II process ensures waters of a higher quality than the criteria assigned are not measurably degraded unless necessary and in the overriding public interest.***⁵⁵

- January 24, 2025, Ecology memo to Forest Practices Board, *Progress Update: Tier II Antidegradation Analysis for western Washington Type Np Waters Buffer Rule.*

*...The draft Western Washington Type Np Tier II Analysis will consist of **1) an evaluation of whether the proposed rule has the potential to cause a measurable change to water quality, 2) consideration of alternatives, and 3) if applicable, a necessary and overriding public interest determination.***⁵⁶

- February 12, 2025, Ecology presentation to Forest Practices Board, *Tier II Analysis Update – Type Np Rulemaking:*⁵⁷

*What is a Tier II Analysis? Evaluation of: New or expanded actions affecting waters of higher quality than Tier I standards. Potential for measurable change associated with proposed actions. **If potential to cause measurable change to water quality, further analysis to determine if lowering of water quality is necessary and in the overriding public interest*** (slide 7).

- April 24, 2025, Ecology memo to Forest Practices Board, *Update on Preliminary Findings of Ecology’s Draft Tier II Antidegradation Analysis for the Board’s Type Np Waters Buffer Rule:*

... We expect a significant amount of Type Np waters will likely be protected from warming beyond the Tier II measurable change threshold of 0.3°C under the proposed rule. However, under certain site-specific conditions, we have simultaneously determined some Type Np waters are likely to warm beyond 0.3°C.

*...Ecology’s measurable change determination prompts the Tier II necessary and overriding public interest (OPI) analysis in WAC 173-201A-320(4). The final preliminary economic analyses provided by DNR are key to informing the OPI analysis.*⁵⁸

⁵⁵ August 9, 2023, Forest Practices Board meeting minutes, p.5.

⁵⁶ January 24, 2025, Ecology memo to Forest Practices Board, p. 1.

⁵⁷ https://dnr.wa.gov/sites/default/files/2025-08/bc_fpb_ecy_tierII_20250212.pdf

⁵⁸ April 24, 2025, Ecology memo to Forest Practices Board, p. 2.

- May 14, 2025, Ecology presentation to Forest Practices Board, *Preliminary Draft Tier II Analysis – Type Np Buffer Rulemaking*.⁵⁹

*Necessary and public interest analysis. **Before lowering of water quality can be authorized, it must be demonstrated necessary. Must select best combination of approaches that can be feasibly implemented to prevent or minimize lowering of water quality.** Proposed action must be feasible while meeting goals and objectives of authorizing statute with least necessary burden on those required to comply (RCW 34.05.330(1)) (slide 25).*

1.b.2 - Comment ID: VVVV

Comment Summary – Skagit County Commissioner Browning met with the previous Ecology Director Watson in October 2021 to discuss the 0.3°C temperature increase as a trigger rather than a strict limit to do further analysis. The County pointed to WAC 173-201A-320(4) and (5), 173-201A-410 (short-term modifications) and 173-201A-420 (variances) for avenues that could both protect water quality and working forests with outcomes less burdensome on our economy. These statutes clearly give Ecology discretion to temporarily lower water quality criteria with stipulations. However, both Director Watson and her Forest Practices Board designee, Rich Doenges, told the County that Ecology had no wiggle room as it was a ‘limit’ and therefore, to meet Clean Water Act Assurances, anything less than a continuous 75-125ft buffer on Type Np streams would be unacceptable. Then, on May 14, 2025, Ecology shifted its interpretation of the policy acknowledging the 0.3°C temperature increase was a ‘trigger’ for more analysis.

Response

Thank you for your comments. We are unable to verify what was discussed during conversations with previous Ecology staff in 2021. With respect to your comments on measurable change, please see previous response to comment 1.b.1.

1.b.3 - Comment ID: ZZZ

Comment Summary – The May 21, 2021, report of the Technical Type Np Prescription Workgroup commissioned by TFW Policy states that it was directed as follows:

the state water quality measurable change standards permit no temperature increase of 0.3°C or greater (WAC 173-201A-200, -300-320). The workgroup was tasked with developing buffer options that address the temperature issue. (emphasis added)

The artificial constraint that stream temperatures may not experience human-caused increases greater than 0.3 degrees is repeated throughout the technical workgroup report, and the recommendations therein were predicated on that outcome.

Response

Thank you for your comment. Please see response to comment 1.b.1.

⁵⁹ https://dnr.wa.gov/sites/default/files/2025-08/bc_fpb_ecy_tierII_20250514.pdf

1.b.4 - Comment ID: ZZZ

Comment Summary – At the October 31, 2022, special meeting of the Forest Practice Board, Brandon Austin, representing Ecology, presented his department’s policy position (the “Majority Report”, which derives from the technical workgroup report and is the basis of the proposed rule) and stated:

“...the anti-degradation standards are an element of Tier II waters that *require efforts to repair the impairment* of any waters of high quality that don't exceed the designated use criteria. *These waters are not allowed to warm more than 0.3 degrees Celsius* and the standards apply to all Tier II waters, whether they contain fish or not.” (*emphasis added*)

Response

The full context of this quote from October 31, 2022, reveals Ecology staff adding:

*...there's a number of factors that are looked at once there's a proposed rule to determine whether the waters meet the water quality standard of 0.3°C, and if they don't, Ecology must determine if the rise in stream temperature is necessary [and in the overriding public interest] and by how much the temperature rise will not meet the standard.*⁶⁰

1.b.5 - Comment ID: ZZZ

Comment Summary – At the August 9, 2023, meeting of the Forest Practice Board, Rich Doenges, Designee for Director of Ecology, asserted:

(E)cology is stating that including the *minority report just wouldn't meet our requirements on the Clean Water Act to continue to protect water quality*. Because the buffer in that minority report does not provide enough protection to ensure temperature doesn't get warmer than what's allowed under current standards...(E)cology's position is that the minority report is not protective enough of water quality. And so it wouldn't be able to sign off on that. (*emphasis added*)

Without the benefit of any analysis (let alone the Draft Analysis which was not initiated until nearly two years after Mr. Doenges’ statement), Doenges and Ecology pre-determined that no other buffer configuration besides the Majority Report would address the perceived issue, meet antidegradation requirements, or fulfill the Board’s obligations under State law.

Response

Thank you for your comment. The full context of this quote from August 9, 2023, shows Ecology staff stating:

...Ecology is stating that including the minority report just wouldn't meet our requirements on the Clean Water Act to continue to protect water quality, because the buffer in that minority report does not provide enough protection to ensure temperature

⁶⁰ October 31, 2022, Forest Practices Board meeting minutes, p. 6.

*doesn't get warmer than what's allowed under current standards. Even the Majority Report was a compromise. Ecology's position is that the minority report is not protective enough of water quality. And so, [Ecology] wouldn't be able to sign off on that.*⁶¹

During the discussion, Board member Doenges elaborated, adding, “My understanding of the science is that when you have discontinuous buffers, especially of the size that’s in the minority report, you are unable to maintain stream temperatures at the level that’s necessary for water quality standards.”⁶²

We assert it was the Board’s decision to advance the TFW Policy Majority proposal. Board member Doenges’ comments represent a good faith effort to support advancing the TFW Policy Majority recommendations for development of a CR-102 rulemaking package, which Ecology believed at the time would be the best use of limited resources to assemble rulemaking materials. Also, if the proposal was determined to cause measurable change to water quality, it likely represented an alternative that could be meaningfully evaluated as potentially representing the best combination of approaches to prevent or minimize the warming of waters of the state, in accordance with Tier II antidegradation requirements in WAC 173-201A-320(1) and (4)(b).

1.b.6 - Comment ID: JJJJ

Comment Summary – If temperature change ≥ 0.3 °C is not a limit, as originally dictated to the AMP, what is the so-called “limit” or “threshold”? Is it the numeric criteria? If not, why not? Is it a qualitative or quantitative assessment of getting close to 0.3 °C? If so, what is the basis for this threshold? How close is close enough in Ecology’s view? How is it measured or assessed? Where is it measured or assessed? What frequency and duration of temperature effects are required for compliance or noncompliance in the future? How far downstream? Are diffusion, down-stream cooling, and reasonable transient and short-term effects considered? How? If not, why not?

Response

Thank you for your comments. Measurable change to waters of the state, defined for water temperature as 0.3°C, is not allowed for new or expanded actions in Tier II waters (i.e., waters where temperature is lower than the criterion value designated for that water) unless Ecology determines that the lowering of water quality is necessary and in the overriding public interest, per WAC 173-201A-320(1). Please see the previous response to comment under 1.b.1. regarding Ecology’s instructions to the Adaptive Management Program and the Forest Practices Board. The basis for the 0.3°C metric is that it functions as a reliable field detection level as an indication of change to water temperature.⁶³

⁶¹ August 9, 2023, Forest Practices Board Meeting. Timestamp 4:50:15. <https://twv.org/video/washington-state-forest-practices-board-2023081007/>

⁶² *Id.*, at 4:52:42

⁶³ Responsiveness Summary, WAC 170-201A Surface Water Quality Standards for the State of Washington, July 1, 2003. Publication number 03-10-060, p. 41. <https://apps.ecology.wa.gov/publications/documents/0310060.pdf>

Per Tier I of the antidegradation rules, existing and designated uses must be maintained and protected. No degradation may be allowed that would interfere with, or become injurious to, existing or designated uses, except as provided for in chapter 173-201A of the Washington Administrative Code (WAC 173-201A-310(1)).

For new or expanded actions that Ecology has determined will cause a measurable lowering of water quality, the necessary and overriding public interest process instructs that information to conduct the analysis must include information that identifies and selects the best combination of site, structural, and managerial approaches that can be feasibly implemented to prevent or minimize the lowering of water quality (WAC 173-201A-320(4)(b)).

Water quality protections, including temperature protections, apply to all waters of the state in all locations where water is present (furthest upstream extent to furthest downstream extent). Where water temperature measurements are taken depends on the individual waterbody and the contributing source of pollution. The focus of this analysis is on the Tier II antidegradation section of the Water Quality Standards (WAC 173-201A-320). Other parts of the standards also apply, including the (Tier I) Aquatic life temperature criteria in WAC 173-201A-200(1)(C).

The question regarding diffusion, down-stream cooling, and reasonable transient and short-term effects refers to RCW 90.48.420(1).

*(1) The department of ecology, pursuant to powers vested in it previously by chapter 90.48 RCW and consistent with the policies of said chapter and RCW 90.54.020(3), shall be solely responsible for establishing water quality standards for waters of the state. **On or before January 1, 1975, the department of ecology shall examine existing rules containing water quality standards and other applicable rules of said department pertaining to waters of the state affected by nonpoint sources of pollution arising from forest practices and, when it appears appropriate to the department of ecology, modify said rules. In any such examination or modification the department of ecology shall consider such factors, among others, as uses of the receiving waters, diffusion, down-stream cooling, and reasonable transient and short-term effects resulting from forest practices.***

Adoption of forest practices rules pertaining to water quality by the forest practices board shall be accomplished after reaching agreement with the director of the department or the director's designee on the board. Adoption shall be accomplished so that compliance with such forest practice[s] rules will achieve compliance with water pollution control laws.

While the provision regarding diffusion, down-stream cooling, and reasonable transient and short-term effects resulting from forest practices was applicable to Ecology's review and modification of any forest practices rules on or before January 1, 1975, that doesn't mean these considerations are not to be further considered when Ecology reviews the forest practices rules to ensure that compliance with forest practices rules will achieve compliance with water quality rules or water pollution laws. All of these are aspects Ecology evaluates in assessing whether an action complies with water quality laws and regulations, especially with respect to nonpoint

pollution, and in consideration of remaining uncertainty with updated practices to address nonpoint pollution.

1.b.7 - Comment ID: JJJJ

Comment Summary - Under what specific circumstances will the proposed rule result in measurable temperature change? Are those the only acceptable circumstances? On what basis?

Response

Based on our review of best available science (including the Hard and Soft Rock studies), we identify specific situations that are more likely to see temperature increases of at least 0.3°C in the “Landscape Scale Distribution - Site-specific characteristics” section of our measurable change analysis within our Tier II analysis report. These are not the only acceptable circumstances, but rather these are the circumstances we believe are most likely to see temperature increases should the Board’s proposed Type Np buffer rule be adopted. Applying best management practices to nonpoint sources of pollution across a variable landscape (the size of western Washington) means that uncertainty will exist with regard to the effectiveness of different buffer prescriptions contained within the proposed rule. As we explain in our report, remaining uncertainty can be investigated with additional adaptive management study.

1.b.8 - Comment ID: JJJJ

Comment Summary - Ecology says forest practices under existing rules are likely to result in measurable change in greater frequency and magnitude than the proposed Np buffer rule, but CMER studies did not evaluate routine harvest scenarios adjacent to Np streams. What is the basis for extending data from rare harvest scenarios to routine harvest scenarios? When was it analyzed and presented to the public?

Response

There is currently no dataset that catalogs the riparian buffers left after adjacent harvests along Np streams in western Washington. However, the two CMER studies tested a range of buffer prescriptions from approximately 50% of the stream length buffered to 100% buffered. Due to unstable slopes many of the sites had variable width buffers as well. Based on aerial imagery, there are a wide range of Np buffer configurations that exist across the landscape. It is unclear what proportion of streams are closer to 50% and which are closer to 100% and all the permutations between. What we do know is that buffer configurations are highly variable and they range from 50 to 100% in buffer length. As we state in our draft Tier II analysis, the Hard and Soft Rock studies tested 14 treatment sites that range from 50 to 100% in buffer length. By looking at these two studies in combination we can more accurately capture that range in buffer configuration that exists across the landscape.

The public review for this document, including our analysis, was from July 7 – August 18, 2025. Please also see response to comment 1.b.9 for additional background on what led to the Board’s proposed rule and the required Tier II analysis of the proposed rule.

1.b.9 - Comment ID: JJJJ, QQQQ

Comment Summary – Ecology asserted that studies showing measurable temperature change from application of existing Type Np buffers constitutes a violation of Tier II requirements. If the proposed rule is a trigger for Tier II analysis, explain Ecology’s determination and direction to adaptive management prior to publication of the proposed rule that existing Type Np buffer rules violate Tier II requirements. In your explanation, explain the triggering event for Ecology’s prior determination and direction that existing Type Np buffer rules violate Tier II when no purported “new or expanded action” had yet occurred.

Response

Ecology relies on the Forest Practices Adaptive Management Program (AMP) to address incomplete information regarding the effectiveness of Forest Practices Rules at meeting water quality standards (protection of designated uses, narrative and numeric criteria, and antidegradation), consistent with Schedule L-1 of the Forests and Fish Report and the Forest Practices Habitat Conservation Plan. At the beginning of Forests and Fish rule development, information was not available to determine impacts to water quality resulting from the Western Washington Forests and Fish Np buffer rule. The science produced by the AMP (Hard Rock Phase I and II, and Soft Rock) addressed that incomplete information. Through the adaptive management process, 1) CMER science confirmed by consensus that existing Type Np buffer rules do not protect waters from warming, 2) TFW Policy Committee agreed by consensus action was warranted in response to the warming impacts observed in the studies, and 3) the Forest Practices Board proposed an action (the proposed Np buffer rule) which triggered Tier II evaluation to ensure attainment of standards now that we have additional information. This is consistent with WAC 173-201A-320 and Ecology’s Supplemental Guidance on Implementing Tier II Antidegradation. This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320.

1.b.10 - Comment ID: KKKK

Comment Summary – The original December 2018 FPB-approved charter for the Type N Technical Workgroup was to deliver a set of proposed Np Buffer alternative recommendations that met state water quality standards. There was no mention of designing alternatives specifically to prevent measurable temperature change. However, by the time the Technical Workgroup produced its May 2021 Final Report for TFW Policy, the goal had changed to meet the “measurable change standard,” which the Technical Workgroup, following Ecology’s direction, misinterpreted as prohibiting temperature increase $\geq 0.3^{\circ}\text{C}$.

Response

Thank you for your comment. Please see previous responses to 1.b.1 and 1.b.6. Meeting state water quality standards includes meeting the requirements for the protection of designated uses, narrative and numeric criteria, and antidegradation requirements. Antidegradation requirements include the Tier II antidegradation requirements found in WAC 173-201A-320.

Forest Practices Rules are required to meet state water quality standards, per RCW 76.09.010(g), RCW 90.48.420(1), and WAC 222-12-010.

1.b.11 - Comment ID: KKKK

Comment Summary – The parties to the FFR - including Ecology - did not select measurable temperature change of ≥ 0.3 °C as the limit for forest practices. The parties identified Overall Performance Goals as represented by Resource Objectives and Performance Targets in Schedule L-1. The parties' Overall Performance Goals were forest practices "will not significantly impair the capacity of aquatic habitat to: (a) Support harvestable levels of salmonids; (b) Support the long-term viability of other covered species; or (c) Meet or exceed water quality standards (protection of beneficial uses, narrative and numeric criteria, and antidegradation)." The Goals contain the FFR's only reference to antidegradation.

Response

Thank you for your comment. Please see response to previous comment 1.b.10.

1.b.12 - Comment ID: KKKK

Comment Summary – The parties - including Ecology - agreed the FPB would assess forest practices, and do so based on significant impairment, not an indication of measurable change. By including the "significant impairment" language, the parties expected that streams subject to forest practices might show insignificant impairment, and this insignificant impairment would not necessarily require rule revisions. In other words, no change at no time in no place (i.e. any measurable change) is not the standard for rule revisions and should not compel forest practices rule revisions.

Response

Thank you for your comment. Please see responses to previous comments 1.b.1, 1.b.9, and 1.b.10. The TFW Policy Committee agreed by consensus in 2018 that action was warranted to address the warming impacts observed in multiple consensus-approved CMER effectiveness studies.

1.b.13 - Comment ID: KKKK

Comment Summary – The Np Buffer rule proposed for adoption cannot be necessary to meet the statute's goals and objectives until the FPB determines current forest practices are not meeting the resource objectives. The FPB never made the required determination (that existing rules are causing significant impairment of capacity to meet water quality standards) before determining the form of and need for rulemaking. Without the FPB having applied the standard (significant impairment of capacity), the FPB cannot determine that the rule is necessary to meet the objectives of the statute or evaluate the viability of different alternatives.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a

measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. This comment is outside the scope of this Tier II analysis.

1.b.14 - Comment ID: KKKK

Comment Summary – We assert that there has been no failure of resource objectives. The resource objective is to “[p]rovide cool water by maintaining shade, groundwater temperature, flow, and other watershed processes controlling stream temperature.” The performance target is “[w]ater quality standards - current and anticipated in next triennial review (e.g., for bull trout).” The example reference to bull trout clearly means the performance target is the aquatic life designated use temperature criteria in WAC 173-201A-200 (e.g., 16 °C for core summer salmonid habitat), not the measurable change criteria in Tier II. By definition, Tier II waters are meeting the L-1 target and objective, and the overall performance goal for stream temperature because they are generally colder than the designated use temperature criteria.

Response

Thank you for your comment. This is not correct. The performance target of water quality standards includes meeting the requirements for the protection of designated uses, narrative and numeric criteria, and antidegradation requirements. Antidegradation requirements include the Tier II antidegradation requirements found in WAC 173-201A-320. Forest Practices Rules are required to meet state water quality standards, per RCW 76.09.010(g), RCW 90.48.420(1), and WAC 222-12-010. The TFW Policy Committee agreed by consensus in 2018 that action was warranted to address the warming impacts observed in multiple consensus-approved CMER effectiveness studies.

c) Biological relevance of measurable change

1.c.1 - Comment IDs: ZZZ, HHHH, KKKK, JJJJ, BBBB

Comment Summary - Water temperature changes of 0.3°C are an arbitrary threshold, not biologically relevant, and no resource problems are alleged in the Board’s Np buffer proposal. Ecology’s draft Tier II analysis did not provide any information to describe how temperature responses, whether 0.3°C or the temperature responses observed in CMER studies, negatively effect biota of interest. One commenter noted that no meaningful evaluation has been offered explaining how the current Np buffer rule compromises salmon recovery or how the proposed rule would aid in salmon recovery.

Response

We appreciate your comments. WAC 173-201A-320 requires the Tier II protection of high quality waters be applied independent of the biological data. Tier II, including the necessary and overriding public interest analysis, must still comply with the Tier I provisions (per WAC 173-201A-320(7)), which state that “Existing and designated uses”, including protection of aquatic life, “must be maintained and protected” (WAC 173-201A-310). Meeting all aspects of water quality standards, including antidegradation requirements, supports the aquatic ecosystems of which salmon and other aquatic life depend on. The Forest Practices Act (RCW 76.09.010(2)(g)) and State Water Pollution Control Act (RCW 90.48.420(1)) require Forest Practices Rules to

meet all aspects of water quality standards. Evaluation of how the current Type Np buffer rule compromises salmon recovery is beyond the scope of this Tier II analysis.

d) Designated use numeric temperature criteria

1.d.1 - Comment IDs: JJ, III, PPP, TTT, UUU, XXX, ZZZ, DDDD, JJJJ, KKKK, NNNN, QQQQ, RRRR, WWWW

Comment Summary – The draft Tier II analysis ignored evidence that the Hard and Soft Rock CMER studies showed that stream temperatures generally stayed below the designated use numeric temperature criteria of 16°C. The existing Forests and Fish Type Np buffer rule already meets or exceeds temperature standards protective of fish with rare exception. The applicable Schedule L-1 performance target is the water quality standards designated use numeric temperature criteria for aquatic life, not Tier II antidegradation protections.

Response

We appreciate your comments. Please see response to comment 1.b.14. All aspects of water quality standards (protection of designated uses, narrative and numeric criteria, and antidegradation) are equally and independently applicable to waters of the state. The draft Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, and if so whether that measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320.

e) Water pollution control programs and adaptive management

1.e.1 - Comment IDs: JJ, XXX, JJJJ, QQQQ RRRR, VVVV, WWWW

Comment Summary - The forest practices rules went through a Tier II analysis in 2001 as a new or expanded action and were approved as a water pollution control program (WPCP) per WAC 173-201A-320(6) at that time. This approval meant that no further Tier II analyses would be required. Therefore, Ecology’s draft Tier II analysis for the Board’s proposed Type Np buffer rule is unwarranted and conflicts with the original approval of the Forest Practices Rules as a WPCP. WAC 173-201A-320(6) acknowledges Tier II requirements are met through the adaptive management program, and under this framework, new or expanded actions will not require site-specific Tier II analysis. In this context, new or expanded actions is meant for site-specific activities seeking coverage under Forest Practices rules, not to the programmatic framework of the rules, including Type Np buffers. One commenter questioned whether forest practices rules are currently non-compliant as a water pollution control program.

Response

The existing Forests and Fish Type Np buffer rule was determined to be ineffective at maintaining stream temperatures, as concluded in multiple consensus approved CMER effectiveness studies. The TFW Policy Committee agreed by consensus in 2018 that action was warranted to address the warming impacts observed in these studies. As a water pollution control program, the Forest Practices Rules and Adaptive Management Program has functioned to address incomplete information pertaining to Type Np buffer effectiveness under the current rule. Further, the AMP has developed and selected updated control practices to protect water quality, as illustrated by the Board’s 2025

proposed western Washington Type Np buffer rule, meeting the intent of WAC 173-201A-320(6)(c).

Ecology considers the Forest Practices Rules an “Other water pollution control program authorized, implemented, or administered by the department” per WAC 173-201A-320(1)(d); however, Ecology’s recognition of the Forest Practices Rules as a water pollution control program does not relieve proposed revisions to Forest Practices Rules from undergoing Tier II analyses if Ecology finds a proposed rule has been determined to cause a measurable lowering of water quality where water quality constituents are of higher quality than criterion designated for that water under WAC 173-201A.

WAC 173-201A-320(6)(c) establishes that antidegradation requirements can be considered met for general permits and programs that have an adaptive management process to refine control practices for protecting water quality when information is incomplete. Meeting antidegradation requirements in this context means that in areas where uncertainty still exists with control practices, antidegradation requirements are met by relying on the adaptive management process to address incomplete information. However, simply having an adaptive management program in place is not sufficient to avoid Tier II analyses when new or expanded actions are proposed which Ecology determines will cause a measurable lowering in water quality. It is Ecology’s responsibility to determine whether new or expanded actions have potential to cause measurable change to water quality, and if so, whether that measurable change is necessary and in the overriding public interest.

Per WAC 173-201A-320(6)(a), under the framework of an “other water pollution control program,” individual activities covered by this program will not require a Tier II analysis. Individual activities in this context means individual forest practices activities, such as site-level Forest Practices Application proposals for timber harvest or other forestry activities. Rather than evaluating each specific Forest Practices Application proposal for compliance with Tier II antidegradation requirements, Ecology relies on the Forest Practices Rules to achieve compliance with antidegradation requirements – this is consistent with how Ecology relies on the Forest Practices Rules as the primary mechanism to bring waters into compliance with all aspects of state water quality standards as Forest Practices Rules must meet state water quality standards per RCW 76.09.010(g), RCW 90.48.420(1), and WAC 222-12-010.

2. Tier II analysis process

a) Tier II analysis alternatives

2.a.1. - Comment IDs: ZZZ, JJJ, PPP

Comment Summary - Viable alternatives to the Board’s proposed Type Np buffer rule were excluded prior to Tier II analysis, ignoring Tier II procedural steps. Since Ecology changed its interpretation of measurable change, the draft Tier II analysis should be revised to include other Type Np buffer configurations, along with a wider range of alternatives which might accomplish the outcome of a rule likely to protect many Type Np waters across the landscape from warming beyond 0.3°C. Ecology’s inclusion of a 100ft buffer alternative is without genuine analysis and falls short of what Tier II and APA demand. Ecology should have evaluated a wider range of alternatives and included the TFW Policy Committee Minority proposal along with the

current Forests and Fish Type Np buffer rule. One commenter noted that Ecology's assertion that non-preferred alternatives would fail to meet state water quality standards lacks evidentiary support.

Response

Thank you for your comments. Ecology did not change its interpretation of measurable change, please see response to 1.b.1.

This Draft Tier II Analysis for the Forest Practices Board's Proposed Western Washington Type Np Waters Buffer Rule is an analysis of the buffer prescriptions contained in the CR-102 rulemaking package put forward by the Board. It was the Board's decision to choose what alternative(s), if any, to move forward for CR-102 rulemaking. In accordance with Ecology's Supplemental Guidance on Implementing Tier II Antidegradation, after a new or expanded action has been determined to cause a measurable change to water quality, the required necessary and overriding public interest analysis must incorporate evaluation of less-degrading alternatives which can be feasibly implemented. The Tier II guidance states, "This [consideration of feasible, less-degrading alternatives] demands an expanded site-specific review of alternatives that would reduce or completely eliminate the degradation of water quality."⁶⁴

Therefore, the inclusion of the 100ft buffer alternative is warranted, as it represents an alternative that, based on review of best available science, and consistent with Type Np Technical Workgroup findings, would provide high certainty in preventing Type Np stream temperatures from warming beyond a measurable change of 0.3°C, and prevents or minimizes the lowering of water quality.

b) Science informing Tier II analysis

2.b.1 - Comment ID: C

Comment Summary – There should be data that substantiates the relationship between buffer width and water temperature to arrive at the widest optimal buffer width that does not affect water temperature.

Response

Thank you for your comment. Figure 17 shows the predicted relationship between buffer width and stream temperature.

2.b.2 - Comment ID: JJ

Comment Summary – The Hard and Soft Rock CMER studies showed no link or a weak link between shade and water temperature change.

Response

⁶⁴ Water Quality Program Guidance Manual – Supplemental Guidance on Implementing Tier II Antidegradation, p. 14.

There is research over decades supporting links between shade loss and increases in stream temperatures. Some of these studies are listed in the Hard and Soft Rock reports (Gomi et al. 2006, Janisch et al. 2012, Bladen et al. 2016, etc.). We also provided a response summary of a subset of this research in Table 1 of our Tier II analysis. This was to bolster the findings from the Hard and Soft Rock reports that conclude:

- *“The loss of riparian cover was the dominant factor in the increased summer stream temperatures observed in the first four years after harvest”* (Hard Rock Phase II report).
- *“The dominant factor affecting the magnitude of temperature increases was the loss of riparian cover”* (Soft Rock report).

Both reports, with these statements, underwent independent scientific review and were approved, by consensus, at CMER.

2.b.3 - Comment ID: JJ

Comment Summary – The draft Tier II analysis misrepresents and omits findings from the Hard Rock and Soft Rock CMER studies. While the Tier II analysis emphasizes better thermal performance from the 100% buffer treatment, it fails to mention that other buffer treatments, such as the 0% buffer treatment, sometimes performed similarly with regard to 7-day average daily maximum temperature.

Response

We did not include the 0% buffer because this was an analysis of the proposed Np Buffer rule and there is no part of that rule that allows clearcut harvests to the streams edge, therefore it was not relevant to this analysis. There were also 0% treatments in some of the other studies cited in the analysis, these were also left out for the same reason, as noted in footnote number 22.

Also, the 0% buffer treatment did not perform similarly, there was an initial increase of 3.8 and 3.0° C for the first 2 years post-harvest and the temperature remained elevated, relative to reference conditions, for 10 years after harvest.

2.b.4 - Comment ID: JJ

Comment Summary – Studies were designed for average responses, not for site-specific factors, and causal claims about landscape or canopy effects are unsupported.

Response

We acknowledged the limitations of the site-specific parts of the analysis in the report:

While individual sites cannot be used to find specific causal mechanisms that may influence the magnitude and longevity of a temperature response, they can be useful in assessing areas that may be more susceptible to temperature increases after harvest.

These studies were designed to test for causal relationships between shade loss and temperature increases (see comment 2.b.2 for explanation).

They were also designed to extrapolate, to a limited degree, to the broader landscape. From Hard Rock Phase II:

The temporal scope of inference is the nine years post-harvest. The spatial scope of inference is limited to Type Np basins dominated by competent lithologies, which comprise approximately 29% of western Washington FPHCP-covered lands (P. Pringle, personal communication, September 2005, formerly Washington Department of Natural Resources). The spatial scope of the study reflects other constraints as well, including those associated with basin size, stand age, and the presence of stream-associated amphibians (see Section 2-4. Site Identification and Blocking). Results should be applied with caution to Type N streams outside the selection criteria. A similar study on sites representing more erodible, soft-rock lithologies is also in progress. In combination, the two studies will allow for broader inferences about FP rule effectiveness.

This language was independently scientifically reviewed and approved by consensus at CMER.

2.b.5 - Comment ID: JJ

Comment Summary – The Hard and Soft Rock studies covered rare harvest scenarios under the current Type Np buffer rule, which limits their relevance.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. We found that a review of Hard and Soft Rock (in addition to other similar studies) temperature and shade data was helpful with informing our measurable change determination.

2.b.6 - Comment ID: JJ

Comment Summary – Commenter notes wide variability in CMER studies where sites had high canopy closure and expressed that no evidence showed temperature responses under current rules cause significant biological harm, or that warming meaningfully transfers downstream. Commenter states there is no robust evidence connecting buffer changes with meaningful temperature responses.

Response

Thank you for your comment. Please see responses to comments 2.b.2 and 1.c.1. Upon review of best available science, we respectfully disagree that there is a lack of evidence linking buffer changes with meaningful temperature responses.

2.b.7 - Comment ID: JJ

Comment Summary – Ecology disregarded scientific uncertainties and future research needs identified by the Type Np Technical Workgroup.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality,

defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. We note in our report that uncertainty associated with the proposed rule's effectiveness may be reduced by relying on additional Adaptive Management Program study. Additional study, in combination with other CMER projects, has valuable potential to increase understanding of small Type Np streams under three-foot bankfull width, which the Hard and Soft Rock CMER studies did not directly evaluate. Further studies may also increase understanding of other contributing factors to Type Np stream temperature in combination with canopy cover, such as windthrow, aspect, topography, lithology, and flow permanence.

2.b.8 - Comment ID: JJ

Comment Summary – The Hard Rock study's amphibian findings do not support a causal link to temperature, and that broader literature shows inconsistent amphibian-buffer relationships.

Response

Thank you for your comment. We do not state, and the authors of the Hard Rock report don't state, that there is a direct causal relationship between stream temperature and amphibian declines after harvest. From the Tier II analysis report:

It is important to note, like the authors of the Hard Rock reports did, that the study was not designed to determine the mechanism for increases or decreases in amphibians after harvest. What the authors (McIntyre et al. 2021) could say is that they, "observed a substantial negative response to timber harvest in the eight years post-harvest for some species in some buffer treatments, and for Coastal Tailed Frog in all buffer treatments." McIntyre et al. (2021) goes on to say that: "[I]t is possible that the increased temperatures we observed in all buffer treatment streams had negative longer-term consequences that were not immediately apparent, but which may have impacted movement or reproductive success over time, especially for Coastal Tailed Frogs, which had experienced the greatest declines across all buffer treatments seven and eight years post-harvest."

What is also clear is that the same treatment effect that caused the temperature increases at the Hard and Soft Rock sites, can also affect in-stream and riparian habitat for amphibians. McIntyre et al. (2021) reported an increase in in-channel wood loading, from windthrow and logging slash, and a retention of fine sediments in the streams. The authors report that both can have negative consequences for stream-associated amphibians. This decrease in habitat quality can also restrict movement of amphibian populations, that may utilize the stream banks or move between streams (Wahbe and Bunnell 2001, Peterman et al. 2011, McIntyre et al. 2021). The authors point to an increase in wood in the stream and gaps in riparian cover as potential barriers to in-stream and overland travel.

2.b.9 - Comment ID: JJ

Comment Summary – Potential positive impacts on food webs from warmer water temperatures and altered canopies were ignored.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Addressing impacts on food webs from warmer water temperatures is beyond the scope of this Tier II analysis.

2.b.10 - Comment ID: UU

Comment Summary – Commenter expressed concern that the sample size of CMER studies was very small, and the sites were not randomly selected.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Responding to concerns regarding sample sizes and site selection processes of CMER studies is beyond the scope of this Tier II analysis.

2.b.11 - Comment ID: UU

Comment Summary – Commenter expressed concern that CMER studies did not allow for consideration of current forest harvest practices around Type N waters.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Responding to this concern is beyond the scope of this Tier II analysis.

2.b.12 - Comment ID: UU

Comment Summary – Commenter notes the diversity between individual CMER study sites was not adequately considered.

Response

Thank you for your comment. Our understanding of this comment is that it is regarding CMER study sites and the Board's proposed rule. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Responding to this concern is beyond the scope of this Tier II analysis.

2.b.13 - Comment ID: UU

Comment Summary – CMER studies did not establish an impact on fish.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Responding to this concern is beyond the scope of this Tier II analysis.

2.b.14 - Comment ID: UU

Comment Summary – It is unknown what portions of Type N streams go dry during the year.

Response

Thank you for your comment. We note that further adaptive management studies are likely to be useful in reducing uncertainty regarding discontinuous Type Np streams.

2.b.15 - Comment ID: HHHH

Comment Summary – Ecology's presentation of information from Groom et al. 2018 showed flawed information and has eroded public trust. Commenter notes the Groom study did not separate features that would affect water temperature, and that the publication predicts temperature increases that were not observed in the study's data.

Response

Thank you for your comment. The shade/temperature graph from Groom et al. 2018 was included in our analysis in part because it was in the Type Np technical workgroup's final report. It was also included in WDFW's Riparian Ecosystems, Volume 1. Both are public documents that have been available since 2021 and 2020, respectively.

Groom et al. 2018 predicts temperature increases not observed in that study's data because those are predictions derived from a model. The model was developed from the study data.

2.b.16 - Comment ID: HHHH

Comment Summary – Commenter notes a need for a study with sufficient samples directed at stream temperatures and the influence of buffers to inform what changes to Forest Practices Rules are necessary, and a look at under which circumstances the current rules may not be sufficient.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. This comment is beyond the scope of this Tier II analysis.

2.b.17 - Comment ID: HHHH

Comment Summary – An analysis of the Forest Practices Np strategy should not reflect Ecology's scenarios in the draft Tier II analysis but rather, Ecology should compare forest

practices approaches to natural disturbance events such as wildfires and episodic windthrow events from large storms.

Response

This Tier II analysis relied on peer reviewed scientific studies that helped inform the need for a change in the Np rule and then to provide a list of alternative buffer configurations.

Natural disturbances, such as wildfire and episodic windthrow, are not equivalent to clear-cut harvests adjacent to Np streams. An examination of random disturbance events would not provide the necessary information to determine whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320.

2.b.18 - Comment ID: HHHH

Comment Summary – The draft Tier II analysis did not take a systems approach, instead focusing on solar radiation and peak daily temperatures and did not including the negative and positive effects of management in a connected way.

Response

Thank you for your comment. Potential positive effects of unbuffered sections of streams are considerations for a cost benefit analysis (see section 4.2.2 of IEC's final preliminary CBA). This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. The necessary and overriding public interest analysis assessed the social, economic, and environmental impacts associated with preventing the lowering of water quality, in accordance with WAC 173-201A-320(4)(a). The analysis found that costs could increase significantly compared to the proposed rule while increasing certainty of preventing measurable change on only a subset of streams expected to warm. WAC 173-201A-320(4)(b) calls for information that identifies and selects the best combination of approaches that can be feasibly implemented to prevent or minimize the lowering of water quality.

2.b.19 - Comment ID: HHHH

Comment Summary – Ecology should consider what is biologically relevant, including which aspect or life history state of species is a concern and how it might be affected.

Response

Thank you for your comment. Please see response to comment 1.c.1.

2.b.20 - Comment ID: HHHH

Comment Summary – The draft Tier II analysis does not identify a target species and life form, such as cutthroat and Dolly Varden.

Response

Thank you for your comment. Please see response to comment 1.c.1.

2.b.21 - Comment ID: HHHH

Comment Summary – WAC 173-201A-320(3)(a) does not specify whether 0.3°C is the daily maximum peak or another metric such as daily mean temperature. Commenter states the 7-day maximum is not the right metric to consider because it only provides statistically significant results and is not biologically relevant in any way.

Response

Thank you for your comment. Please see response to comment 1.c.1. WAC 173-201A-320(3) notes that measurable change is “in the context of this regulation” with regulation meaning all of WAC 173-201A, therefore the 7-DADMax is the metric (WAC 173-201A-200(1)(c)). Disagreement with criteria metrics is beyond the scope of this Tier II analysis.

2.b.22 - Comment ID: HHHH

Comment Summary – Other studies found the metric of degree days includes both a description of magnitude and duration of exposure and has greater relevance for fish (Neuheimer and Taggart 2007) and other biota (Everall et al. 2015). Lack of buffers, however, has generally not shown increases in average daily temperatures, but may also decrease minimum temperatures. Perhaps with the right investigation, we could identify situations where the average daily temperature or another meaningful metric showed relevant increases resulting from forest management.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. This analysis used the same metric (7-DADMax) used in WAC 173-201A. This is also the same metric underlying the temperature analysis in the Hard and Soft Rock reports as well as the other studies cited in the analysis (e.g., Bladon et al. 2018). Any deviation from metrics used in the studies most relevant to Washington’s Forest Practices Rules would not help inform the measurable change analysis. The studies listed in this comment are associated with Atlantic Cod and Mayflies in Europe and are unrelated to the proposed Type Np buffer rule.

2.b.23 - Comment ID: HHHH

Comment Summary – Commenter asks, which species is Ecology claiming needs additional protection in Np streams, and which species will be added to the covered species list of the Forest Practices HCP because of additional protections?

Response

Thanks for your comment. Please see response to comment 1.c.1.

2.b.24 - Comment ID: JJJJ

Comment Summary – Ecology’s method of counting all temperature increases $>0.5^{\circ}\text{C}$ as equal in the draft Tier II analysis is misleading, failing to reflect ecological relevance.

Response

Thank you for your comment. Please see response to comment 1.c.1.

2.b.25 - Comment ID: JJJJ

Comment Summary – First year post-harvest temperature responses in the Hard Rock and Soft Rock studies did not have any relationship with canopy closure (%), percent of channel with buffer, or total buffer length. This suggests stream temperature response in Np streams is more complex than buffer length and width alone, and the draft Tier II analysis does not reflect that complexity.

Response

Thank you for your comment. Our analysis acknowledges that other factors, in addition to canopy cover, (e.g., lithology, aspect, windthrow, valley wall slope) likely affect temperature response in Type Np streams. See the Site-Specific Conditions section of the Tier II analysis for a detailed description of these conditions. However, both Hard and Soft Rock reports conclude that the loss of canopy cover was the dominant factor in the increased summer stream temperature (see comment 2.b.2).

2.b.26 - Comment ID: JJJJ

Comment Summary – The Tier II analysis draws inappropriate conclusions about the influence of site-specific variables that were not directly manipulated in the [Hard and Soft Rock] studies. The studies allow inference about average treatment effects across specific criteria and conditions, not causation from untested variables.

Response

Thank you for your comment. The Tier II analysis does not state that there is a causal relationship between the independent variables assessed in Hard and Soft Rock, instead the report cautions against this (see comment 2.b.4). This analysis uses factors known to influence stream temperature (e.g., lithology, aspect, topography, and stream size) to point out areas across the landscape that might be more or less susceptible to temperature increases under the proposed Type Np buffer rule. The Tier II analysis report states that overall measurable change determination is based on “the results of the Hard Rock 100% buffer treatment, the shade-temperature model (Figure 17), and other best available science, these minimal increases (~ 0.0 - 1.0°C) should be temporary, likely no longer than 2 years post-harvest.”

2.b.27 - Comment ID: JJJJ

Comment Summary – The Tier II analysis overreaches by applying study results to broader areas of the landscape without scientific justification. The Hard Rock and Soft Rock studies were limited in geographic and ecological scope, and findings cannot be generalized to all the managed forest landscape in Western Washington.

Response

Thank you for your comment. The Tier II analysis does not solely rely on Hard and Soft Rock in isolation. Instead, it assesses the results of both studies in combination as was suggested by the authors of the Hard Rock Phase II report, “In combination, the two studies will allow for broader inferences about FP rule effectiveness” when describing the scope of inference. This language about how these results can be interpreted was independently scientifically reviewed and approved by consensus at CMER. In addition to the Hard and Soft Rock studies we also cited several other studies (see Table 1) with similar findings. Due to the Forest Practices Board’s proposed rule applying to broad areas of the landscape (all of Western Washington), we needed to use the best available science to inform our determination on whether the proposed rule would cause measurable change to water quality across that landscape, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. After a thorough literature search, the studies listed in Table 1 seemed to be the most relevant to the proposed Np rule.

2.b.28 - Comment ID: JJJJ

Comment Summary – Two assessments, one by WFPA and one by DNR, found that less than 2% of routine timber harvests in Western Washington match the treatments in the Hard Rock study. Even under the extreme harvest scenarios not reflective of most real world timber harvests, scientific findings showed that temperature effects of harvest under existing Type Np buffers were spatially and temporally limited, did not persist downstream, and that relevant biological and ecological responses were not correlated with the targeted standard.

Response

Thanks for your comment. Please see response to comment 1.c.1. This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Responding to concerns about the frequency that most timber harvests match the treatments in the Hard Rock study is beyond the scope of this Tier II analysis.

2.b.29 - Comment ID: JJJJ

Comment Summary – The Tier II analysis attempts to predict future responses using narrative matching of physical features rather than established predictive tools. For example, there was no consistent relationship between canopy cover and temperature change above 70% shade, and yet the report ignores this context and relies heavily on canopy closure as a basis for the proposed rule.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC

173-201A-320. We relied on existing best available science rather than adapting predictive tools to answer the measurable change question. There are a number of studies (Table 1) that have documented an increase in stream temperature while retaining continuous buffers. We then determined that:

Overall, the proposed buffer prescriptions should result in minimal temperature increases after harvest and likely only under certain conditions. Based on the results of the Hard Rock 100% buffer treatment, the shade-temperature model (Figure 17), and other best available science, these minimal increases (~0.0-1.0°C) should be temporary, likely no longer than 2 years post-harvest.

2.b.30 - Comment ID: JJJJ

Comment Summary – The Tier II analysis did not provide a complete presentation of results from the Hard Rock study. Temperature responses from the Hard Rock Forest Practices and 100% buffer treatments were presented, and the relatively better performance of the 100% buffer treatment was noted (p. 30). However, the 0% buffer also performed similarly to the 100% buffer, a result not presented in the Tier II analysis. When examined together, all three treatments show similar seven-day average daily maximum (7DADM) temperature responses. As expected, the warmest harvest unit received a 0% buffer. However, the six coolest harvest units received 0, 50, or 100% buffer treatments. In addition, we note that the responses of the 50% buffer treatment were similar to the reference. The existence (in a small sample) of a reference unit with a generally colder temperature than other reference and 50% buffer units contributed to the finding of a statistical difference in temperature between the current Forest Practices buffer and the reference.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. The 0% buffer treatment did not perform similarly to the 100% buffer treatment, see comment 2.b.3 for an explanation of why the 0% treatment was not included in the analysis.

2.b.31 - Comment ID: JJJJ

Comment Summary – To demonstrate general temperature responses on treated harvest units compared to the reference, the Tier II analysis presented the number of instances where the mean monthly temperature response was greater than 0.5°C compared to the reference (p. 34). This summary is misleading because an increase from 11 to 11.8°C is tallied the same as an increase from 16.5 to 17.3°C. A more nuanced view is provided by the distribution of 7DADM estimates for all of the reference and treatment units from the Hard Rock and Soft Rock studies. For Hard Rock, the 7DADM exceeded 16°C in 15/213 (7%) instances; for Soft Rock, the 7DADM exceeded 16°C in 6/89 (7%) instances.

Response

Thank you for your comment. Review of treated harvest units (existing Np buffer rule and other continuous buffer treatments) in CMER studies where warming was greater than 0.5°C compared to reference sites was helpful for informing us of our measurable change determination. We emphasize all aspects of water quality standards (protection of designated uses, narrative and numeric criteria, and antidegradation) are equally and independently applicable to waters of the state. Therefore, it was important to look at the temperature increases attributable to the treatment effect (MMTR values) as well as the changes and distributions of the daily maximums. The draft Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, and if so, whether that measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320.

2.b.32 - Comment ID: JJJJ

Comment Summary – The use of 30–80-year-old second growth stands as reference conditions in the Hard Rock and Soft Rock studies is itself an untested assumption. For example, whether using riparian stands that remain after natural disturbances (e.g., fire or wind-throw events) as reference conditions is appropriate or not for Type Np streams is a productive line of inquiry for the Tier II analysis to pursue.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. The use of 30–80-year-old second growth stands as reference sites was part of the original Hard and Soft Rock study designs and included in the methods of the final reports, which were independently scientifically reviewed and approved by consensus at CMER. This rigorous review and acceptance by the scientific community provides us with enough confidence to include these studies in our analysis of best available science.

2.b.33 - Comment ID: JJJJ

Comment Summary – The Tier II analysis discussion of how site-specific conditions may or may not have influenced the temperature responses observed at harvest units is misleading and indicative of a profound misunderstanding of the experimental designs implemented in Hard Rock and Soft Rock (pp. 35-43). In both studies, the experimental designs support inferences about the average estimated temperature responses (and related uncertainty) due to buffer treatments as implemented. Factors such as canopy shade, windthrow, topography, and lithology (among others) were not manipulated directly in either study (some of these factors cannot be manipulated in an experiment), therefore causal inference about those factors cannot be made. Both studies support inference about how the populations (from which the harvest units were drawn for the studies) would respond on average to the buffer prescriptions that approximate those prescriptions implemented in the two studies. What the Hard Rock and Soft Rock studies most assuredly do not support are suppositions about how factors besides the

buffer treatment may have caused an estimated temperature response (as claimed on p. 35 of the Tier II analysis). Although variability in biological and physical factors within and across treatment groups was incorporated in error estimates (95% confidence intervals) for the treatment responses, direct conclusions cannot be reached about how these factors influenced the responses. More generally, a misunderstanding about associations between site-specific conditions, causal mechanisms, and responses falls within a broader discussion of scope of inference.

Response

Thank you for your comment. The Tier II analysis does not state that factors besides buffer treatment may have caused an estimated temperature response. In fact, page 35 explicitly warns against this:

While individual sites cannot be used to find specific causal mechanisms that may influence the magnitude and longevity of a temperature response, they can be useful in assessing areas that may be more susceptible to temperature increases after harvest.

This investigation into some of the potential factors that are known to influence stream temperature (e.g., lithology, aspect, windthrow, valley wall slope) was helpful context to show areas that may influence stream temperature under the proposed rule. We use very careful language to describe that this is not a formal statistical analysis of the independent variables associated with Hard and Soft Rock. This is explained in the Scope of Inference section:

The authors of Hard Rock state that the spatial scope of the study is comprised of Type Np stream networks of similar lithology, basin size, stand age, and presence of amphibians. The Soft Rock authors similarly conclude that inference is limited to similar site conditions but can be informative to other situations depending on variable of interest and the characteristics of the site in question. It is important to note that the authors of the Hard Rock report mention that there is an upcoming report from the Soft Rock study and that, "In combination, the two studies will allow for broader inferences about FP rule effectiveness." The purpose of the above section was to assess the results of both studies in combination. This increases the number of treatments, lithology type, geographic coverage, and variation in site-specific conditions broadens the scope of inference. However, it is important to note that this only applies to the broader treatment effects. The investigation into site-specific conditions that may have influenced temperature response is more limited.

However, when making our measurable change determination we did, as you suggest, use the "inference about how the populations (from which the harvest units were drawn for the studies) would respond on average to the buffer prescriptions that approximate those prescriptions implemented in the two studies." This helped us conclude that:

Overall, the proposed buffer prescriptions should result in minimal temperature increases after harvest and likely only under certain conditions. Based on the results of the Hard Rock 100% buffer treatment, the shade-temperature model (Figure 17), and other best available science, these minimal increases (~0.0-1.0°C) should be temporary, likely no longer than 2 years post-harvest.

2.b.34 - Comment ID: JJJJ

Commet Summary – The Tier II analysis relied heavily on the Hard Rock and Soft Rock studies to argue that larger buffers are required on Type Np streams to maintain water temperature standards. Generally, the Tier II analysis misunderstood that inference from the Hard Rock and Soft Rock studies involves statements about the average response (with estimated uncertainty) of additional harvest units drawn from the same population (e.g., with similar underlying characteristics) and harvested in the same manner (e.g., retaining one of the buffer treatments). Instead, the Tier II analysis attempts to extrapolate, based on results from the two studies, how other locations would respond to buffer treatments by matching lithology, basin size, stand age, presence of amphibians, and other factors (p. 43-44 and pp. 48-50). Doing so misrepresents the scope of inference from the two studies.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. The Hard Rock 100% buffer treatment showed a measurable change in stream temperature, relative to reference conditions for 2 years after harvest. Other studies have also found temperature increases after harvest while retaining continuous riparian buffers. This led us to conclude that:

Overall, the proposed buffer prescriptions should result in minimal temperature increases after harvest and likely only under certain conditions. Based on the results of the Hard Rock 100% buffer treatment, the shade-temperature model (Figure 17), and other best available science, these minimal increases (~0.0-1.0°C) should be temporary, likely no longer than 2 years post-harvest.

This is in line with the scope of inference from the Hard Rock Phase II report:⁶⁵

The temporal scope of inference is the nine years post-harvest. The spatial scope of inference is limited to Type Np basins dominated by competent lithologies, which comprise approximately 29% of western Washington FPHCP-covered lands (P. Pringle, personal communication, September 2005, formerly Washington Department of Natural Resources). The spatial scope of the study reflects other constraints as well, including those associated with basin size, stand age, and the presence of stream-associated amphibians (see Section 2-4. Site Identification and Blocking). Results should be applied with caution to Type N streams outside the selection criteria. A similar study on sites representing more erodible, soft-rock lithologies is also in progress. In combination, the two studies will allow for broader inferences about FP rule effectiveness.

⁶⁵ Effectiveness of Experimental Riparian Buffers on Perennial Non-fish-bearing Streams on Competent Lithologies in Western Washington – Phase 2 (Nine Years after Harvest), p. 2-20.

This scope of inference was independently scientifically reviewed and approved by consensus at CMER.

2.b.35 - Comment ID: JJJJ

Comment Summary – In the Hard Rock study, appropriate scope of inference involves not only a consideration for site-selection criteria but also how the treatments were implemented. For the Hard Rock study, investigators stated: “To maximize the influence of the buffer treatments and to reduce confounding effects we designed the study so that harvest units would encompass the entire Type N basin when possible.” Additionally, the study considered basins 30–120 acres in size for inclusion in the sample. A subsequent analysis of basins >30 acres in size and harvested from 2010-2022 found only 17% of basins were 30-120 acres in size; 19% had >85% of the Type Np basin in the FPA; and 1.5% met both criteria. Based on this sample, the maximum post-harvest temperature response of 1.2°C (95% confidence interval: 0.3-2.1) estimated for the current Forest Practices buffer may occur in less than 2% of the basins on the FFR landscape (assuming that the units harvested from 2010-2020 are representative of the overall population). In this small subset of units to which the Hard Rock results apply, an increase of 0.3°C, or more, is possible.

Response

Thank you for your comment. The data this commenter cites to is from a WFPA GIS analysis that was part of a Proposal Initiation to the Forest Practices Adaptive Management Program (AMP). This analysis was not peer reviewed and was ultimately rejected by the AMP, as was stated in the Type N Action Development Dispute Majority/Minority Recommendations to the Forest Practices Board⁶⁶. No official publication with detailed steps of how this analysis was performed was ever released. The authors of this report state that they, “found fewer than 15 basins (1.4%) of 30 - 120 acres or greater being included in a single Forest Practices Application over this time period.” What this type of analysis misses is that single Forest Practices Applications (FPAs) do not accurately reflect how clear-cut harvests of Np watersheds occur in practice. The relevant question is not how many FPAs fully encompass an Np watershed, it is how many Np basins are fully impacted by a clear-cut harvest.

Since we are unable to verify the percentages reported in this comment, we do not feel confident in accepting these values in lieu of what is described in the scope of inference from the Hard and Soft Rock reports. All three reports (Hard Rock Phase I and II, Soft Rock) were independently scientifically reviewed and approved by consensus at CMER.

2.b.36 - Comment ID: JJJJ

Comment Summary – The Soft Rock study drew its sample from a relatively small portion of the landscape. For example, the Soft Rock study selected harvest units that occurred on marine sedimentary lithology which underlies 18% of the industrial forest landscape in western Washington. Importantly, the Soft Rock study was unable to include a random selection of

⁶⁶ Type N Action Development Dispute Majority/Minority Recommendations to the Forest Practices Board. TFW Policy Caucuses: Large Forest Landowners, Small Forest Landowners, Washington State Association of Counties, p. 15. https://dnr.wa.gov/sites/default/files/2025-07/bc_fpb_mtg_packet_20221031.pdf

harvest units in the study. As a result, the investigators stated: “However, the fact that the sites covered a relatively narrow range of forest conditions in western Washington means that direct inference is limited to similar conditions. This does not imply that results are not informative to other situations, but that the application of the results of this study should consider the variable in question, physical site characteristics, type and extent of forest harvest, and the physical processes involved.” Based on this advice, the Soft Rock results are unlikely to apply to all of the potential harvest units that occur on marine sedimentary lithology. For those units that have similar criteria to the 10 units included in the Soft Rock study (including harvest of the entire Type Np basin) the maximum post-harvest temperature response of 0.6°C (observed in post-years 1 and 2) estimated for the current Forest Practices buffer may occur. Based on the 95% confidence intervals (0.3-0.9 and 0.3-0.85 in post-years 1 and 2, respectively), an increase of 0.3°C post-harvest, or more, is possible.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. We did not use the Soft Rock findings in isolation to make our overall measurable change determination. Instead, we looked at Hard and Soft Rock together as was suggested in the scope of inference section of the Hard Rock Phase II report (pg. 2-20):

A similar study on sites representing more erodible, soft-rock lithologies is also in progress. In combination, the two studies will allow for broader inferences about FP rule effectiveness.

We also used other best available science, in addition to Hard and Soft Rock (Table 1), to make our measurable change determination:

Overall, the proposed buffer prescriptions should result in minimal temperature increases after harvest and likely only under certain conditions. Based on the results of the Hard Rock 100% buffer treatment, the shade-temperature model (Figure 17), and other best available science, these minimal increases (~0.0-1.0°C) should be temporary, likely no longer than 2 years post-harvest.

2.b.37 - Comment ID: JJJJ

Comment Summary – The attempt in the Tier II analysis to link stream temperature responses to factors such as lithology, aspect, valley wall slope, and bankfull width is unproductive given the management prescription in question is extent and width of buffers retained on Type Np streams (p 48-51). We acknowledge understanding if, and how, buffers are associated with temperature responses in small streams is challenging. For example, first year postharvest temperature responses in the Hard Rock and Soft Rock studies did not have any relationship with canopy closure (%), percent of channel with buffer, or total buffer length. Similarly, an evaluation of all of the July MMTR from the Hard Rock study indicated that, above 70% canopy closure, no association existed between the temperature response and canopy closure. Specifically, temperature responses could be greater (warmer), equal to (no change), or less

(cooler) than 0°C in treatments compared to the reference, suggesting that other factors influenced temperature responses in addition to shade (when shade was >70%) provided by the buffer prescriptions. Critically, when shade was >70%, increases of less than 0.3°C were as likely as increases greater than 0.3°C.

Response

Thank you for your comment. We agree that there are other factors that influence temperature response in addition to shade, as stated in this comment. This is why we have provided some potential factors that could influence temperature (in addition to shade) under the proposed rule. It is also important to note that the figure this comment pointed to was included in the Soft Rock report to “to illustrate differences between the two studies in the relationship of July MMTR in the first year after harvest and the first-year same site descriptors” (Soft Rock) not to report on the correlation between canopy cover/buffer configuration and stream temperature, as the comment suggests. We also could not verify the percentages and increases greater or less than 0.3°C in the Hard and Soft Rock reports, therefore we are unable to incorporate that information into our analysis. Finally, this Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. As stated in our measurable change analysis:

Overall, the proposed buffer prescriptions should result in minimal temperature increases after harvest and likely only under certain conditions. Based on the results of the Hard Rock 100% buffer treatment, the shade-temperature model (Figure 17), and other best available science, these minimal increases (~0.0-1.0°C) should be temporary, likely no longer than 2 years post-harvest.

2.b.38 - Comment ID: JJJJ

Comment Summary – Commenter suggests a purposeful technical synthesis of available information to predict temperature responses as function of buffer characteristics (e.g., extent and/or length) can provide accurate information about temperature responses to management prescriptions. For example, using a statistical model, with appropriate summaries such as 95% prediction intervals (Groom et al. 2018), to understand how out of sample basins would respond to treatments is more reliable than the Tier II approach of narrative associations about locations that may or may not be similar to the populations from which the Hard Rock and Soft Rock studies were selected. At the very least, an attempt to understand how harvest units included in the Groom et al. (2018) analysis compared to harvest units in the Hard Rock and Soft Rock studies, and whether the prediction curve could be applied with or without adjustments to harvest units in Washington, could provide useful context for decision-making (the Type Np workgroup evaluated this option). For example, measured buffer widths from the Hard Rock and Soft Rock studies could be used to predict temperatures for reference and treatment units, and these predictions could be compared to the estimated temperatures calculated from empirical data presented in the Hard Rock and Soft Rock final reports.

Response

Thank you for your comment. We agree that models like the Groom et al. 2018 Bayesian analysis are powerful tools to try and predict the relationship of stream temperature to shade. This is why we included it in our analysis to show “that an approximately 0.8°C increase in temperature is still likely with a 50ft continuous buffer.” However, we later state that:

[T]his model was developed using data from studies testing the effectiveness of buffers on state and private lands in Oregon, so there is some uncertainty around how well this model translates to FPHCP lands in western Washington.

Adapting the Groom (or developing a new) model to predict stream temperature response in relation to a continuum of buffer widths for western Washington FPHCP lands is a worthy endeavor. However, this would likely be an expensive long-term research and modeling project that should be conducted by a research institution. This could help us understand and predict the relationship between stream temperature and buffer configuration in relation to other known variables that can influence stream temperature in headwater streams. Had this been done by CMER or the Type Np Technical Workgroup we would have incorporated it into our analysis.

This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. We included the narrative discussion to help provide context to our overall measurable change determination. This identification of site-specific factors that could influence stream temperature under the proposed rule may be useful if CMER, or another institution, develops a new shade/temperature model. Developing a new model is beyond the scope of the Tier II analysis and is ultimately unnecessary to determine that:

Overall, the proposed buffer prescriptions should result in minimal temperature increases after harvest and likely only under certain conditions. Based on the results of the Hard Rock 100% buffer treatment, the shade-temperature model (Figure 17), and other best available science, these minimal increases (~0.0-1.0°C) should be temporary, likely no longer than 2 years post-harvest.

2.b.39 - Comment ID: KKKK

Comment Summary – The problem with using the measurable change criterion (<0.3°C) is that none of the treatments, including the reference sites meet this criteria most of the time. Only two reference (unharvested) sites meet the criteria in year 2 post-harvest, only 1 in 4 of the continuous buffer sites meet the criteria in year 8 and even more surprising, only 1 in 4 of the continuous buffer sites and 2 of 4 unbuffered (cut to the stream bank) met the criteria for year 15. By these data, one could as easily assert that even reference sites (i.e. no human action) will not achieve Ecology’s anti-degradation standard most of the time, but more often harvesting all the way to the stream bank will get you there. This odd result for the no-buffer scenario is likely a result of those stands reaching full canopy closure by 15 years, whereas buffers are more likely to suffer losses from disturbance during the same time frame. This suggests that we need

to take a closer look at this unattainable, and as the Np workgroup stated - biologically irrelevant - temperature standard.

Response

Thank you for your comment. The data mentioned in this comment and cited from Table 4 in the associated comment letter is not from the Hard or Soft Rock reports. No formal statistical analysis was conducted on stream temperature 15 years post-harvest. Ecology cannot accept assertions derived from data extracted from an unpublished report without the consent of all the authors. We also object to performing summary statistics in the form of simple averages and presenting them as fact. Therefore, none of the data presented in Table 4 has been, or can be, verified. In contrast, all three reports (Hard Rock Phase I and II, Soft Rock) were independently scientifically reviewed and approved by consensus at CMER. To conduct a review of best available science, all data and reports must be independently verified, so it would not be appropriate for Ecology to incorporate what was presented by this comment in lieu of the Hard and Soft Rock reports.

Please also see response to comment 1.c.1. The intent of Tier II antidegradation protections is to prevent and minimize human-caused pollution and impacts to waters of the state while ensuring protection of all designated and existing uses, including aquatic life.

2.b.40 - Comment ID: KKKK

Comment Summary – The data used to compel this rule were generated from 3 study locations with 16 total replicates across treatments. Rule proponents say adding these continuous buffers will result in cooler water flowing into our fish-bearing streams. There is no clear evidence in either direction to support this claim as for those few sample sites where downstream measurements were taken there was insignificant measurable change downstream; none of which exceeded the threshold for beneficial designated uses (16°C) needed for our cold-water fish species. Where maximum harvest levels were tested, including full basin harvests, there were instances of too much temporary warming for some of our fish species, if they had been in these waters. These same tests also showed that current Np buffer rules on non-fish streams meet the maximum temperature thresholds (designated use threshold for cold water fish species of which there are none in non-fish streams), even during the hot summers we've had over the past 15 years. In fact, the current rule does as well as the no-treatment sites when averaged across the few locations used to develop these data, and even better than the continuous buffer proposal put forth in the Tier II analysis.

Response

Thank you for your comment. State water quality standards, including protections of designated uses, narrative and numeric criteria, and antidegradation, including Tier II antidegradation protections, applies to all waters of the state, regardless of whether any particular species of aquatic life are present in any given water body. Based on our review of best available science, application of the buffer prescriptions in the Board's proposed rule is expected to result in significant improvement in maintaining existing Type Np water temperature levels following adjacent timber harvest on Forest Practices HCP lands.

2.b.41 - Comment ID: KKKK

Comment Summary – Commenter asks, given the data from CMER Np studies, what is the benefit we are procuring for this enormous cost? What is the beneficial use that has to be quantified to compare to the costs? Will we have cooler water for downstream uses? Do we even know if the extra shade will be offset by reduced flows from keeping extra trees on site (i.e. extra evapotranspiration) within the system so that no measurable benefit occurs downstream where it is presumably needed? A hydrologic study of every basin would probably be needed to answer these questions with any certainty. However, based on what we see on the landscape we know that either alternative is likely – it is after all why we have this concept of hydrologic green-up. Each of these questions deserves further study which should be initiated as part of the CMER workplan, or via outsourced research if CMER decides to move in that direction. The results and the demands for greater certainty demand a broader understanding of impacts that can only be obtained with monitoring studies – that to date have been very low priority for everyone but the landowner caucuses.

Response

Thank you for your comments. The summary of probable costs and benefits of the Board's proposed Np buffer rule is provided in the Cost-Benefit Analysis report commissioned by the Forest Practices Board. State water quality standards, including protections of designated uses, narrative and numeric criteria, and antidegradation, including Tier II antidegradation protections, applies to all waters of the state, regardless of whether any particular species of aquatic life are present in any given water body. Also, Forest Practices Rules are required to meet state water quality standards, per RCW 76.09.010(g), RCW 90.48.420(1), and WAC 222-12-010. Based on our review of best available science, application of the buffer prescriptions in the Board's proposed rule is expected to result in significant improvement in maintaining existing Type Np water temperature levels following adjacent timber harvest on Forest Practices HCP lands. As we note in our draft analysis, Ecology supports further adaptive management study to reduce remaining uncertainty with regards to Type Np water quality protection.

2.b.42 - Comment ID: KKKK

Comment Summary – The CMER Hard and Soft Rock site data show that there are naturally warm(er) sites and cool(er) sites within stream networks. This finding is consistent with monitoring studies completed by large landowners as part of their individual HCP commitments. Naturally cool streams and naturally warm streams exist across the landscape. Data mining of site-specific attributes for each type of stream could be combined with a spatially explicit dataset such as that developed by the UW Team to identify areas of potential high/low concern. Utilizing these AI capable technologies combined with data mining techniques is likely to support targeted action with measurable benefits while minimizing costs when those areas of significant concern are identified.

Response

Thank you for your comment. The draft Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, and if

so, whether that measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Responding to comments exploring new ways of targeting water quality protections beyond what is presented in the Board's proposed Type Np buffer rule is beyond the scope of this Tier II analysis.

2.b.43 - Comment ID: QQQQ

Comment Summary – The Hard and Soft Rock studies were designed to test the effectiveness of the rules to meet the resource objectives of meeting designated criteria standards, not antidegradation requirements.

Response

Thank you for your comment. The Hard Rock Phase I Findings Report CMER/Policy Interaction Framework Six Questions document states:

The objective of the Type N Experimental Buffer Treatment Project in Hard Rock Lithologies (Hard Rock Study) was to evaluate the effectiveness of the current westside riparian management zone (RMZ) prescriptions for Type N (non-fish-bearing) Waters in maintaining key aquatic conditions and processes affected by Forest Practices. Specifically, we evaluated whether the riparian buffer prescription for Type N Waters met the following overall Performance Goals, namely: (1) to support the long-term viability of stream-associated amphibians and (2) to meet or exceed water quality standards (WQS).⁶⁷

The Soft Rock Study CMER/Policy Interaction Framework Six Questions document states:

We evaluated the effects of the current Forest Practices rules (WAC 222-30-021(2)) on riparian vegetation and wood recruitment, canopy closure and stream temperature, stream discharge and downstream transport of suspended sediment and nitrogen, and benthic macroinvertebrates. Results will inform the efficacy of current Forest Practices rules in meeting the objectives outlined in the Washington Forest Practices Habitat Conservation Plan (FPHCP; Schedule L-1, Appendix N).

Schedule L-1 states the overall performance goal related to water quality standards is to “Meet or exceed water quality standards (protection of designated uses, narrative and numeric criteria, and antidegradation).”⁶⁸ State water quality standards, including protections of designated uses, narrative and numeric criteria, and antidegradation, including Tier II antidegradation protections, applies to all waters of the state.

- c) Necessary and overriding public interest

⁶⁷ Findings Report. Chapter 7. Stream Temperature and Shade. Type N Experimental Buffer Treatment Project in Hard Rock Lithologies. May 11, 2018, p. 1.

⁶⁸ Forest Practices Habitat Conservation Plan, Appendix N. Schedule L-1 – Key questions, resource objectives, and priority topics for adaptive management, p.1.

2.c.1 - Comment ID: BBBB

Comment Summary – Ecology was involved and supportive of the 1987 Timber, Fish, and Wildlife Agreement through at least the Forest Practices Habitat Conservation Plan (FPHCP) process where all Forests and Fish stakeholders at the table were compromising as “necessary and in the overriding public interest” in a shared risk paradigm. Commenter alleges Ecology has had a change in heart regarding what is necessary and in the public interest since development of the FPHCP.

Response

Thank you for your comment. Ecology continues to actively engage with and support the Timber Fish and Wildlife community and Forest Practices Habitat Conservation Plan. Ecology and other Forests and Fish stakeholders agreed in Appendix L of the 1999 Forests and Fish Report to establish a formal Forest Practices Adaptive Management Program, and to include a formal dispute resolution process. Forests and Fish authors stated:

*Adaptive Management is a formal process for evaluating the current resource status and, over time, for evaluating the effectiveness of rules and guidance in protection, maintenance, and enhancement of habitat necessary to meet resource goals and objectives, for making adjustments to forest practices on a regional or statewide basis, and for requiring mitigation, where necessary, to achieve resource objectives.*⁶⁹

As acknowledged by TFW Policy Committee consensus, Adaptive Management studies showed that current rules to protect Type Np streams in Western Washington are not meeting resource goals and objectives, and action was therefore warranted. Ecology views the Board’s proposed Type Np buffer rule, which is the result of a formal dispute resolution process, as the result of the Adaptive Management Program working as agreed to in the Forests and Fish Report and established in the Forest Practices Habitat Conservation Plan.

Per WAC 173-201A-320(4), the analysis of necessary and overriding concern of public interest applies when a proposed activity has been determined to cause a measurable lowering in water quality. As Ecology identified the Board’s proposed rule as likely to result in measurable change, the necessary and overriding concern of public interest assesses whether that lowering of water quality is in the necessary and overriding public interest. In other words, the analysis takes the impacts of the proposed rule as starting point, and considers whether the impacts to the public that would result from additional or expanded regulatory requirements (that would be necessary to prevent any lowering of water quality) would be sufficiently detrimental to the public interest to outweigh the public benefits of avoiding the reduction in water quality.

2.c.2 - Comment ID: JJJJ

Comment Summary – Commenter asks if the necessary and overriding public interest factors in WAC 173-201A-320(4) are for the same purpose as the cost benefit analysis required by the Administrative Procedure Act. What is the statutory/regulatory basis for using the Board’s cost

⁶⁹ Appendix L – Adaptive Management, Forests and Fish Report, p. 70, 80-81.

benefit analysis to support Ecology's overriding public interest analysis? Has Ecology completed an overriding public interest analysis under Tier II for prior Forest Practices Board rulemakings?

Response

Ecology determined that the proposed rule – the “new or expanded action” as governed by WAC 173-201A-320 - will cause a measurable change to water quality. The necessary and overriding public interest factors in WAC 173-201A-320(4) are for the purpose of determining whether that measurable change is in fact necessary and in the overriding public interest, as compared to a more protective action that would not result in measurable change. The basis for using the Board's Cost Benefit Analysis to support Ecology's Necessary and Overriding Public Interest Analysis is found in WAC 173-201A-320(4), and (a),

Necessary and overriding public interest determinations. Once an activity has been determined to cause a measurable lowering in water quality, then an analysis must be conducted to determine if the lowering of water quality is necessary and in the overriding public interest. Information to conduct the analysis must be provided by the applicant seeking the authorization, or by the department in developing a general permit or pollution control program, and must include:

(a) A statement of the benefits and costs of the social, economic, and environmental effects associated with the lowering of water quality. This information will be used by the department to determine if the lowering of water quality is in the overriding public interest.

Ecology used information provided by the Board (the Cost-Benefit Analysis and Small Business Economic Impact Statement) consistent with the WAC 173-201A-320(4) requirement for the “applicant seeking the authorization” to provide this information, to examine the potential impacts of additional regulatory requirements that would avoid reducing water quality with greater certainty. Ecology relies on the Board's economic analyses to inform statements in our Tier II analysis regarding the benefits and costs of the social, economic, and environmental effects associated with the lowering of water quality.

Ecology has not completed an overriding public interest analysis under Tier II for prior Forest Practices Board rulemakings that were the result of the Adaptive Management Program process, due to prior AMP-driven rulemaking efforts having not resulted in a determination of measurable change to water quality. For additional discussion on the topic of Tier II evaluations for other Forest Practices Board rulemakings, see response to comment 1.a.1.

2.c.3 - Comment ID: JJJJ

Comment Summary – Ecology's unprecedented necessity and overriding public interest analysis for the Board's proposed rule is inconsistent with its own policy, in addition to multiple decades of implementing the Forest Practices Rules.

Response

Ecology's draft necessary and overriding public interest analysis for the Board's proposed rule is not inconsistent with the Tier II antidegradation rule (WAC 173-201A-320) or Ecology's 2011 Supplemental Guidance on Implementing Tier II Antidegradation. Reissued

general permits or other water pollution control programs may include revisions to the program and will undergo an analysis under Tier II at the time Ecology develops and approves the general permit or program. Ecology's Tier II Supplemental Guidance states:

Ecology's decision to develop a general permit or a control program for a type of pollutant source is considered in the overriding public interest because it takes into account the costs and benefits of permitting a large number of activities in the most effective and efficient way possible, thus saving public funds while protecting water quality.

In this case, Ecology has developed a draft Tier II antidegradation analysis on the FPB's proposed Type Np buffer rule, which would apply to (Type Np) state waters across all of Western Washington forestlands subject to Forest Practices Rules and the Forest Practices Habitat Conservation Plan. By conducting the draft Tier II analysis on the proposed rule, rather than on every individual forest practices application for timber harvest near Type Np streams under the proposed rule, Ecology is permitting a large number of activities (all Forest Practices Applications where harvest occurs adjacent to Type Np waters in Western Washington) in the most effective and efficient way possible, thus saving public funds while protecting water quality. This is consistent with how Ecology has participated in the implementation of Forest Practices Rules since the Forests and Fish agreement. Ecology has historically not conducted site specific antidegradation reviews of Forest Practices Applications. Rather, Ecology broadly relies on the prescriptions in the rules to achieve compliance with water quality standards, including antidegradation requirements, since the rules are required to meet water quality standards, and further relies on the adaptive management process to revise prescriptions in the rules when science shows a need to do so.

2.c.4 - Comment ID: JJJJ

Comment Summary – Ecology improperly relied on a flawed Cost Benefit Analysis as a surrogate for its overriding public interest analysis and provides insufficient basis to determine the proposed rule is necessary (i.e., implementable and feasible, including cost feasibility) and in the overriding public interest given the staggering costs and negligible to minor benefits to aquatic habitat.

Response

Comments regarding concerns with the Board's rulemaking process, including the Board's commissioned Cost Benefit Analysis, are beyond the scope of this Tier II analysis.

The analyses required under Tier II do not assess the costs or benefits of the proposed rule itself as compared to the regulatory baseline. Per WAC 173-201A-320(4), the analysis of necessary and overriding concern of public interest applies when a proposed activity has been determined to cause a measurable lowering in water quality. As Ecology identified the Board's proposed rule as likely to result in measurable change, the necessary and overriding concern of public interest assesses whether that lowering of water quality is in the necessary and overriding public interest. In other words, the analysis takes the impacts of the proposed rule as starting point, and considers whether the impacts to the public that would result from

additional or expanded regulatory requirements (that would be necessary to prevent any lowering of water quality) would be sufficiently detrimental to the public interest to outweigh the public benefits of avoiding the reduction in water quality.

As such, Ecology used information provided by the Board (the Cost-Benefit Analysis and Small Business Economic Impact Statement) consistent with the WAC 173-201A-320(4) requirement for the “applicant seeking the authorization” to provide this information, to examine the potential impacts of additional regulatory requirements that would avoid reducing water quality with greater certainty. Per the findings of the Tier II analysis, Ecology identified that the additional impacts could be significantly detrimental to the public interest as compared to the public gains of added certainty in avoiding lowering of water quality. The analysis of necessary and overriding public interest considered these additional impacts in incremental terms (resulting from additional regulation beyond the Board’s proposed rule) as well as cumulatively (including the impacts estimated for the proposed rule as compared to the baseline). These relative proportions, in conjunction with Ecology’s consideration of contextual information such as interindustry economic relationships and total employment, are intended to provide additional context for the determination.

2.c.5 - Comment ID: HHHH

Comment Summary – The Tier II antidegradation analysis is not in the public interest. Retaining the current Type Np buffer rule and conducting scientific assessment of where additional protection has a demonstrated need and then developing additional measures to target those needs would be in the public interest instead.

Response

Comments regarding concerns with the Board’s proposed rule and/or rulemaking process are beyond the scope of this Tier II analysis.

The analyses required under Tier II do not assess the costs or benefits of the proposed rule itself as compared to the regulatory baseline. Per WAC 173-201A-320(4), the analysis of necessary and overriding concern of public interest applies when a proposed activity has been determined to cause a measurable lowering in water quality. As Ecology identified the Board’s proposed rule as likely to result in measurable change, the necessary and overriding concern of public interest assesses whether that lowering of water quality is in the necessary and overriding public interest. In other words, the analysis takes the impacts of the proposed rule as starting point, and considers whether the impacts to the public that would result from additional or expanded regulatory requirements (that would be necessary to prevent any lowering of water quality) would be sufficiently detrimental to the public interest to outweigh the public benefits of avoiding the reduction in water quality.

2.c.6 - Comment ID: KKKK

Comment Summary – Average dollar amounts dispersed by the Forestry Riparian Easement Program can be used to calculate willingness to pay values for ecosystem services. When calculated, they provide willingness to pay ratios of 0.03 and 0.04. Given these ratios, what overriding public interest is being served by advancing the proposed Np buffer rule?

Response

The analyses required under Tier II do not assess the costs or benefits of the proposed rule itself as compared to the regulatory baseline. Comments regarding concerns with the Board's proposed rule and/or rulemaking process, including economic analyses, are beyond the scope of this Tier II analysis. Per WAC 173-201A-320(4), the analysis of necessary and overriding concern of public interest applies when a proposed activity has been determined to cause a measurable lowering in water quality. As Ecology identified the Board's proposed rule as likely to result in measurable change, the necessary and overriding concern of public interest assesses whether that lowering of water quality is in the necessary and overriding public interest. In other words, the analysis takes the impacts of the proposed rule as starting point, and considers whether the impacts to the public that would result from additional or expanded regulatory requirements (that would be necessary to prevent any lowering of water quality) would be sufficiently detrimental to the public interest to outweigh the public benefits of avoiding the reduction in water quality.

2.c.7 - Comment ID: QQQQ

Comment Summary – Relying on the economic analysis by Industrial Economics Incorporated for Ecology's necessary and overriding public interest analysis will lead to inaccurate determinations of costs and benefits which violates the Administrative Procedure Act.

Response

The Administrative Procedure Act (Chapter 34.05 RCW) does not apply to Ecology's Tier II analysis (which is directed by WAC 173-201A-320). The analyses required under Tier II do not assess the costs or benefits of the proposed rule itself as compared to the regulatory baseline. Comments regarding concerns with the Board's proposed rule and/or rulemaking process, including economic analyses, are beyond the scope of this Tier II analysis. Per WAC 173-201A-320(4), the analysis of necessary and overriding concern of public interest applies when a proposed activity has been determined to cause a measurable lowering in water quality. As Ecology identified the Board's proposed rule as likely to result in measurable change, the necessary and overriding concern of public interest assesses whether that lowering of water quality is in the necessary and overriding public interest. In other words, the analysis takes the impacts of the proposed rule as starting point, and considers whether the impacts to the public that would result from additional or expanded regulatory requirements (that would be necessary to prevent any lowering of water quality) would be sufficiently detrimental to the public interest to outweigh the public benefits of avoiding the reduction in water quality.

2.c.8 - Comment ID: VVVV

Comment Summary – The implementation of the proposed rule has significant impacts on Skagit County's economy and social well-being. Annually, Skagit County receives approximately \$9.5 million in taxes with \$169,175,000 in wages earned through the forest industry. The projected outcome from the cost benefit analysis is devastating to our rural communities. In Skagit County, the analysis done by the University of Washington shows approximately a 9,000 acre change in the amount of newly buffered Np streams, which equates to about 4-5% of our current harvestable acres (230 acres). Extrapolating out, this is far from being a "least

burdensome” outcome, it is not “in the overriding public interest” and it far exceeds the unsubstantiated benefits proclaimed by Industrial Economics Corp (IEc), in its report.

Response

The Administrative Procedure Act (Chapter 34.05 RCW) requirements related to “least burdensome” requirements do not apply to Ecology’s Tier II analysis (which is directed by WAC 173-201A-320(4)). The analyses required under Tier II do not assess the costs or benefits of the proposed rule itself as compared to the regulatory baseline. Comments regarding concerns with the Board’s proposed rule and/or rulemaking process, including economic analyses it completed pursuant to the APA, are beyond the scope of this Tier II analysis. Per WAC 173-201A-320(4), the analysis of necessary and overriding concern of public interest applies when a proposed activity has been determined to cause a measurable lowering in water quality. As Ecology identified the Board’s proposed rule as likely to result in measurable change, the necessary and overriding concern of public interest assesses whether that lowering of water quality is in the necessary and overriding public interest. In other words, the analysis takes the impacts of the proposed rule as starting point, and considers whether the impacts to the public that would result from additional or expanded regulatory requirements (that would be necessary to prevent any lowering of water quality) would be sufficiently detrimental to the public interest to outweigh the public benefits of avoiding the reduction in water quality.

Per the findings of the Tier II analysis, Ecology identified that the additional impacts could be significantly detrimental to the public interest as compared to the public gains of added certainty in avoiding lowering of water quality, as compared to the starting point of the impacts of the proposed rule that would still risk lowering water quality on some streams. This included consideration of impacts to stumpage taxes. Because the question of how impacts fall on specific counties is complex, we have expanded the “Stumpage Tax Revenues” discussion in the Necessary and Overriding Public Interest section of the Final Western WA Type Np Tier II Antidegradation Analysis to clarify data limitations and what determinations or observations about impacts at the county level can be made using available data.

d) Public involvement

2.d.1 - Comment IDs: KKKK, QQQQ

Comment Summary – Ecology’s Tier II analysis lacks transparency, has already been completed, and has not incorporated adequate public involvement. What will Ecology do with public comments on the draft Tier II analysis and how will comments be used to adjust or inform the analysis?

Response

Ecology submitted a memo to the Forest Practices Board on October 11, 2023 communicating the process that Ecology would follow for the Tier II analysis of the Board’s Type Np rulemaking package, including issuing the draft Tier II analysis for public review concurrent with the Board’s CR-102 rule package.⁷⁰ Ecology reminded the Board of this process in a January 24, 2025

⁷⁰ Ecology memo to Forest Practices Board. October 11, 2023.

memo⁷¹, and public presentation during the Board’s February 12, 2025 regular meeting.⁷² Ecology intends to evaluate and respond to all comments submitted and to utilize all applicable and relevant feedback to inform any necessary revisions to our draft Tier II analysis.

3. Economic analyses

a) Forest Practices Board’s economic analyses

3.a.1 - Comment IDs: JJ, III, PPP, ZZZ, WWW, KKKK, PPPP, QQQQ, VVVV

Comment Summary – Commenters express that the economic analyses conducted by Industrial Economics Incorporated (IEc) for the Forest Practices Board’s proposed rule is biased, lacks rigor, shows excessive uncertainty, ignored key factors like higher costs to small forest landowners, incorrectly categorizes costs as benefits, and violates Administrative Procedure Act requirements of identifying the least burdensome alternative. Commenters noted concern with the costs to benefits comparison IEc reported in the Board’s Cost Benefit Analysis and Small Business Economic Impact Statement, and concern with Ecology’s reliance on these economic analyses to inform the Tier II analysis. One commenter expressed concern about how IEc addressed the value of carbon and carbon credits. One commenter provided cost-benefit ratio calculations and alleged the benefits do not outweigh the costs as reported by IEc.

Response

Thank you for your comments. This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, and if so, whether that measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Concerns with the Board’s rulemaking process, including the Board’s economic analyses it completed pursuant to the Administrative Procedure Act, are beyond the scope of this Tier II analysis.

3.a.2 - Comment ID: KKKK

Comment Summary – We have requested that the Forest Practices Board re-initiate a proper CBA. Will you integrate a new CBA into the Tier II analysis? If so, how?

Response

Thank you for your comment. If the Board chose to work on issuing a new CR-102 rulemaking package for the protection of Western Washington Type Np waters, Ecology may need to adjust components of the draft Tier II analysis to reflect any new information presented in a new CR-102 package. This would all depend on any potential changes in any new CR-102 rulemaking package.

3.a.3 - Comment ID: KKKK

Comment Summary – On what basis does the Department of Ecology justify that the immediate asset forfeiture value of \$2.275B to private forest landowners, and downstream

⁷¹ https://dnr.wa.gov/sites/default/files/2025-05/bc_fpb_tierII_20250212.pdf

⁷² https://dnr.wa.gov/sites/default/files/2025-08/bc_fpb_ecy_tierII_20250212.pdf

impacts as high as \$6B are somehow less than some amorphous, feel-good qualitative benefits as stated in the CBA you are using to justify the Tier II Analysis for the Np rule?

Response

Thank you for your comment. A breakdown of the probable costs and benefits of the Board's proposed Np buffer rule can be found in Table ES-3 (page ES-6) of the Board's Final Preliminary Cost-Benefit Analysis (CBA).⁷³ We note that different costs and descriptions of benefits are expressed in the Board's CBA than what are expressed in this public comment. Per the necessary and overriding public interest determination process outlined in WAC 173-201A-320(4), Ecology is relying on the economic analyses in the Board's CR-102 rulemaking package to inform the Tier II analysis. The Board's Final Preliminary Cost-Benefit Analysis concluded that the probable benefits of the proposed Western Washington Type Np buffer rule likely outweigh the probable costs.⁷⁴ As we note in our draft analysis, under simplified scaling assumptions, we observed that, compared to the Board's proposed rule, a less-degrading 100ft buffer alternative would protect waters from degradation with higher certainty; however, this could at least double costs in comparison to the proposed rule, including lost land values, jobs impacts, and state revenues. While an expanded buffer would prevent or minimize the lowering of water quality on average with greater certainty than the proposed rule, we could not determine that it would increase benefits as consistently based on current scientific knowledge. The scale by which temperature related benefits would increase depends on site-specific and complex relationships between incremental buffer width, stream temperature, habitat, and affected species. The potential for the lowering of water quality under the proposed rule is likely in the public interest in avoiding these additional costs and uncertainties in the size of realized benefits.

b) Forestry Riparian Easement Program

3.b.1 - Comment ID: KKKK

Comment Summary – For small forest landowners in wetter regions of the state, timber harvest is no longer economically viable, therefore the Forestry Riparian Easement Program (FREP) cannot be used to address the economic impacts of the proposed Type Np buffer rule because FREP requires an adjacent harvest. Commenter expressed concern regarding the increased pressure on the FREP program if the Board adopts the Type Np buffer rule. Commenter expresses concern that an analysis of impacts to the FREP program and discussion with state legislators responsible for budget decisions are needed prior to advancing this rule. Commenter states that payments made through the FREP program more accurately represent willingness to pay estimates for ecosystem services in riparian buffers.

Response

⁷³ https://dnr.wa.gov/sites/default/files/2025-05/bc_fpb_typenp_rm_20250514.pdf

⁷⁴ Final Preliminary Cost-Benefit Analysis of the Proposed Type Np Buffer Rule. Industrial Economics Incorporated, April 23, 2025, p. 69.

Thank you for your comment. Comments regarding concerns of the Board’s proposed rule as it pertains to the Forestry Riparian Easement Program are beyond the scope of this Tier II analysis. Please see response to comment 2.c.6.

c) University of Washington economic analysis

3.c.1 - Comment IDs: WWW, KKKK, VVVV

Comment Summary – Commenters express concern regarding the economic impacts described in the University of Washington Report, “Economic Impact Analysis of the Proposed Forest Practices Riparian Buffer Rule Change for Type Np Streams in Western Washington.”⁷⁵

Commenters express concern that the costs estimated in this report are greater than the costs estimated in IEC’s Cost Benefit Analysis. One commenter expressed concern that the costs estimated in UW’s analysis do not justify the benefits proclaimed by Industry Economics Incorporated in the Board’s Cost Benefit Analysis.

Response

Thank you for your comments. Comments regarding concerns related to costs estimated by the University of Washington are beyond the scope of this Tier II analysis. Per the necessary and overriding public interest determination process outlined in WAC 173-201A-320(4), Ecology is relying on the economic analyses in the Board’s CR-102 rulemaking package (Cost-Benefit Analysis, Small Business Economic Impact Statement) to inform the Tier II analysis. Additionally, concerns regarding the Board’s rulemaking process, including the economic analyses it completed pursuant to the Administrative Procedure Act, are beyond the scope of this Tier II analysis.

d) Least burdensome alternative

3.d.1 - Comment IDs: JJ, III, PPP, TTT, UUU, ZZZ, JJJJ, PPPP, QQQQ, VVVV

Comment Summary – Ecology’s determination that benefits of the proposed rule exceed costs is arbitrary and fails to select the least burdensome alternative. Ecology’s action prevented the Forest Practices Board from selecting the least burdensome alternative required under the Administrative Procedure Act, RCW 34.05.328. Ecology ignored the requirement to find the least burdensome alternative.

Response

Thank you for your comments. The Final Preliminary Cost Benefit Analysis commissioned by the Forest Practices Board concluded that the probable benefits of the proposed Western Washington Type Np buffer rule likely outweigh the probable costs.⁷⁶ Our conclusion in the draft Tier II analysis is not that the benefits of the proposed rule exceed the costs, rather, the proposed rule meets the requirement to be necessary and in the overriding public interest. We

⁷⁵ <https://www.nrsig.org/projects/washington-forest-practice-buffers/files/Economic%20Impact%20Analysis%20of%20the%20Proposed%20Forest%20Practice%20Riparian%20Buffer%20Rule%20Change%20for%20Type%20Np%20Streams%20in%20Western%20Washington.pdf>

⁷⁶ Final Preliminary Cost-Benefit Analysis of the Proposed Type Np Buffer Rule. Industrial Economics Incorporated, April 23, 2025, p. 69.

determined this by conducting an analysis in accordance with WAC 173-201A-320(4) where we compared the proposed action to an alternative that would prevent measurable change to water quality with greater certainty. Comments pertaining to the Board's rulemaking process, including the economic analyses it developed pursuant to the Administrative Procedure Act (APA), are beyond the scope of this Tier II analysis. The APA (Chapter 34.05 RCW) does not apply to Ecology's Tier II analysis, which is directed by WAC 173-201A-320.

3.d.2 - Comment ID: FFFF, MMMM

Comment Summary - Ecology is not required to choose the "least burdensome" option, as some groups have misrepresented. The law requires Ecology to select the least degrading feasible option that protects water quality. That legal distinction matters, and Ecology must reaffirm its commitment to protecting Washington's high-quality waters as required by law.

Response

Thank you for your comments. The Administrative Procedure Act (Chapter 34.05 RCW) does not apply to Ecology's Tier II analysis, which is directed by WAC 173-201A-320.

Per WAC 173-201A-320(4):

Once an activity has been determined to cause a measurable lowering in water quality, then an analysis must be conducted to determine if the lowering of water quality is necessary and in the overriding public interest. Information to conduct the analysis must be provided by the applicant seeking the authorization, or by the department in developing a general permit or pollution control program, and must include:

Per WAC 173-201A-320(4)(b):

Information that identifies and selects the best combination of site, structural, and managerial approaches that can be feasibly implemented to prevent or minimize the lowering of water quality. This information will be used by the department to determine if the lowering of water quality is necessary.

4. Miscellaneous comments

a) Adaptive Management Program Type Np buffer alternatives

4.a.1 - Comment IDs: KKKK, PPPP, QQQQ, VVVV

Comment Summary - Ecology dismissed more cost-effective alternatives without analysis. Ecology constrained what buffer alternatives could be considered by the Type Np Technical Workgroup and manipulated the Forest Practices Board in its determination of what TFW Policy proposal would be acceptable for rulemaking without analysis of alternatives and additional proposals. Ecology's Forest Practices Board representative blocked consideration or analysis of any alternative rule approach.

Response

Thank you for your comments. Please see responses to comments 1.b.1 and 1.b.5. The Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would

cause measurable change to water quality, and if so whether that measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320.

b) Ecology authority with Forest Practices Board rulemaking

4.b.1 - Comment IDs: JJ, JJJJ, PPPP, QQQQ, WWWWW

Comment Summary – Ecology has misused its statutory and regulatory authority. This rulemaking process has been driven by regulatory overreach. The Forest Practices Board does not need Ecology’s agreement to develop rules, only to adopt them. Tier II does not give Ecology veto power over the science based adaptive management process directed by the Board under RCW 76.09.370. Ecology’s preparation of a Tier II analysis outside the adaptive management program usurps the Board’s authority and contravenes the Legislature’s direction that adaptive management is the vehicle to produce rule changes per RCW 76.09.370(6) and (7). Ecology’s overreach threatens the collaborative structure intended by statute. The Tier II analysis exceeds Ecology’s authority under RCW 76.09.040 and RCW 90.48.420.

Response

Thank you for your comments. WAC 173-201A-320 requires Ecology to conduct a Tier II analysis when a new or expanded action has been determined to cause a measurable change to water quality. Ecology is an active participant in the Forest Practices Adaptive Management Program and supports the adaptive management process as directed by the Board under RCW 76.09.370. Ecology views the Board’s proposed Western Washington Type Np buffer rule as consistent with recommendations resulting from the scientifically based adaptive management process established by rule of the Board, in accordance with RCW 76.09.370(6).

RCW 90.48.420(1) states that:

Adoption of forest practices rules pertaining to water quality by the forest practices board shall be accomplished after reaching agreement with the director of the department [of ecology] or the director’s designee on the board. Adoption shall be accomplished so that compliance with such forest practice[s] rules will achieve compliance with water pollution control laws.

RCW 76.09.040(1)(b) states that:

Forest practices rules pertaining to water quality protection shall be adopted by the board after reaching agreement with the director of the department of ecology or the director’s designee on the board with respect to these rules. All other forest practices rules shall be adopted by the board.

Comments specific to the decisions made by the Forest Practices Board are beyond the scope of this Tier II analysis. The Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, and if so whether that measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320.

c) RCW 90.48.420(1)

4.c.1 - Comment IDs: JJ, JJJJ, QQQQ

Comment Summary – Ecology’s Tier II analysis ignores the Legislature’s directive in RCW 90.48.420(1) to consider the “uses of the receiving waters, diffusion, down-stream cooling, and reasonable transient and short-term effects resulting from forest practices.”

Response

Thank you for your comments. Please see response to comment 1.b.6.

d) 2019 Water Quality Standards rulemaking

4.d.1 - Comment IDs: KKKK, RRRR

Comment Summary – The Board’s proposed Np buffer rule emerged from a premise that was forced into the Adaptive Management Program by Ecology after a 2019 Settlement Agreement with Northwest Environmental Advocates which removed the 2.8°C cumulative warming allowance for nonpoint sources like forest practices. Since the 2019 settlement agreement Ecology has asserted there can be no temperature change beyond 0.3°C following timber harvest. The interpretation of Tier II antidegradation requirements began to shift when it became clear that harvest treatments in the Hard Rock study were not resulting in widespread exceedance of designated use temperature standards. Ecology’s 2019 Cost Benefit Analysis for rulemaking changes to the Water Quality Standards including the removal of the 2.8°C warming allowance found there would be zero costs to the public. How does Ecology reconcile that finding with the major costs identified in Industrial Economics Incorporated’s (IEC’s) Cost Benefit Analysis for the Board’s proposed Np buffer rule? What is Ecology planning to do in response to IEC’s economic findings?

Response

Thank you for your comments. Please see response to comment 1.b.1 regarding Ecology’s consistent interpretation of Tier II antidegradation requirement and measurable change, defined as 0.3°C.

In 2019 Ecology made amendments to sections of the Surface Water Quality Standards as agreed to in the 2018 U.S. District Court Stipulated Order of Dismissal (Order) between NWEA, the EPA, and Ecology. In the Order, Ecology agreed to take action on several sections of the surface water quality standards by October 2021, including the following revisions:

- 1. Remove two sub-sections in the fresh and marine water temperature criteria related to an incremental temperature allowance from all nonpoint source activities.*

Based on Ecology’s 2019 Cost Benefit Analysis (CBA), there are a few reasons why the removal of the 2.8°C from the water quality standards had no costs or benefits. First is a comparison to baseline. Normally, the baseline would be a limit to temperature increases from all existing and potential nonpoint combined to 2.8°C, with the adopted rule removing that limit. However, Ecology’s 2019 CBA notes that since it was a legal requirement to remove that section, the

removal requirement itself is the baseline (i.e., the Agreed Order is part of the baseline).⁷⁷ Therefore, the change from baseline (remove this requirement) to adopted (requirement removed) is effectively the same, and therefore no costs or benefits are applicable. Ecology's 2019 CBA also notes that even if we ignore that legal requirement, the real world cost/benefit is still zero because Ecology never had cause to implement the 2.8°C allowance requirement.⁷⁸ The 2.8°C allowance had not been used because although it may be applicable to the combined effect of all nonpoint source activities in the water body including all existing and potential future actions, any future actions in high quality waters must still be reviewed for potential Tier II analysis. That is to say that the former 2.8°C allowable increase for existing and future potential sources did not supplant the Tier II rule requirement nor did it render irrelevant the 0.3°C measurable change analysis required for any single source. The antidegradation 0.3°C measurable change requirement is more protective when considering a new or expanded action and is a separate analysis than the 2.8°C for all combined actions.

Because there were no situations in which the 2.8°C analysis was needed, there was never any cost/benefit associated with the requirement to start as baseline, and therefore removing it is the same as it never having been there in the first place. This is different from the Forest Practices Board's proposed rule, where 1) there is a clear change between baseline and proposed rules; and 2) the Board's baseline rules have been implemented for many years.

For the Board's proposed Type Np buffer rulemaking, Ecology used information provided by the Board (the Cost-Benefit Analysis and Small Business Economic Impact Statement, both produced by Industrial Economics Incorporated) consistent with the WAC 173-201A-320(4) requirement for the "applicant seeking the authorization" to provide this information, to examine the potential impacts of additional regulatory requirements that would avoid reducing water quality with greater certainty. Ecology relies on the Board's economic analyses to inform statements in our Tier II analysis regarding the benefits and costs of the social, economic, and environmental effects associated with the lowering of water quality.

4.d.2 - Comment ID: KKKK

Comment Summary - The Ecology 2019 Cost/Benefit Analysis (CBA) for the rulemaking which gave effect to this Settlement Agreement provision stated that there would be no societal costs or benefits associated with the rule amendment. This finding does not align with the FPB's preliminary CBA for the proposed Np buffer rule making and it certainly doesn't align with the impacts generated using the UW Team's evaluation of current private forest land takings. This is perhaps why, at the last minute (April 24, 2025 Tier II preliminary findings memo from Ecology to the FPB), that Ecology modified their interpretation of antidegradation of Tier II waters to suggest the 0.3°C was a trigger and not a limit.

Response

Thank you for your comment. Please see responses to comments 1.b.1 and 2.c.8 and 4.d.1.

⁷⁷ Final Regulatory Analyses, Chapter 173-201A WAC Water Quality Standards for Surface Waters of the State of Washington, p.7. <https://apps.ecology.wa.gov/publications/documents/1910049.pdf>

⁷⁸ *Id.*, p. 10.

e) Forest Practices Habitat Conservation Plan's associated Biological Opinion

4.e.1 - Comment IDs: BBBB, HHHH, KKKK

Comment Summary – Commenters note that the Forest Practices Habitat Conservation Plan's (FPHCP's) Biological Opinion stated that warming of water was expected under the existing Forests and Fish rules. Commenters express concern that Ecology's position in the draft Tier II analysis to support the Board's proposed Type Np buffer rule is contrary to the FPHCP's Biological Opinion, which recognized potential for warming in Type Np waters and was promised to deliver fifty years of regulatory assurances.

Response

Thank you for your comments. We agree with the fact that the United States Fish and Wildlife Service (USFWS), in their May 16, 2006, Biological Opinion for the Forest Practices Habitat Conservation Plan, acknowledged that, "...along Type Np streams, reductions in shade are likely to continue to occur in site-specific situations and water temperature may increase over limited distances as a result of these unbuffered Type Np reaches."⁷⁹

We assert that while the USFWS made this statement during review of the Forests and Fish Type Np buffer rules, this fact does not alleviate the Forest Practices Rules from the requirements in RCW 90.48.420(1), RCW 76.09.010(2)(g), and WAC 222-12-010 regarding meeting state water quality standards, including protection of designated uses, narrative and numeric criteria, and antidegradation requirements.

4.e.2 - Comment ID: KKKK

Comment Summary – How do you plan to reconcile no measurable temperature change criteria with the clear acknowledgement and acceptance of change in Np streams identified in the FPHCP biological opinion?

Response

Thank you for your comment. Please see responses to comments 1.b.1 and 4.e.1.

f) HEAL Act

4.f.1 - Comment IDs: JJ, KKKK

Comment Summary – Commenters express concern that environmental health disparities and associated economic impacts have not been addressed in the draft Tier II analysis, and that compliance with RCW 70A.02, Environmental Justice (HEAL Act) is justified.

Response

Thank you for your comments. Addressing environmental health concerns in accordance with RCW 70A.02 is beyond the scope of this Tier II analysis. The action being considered (proposed Type Np buffer rule for Western Washington) is an agency action proposed by the Forest

⁷⁹ U.S. Fish and Wildlife Service Biological Opinion – Washington Forest Practices Habitat Conservation Plan. Part 1, p. 255. https://dnr.wa.gov/sites/default/files/2025-05/fp_hcp_usfws_bo_part_1.pdf

Practices Board, not Ecology. Ecology's Tier II analysis of the Board's proposed rule is not a significant agency action subject to RCW 70A.02.

g) Site specific approaches

4.g.1 - Comment IDs: VVV, KKKK, JJJJ, TTTT, VVVV

Comment Summary – Commenters express general concern with a one-size-fits-all approach to riparian buffer management and instead recommend site-specific strategies and targeted actions. One commenter noted that no-touch buffers can have a negative impact on forest understory, may inhibit species and structural diversity that enable complex habitats to develop, and may increase risk of wildfires. Another commenter recommended equipment be limited to hand operations only within site potential tree height buffers when appropriate. Another commenter asked Ecology to include site-specific approaches and solutions through the Board's Adaptive Management Program process. Specific recommendations included prioritizing areas for precision buffers to address degraded watersheds, applying site-specific multi-layered shade standards, and engaging in carbon markets.

Response

Thank you for your comments. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, and if so, whether that measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Comments regarding the design of the Board's proposed rule and the Board's general approach to riparian buffer management are beyond the scope of this Tier II analysis.

h) 303(d) listings

4.h.1 - Comment IDs: JJ, JJJJ

Comment Summary – Ecology's argument that the Board's proposed Type Np buffer rule may avoid costs from other potential regulations, such as those required under 303(d) listings and Total Maximum Daily Loads is speculative and coercive. One commenter noted that there is no empirical demonstration that increasing shade in small, headwater Np streams produce meaningful downstream temperature improvements in large receiving systems such as the South Fork Nooksack River.

Response

Thank you for your comments. As noted in the draft Tier II analysis (appendix C), in addition to TMDL reprioritization, existing Total Maximum Daily Loads that relied on the Forest Practices Rules may need to be revised if Clean Water Act (CWA) Assurances are withdrawn. Since the Forests and Fish agreement, Ecology has largely relied on deferring to the implementation of the Forest Practices Rules and Adaptive Management Program in lieu of modeling those areas and assigning actions to comply with load allocations in a TMDL. The intent of our discussion regarding potential loss of CWA Assurances is to help illustrate some of the uncertainties that would need to be investigated by Ecology, and to identify areas where potential costs would be likely, including potential costs in developing, revising, and reprioritizing TMDLs, and

compliance costs with implementing TMDLs. These potential costs are likely avoided by retaining CWA Assurances.

4.h.2 - Comment ID: JJJJ

Comment Summary – The Tier II analysis presented a narrative argument for allocation of sufficient shade on Type Np streams to conserve thermal regimes in the South Fork Nooksack River (p. 100-103). Specifically, the Tier II analysis stated: “Without a new Np buffer rule, there is potential for additional 303(d) listings for Np streams and other waters of the state (RCW 90.48.020) if water temperatures increase above water quality criteria” (p.101). The implicit argument is that increasing buffer extent and width will increase shade and decrease temperatures on Type Np waters (and, consequently, the temperature of water exported to Type F streams). We recognize that shade and stream temperature are related in many systems, and that riparian vegetation can serve to maintain desired thermal profiles in aquatic systems. In addition to the oft-noted association between shade and stream temperature, many research efforts document how factors not associated with forest management, including lithology, drainage area, elevation, and annual variation in climatic conditions, influence stream temperature (Boyd and Kasper 2003, Gomi et al. 2006, Reiter et al. 2020; Martin et al. 2021). In fact, the Tier II analysis attempted to match results from the Hard Rock and Soft Rock studies to other areas of the landscape based on these factors rather than canopy shade specifically.

Recent research evidence suggests strong associations can exist between forest management, stream temperature, and variation in stream discharge. For example, increased variation in precipitation regimes can lead to reduced stream discharge, particularly during the summer months in the Pacific Northwest of North America (an area where forecasts suggest summer droughts will increase in severity). Reduced stream volume may make small streams susceptible to warming even in the presence of buffers retained to provide full shading, possibly due to reduction and/or modification of hyporheic exchange. This possibility was ignored by the Tier II analysis. We urge consideration of how buffers, regeneration of upland harvest units, and climatic variation interact to influence stream discharge across the managed forest landscape, and potential consequences for stream temperature in watersheds of interest.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, and if so, whether that measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Near the end of the Tier II analysis, we do mention that:

additional CMER projects are currently underway that are likely to increase our understanding of stream temperature, changes in canopy cover, and amphibian use in headwater streams, including Temperature and Amphibians in Discontinuously Flowing Np Reaches, Extensive Riparian Status and Trends Monitoring Program – Riparian Vegetation and Stream Temperature, and the Riparian Characteristics and Shade Response project. Building from previous Type N studies by further increasing our collective understanding of upper headwater streamflow processes, including temperature response to forest practices treatments, should continue to be a priority for the program.

In particular, the Temperature and Amphibians in Discontinuously Flowing Np Reaches project could help inform how upland harvests influence stream flow and hyporheic exchange in headwater streams. However, providing a thorough analysis of the relationship of stream discharge to upland harvests in relation to stream temperature is beyond the scope of this Tier II analysis.

i) Biological effects

4.i.1 - Comment IDs: HHHH, JJJJ

Comment Summary - Commenters noted that the draft Tier II analysis failed to discuss other effects of forest management on aquatic habitat, such as the effect of changes to primary productivity that would occur under the proposed Type Np buffer rule.

Response

Thank you for your comments. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Discussing other effects of forest management, such as changes to primary productivity, is beyond the scope of this Tier II analysis.

j) Other comments

4.j.1 - Comment IDs: JJ, VVVV

Comment Summary – Ecology blurs the distinction between Tiers I, II and III of the antidegradation policy, violating the federal Clean Water Act's three-tier framework. Ecology appears to be interpreting Tier II waters as if they were Tier III waters.

Response

Thank you for your comments. We interpret the Tier II antidegradation requirements in WAC 173-201A-320 according to Ecology's Water Quality Program Guidance Manual: Supplemental Guidance on Implementing Tier II Antidegradation (publication no. 11-10-073). This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. For additional explanation of Ecology's interpretation of measurable change, please refer to responses to comments 1.b.1 and 1.b.6. Tier III protections are governed by WAC 173-201A-330.

4.j.2 - Comment ID: SSS

Comment Summary – How well has Ecology considered the effects of increased peak flows on habitat in this rule making?

Response

Thank you for your comment. The consideration of peak flows on habitat as a result of this rulemaking is beyond the scope of this Tier II analysis. This Tier II analysis focused on whether

the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320.

4.j.3 - Comment ID: SSS

Comment Summary – Commenter notes larger species are harmed by cutting 86% of a watershed which bear and elk need for cover. Commenter asks, where will bear and elk find sufficient cover when most of the watershed is removed?

Response

Thank you for your comment. Concerns regarding the effects on bear and elk resulting from timber harvest are beyond the scope of this Tier II analysis. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320.

4.j.4 - Comment ID: ZZZ

Comment Summary – The Tier II analysis conflicts with the legislative intent of RCW 76.09.370 regarding how proposed rule changes must maintain timber industry viability and further salmon recovery. Commenter requests the Tier II analysis be revised to explain how the Legislature framed the necessary and overriding public interest, regarding only recommending changes necessary to promote salmon recovery.

Response

Thank you for your comment. WAC 173-201A-320 requires Ecology to conduct a Tier II analysis when a new or expanded action is conducted under the authorization of an "other water pollution control program authorized, implemented, or administered by the department" where such proposed action has been determined to cause a measurable lowering in water quality. The necessary and overriding public interest process in the context of Tier II antidegradation is regulated by WAC 173-201A-320(4). The legislature was clear in RCW 76.09.370(6) that:

After the board has adopted permanent rules under subsection (2) of this section, changes to those rules and any new rules covering aquatic resources may be adopted by the board but only if the changes or new rules are consistent with recommendations resulting from the scientifically based adaptive management process established by a rule of the board.

The Board's proposed Western Washington Type Np Waters Buffer Rule is a direct result of recommendations resulting from the Board's own Adaptive Management process. The legislature was also clear in The Washington State Water Pollution Control Act, RCW 90.48.010:

It is declared to be the public policy of the state of Washington to maintain the highest possible standards to insure the purity of all waters of the state consistent with public

health and public enjoyment thereof, the propagation and protection of wild life, birds, game, fish and other aquatic life, and the industrial development of the state, and to that end require the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the state of Washington. Consistent with this policy, the state of Washington will exercise its powers, as fully and as effectively as possible, to retain and secure high quality for all waters of the state. The state of Washington in recognition of the federal government's interest in the quality of the navigable waters of the United States, of which certain portions thereof are within the jurisdictional limits of this state, proclaims a public policy of working cooperatively with the federal government in a joint effort to extinguish the sources of water quality degradation, while at the same time preserving and vigorously exercising state powers to insure that present and future standards of water quality within the state shall be determined by the citizenry, through and by the efforts of state government, of the state of Washington.

Also, Forest Practices Rules are required to meet state water quality standards, per RCW 76.09.010(g), RCW 90.48.420(1), and WAC 222-12-010. We assert that utilizing the best combination of approaches that can be feasibly implemented to prevent or minimize the lowering of water quality throughout watersheds is supportive of promoting salmon recovery and is consistent with the intent of the legislature.

4.i.5 - Comment ID: HHHH

Comment Summary – Commenter describes Ecology’s involvement with the development of a Habitat Conservation Plan (HCP) in Lewis County between 1998 and 2006 that resulted in Ecology not supporting the proposed HCP.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Comments regarding previous work related to other HCPs are beyond the scope of this Tier II analysis.

4.i.6 - Comment ID: HHHH

Comment Summary – Commenter requests Ecology suspend the draft Tier II analysis and work with the Forest Practices Community to develop a statement of need.

Response

Thank you for your comment.

WAC 173-201A-320 requires Ecology to conduct a Tier II analysis when a new or expanded action is conducted under the authorization of an “other water pollution control program authorized, implemented, or administered by the department” where such proposed action has been determined to cause a measurable lowering in water quality.”

Ecology will continue to evaluate Forest Practices Board rulemakings affecting water quality related requirements in the forest practices system for Tier II consideration whenever the Board proposes such rulemakings. This is consistent with the fact that Forest Practices Rules are required to meet state water quality standards, including antidegradation, per RCW 76.09.010(g), RCW 90.48.420(1), and WAC 222-12-010.

4.i.7 - Comment ID: JJJJ

Comment Summary – The draft Tier II analysis ignores the potential role of non-forestry management factors and fails to consider how changing precipitation patterns and reduced discharge could increase river temperatures even with high levels of shading. Thus, Ecology’s claim that the rule protects Tier I uses is unsupported.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. This analysis was limited in scope to the affected lands that would be subject to the Board’s proposed rule (Forest Practices Habitat Conservation Plan lands).

As we note in our draft analysis, the ability of the proposed buffer rule to help prevent streams from warming will be vital in streams that maintain narrow margins before numeric temperature thresholds are exceeded. For example, if a Type Np stream naturally flows near 15.8°C in a stream with an assigned numeric criterion of 16°C, the application of the proposed buffer rule will play an important role in helping to prevent the stream from warming beyond 16°C. Based on our analysis, we find that on average across the landscape the proposed rule is not likely to cause exceedances of applicable water quality numeric criteria, although we acknowledge that the effectiveness of each buffer scenario will vary due to regional differences and site-specific factors contributing to water temperature.

See comment 4.h.2 for response on stream discharge and temperature.

4.i.8 - Comment ID: JJJJ

Comment Summary - Ecology’s analysis doesn’t explain the basis or threshold for what it considers Tier II compliance versus noncompliance.

Response

Thank you for your comment. Compliance with Tier II antidegradation rules is described in WAC 173-201A-320(1) and (4). In short, whenever a water quality constituent is of higher quality than a criterion designated for that water, new or expanded actions that are expected to cause a measurable change in the quality of the water may not be allowed unless Ecology determines that the lowering of water quality is necessary and in the overriding public interest. Per WAC 173-201A-320(4), once an activity has been determined to cause a measurable lowering in water quality, then an analysis must be conducted to determine if the lowering of water quality is necessary and in the overriding public interest. Information to conduct the analysis must include a statement of the benefits and costs of the social, economic and environmental effects

associated with the lowering of water quality, and information that identifies and selects the best combination of approaches that can be feasibly implemented to prevent or minimize the lowering of water quality.

As we note in our analysis, additional buffer requirements beyond the proposed rule that are less likely to result in degradation would likely result in increased costs. However, despite providing the greatest water quality-related benefits (i.e., related to stream temperature directly or indirectly) to a subset of streams most at risk of degradation under the proposed rule, we cannot confidently assess the scale and scope of benefits using current knowledge. Therefore, the alternative 100ft continuous buffer, which provides the highest degree of certainty to prevent degradation across Type Np waters, may not currently be able to demonstrate the specific degree to which it better meets water quality standards as compared to the proposed rule, and whether the additional costs associated with the alternative buffer requirements are commensurate or necessarily feasible to achieve that high degree of certainty.

4.j.9 - Comment ID: RRRR

Comment Summary – Ecology uses a photo of a pristine fish stream in the Olympic National Park to promote a rule that targets small, non-fish bearing streams on private land which is misleading and erodes public trust.

Response

Thank you for your comment. We understand this comment is in reference to a photo of a forested stream in a blog post published by Ecology regarding forest practices in Washington State and the public comment opportunities associated with the draft Tier II analysis and the Board's proposed rule. The blog post is not part of this Tier II analysis.

4.j.10 - Comment ID: CCCC, WWWWW

Comment Summary – This rule sets a troubling precedent for all land use near water bodies in Washington, potentially impacting not just forestry, but agriculture, construction, and land development more broadly. If this interpretation of water temperature regulation becomes the norm, the regulatory burden will become unmanageable for landowners across the state. Options to address riparian habitat and water quality on agricultural lands are currently being addressed through various workgroups and the Voluntary Stewardship Program. These efforts focus on science-based decision-making which provides predictability for regulated landowners. By proposing significant new requirements without meaningful stakeholder education and engagement, the proposed rule undermines confidence in the process and places future agreements at risk of failure.

Response

Thank you for your comments. Please see response to comment 1.b.1. The Forest Practices Board's proposed Western Washington Type Np Waters Buffer Rule is a direct result of recommendations from the Board's own science-based Adaptive Management Program. We continue to support science-based decision-making and meaningful stakeholder education and

engagement to address riparian habitat and water quality on lands beyond the jurisdiction of the Forest Practices Habitat Conservation Plan.

4.j.11 - Comment ID: CCCC

Comment Summary - The proposed rule would have disproportionate burden on the hardwood industry since hardwoods such as red alder are more commonly found closer to creeks. If this rule was adopted, coupled with DNR producing far less than half the allowable cut of hardwood from state lands, it would create severe hardship on an industry currently struggling. As mills close, this results in longer haul distances to remaining mills, adding to carbon emissions – thus counteracting efforts to reduce carbon emissions as required by the state and administered by Ecology.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board’s proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. Concerns regarding the effect of the Board’s proposed rule on the hardwoods industry and carbon emissions are beyond the scope of this Tier II analysis.

Note that under “costs and benefits of a less degrading alternative” subsection “Infrastructure and supply chain” in the Tier II analysis, we discuss potential impacts to mills from the expansion of the Board’s proposed rule to a 100 foot buffer. We have also added a footnote in that section which speaks to a potential shift in emissions due to shifts in regional availability of timber and locations of sawmill operations.

4.j.12 - Comment ID: TTTT

Comment Summary – We suggest Ecology strengthen its commitment to the use of best available science and its protection of water quality by linking RMZ width explicitly to Site Potential Tree Height (SPTH), as recommended by the most recent guidance provided by the Washington Department of Fish and Wildlife. Ecology contributed to this guidance by providing funding and feedback on the draft documents. Ecology employees also participated in a technical advisory group that convened three all-day meetings over the course of the project. The Snoqualmie Tribe is concerned that Ecology’s support of the current proposed DNR rulemaking is inconsistent with the guidance published by WDFW – guidance that Ecology supported and helped create. Currently, WDFW recommends that RMZs be delineated by using the SPTH200 method. This method does not distinguish between non-fish and fish-bearing streams, as intact riparian areas are vital to protecting ecological function for all streams. This BAS, which was funded and reviewed by Ecology, results in no scientifically valid justifications for adopting narrower RMZ widths (which corresponds to higher likelihood of water quality impacts) regardless of the presence or absence of fish (Quinn, T., G.F. Wilhere, and K.L. Krueger, 2020). We recommend the adoption of the state-adopted BAS and the utilization of SPTH200 for determining management zone width for all stream types. Logging practices as currently allowed and designed are negatively impacting stream temperatures and water quality, however implementing regulatory RMZ widths determined by SPTH will help to preserve water

quality, reduce temperature rise in streams, and support other critical ecological functions such as providing woody debris and other organic materials to stream channels and riparian zones.

We appreciate your efforts to protect water quality and prevent temperature rise in Type Np streams and we believe the proposed rule is a step in the right direction. However, the Tribe recommends utilizing the state-endorsed Washington Department of Fish and Wildlife's guidance for calculating the width of Riparian Management Zones to best protect water quality and forest health. We also ask that the Washington Department of Ecology consider how the endorsement of this proposed rule is inconsistent with guidance set forth by their partner agency, WDFW. Please be consistent in applying Best Available Science across various land use zones.

Response

Thank you for your comments. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320.

The full 200-year site potential tree height buffer, as recommended by WDFW in Volumes 1 and 2 of the Riparian Ecosystems report, encompasses all riparian functions on streams of all sizes. The focus of this Tier II analysis is limited to impacts to temperature in small headwater streams in Western Washington. Concerns with the design of proposed buffer prescriptions put forward by the Forest Practices Board are beyond the scope of this Tier II analysis.

4.j.13 - Comment ID: UUUU

Comment Summary – The Confederated Tribes of the Colville Reservation appreciate the opportunity to engage in this important conversation and wish to emphasize the imperative for region specific consideration in the development and implementation of buffer rules, particularly as they may pertain indirectly to eastern Washington. Changes in timber industry practices resulting from the rule could influence market dynamics throughout Washington. Additionally, research and adaptive management arising from its implementation may be used to drive potential strategies for consideration in the Central Region.

Through decades of experience managing lands and waters on the Colville Reservation, we have witnessed firsthand the distinct environmental conditions that characterize eastern Washington. It is clear to us that the climate, vegetation, hydrology, and ecological functions on the east side of the state differ substantially from those found in western Washington. As such, we are concerned that the application of general rules across the state does not fully capture the needs or realities faced by our communities and ecosystems.

Eastern Washington is defined by a drier climate and lower precipitation. Our riparian zones are typically narrower, with sparser vegetation. In contrast, western Washington's lush, dense riparian vegetation supports wider buffers with different management objectives that may not translate effectively to our region. Central and Eastern Washington are also experiencing high

severity wildfire in riparian areas, with significant impacts in the areas burned on the Colville Reservation over the last decade.

The hydrological systems of eastern Washington streams tend to be simpler and carry lower flow volumes than those in the west. Our resource priorities often center on protecting water quantity, preventing erosion, and ensuring the sustainability of cultural and ecological resources. Wider buffers designed for western Washington's complex floodplains and salmon habitat may not reflect the unique needs of our streams and species, which require a tailored approach to management and protection.

The Confederated Tribes of the Colville Reservation advocate for region-specific studies and adaptive management practices that recognize and address the unique conditions of eastern Washington. We urge the Department of Ecology to work with the Forest Practices Board and tribal representatives in conducting thorough evaluations of buffer effectiveness, stream temperature, riparian habitat, and forestry impacts on aquatic life on the east side of the state.

Additionally, the cultural significance of our waterways and riparian areas cannot be overstated. Many of our pre-contact camps, resource gathering areas, and wildlife habitats rely on thoughtful buffer management to maintain both water quality and quantity. The stories of our elders, who have witnessed the ongoing impacts of logging, agricultural water extraction, and loss of beaver populations, underscore the need for careful, locally informed stewardship. It is crucial that any buffer rule applied to perennial non-fish waterways also safeguards these cultural and ecological resources for future generations.

Recommendations:

- Conduct region-specific studies to evaluate buffer rules in eastern Washington, considering local climate, vegetation, and hydrology.
- Modify or supplement the Adaptive Management Program to ensure eastern Washington's unique needs are met in a timely manner with growing risk to loss from wildfire.
- Engage tribal stakeholders and other local entities in decision-making processes to ensure the rules reflect our lived experience and environmental realities.
- Monitor the implementation and effectiveness of buffer rules and commit to revising them as new data emerge.
- Establish additional protections for Tribal cultural resources and recognize the intertwined nature of ecological and cultural stewardship.

Response

Thank you for your comments. While these comments are beyond the scope of this Tier II analysis, we support ongoing and future efforts in the Forest Practices Adaptive Management Program to conduct region-specific studies to evaluate riparian buffer rules specific to Eastern Washington. We also acknowledge the important differences in unique environmental conditions between Eastern and Western Washington. Ecology is committed to working with

Tribal stakeholders to address water quality issues and to support Tribal cultural resources in all regions of Washington State.

4.j.14 - Comment ID: BBBB

Comment Summary – The details of this Tier II analysis are mostly beyond my understanding and certainly beyond 99.9% of the family forest owners that are potentially impacted. When the governed don't have understanding or buy-in they logically conclude this is imply about bureaucratic power with no connection to solving any real problems.

I suspect it's hard to backtrack on an agency position at this late date. . . . but you must find a way to backtrack, if only to salvage some credibility for DOE.

Ecology once had all TFW Policy caucuses supporting efforts to provide more Np shade. . . a consensus that likely won't survive hard-liner interpretations of Tier II. Maybe Ecology does have the power to force the Board to triple current Np buffers, but the more important question Ecology should be asking is: Will alienating, or betraying Forests and Fish partners help, or hurt long term goals to better protect cool water?

The older and larger family forest owners are now considering the legacy of their forestlands. They are increasingly deciding they "have had it with this one-way street" purporting to be a collaborative and balanced goal called Forests and Fish. Reject this flawed analysis that is ultimately counter-productive to Ecology interests, and a betrayal of Forests & Fish.

Response

Thank you for your comments. We emphasize our continued support for the Forest Practices Adaptive Management Program, our Timber, Fish, and Wildlife partners, and the agreements and goals contained in the Forests and Fish Report. We also emphasize our continued support for the overall performance goals documented in Schedule L-1 of the Forest Practices Habitat Conservation Plan.

5) Support for the environment

a) General support for the environment and draft Tier II analysis

5.a.1 - Comment IDs: CCC, KKK, MMMM, SSSS

Comment Summary – Commenters expressed broad support for the environment, including expanding riparian buffer zones for non-fish streams. Commenters noted support for the Draft Tier II Analysis for the Forest Practices Board's proposed Type Np Buffer Rule for Western Washington.

Response

Thank you for your comments.

5.a.2 - Comment ID: MMMM

Comment Summary – The Tier II review is not only appropriate but necessary to ensure Washington upholds its legal obligations under state water quality standards and the Clean Water Act. The Adaptive Management Program has demonstrated, and all participants have

agreed, that existing Type Np buffers fail to meet water quality standards. Reinforcing that point, decades of research show that current 50-foot buffers do not protect water quality. Ecology has both the responsibility and authority to determine whether forest practice regulations meet water quality standards, and in this case, that requires a Tier II analysis.

Ecology is applying Tier II correctly. When forest practice rules are updated, Ecology must ensure the new rule protects high-quality waters. This is a legal requirement under Washington's antidegradation policy and consistent with Ecology's 2011 guidance on forestry rule updates. While existing rules were presumed to meet water quality standards, this is a new rule update, and therefore Tier II review is necessary.

The Forest Practices Habitat Conservation Plan and Adaptive Management Program were built on the principle of continuous improvement. This program was designed to evolve forest rules when science shows a need. Field research and monitoring clearly demonstrate that current buffers are insufficient. The proposed rule reflects the best available science and adaptive management principles, ensuring that updated protections are both scientifically justified and legally enforceable.

Tier II review strengthens, rather than obstructs, adaptive management by adding accountability and transparency. It ensures that improvements meet water quality standards. Ecology's current review is fully consistent with its long-standing position that new or revised rules must be evaluated under Tier II. While technical details may have been difficult for some stakeholders to interpret, Ecology's interpretation of Tier II requirements has remained consistent, and this review continues that framework.

Public confidence depends on transparency and scientific integrity. Strong protections for headwater streams are widely supported because they improve water quality and sustain downstream habitat.

This process is not a barrier to adaptive management but an essential safeguard to ensure new rules meet water quality requirements. We urge Ecology to complete a thorough, science-based Tier II analysis so Washington can fulfill its commitments to balanced resource protection.

Response

Thank you for your comments.

5.a.3 - Comment ID: IIII

Comment Summary – Commenter notes the proposed rule brings practices on private land into greater alignment with existing rules for logging on public lands. Commenter notes Ecology's draft Tier II analysis confirms that adding buffer requirements to privately owned working forests would reduce both water temperature and erosion. Commenter notes Ecology's Watershed Health Monitoring Project shows there is still significant work to be done to improve our state's stream conditions.

Response

Thank you for your comments. To clarify, our Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, focused on potential temperature increases of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest. We did not evaluate the effect of the proposed rule on reducing erosion.

5.a.4 - Comment ID: JJJJ

Comment Summary - Explain Ecology's direction and determinations made during adaptive management regarding Tier II compliance when no proposed rules were before the Board.

Response

Thank you for your comment. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. This comment is outside the scope of this Tier II analysis.

5.a.5 - Comment ID: EEEE

Comment Summary – The state's Forest Practices Rules for private lands are governed by a Habitat Conservation Plan developed under the Forests and Fish agreement. The plan is designed to ensure compliance with federal laws which require maintaining the health of our waters and the living things who use them. A critical part of the plan requires continual evaluation to ensure the rules are working. If the rules are not working, the plan requires adaptive management to improve them. Type Np streams cover the majority of stream length in our state and drain directly into fish-bearing streams – they are critical for downstream water quality. Under current rules, Type Np streams can be clearcut up to the streambank along half their length. When these rules were adopted many expressed concern about the adequacy of these buffers, and Ecology shared those concerns but accepted the rules because of the adaptive management provisions. Within a few years of adoption, evidence began to cast doubt on those rules, so more than 20 years ago formal studies began to be designed. In 2018, the Hard Rock study was presented to the TFW Policy Committee which agreed by consensus that the rule needed to be updated. Seven years later, we are finally approaching the end of a long road to an improved, science-based rule.

There has been push back from interests connected with timber revenues, claiming the process and science were flawed. However, those folks were at the table and gave consent while studies were designed, conducted and submitted – accepting the need for action by consensus decision of TFW Policy Committee in 2018.

The proposed rule takes into account variations in basin size, bankfull width and harvest strategy. More targeted variations are possible, and we can always say there is a need for more study or that a rule is too broad and ignores site-specific conditions. Ecology says in the draft Tier II analysis that more study can help to fine-tune the regulations, which are designed to change as science and environment change.

This Np rule change is the first real test of the adaptive management program and if we collectively fail this test, Ecology will be forced to scuttle the Forest Practices Habitat Conservation Plan and start from square zero. This proposed rule is a good step toward protecting aquatic resources.

Response

Thank you for your comments.

5.a.6 - Comment ID: FFFF

Comment Summary – We appreciate Ecology’s commitment to ensuring that Washington’s high quality waters are maintained and protected, as required under state water quality standards and the Clean Water Act. The Tier II analysis is both lawful and necessary. When Forest Practices Rules are updated, Ecology is legally obligated to ensure that changes maintain high-quality waters. This process is consistent with Ecology’s 2011 guidance on forestry rule updates and reflects longstanding agency interpretation, not a change in position.

The timber industry’s assertion that this review is “illegal” is inaccurate. Forest Practices rules have never been exempted from Tier II analysis. Existing rules have historically been presumed to meet Tier II requirements through the Adaptive Management Program and Schedule L-1, and the proposed Type Np rule is a new update. Under law, new or revised rules must undergo Tier II review to confirm they continue to meet water quality standards at the landscape scale.

The Adaptive Management Program was designed precisely for situations like this – where science shows a need for stronger protections. Decades of research demonstrate that wider buffers are essential to maintaining ecological function and downstream water quality. Research and monitoring support these improvements and Tier II review ensures they are implemented in a way that fully meets water quality standards. We urge Ecology to affirm its legal obligation to apply Tier II review to new or updated Forest Practices Rules, recognize the strong scientific foundation for the proposed rule, and ensure the rule reflects the least degrading feasible option to protect high quality waters.

Response

Thank you for your comments.

5.a.7 - Comment ID: KKK

Comment Summary – I appreciate family forests and landowners who sometimes protect more than 75 feet. Public interest includes environmental impacts, with emphasis on protection, restoration, and recovery of threatened and endangered species; environmental justice; implications for public health and safety; aesthetic, recreational, and economic effects; and impacts on public resources. The public interest can also be presumed to be reflected in watershed plans, groundwater area management, water supply plans, water conservation plans, Ecology’s rules, and local land use plans and development regulations. I understand Tier II is done because logging in riparian zones lowers water quality. The lowering of water quality won’t be 100% prevented by just a 75ft buffer (page 52 of draft Tier II analysis), and a 100ft buffer would reduce the likelihood of degradation.

Salamanders, such as the Van Dyke salamander occupy logs near streams, and steelhead may also benefit from watershed protections. Harvesting 180 meters away from a stream may affect microclimate, including soil temperatures, and red-legged frogs need cool moist soil in summer.

The rule change allows 85% harvest and a 75ft buffer. There is some evidence that we need to leave more than 85%. A measurable increase in peak flow is detected if as little as 29% of a watershed is cut (Grant et al 2008). Excessively high winter flows displace coho juveniles. Research on Kennedy Creek showed there can be scour and fill (and chum egg mortality) during a peak flow interval of 1.4 years.

Please consider how timberland owners make more money for stumpage when demand is high. A June 2025 report by DNR says that timberland owners can usually wait to harvest until prices get better. A 75ft buffer does not jeopardize the economic viability of the timber industry while contributing to measures to meet salmon recovery (RCW 76.09.370).

In 2021 the governor said we would establish a statewide standard for fully functioning riparian habitats where these areas are critical to maintain cool water – and prioritize funding for streamflow and floodplain habitat.

Clearcuts that harvest 85% of a watershed may not help huntable wildlife like bear and elk. It is in the public interest to maintain huntable populations of game. Please protect the revenue generated from hunting and fishing and outdoor recreation. In 2022, \$630 million in tax revenues were generated from hunting, fishing and wildlife recreation in Washington, dwarfing the ~\$35 million in revenues distributed to counties from timber excise taxes.

Response

Thank you for your comments.

5.a.8 - Comment ID: SSSS

Comment Summary – While we are concerned the proposed rule may increase stream temperatures in some instances, the Swinomish Tribe strongly supports the outcomes of the Tier II analysis and urges Ecology not to waver in its determination to enforce strong water quality rules in forest lands despite industry pressure. The best available science synthesized in the Tier II report demonstrates unequivocally the need for increased buffer length and width on Np streams. Spurious interpretations of the antidegradation standard should be rebutted, and Ecology plays a key role in defending the integrity of the Adaptive Management Program.

The best available science performed over a number of years is robust and clearly shows that riparian buffers on Np streams need to be longer and wider. It is essential Ecology defend this best available science. Industry lobbying groups have used spurious technical arguments to cast doubt on the Hard and Soft Rock studies. However, both peer-reviewed studies demonstrated unequivocal increases in stream temperature following harvest in locations proximal to the experimental clearcuts as well as in downstream locations where fish may be present. The latter point is of great importance to us given our Tribe’s key economic, subsistence, and cultural interests in the fisheries supported by high quality water.

Chief among industry’s technical complaints is that the Hard and Soft Rock studies consisted of only a handful of study locations and therefore findings should not be extrapolated to western

Washington. Consistent with this is their insistence that rulemaking should not proceed before studies are conducted using an ‘extensive monitoring’ design. Ecology should reject these spurious complaints. AMP participants, including industry representatives, chose the before-after-control-impact (BACI) study design for the Hard and Soft Rock studies because of the ability of this design to isolate the effects of timber harvest from other sources of variability in stream temperature. As an ‘intensive monitoring’ design, it was necessary to restrict the number of sites due to staffing, access, and other logistical and financial constraints. If an extensive landscape-scale approach had been pursued, the sources of variability introduced by the abundance of site-specific factors at each study site would have precluded a determination of the effect size of timber harvest on stream temperature. In that situation, industry would now be arguing from the other side, pointing out the limitations of extensive monitoring and demanding new studies following the BACI approach to demonstrate effect size.

The summary presented in Ecology’s tier II analysis is thorough, represents high-quality multi-stakeholder efforts, and clearly demonstrates the need for larger buffers to meet anti-degradation standards and achieve water quality for salmon. Therefore, we urge Ecology to strongly defend the science and reject industry’s baseless attempts to undermine it.

Following the release of Ecology’s draft tier II antidegradation analysis, industry representatives argued in oral comments before the Forest Practices Board that the report demonstrated an admission by Ecology that a 0.3°C change in stream temperature represented a threshold for additional analysis, not a limit that may never be exceeded. This debate references WAC 173-201A-320, which defines tier II protections, the measurable change standard of 0.3 °C, and the necessary and overriding public interest analysis required when the measurable change standard is expected to be violated by a new or expanded action.

It is industry’s contention that the inclusion of a necessary and overriding public interest analysis in the draft tier II report constitutes an admission that the measurable change standard may be exceeded if Ecology deems it to be in the public interest. Industry further contends that the current Np buffer rule, or the rule proposed by the minority caucuses during dispute resolution, could be evaluated and found to be in the public interest despite allowing stream temperature increases.

The idea that the current rule and/or the minority proposed rule could be in the overriding public interest and should therefore be considered by the Board is an illogical extrapolation and should be strongly rebutted by Ecology. TFW Policy cannot knowingly develop, and the Board cannot knowingly sanction, a rule that violates state water quality standards.

Best available science strongly supports the finding that continuation of the current rule or enactment of the minority proposed rule would violate the measurable change standard by raising stream temperatures above the 0.3° threshold. Therefore, the Board’s decision to consider only the majority proposal represented a good faith effort to enact a rule consistent with state water quality laws. Ecology’s overriding public interest analysis follows this good faith effort but cannot be used to justify proposals that clearly violate the measurable change standard. We believe Ecology should clearly articulate this dynamic related to the antidegradation standard and the overriding public interest analysis.

The Tribe calls on Ecology and our partners to renounce legal threats to the Np buffer rulemaking process and disavow efforts to undermine the scientific findings produced by the multi-stakeholder AMP. These and other components of public pressure campaigns aimed at Ecology, the Forest Practices Board and the Department of Natural Resources seek to undermine the efficacy of adaptive management and therefore the Forest Practices Habitat Conservation Plan. These tactics should be strongly rejected.

Further, we are concerned these dynamics may threaten the Timber, Fish, and Wildlife Agreement, which forms the basis for tribal inclusion in regulating forest practices in Washington. Ecology has the duty to protect and restore the State's water quality and enforce the Clean Water Act, and thus plays a critical role in maintaining an effective regulatory environment for water quality protections. It is imperative that Ecology strongly and clearly rebut the baseless claims of scientific inadequacy and misinterpretations of the antidegradation standard.

We commend Ecology for your leadership on the Np buffer issue, and urge you to continue to push for strong water quality rules in Np streams for the benefit of salmon, the Swinomish Tribal Community and all the people of Washington State.

Response

Thank you for your comments. Compliance with Tier II antidegradation rules is described in WAC 173-201A-320(1) and (4). In short, whenever a water quality constituent is of higher quality than a criterion designated for that water, new or expanded actions that are expected to cause a measurable change in the quality of the water may not be allowed unless Ecology determines that the lowering of water quality is necessary and in the overriding public interest. Per WAC 173-201A-320(4), once an activity has been determined to cause a measurable lowering in water quality, then an analysis must be conducted to determine if the lowering of water quality is necessary and in the overriding public interest. Information to conduct the analysis must include a statement of the benefits and costs of the social, economic and environmental effects associated with the lowering of water quality, and information that identifies and selects the best combination of approaches that can be feasibly implemented to prevent or minimize the lowering of water quality.

As we illustrate in our draft analysis, based on review of best available science, we find the Board's proposed rule is representative of an alternative that selects the best combination of approaches at this time that can be feasibly implemented at the landscape scale (Western Washington) to prevent or minimize the lowering of Type Np water quality. The remaining level of risk of exceeding Tier II measurable change temperature thresholds in some areas is necessary and in the public interest to meet administrative requirements for rulemaking (by meeting statutory goals and objectives with least burden) and to avoid potentially significant additional costs to landowners, and resulting impacts to employees, businesses, and local governments. The cost benefit analysis developed for the proposed buffer rule, which is associated with the lowering of water quality, demonstrates the proposed rule strikes the balance in ensuring the probable benefits likely outweigh the probable costs with respect to social, economic, and environmental effects given current scientific knowledge.

b) Additional riparian buffer protections

5.b.1 - Comment IDs: KKK, LLLL, TTTT

Comment Summary – Commenters recommend improving water quality conditions and/or general aesthetics of timber harvests by establishing buffer prescriptions for Np streams that require wider riparian management zones than what is currently proposed by the Forest Practices Board. One commenter recommended 75ft buffers for all Type Np streams, another recommended buffers equal to one 200 year site potential tree height, and another commenter asked Ecology to leave additional trees outside a 75ft buffer.

Response

Thank you for your comment. The Forest Practices Board establishes rules that govern the riparian zone widths on forestlands subject to Forest Practices Rules (WAC 222) and the Forest Practices Habitat Conservation Plan. Ecology's Draft Tier II Analysis was developed for the purpose of evaluating the proposed Type Np buffer rule that the Board moved forward for public review, in accordance with Tier II antidegradation requirements in WAC 173-201A-320 and to ensure the rule meets water quality standards.

6) Comments on Forest Practices Board's proposed rule

a) Support for proposed rule

6.a.1 - Comment IDs: A, G, H, I, J, K, L, M, N, O, P, Q, R, S, U, V, W, X, Y, Z, AA, BB, CC, DD, EE, FF, GG, HH, II, KK, LL, MM, NN, OO, PP, QQ, RR, SS, TT, VV, WW, XX, AAA, DDD, EEE, GGG, QQQ, RRR

Comment Summary – Commenters support the Forest Practices Board's proposed rule and/or broadly support expanding riparian buffers. Commenters did not provide any comment regarding Ecology's Draft Tier II Analysis.

Response

Thank you for your comments. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality, defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. It is beyond the scope of this Tier II analysis to respond to comments directed at the Board's proposed rule only.

b) Opposition to proposed rule

6.b.1 - Comment IDs: D, E, F, UU, CCCC, DDDD, NNNN

Comment Summary – Commenters oppose the Forest Practices Board's proposed rule. Commenters did not provide any comment regarding Ecology's Draft Tier II Analysis.

Response

Thank you for your comments. This Tier II analysis focused on whether the Forest Practices Board's proposed Type Np buffer rule would cause measurable change to water quality,

defined for temperature as an increase of 0.3°C or greater, and if so, whether such a measurable change is necessary and in the overriding public interest, in accordance with WAC 173-201A-320. It is beyond the scope of this Tier II analysis to respond to comments directed at the Board's proposed rule only.

Appendix A-1. List of Commenters

Table 1: Commenter Identification

Comment ID	Name or Signatory	Organization/Entity
A	Jeremy Miller	Individual
B	Max Bliss	Individual
C	Terrence Flatley	Individual
D	James Campbell	Individual
E	Robert Winslow	Individual
F	Eric Wisti	Individual
G	Craig Zora	Individual
H	Annie Roberts	Individual
I	John DiMarchi	Individual
J	Mary Foster	Individual
K	Donna Albert	Individual
L	Mari Mennel-Bell	Individual
M	Deborah Harrison	Individual
N	Susan Crampton	Individual
O	Kristin Lillegard	Individual
P	Ann Dorsey	Individual
Q	Jay Oak-Schiller	Individual
R	Lynne Ashton	Individual
S	Prana Briggs	Individual
T	Sage	Individual
U	Hal Enerson	Individual
V	Lori Erbs	Individual
W	Anonymous	Individual
X	Minerva Hodis	Individual
Y	Deborah Battisti	Individual
Z	Shannon Ozog Somes	Individual
AA	Sheela Word	Individual
BB	Michael Siptroth	Individual
CC	Derek Dexheimer	Individual
DD	Lisa Dekker	Individual
EE	Nancy Zahn	Individual
FF	Sophia Keller	Individual
GG	Lauren Beard	Individual
HH	Rebecca Winn	Individual
II	Eleana Pawl	Individual
JJ	Dave Roberts	Individual

KK	Cheyenne Tuller	Individual
LL	Jacob Veal	Individual
MM	Cassie Zsenits	Individual
NN	Sage Mailman	Individual
OO	Jonathan Larson	Individual
PP	Taylor P	Individual
QQ	Mallory	Individual
RR	Alexis Basballe	Individual
SS	Peter Stedman	Individual
TT	David Toler	Individual
UU	Joseph Murray	JMurray Forestry
VV	Connie Barron	Individual
WW	Michael Jimenez	Individual
XX	Charles Creed	Individual
YY	Ann Dorsey	Individual
ZZ	David Onstad	Individual
AAA	Emily	Individual
BBB	Anonymous	Individual
CCC	Joan Beldin	Individual
DDD	Mike Doherty	Individual
EEE	James Wesley	Individual
FFF	Jeffrey Mocniak	Individual
GGG	Jim Byrne	Individual
HHH	Lisa Belleveau	Individual
III	Nancy Churchill	Individual
JJJ	Jeanette Burrage	Individual
KKK	Bonnie Blessing	Individual
LLL	Bonnie Blessing-Earl	Individual
MMM	Anonymous	Individual
NNN	Sally Keely	Individual
OOO	Beverly Myers	Individual
PPP	Erik Nelson	Individual
QQQ	Barbara Kinsey	Individual
RRR	Walter Roslan	Individual
SSS	Warren Kronenberg	Individual
TTT	Loni Simone	Individual
UUU	Randal Stevenson	Individual
VVV	Aimee Powell	Individual
WWW	Victor Musselman	Washington Farm Forestry Association
XXX	Steve Stigar	Individual
YYY	Ann Stinson	Washington Farm Forestry Association
ZZZ	John Gold	Sierra Pacific Industries

AAAA	Ed Chad	Individual
BBBB	Ken Miller	Washington Farm Forestry Association
CCCC	Washington Hardwoods Commission	Washington Hardwoods Commission
DDDD	Gene Strong	Board of County Commissioners of Wahkiakum County
EEEE	Brian Grad	Olympic Climate Action Board of Directors
FFFF	Brel Froebe	Center for Responsible Forestry
GGGG	Mike Town	Sierra Club
HHHH	William Vogel	Washington Farm Forestry Association/Larch Environmental, LLC
IIII	Kim Ngo	Issaquah Alps Trails Club
JJJJ	Darin Cramer	Washington Forest Protection Association
KKKK	Elaine Oneil	Washington Farm Forestry Association
LLLL	Nathan Baker	Friends of the Columbia Gorge
MMMM	Rico Vinh	Forests & Fish Conservation Caucus
NNNN	Ranie Haas	Washington State Tree Fruit Association
OOOO	Court Stanley	Washington State Association of Counties
PPPP	Jason Williams	IAM W130
QQQQ	Doug Hooks	Washington Forest Protection Association
RRRR	Cindy Mitchell	Washington Forest Protection Association
SSSS	Amy Trainer	Swinomish Indian Tribal Community
TTTT	Michael Ross	Snoqualmie Tribe
UUUU	Jarred-Michael Erickson	Confederated Tribes of the Colville Reservation
VVVV	Lisa Janicki, Ron Wesen, Peter Browning	Skagit County Board of Commissioners
WWWW	John Stuhlmiller	Agricultural Organizations of Washington: Far West Agribusiness Association, Northwest Agricultural Cooperative Council, Save Family Farming, Washington Association of Wheat Growers, Washington Cattle Feeders, Washington Cattlemen's Association, Washington Friends of Farms and Forests, Washington Potato and Onion Association, Washington State Dairy Federation, Washington State Farm Bureau, Washington State Sheep Producers, Washington State Tree Fruit Association, Washington State Water Resources Association, Washington Winegrowers Association, Whatcom Family Farmers, Yakima County Cattlemen's Association, Yakima-Klickitat Farm Association

Appendix A-2. 2006 Ecology Antidegradation Memo and 2006 DNR Strategy for Attaining Water Quality Standards and Implementing SSHB 1095 Memo



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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April 27, 2006

FROM: Dave Peeler, Department of Ecology, Water Quality Program Manager
TO: Tom Laurie, Department of Ecology, Forest Practices Board Designee,
SUBJECT: Ecology Water Quality Program concurrence with small land owner RMAP
permanent rule adoption and implementation strategy, May 10, 2006

Below is a statement of Ecology's Water Quality Program's concurrence with the Forest Practices Board's proposed rule amending small forest landowners' requirements under the Road Maintenance and Abandonment Plan (RMAP) rules.

Background

The small landowner RMAP responds to concerns about the burden on small forest landowners to comply with the RMAP process. This proposal involves amending Title 222 WAC, Forest Practices, to limit the burden on small forest landowners from forest road maintenance and abandonment planning requirements. The legislature directed the Forest Practices Board (FPB) to adopt a rule consistent with Chapter 311, Laws of 2003, effective May 14, 2003.

The change in this rule moves the burden for achieving compliance with the road maintenance and abandonment portion of the forest practices rules by 2016 from the small forest landowner to the state. Instead of requiring all small forest landowners to submit a RMAP, only those that harvest are required to fill out a checklist RMAP on that portion of their property being harvested. The rule change does not remove the requirement for roads to be in compliance by 2016. However, for those small landowners who do not harvest prior to 2016, the state will receive no information about the condition of their roads, which will make assessing the level of compliance extremely difficult. Small forest landowners are not required to replace a culvert until it is a priority in a given basin, and can apply for financial assistance to the fish passage program.

Environmental Impact Statement

According to the Environmental Impact Statement (EIS), these rule changes increase the risk to the resource. For example, there is no basis to believe that all small forest landowners will harvest on all acreages before 2016. Although the legislature has provided substantial funding for contributing to the replacement of culverts, the Washington Department of Fish & Wildlife (WDFW) has not been funded to complete a total inventory of those culverts to prioritize by watershed.

RMAP Implementation Strategy to Address Risk

To minimize this risk, the Department of Natural Resources (DNR) has committed to three strategies (see Herman's memo of April 26, 2006).

1. DNR, along with WDFW and Ecology, will provide education and outreach to small forest landowners on roads and culverts.



2. DNR will assess the many RMAPs submitted by small forest landowners, before these rule changes, and compare them with the findings from compliance monitoring in 2007. DNR will also estimate the total number of unaddressed road related problems. This assessment will give the FPB an idea of the percentage of small forest landowner roads out of compliance and what the overall compliance rate is.
3. CMER will be conducting research on the effectiveness of Best Management Practices (BMPs) associated with roads. This study will include small forest landowners and the data will also give an insight to progress towards identifying and repairing roads.

The information brought together from the sources identified above will be used as a basis for DNR's report to the legislature in 2008 and 2013 on the effectiveness of this strategy. Ecology and WDFW will have a part in developing and reviewing these reports. If the strategy does not seem to be working, Ecology expects that the DNR will notify the legislature and recommend solutions.

Road compliance relies on BMPs, but they are also performance-based. If the resulting implementation of the rules does not achieve compliance with water quality standards, additional requirements may need to be developed through the adaptive management process, in addition to the reports to the legislature. Just as the adaptive management process will be used to determine whether changes to the forest practices rules are necessary as the water quality standards change, so too will it be necessary to use this process to determine changes required if the new small forest landowners RMAP strategy is not successful.

Conclusion

Concurrence of the Department of Ecology is required for adoption of Forest Practices Rules that affect water quality. Ecology's Water Quality Program finds that the proposed Small Landowner RMAP permanent rule, together with the strategy outlined above and detailed in Jed Herman's memo of April 26, 2006, meets the requirements of the Clean Water Act and state water quality standards. This finding is based on the following:

- The commitment that compliance monitoring will proceed in a timely way.
- Our expectation that recommendations will be proposed to the legislature if monitoring shows that application of this rule change is not moving toward compliance with the Clean Water Act and state water quality standards, including anti-degradation.

We appreciate the opportunity to work with the Board, DNR staff, the stakeholder group, and the general public in developing this permanent rule package.

cc: Forest Practices Board & Liaisons

Enclosure



April 26, 2006

MEMORANDUM

TO: Stephen Bernath and Helen Bresler, Water Quality Program
Department of Ecology

FROM: *JDH* Jed Herman, Forest Practices Program
Department of Natural Resources

SUBJECT: Strategy for Attaining Water Quality Standards and Implementing SSHB 1095

This is in response to your comments dated December 16, 2005 on the draft economic and environmental analyses on proposed forest practices rules regarding small forest landowner road maintenance and abandonment planning. To assist the Department of Ecology's anti-degradation evaluation of the proposal, the following is a description of our strategy for implementing the provisions of Second Substitute House Bill (SSHB) 1095 and meeting water quality standards related to forest roads on small landowner properties.

BACKGROUND

The Washington State forest practices laws and rules are designed to ensure that forest practices performed on private and state-owned forest lands protect public resources, including water quality. They are also designed to ensure the economic viability of the timber industry.

In response to declining fish stocks throughout Washington State, the 1999 Legislature directed the Forest Practices Board to amend the state forest practices rules protecting aquatic resources, strongly encouraging the Board to follow recommendations set forth in the 1999 Forests and Fish Report to the Board dated April 29, 1999. (Engrossed Substitute House Bill 2091) The Board responded by adopting emergency rules consistent with the Forests and Fish Report (effective 3/20/2000) and later adopted permanent rules that became effective on 7/1/2001.

This legislation, commonly referred to as "Forests and Fish", required forest road planning to meet standards that prevent mass wasting, delivery of sediment, and blockages to fish passage. All roads associated with forest practices are to meet those standards by 2016. It also specified that the rules consistent with the Forests and Fish Report and any new rules covering aquatic resources could be changed only under the following circumstances: 1) changes must be consistent with the scientifically based

adaptive management process; 2) changes ordered by court; or 3) changes in future state legislation. (RCW 76.09 370(6))

In 2003, the Legislature exercised that prerogative. It acknowledged that the planning and implementation aspects of the road maintenance and abandonment plan requirement in the 1999 legislation may cause an unforeseen and unintentional disproportionate financial hardship on small forest landowners. In passing SSHB 1095, it directed the Board to amend the RMAP planning requirements for landowners who harvest less than 2 million board feet per year. The legislation was prescriptive. The rules were to be changed in several ways including the following:

- A small forest landowner exemption from road maintenance and abandonment planning and reporting requirements, to be replaced with a simplified checklist, which would not be required until a landowner submitted a forest practices application to harvest timber;
- An exemption for forest landowners who own a total of 80 acres or less of forest land in Washington from road maintenance and abandonment planning for any block of forest land that is 20 contiguous acres or less;
- An assurance that small forest landowners' forest practices applications would not be denied based on having fish passage barriers;
- A provision for a cost-share program for small forest landowners to remove fish passage barriers. This program is to fund projects on a worst-first basis, with priorities determined by the Department of Fish and Wildlife and funding managed by the Department of Natural Resources.

The RMAPs provisions of the 1999 Forests and Fish legislation were established to ensure prevention and repair of resource damage due to forest roads and culverts. Because small forest landowners are no longer required to submit road maintenance and abandonment plans to DNR, or to report progress on planned road repairs and fish barrier removal, it is important that the state and landowners ensure resource protection related to roads by other means.

STRATEGY

Given the Forests and Fish goal of forest roads being compliant with the forest practices act and rules by the year 2016, and the change in context and procedure of the forest practices rules by SSHB 1095, the state is conducting a three-tiered strategy on the topic of road maintenance and abandonment for small forest landowners. The strategy consists of 1) educational and outreach efforts targeting small forest landowners, 2) assessing small forest landowner progress on protecting water quality and providing for fish passage, and 3) continued requests for adequate funding to provide assistance to small forest landowners. The state will also develop and present comprehensive assessments of the effectiveness of the rules to the Legislature in 2008 and 2013.

Education and Outreach

The 1999 Forests and Fish legislation authorized a program within DNR, the Small Forest Landowner Office (SFLO), to be a "resource and focal point for small forest

landowner concerns and policies.” (RCW 76.13.110) It is with the help of this office that many of the assistance programs described below are developed and maintained.

- Forestry Riparian Easement Program: A compensation program in which the State purchases 50-year easements from volunteer small forest landowners on trees that, due to Forests and Fish laws, are required to be left unharvested to protect water quality and fish habitat.
- Family Forest Fish Passage Program: A partnership program between DNR, Washington Department of Fish and Wildlife and the Interagency Committee for Outdoor Recreation, with involvement from the Washington Farm Forestry Association (WFFA), that provides cost share funding to small forest landowners for the repair of fish passage barriers.
- Technical assistance in the Alternate Planning process.
- *Forest Practices Illustrated*: Once completed, this will be a user-friendly publication for forest practices practitioners that will include information on how to protect public resources including specific information for meeting water quality and fish passage standards.
- Informational brochure: *Road Maintenance and Abandonment for Small Forest Landowners*.
- Updated checklist RMAP.
- Road maintenance and abandonment workshops for small forest landowners.
- Annual field days for small forest landowners: The SFLO and Forest Stewardship Program partner with Washington State University Extension to host workshops that include subjects such as forest practices regulation, overviews of financial and technical assistance programs, and silvicultural practices in riparian areas.
- Bi-monthly e-mail newsletter: This contains the latest information of potential interest to small forest landowners.
- Comprehensive website that provides educational information and important links to useful information (<http://www.dnr.wa.gov/sflo/>).
- Presentations at Washington Contract Loggers Association trainings.
- SFLO attendance and presentations at WFFA chapter meetings to provide updates on state regulations and incentive programs.
- Annual public outreach to landowners through regional partners such as conservation districts and regional fish enhancement groups.
- Annual public outreach via local and regional newspapers.

Assessing Progress

In order to evaluate how well and to what extent water quality and fish passage standards are being met and implemented on small forest land ownerships, a number of information sources will be used. When combined and viewed together, the totality of the information will provide a comprehensive report of the effect of small forest landowner RMAPs on water quality and fish passage.

The effects of SSHB 1095 provisions on water quality and fish passage can be thought of in two distinct categories of small forest landowners: Those who will conduct or have conducted a forest practice and those who have not. The first category represents a

population of landowners by which information is gathered through the submission of Forest Practices Applications/Notifications (FPA/N) and in many cases checklist RMAPs. Through the process of application/notification review and approval, the standards for protecting water quality and fish passage are ensured for the area covered by the forest practice. In some cases the area of the forest practice is a portion of the landowner's total ownership. There are cases where landowners have chosen to conduct a full RMAP on their entire ownership.

Please note that the cost-benefit analysis conducted for this rule making (enclosed) provides some prognosis for the amount of small forest landowner acreage that will be covered by this first category by the year 2016.

The second category is those landowners who have not conducted a forest practice, and therefore, won't have submitted an FPA/N and checklist RMAP. For this set of landowners the State will have to work with them to ensure that water quality and fish passage standards are met on a case-by-case basis as problems and issues are discovered. The extent of this issue will be a topic analyzed with the following sources of information in the 2008 and 2013 legislative reports:

- Sample survey of small forest landowner acreages that have RMAP information on their ownership. Prior to the passage of SSHB 1095 in 2003, and after the initial implementation of the rules that mandated the submission of RMAPs from all forest landowners in 2000, DNR received approximately 5,100 RMAPs from landowners who owned less than 500 acres. This existing information will be used to estimate the total small landowner acreage covered by an FPA/N and acreage that is not.
- CMER study: Road Sub-Basin Scale Effectiveness Monitoring Project. This project will provide information on how effective the rules are in protecting water quality and fish passage on a sample of all land ownerships. Information will be available from this project regarding small forest landowner roads.
- Compliance monitoring of small forest landowner roads in 2007.

The combination of the information listed above with the known information gathered through FPA/Ns will provide the basis for informing the Legislature as well as Forests and Fish participants on how well and to what extent water quality and fish passage standards are being met and implemented.

Requests for Funding

It is also important that funding continues to be available for small forest landowner programs related to the 2003 provisions for small forest landowners. To date, the Legislature has appropriated a total of \$6 million for the Family Forest Fish Passage Program (\$2 million for the 03-05 biennium and \$4 million for the 05-07 biennium). DNR will continue to include requests for funding this program in future budget proposals.

In addition to seeking funding from the Legislature for small forest landowner fish passage projects, the SFLO has sought and obtained grants from other state and federal sources for that purpose. To date \$4.3 million has been granted on 101 projects. Enclosed is the Small Forest Landowner Office 2006 Progress Report with information pertaining to these accomplishments. The SFLO plans to continue applying for grants as they become available.

Feedback to the Legislature

SSHB 1095 directed DNR to monitor the extent of the checklist road maintenance and abandonment plan approach and report its findings to the Legislature by December 31, 2008, and December 31, 2013.

DNR, in consultation with the Department of Ecology, the Department of Fish and Wildlife, and other Forests and Fish partners, is committed to developing as comprehensive an assessment as possible to provide the Legislature with meaningful feedback on the scope and effectiveness of the checklist approach for small forest landowners, the cost-share program for fixing fish barriers, and on the state's accomplishments in assisting small forest landowners in complying with the forest practices rules.

Enclosures: *Small Forest Landowner Office 2006 Progress Report*
Economic Analysis, Rule Making for Small Forest Landowner Road
Maintenance and Abandonment Planning

c: Jeanette Barreca

Appendix B. Regulatory Context for Forest Practices in Washington State Needing to Meet State Water Quality Standards

Table B-1. Regulatory Context for Forest Practices in Washington State Needing to Meet State Water Quality Standards.

Document	Purpose	Description/Result
Forests and Fish Report April 1999	Goals. The authors of this Report have been working to develop biologically sound and economically practical solutions that will improve and protect riparian habitat on non-federal forest lands in the State of Washington (page 2).	The goals of the forestry module discussions are four fold: (1) to provide compliance with the Endangered Species Act for aquatic and riparian dependent species on non-federal forest lands; (2) to restore and maintain riparian habitat on non-federal forest lands to support a harvestable supply of fish; (3) to meet the requirements of the Clean Water Act for water quality on non-federal forest lands; and (4) to keep the timber industry economically viable in the State of Washington. Forest and Fish Report Appendix M - Assurances M.3 Assurances related to the Clean Water Act. EPA's and DOE's assurances are contained in Schedule M-2. Each of EPA and DOE agree for the benefit of the other authors of this Report to fully perform their obligations under Schedule M-2. Schedule M-2 - Clean Water Act Section 303 Assurances
Salmon Recovery Act ENGROSSED SUBSTITUTE HOUSE BILL 2091 Chapter 4, Laws of 1999 (partial veto) 56th Legislature 1999 1st Special Session FOREST PRACTICES-- SALMON RECOVERY	Took the Forests and Fish Report and turned it into a bill that became state law. This bill was codified into three different state statutes.	Chapter 76.09 RCW – Forest Practices Chapter 77.85 RCW – Salmon Recovery Chapter 90.48 RCW – Water Pollution Control
Chapter 76.09 RCW	Forest Practices Act	76.09.010 - Legislative finding and declaration (2) The legislature further finds and declares it to be in the public interest of this state to create and maintain through the adoption of this chapter a comprehensive statewide system of laws and forest practices rules which will achieve the following purposes and policies: (g) Achieve compliance with all applicable requirements of federal and state law with respect to nonpoint sources of water pollution from forest practices; 76.09.020 definitions

Document	Purpose	Description/Result
		(4) "Aquatic resources" includes water quality, salmon, other species of the vertebrate classes Cephalaspidomorphi and Osteichthyes identified in the forests and fish report, the Columbia torrent salamander (<i>Rhyacotriton kezeri</i>), the Cascade torrent salamander (<i>Rhyacotriton cascadae</i>), the Olympic torrent salamander (<i>Rhyacotriton olympian</i>), the Dunn's salamander (<i>Plethodon dunni</i>), the Van Dyke's salamander (<i>Plethodon vandyke</i>), the tailed frog (<i>Ascaphus truei</i>), and their respective habitats. 76.09.040 Forest practices rules—Adoption—Review of proposed rules—Hearings—Fish protection standards—Program for the acquisition of riparian open space (1)(b) Forest practices rules pertaining to water quality protection shall be adopted by the board after reaching agreement with the director of the department of ecology or the director's designee on the board with respect to these rules. All other forest practices rules shall be adopted by the board. 76.09.040(2)(a) 2)(a) The board shall prepare proposed forest practices rules consistent with this section and chapter 34.05 RCW. In addition to any forest practices rules relating to water quality protection proposed by the board, the department of ecology may submit to the board proposed forest practices rules relating to water quality protection. (b)(i) The board shall hold one or more hearings on the proposed rules pursuant to chapter 34.05 RCW. Any county representative may propose specific forest practices rules relating to problems existing within the county at the hearings. (ii) The board may adopt and the department of ecology may approve such proposals if they find the proposals are consistent with the purposes and policies of this chapter. 76.09.370 Findings-Forest and Fish report-Adoption of rules (7) In adopting permanent rules, the board shall incorporate the scientific-based adaptive management process described in the forests and fish report which will be used to determine the effectiveness of the new forest practices rules in aiding the state's salmon recovery effort. The purpose of an adaptive management process is to make adjustments as quickly as possible to forest practices that are not achieving the resource objectives. The adaptive management process shall incorporate the best available science and information, include protocols and standards, regular monitoring, a scientific and peer review process, and provide recommendations to the board on proposed changes to forest practices rules to meet timber industry viability and salmon recovery.

Document	Purpose	Description/Result
Chapter 77.85 RCW	Salmon Recovery Act	77.85.180 Findings (1) The legislature finds that the forests and fish report as defined in RCW 76.09.020 was developed through extensive negotiations with the federal agencies responsible for administering the endangered species act and the clean water act. The legislature further finds that the forestry industry, small landowners, tribal governments, state and federal agencies, and counties have worked diligently for nearly two years to reach agreement on scientifically based changes to the forest practices rules, set forth in the forests and fish report as defined in RCW 76.09.020. The legislature further finds that if existing forest practices rules are amended as proposed in the forests and fish report as defined in RCW 76.09.020, the resulting changes in forest practices (a) will lead to: (i) Salmon habitat that meets riparian functions vital to the long-term recovery of salmon on more than sixty thousand miles of streams in this state; (ii) identification of forest roads contributing to habitat degradation and corrective action to remedy those problems to protect salmon habitat; (iii) increased protection of steep and unstable slopes; and (iv) the implementation of scientifically based adaptive management and monitoring processes for evaluating the impacts of forest practices on aquatic resources, as defined in RCW 76.09.020, and a process for amending the forest practices rules to incorporate new information as it becomes available; (b) will lead to the protection of aquatic resources to the maximum extent practicable consistent with maintaining commercial forest management as an economically viable use of lands suitable for that purpose; and (c) will provide a regulatory climate and structure more likely to keep landowners from converting forestlands to other uses that would be less desirable for salmon recovery. (2) The legislature further finds that the changes in laws and rules contemplated by chapter 4, Laws of 1999 sp. sess., taken as a whole, constitute a comprehensive and coordinated program to provide substantial and sufficient contributions to salmon recovery and water quality enhancement in areas impacted by forest practices and are intended to fully satisfy the requirements of the endangered species act (16 U.S.C. Sec. 1531 et seq.) with respect to incidental take of salmon and other aquatic resources and the clean water act (33 U.S.C. Sec. 1251 et seq.) with respect to nonpoint source pollution attributable to forest practices. 77.85.190 Federal assurances in forests and fish report—Events constituting failure of assurances—Governor's authority to negotiate. (1) Chapter 4, Laws of 1999 sp. sess. has been enacted on the assumption that the federal assurances described in the forests and fish report as defined in

Document	Purpose	Description/Result
		RCW 76.09.020 will be obtained and that forest practices conducted in accordance with chapter 4, Laws of 1999 sp. sess. and the rules adopted under chapter 4, Laws of 1999 sp. sess. will not be subject to additional regulations or restrictions for aquatic resources except as provided in the forests and fish report. (2) The occurrence of any of the following events shall constitute a failure of assurances: (e) The environmental protection agency or department of ecology fails to provide the clean water act assurances described in appendix M to the forests and fish report;
Chapter 90.48 RCW	Water Pollution Control Act	90.48.010 Policy Enumerated It is declared to be the public policy of the state of Washington to maintain the highest possible standards to insure the purity of all waters of the state consistent with public health and public enjoyment thereof, the propagation and protection of wild life, birds, game, fish and other aquatic life, and the industrial development of the state, and to that end require the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the state of Washington. Consistent with this policy, the state of Washington will exercise its powers, as fully and as effectively as possible, to retain and secure high quality for all waters of the state. 90.48.420 Water quality standards affected by forest practices—Department of ecology solely responsible for water quality standards—Forest practices rules—Adoption—Examination—Enforcement procedures. 1) The department of ecology, pursuant to powers vested in it previously by chapter 90.48 RCW and consistent with the policies of said chapter and RCW 90.54.020(3), shall be solely responsible for establishing water quality standards for waters of the state. On or before January 1, 1975, the department of ecology shall examine existing rules containing water quality standards and other applicable rules of said department pertaining to waters of the state affected by nonpoint sources of pollution arising from forest practices and, when it appears appropriate to the department of ecology, modify said rules. In any such examination or modification the department of ecology shall consider such factors, among others, as uses of the receiving waters, diffusion, down-stream cooling, and reasonable transient and short-term effects resulting from forest practices. Adoption of forest practices rules pertaining to water quality by the forest practices board shall be accomplished after reaching agreement with the director of the department or the director's designee on the board. Adoption shall be

Document	Purpose	Description/Result
		accomplished so that compliance with such forest practice[s] rules will achieve compliance with water pollution control laws.
Implements Chapter 90.48 RCW	WAC 173-201A Surface Water Quality Standards	These rules are developed under the authorities provided by the State Water Pollution Control Act. State development of Water Quality Standards is a federal requirement under the Federal Clean Water Act. State standards consist of designated uses of a waterbody, criteria to protect designated uses, and antidegradation requirements to protect existing uses and high quality/high value waters.
RCW 76.09	WAC 222 FOREST PRACTICES BOARD	This WAC has 15 chapters that include practices, board function etc. Below are key chapters.
	WAC 222-12-010 Authority	Promulgation of all forest practices rules shall be accomplished so that compliance with such forest practices rules will achieve compliance with the water quality laws. Those rules marked with an asterisk (*) pertain to water quality protection; pursuant to RCW <u>76.09.040</u> they can be amended only by agreement between the board and the department of ecology.
	WAC 222-12- 045 Adaptive management program	(2) Program elements: By this rule, the board establishes an active, ongoing program composed of the following initial elements, but not to exclude other program elements as needed: (a) Key questions and resource objectives: Upon receiving recommendations from the Timber/Fish/Wildlife (TFW) policy committee, or similar collaborative forum, the board will establish key questions and resource objectives and prioritize them. (i) Projects designed to address the key questions shall be established in the order and subject to the priorities identified by the board. (ii) Resource objectives are intended to ensure that forest practices, either singularly or cumulatively, will not significantly impair the capacity of aquatic habitat to: (A) Support harvestable levels of salmonids; (B) Support the long-term viability of other covered species; or (C) Meet or exceed water quality standards (protection of beneficial uses, narrative and numeric criteria, and antidegradation).

Appendix C. Discussion of Potential Loss of Clean Water Act Assurances and Related Uncertainty

Ecology considers Forest Practices Rules to meet the objectives of the Clean Water Act (CWA) and state water quality standards, so long as regulations are upgraded as called for in adaptive management (page 172, bullet 4, Forests and Fish Report, Schedule M-2).

The CWA Assurances depend heavily on a rigorous and reliable adaptive management process to address the uncertainty of the Forest Practices Rules' ability to meet required water quality protections. The CWA Assurances apply to the Forest Practices Program, which includes landowners covered by the FPHCP. These "assurances" mean that so long as landowners comply with Forest Practices Rules, the rules are tested for effectiveness, and the rules are upgraded as determined necessary through adaptive management, the development of Total Maximum Daily Loads (TMDLs) remains a low priority for Ecology (page 167, Forests and Fish Report, Schedule M-2).

Further explanation of CWA Assurances can also be found in the [Water Quality Program Policy 1-11, Chapter 1](#),⁸⁰ page 50:

*Under state law, landowners must conduct forest practices activities in a manner that supports the attainment of water quality standards. In 2000, Washington adopted revised forest practices rules that identify stream buffers and other management prescriptions expected to meet water quality standards. The state Forest Practices Board tests the forestry rules through a formal adaptive management program, which has the goal of identifying and expediently revising any forestry rules that do not support the attainment of water quality standards. Washington established the Clean Water Act Assurances as a formal agreement in the 1999 Forests and Fish Report in recognition of the improvements to the rules and commitments made. Ecology views the forest practices rules, with its adaptive management program, as providing protection equal to what would occur under a TMDL in watersheds where the rules apply. For this reason, TMDL development is a low priority in watersheds where forestry is the primary land use. Ecology may assign a higher TMDL development priority to forested watersheds with a broader mixture of land uses, but Ecology would still rely upon the forest practices rules to address any portion of the pollution contributed by forestry activities. **The agreement to rely on the forest practices rules in lieu of developing separate TMDL load allocations or implementation requirements remains conditioned on maintaining an effective adaptive management program**" (emphasis added).*

It is important to understand the potential impact of withdrawing CWA Assurances. If Ecology withdraws the Assurances, the impact may not be limited to Type Np streams in western Washington but instead may impact the Forest Practices Program overall. The reason for this is

⁸⁰ <https://apps.ecology.wa.gov/publications/documents/1810035.pdf>

the withdrawal of programmatic Assurances would mean Ecology may no longer be able to rely on the Forest Practices Adaptive Management Program (AMP) to upgrade protections for waters of the state (RCW 90.48.020) when Cooperative Monitoring Evaluation Research (CMER) studies determine existing forest practices rules pertaining to water quality are ineffective at maintaining required water quality protections.

Without a new Np buffer rule, there is potential for additional 303(d) listings for Np streams and other waters of the state (RCW 90.48.020) if water temperatures increase above water quality criteria. Further, impaired waters of the state on FPHCP lands are assigned a low priority for Total Maximum Daily Load (TMDL) development because of the Clean Water Act Assurances, which rely on the Forest Practices AMP to improve water quality protections when determined necessary. If Type Np rule upgrades are not adopted and Ecology withdraws CWA Assurances, Ecology would need to reprioritize category 5 (impaired) waters that were previously covered by the Clean Water Act Assurances for TMDL development. This will result in additional costs associated with TMDL development and implementation, however the extent and scale to the state and landowners remain uncertain. There will also be likely costs associated with updating TMDLs that previously relied on the assurances to address upstream areas.

In addition to TMDL reprioritization and the need to update previously completed TMDLs that relied on the assurances, there will likely be additional costs related to the modeling and analysis required for TMDLs with a forestry component. In the past Ecology largely relied on deferring to the implementation of the forest practices rules and AMP in lieu of modeling those areas and assigning actions to comply with load allocations in the TMDL. Additional compliance costs to those regulated by the TMDL are also likely, however, they remain uncertain.

For greater context in understanding what the “world without Clean Water Act Assurances” may look like, we encourage consideration of the following real-world example:

The South Fork Nooksack River is currently impaired for temperature and has an approved TMDL and Water Quality Improvement Report and Implementation Plan (Kennedy et al. 2020). In the Forestry Practices section (page 154), Kennedy et al. (2020) states that, “The state’s forest practices regulations will be relied on to bring waters into compliance with the load allocations established in this TMDL project on private and state forest lands...The agreement to rely on the forest practices rules in lieu of developing separate TMDL load allocations or implementation requirements for forestry is conditioned on maintaining an effective adaptive management program.” This section is critical for Ecology when developing temperature TMDLs in mixed use watersheds. It allows the authors to assume all FPHCP lands within the watershed meet shade requirements (and temperature limits by extension) when developing effective shade models and load allocations.

In the Shade load allocations section (page 139), the authors note that “For the tributaries to the SFNR [South Fork Nooksack River], which are not modeled individually, the load allocations for effective shade are represented as shade curves in Figure [C-1] ...The goal was to capture the characteristics of any tributary over a range of channel widths and aspects that occur in the

SFNR watershed.” This approach would no longer be effective if there were known shade deficits in the Type Np stream networks on FPHCP lands. Instead, the authors would have needed to follow the procedure for the SFNR mainstem, as laid out in the Analytical Approach (page 60) and TMDL Analysis (page 61) sections.

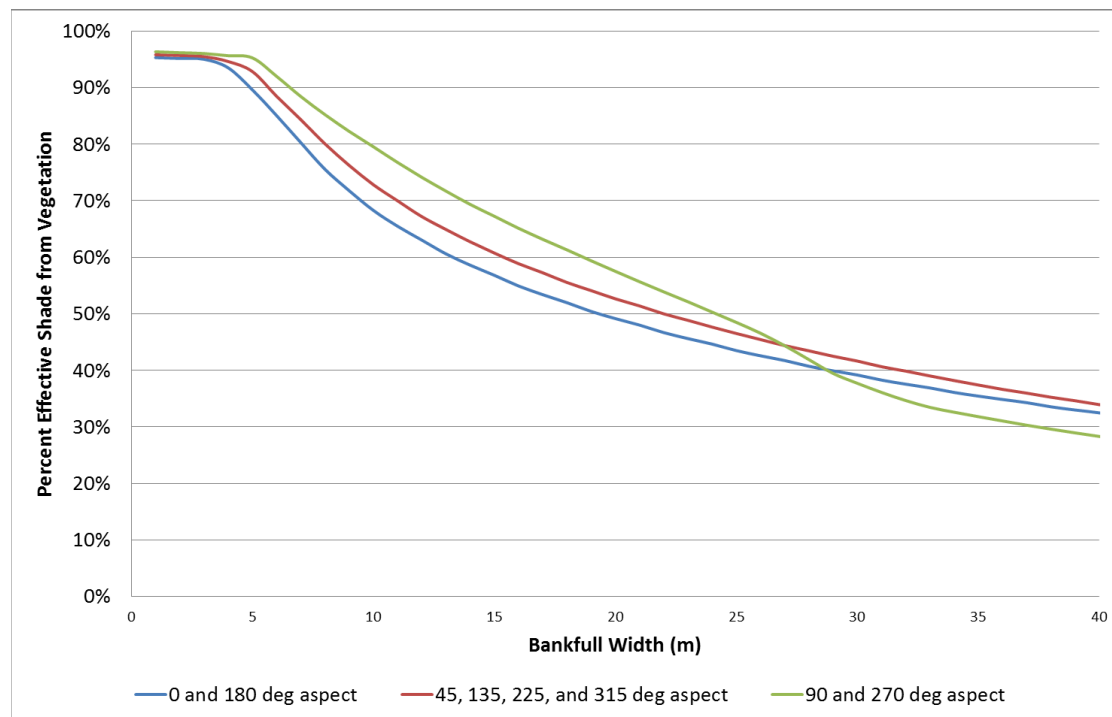


Figure C-1. Shade Curve for determining load allocations of effective shade for tributaries (Kennedy et al. 2020).

The authors are clear in the Shade Load Allocation section that load “allocations for the South Fork Nooksack temperature TMDL establish limits on the allowable heat load from nonpoint sources. The TMDL quantifies heat loads in terms of Watts/m² and as effective shade. Effective shade allocations control delivery of direct solar radiation to the stream, both to the mainstem and its tributaries. This is considered the largest source of heat.”

If the baseline Type Np rule remains in effect and withdrawal of CWA Assurances no longer allows Ecology to assume nonpoint sources of pollution are addressed by the Forest Practices AMP, then Ecology would need to find another way to address nonpoint heat sources in the Type Np networks. There is a high degree of uncertainty around what this would look like, but it is likely to be disruptive to the regulatory environment and potentially very costly in areas, like the South Fork Nooksack watershed, where forestry is a major land use (Figure C-2).

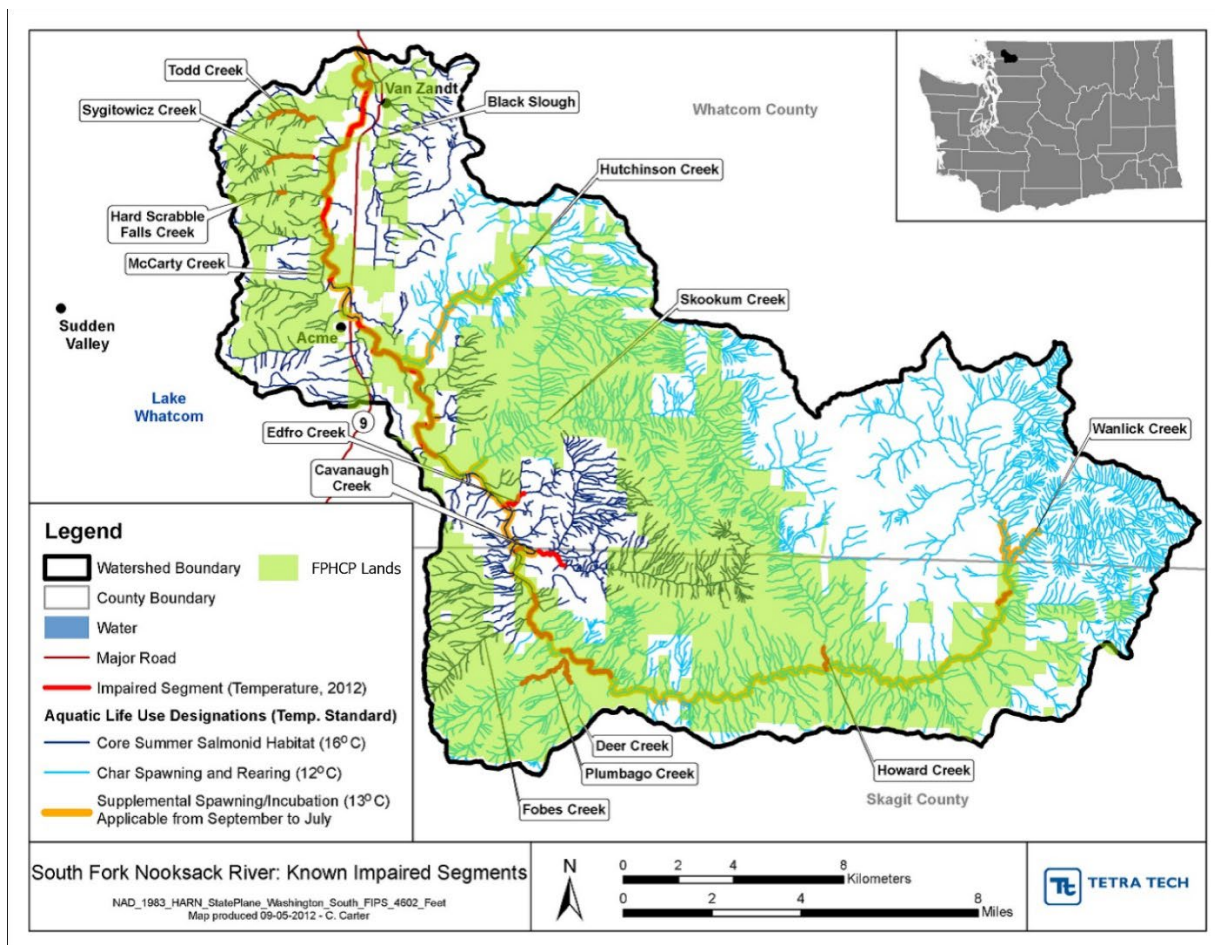


Figure C-2. Map from the South Fork Nooksack temperature TMDL showing designated use categories and impaired waters, overlaid with FPHCP lands (Adapted from Kennedy et al. 2020).

Below are several areas of uncertainty Ecology would need to investigate in a world without CWA Assurances specific to the Nooksack TMDL and including the baseline western Washington Type Np rule:

- Modeling stream networks and riparian buffers in the upper watershed.
- Revising methods to update new load allocations for effective shade.
- Developing implementation strategies for applying load allocations for effective shade to Forest Practices HCP lands.
- Analysis of potential liabilities that may exist.

Additionally, it is important to note that addressing impaired waters across regions of the state, depending on local factors that influence impairments, results in substantial regulatory uncertainty regarding how landowners with impaired waters would be affected. Ecology would need to determine the appropriate scale when assessing shade deficits and temperature impairments. This could be individual watersheds or at the broader landscape level, depending on location and scale of impaired waters.

Appendix D. Acronyms

Table D-1. Acronyms.

Acronym	Meaning
7DTR	Seven Day Average Temperature Response
7DADM	Seven Day Average Daily Maximum temperature
AKART	All known, available, and reasonable methods of prevention, control, and treatment
AMP	Forest Practices Adaptive Management Program
APA	Administrative Procedure Act, Chapter 34.05 Revised Code of Washington State
BCIF	Westside Type N Buffer Characteristics, Integrity and Function Project
CBA	Cost Benefit Analysis
CFR	Code of Federal Regulations
CMER	Cooperative Monitoring Evaluation Research Committee
CWA	Clean Water Act
DNR	Washington State Department of Natural Resources
Ecology	Washington State Department of Ecology
IEC	Industrial Economics Incorporated
ISPR	Independent Scientific Peer Review
FP	Forest Practices
FPHCP	Forest Practices Habitat Conservation Plan
EPA	Environmental Protection Agency
MMTR	Mean Monthly Temperature Response
Np	Non-fish Perennial
NPDES	National Pollutant Discharge Elimination System
PiP	Perennial Initiation Point
TMDL	Total Maximum Daily Load
TFW	Timber, Fish, and Wildlife
RCW	Revised Code of Washington State
RFA	Regulatory Fairness Act, Chapter 19.85 Revised Code of Washington State
RMZ	Riparian Management Zone
UMPPF	Uppermost Point of Perennial Flow
WAC	Washington Administrative Code