STATE OF WASHINGTON
FOREST PRACTICES BOARD

PO Box 47012
Olympia, WA 98504-7012

Regular Board Meeting – August 9, 2017
Natural Resources Building, Room 172, Olympia

Please note: All times are estimates to assist in scheduling and may be changed subject to the business of the day and at the Chair's discretion. The meeting will be recorded.

DRAFT AGENDA

9:00 a.m. – 9:15 a.m.	**Welcome and Introductions** Safety Briefing – Patricia Anderson, Department of Natural Resources (DNR)
9:15 a.m. – 9:25 a.m.	**Approval of Minutes** *Action: Approve May 9 & 10, 2017, meeting minutes.*
9:25 a.m. – 9:40 a.m.	**Public Comment** – This time is for public comment on general Board topics. Comments on Board action items will occur prior to each action taken.
9:40 a.m. – 10:00 a.m.	**Report from Chair**
10:00 a.m. – 10:45 a.m.	**Water typing System, Science/Technical Expert Group Recommendations** – Hans Berge, Adaptive Management Program Administrator (AMPA) • Summary of process to determine Potential Habitat Breaks (PHB) • Data collection and analysis • Report of results to determine PHB
10:45 a.m. – 11:00 a.m.	**Break**
11:00 a.m. – 11:15 a.m.	**Staff Recommendations for PHBs and Next Steps for the Water Typing System Rules and Guidance –** Marc Engel, DNR
11:15 a.m. – 11:35 a.m.	**Public Comment on Staff Recommendations**
11:35 a.m. – 12:00 p.m.	**Board Direction for PHBs and Next Steps for the Water Typing System Rules and Guidance –** Marc Engel, DNR *Action:* • *Approval of PHBs and direction to incorporate into water typing system rule and board manual guidance;* • *Direction to staff on rulemaking and board manual section development timelines*
12:00 p.m. – 1:00 p.m.	**Lunch**
1:00 p.m. – 1:15 p.m.	**Public Comment** – This time is for public comment on general Board topics for those that were not able to be at the earlier public comment period.
1:15 p.m. – 1:35 p.m.	**Board Subcommittee Update on Efficiency and Effectiveness Improvements for the Adaptive Management Program** – Lisa Janicki, Board Subcommittee Chair and Hans Berge, AMPA • Summary of process to evaluate Adaptive Management Program (AMP) staffing and procedures • Report of results to improve the AMP • Progress towards Principals meeting

1:35 p.m. – 1:45 p.m.	**Recommended Actions for the Adaptive Management Program –** Lisa Janicki, Board Subcommittee Chair
1:45 p.m. – 2:05 p.m.	**Public Comment on Subcommittee Recommendations**
2:05 p.m. – 2:20 p.m.	**Board Direction on Next Steps for the Adaptive Management Program –** Hans Berge, AMPA and Jeff Davis, Board Subcommittee Staff *Action: Approval of subcommittee recommendations*
2:20 p.m. – 2:30 p.m.	**Electronic Signature Rule Making –** Patricia Anderson and Marc Ratcliff, DNR
2:30 p.m. – 2:35 p.m.	**Public Comment on Electronic Signature Rule Making**
2:35 p.m. – 2:45 p.m.	**Electronic Signature Rule Making** – Patricia Anderson and Marc Ratcliff, DNR *Action: Consider approval of draft language to initiate rule making.*
2:45 p.m. – 2:55 p.m.	**Break**
2:55 p.m. – 3:05 p.m.	**Public Records Fee Schedule Rule Making –** Marc Ratcliff, DNR
3:05 p.m. – 3:20 p.m.	**Public Comment on Public Records Fee Schedule Rule Making**
3:20 p.m. – 3:30 p.m.	**Public Records Fee Schedule Rule Making** – Marc Ratcliff, DNR *Action: Consider approval of notifying public of possible rule making by filing a CR-101 Preproposal Statement of Inquiry.*
3:30 p.m. – 4:10 p.m.	**Compliance Monitoring 2014-2015 Biennial Report (w/ISPR Review)** – Garren Andrews, DNR
4:10 p.m. – 4:25 p.m.	**TFW Policy Committee Priorities** – Ray Entz and Scott Swanson, TFW Policy Committee Co-Chairs
4:25 p.m. – 4:35 p.m.	**2017 Work Plan** - Marc Engel, DNR *Action: Consider changes to the 2017 work plan.*
Staff Reports will not be orally presented	**Staff Reports** A. **Adaptive Management Update** – Hans Berge, AMPA B. **Board Manual Update** – Marc Ratcliff, DNR C. **Compliance Monitoring (including 2016 Annual Report)** – Garren **Andrews, DNR -** Garren Andrews, DNR D. **Northern Spotted Owl Implementation Team Update on a Safe Harbor Agreement** – Lauren Burnes, DNR E. **Rule Making Activity** – Marc Engel, DNR F. **Small Forest Landowner Advisory Committee and Small Forest Landowner Office Update -**Tami Miketa, DNR G. **Upland Wildlife Update -** Terry Jackson, Washington Department of Fish and Wildlife H. **Review of the Implementation of Board Manual Section 16 –** Donelle Mahan, DNR
	Executive Session To discuss anticipated litigation, pending litigation, or any other matter suitable for Executive Session under RCW 42.30.110.

FOREST PRACTICES BOARD
Special Board Meeting
May 9, 2017
Natural Resources Building, Room 172
Olympia, Washington

Members Present
Stephen Bernath, Chair, Department of Natural Resources
Bill Little, Timber Products Union Representative
Bob Guenther, General Public Member/Small Forest Landowner
Brent Davies, General Public Member
Carmen Smith, General Public Member/Independent Logging Contractor
Dave Herrera, General Public Member
Heather Ballash, Designee for Director, Department of Commerce
Joe Stohr, Designee for Director, Department of Fish and Wildlife
Lisa Janicki, Elected County Official
Patrick Capper, Designee for Director, Department of Agriculture
Paula Swedeen, General Public Member
Tom Laurie, Designee for Director, Department of Ecology
Tom Nelson, General Public Member

Staff
Joe Shramek, Forest Practices Division Manager
Marc Engel, Forest Practices Assistant Division Manager
Patricia Anderson, Rules Coordinator
Phil Ferester, Senior Counsel

WELCOME AND INTRODUCTIONS

Stephen Bernath called the Forest Practices Board (FPB or Board) meeting to order at 9:00 a.m.

PUBLIC COMMENT

Jim Peters, Northwest Indian Fisheries Commission, said he attempted to gather stakeholders last week to resolve some outstanding stream typing issues in order to obtain consensus that was not attainable through the mediation process. He encouraged that this type of gathering be allowed as a way to build relationships and to possibly reach consensus once issues are presented at TFW Policy Committee (TFW Policy). Peters also asked the Board not to take action on the Adaptive Management Program (AMP) improvements until caucuses have had a chance to review the recommendations with their respective caucuses.

Adrian Miller, Olympic Resource Management, said there are many areas where TFW Policy reached consensus recommendations on the water typing system. Concerning two non-consensus issues, he said off-channel habitat clearly has a majority of agreement; however, from a landowner's perspective, it needs to be enforceable, repeatable and measurable. The establishment of an F and N water type break is not so clear, but ensuring it is enforceable, measureable and repeatable would lend to improvement.

Jenny Knoth, Green Crow, said they commend the efforts made by TFW Policy to come to consensus on a number of water typing topics; however, efforts are undermined through an artificial rush to produce a change in rule. She said there has been no evidence presented that the current rule requires change and to set arbitrary regulatory points is inconsistent with the goals of the 30-year old Timber, Fish and Wildlife agreement and the subsequent Forests and Fish Report. She asked the Board to make decisions based on science.

Norm Schaaf, Merrill & Ring, urged the Board to reflect on how to develop a rule that does not have unintended consequences and is implementable, repeatable and based on science. He also noted that the map-base is inaccurate for their timberlands and does not address all habitat situations. He urged the Board to remember that ambiguity adds cost and uncertainty to the process without adding resource protection and he doubted the goal of a probability approach for determining fish passage.

Mary Scurlock, Conservation Caucus, said while the framework for a permanent stream typing rule has more agreement among TFW Policy caucuses than is apparent, she encouraged the Board to delve deeply into the disagreements because they are important. She said the interim stream typing system relies too heavily on where fish can be detected today to be consistent with the definition of fish habitat in WAC. She suggested that the 80/20 probability for fish passage is not an arbitrary point but is a policy objective to set and guide the work for the metrics. She concluded by describing her caucus' concerns with the Adaptive Management Program Administrator's (AMPA) majority/minority report.

Karen Terwilleger, Washington Forest Protection Association (WFPA), said their goal for the water typing system is to develop a legally supportable, durable, scientifically sound water typing system that meets the Forests and Fish requirements and is implementable, repeatable and enforceable. She stated that science has to drive the process for these issues and that they support the consensus recommendations before the Board.

Kendra Smith, Washington State Association of Counties, said she appreciated DNR providing a framework for the water typing issues and asked the Board to continue the technical group. She said they support the adaptive management process and decisions based on science.

Kevin Godbout, Weyerhaeuser Company, said that the 'day of' Board document packet comes too late to allow the public to have enough time to prepare for agenda topics and discussion. He said that using probability for determining fish passage is arbitrary and a departure from Forest and Fish. He asked the Board to direct the technical group to evaluate whether is it possible to establish a probability for fish barriers and evaluate the potential economic impacts.

RULES VS. GUIDANCE DISCUSSION

Steven Reneaud, Attorney General's Office, provided an overview on the subject of what is considered rule versus guidance. Reneaud described for the Board the statutory requirements for establishing rules, the reliance on an adaptive management process and non-binding nature of agency guidance documents. Reneaud explained how the Board Manual could not be used to dictate conduct or outcomes, but rules established by the Board can because rules have a legally binding effect.

He said the distinction matters because guidance cannot be enforced by an agency. He said if a guidance document alters a basis for obtaining or maintaining a benefit provided under the rules, the directive included in the guidance document must go through the rule making process and become a rule.

Swedeen asked for clarification on how technical guidance would apply when it is a requirement versus when one might have flexibility in the outcome. Ferester responded that if an agency required an individual to do something all the time and in a particular way that situation would be appropriate to be a rule rather than guidance. Guidance explains and illustrates how to act on and apply the rules.

TFW POLICY COMMITTEE'S RECOMMENDATIONS ON WATER TYPING SYSTEM COMPONENTS

Hans Berge, Adaptive Management Program Administrator (AMPA), provided an overview and history of Board actions pertaining to a permanent water typing rule, including the matrix TFW Policy used for framing the work, the Board's direction at the November 2016 meeting, and the outcomes from the dispute resolution process. He outlined TFW Policy's recommendations and consensus elements thus far. There is consensus on not changing most elements of the existing Type F rules, accepting past approved water type modification changes, and the acceptance of a framework for the fish habitat assessment. He said conceptual agreement was achieved for off-channel habitat (OCH), including using bankfull width (BFW) for channelized waters and ordinary high water line (OHWL) for non-channelized waters. However, disagreement still exists regarding the OHWL and whether fish habitat (the outer edge of the Type F water) ends at the wetland edge or at the edge of the periodically inundated areas within the OHWL within the wetland.

Berge said that conceptual agreement regarding the framework for a fish habitat assessment methodology (FHAM) was reached. The outstanding issues still needing resolution are minimizing electrofishing and the criteria used for potential habitat barriers (PHB). Consensus was not reached for whether a probability should be used, and if so, what threshold should be used for determining that probability. Berge described how the PHB criteria would equate to the established targeted probability.

Board members discussed the pros and cons with using a probability criteria and the uncertainty of providing numbers to the technical group tasked with the goal of establishing a process to identify the PHB.

Berge continued by presenting the minority/majority summary reports for OCH and the methods for determining the PHB including a description of the results of the votes and how the application of the votes would influence the water typing system rule. He also reviewed the disagreements outlined in the summary report.

PUBLIC COMMENT

Norm Schaaf, Merrill & Ring, let the Board know that wetlands that transition from within the stream to upland gradients do occur on their ownership quite often.

Ken Miller, Washington Farm Forestry Association (WFFA), expressed his concerns on the effectiveness of the AMP, which includes lack of collaboration, and the federal services having an integral part and vote in all discussions. He recommended that the principals meet at least annually to reaffirm the principals of Forests and Fish and the Board affirm their unwillingness to entertain any changes to Forests and Fish rules unless there is clear science, a law that requires action, or TFW stakeholders unanimously request a change.

Mark Hicks, Department of Ecology (Ecology), commented on the AMP review. He said Ecology supports making changes to improve the program and wants to ensure any changes are well vetted to achieve the intended outcome. He requested the Board ensure adequate time is provided for any proposed revision to be discussed and refined with joint participation by both TFW Policy and Cooperative Monitoring, Evaluation and Research Committee (CMER).

Peter Goldman, Conservation Caucus, provided his perspective on the relationship between rules versus guidance. He provided three suggestions to clarify the issue: improve rules by stating standards, adopt a general rule relying on the Board Manual for implementation of the rule, or re-write the manual so DNR has discretion to enforce elements of the manual.

Chris Mendoza, Conservation Caucus, clarified that his caucuses' interpretation of OCH is found in existing rule and guidance. They believe the wetland is equal to Type F water when the ordinary high water line is the wetland edge.

Jamie Glasgow, Conservation Caucus, urged the Board to help DNR meet its obligations under the Forest Practices Habitat Conservation Plan (FPHCP) by adopting habitat accessibility as the driver of the permanent habitat-based stream typing rule; defining potential habitat breaks as permanent natural stream features that have at least an 80% likelihood of preventing upstream fish passage; and making the primary metrics for determining PHBs are stream gradient and stream width or their combination. He also requested the Board direct DNR and WDFW to lead the board-directed technical analysis for identifying specific metrics for PHBs; set timelines for implementation of the FHAM that ensure rule implementation by March 1, 2018 and develop and finalize a revised protocol-fishing survey method.

Steve Barnowe-Meyer, WFFA, said they support WFPA's letter dated May 5 that describes the significant gains in reaching consensus and areas of disagreement at TFW Policy regarding FHAM. He also urged the Board to rely on the definition of Type F waters in WAC 222-16-030 that only "periodically inundated areas of their associated wetlands" be considered OCH.

Ray Entz, Kalispel Tribe of Indians, urged the Board to take immediate action to strengthen leadership within the AMP. He suggested that this might require rule making and substantial changes since the status quo is not working.

Harry Bell, WFFA, expressed concerns about the AMP that include concerns regarding members of the TFW Policy Committee continually having fractious debates or trying to reinterpret the FPHCP. He said the solution for improvement is for TFW Policy members to be given authority and incentive to provide clear and prioritized direction for CMER research per the goals in the FPHCP and Forests and Fish Agreement.

Karen Terwilleger, WFPA, said there are two overall challenges surrounding the AMP:

1. A loss in focus of the common goal at the table. She said this needs to be reinvigorated and needs to start with the principals reestablishing effective relationships.
2. A breakdown of trust. She asked the Board to consider three criteria when making decisions:
    - Does the action enhance trust around the table?
    - Does it enhance transparency?
    - Does it enhance participation from the caucuses around the table?

Mary Scurlock, Conservation Caucus, spoke to the probability idea within the FHAM framework. She said her caucus believes that the use of probability for potential habitat breaks is not arbitrary. She felt Berge's minority/majority report misrepresented second vote outcomes.

TFW POLICY COMMITTEE'S PROGRESS REPORT ON UNSTABLE SLOPES PROPOSAL INITIATION

Hans Berge, AMPA, walked the Board through TFW Policy's consensus recommendations for all of the elements within the unstable slopes proposal initiation. He focused on the next steps for the following six components:

- Component 1: Non-glacial deep-seated landslides
- Component 2: Deep-seated landslides, Public Safety Risk and Reactivation
- Component 3: Dr. Anne Weekes Landslide Screening Tool for complex or composite rotational deep-seated landslide assessment
- Component 4: Shallow-rapid landslide coarse screen
- Component 5: Run-Out Path Analysis
- Component 6: Policy Track. Landslide Risk Flow Chart

Stephen Bernath suggested that the state geologist from Washington Geologic Survey provide a presentation on the new DNR web portal for LiDAR at an upcoming meeting.

EFFICIENCY AND EFFECTIVENESS IMPROVEMENTS FOR THE ADAPTIVE MANAGEMENT PROGRAM

Bernath reminded the Board that a financial audit of the AMP is required by rule and stated that it will occur after the close of the biennium. He said discussion with the state auditor's office have begun regarding a performance audit.

Howard Haemmerle, DNR, provided a presentation based on his analysis of the Lean process. He reviewed the three principle goals within the Lean process and that the original Lean assessment began in 2012.

He shared benefits evaluated from the analysis included that the expert technical skills needed for the technical writing implementation group are adequately being established and the number of participants is adequate.

He said the negatives included the goal of reducing process cycle time is not being met because either initial times to complete projects may have been unrealistic, lack of time to meet timelines, or the firewall to separate policy agenda has negatively affected the scientific process.

His recommendations included:

- Incorporate components of the Lean Process into the AMP project development process.
- Review/revise CMER process
- Revise structure of project teams
- Review/revise the CMER work plan
- Establish a monitoring group with the purpose of identifying and proposing corrective actions as needed.
- Develop success criteria.

Bernath asked if the Lean process could be incorporated into the backend of the process. Haemmerle responded there is no commitment among the stakeholders; however, the Board could direct them to do this.

Bernath said at the February 2017 Board meeting, direction was given to AMPA to identify the range of comments gathered from caucuses to help construct and suggest a path forward in response to some of those comments.

Hans Berge, AMPA, said those individuals and sources contributed to the suggestions and feedback contained in the recommendations. He provided a brief outline of the goals of the AMP and why the program is important.

He also outlined his perspectives and recommendations in four areas: leadership, TFW Policy, CMER and overall adaptive management improvements.

Bernath asked if the trust building in recommendation #13 is about building relationships. Berge responded yes it is. Swedeen expressed support of this concept.

Heather Ballash asked for advice about where to start and Berge responded with leadership making a commitment as the first action, followed by action on the Lean process recommendations and then on emphasizing Board priorities regarding AMP (particularly focusing on evaluating effectiveness of existing rules).

Swedeen requested a motion be presented at tomorrow's meeting.

Berge concluded by saying that implementation of the recommendations will improve the efficiency and effectiveness of the AMP. However, given the performance audit that will occur in the next biennium, there will likely be additional improvements recommended.

REVIEW OF IMPLEMENTATION OF BOARD MANUAL 16 ONE YEAR LATER

Joe Shramek, DNR, provided a one-year status update on how the guidance for Board Manual Section 16 is being implemented operationally. He reminded the Board about the additional information rulemaking in 2015 and the approval of amendments to Section 16 in 2016.

Implementation measures included:

- Staff training occurred in 2016 to help staff know what to focus on during Forest Practices Applications (FPA) screening, specifically to responses to questions regarding unstable

slopes and the supplemental slopes stability form and ensuring completeness of geotechnical reports/memos.

- Training was provided to the stakeholder community in 2016, mainly through regional TFW meetings. This training focused on explained DNR's expectations from applicants related to questions and material submitted.
- Shramek described his program guidance memo regarding expectations and processes related to screening and reviewing forest practice applications associated with potentially unstable landforms.

He mentioned changes completed in June 2016 regarding FPA questions 11 and 12 to align with rule language specifically related to the concept of on or around. DNR also conducted in 2016 an internal review of Class III and IV FPAs. DNR found that classification decisions were accurate, that forest practice program licensed geologist involvement for Class IV-Special FPAs met established expectations, and that field verification by foresters during FPA review met expectations. Areas for improvement included office processing, where about 25% of sampled FPAs included one or more error. The review also revealed that internal documentation gaps existed and there was inconsistency within how Regions conducted screenings.

Follow-up measures include focused training of regional program staff and the program's commitment to conduct a second internal review in autumn/winter 2017.

Shramek mentioned that large industrial landowners are generally providing adequate unstable slope information, but that the small landowner community would benefit from greater assistance. He mentioned that DNR is committed to making this work.

Paula Swedeen requested an update at the August Board meeting on the adequacy of the content contained in Section 16. She wanted to know how the manual being implemented and whether clearer instructions are needed.

PERFORMANCE MEASURES AND STATISTICS

Joe Shramek, DNR, began by describing the forest practices program's overall approach for ensuring FPAs are reviewed, acted on and complied to meet the forest practices rules. When corrective actions are needed, DNR has a suite of tools available to bring about compliance.

Shramek illustrated the program's approach by reviewing information about the numbers of FPAs classified, reviewed and complied in the last fiscal year: approximately 4,500 FPAs were classified; 3,800 FPAs were field-reviewed prior to a decision; 1,570 post-FPA field compliance visits were conducted for three strategic program deliverables; 93 enforcement Stop Work Orders and Notice to Comply actions were taken; and 5 appeals of enforcement orders.

He summarized three specific post-FPA compliance deliverables. The deliverable for conducting field compliance reviews on all Class IV-Special FPAs involving unstable slopes was exceeded, with 118% of the target number of site visits made. The deliverable for ensuring that riparian management prescriptions were followed was exceeded, with actual site visits amounting to 147% of the target. The deliverable for ensuring that hydraulic projects on Type S and F waters

were installed as approved was exceeded, with actual number of site visits amounting to 166% of the target number.

Shramek explained the difference between how a Notice to Comply is used versus how a Stop Work Order is used. He explained that over the last five years, less than one percent/per year of active FPAs required issuance of either a Notice to Comply or Stop Work Order. He explained that completed information within an FPA is important to ensure DNR has the adequate information to classify and review the activity. There has been an increase in the number of FPAs DNR disapproved due to incomplete information or voluntary withdrawn by landowners.

Meeting adjourned at 5 p.m.

FOREST PRACTICES BOARD
Regular Board Meeting
May 10, 2017
Natural Resources Building, Room 172
Olympia, Washington

Members Present
Stephen Bernath, Chair, Department of Natural Resources
Bill Little, Timber Products Union Representative
Bob Guenther, General Public Member/Small Forest Landowner
Brent Davies, General Public Member
Carmen Smith, General Public Member/Independent Logging Contractor
Court Stanley, General Public Member
Dave Herrera, General Public Member
Heather Ballash, Designee for Director, Department of Commerce
Jeff Davis, Designee for Director, Department of Fish and Wildlife
Lisa Janicki, Elected County Official
Patrick Capper, Designee for Director, Department of Agriculture
Paula Swedeen, General Public Member
Tom Laurie, Designee for Director, Department of Ecology

Staff
Joe Shramek, Forest Practices Division Manager
Marc Engel, Forest Practices Assistant Division Manager
Patricia Anderson, Rules Coordinator
Phil Ferester, Senior Counsel

WELCOME AND INTRODUCTIONS
Stephen Bernath called the Forest Practices Board (FPB or Board) meeting to order at 9:00 a.m.

APPROVAL OF MINUTES
MOTION: Tom Laurie moved the Forest Practices Board approve the February 8, 2017 meeting minutes.

SECONDED: Bob Guenther

ACTION: Motion passed, 11 support / 2 abstentions (Herrera and Davies).

REPORT FROM CHAIR
Stephen Bernath said that because of the extremely wet winter in northeastern Washington, the region has experienced more than 160 landslides, which has affected forest land and non-forest land as well as numerous public and private roads. Triage is occurring to determine the jurisdiction over these landslides.

He reported on two legislative bills: 1-HB 1531 relating to the importance of forest riparian easements for sequestering carbon. It would require DNR to share information about the amount

of carbon sequestered when the state has a climate strategy; 2-HB 1275 relating to streamlining permitting around forest practices hydraulic projects and eliminating the need for landowners having to get substantial shoreline development permits from the local government.

PRESENTATION OF RMAP CERTIFICATES TO LANDOWNERS

Stephen Bernath shared how the concept of road maintenance and abandonment plans came about. He said that new standards for road construction and maintenance were incorporated into the Forests and Fish negotiations including fish barrier removal, which became one of the cornerstones for the Forest Practices Habitat Conservation Plan (FPHCP). He said the federal services viewed the 15-year period to accomplish Road Maintenance and Abandonment Plans (RMAP) as short-term mitigation while riparian areas recovered. He emphasized the importance of large landowner's willingness to do this work over a 15-year period without any public financing.

Hilary Franz, Commissioner of Public Lands, acknowledged that 43 companies worked to complete the plans on time. She shared several statistics: 50,000 miles of forest roads upgraded, 6,000 fish passage barriers replaced, and 3,500 stream miles opened up for fish habitat up to 300 million dollars involved in these projects.

Heather Bartlett, Department of Ecology (Ecology), acknowledged the improvements done through this effort, especially from the perspective of a fish biologist. She said Ecology commends the success seen in these projects.

Jeff Davis, Washington Department of Fish and Wildlife (WDFW), mentioned the importance restoring fish passage is for WDFW. He mentioned the importance these projects are for providing upstream habitat access and allowing the natural flow of sediment and large wood downstream. He highlighted the importance landowner's commitment to the program through the economic down turn.

Several Board members thanked those companies who worked to complete their plans and some shared their experience with the program. Companies with completed plans were announced and presented with a certificate signed by the Commissioner of Public Lands, and the directors of Ecology and Fish and Wildlife. Commissioner Franz, and Heather Bartlett and Jeff Davis were on hand to present the certificates.

<u>Companies with completed RMAPS:</u>

Ahtanum Irrigation District
Alco Holdings LLC
Aloha Lumber
American Forest Resources
Arbor Pacific
Arden Tree Farms, Inc.
Baring Timber
Bascom Pacific LLC
Bloedel Timberlands
C&G Timber
Camball Global
City of Bremerton
City of Montesano
Forecastle Timber Co
Forest Capital Partners
GMO Fund VIII
Grays Harbor County
Green Crow Corporation
Green Crow Timber LLC
Guy Bennett Lumber Co

Herbrand
Hancock Renewable Energy Group
Inland Empire Paper Co
Keystone Forest Investments
Manke Lumber
Menasha Forest Products Corp
Muckleshoot Federal Corporation
North Cascades Timberlands LLC
ORM Timber Operating Co
Plum Creek (Weyerhaueser)
Pope Resources
Port Blakely
Riley Creek Lumber
Seattle City Light
Seefeld Corporation
Springboard Wallace
Stimson Lumber
TCI & Chinook
The Nature Conservancy
The Timber Exchange
Vaagen Brother Lumber
WAFC TA LLC
Western Pacific Timber

PUBLIC COMMENT

Ken Miller, Washington Farm Forestry Association (WFFA), invited the Board to conduct a field tour on his tree farm to provide the Board a better understanding of the disproportionate impact to small landowners regarding the rules and to see what their RMZ template proposal looks like on the ground.

Ray Entz, Kalispel Tribe and Upper Columbia United Tribes, implored the Board to not assign the unresolved issues within the AMP back to TFW Policy.

Jim Peters, Northwest Indian Fisheries Commission, acknowledged the commitment taken by landowners and state agencies to the RMAP program. He mentioned that the main reason the western tribes stayed with Forests and Fish was the AMP. He acknowledged the importance of having the caucus principle's presence was in keeping members accountable.

Jenny Knoth, Green Crow, said their RMAP improvements included opening fish habitat on 12 river miles at a cost of about $1.8 million. She said their community involvement is due to providing forest products and asked the Board to consider the impact of Board decisions on those communities in providing stable family wage jobs.

Adrian Miller, Olympic Resource Management, said the AMP works well when the rules are followed. He also added that supervision and accountability is critical for making the system work well. He reminded the Board that the funding for these projects is huge compared to other states.

Tim Romanski, U.S. Fish and Wildlife Service, said development of a water-typing model will take time and therefore robust field procedures to accurately delineate fish habitat are needed more immediately. He said they value the Board's work to implement the FPHCP and look forward to working with the Board and DNR to develop field procedures for Type F streams, and/or providing concurrence on significant adaptive management actions affecting the FPHCP.

Chris Mendoza, Conservation Caucus, mentioned that the CMER Procedures Standards Manual is important for keeping projects on task and members accountable. He acknowledge the benefit

of the program in research and gathering information. He also acknowledged RMAP accomplishments achieved by landowners. He added that uncompleted RMAP projects in headwater systems could be related to the current FHAM discussion for how those streams will be typed and protected.

Peter Goldman, Washington Forest Law Center/Conservation Caucus, said they have been working cooperatively with DNR on addressing a problematic Snohomish County FPA involving steep and unstable slopes. He said there are still major gaps in Board Manual Section 16 and DNR's interpretation of it as the FPA in Snohomish County demonstrates. He urged the Board to ask DNR when they are going to take steps to better address reactivation, landslide dormancy, and accuracy in laying out groundwater recharge areas.

RECOMMENDATIONS FOR NEXT STEPS IN RULE AND GUIDANCE DEVELOPMENT FOR WATER TYPING SYSTEM

Marc Engel, DNR, reminded the Board that TFW Policy has completed stage one and two of dispute resolution and re-capped the items where dispute resolution has ended and those still in dispute. He presented staff recommendations based on TFW Policy's consensus for elements of the permanent water typing process: acceptance of past water typing modification forms (WTMF), the FHAM framework and the Adaptive Management Program Administrator's (AMPA) role in forming a technical expert group to evaluate and describe what would potentially constitute a fish barrier.

Engel said that PHBs could conceptually be different for different geographical parts of the state and could involve seasonal fluctuations. The technical group will be tasked with determining those parameters that constitute a change in habitat.

Swedeen said she believes a change in habitat means an acknowledgement that those areas above PHBs means we assume no longer supports fish.

Engel concluded with the progress and outcome for OCH. He said in that channelized streams would use BFW and non-channelized streams would use OHWL. He added that the habitat break evaluation and final recommendation would include an accessibility element.

Swedeen stated that the language regarding OCH still needs discussion to reach agreement. She proposed a field visit with conservation caucus technical staff to further discuss and evaluate to resolve this issue.

PUBLIC COMMENT ON NEXT STEPS FOR WATER TYPING

Bill Monahan, Rayonier, said they continue to operate in Washington and look for opportunities to grow here because they believe there is regulatory consistency. He said their experience with the existing stream typing rules is that they are working well as evidenced by their data. He said overreaction on this issue, like going to default physicals, would not be balanced and is inconsistent with the concept of shared risk. He said lots of consensus has come through the technical work group and at TFW Policy. He encouraged that this process continue to let science help to get at accurate and balanced results for non-consensus issues.

Ken Lentz, WFFA, urged the Board to consider the disproportionate impacts to small forest landowners regarding these new rules resulting from the moving of the Type F/N break point upstream.

Ken and Bonnie Miller, WFFA: Ken Miller described his views on the struggle to understand the "end of fish habitat" debate. He said the whole issue has been a moving target making it difficult to get meaningful public comment adding another disproportionate impact on small forest landowners. Bonnie Miller shared excerpts from comments made by small landowners that typifies the discouragement of most small forest landowners.

Elaine Oneil, WFFA, provided comments on the proposal to modify the terms of the protocol survey and an eventual fish habitat model to characterize all habitat with a 20% chance of having fish as "fish habitat." She said the proposal violates the principals of shared risk and pushes more people out of forestry and off the land.

Claudine Reynolds, Port Blakely Tree Farm, suggested that before decisions are made to change the protocol, a better understanding of what the implications are on the ground is needed. She said that could not be done without rigorous science and thorough vetting with multiple stakeholders. She requested the Board direct the Fish Habitat Technical Group to determine the metrics to identify potential habitat breaks and report directly to the Board as a path forward.

John Gold, Sierra Pacific Industries, said the Board has not received any independent analysis demonstrating that resource protection standards are not being met under the current water typing system. He stated that he believes the current practice by forest landowners not only meets, but also far exceeds the current rule. He said they support the consensus elements summarized in DNR's May 5, 2017 memo and the majority opinion related to OCH. He urged the Board to reject the departure from current policy, rule and the Forests and Fish Report performance target that the "line demarcating fish and non-fish habitat waters be drawn so as to be equally likely to be over and under inclusive," and to consider the costs and benefits in advance of adopting any new rule.

Ray Entz, Kalispel Tribe/Upper Columbia United Tribes, said that the term "significant" concerning a change in habitat to establish the PHB is not a good description. He suggested that accessibility by fish is perhaps a better description.

Peter Goldman, Conservation Caucus, reminded the Board that the accomplishments today regarding fish habitat was the original intent of the water typing rule and that the motion needs to include "accessibility" for fish. He asked the Board to consider including into the motion the term accessibility after the terms "significant change in habitat."

Kevin Godbout, Weyerhaeuser Company, asked the Board to consider a motion that can be workable, backed by scientific criteria, and that ensures protocol surveys are part of the assessment that include more than just barriers. He said they support the conceptual starting point for the FHAM and staff recommendations, but still have some concerns regarding the use of probability metrics.

Adrian Miller, Olympic Resource Management, said electrofishing is one tool used for determining fish habitat, but is not the only one. He encouraged the Board to accept staff's recommendations and make this a Board process moving forward.

Chris Mendoza, Conservation Caucus, stated that a technical group had come up with a framework and that this proposal goes against that group's efforts. He said that "probability" and "significant changes" are ambiguous terms and suggested that the second bullet under OCH definition goes against current rule.

Kris Northcutt, Merrill and Ring Timber Company, said electrofishing is one of many tools used for determining fish use but not the only one. He said models are a good starting point, but do not meet every situation.

Karen Terwilleger, WFPA, asked the Board to consider staff recommendations for forming a technical group with members of the existing technical group. She supports staff recommendations on OCH and the FHAM framework.

Jaime Glasgow, Conservation Caucus, said that PHBs should be linked to potential fish passage and should not be based on present day fish use or focused on simple changes to habitat. He suggested that PHBs should be defined as having a high likelihood of preventing upstream fish passage.

Mary Scurlock, Conservation Caucus, wanted to clarify that the recommendations for accepting WTMF as regulatory break points remain subject to the current process for review and should rely on the actual language of TFW Policy's dispute resolution recommendations. She encouraged the Board to use a method that can be simple and easily applied across the landscape and one that relied on specific metrics for establishing breaks may be prone to failure.

PUBLIC COMMENT (PM)

Joe Murray, WFPA, said participants have been working on improvements to the AMP since its inception and will likely continue for as long as the program lasts. He asked that the proposed recommendations have further discussion and evaluation by the participants. He also suggested a sub group of principals be formed to develop the proposal and standards for the final recommendations that could then be used to produce a manual.

BOARD DIRECTION ON NEXT STEPS FOR THE WATER TYPING SYSTEM

Marc Engel, DNR, presented staff recommended actions for the Board to consider.

<u>Dispute Resolution</u>

MOTION: Tom Laurie moved that the Forest Practices Board acknowledge that TFW Policy has completed both stages of Dispute Resolution and the board is assuming management for the development of the final issues needed to have a complete permanent water typing system in the forest practices rules.

SECONDED: Paula Swedeen

Discussion:
None.

ACTION: Motion passed unanimously.

Consensus Recommendations

MOTION: Tom Laurie moved that the Forest Practices Board accept TFW Policy's consensus recommendations on existing approved Water Type Modification Form break points.

SECONDED: Heather Ballash

Discussion:
Laurie acknowledged Mary Scurlock's testimony that suggested additional wording for this motion. Engel reported that the motion does include the suggestion by Scurlock.

ACTION: Motion passed unanimously.

Forest Habitat Assessment Methodology

MOTION: Carmen Smith moved the Forest Practices Board accept TFW Policy's framework for a Fish Habitat Assessment Methodology (FHAM).

SECONDED: Lisa Janicki

Discussion:
None.

ACTION: Motion passed unanimously.

MOTION: Jeff Davis moved the Forest Practices Board direct the AMPA to contract a third party technical expert to convene and lead a group of internal and external science/technical experts to work under the direction of the Board, the third party expert will consult with the TFW Policy Committee caucuses to identify team members.

SECONDED: Bob Guenther

Discussion:
Tom Nelson commented that this new technical group is on a very short time schedule and suggested the existing diverse group continue as the core group working on this task.

Dave Herrera agreed with Nelson.

Lisa Janicki said she would have liked a redline version of what became a motion rather than trying to figure out what was changed. She noted the change in this motion that added another

layer with the AMPA contracting a third party to lead a group versus having the AMPA convene and lead a group.

Jeff Davis responded that he is concerned with all of the AMPA's responsibilities and also concerned with bias from the group. He is mainly concerned with helping the AMPA deliver recommendations to the Board in August.

Tom Nelson said he is still concerned with the time lines set forth and when the contracting would occur.

Hans Berge, DNR, said he agrees that the extra layer would be problematic to complete by the Board's August meeting.

Discussion continued on whether to contract with a third-party expert and/or to use the existing technical group. The Board determined it was best to revise the motion.

Nelson suggested as a friendly amendment to revert to the original recommendation for Board action.

MOTION: Jeff Davis moved the Forest Practices Board direct the AMPA to convene and lead a group of internal and external science/technical experts to work under the direction of the Board, in consultation with the TFW Policy Committee caucuses to identify team members.

SECONDED: Bob Guenther

Discussion:
Brent Davies clarified that this action will provided the AMPA with the ability to draw from existing experts as well as others outside the program.

Berge requested the Board to help recruit experts for this group that

ACTION: Motion passed unanimously.

ACTION: Jeff Davis moved the Forest Practices Board direct the group of internal and external science/technical experts to determine those elements that would constitute a barrier and/or potential habitat break (PHB). The group is directed to review the FHAM listed habitat break features for combinations of primary/secondary features to determine those physical, biological and chemical elements that would individually or in combination constitute a high probability the PHB is coincident with a significant change in habitat including stream size, stream gradient, the interaction of size and gradient and the presence of barriers that limit accessibility, thus the appropriate point to initiate a protocol survey.

SECONDED: Tom Laurie

Discussion:
Paula Swedeen suggested removing the word "or" in the third line of the motion. She explained that based on public comment she wanted to ensure that a habitat break could not occur where a tributary stream exists that would allow for electrofishing.

Tom Nelson agreed with Swedeen; however, he said it should be taken care of with the technical team. He would also like to revert to the original recommendation.

Tom Laurie said he wants all possibilities to be considered by the technical team.

Jeff Davis said his preference is to keep "and/or" because there will be other barriers or reasons why fish may not use the habitat.

Swedeen agreed regarding the wording, however disagreed with Nelson about reverting to the original recommendation, which did not include verbiage on accessibility.

Noel Willet said he felt blindsided on what was originally presented from staff prior to lunch because there was much wordsmithing done that he is now trying to interpret. He also asked why the second sentence was revised so dramatically.

Bernath responded that Board members received comments that accessibility was important as well as receiving consensus recommendations on size and gradient, which staff felt should be incorporated into the recommendation.

Nelson said he is concerned with listing some, but not all, of the conditions for the technical team to consider.

Bernath said that there was no intention of limiting the technical group.

ACTION: Motion passed unanimously.

MOTION: Tom Laurie moved the Forest Practices Board direct the AMPA to bring the PHB recommendations to the Board for the August 2017 meeting. The recommendations need to include the metrics to identify the PHBs and a plan for validation of the eventual rule.

SECONDED: Patrick Capper

Discussion:
Tom Nelson suggested a friendly amendment by adding . . ." and a plan for validation of the eventual rule" to the end of the motion.

ACTION: Motion passed unanimously.

Off-Channel Habitat

MOTION: Tom Nelson moved off-channel habitat (OCH) to include:

- Type F channelized streams: The edge of OCH is bankfull elevation, the outer edge of inundation as defined at the bankfull elevation ("edge" as defined in WAC 222-16-010);
- Type F non-channelized streams: The edge of OCH is the OHWL, which includes those portions of wetlands periodically inundated at the ordinary high water level.

SECONDED: Lisa Janicki

AMENDMENT TO MOTION: Paula Swedeen moved to amend the motion as follows:

. . . Type F non-channelized streams: The edge of OCH is the OHWL~~, which includes those portions of wetlands periodically inundated at the ordinary high water level~~.

SECONDED: Brent Davies

Discussion:
Tom Laurie commented that OHWL includes portions of wetlands when you find it there and questioned the removal of language. Swedeen said that based on the public comments there is disagreement that it is not portions versus the edge of the wetlands.

Laurie said the original motion uses the term "includes" to mean that it is not an inclusive statement.

ACTION ON AMENDMENT: Amendment fails, (2 support (Davies and Swedeen) / 10 oppose / 1 abstention (Ballash)).

ACTION: Motion passed (11 support / 2 oppose (Davies and Swedeen)).

Bob Guenther asked for an update prior to the August meeting on how the technical group is progressing.

DESIGNATION OF RESPONSIBLE OFFICIAL FOR SEPA
Marc Engel, DNR, reported on the need for the Board to designate a person to serve on the Board's behalf as the responsible SEPA official. He said staff recommends the Board designate the chair.

PUBLIC COMMENT ON RESPONSIBLE OFFICIAL DESIGNATION
None.

DESIGNATE RESPONSIBLE OFFICIAL FOR SEPA ASSOCIATED WITH BOARD RULEMAKINGS

MOTION: Stephen Bernath moved the Forest Practices Board designate the Board's Chair to serve as the responsible official for complying with the SEPA process.

SECONDED: Heather Ballash

Discussion:
None.

ACTION: Motion passed unanimously.

TFW POLICY COMMITTEES PRIORITIES FOR CMER WORK PLAN

Hans Berge, AMPA, presented changes to the biennial CMER work plan. He highlighted important changes and status on various science advisory group projects that are included in the budget.

2017-2019 CMER MASTER PROJECT SCHEDULE AND PROPOSED BUDGET FOR 17-19 BIENNIUM

Hans Berge, AMPA, described recommended changes to the current master project schedule and the recommended CMER budget for the next two years. He highlighted the addition of science staff in eastern Washington to help with the development of various projects. The other item of importance is technical support for the TFW Policy. Support is needed for the continued work regarding unstable slopes, Type F, and OCH. He mentioned that the budget reflects allocations for active projects that will be completed within the biennium. He then provided a status review, included estimated completion timeframes, for several on-going projects contained within the budget.

Berge said one recommendation is focused on showing funding for various projects to provide justification and avoid errors. He stated that the requests for research expenditures in 2018 is $3.6 million. He said the difference by a positive $3,000 dollars between year 1 and year 2 is because the program will under spend by a little over $100,000 in the first year and over spend just under $100,000 in the second year.

Berge said that the master project schedule and proposed budget numbers are consensus recommendations of the TFW Policy for the Board's consideration and action.

PUBLIC COMMENT ON 2017-2019 CMER MASTER PROJECT SCHEDULE & BUDGET

Ray Entz, Kalispel Tribe, shared his caucus' concerns with the budget and suggested that consensus will be difficult in the future, if some of their priorities are not addressed. He described their concerns about extended project timelines and non-essential projects that have the potential to stress the budget.

2017-2019 CMER MASTER PROJECT SCHEDULE AND BUDGET

Berge requested the Board to approve the 2017-2019 schedule and budget.

MOTION: Heather Ballash moved the Forest Practices Board approve the updates to the CMER work plan, the updated 2017-2019 CMER Master Project Schedule and associated Adaptive Management Program Budget as presented.

SECONDED: Noel Willet

Discussion:
Brent Davies expressed her concern over the lack of resources for Eastside science advisory group and asked if this could be improved. Berge responded that he has dedicated some of his staff to help but the gap is still alarming.

ACTION: Motion passed unanimously.

NEW BUSINESS

ADAPTIVE MANAGEMENT PROGRAM RECOMMENDATONS

Bernath said it is clear that Board members are interested in encouraging the AMP review to continue. Tom Laurie began the discussion by presenting a motion.

MOTION: Tom Laurie moved the Forest Practices Board recognize the Adaptive Management Program is not progressing as effectively as needed and that changes in the operation and structure of the program may be needed.

The Board directs AMPA to contract with a facilitator to bring together the TFW Policy Committee and CMER to review proposed revisions to the Adaptive Management Program brought forward to the Board on May 9, 2017, and to report back to the Board by its November 2017 meeting.

The report to the Board will identify why specific recommended changes are or are not supported by consensus, along with any alternative consensual recommendations.

Non-consensus alternative recommendations may be included in the report, along with the level of support for the alternatives and the reason why.

In November, the Board may take action on all or part of the recommendations or move to consider these results along with recommendations from any forthcoming performance audit.

SECONDED: Stephen Bernath

Discussion:
Laurie said the Board could take action to support the changes discussed at yesterday's meeting. He said he wanted to make sure the stakeholders have an opportunity to participate and comment.

Bernath said that after hearing many of the caucuses interested in bringing the principals together and after consulting with the Commissioner of Public Lands, DNR would make a commitment to work with caucuses to plan a principals meeting.

Hans Berge, DNR, recapped his recommended priorities that include the Board setting clear direction on a path forward.

Brent Davies suggested a motion that would support the convening of a principals meeting. She also recognized that perhaps sending it back to TFW Policy and CMER may not get the Board where they want to go in a quick time frame suggested the motion include

Swedeen and Nelson agreed with Davies. Nelson suggested that Berge present his recommendations to the principals and report at the August meeting on progress.

Laurie is open to modifying his motion as it was not his intent to put this on TFW Policy rather involve the stakeholders for comments.

Berge said that it is more CMER focused and his goal is to get a recommitment to the spirit of TFW that will enable better collaboration and be more efficient.

Lisa Janicki suggested a joint meeting of the principals and the Board.

PUBLIC COMMENT ON ADAPTIVE MANAGEMENT PROGRAM RECOMMENDATIONS

Ray Entz, Kalispel Tribe, reminded the Board that the AMP issues have been discussed for some time and no challenge within the program is easy to resolve. He implored the Board to take leadership and facilitate the process to make the needed changes. He doubted the ability for current members to fix the problems.

Doug Hooks, WFPA, provided observations of the CMER committee that result in conflicting priorities given the wide perspective and interests from members. Setting priorities and goals, instilling trust and transparency will help these issues. He added that the first step is to define the problem.

ADAPTIVE MANAGEMENT PROGRAM RECOMMENDATONS

Laurie withdrew his motion.

ACTION: Motion withdrawn

MOTION: Stephen Bernath moved the Forest Practices Board commit to the TFW approach and its ground rules and recommend that a subcommittee of the Board work with the Adaptive Management Program Administrator and the Commissioner of Public Lands (staff) to develop an improvement plan and have a meeting of the principals before or in conjunction with the Forest Practices Board at their August 2017 meeting to make the Adaptive Management Program system work better.

SECONDED: Lisa Janicki

Discussion:
Bernath said the concept of the motion is that the Board is committed to working with TFW Policy and CMER on these issues to make progress as well as gather the principals together.

Bob Guenther said he views the motion as everyone making the commitment.

Dave Herrera asked what the role of the subcommittee is. He also said that he does not believe it is broken as described because work products and recommendations are being delivered to the Board. He wants to ensure all participants are able to provide comment.

Bernath said the subcommittee would work with the AMPA to ensure conversations occur with TFW Policy and CMER and they are not left out of the process.

Bernath invited Jim Peters, NWIFC, to provide comment on the motion. Peters recognized that some improvements are needed, but he reminded the Board that because TFW Policy does not reach consensus does not mean the process is broken. He said he would work to encourage his principals to commit to these discussions.

ACTION: Motion passed unanimously.

The subcommittee members are Lisa Janicki, Brent Davies, Paula Swedeen and Dave Herrera.

STAFF REPORTS
The following reports were not discussed:

- Adaptive Management Update
- Board Manual Update
- Compliance Monitoring
- Northern Spotted Owl Implementation Team
- Rule Making Activity
- Small Forest Landowner Advisory Committee and Small Forest
- Landowner Office Update
- Upland Wildlife Update Taylor's Checkerspot Butterfly Annual Report
- Western Gray Squirrel Annual Report

2017 WORK PLAN
Marc Engel, DNR, presented changes to the work plan reflecting the decisions made during today's meeting: the target date for final rule and guidance for the permanent water typing system was moved from November 2017 to February 2018, the PHB technical group's recommendations will be presented at the August 2017 meeting, and a report will be provided by the Board's AMP subcommittee at the August 2017 meeting.

MOTION: Tom Laurie moved to accept the work plan as mended.

SECONDED: Carmen Smith

ACTION: Motion passed unanimously.

EXECUTIVE SESSION

None.

Meeting adjourned at 5:20 p.m.

DEPARTMENT OF NATURAL RESOURCES

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MEMORANDUM

TO: Forest Practices Board

FROM: Patricia Anderson, FPB Rules Coordinator

SUBJECT: Rule Making Related to Electronic Submission of an FPA/N including Signature and Payment

On August 9, I will request the Board's approval to file a CR-102 *Notice of Rule Making* with the enclosed draft language. This will initiate public review of the proposed amendments to chapter 222-20 WAC adding the option for an electronic submission of an FPA/N, including electronic signature and payment. This rule making is a placeholder for when the new business system becomes available.

Incorporating this option into rule will allow applicants to submit an electronic FPA/N in addition to the current acceptable methods of certified mail or hand delivery to a region office. Additionally, the new system will allow applicants to submit digital signatures and payments electronically. This rule will not limit the method DNR will accept an FPA/N and receive payment, nor conversely, require prospective applicants to use only electronic formats. The same process DNR accepts and validates an FPA/N through mail receipt will apply to an electronically submitted FPA/N once the system is active.

The anticipated timeline for the rule making is:
- September 2017: Public review and comment of draft rules and one hearing
- November 2017: Staff request for adoption of rules
- December 2017: Rules become effective

I am also enclosing a preliminary cost-benefit analysis. A small business economic impact statement is not required because the proposed rules do not impose additional costs on businesses.

I look forward to seeing you on August 9.

PAA/
Enclosures: Draft Rule Proposal
Preliminary Cost-Benefit Analysis

Forest Practices Board
Proposed Rule Amendments
Acceptance of Electronically Submitted FPA/N Rule Making
August 2017

WAC 222-20-010 Applications and notifications—Policy.

(1) **No Class II, III or IV forest practices** shall be commenced or continued unless the department has received a notification for Class II forest practices, or approved an application for Class III or IV forest practices pursuant to the act. Where the time limit for the department to act on the application has expired, and none of the conditions in WAC 222-20-020(1) exist, the operation may commence.

(2) **The department shall** prescribe the form and contents of notifications and applications. The department shall specify the information required for a notification, and the information required for the department to approve or disapprove an application.

(3) **Except as provided in subsection (4) of this section, applications and notifications** shall be signed by the landowner, the timber owner, and the operator if the operator is known at the time the application is submitted. Electronic signatures may be accepted when the department develops an electronic business system.

(4) In lieu of a landowner's signature, where the timber rights have been transferred by deed to a perpetual owner who is different from the forest landowner, the owner of perpetual timber rights may sign a forest practices application or notification for operations not converting to another use and the statement of intent not to convert for a set period of time. The holder of perpetual timber rights shall serve the signed forest practices application or notification and the signed statement of intent on the forest landowner. The forest practices application shall not be considered complete until the holder of perpetual timber rights has submitted evidence acceptable to the department that such service has occurred.

(5) **Where an application** for a conversion is not signed by the landowner, the department shall not approve the application. Applications and notifications for the development or maintenance of utility rights of way shall not be considered to be conversions.

(6) **Transfer of the** approved application or notification to a new landowner, timber owner or operator requires written notice by the former landowner or timber owner to the department and should include the original application or notification number. This written notice shall be in a form acceptable to the department and shall contain an affirmation signed by the new landowner, timber owner, or operator, as applicable, that he/she agrees to be bound by all conditions on the approved application or notification. In the case of a transfer of an application previously approved without the landowner's signature, the new timber owner or operator must submit a bond securing compliance with the requirements of the forest practices rules as determined necessary by the department. If an application or notification indicates that the landowner or timber owner is also the operator, or an operator signed the application, no notice need be given regarding any change in subcontractors or similar independent contractors working under the supervision of the operator of record.

(7) **The landowner or timber owner must provide notice of hiring or change of operator** to the department within forty-eight hours of the change. The department shall promptly notify the landowner if the operator is subject to a notice of intent to disapprove under WAC 222-46-070. Once notified, the landowner will not permit the operator, who is subject to a notice of intent to disapprove, to conduct the forest practices specified in the application or notification, or any other forest practices until such notice of intent to disapprove is removed by the department.

(8) **Applications and notifications,** if complete, will be considered officially received on the date ~~and time~~ shown on any registered or certified mail receipt, or the written receipt given at the

~~time~~date of personal delivery, or ~~at~~on the ~~time~~date of receipt by general mail delivery, or on the date of electronic receipt when the department develops an electronic business system. The department will immediately provide a dated receipt to the applicant. Applications or notifications that are not complete, or are inaccurate will not be considered officially received until the applicant furnishes the necessary information to complete the application.

(a) A review statement from the U.S. Forest Service that evaluates compliance of the forest practices with the Columbia River Gorge National Scenic Area Act (CRGNSA) special management area guidelines is necessary information for an application or notification within the CRGNSA special management area. The review statement requirement shall be waived if the applicant can demonstrate the U.S. Forest Service received a complete plan application and failed to act within forty-five days.

(b) A complete environmental checklist (WAC 197-11-315) is necessary information for all Class IV applications.

(c) A local governmental entity clearing and/or grading permit is necessary information for all Class IV applications on lands that will be converted to a use other than commercial timber operations if the local governmental entity has jurisdiction and has an ordinance requiring such permit.

(d) A checklist road maintenance and abandonment plan is necessary information for all small forest landowners' applications or notifications for timber harvest (including salvage), unless exempt under WAC 222-24-0511, or unless the application is a small forest landowner long-term application which requires a roads assessment.

(9) **Where potentially unstable slopes or landforms are in or around the area of an application,** the department may require the landowner to provide additional information in order to classify the application appropriately. If necessary, the department may require additional geologic information prepared by a qualified expert. The department may request that the qualified expert explain the methods the qualified expert used to evaluate the proposed harvest or construction activities with respect to the potentially unstable slopes or landforms. Nothing in this subsection is intended to require a geotechnical report if the geologic information provided is sufficient to appropriately classify the application.

(a) "Qualified expert" is defined in WAC 222-10-030.

(b) "Potentially unstable slopes or landforms" are those listed in WAC 222-16-050 (1)(d)(i)(A) through (E).

(10) **Financial assurances** may be required by the department prior to the approval of any future forest practices application or notification to an operator or landowner under the provisions of WAC 222-46-090.

WAC 222-20-030 Delivery of notifications and applications—Receipts—File numbers.

(1) **Notifications and applications** ~~should~~shall be delivered to the department by mail or personal delivery at the appropriate region office, or electronically when the department develops an electronic business system. Notifications and applications actually received at the appropriate region office by other means may be accepted or returned to the applicant.

(2) **Upon delivery of** a complete notification or application the department will provide a written receipt to the landowner, timber owner, and operator.

(3) **Each receipt will** indicate the file number assigned to the notification or application.

PRELIMINARY COST-BENEFIT ANALYSIS
Pursuant to RCW 34.05.328
Forest Practices Board
Acceptance of Electronically Submitted Forest Practices Applications
June 2017

Introduction

The Forest Practices Board (Board) is proposing rule amendments related to adding electronic transactions as an option for prospective applicants submitting forest practices applications and notifications (FPA/N). For DNR to accept and approve an FPA/N, applicants must provide necessary information, sign the FPA/N and pay a specified fee amount.[1] The proposed rule will allow applicants to submit digital signatures and submit payments electronically. Legislative authority for agencies creating a framework for implementing electronic transactions is found in RCW 19.360.010. Washington State's Office of the Chief Information Officer (OCIO) provides information agencies can use for establishing policy or rules governing the use and acceptance of electronic signatures.

The Administrative Procedure Act (chapter 34.05 RCW) requires agencies to make certain determinations before adopting rules. This document is structured to fulfill agency requirements listed in RCW 34.05.328(1)(a) through (e), and small business impact per the Regulatory Fairness Act, chapter 19.85 RCW.

Goal and Need

Before adopting rules, agencies are required to determine that rules are needed to achieve the general goals and specific objectives of the statute the rules implement.[2] In this case, the statute being implemented is RCW 76.09.060(1):

> *The department shall prescribe the form and contents of the notification and application. The forest practices rules shall specify by whom and under what conditions the notification and application shall be signed or otherwise certified as acceptable. …The application or notification shall be delivered in person to the department, sent by first-class mail to the department or electronically filed in a form defined by the department.*

This statute establishes DNR's authority to specify the information needed on an FPA/N and establishes the process by which DNR receives FPA/Ns.

The Board's Preproposal Statement of Inquiry (CR-101) indicates that the proposed rule "…will allow applicants to submit an electronic FPA/N in addition to the current acceptable methods for submittal of an FPA/N through certified mail or hand delivery to a Department of Natural Resources region office." The goal of the proposed rule is to provide an alternative option in addition to existing methods of submitting and paying for an FPA/N. This rule will not prevent landowners from submitting or providing payment for an FPA/N through conventional methods if they do not have access to electronic platforms or desire to use electronic systems.

DNR's Forest Practices Division is in the process of updating the current business application system. The new system, when active, will provide the ability for applicants to submit an FPA/N

[1] Forest practices fees are charged for most forest practices activities, not all activities require fees. RCW 76.09.065.
[2] RCW 34.05.328(1)(b).

through electronic formats, including signatures and fee payment. This rule will precede the new applications system. Providing electronic transactions is a business model practiced within both government and within private sector as a way to lower transaction costs for both customers and organizations alike.

Rule Proposal

The rule proposal amends WAC 222-20-010 and WAC 222-20-030. Minor content addition in subsection (3) in WAC 222-20-010 makes clear that electronic signatures submitted through an electronic system will be accepted once DNR implements the new system and hold the same standing as a hand written signature. Additional content is subsection (8) in WAC 222-20-010 specifies that an electronically submitted applications and payment will be considered received pending review by region staff.[3] Minor content addition in subsection (1) in WAC 222-20-030 clarifies the ability for applicants to submit FPA/Ns through conventional means ***or*** by an electronic system to the appropriate region office.

Alternatives to Rule Making, Consequences of Not Adopting a Rule, and Least Burdensome Alternative

Agencies must analyze alternatives to rule making and the consequences of not adopting a rule[4], and must determine, after considering alternatives, that the rule being adopted is the least burdensome alternative for those required to comply with it.[5] The Board is not considering alternative versions of the proposed rule, but there may be alternative ways to accomplish the Board's goal to, "provide an alternative option in addition to existing methods of submitting an FPA/N." Alternatives that were considered are as follows:

Alternative 1: Adopt the proposed rule.
Alternative 2: Do not adopt the proposed rule.
Alternative 3: Do not adopt the proposed rule but accomplish the goal using another method.
Alternative 4: Adopt the proposed rule <u>and</u> supplement the goal by another method.

- Alternative 1 would accomplish the goal.
- Alternative 2 would not accomplish the goal.
- Alternative 3 could accomplish the goal to some extent, but would require DNR as an agency to adopt a policy that covers all operational divisions of DNR. Communicating that an electronically submitted FPA/N is an acceptable method could be added to the FPA/N instructions.
- Alternative 4 would accomplish the goal to a greater extent than either 1 or 3.

Concerning the consequence of not adopting the rule, DNR and/or the Forest Practice Division would need to establish a policy for accepting electronic formats. Although the OCIO allows agencies to implement this through policy or rule, the Board has elected to accomplish this through rule making. This decision is consistent with the adoption of past rules governing the Board's FPA/N application and notification chapter.

[3] The same process used for receiving FPA/Ns and payment by mail and the subsequent review by region staff to verify completeness will apply to electronically submitted FPA/Ns.
[4] RCW 34.05.328(1)(b).
[5] RCW 34.05.328(1)(e).

Alternative 4 may be the most effective method because it would reach prospective applicants who rely on the rules for their information, and also applicants who rely on the FPA/N instructions for their information. Adopting rule also clarifies the manner in which region offices receive completed FPA/Ns. In addition, a rule would ensure electronic signatures have the same force and effect as that of a signature fixed by hand. Other modes of information such as the Forest Practices Illustrated or tutorial guides would also provide applicants the knowledge regarding electronic processes.

As for a "least burdensome" alternative, none of the listed alternatives would be more burdensome for applicants than DNR's current FPA/N submittal and payment process.

Benefit and Cost of the Rule

Before adopting rules, agencies must determine 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.[6]

DNR is electing not to quantitatively assess the rule proposal since the costs to implement are accrued by DNR and the benefits are passed on to applicants opting to use electronic transactions. The rule is an expansion of DNR's current business model and does not change, nor impose additional requirements for those wishing to submit FPA/Ns.

Benefit: Providing the ability for applicants to submit signatures and payment electronically is expected to benefit prospective applicants seeking the option to do so. In some cases, the use of electronic records decreases transaction times and reduces costs, such as savings in reduced printed material or travel time associated with delivering FPA/Ns to region offices. It is anticipated that the more applicants use electronic options provided with the new system, the greater an awareness of its efficiency will occur.

Cost: Because DNR already requires the potential applicants to sign an FPA/N and provide fees for conducting certain forest practices activities, landowners will not bear any additional costs from this rule making.

Initial upfront program costs to DNR will occur for the anticipated building of the new electronic business system. Cost estimates are not available because the new system is still in the planning phase. However, incorporating electronic options into the planned system will not affect the decision to move forward by the department.

Small Business Impacts

The Regulatory Fairness Act requires state agencies prepare a small business economic impact statement (SBEIS) for proposed rules if the rules will impose more than minor costs on businesses in an industry.[7] The purpose of the SBEIS is to look at how a rule might impact small businesses. When these impacts are identified, the agency must try to find ways to reduce those impacts.

As previously stated, the rule is not expected to impose additional costs to applicants because it is an expansion of the existing process and does not change DNR's FPA/N requirements or fees. In some cases, utilizing an electronic option may disproportionately benefit smaller businesses by

[6] RCW 34.05.328(1)(d).
[7] RCW 19.85.030.

reduced transit times to region offices. Therefore, the proposed rule does not meet the threshold of imposing more than minor costs on businesses, and an SBEIS is not required.

Summary

Goal of the rule proposal

The Board's goal in adopting the rule proposal is to provide an electronic option when submitting an FPA/N and providing payment for forest practices activities. The proposed rule language supplements the existing language in WAC 222-20-010 and -030 by specifying that DNR will accept electronic signatures and payment once DNR has implemented the new system. The process for receiving and reviewing an FPA/N and payment by region staff will be the same for those submitted by mail or through an electronic format.

Alternatives to rule making and consequence of not adopting a rule

Per Washington State's OCIO guidelines, agencies must establish use of electronic systems by policy or rule. The alternative method to accomplish the Board's goal through DNR policy would not reach the intended audience. Some prospective applicants rely on rules for their information rather than on agency websites or policy links. For that reason, the consequence of not adopting the rule may be that this subset of prospective applicants will not be adequately informed. The most effective way to reach the targeted audience therefore, is to both adopt the proposed rule and add the information to the FPA/N instructions to assure that as many applicants as possible understand their options.

Benefit and cost of the rule proposal

It is expected that adding language to chapter WAC 222-20 regarding electronic signature and payment options will be beneficial for prospective applicants. This rule making does not limit the method DNR will accept an FPA/N and receive payment, nor conversely, require prospective applicants to use only electronic formats. Therefore, individuals will not bear additional costs because DNR's business model will continue to allow prospective applicants to submit FPA/Ns signed by hand and provide payment by conventional means.

DEPARTMENT OF
NATURAL RESOURCES

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MEMORANDUM

July 19, 2017

TO: Forest Practices Board

FROM: Marc Ratcliff
Forest Practices Policy Section

SUBJECT: Possible Rule Making Regarding Public Records Fee Schedule

At your August Board meeting, I will request the Board's approval to file a *Preproposal Statement of Inquiry* (CR-101) to notify the public of possible rule making by the Board to amend language in WAC 222-08-090 for fee collection of public records requests.

Rule amendments are needed resulting from recently passed legislation pertaining to how agencies—the Board—collects fees from public record requests. House Bill 1595 amended the Public Records Act by allowing two options when providing disclosure requests:

- The actual cost method allowing DNR to charge actual costs, but requires DNR to complete several steps including data collection sufficient to justify DNR's rates, publication of the rates, and the requirement to conduct public hearings prior to Board adoption and subsequent implementation of a rule; or
- The statutory fee method allowing DNR to use the default fee schedule in RCW 42.56.120 after Board adoption of a rule explaining that an actual cost method would be 'unduly burdensome' to accomplish.

The new legislation becomes effective July 23 and DNR, as an agency, is amending its rules to correspond with the new statutory fee schedule outlined in the Public Records Act.

Staff recommends the Board adopt the same cost method that DNR, as an agency, will adopt for the charging of public records request fees. At this time, staff anticipates having draft rule ready for the Board's November meeting.

Please feel free to contact me with any questions at 360.902.1414, or marc.ratcliff@dnr.wa.gov.

MR

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M E M O R A N D U M

DATE: 24 July 2017

TO: Forest Practices Board

FROM: Garren Andrews, Compliance Monitoring Program Manager

SUBJECT: Compliance Monitoring Program 2014-2015 Biennial Report, and Independent Scientific Peer Review Synthesis and Assessment

Attached is the 2014-2015 Forest Practices Compliance Monitoring biennial report, and Independent Scientific Peer Review synthesis and assessment.

The 2014-2015 Compliance Monitoring Program biennial report contains data analysis and interpretation, and trend analysis of the nine standard sample prescriptions for the 2014-2015 sampling window. Trend analysis was conducted to detect compliance trends on data collected from 2010-2015.

An Independent Scientific Peer Review was conducted on the 2014-2015 Forest Practices Compliance Monitoring biennial report, and program analytical study design. Major and minor recommendations from the assembled ISPR team are provided in the synthesis and assessment document.

NATURAL RESOURCES

2014-2015 Biennium Forest Practices Compliance Monitoring Report

August 2016

WASHINGTON STATE DEPT OF
NATURAL RESOURCES
PETER GOLDMARK
COMMISSIONER OF PUBLIC LANDS

2014-2015 Biennium Forest Practices Compliance Monitoring Report

August 2016

Garren Andrews
Forest Practices Division
Washington State Department of Natural Resources

Alice Shelly
R2 Resource Consultants, Inc.

Table of Contents

1. Acknowledgments

This biennial report is dedicated to Walt Obermeyer. Walt worked for the Washington State Department of Natural Resources for 29 years and in the Compliance Monitoring Program from 2009 to 2015. Walt will be missed.

The contributions of the following were critical to the completion of this report: the tribal staff and regional staffs of the Washington State Departments of Ecology, Fish and Wildlife, and Natural Resources who performed field reviews in good weather and bad, with special thanks to those who reviewed and entered data, including Todd Olson, Jean Parodi, and John Heimburg. Also thanks to the Forest Practices Division leadership who patiently reviewed various drafts

2. Executive Summary

The Compliance Monitoring Program (CMP) is a key component of the Washington State Department of Natural Resources' (DNR's) Forest Practices Program (FP Program). Compliance monitoring is linked to DNR's responsibility to ensure that operators and landowners are complying with forest practices administrative rules (FP rules) when conducting forest practices activities. Through monitoring, the CMP provides feedback to the FP Program regarding the degree to which specific FP rules are being implemented correctly and highlights where there is a need for focus, training, guidance, or clarity.

The CMP reports on real-world compliance on the ground. The FP rules direct DNR to provide "statistically sound, biennial compliance audits and monitoring reports to the [Forest Practices] Board for consideration and support of rule and guidance analysis" (WAC 222-08-160[4]). In addition to the biennial report produced by the CMP, in 2011 the Commissioner of Public Lands requested an annual report in the intervening years.

This biennial CMP report covers data samples collected during the 2014 and 2015 field seasons. Two years are needed to obtain enough data to attain the desired level of statistical precision. The data from the 2014 and 2015 field seasons have been combined to satisfy the desired precision for statistical estimates.

The CMP evaluates compliance with prioritized FP rules considered to have the greatest potential impact on public resources, defined as water, fish, wildlife, and capital improvements of the state. The rule groupings evaluated by compliance monitoring pertain to riparian and wetland areas and to road construction and maintenance.

Sample Design and Methodology

For the purposes of monitoring and statistical analysis, individual FP rules are grouped into categories of similar rules called "prescriptions." Separate samples are chosen for each prescription type monitored. Estimated populations for individual prescriptions are associated with forest practices applications (FPAs) that include forest practices activities, such as timber harvest or road construction. Sample selections for each prescription type are drawn from the FPAs that contain the prescriptions being monitored that year (numbers in parentheses indicate the estimated population of FPAs with the prescription in the 2014-2015 sample): Roads (1,410), Type A&B Wetlands (237), Forested Wetlands (322), No Inner Zone Harvest (NIZH) (737), Desired Future Condition Option 1 (DFC1) (55), Desired Future Condition Option 2 (DFC2) (152), Non-Fish-Bearing Perennial Stream (Np) (929), and Non-Fish-Bearing Seasonal Stream (Ns) (1018).

For this biennial report, 200 prescriptions were sampled. Sample sizes were calculated from a combination of prescription population size, cluster size, and variance. Prescription sample sizes were as follows: Roads (13), Type A & B Wetlands (35), Forested Wetlands (23), No Inner Zone Harvest (25), Desired Future Condition Option 1 (20), Desired Future Condition Option 2 (14), Non-Fish-Bearing Perennial Stream (35), and Non-Fish-Bearing Seasonal Stream (35).

FP rules monitored annually are referred to as the Standard Sample. In addition, certain rule groups are monitored periodically and are known as an Emphasis Sample. The Standard Sample monitors the following rules:

- Riparian protection (WAC 222-30-021 and 022)
- Wetland protection (WAC 222-30-020[6] and [7] and WAC 222-24-015)
- Road construction, maintenance, and abandonment (WAC 222-24)
- Haul routes for sediment delivery (WAC 222-24)

In addition, the physical criteria of waters (e.g., stream width, stream gradient, etc.) are observed to estimate the number of occurrences in which water types recorded on FPAs are different than what is observed on the ground (WAC 222-16-031).

Changes in Study Design

The CMP made significant modifications in the 2014-15 study design to increase precision in statistical estimates for each prescription type observed. Previously, compliance rates were estimated by dividing 100% compliant samples by the total number of samples for each prescription type. The updated study design divides the number of compliant rules by the number of total sampled rules within each prescription type, resulting in an average compliance rate. This change increases statistical precision in results and provides more information to help determine causes of noncompliance associated with rule interpretation and implementation. The added precision helps discern changes in compliance rates over time. The modified design creates flexibility for future sampling to add or remove different prescription types from the sample as needed, while still providing the desired confidence intervals for each prescription type. As a result of rule overlap, the No Inner Zone Harvest and No Outer Zone Harvest prescriptions have been combined.

Trend analysis was incorporated to detect trends in prescription, and individual rule compliance over time. Data collected from 2010-2013 for the standard prescription types were converted to be consistent with current data collection, and analytical protocols. Weighted least squares multivariate linear regression analysis was used to predict general trends in average compliance through time.

Notable Aspects of CMP Samples

- FPAs are randomly selected.
- Conclusions about average compliance are based on a two year window, with approximately half the samples observed in the first year and half the samples observed in the second year. Two years are needed to obtain enough data to attain the desired level of statistical precision.
- The CMP establishes sample sizes based on an estimated 95% confidence interval width of +/– 6% on compliance estimates.[1]

[1] A 95% confidence internal of +/– 6% means that if the sample was repeated 20 times, one would expect the population mean (the "true" compliance rate) to fall within the confidence interval 19 out of 20 times.

- CMP results are reported for all the landowners combined.
- The Compliant percentages reported for all sampled prescriptions, except the Haul Route prescription, reflect average compliance for the prescription. Compliance with individual rules within the prescription are summed to calculate the percentage of prescription compliance rates. See section 4 for additional information.
- The Haul Route prescription type follows a different sample design. The Compliant percentages reported for the Haul Routes prescription are overall rates of compliance with FP rules for haul routes (instead of the percentage of the sample compliant). See Section 4 for more information.
- A rule application assessed as compliant is rated either Compliant or Exceeds Rule Requirements. The latter is used when a landowner has implemented higher protection standards than required by FP rules.
- When a prescription is assessed as a deviation, it is rated either Low, Moderate, High or Indeterminate to provide the degree of deviation from rule or FPA requirements.
- Compliance is determined both for compliance of the forest practices activity implementation with FP rules, called "rule compliance," and for compliance of the forest practices activity implementation with what was stated on the FPA, called "FPA compliance."

Findings

Findings from the 2014-2015 sampling season are reported in Sections 5 and 6 of this report.

Water Typing

Supplemental Water Information Forms (SWIFs) were completed for 28 samples due to observed water typing differences between water type documentation on FPAs and on-the-ground physical features. Eleven waters were underclassified, 10 waters were overclassified, 6 waters were indeterminate, and 1 SWIF was completed for a non-water typing issue. Additional relevant data and results for water typing are located in Section 5.

Riparian Management Zones

The DFC1 rate of rule compliance for the 2014-2015 sample period was 94%. The DFC2 rate of rule compliance was 98%. The NIZH rate of rule compliance was 94%. The Np activity rate of rule compliance was 94%. The Ns activity rate of rule compliance was 97%. Additional relevant data and results for water typing are located in Section 5.

Wetland Management Zones

The Type A&B Wetlands rate of rule compliance for the 2014-2015 sample period was 94%. The Forested Wetlands rate of rule compliance was 97%. Additional relevant data and results for water typing are located in Section 5.

Roads

The Roads rate of rule compliance for the 2014-2015 sample period was 98%

The rate of rule compliance for the Haul Routes prescription in the 2014-2015 sample period was 90%. Additional relevant data and results for roads are located in Section 6.

Trend Analysis

Trends of year to year increasing prescription compliance rates were observed for DFC2 (1.5%), NIZH (1.0%), and Roads (1.4%). No statistically-significant trends of decreasing prescription compliance were observed. Additional relevant data and results for water typing are located in Section 7.

Changes Made Based on CMP Feedback

A primary goal of the CMP is to provide feedback from compliance monitoring for the purposes of improving compliance with FP rules. The following are some recent changes made to address issues identified as a result of compliance monitoring: Leave tree, DFC, and RMZ length rule and Forest Practices Board Manual clarifications are currently under review and are targeted for 2017 completion. Rule and Board Manual clarifications have been incorporated into the Forest Practices Board work plan.

3. Introduction

Photo by: Monica McMackin

Compliance monitoring is a component of the Washington State Forest Practices Program. Section 1 gives a brief history leading to the development of the Compliance Monitoring Program and explains key factors and concepts regarding compliance monitoring and the forest practices rules that are monitored.

3.1 History and Context

The 1974 Forest Practices Act (FP Act) declared that "forest land resources are among the most valuable of all resources in the state" (Revised Code of Washington [RCW], Title 76.09). This law and its corresponding forest practices rules (FP rules) (Washington Administrative Code [WAC], Title 222) regulate forestry activities on state and private lands in Washington State and are designed to both protect public resources on forestland and ensure that Washington continues to support a viable forest products industry. (WAC 222-16-010 [Public Resources]) Public resources are defined as water, fish, wildlife, and capital improvements of the state or its political subdivisions. The FP Act created the Forest Practices Board (the Board), an independent state agency with 13 members. The Board, working with the public, stakeholder groups, and DNR, adopts FP rules and approves technical guidance (Forest Practices Board Manual) that assists landowners in implementing FP rules. The FP rules are administered by DNR (with input and consultation from other entities where directed by rule).

A flexible Forest Practices Program (FP Program) was developed to implement the FP Act and rules, because knowledge and understanding of natural systems evolves and natural systems

change over time. A flexible FP Program is essential for meeting the intent of the FP Act in an arena where change is expected and ongoing. Components that provide systematic feedback and facilitate change when needed have been intentionally designed and incorporated into the FP Program. These components include the Compliance Monitoring Program (CMP), the Adaptive Management Program (AMP), and the Forest Practices Training Program (FPTP). Other FP Program components that provide critical functions for implementing the FP Act and rules and that provide information to improve the FP Program include forest practices application (FPA) review and FPA compliance and enforcement. When these components provide feedback suggesting that change is needed to better meet the goals of the FP Act and rules, the Board can adopt new FP rules, modify existing ones, and adopt board manual technical guidance. Additionally, the FP Program may adjust its operational practices, within the bounds of the FP Act and rules, to create some of the desired changes. Since promulgation of the FP Act in 1974, the FP Program's flexible design has facilitated many changes to the FP rules to the Board Manual, and to the FP Program.

One such change was the incorporation of the Compliance Monitoring Program into the FP Program. The CMP was not part of the original FP Program established in 1974. The CMP was first formally proposed as an essential element in the 1999 Forests and Fish Report, a multi-stakeholder agreement that delineated acceptable measures to protect water quality and habitat for federally listed aquatic species and other riparian dependent species on private and state forestlands in Washington. The legislature enacted the Forests and Fish Report protection measures into law in 1999 based upon best available science. As a result, compliance monitoring for forest practices became a legal requirement. The CMP was promulgated as part of the FP rules in 2001 when the Board adopted FP rules that reflected the protection measures in the Forests and Fish law.

Regarding compliance monitoring, WAC 222-08-160(4) states: "The department shall conduct compliance monitoring that addresses the following key question: 'Are forest practices being conducted in compliance with the rules?' The department shall provide statistically sound, biennial compliance audits and monitoring reports to the board for consideration and support of rule and guidance analysis. Compliance monitoring shall determine whether forest practices rules are being implemented on the ground. An infrastructure to support compliance will include adequate compliance monitoring, enforcement, training, education and budget."

When funding for the CMP was allocated by the legislature in 2006, DNR, with input from other stakeholders, developed a compliance monitoring program design and implemented an initial sampling effort in the spring of that year. The CMP has completed annual compliance monitoring sampling every year since 2006. Additionally, the program has produced biennial reports starting with the 2006–2007 CMP Biennium Report showing results of field reviews, as directed by WAC 222-08-160(4), for consideration and support of rule and guidance analysis. All completed reports can be found on the CMP website: http://www.dnr.wa.gov/programs-and-services/forest-practices/rule-implementation.The CMP is a key component of a feedback loop intended to improve compliance with the FP rules that protect public resources and maintain a viable forestry industry in Washington State. When sampling results provide sufficient information regarding a need for change, CMP reports include suggestions for potential changes

that could help the FP Program better achieve the goals of the FP Act and rules. See Section 9 for a list of recent changes that resulted from CMP feedback.

3.2 Compliance Monitoring Program

Program Staffing

The Compliance Monitoring Program is directed by the DNR Forest Practices Assistant Division Manager for Operations. The program staff includes a program manager and a field coordinator, along with funded participation of one full-time staff person each from the Department of Ecology and Department of Fish and Wildlife. Additional assistance is provided by tribal biologists and other forest practices staff.

Reports

Field sampling of completed FPAs occurs annually and findings are presented in a biennial report as required by WAC 222-08-160(4). In 2011, the Commissioner of Public Lands requested that the FP Program also begin producing annual reports in the years that a biennial report is not required. This present report is a biennial CMP report and covers data samples collected during the 2014 and 2015 field seasons. The data from the 2014–2015 field seasons has been combined to produce the desired precision for statistical estimates and resulting comprehensive findings, conclusions, and recommendations are detailed in this biennial report.

Forest Practices Activities and Prescriptions

Forest practices activities are operations such as timber harvest and forest road construction that are subject to FP rules. Prescriptions are groupings of similar rules that apply to a forest practices activity. FP rules are divided and grouped by like topic/application for monitoring purposes. For example, forest practices activity types such as road construction and timber harvest are evaluated based on options available for implementing a particular activity, such as the many options available for harvest in the riparian management zone (DFC1, DFC2, etc.); and forest practices activity types are evaluated based on the function/feature being protected, such as water quality. In CMP reports, these rule groupings are called “prescription types.” The CMP obtains data from samples and reports compliance monitoring findings by prescription type.

These prescription types allow for statistical estimation of compliance with specific rule groups rather than an overall forest practices compliance rate. This enhances the ability to determine where additional training, education, or FP compliance efforts might be needed to increase landowner understanding and compliance with FP rules. The CMP, with stakeholder input, determines which FP rule prescription types will be sampled each year and then estimates the number of samples required for statistical precision. This number of samples is then visited by the compliance monitoring field team for each of the FP rule prescription types.

Compliance

Each FPA is observed for compliance with 2 elements: first, how well the conditions on the ground — after completion of forest management activities — meet FP rules; and second, how well the conditions on the ground — after completion of forest management activities — meet what the applicant stated on the FPA. The first is called "rule compliance" and the second is called "FPA compliance." The compliance monitoring field team has found that deviation on a particular FPA can occur in one of the following 3 ways:

1) The conditions on the ground are in compliance with FP rules but not with the FPA. For example, a landowner/applicant states on the FPA that he or she will leave an RMZ along the entire 1000-foot length of the Np stream in the harvest area, but upon completion of harvest the landowner leaves a buffer along 700 feet of the stream length. The 700-foot RMZ buffer is still in compliance with FP rules because the FP rules do not require the entire length of an Np stream to be buffered. However, the 700-foot buffer is not in compliance with what the landowner stated would be done on the FPA.
2) The conditions on the ground are in compliance with the FPA but deviate from the FP rules. For example, a landowner/applicant incorrectly measures the width of the stream in the FPA area and states on the FPA that the stream falls into a smaller (incorrect) width category that requires less protection. Subsequently, if the landowner implements the forest practices activity using the incorrect protection measures, the forest practice has deviated from FP rules but is in compliance with what the landowner stated on the FPA.
3) The conditions on the ground deviate from both the FP rules and the FPA.

The primary intent of the CMP is to determine on-the-ground compliance with FP rules, or "rule compliance." However, understanding deviation from the FPA, or "FPA compliance," can help DNR determine whether improvements should be made in FPA forms, FPA application instructions, or other methods of landowner outreach and education. Information regarding the type of deviation helps to inform the efforts of the FP Program to improve on the ground compliance with FP rules.

Compliance Monitoring Scope Limitations

Compliance monitoring is limited by mandate, and budget, which results in a focused program with a well-defined yet limited scope. Compliance monitoring does not involve the following:

- Focus on individual landowners and compliance specific to those landowners, but rather focuses on 2 overall groups: small and large forest landowners.
- Focus on individual regions and compliance specific to that region, but rather focuses on statewide FP rules and FPAs.
- Track FP rule violations. When field reviewers encounter rule violations, the appropriate DNR regional staff is notified for further review and action.
- Modify water types. Field reviewers do, however, record observed differences between water type documentation on FPAs and on-the-ground physical features. See Section 5.1.

3.3 Forest Practices Rules

Overall, FP rules provide protection for many riparian and upland species and their forest habitat, as well as protection for water quality. Currently, compliance monitoring focuses on rules that protect aquatic and riparian species habitat. FP rules that help protect aquatic and riparian species habitat include rules regarding the following:

- Riparian protection
- Wetland protection
- Water typing
- Road construction, maintenance, and abandonment near water
- Harvest or road construction on unstable slopes

Budget and staffing preclude the ability to monitor with statistical precision all FP rules that might affect aquatic and riparian species habitat, as well those that apply to upland habitat. The CMP prioritizes rule sampling based on a forest practices activity's potential to impact public resources.

The following are the CMP's prioritized rules chosen for sampling during the 2014-2015 field seasons.

Standard Sample

Certain specific FP rule groups are sampled every year and are considered to be part of the CMP Standard Sample. These include the following:

- Riparian rules — Western Washington and Eastern Washington RMZ rules (WAC 222-30-021 and 022)
- Road construction and maintenance rules (WAC 222-24)
- Wetland rules (WAC 222-30-020[6] and [7]; and WAC 222-24-015)
- Haul routes (WAC 222-24) for sediment delivery

Trend Analysis

For 2010-2015 data, rule compliance was carefully tracked to make sure that the compliance determination was consistently applied in all years. Data were converted to ensure consistent application of compliance determinations across the dataset (i.e. 2010 – 2013 data). Where data were not collected in accordance with current field protocols, were incomplete, or un-convertible, the data were removed from the trend analysis dataset. Data for rules were combined and compared through time within each corresponding prescription type. Trends in average compliance within prescriptions and individual rule compliance are tracked to maintain consistency with current methods.

Emphasis Sample

Other FP rule groups are sampled, as necessary, and are considered to be Emphasis Samples. These other FP rule groups govern activities utilized less often than the rules sampled in the Standard Sample. The smaller population size usually leads to the CMP sampling a higher proportion of the total emphasis population than is sampled in Standard Samples.

Note: Due in part to the CMP study redesign, trend analysis project, and staffing changes, there was no Emphasis Sample conducted for the 2014-15 reporting period.

4. Compliance Monitoring Design and Methodology

Compliance monitoring design was developed to be a consistent and repeatable field-based method to determine if forest practices are conducted in compliance with forest practices rules (FP rules). Compliance monitoring design details are found in the document *Washington State Department of Natural Resources Forest Practices Compliance Monitoring Program Design and Compliance Monitoring Protocols*. Section 2 explains key design and methodology concepts used in the forest practices Compliance Monitoring Program.

4.1 Population and Sample Selection

The population designated for sampling consists of the total number of each prescription type identified on forest practices applications (FPAs) that have completed forest practices activities and expire April 1, 2014, through March 31, 2016. Each FPA states all of the forest practices activities that the landowner intends to implement. This information allows the compliance monitoring field team to locate FPAs that list the particular FP rule prescriptions being sampled in a given year. Sample selections for each prescription type are drawn from the FPAs that contain the prescriptions being monitored that year.

Landowner Population Groups

Compliance Monitoring Program (CMP) reports provide riparian and road compliance findings separately for small forest landowners and large forest landowners, in addition to findings for all landowners combined. To date, sample sizes for small forest landowners have been too small to achieve sufficient statistical precision for conclusions regarding small forest landowners as a separate landowner group. Statistical distributions are only calculated for all landowners combined.

Sample Selection

Populations are grouped by prescriptions (DFC1, DFC2, NIZH, etc.) that have been identified on completed individual FPAs to more accurately analyze the collected field data. Therefore, populations are determined by the frequency of prescriptions that occur as part of completed FPAs.

There are thousands of active (not yet expired) FPAs every year, because the majority of FPAs have 3 years in which to be completed. Each FPA has an expiration date. For the current report, to ensure that all active FPAs had an opportunity to be selected, the populations to be sampled are those FPAs that expire between April 1 of the preceding year and March 31 of the sampling year. For the 2014-15 sample, this included 2,797 FPAs in 2014, and 1,949 FPAs in 2015 (including forest practices notifications; see Glossary). Using the April 1 to March 31 window improves the likelihood that the forest practices operations are complete prior to the primary compliance monitoring sampling months (February through November), and that the compliance monitoring field team attempts to visit the site before the FPA expires.

To provide a random selection of FPAs from the sampling population, the FPAs that expire between April 1 and March 31 are assigned a random number as a decimal fraction between 0 and 1 and then are ordered from the smallest to the largest number. The selection methodology involves reviewing the FPAs in this random order. Each FPA is reviewed to determine the sample FP rule prescription types it includes. This selection process continues through the ordered list of FPAs until the target population/sample size is reached for each prescription type.

All FPAs in the population are ordered by the assigned generated random number and categorized by region. Division staff review FPAs in the random order assigned for monitored activities that are completed. Region staff determine if the activities identified in the FPA have been completed. FPAs that do not contain monitored activities and FPAs that are not complete are discarded from the population. Sample sizes are applied in proportion to region population size for each prescription type.

For each riparian prescription, the population to be sampled consists of FPAs that included that prescription. In some cases, a single FPA contains multiple implementations of the same riparian prescription type. If this is the case, 1 prescription implementation is randomly selected for assessment. Table 1 lists the Standard Sample prescriptions monitored in 2014 and 2015.

For roads prescriptions, compliance with a single rule on a single FPA is the percentage of applications of that road rule that were compliant. Thus, for road rules only, compliance with a single rule can be a number between 0 and 1. For example, if a single rule is applied 6 times on one FPA and is compliant 5 out of 6 times, the compliance is 0.833 instead of 0 or 1 for that road rule on that FPA. The remaining analysis is the same for riparian prescriptions.

Table 1. 2014-2015 Standard Sample Prescriptions Monitored

	Statewide	Western WA Only
Roads	Road Construction and Abandonment	
	Haul Routes	
Harvest	RMZ — Type Ns Prescriptions	
	RMZ — Type Np Prescriptions	
	Wetlands (Type A&B and Forested)	RMZ — Type S or F Inner Zone Harvest DFC1
	RMZ — Type S or F No Inner Zone Harvest	RMZ — Type S or F Inner Zone Harvest DFC2

To be efficient with staff time and funding, haul routes were sampled on a subset of FPAs that were selected for other prescription compliance sampling, rather than from a separately randomized list.

Sample Size and Confidence Values

Standard Sample

In the biennial compliance monitoring design used by the CMP, the Standard Sample uses a significance level of 95%. The CMP set a desired half-width of the 95% confidence interval (CI) at 6%. A 95% CI at +/– 6% means that if the sample was repeated 20 times, one would expect the population mean (the "true" compliance rate) to lie within the confidence interval 19 out of 20 times. The CMP sets the sample size to provide an approximate +/– 6% CI for the average compliance rate of each prescription type sampled for the biennium. This sample size is an estimate based on assuming that the variance in compliance rates and average number of applicable rules within each prescription is similar to historical observations. If there is significant variation from the estimates with the actual numbers the following year's sample size may increase to account for the variation. The population of FPAs in any given year is finite. Therefore, the size of the population impacts the variance of compliance rates and, by extension, the width of CIs and the estimated sample sizes. Thus, infrequent prescriptions may need fewer samples to attain the desired precision levels. Estimated population sizes for each prescription are used in the sample size estimation to estimate a "finite population correction factor." This means that a smaller sample is required than would be for an infinite population.

For this biennial report, variance and cluster size (mean number of rules per prescription) were estimated based on the sample values from 4 years of data (2010–2013) prior to the 2014 sampling, and from 5 years of data (2010-2014) for the 2015 sample. Based on these data and the estimated FPA population size for the biennium, sample sizes were set for the biennium, and 40% of this sample size was applied to 2014. Only 40% of the biennial sample was completed in 2014 due to staffing changes. The remaining 60% of the biennial sample was completed in 2015. The sample sizes were set based on an estimate of the sample sizes required to attain a width of +/– 6% for a 95% CI for the combined 2014–2015 sample. The CI for this estimation was formed by assuming an approximate normal distribution for the average compliance ratio, so the half-width of a 95% CI is the estimated standard error multiplied by an appropriate t-statistic (approximately 2).

As a result of varying population values the CMP updated variance estimates prior to 2015 sampling to include 2014 results in the variance and cluster size estimates. This 2-year approach assumes that there is no change in compliance between the 2 years, so that no bias is introduced by having unbalanced population sampling between the 2 years.

To reach the desired sample size, population sizes for each prescription type are estimated based on the proportion of the entire population viewed (Table 2). Total population sizes for prescription types are estimated. See Appendix A for more information regarding statistical methodologies.

Table 2. 2014-2015 Standard Sample Count by Prescription Type

Geographic Region	Prescription Type		Sample Count	Estimated Population Size of FPAs with the Prescription
Statewide		Road Construction and Abandonment	13	1410
		Haul Routes	27	n/a*
		RMZ — Type Ns Prescriptions	35	1018
		RMZ — Type Np Prescriptions	35	929
		Type A & B Wetlands	35	237
		Forested Wetlands	23	322
		RMZ — Type S or F No Inner Zone Harvest	25	737
Western WA		RMZ — Type S or F Inner Zone Harvest DFC1	20	55
		RMZ — Type S or F Inner Zone Harvest DFC2	14	157

*The Haul Routes prescription does not have an estimated population.

The sample size for haul routes is not set based on statistical precision.

4.2 Field Review and Data Collection

The compliance monitoring field team uses two primary data collection methods of field observations and field measurements. These two methods determine whether the landowner/applicant met the requirements of FP rules while implementing forest practices activities. Field observations are visual assessments that help provide answers to the questions asked on CMP Field Forms. Specific measurements are taken to determine attributes such as tree/stump counts, RMZ length, RMZ width, and bankfull width. Examples of types of field observations and field measurements follow.

Riparian Harvest

- Observations:
  - Presence of alluvial fans, headwall seeps, and springs
  - Location of uppermost point of perennial flow

    - Presence of unstable slopes

- Measurements:
    - Bankfull width (BFW) — Measured for Type S, F, and N waters, except where the stream obviously exceeds or is below a threshold width (i.e., under or over 10 feet in Western Washington; under or over 15 feet in Eastern Washington). The channel width is measured (using a tape measure) at even intervals along the stream reach within the boundaries of the FPA. The goal is to obtain a minimum of 10 measurements.
    - Stream length — Measured using a hip chain. The length is used to determine the stationing for BFW measurements and RMZ width measurements.
    - RMZ and WMZ widths — RMZ widths (and the 3 zones within the RMZ) and WMZ widths are measured using a laser hypsometer to ensure accurate horizontal distances. Lasers with reflectors (held in place) are used to ensure measurement precision. RMZ widths are marked with flagging for visual reference.

Road Construction and Abandonment and Haul Route Assessment

The assessment of road construction and abandonment is based on answering a series of questions found on the CMP Roads Field Form. The questions address observed site conditions based on the required management practices in FP rules (WAC 222-24-010, 020, 030, and 040). The assessment of haul routes is based on observation of fulfillment of road rule requirements and on professional judgment from CMP participants, used to rate sediment delivery levels resulting from each haul route. Haul Route compliance is calculated by distance. Whereas, the compliance rate is the distance compliant divided by the distance sampled.

4.3 Compliance Assessment and Ratings

The CMP utilizes average compliance for a prescription among FPAs rather than the proportion of completely compliant FPAs. Each FPA is analyzed as a cluster of rules within each prescription. FPAs are then grouped according to relevant riparian prescriptions or road activities. Haul Routes, Roads, No Inner Zone Harvest (NIZH), Desired Future Condition Option 1 (DFC1), Desired Future Condition Option 2 (DFC2), Non-Fish-Bearing Perennial Waters, Non-Fish-Bearing Seasonal Waters, Type A&B Wetlands, and Forested Wetlands comprise the evaluated prescriptions. Compliance with individual rules is given a Bernoulli 0/1 result; the prescription compliance is the sum of compliant rules divided by the sum of all rules applied across all FPAs. For example: If a prescription has 17 rules that apply to it (across all sampled FPAs), and 16 of those rules are implemented per rule requirements, then the average compliance for that prescription is 94% (16 compliant rules ÷ 17 total rules = 94%).

Haul Routes

Because haul routes were not sampled in proportion to regional population sizes, a stratified mean ratio compliance estimate was used to estimate statewide compliance. The stratified mean ratio is the ratio of the stratified mean length of compliant haul routes divided by the stratified mean length of total haul routes sampled. Because the sampling has not generally been done in a

strictly random manner, there is potential for bias in the final estimate. Therefore, limiting potential conclusions based on statistical analysis of the Haul Route prescription. Conclusions may be fallaciously attributed to a phenomenon rather that to the method of sampling.

Compliant/Deviation Determination

Compliance percentages disseminated in CMP reports do not necessarily represent the complete picture of compliance with FP rules because there are varying levels of compliance that are difficult to quantify. The terminology describing compliance was changed to better acknowledge and respond to this issue. In past CMP reports, prescriptions have been described as Compliant or Noncompliant. Beginning with the 2012 report, prescriptions were considered Compliant with or a Deviation from FP rules. The former Noncompliant category has been relabeled Deviation to more accurately acknowledge that while a prescription as a whole may deviate from FP rules, several of the FP rules that comprise a prescription may be compliant. Section 4.1 of this report explains that a prescription is a grouping of FP rules. These groups were constructed by the CMP for the purposes of estimating compliance. The following example illustrates this concept.

The DFC2 prescription type (leaving trees closest to Type S or F water in Western Washington) is not a single FP rule but rather a grouping of several rules, some of which are listed below (WAC 22-30-021):

- Core zone — "No timber harvest or construction is allowed in the core zone."
- Inner zone — "Forest practices in the inner zone must be conducted in such a way as to meet or exceed stand requirements" (see Glossary). "Trees are selected for harvest starting from the outer most portion of the inner zone first."
- Outer zone — "Timber harvest in the outer zone must leave twenty riparian leave trees per acre." "Dispersal strategy-riparian leave trees, which means conifer species with a diameter measured at breast height (DBH) of twelve inches (12") or greater, must be left dispersed approximately evenly throughout the outer zone."

These examples are only a few of the FP rules that are part of the DFC2 prescription type. When the DFC2 prescription in a CMP report is shown with a compliance of 98%, this refers to the average compliance of the sampled relevant rules within the DFC2 prescription. The corresponding Deviation category includes any FPAs that are a part of the DFC2 sample that deviated from compliance on at least 1 of the FP rules included in the prescription type.

It is important for readers to understand the meaning and severity of deviation from FP rules. To aid in this understanding, compliant and deviation assessments are assigned a compliance rating. Compliant prescriptions are rated either Compliant or Exceeds Rule Requirements. Prescriptions that deviate from FP rules are rated either Low, Moderate, or High. When the compliance monitoring field team, due to a variety of circumstances, cannot determine the degree of deviation, it is rated Indeterminate. These ratings help to convey the relative magnitude of deviation from what was required by the relevant rule.

Compliance Ratings and Reasons Descriptions

This section describes five compliance ratings and three reasons for deviation that are applied after the Compliant/Deviation assessment is made, as well as the Indeterminate rating. There are two categories for a Compliant assessment: Compliant and Exceeds Rule Requirements. There are three ratings for a Deviation assessment — Low, Moderate, High — as well as the Indeterminate rating. There are three reasons for a Deviation assessment — Layout, Operational, and Administrative.

Compliant Rating Determinations

The Compliant rating means that an activity meets the requirements of the individual FP rule that is relevant to that activity. By signing and submitting an FPA, a landowner conveys the intention to conduct specific forest practices activities on lands with specific site characteristics as described on the FPA. The landowner's signature on the FPA acknowledges that the landowner understands that FP activities must comply with the FP Act and rules.

Implementing this system requires the following assumptions:

- All participants acknowledge that this process relies on professional judgment and does not represent determinations of rule effectiveness.
- There will be no statistical analysis beyond the narrow scope intended.

Compliant Ratings Definitions

- Compliant rating — The activity is compliant with the FP rule.
- Exceeds Rule Requirements (or Exceeds) rating — While implementing their forest practices activities, landowners/applicants chooses to provide more protection than required by FP rules.

Deviation Rating Determinations

The Deviation rating means that an activity does not meet the requirements of the individual FP rule that is relevant to that activity. In order to gauge the magnitude of the deviation and where DNR might focus training efforts to improve compliance, the compliance monitoring field team uses professional judgment to rate deviations. It is important to note that these deviation ratings employ professional judgment and should not be used to excuse activities that violate FP rules or approved FPAs. There are three Deviation categories — Low, Moderate, High — as well as an Indeterminate rating. The following guidelines are used to assist professional judgment when rating the impact of deviation in the field:

- Low Deviation — Minor deviation from requirements of the rule. Examples include:
    - Outer zone has less than the required number of leave trees after harvest.

- Moderate Deviation — Moderate deviation from requirements of the rule. Examples include:
    - Trees harvested from the inner zone are larger than allowed by the Desired Future Condition harvest strategy.
- High Deviation — Major deviation from requirements of the rule. Examples include:
    - No leave trees left in the outer zone.
- Indeterminate — The rule is out of compliance, but the compliance monitoring field team cannot determine the degree of deviation.

Deviation Reasons Determinations

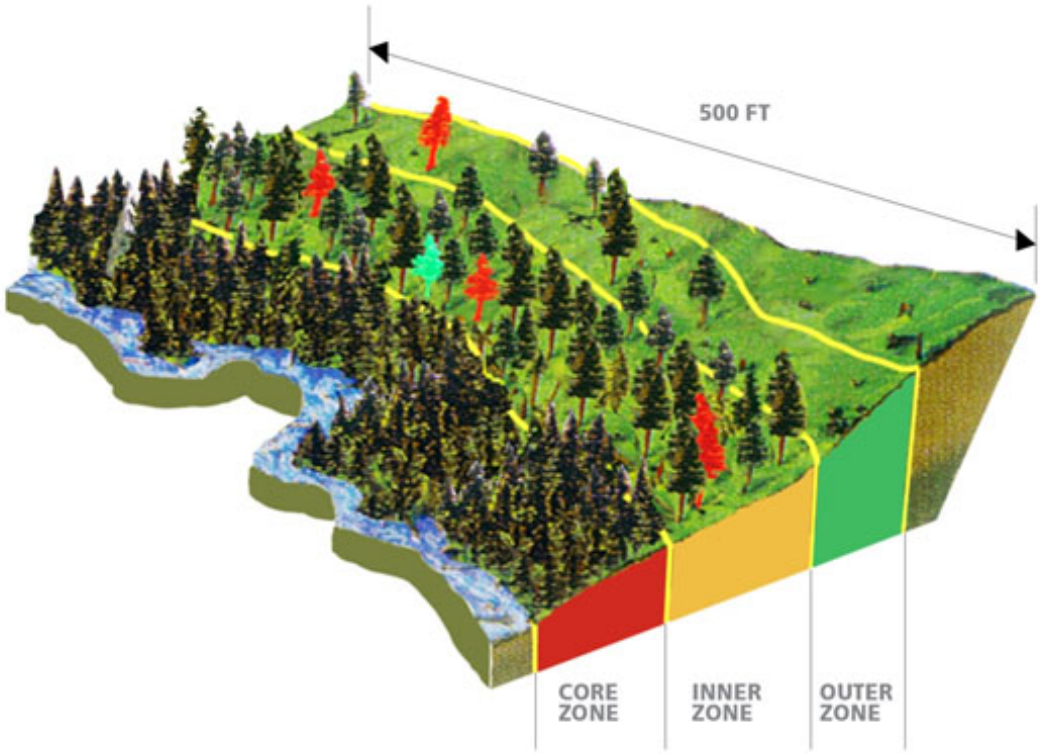
The Deviation reason assessment is determination made by the field team as to a potential cause for non-compliance. It is important to note that these deviation reasons employ professional judgment. There are three Deviation categories — Layout, Operational, and Administrative. The following guidelines are used to assist professional judgment when rating the impact of deviation in the field:

- Layout — The arrangement of the harvest unit did not meet the specifications of the rule. Examples include:
    - A stream meander is unaccounted for in the layout of an RMZ.
- Operational — The timber harvest and related activities process did not follow the arrangement of the harvest unit or associated activity. Examples include:
    - Designated leave trees harvested within a no-cut inner zone.
- Administrative — Information and/or data provided on the Forest Practices Application and associated documents deviates from the conditions observed on the ground. Examples include:
    - An incorrect site class is recorded on an FPA.

The following examples of deviations from FP rules illustrate that there can be a level of compliance for many of the rules included in a prescription type, even when they are assessed as a Deviation. The examples show the process of assigning ratings to the deviation.

Figure 1 illustrates a riparian harvest adjacent to Type F water assessed as a Deviation and rated as Low. A riparian zone harvest is subject to a number of complex FP rules. In this example, the landowner/applicant followed multiple FP rules by typing the stream accurately; measuring the stream width correctly; correctly measuring the core, inner, and outer zone widths; and leaving the core zone intact.

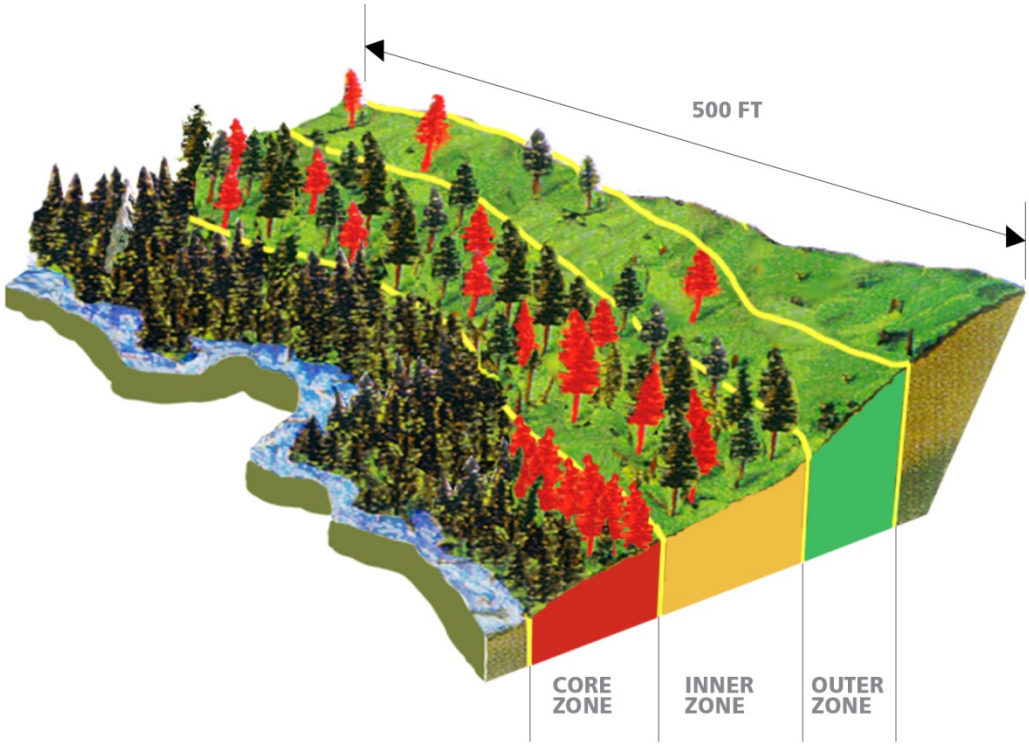
Figure 1. Inner Zone Harvest with Deviation Rated as Low



The red trees in the image represent trees that were required by rule to be left but were harvested. An offsetting factor in representing the average number of trees per acre required is that 1 tree per 500 feet was taken out of the outer zone, 3 trees too many were harvested from the inner zone, and an additional tree that had *not* been required to be left was left in the inner zone (represented in Figure 1 by the lime green tree outline).

In contrast, Figure 2 illustrates an example of inner zone harvest assessed as a Deviation and rated as High, on fish-bearing waters. In this scenario, the landowner/applicant planned a riparian zone harvest and followed the same FP rules as in the example above, except that harvest rules were not followed completely in any of the 3 zones. Each zone would be assessed for individual rule compliance. In this example, core zone trees were harvested, as were many inner zone trees and outer zone trees that were required to be left.

Figure 2. Inner Zone Harvest with Deviation Rated as High



In Figure 2, 11 trees are missing per 500 feet of the inner zone and 3 trees are missing per 500 feet of the outer zone. Additionally, some harvest occurred in the core zone.

The expectation is for landowners to follow all relevant FP rules. However, there is more to evaluating compliance with FP rules than estimating average compliance for prescription types. The CMP continues to work toward finding better ways to explain a more complete picture of compliance in the reports.

4.4 Design/Methodology Changes

Evaluation of Rule Compliance

An FPA contains a set of rule applications for a particular prescription. As part of the former study design, each FPA was evaluated as either compliant or not compliant for the prescription, based on 100% compliance with all rules in the prescription. The prescription compliance was the number of FPAs that were 100% compliant divided by the total number of FPAs containing the prescription. This can be viewed as a binomial proportion, and confidence intervals were formed under this assumption. This is statistically simple, but the sample sizes required for precise estimates of these proportions were costly and difficult to attain, and the pass/fail aspect

of the compliance assessment did not adequately identify or explain the exact rules being deviated from.

The CMP has integrated a more quantitative estimate of compliance with each rule, with an increase of precision associated with the overall sample estimates. The sampling method remains cluster sampling. There are 2 levels of sampling units: the prescriptions and the rule application. The prescriptions are clusters of rule applications. In the previous method, only 1 assessment was made for each prescription per FPA, so the FPAs were all clusters of size 0 or 1, and the zeros dropped out of the population for the prescription. The changes made are to the methodology of assessing compliance with each prescription, rather than changes to the sampling design. These changes under the current sampling design amount to multiple applications of rules on single FPAs (i.e., the number of rules under prescription A on a single FPA = 0, 1, 2 … up to the total number of rules under prescription), so the FPAs are treated as clusters.

The purpose of the change is to estimate the *average* compliance for a prescription or rule group among FPAs rather than the proportion of completely compliant activities among FPAs. As discussed above, each FPA is a cluster of rule prescriptions, which can be grouped in various ways (prescription or rule group) or evaluated individually. If a single rule is of interest, the compliance proportion for that rule is a simple binomial proportion — FPAs that do not apply the rule drop out of the population. When groups of rules (or prescriptions) are of interest, all FPAs that contain at least 1 of the rules are part of the population (from a random sample). Multiple implementations of a rule on a single FPA are not independent, the FPA is a cluster sample, and each has a different number of rules. The mean or average compliance and the variance of the mean are calculated according to the rules of estimation for cluster samples (Cochran 1963; Scheaffer et al. 1990). Compliance rates calculated using this approach will most likely be higher than the compliance rates previously estimated. For example, if there are many rules in a prescription, bad performance on a single rule will have little effect on overall average compliance. On the other hand, compliance for each individual rule can be evaluated and tracked separately, although precision is not be controlled for individual rule compliance.

Sample Size Estimation

Three independent factors are used to calculate the biennial sample size for each individual prescription: (1) population size; (2) the expected variation within that population; and (3) the desired level of precision in the sampling estimate. The variance of the mean prescription compliance depends on the total number of FPAs that contain the prescription (the population size; because this is a finite population), the sampled number of FPAs that contain the prescription, the average number of rules per prescription applied on each FPA, and the variability of compliance among FPAs. Data from the previous five years of sampling are used to estimate compliance variance for each prescription by year and to approximate sample sizes that should attain reasonable standard errors. Population sizes for each prescription are needed to approximate sample sizes. Because population sizes can vary from year to year, upper bounds for population sizes were used as initial estimates. When good estimates or census data are available before sampling is complete, the population sizes can be updated in the sample size estimation worksheet and the sample sizes can be adjusted. However, it is important to remember that the

variance used for the sample size estimates is also only an estimate. There is no guarantee that the estimated confidence intervals will be the exact width that was projected.

4.5 Compliance Monitoring Challenges

Challenges are not uncommon for any complex assessment program. This section reviews current challenges for the CMP.

Sample and Measurement Error

Sampling error occurs when rule or Board Manual guidance specifies that average values are to be used during the layout of a specific prescription type. This is because averages vary depending on where measurements are taken. It is unlikely that the compliance monitoring field team can duplicate the exact same ten measurements made along a stream reach for calculating stream width as were measured by a landowner. The result is that the compliance monitoring field team's average stream width value is likely different from the landowner's average stream width value. The CMP resolves the inability to determine statistical variability for average values by assigning an absolute 5% measurement error tolerance. This measurement error tolerance applies for 3 specific measurements: when determining 1) leave tree to edge of bankfull width; 2) buffer widths and lengths or floors within RMZs 3) bankfull width of N and F/S streams. When a landowner's average value is within 5% of the compliance monitoring field team's average value, the landowner's values are considered accurate. If the landowner's average value falls outside the 5% error tolerance, the compliance monitoring field team value is assumed to be correct and the landowner's average value incorrect.

Variation in Natural Conditions

Natural systems such as forests are highly variable and difficult to measure with precision. Forest practices rules require precise measurements to implement forest practices activities. Applying precise measurements becomes difficult for forest practice activity implementation as well as for FPA compliance and compliance monitoring. When precise measurements required in the FP rules are confounded by variable site conditions, the CMP follows the most protective interpretation of the FP rules to determine compliance.

A frequent example of precise FP rules conflicting with imprecise on-site conditions occurs when a stream reach has FP rule–defined characteristics of both a Type Np stream and a Type F stream. Type Np streams are defined as streams that are perennial non-fish habitat streams. Type F streams are defined as having a gradient equal to or less than 20%. When a stream reach meets the physical criteria for a Type F stream, and lies upstream of a portion of a stream reach that has a gradient greater than 20%, the stream is considered Type F. The only exception is when an approved Water Type Modification Form or supporting Interdisciplinary Team documentation has been submitted endorsing the change of the water type.

5. Forest Practices Rule Compliance for Water Types and Riparian, Wetland, and Equipment Limitation Zones

Forest practices rules (FP rules) are designed to protect aquatic resources and related habitat adjacent to typed waters and wetlands when forest practices activities are carried out. Riparian and wetland areas provide fish, amphibian, and wildlife habitat and protect water quality. A riparian management zone (RMZ) is the area adjacent to Types S, F or Np streams (see definitions below) where trees are retained to provide functions required by aquatic and riparian species, maintain water quality, as well as for protection from disturbance. A wetland management zone (WMZ) is the area located around the perimeter of a wetland where trees are left to provide protection from disturbance, maintain hydrologic functions as well as shade and nutrients for the wetland. Both RMZ and WMZ buffers filter runoff to minimize sediment entering water; provide long-term large woody debris recruitment and organic material crucial for fish and amphibian habitat; maintain shade to help regulate stream temperatures; and provide amphibian and wildlife habitat. Protection on Type Np and Ns streams also includes an equipment limitation zone (ELZ). This is a 30-foot-wide zone adjacent to Type Np and Ns streams. There are limitations on equipment use within the ELZ, and on-site mitigation measures are required if activities expose the soil on more than 10% of the zone.

FP rule protection measures that guide timber harvest options within RMZs depend on the water type (Type S, F, Np, Ns), width of the stream (bankfull width), and the site class (I, II, III, IV, V) of the RMZ. Wetland protection depends on the type and size of the wetland.

Section 5.1 through 5.4 provides FP rule and on-site review descriptions and compliance monitoring findings for the following within the Standard Sample:

- Water type observations
- Western Washington RMZs
- Eastern Washington RMZs
- Statewide wetlands

While maintaining adequate shade is an important part of riparian prescriptions, the forest practices shade rules are not yet part of the FP rules being monitored by CMP. Consequently, the riparian descriptions throughout the remainder of this report do not include shade, even though shade is integral to the overall protection provided in riparian areas. The CMP will initiate sampling for shade compliance after the program has adopted methods suitable to produce relevant information.

5.1 Statewide Water Type Observations

In the initial years of compliance monitoring, compliance monitoring field team observations indicated that at times water types observed on the ground did not match water type classifications provided on submitted and approved forest practices applications (FPAs). This led to a focus on consistency and accuracy of water type information on FPAs, because the width and length of riparian buffers required under FP rules are directly linked to water type. In the FP rules, water is classified in specific stream and wetland categories, or "types," based on several factors (WAC 222-16-030, 031, and 035). Stream and wetland type classification is a fundamental aspect of determining which FP rules apply to forest management activities taking place adjacent to typed water. Specific FP rules apply to specific water types because different water types fulfill unique and cumulative functions for aquatic and riparian species and water quality. Waters of the state were initially classified by type using local knowledge and orthophotos and were represented on a set of water type maps. Currently, the public can find information about the water type assigned to a particular stream on the FPARS mapping site: http://www.dnr.wa.gov/programs-and-services/forest-practices/forest-practices-application-review-system-fpars. Because waters depicted on DNR water type maps were originally typed without a field visit, the maps can display incorrect water types and must be field verified by landowners prior to FPA approval.

FP Rules for Water Type

Forest practices water typing rules define 4 types of streams (S, F, Np, and Ns) and three types of wetlands (forested, nonforested Type A [including bogs], and nonforested Type B). The four types of streams are classified hierarchically based on stream function and level of protection required for the stream. The following are the stream types in hierarchical order starting with the highest level (requiring the most protection):

- Type S streams — The highest level of classification, "Shorelines" of the state as designated by the Department of Ecology.
- Type F streams — The second highest level of classification, with fish or specifically defined human uses or both.
- Type Np streams — The next lowest classification in the stream hierarchy, these are non-fish-bearing streams that have a perennial flow of water during a normal rainfall year and include intermittent dry portions of the perennial channel.
- Type Ns streams — The lowest level of classified streams, seasonal non-fish-bearing streams where surface flow is not present year-round.

Wetlands are classified into two broad categories: Forested and Nonforested. Nonforested Wetlands are further divided into Type A and Type B.

- Forested Wetlands — Wetlands that have a crown closure of 30% or more (see Glossary).
- Nonforested Wetlands — Wetlands that have a crown closure of less than 30%.
    - Type A Wetlands — Greater than 0.5 acre in size and associated with at least 0.5 acre of ponded or standing open water present for at least 7 consecutive days between April 1 and October 1, and all bogs greater than 0.25 acre.
    - Type B Wetlands — All other nonforested wetlands greater than 0.25 acre.

On-site Review for Statewide Water Types

Field observations sometimes indicate that water types depicted on water type maps are incorrect. Landowners may use existing DNR water type maps as a starting point for information as they prepare their FPA for submittal to DNR, but must verify water types located within the areas proposed for forest management activities and indicate the correct water types on the FPA. Correct and accurate water typing is critical. When water is incorrectly underclassified, inadequate riparian protection measures may be applied, which may ultimately impact public resources; conversely, if a water is overclassified, excessive protection may be provided to the detriment of the proponent's objectives for the forest practice activity. Water type verification occurs through measurement of the water's physical characteristics as defined in WAC 222-16-031 and 035, or through a protocol (fish) survey (to confirm fish presence/absence) as specified in Forest Practices Board Manual, Section 13. Applicants are encouraged but not required to complete water type classification worksheets or protocol surveys and submit them with their FPA as supporting documentation for the water types indicated on the FPA.

Changes to DNR water type maps can be made when data from field observations indicate that the water type on the water type map is incorrect and/or if a stream is found on the ground in a

different location than depicted on the map or not at all. To propose a permanent water type change from the water type indicated on the DNR water type map, an individual submits a Water Type Modification Form to DNR. The Water Type Modification Form goes through a concurrence process that provides opportunity for review by all TFW stakeholder groups.

The compliance monitoring field team observes physical criteria (such as stream width, stream gradient, etc.) to determine if there appear to be differences between water types recorded on FPAs and what is observed on the ground. These observations are made on the same stream reaches and wetlands that have been randomly selected for compliance monitoring for other rules that year. The compliance monitoring field team evaluates only the stream reach or wetland within the proposed boundary shown on the FPA; therefore, the information is not sufficiently comprehensive to determine all water types, depending on the length and location of the water within the FPA. Water types can sometimes only be determined by continuing to observe and measure upstream or downstream of the FPA harvest unit boundary.

The CMP developed the Supplemental Water Information Form (SWIF) to be, used specifically for the purpose of recording potential water type and other water related discrepancies. A SWIF is completed when potential inconsistencies are found by the compliance monitoring field team between on-the-ground measurements and observations and what is described in the FPA. The information is reported in the compliance monitoring report. If an FP rule violation occurred because of the water type inaccuracy observed (i.e., the water did not receive enough riparian protection — buffer width and length), then the information relating to the violation is sent to the appropriate DNR region for follow up. The intent of using SWIFs is to obtain a sense of both the overall magnitude of possible water typing discrepancies on the landscape and the potential incorrect implementation of riparian buffers designed to protect aquatic resources. The compliance monitoring field team does not engage in formal water typing (e.g., fish protocol surveys) with the intent of changing water types, because that action has a defined process beyond the scope of the compliance review. The responsibility is on the landowner to ensure that the water types on the FPA have in fact been field validated.

Findings for Statewide Water Types

Water types recorded on a SWIF are further broken down into waters correctly classified, underclassified, overclassified, and indeterminate. The latter three categories are defined as follows:

- Underclassified — Physical characteristics indicate that the water should have been typed on the FPA and protected on the ground at a higher level of the hierarchical water typing system. For example, the FPA depicts a Type Np water that after observation is found to have Type F physical characteristics or observed fish.
- Overclassified — Physical characteristics indicate that the water should have been typed on the FPA and protected on the ground at a lower level of the hierarchical water typing continuum. For example, the FPA inaccurately depicts a Type Ns water that after observation is found to actually be an untyped stream.
- Indeterminate — Waters for which the compliance monitoring field team determines there is not enough information to make a water typing determination. For example,

when the compliance monitoring field team visits a site in the wettest part of the year (winter) and cannot determine if the water would flow in the driest part of the year (summer), the compliance monitoring field team cannot determine with certainty if the water is a Type Np (perennial) or Ns (seasonal).

Table 3. 2014-2015 Water Typing Observation Information

Water Type on FPA	# Waters in Standard Sample	# Waters Recorded on SWIF	SWIF # Waters Underclassified	SWIF # Waters Overclassified	SWIF # Waters Indeterminate
F or S	59	1	*	0	0
Ns	35	8	2	5	1
Np	35	5	3	0	2
Type A Wetlands	17	8	4	2	2
Type B Wetlands	18	5	1	3	1
Forested Wetlands	23	1	1	0	0
Total	187	28	11	10	6

*Compliance Monitoring field protocols stipulate that F or S waters are not to be evaluated for underclassification, as there is no higher order water.

Water typing observations from 2014 and 2015:

Of the 187 sampled waters in 2014 and 2015, 28 samples called for SWIFs due to water discrepancies.
Eleven samples were underclassified, resulting in an underclassification rate of roughly 6%. No protocol surveys or approved Water Type Modification forms were attached to the FPAs with underclassified waters. Of the 11 underclassified waters, 9 were segments that met fish habitat physical characteristics or fish presence was visually observed. Of those, 5 were wetlands where fish presence was observed or were associated with F streams. Three Np streams and 1 Ns stream met fish habitat physical characteristics, respectively. Another underclassified water was typed as Ns, but water flow was observed during the compliance monitoring field visit in September. Additionally, a type B wetland was determined by the DNR wetland specialist to be a bog (treated as an A wetland by FP rules).
Ten samples were overclassified, resulting in an overclassification rate of 5%. Five Ns waters were determined to be wet swales or channels with no connectivity to higher order waters. An A wetland was determined to be non-existent, and 2 type B wetlands were measured to be smaller in area than what was reported on their respective FPAs. The 2 type B wetlands were determined to be a Forested wetland, and a non-forested wetland respectively.
Six samples were indeterminate. Three of the indeterminate observations were for wetlands. Bog indicators were observed by the compliance monitoring field team for a sampled Type B wetland. However, due to physical sampling limitations, a final water typing determination was

not possible. Two of the indeterminate observations were for Np waters. Sampled segments at both sites met fish habitat physical characteristic criteria. At one site the bottom 2-3 stations met fish physical criteria, however, the remaining portion of the segment did not, with no supporting documentation or data a final water typing determination could not be made. At the second site, an approved WTMF was submitted along with the FPA. However, the WTMF was devoid of any typing information and was unclear to which portion of the stream segment it applied to. (Table 3.)

Additionally, 3 SWIFs were completed for non–water typing issues. A SWIF was filled out when the compliance monitoring field team observed a channel migration zone that was unreported on the accompanying application. Rule compliance was unaffected due to an excessively large no-cut buffer left by the landowner. Two SWIFs were completed for overstated stream size (by the applicant) on a Type F water (stream was less than 10 feet wide).

5.2 Statewide Summary for FP Rule Compliance for RMZs, WMZs, and ELZs

Section 5.2 provides 2 summary tables: Table 4 lists the RMZ, WMZ, and ELZ prescriptions sampled in 2014 & 2015; Table 5 shows statewide results for compliance with RMZ and WMZ FP rules. The data and findings for each prescription are discussed in Section 5.3 (Western Washington RMZs) and Section 5.4 (Statewide RMZs, WMZs, and ELZs).

Table 4. RMZ, WMZ, and ELZ Prescriptions Sampled in 2014 & 2015

Western WA	Eastern WA	Statewide
RMZ — Option 1, Thinning from Below RMZ — Option 2, Leaving Trees Closest to Water	No sample unique to Eastern WA	WMZ — Wetlands RMZ — No Inner Zone Harvest ELZ — Type Ns & Np Activities RMZ — Type Np

Each prescription has a unique set of timber harvest requirements and includes the use of a corresponding set of protocols and questions to determine compliance status. FP rule prescriptions for Type F and N streams can be different for Eastern and Western Washington. However, samples were not separated by Eastern and Western Washington. Wetland rules are the same for Eastern and Western Washington.

The small proportion of small forest landowner FPAs in Table 5 reflects the small proportion of total small forest landowner FPAs within the total FPA population containing the prescriptions assessed.

Table 5. 2014-2015 Compliance with FP Rules for Riparian, Wetland Harvest, and Roads Prescriptions

		Western WA		Statewide					
	Status of Compliance	DFC1	DFC2	No Inner Zone Harvest	Np Activities	Ns Activities	Type A&B Wetlands	Forested Wetlands	Roads
Small Forest Landowners	# Compliant Rules	n/a	n/a	17	2	6	36	11	n/a
	# with Deviation	n/a	n/a	0	0	1	6	0	n/a
	% of Sample Compliant	n/a	n/a	100%	100%	86%	86%	100%	n/a
	Confidence Interval	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Prescriptions Assessed	0	0	4	1	5	12	7	0
Large Forest Landowners	# Compliant Rules	131	98	99	126	53	84	27	81.7
	# with Deviation	8	2	8	8	1	1	1	1.3
	% of Sample Compliant	94%	98%	93%	94%	98%	99%	96%	98%
	Confidence Interval	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Prescriptions Assessed	20	14	21	34	30	23	16	13
All Landowners	# Compliant	131	98	116	128	59	120	38	81.7
	# with Deviation	8	2	8	8	2	7	1	13
	% of Sample Compliant	94%	98%	94%	94%	97%	94%	97%	98%
	Confidence Interval	(91, 97)	(95, 100)	(87, 100)	(89, 99)	(92, 100)	(89, 100)	(92, 100)	(95, 100)
	Prescriptions Assessed	20	14	25	35	35	35	23	13

5.3 Western Washington RMZs

5.3.1 Western WA Type S and F Waters

Section 3.3.1 addresses Type S and F riparian prescriptions: DFC1, Thinning from Below; and DFC2, Leaving Trees Closest to the Water.

On-site Review for Western WA Type S and F Waters

During the compliance monitoring field review, there are questions on the Western Washington Riparian Field Forms common to all riparian harvest options for Type S and F waters, including the following:

- Is there any harvest within the core, inner, and outer zones?
- Is the site class (variable in determining inner zone width) consistent with DNR site class maps?
- Is the stream width (variable in determining inner zone width) the same as stated on the FPA? If not, does it impact the inner zone width?
- Are unstable slopes with the potential to deliver (sediment) bounded out of the harvest unit?

In addition to common questions relevant to all Type S and F water riparian prescriptions, specific Western Washington riparian prescription questions are asked on the Western Washington Riparian Field Forms that assess the unique rules directed at individual harvest options.

5.3.1.1 Western WA Type S and F Waters — DFC1, Thinning from Below

Desired Future Condition Option 1 is available if DFC growth modeling results show an available surplus basal area that allows for harvest to take place in the inner zone. DFC calculations indicate if a forest stand meets basal area requirements (that is, if the stand is on a trajectory to meet the DFC of 325

square feet of basal area per acre at a stand age of 140 years) then harvest is allowed. When DFC calculations indicate harvest is allowed because the model projects more basal area is available than needed to meet the target basal area in the FP rule, then the smallest diameter trees are allowed to be harvested, followed by the harvest of progressively larger trees until the surplus basal area limit has been reached (also referred to as "thinning from below"). This selection process is intended to establish a forest environment where the leave trees in the inner zone can grow larger in a shorter time and meet desired large wood, fish habitat, and water quality requirements more quickly. The widths of the inner zone and outer zone vary depending on the bankfull width of the stream and the site class. A minimum of 57 conifer trees per acre must be left in the inner zone. A minimum of 20 conifer trees per acre greater than 12 inches (12") diameter breast height (DBH) must be retained in the outer zone. The leave trees in the outer zone may be dispersed evenly throughout the zone or clumped around sensitive features such as seeps, springs, and forested wetlands.

Findings for Western WA Type S and F Waters — DFC1, Thinning from Below

Desired Future Condition Option 1 is the most complex Type F prescription to implement in terms of the number of requirements to be met. It occurs relatively rarely in the population of FPAs. In the 2014-15 sample, 20 FPAs were selected for review with DFC1 chosen as the harvest option from a total population of 55 FPAs. The resulting DFC1 prescription sample size was 20, and a total of 139 rules were evaluated.

Table 6. 2014-15 Compliance Ratings for Western WA Type S and F Waters — DFC1, Thinning from Below

RMZ Prescription	FP Rule Compliance Ratings						
	Compliant Ratings		Deviation Ratings				
	Exceeds (part of Compliant)	**Compliant**	**Low**	**Moderate**	**Major**	**No Assessed Deviation Rating**	**Indeterminate**
DFC1 (%)	9.9%	94.2%	5.0%	0.7%	0%	0%	0%
DFC1 (Rule Count)	13	131	7	1	0	0	0

Sample size = 20

One hundred thirty one of the sampled 139 rules were compliant for the DFC1 prescription sample, resulting in a 94.2% compliance rate +/- 3%. Of the 20 sites sampled, 14 were 100% compliant and 6 showed deviation from at least 1 FP rule in the prescription type.

Field observations from 2014 and 2015 accounted for 8 non-compliance determinations across 6 sample sites. An unaccounted for meander in a stream course that was approximately 10 feet wide was observed at one site, resulting in a Low Deviation rating, and the reason for non-compliance was determined to be layout. At the second site, 4 required inner zone leave trees were missing from the 12" diameter class, resulting in a Low Deviation rating, and the reason for non-compliance was determined to be a layout issue. The third site had less than the required number of outer zone leave trees, resulting in a Low Deviation rating, and the reason for non-compliance was determined to be operational. At the fourth site, 4 trees removed from a yarding corridor in the core zone were observed, resulting in a Low Deviation rating, and the reason for non-compliance was determined to be operational. At the same site, trees were removed from the inner zone that were larger than allowed by the Desired Future Condition

harvest strategy, resulting in a Low Deviation rating, and the reason for non-compliance was determined to be a result of a layout deficiency. At the fifth site, as a result of a stream meander 2 trees were removed from the core zone, resulting in a Low Deviation rating, and the reason for non-compliance was the result of a layout issue. At the sixth site, as a result of an incorrectly completed Desired Future Condition Worksheet trees were removed from the inner zone that were larger than allowed by the Desired Future Condition harvest strategy, resulting in a Moderate deviation rating, and the reason for non-compliance was determined to be a result of an administrative error. (See table 6.)

Exceeds ratings were assessed for excess Outer Zone leave trees in 9 samples.

5.3.1.2 Western WA Type S and F Waters — DFC2, Leaving Trees Closest to the Water

Desired Future Condition Option 2 only applies to RMZs in site classes I, II, and III on streams that are less than or equal to 10 feet wide and to RMZs in site classes I and II for streams greater than 10 feet wide. For this option, DFC growth modeling results show an available surplus basal area that allows for harvest to take place in the inner zone. Trees are selected for harvest starting from the outermost portion of the inner zone first and then progressively closer to the stream. Twenty conifer trees per acre with a minimum DBH of 12 inches must be left in the harvested area of the inner zone. The widths of the inner zone and outer zone vary depending on the bankfull width of the stream and the site class. For site classes I, II, and III on streams less than or equal to 10 feet, there is a 30-foot no-harvest extension beginning at the outer edge of the core zone. For site classes I and II on streams greater than 10 feet, there is a 50 foot no-harvest extension beginning at the outer edge of the core zone. Twenty conifer trees per acre greater than 12 inches DBH must be retained after harvest in the outer zone, unless a large woody debris in-channel placement strategy is selected. Leave trees in the outer zone may be evenly dispersed throughout the zone or clumped around sensitive features.

Findings for Western WA Type S and F Waters — DFC2, Leaving Trees Closest to the Water

Desired Future Condition Option 2 harvest is easier to implement and is chosen by proponents more frequently than DFC1. In the 2014-15 sample, 14 DFC2 prescriptions were sampled from an estimated population of 157 FPAs. A total of 100 rules were evaluated.

Table 7. 2014-15 Compliance Ratings for Type S and F Waters in Western WA — DFC2, Leaving Trees Closest to the Water

RMZ Prescription	FP Rule Compliance Ratings						
	Compliant Ratings		Deviation Ratings				
	Exceeds (part of Compliant)	Compliant	Low	Moderate	Major	No Assessed Deviation Rating	Indeterminate
DFC2 (%)	22.4%	98%	2%	0%	0%	0%	0%
DFC2 (Rule Count)	22	98	2	0	0	0	0

Sample size = 14

Ninety-eight of the sampled 100 rules were compliant for the DFC2 prescription sample, resulting in a 98% compliance rate +/- 3%. Of the 14 sites sampled, 12 were 100% compliant and 2 showed deviation from at least 1 FP rule in the prescription type.

Field observations from 2014 and 2015 accounted for 2 non-compliance rule determination. At the first site, harvest in the floor zone was observed for the non-compliant sample. 3 harvested stumps were counted, resulting in a Low Deviation rating, and the reason for non-compliance was determined to be operational. At the second site, eight harvested stumps were counted in the floor zone, resulting in a Low Deviation rating, and the reason for non-compliance was determined to be a layout issue. (Table 7.)

Exceeds ratings were the result of leaving more than the required amount of inner, and outer zone leave trees in 14 samples. Additionally, Exceeds ratings were assessed for excess outer portion of floor zone leave trees in 7 samples.

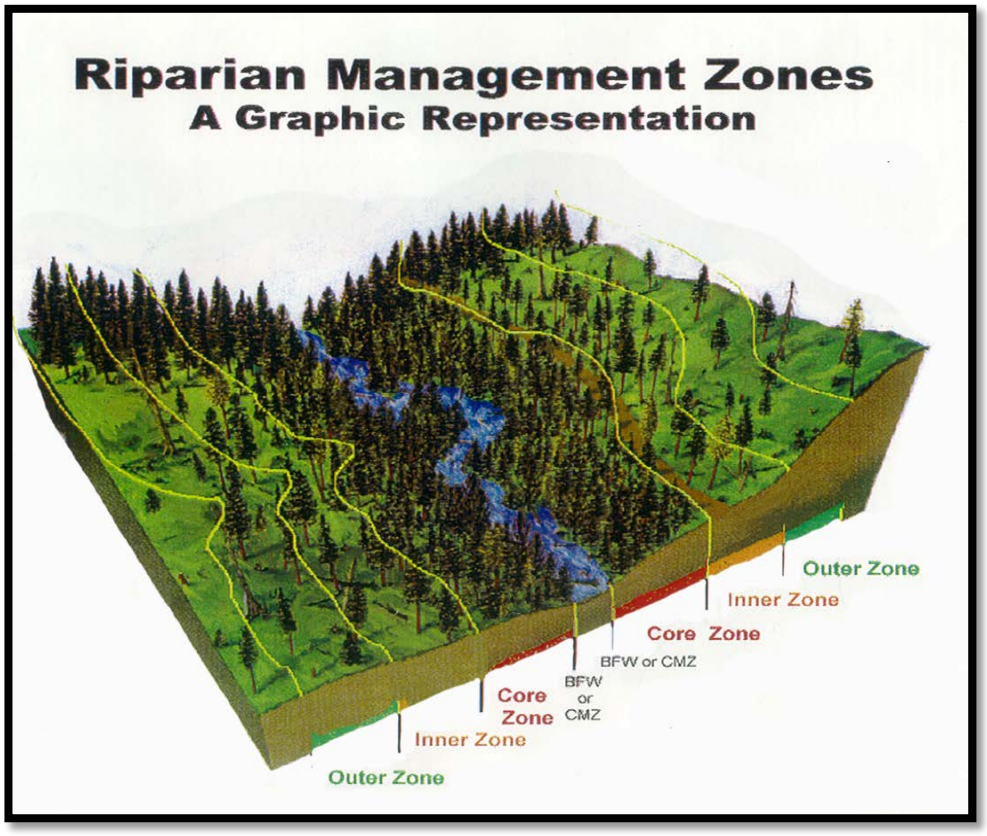
5.4 Statewide RMZs, WMZs, and ELZs

5.4.1 Statewide Typed Waters

Protection measures adjacent to typed water in the state of Washington include protecting channel migration zones (CMZs); establishing riparian management zones (RMZs) along the full length of fish-bearing waters and along a portion of the length of perennial non-fish-bearing waters; retaining no-harvest buffers adjacent to sensitive sites; and establishing equipment limitation zones (ELZs), where equipment is limited along non-fish-bearing waters. RMZs adjacent to fish-bearing streams include a core zone, inner zone, and outer zone, with differing prescriptions delineated in FP rules for inner and outer zones (see Figure 3).

In Western Washington, no timber harvest or road construction is allowed in the 50-foot core zone on fish-bearing waters (zone closest to the water), except for the construction and maintenance of road crossings and the creation and use of yarding corridors. The inner zone (middle zone, not including core zone) ranges from 10 to 100 feet, depending on width of the stream and the site class (see Glossary) of the forested stand. Timber harvest of excess trees in the inner zone is only allowed if predetermined stand requirements are met, which are intended to result in a mature riparian forest stand at 140 years of age (called “desired future condition,” or DFC). Timber harvest is allowed in the outer zone (adjacent to and outside the inner zone), with 20 riparian leave trees per acre retained following harvest.

Figure 3. Type S and F Water RMZs



Protection along non-fish-bearing waters in Western Washington includes RMZs along at least 50% of the length of Type Np waters and around sensitive sites, and the establishment of ELZs for both Np and Ns waters. An ELZ is a 30-foot-wide area where equipment use is restricted in order to minimize ground and soil disturbance. The ELZ protects stream bank integrity and helps minimize sediment delivery to non-fish-bearing waters that could potentially be routed farther downstream to fish-bearing waters.

In Eastern Washington, riparian management is intended to result in stand conditions that vary over time. Management is designed to mimic local disturbance (such as wildfire) regimes in a way that protects riparian function conditions and maintains general forest health. Harvest adjacent to a Type S, F, or Np stream is based on the DNR site class map, timber habitat type, basal area, and shade requirements needed to protect the stream. Habitat types include Ponderosa Pine, Mixed Conifer, and High Elevation. The no harvest core zone along type S and F waters is 30 feet. Harvest units within the Bull Trout Habitat Overlay must leave all available shade within 75 feet of the bankfull width or CMZ, depending on which is greater. Np and Ns waters have an ELZ of 30 feet.

5.4.1.1 Statewide Type S and F Waters — No Inner Zone Harvest

For the No Inner Zone Harvest (NIZH) option, DFC results show that existing stands in the combined core and inner zone do not meet stand requirements in western Washington. Therefore, inner zone harvest cannot take place, or sometimes the landowner elects not to harvest in the inner zone for operational or other reasons.

Findings for Statewide Type S and F Water — No Inner Zone Harvest

No Inner Zone Harvest is the most frequently selected harvest strategy adjacent to fish-bearing waters. This harvest strategy occurred on an estimated 737 FPAs in the 2014-15 population. The resulting NIZH prescription sample size was 25, and a total of 124 rules were evaluated.

Table 8. 2014-15 Compliance Ratings for Statewide Type S and F Waters — No Inner Zone Harvest

RMZ Prescription	FP Rule Compliance Ratings						
	Compliant Ratings		Deviation Ratings				
	Exceeds (part of Compliant)	Compliant	Low	Moderate	High	No Assessed Deviation Rating	Indeterminate
No Inner Zone Harvest (%)	8.6%	93.5%	4.0%	0%	1.6%	1%	0%
No Inner Zone Harvest (Rule Count)	10	116	5	0	2	1	0

Sample size = 25

One hundred sixteen of the sampled 124 rules were compliant for the NIZH prescription sample, resulting in a 94% compliance rate +/- 7%. Of the 25 sites sampled, 17 were 100% compliant and 8 showed deviation from at least 1 FP rule in the prescription type.

Field observations from 2014 and 2015 accounted for 8 non-compliance determinations across 5 sample sites. At the first site, an incorrect site class determination was recorded, resulting in a Low deviation rating, and the reason for non-compliance was determined to be administrative. As a result of the incorrectly applied site class, harvest occurred within the inner zone, and no leave trees were left within the outer zone, resulting in a High Deviation rating, and was administrative per the previous explanation. At the second site, 4 merchantable trees were harvested within the inner zone, resulting in a Low deviation rating, and no determination could be made for the reason for non-compliance. At the third site, an incorrect site class determination was recorded, with the reason for non-compliance was determined to be administrative. As a result of the incorrectly applied site class, harvest occurred within the inner zone, 94 trees were removed from the no-cut Inner Zone. These non-compliance determinations resulted in a High deviation rating, and the reason for non-compliance was determined to be administrative. At the fourth site, 2 trees were removed from the no-cut Inner Zone, resulting in a Low deviation rating, and the reason for non-compliance was determined to be operational. At the fifth site, a Channel Migration Zone was observed that was unreported on the FPA resulting in a Low deviation rating, and the reason for non-compliance was determined to be administrative. (Table 8.)

Exceeds ratings were assessed for excess Outer Zone leave trees on 10 samples. Additional outer zone leave trees were left beyond what was required by rule.

5.4.1.2 Statewide Type Np Waters

Type Np streams and sensitive sites contribute to the quality of water and fish habitat in downstream Type S and/or F streams. They also provide habitat for some wildlife.

Fifty-foot-wide RMZs are required along portions (and specified locations) of Type Np streams. For example, a 50-foot-wide no-harvest RMZ is required where Type Np streams join a Type S or F stream.

In western Washington, the total distance of the 50-foot buffer required along a Type Np stream varies and depends on the length of the Type Np stream from the confluence with the Type S or F stream. At least 50% of a Type Np water's length must be protected by buffers on both sides of the stream (2-sided buffers). If the Type Np water on the FPA is located more than 500 feet upstream from the confluence of a Type S or F water, and if the Type Np water is more than 1,000 feet in length, then the minimum percentage of the length of Type Np water to be buffered varies per the table in WAC 222-30-021(2)(b)(vii).

Sensitive sites associated with Type Np streams must also be protected with buffers or harvest restrictions. These include headwater springs or the uppermost point of perennial flow; the intersection of 2 or more Type Np waters; perennially saturated side-slope seeps; perennially saturated headwall seeps; and alluvial fans. No harvest is allowed within alluvial fans.

In eastern Washington, within fifty horizontal feet of the outer edge of bankfull width of the stream, the landowner must identify either a no cut, partial cut and/or clearcut strategy for each unit to be harvested. For partial cut strategies, basal area requirements must be met that are specified for the timber habitat type. For cleat cut strategies, a two-sided no-harvest fifty-foot buffer along the stream reach must be left that is equal in total length to the clearcut portion and meets the upper end of basal area requirements for the respective timber habitat type (WAC 222-30-022(2)(b)(i)&(ii)).

Type Np streams also require a 30-foot-wide ELZ. Equipment use and other forest practices are specifically limited, and mitigation is required if activities expose more than 10% the soil within the ELZ.

On-site Review for Statewide Type Np Waters

Questions asked on the Field Form for Type Np streams differ from those for Type S and F fish-bearing streams. Examples include the following:

- Is there evidence of equipment entry into the 30-foot ELZ? If so, was less than 10% of the soil within the ELZ exposed due to activities?
- Was the appropriate length of 50-foot no-harvest zone left on the given stream segment?

Findings for Statewide Type Np Waters

Type Np streams were commonly encountered with an estimated 929 FPAs having 1 or more Np streams within their harvest boundaries. The resulting Np prescription sample size was 35, and a total of 136 rules were evaluated.

Table 9. 2014-15 Compliance Ratings for Statewide Type Np Waters

RMZ Prescription	FP Rule Compliance Ratings						
	Compliant Ratings		Deviation Ratings				
	Exceeds (part of Compliant)	**Compliant**	**Low**	**Moderate**	**High**	**No Assessed Deviation Rating**	**Indeterminate**
Np Water (%)	0%	93.4%	2.9%	1.5%	0%	1.5%	0%
Np Water (Rule Count)	0	128	4	2	0	2	0

Sample size = 35

One hundred twenty eight of the sampled 136 rules were compliant for the Type Np prescription sample, resulting in a 93.4% compliance rate +/- 5%. Of the 35 sites sampled, 28 were 100% compliant and 7 showed deviation from at least 1 FP rule in the prescription type.

Field observations from 2014 and 2015 accounted for 8 non-compliance determinations across 7 sites. At the first site, harvest within the buffer of the uppermost point of perennial flow was observed, resulting in a Low Deviation rating, and the reason for non-compliance was determined to be layout. At the second site, the location of the F/N break was inaccurately identified, resulting in the lower 150 feet of the stream being mistyped. The reason for non-compliance was determined to be administrative. At the same site timber harvest was observed within the upper most point of perennial flow no-cut buffer, resulting in a Low Deviation rating, and the reason for non-compliance was determined to be layout. At two additional sites, the sampled stream met fish physical characteristics with no supporting water type modification form or Interdisciplinary Team documentation for Np determination, resulting in the mistyping of the respective sampled segments, the reason for non-compliance was determined to be administrative. No deviation rating is given for inaccurately typed stream segments. At the fifth site, 130 feet of required no-cut buffer was absent, yielding an inadequate buffer length. The resulting deviation rating was Moderate, and the reason for non-compliance was indeterminate. As a result of the inadequate buffer length, harvest was observed within the 50 foot no-cut buffer, leading to a deviation rating of moderate, and the reason for non-compliance was again indeterminate. At the sixth site, a cut stump was observed 46 feet from the edge of Bankfull Width, resulting in a non-compliance determination for harvest within the 50 foot no-cut buffer. The deviation rating was Low, and the reason for non-compliance was operational. At the seventh site, a cut stump was observed 48 feet from the edge of the Upper Most Point of Perennial Flow (UMPPF), resulting in a non-compliance determination for harvest within the 56 foot UMPPF no-cut buffer. The deviation ration was Low, and the reason for non-compliance was operational. (Table 9.)

5.4.1.3 Statewide Type Ns Waters

Buffers are not required for Type Ns streams. There is a 30-foot ELZ requirement, and mitigation measures are required if more than 10% of the soil in the ELZ is exposed.

Findings for Statewide Type Ns Waters

Type Ns waters are common, occurring in an estimated 1018 FPAs in the statewide population for the 2014-15 sample. The resulting Ns prescription sample size was 35, and a total of 61 rules were evaluated.

Table 10. 2014-15 Compliance Ratings for Statewide Type Ns Waters

RMZ Prescription	Forest Practices Rule Compliance Ratings						
	Compliant Ratings		Deviation Ratings				
	Exceeds (part of Compliant)	**Compliant**	**Low**	**Moderate**	**High**	**No Assessed Deviation Rating**	**Indeterminate**
Ns Water (%)	0%	96.7%	0%	0%	0%	3.2%	1.6%
Ns Water (Rule Count)	0	59	0	0	0	2	1

Sample size = 35

Fifty-nine of the sampled 61 rules were compliant for the Ns prescription sample, resulting in a 96% compliance rate +/- 5%. Of the 35 sites sampled, 33 were 100% compliant and 2 showed deviation from at least 1 FP rule in the prescription type.

Field observations from 2014 and 2015 accounted for 2 non-compliance determinations across 2 sites. At the first site, the stream was incorrectly typed. The compliance monitoring team observed flowing water in the channel during the month of September of a stream that had been typed Ns by the landowner. The reason for non-compliance was administrative, and no deviation rating is given for inaccurately typed stream segments. At the second site, based on field measurements collected by the Compliance Monitoring field team, the stream segment met fish physical characteristics, resulting in the mistyping of the sampled segment. The reason for non-compliance was determined to be administrative, and no deviation rating is given for inaccurately typed stream segments. The 1 Indeterminate rating resulted from the landowner/applicant's wording on the FPA regarding water typing. (Table 10.)

5.4.2 Statewide Wetland Management Zones

Forest practices wetland rules are the same for Western and Eastern Washington. Wetland management Zones (WMZs) have variable widths based on the size and type of wetland. Type A Wetlands greater than 5 acres have a minimum 50-foot WMZ width, and an average 100-foot WMZ width. Type A&B Wetlands of 0.5 to 5 acres have a minimum 25-foot WMZ width and an average 50-foot WMZ width, while Type B Wetlands less than 0.5 acre and Forested Wetlands require no WMZ. Leave trees are required (by size and number) within the WMZ. There are no leave tree requirements for the Forested Wetlands type. Restrictions also apply regarding the maximum width of openings created by harvesting within the WMZ. Additionally, ground-based harvesting systems shall not be used within the minimum WMZ width without written approval from DNR.

On-site Review for Statewide Wetlands

Protection measures for wetlands depend on the size and type of wetland. The information collected by the compliance monitoring field team varies depending on the type of wetland. Only one of the questions answered by the team is applicable to all wetlands:

- Were the wetlands typed and sized appropriately on the ground and consistent with the FPA?

In addition, for Type A&B Wetlands, the compliance monitoring field team evaluates the following:

- Leave trees in the WMZ for species, number, and size
- Is the variable buffer width appropriate relative to the WMZ table in the rules?
- If operations were conducted within the WMZ, were the openings less than 100 feet wide?
- If operations were conducted within the WMZ, were the openings no closer than 200 feet from each other?
- Approval by DNR for use of ground-based harvesting systems within the minimum WMZ and for any timber that was felled into or cable yarded across the wetland
- Protections applied when a WMZ overlaps an RMZ
- For particular leave tree requirements, if the harvest within the WMZ is greater than or less than 10%

If harvest occurs within a forested wetland, the compliance monitoring field team determines whether the harvest method is limited to low impact harvest or cable systems; and whether the wetland boundaries (if greater than 3 acres within the harvest unit) are delineated correctly and shown on the activity map by the landowner/applicant.

5.4.2.1 Statewide Type A&B WMZs

Findings for Type A&B WMZs Statewide

Type A&B Wetlands are estimated to occur on 237 FPAs statewide in the 2014-15 population. The resulting Type A&B Wetlands prescription sample size was 35, and a total of 127 rules were evaluated.

Table 11. 2014-15 Compliance Ratings for Statewide Type A&B WMZs

WMZ Prescription	FP Rule Compliance Ratings						
	Compliant Ratings		Deviation Ratings				
	Exceeds (Part of Compliant)	Compliant	Low	Moderate	High	No Assessed Deviation Rating	Indeterminate
Type A&B (%)	5.0%	94.5%	2.4%	0%	0.8%	2.4%	0.8%
Type A&B (Rule Count)	6	120	3	0	1	3	1

Sample Size = 35

One hundred twenty of the sampled 127 rules were compliant for the Type A&B WMZ sample, resulting in a 94.5% compliance rate +/- 5%. Of the 35 sites sampled, 30 were 100% compliant and 5 showed deviation from at least 1 FP rule in the prescription type.

Field observations from 2014 and 2015 accounted for 7 non-compliance determination across 5 sites. At the first site, a wetland was incorrectly typed. The selected Type A Wetland was determined to be associated with a fish-bearing lake (i.e. Type F water). No deviation rating is given for mistyped wetland segments, and the reason for non-compliance was administrative. At the second site, harvest was observed within the 25' minimum WMZ leading to inadequate leave tree counts in the 6", 12", and 20" diameter classes respectively. A deviation rating of Low was given for each of the 3 non-compliant rules, and the reason for non-compliance was determined to be administrative. At three additional sites, the sampled wetland segments were determined to be fish bearing water, resulting in the mistyping of the three sampled wetland segments. The reason for non-compliance was determined to be administrative, and no deviation rating is given for mistyped wetland segments. The 1 indeterminate rating was a result of a Type A Wetland being potentially associated with a fish-bearing lake. A final determination could not be ascertained due to seasonal water flow conditions, and the associated Type S water in question was located on another landowner's property. (Table 11)

5.4.2.2 Statewide Forested WMZs

Findings for Statewide Forested WMZs

Approximately 322 FPAs statewide contained Forested Wetlands in the 2014-15 sample population. The resulting Forested Wetlands prescription sample size was 23, and a total of 39 rules were evaluated.

Table 12. 2014-15 Compliance Ratings for Statewide Forested WMZs

WMZ Prescription	FP Rule Compliance Ratings						
	Compliant Ratings		Deviation Ratings				
	Exceeds (Part of Compliant)	Compliant	Low	Moderate	High	No Assessed Deviation Rating	Indeterminate
Forested (%)	7.9%	97.4%	0%	0%	2.6%	0%	0%
Forested (Rule Count)	3	38	0	0	1	0	0

Sample size = 23

Thirty-eight of the sampled 39 rules were compliant for the forested WMZ sample, resulting in a 97.4% compliance rate +/- 5%. Of the 23 sites sampled, 22 were 100% compliant and 1 showed deviation from at least 1 FP rule in the prescription type.

Field observations from 2014 and 2015 accounted for 1 non-compliance determination. The 1 noncompliant rule recorded was the result of an incorrectly typed wetland. Fish were observed in the selected Forested Wetland, the reason for non-compliance was determined to be administrative. (Table 12.)

6. Forest Practices Rule Compliance for Roads and Haul Routes

Section 6 provides rule and on-site review descriptions and compliance monitoring findings regarding the Standard Sample for roads and haul routes statewide.

Although Roads prescription sampling follows the same design as riparian sampling, Haul Routes prescription sampling is designed differently. Haul Routes sampling assesses each 0.1 mile segment of forest road for correct design and for construction or maintenance of roads to protect typed waters from sediment delivery. This strategy enables determination of the rate of compliance for the entire haul route specified on the FPA.

A well-designed, located, constructed, and maintained system of forest roads is essential to both forest management and protection of public resources. Washington State forest practices rules — including those for road construction, maintenance, and abandonment and for "best management practices" — are some of the most, if not the most, stringent in the country. The FP rules are designed to help ensure that forest roads are constructed, maintained, and abandoned to do the following:

- Provide for fish passage
- Prevent mass wasting
- Limit delivery of sediment and surface runoff to all typed waters
- Avoid capture and redirection of surface water or groundwater
- Divert road runoff to the forest floor
- Provide for the passage of some woody debris
- Protect stream bank stability
- Minimize construction of new roads

- Assure no net loss of wetland function

FP rules accomplish these goals through ensuring the proper location, design, construction, maintenance, and abandonment of forest roads, landings, and stream crossings.

The CMP collects data annually on sites where one or more of the following exists:

- Road construction
- Landing construction
- Type N stream road crossing construction, including fords
- Road abandonment
- Haul routes (forest roads used to truck timber to market)

FP Rules for Statewide Roads and Haul Routes

FP rules for road construction, landing construction, Type F and N stream road crossings, road abandonment, and haul routes are explained below.

Forest Road Construction

Road construction is composed of 3 components: road location, road design, and actual construction. The road rules require specific standards for road location, design, and construction, which are reflected in the questions found in the compliance monitoring Roads Field Form (defined in the on-site review section, below).

1) Road location — FP rules require that roads be located to fit the topography to minimize alteration of natural features (WAC 222-24-020). Examples of FP rule requirements related to road location are the requirement that the landowner/applicant minimize the number of stream crossings and not locate roads in bogs or within natural drainage channels (except for crossings).
2) Road design — FP rules include road design standards that address construction techniques and water management (WAC 222-24-020). For example, new road construction on side slopes exceeding 60% that have the potential to deliver sediment to any typed water or wetland need to utilize full bench construction techniques (WAC 222-24-020[8]).
3) Road construction — Road construction requirements focus on maintaining stable road prisms and water crossing structures, and on minimizing sediment delivery to surface waters and wetlands (WAC 222-24-030). For example, road construction requires that erodible soil disturbed during road construction needs to be located where it could not reasonably be expected to enter the stream network or needs to be seeded with noninvasive plant species.

Landing Location and Construction

Landings are subject to several FP rules. Landings must not be located within specific areas such as natural drainage channels, RMZs, or WMZs. Landings must be constructed so that they are sloped to minimize accumulation of water on the landing. Excavation material shall not be sidecast where there is high potential for material to enter WMZs or within the bankfull width of any stream or the 100-year flood level of any typed water (WAC 222-24-035).

Type F and N Stream Crossings

Installation, maintenance, and removal of bridges, culverts, and temporary water crossings must follow several FP rules (with technical guidance provided in Forest Practices Board Manual Chapter Section 5). For example, culvert placement must be designed so that the alignment and slope of the culvert parallels the natural flow of the stream and so that placement does not cause scouring of the streambed and erosion of the stream banks in the vicinity of the project. Additionally, bridges must not constrict clearly defined channels, and temporary water crossings must be constructed to facilitate abandonment (WAC 222-24-040).

Road Abandonment

Landowners have the option to abandon forest roads, with the exception that in some watersheds landowners are required to abandon roads to keep the road ratio at a certain level. When a landowner chooses to abandon a forest road, specific standards delineated in the FP rules must be followed (with additional technical guidance provided in Board Manual Chapter Section 3). For example, abandoned roads must be out-sloped, water barred, or otherwise left in a condition suitable to control erosion and maintain water movement within wetlands and natural drainages. An abandoned road must be blocked so that four-wheeled highway vehicles cannot pass the point of closure at the time of abandonment, and water crossing structures must be removed (WAC 222-24-052[3]).

Haul Routes

FP rules state that roads currently used or proposed to be used for timber hauling must be maintained in a condition that prevents potential or actual damage to public resources (WAC 222-24-051[12]). The compliance monitoring field team observes and records observations for haul routes regarding level of sediment delivery.

On-site Review for Statewide Roads and Haul Routes

In order to determine road compliance, the compliance monitoring field team visited FPA sites where forest road construction, landing construction, Type N stream road crossings, abandoned roads, and haul routes are present. The compliance monitoring field team used the Roads Field Form and the Haul Route Field Form to record information onsite. The data recorded on the Roads Field Form and the Haul Route Field Form helped the team determine road compliance for each FPA sampled.

Roads Field Form

The compliance monitoring field team used the Roads Field Form to record data observed for forest road construction, landing construction, Type N stream road crossings, and abandoned roads. The initial series of questions on the Roads Field Form helped guide systematic assessment of road surface conditions, drainage structure placement and stabilization, routing of drainage water to the forest floor, and potential delivery of sidecast. Stream crossing questions helped guide systematic stream crossing placement, frequency, culvert sizing, positioning, and stabilization. Other questions were used to address wetland crossings, road location, wetland replacement, abandonment and stabilization of temporary roads, road abandonment, and proper construction and drainage for forest road landings.

The following are examples of questions found on the Roads Field Form:

- Road location — "Does new road construction minimize stream crossings?" (WAC 222-24-020[5])
- Road design — "Where the potential for sediment delivery existed, was full bench construction utilized for roads built on slopes greater than 60%?" (WAC 222-24-020[8])
- Road construction — "Were erodible soils disturbed during construction stabilized to prevent the potential to deliver to typed waters?" (WAC 222-24-030[4])
- Road landing location and construction — "Was the landing sloped to minimize accumulation of water on the landing?" (WAC 222-24-035)
- Type N stream crossings — "Are the alignment and slope of all culverts on grade with the natural streambed? (WAC 222-24-040[2], [3], [4], and [5])
- Road abandonment — "Was the road blocked so that four-wheel highway vehicles cannot pass the point of closure at the time of abandonment?" (WAC 222-24-052)

Haul Route Field Form

The compliance monitoring field team uses the Haul Route Field Form to guide the systematic assessment of haul routes. The sampling method provides information for reporting the proportion of compliance/deviance, the level of sediment delivery (Table 13), and the cause of the noncompliance (Table 14).

There were five recorded levels of sediment delivery (No Delivery, De Minimis, Low, Medium, and High) used by the team for rating levels of sediment delivery, as well as one decision type (No Consensus). (Table 13.)

Table 13. Haul Route Sediment Delivery Level Categories

Delivery Level	Delivery Level Description
No Delivery	Complete disconnection of sediment delivery to typed water. Considered compliant.
De Minimis	Overland flow from roads reaches typed waters, but sediment delivery is indeterminable from background levels of turbidity. Considered compliant.
Low	Low chronic or temporary delivery. Effects are observable at the site of entry (distance downstream less than 1 channel width) only are and not expected to magnify over time given the existing activity.
Medium	Measurable but noncritical levels of delivery. Visual plume at the reach scale.
High	Extensive or critical levels of delivery. Substantial violations of turbidity criteria or significant visual plumes that occupy the channel and go beyond the reach scale (for example, around multiple bends in a stream).
No Consensus	The observers do not agree on the classification. Comments are essential to determine the scope of the difference, recording each observer's classification and the basis of disagreement.

It is helpful to determine, where possible, causes for sediment delivery. The compliance monitoring field team observes and records both primary and secondary causes of sediment delivery. (See Table 14.)

Table 14. Potential Causes of Sediment Delivery

Potential Causes	Cause Description
Faulty cross drainage	Inadequate frequency of or nonfunctioning drainage structures that carry road prism runoff or seepage, allowing sediment delivery to typed water
Inadequate water crossing structures	Absence of or nonfunctioning structures designed to pass typed water across a forest road, resulting in sediment delivery
Obstructed or bermed ditch line	Features of the road surface or ditch that divert water normally serviced by the ditch, causing sedimentation of typed water
Intercepted water	Water intercepted by road features and diverted to a channel other than its channel of origin prior to the road construction
Contaminated ditchwater	Ditchwater containing suspended sediment that flows into typed water
Ruts/inadequate crown	Perturbations of the road surface contributing sediments to runoff that reaches typed water
Driving in ditch line	Vehicular disturbance of stabilized ditches, resulting in sediment reaching typed water
Haul on native surface or inadequate rock	Road haul on a running surface containing fine particles that are captured by runoff and contributed as sediment to typed water
Water channeled to eroded/failing slopes	Water flow or runoff across unstabilized road features that contributes sediment to typed water
Road fill failure	Sediment resulting from the effects of gravity on the fill (slumps, raveling, etc.) being deposited in or carried by runoff to typed water
Cut slope failure	Sediment resulting from the effects of gravity on the cut slope (slumps, raveling, etc.) being carried by ditch flow to typed water

Findings for Statewide Roads and Haul Routes

This section summarizes data from both the Roads Field Forms and Haul Route Field Forms.

Roads Findings

Road construction or abandonment occurred on an estimated 1405 FPAs in the 2014-15 sample. The resulting Roads prescription sample size was 13, and a total of 83 rules were evaluated.

Table 15. FP Rule Compliance for 2014-2015 Road Activities

Statewide Road Activities for 2014 & 2015		
All Landowner Types	**Status of Compliance**	**Road Activities Rule Compliance**
	# of Rules Sampled	83
	# Compliant Rules	81.7
	# with Deviation	1.3
	Compliance %	98.4%
	95% Confidence Interval	CI (95, 100)

Sample size = 13

Eighty-one point seven of the sampled 83 rules were compliant for the Roads prescription sample, resulting in a 98.4% compliance rate +/- 3%. Of the 13 sites sampled, 11 were 100% compliant and 2 showed deviation from at least 1 FP rule in the prescription type.

Field observations from 2014 and 2015 accounted for 2 non-compliance determinations across 2 sites. At 1 of the noncompliant sites, water was observed running across the road surface due to an inadequately sized ditch, resulting in a deviation. The other noncompliant observation was the result of a drainage structure not installed at the natural grade of the stream. Both noncompliant rules had a rating of Low Deviation. (Table 15.)

Haul Routes Findings

The Haul Route prescription sample included an inspection of haul routes along forest roads from the farthest points in the FPA to public access roads. In each sample, the entire road was observed if it was less than 5 miles long. If the entire road was over 5 miles, ten 0.5-mile-long road segments were observed. Within each 0.5 mile, every 0.1-mile segment was observed as to its actual or potential delivery of sediment to typed water; and the primary and secondary causes for the delivery (see Table17) were also recorded. The compliance monitoring field team recorded compliance information for haul routes in general and also specifically for haul routes categorized by side slopes less than or greater than 60%. The data for side-slope percentage provide information needed to fulfill requirements for Clean Water Act assurances. (For more information see *2009 Clean Water Act Assurances Review of Washington's Forest Practices Program.*)

Table 16. Haul Route Compliance Summary

Compliant		Deviation		
90% (82, 98) CI*		9.6% (1.5, 18) CI		
No Delivery	**De Minimis**	**Low**	**Medium**	**High**
86% (76, 95) CI	4.7% (0, 11) CI	3.9% (0, 10) CI	5.6% (0, 24) CI	0.1% (0, 2.4) CI

*CI is confidence interval at the 95% confidence level

Table 17. Haul Route Deviation by Cause

Primary Cause	% Deviation with This Primary Cause
Inadequate water crossing structures	10%
Contaminated ditchwater	3%
Other (described in comments)	17%
Faulty cross drainage	14%
Stream of Spring Intercepted	5%
Road fill failure	2%
Sediment from stream adjacent parallel road	44%
Obstructed or bermed ditch line	2%
Water channeled to eroding slopes	2%

For 61.5 miles of the 67.4 miles of haul routes evaluated, no delivery or de minimus sediment delivery was observed, resulting in a compliance rate of 90% (Table 16). Sediment from stream adjacent parallel roads accounted for 44% of the deviation mileage (Table 17). The 17% that aggregates the “other” category is comprised of non-point-source sediment delivery and blocked drainage structures (Table 17). Faulty cross drainage accounted for 14% of the deviation mileage, and inadequate water crossing structures accounted for 10%, of the deviation mileage. All other primary cause categories accounted for less than 0.3 miles of deviation each respectively. For efficiency reasons, haul routes were observed on FPAs that had been selected for the harvest prescription sample.

7. Forest Practices Rule Trend Analysis

FPA rule compliance has been monitored since 2006. In that time, there have been multiple changes to the methods for monitoring compliance. The current monitoring methods include tracking compliance with individual rules, while sampling the rule applications in clusters (FPAs). One of the goals of the current analytical methodology is to detect trends in prescription, and individual rule compliance over time. The Compliance Monitoring Program feels this goal is best achieved by converting data collected prior to 2014 to be consistent with current data collection, and analytical protocols.

The sample size for each year is set based on maintaining a set precision level (+/- 6%) for average compliance within a set of rules (a prescription) over a two-year period. Because the population of FPAs available in any given year is finite and varying, the number of samples necessary to achieve a specific precision level also varies by year. Differing priorities and compliance estimation methods have caused differences in precision levels attainable by the samples collected in different years. In addition, methods for determining compliance with some individual rules has changed since 2006. These differences create challenges in determining and evaluating trends through time. However, with careful consideration, the difficulties are not insurmountable. On that basis, this report includes an analysis aimed at seeking to discern patterns of changes in compliance rates measured over time.

Methods

For the 2010-2015 dataset, rule compliance was carefully tracked to make sure that the compliance determination was consistently applied in all years. Data were converted to ensure consistent application of compliance determinations across the dataset. Where data were not collected in accordance with current field protocols, were incomplete, or un-convertible, the data were removed from the trend analysis dataset. Data for rules were combined and compared through time within each corresponding prescription type. Trends in average compliance with prescriptions, and individual rule compliance are tracked to maintain consistency with current methods.

Multivariate linear regression analysis was used to predict general trends in average compliance through time. However, because of the varying precision levels among years, the regression assumption of homogeneous variance in average compliance was not satisfied. In general, higher sample sizes as a proportion of the population result in lower variance. Because average compliance is a ratio, the standard error of the average is a function of the proportion of the population sampled in each year and the number of rules within the prescription applied on each FPA. Weighted least squares multivariate linear regression, where the average compliance is weighted by the inverse of the estimated mean standard error for each year, was employed, to correct for the nonhomogeneous variance. In this way, years with better estimates of average compliance receive more weight in the regression, which compensates statistically for unequal variance. Statistical significance was determined with $\alpha = 0.10$. The results for weighted linear regression are supplied. Residuals from regressions are tested for approximate normality using Shapiro-Wilks test with alpha = 0.05. P-values for significance of regressions were calculated, as well as 95% confidence intervals for linear regression coefficients for the weighted regression.

Although there is weak and varying precision within any given year for compliance with a single rule, it can still be useful to track changes through time for the FP rules. Statistical tests are not applied, but graphical trends are displayed for each prescription type.

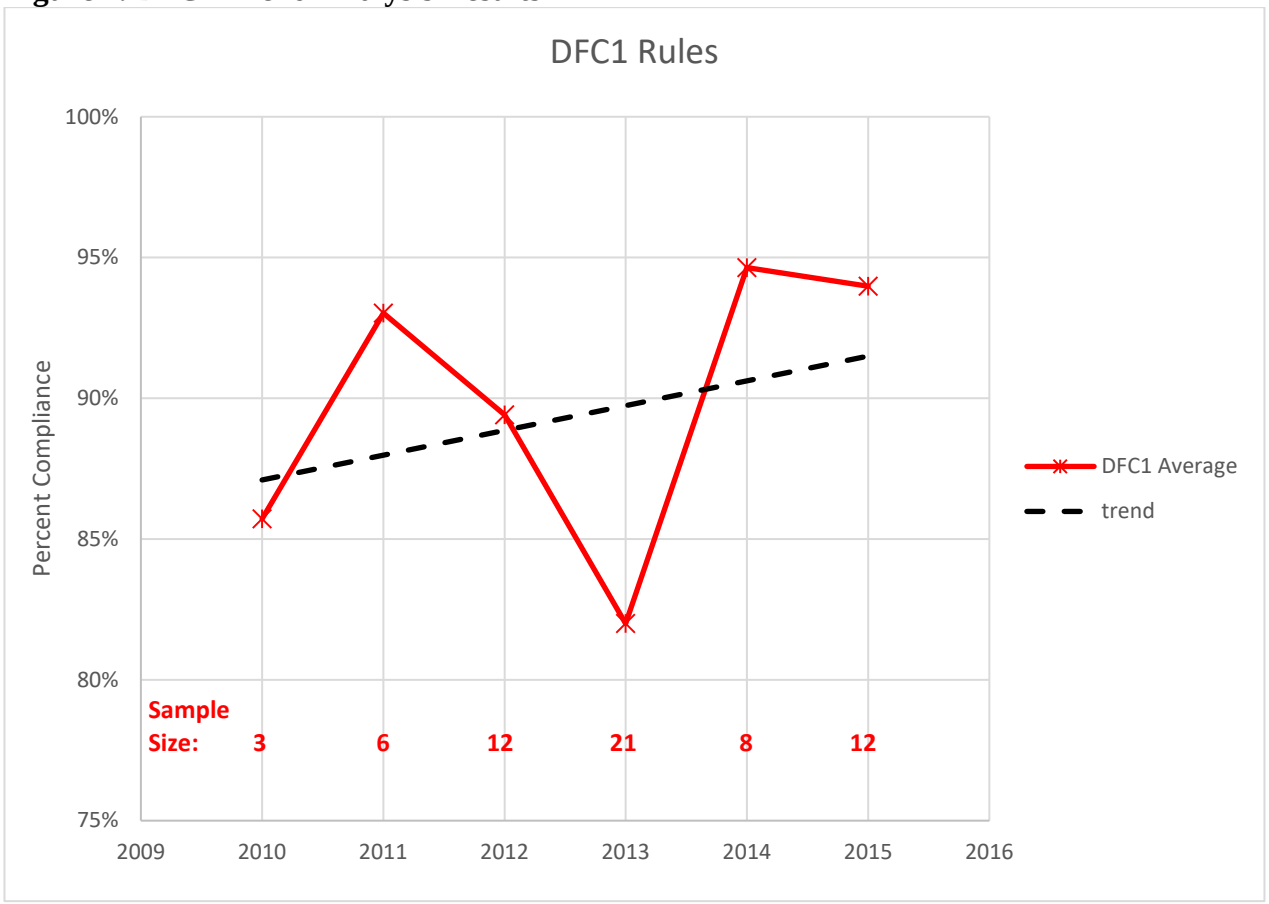
Since no individual rules are measured or tracked for Haul Routes trend analysis was not conducted for the Haul Route prescription type.

Results

Desired Future Condition 1

Trend analysis results for the DFC1 prescription type revealed varying compliance rates for the prescription, and the individual rules from year to year. Prescription compliance rates varied from 82% to 94% over the course of the evaluation period. As a result of the oscillating prescription compliance rate no significant trend results (weighted $p = 0.61$) were observed for the weighted DFC1 prescription type. (Figure 4.)

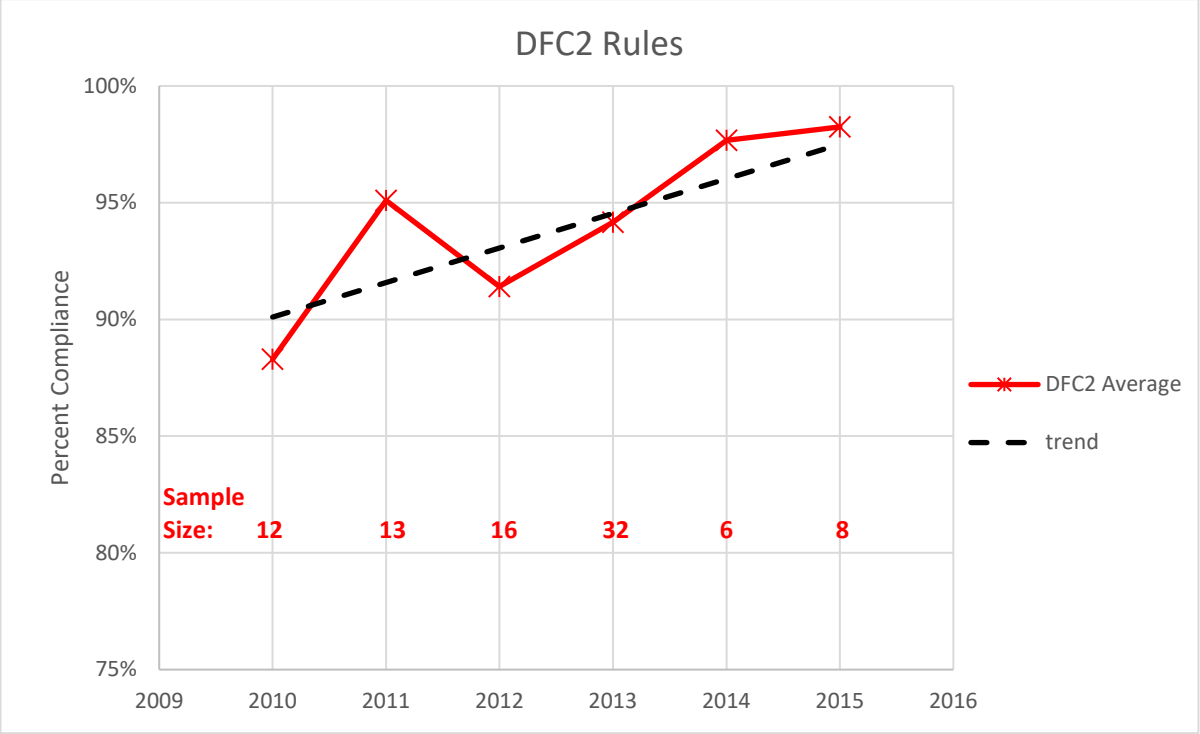
Figure 4. DFC1 Trend Analysis Results



Desired Future Condition 2

Trend analysis results for the DFC2 prescription type revealed varying compliance rates for the prescription, and the associated FP rules from year to year. Prescription compliance rates varied from 88% to 98% over the course of the evaluation period. As a result of the oscillating prescription compliance rate, no significant trend results for weighted regression analysis (p = 0.11) were observed for the weighted DFC2 prescription. (Figure 5.)

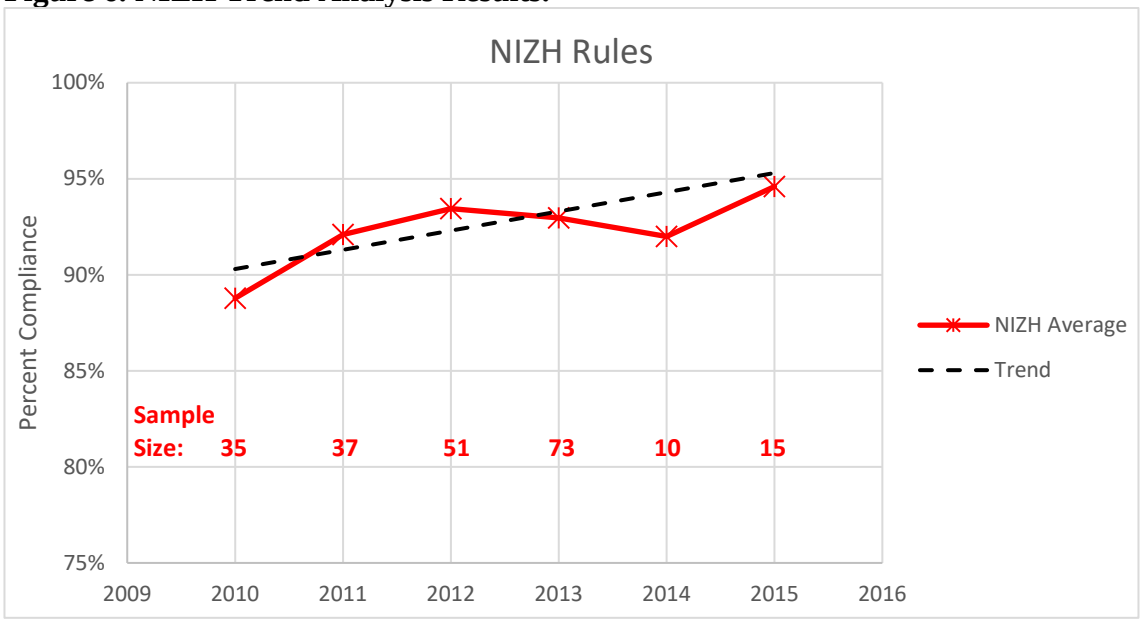
Figure 5. DFC2 Trend Analysis Results



No Inner Zone Harvest

Trend analysis results for the NIZH prescription type revealed relatively consistently increasing compliance rates for the prescription, and the associated FP rules from year to year. Prescription compliance rates varied from 89% to 94% over the course of the evaluation period. As a result of the increasing prescription compliance rate, significant trend results (weighted $p = 0.07$) were observed for the weighted NIZH prescription. A year over year increase of 1.0% of the overall prescription compliance rate was observed. (Figure 6.)

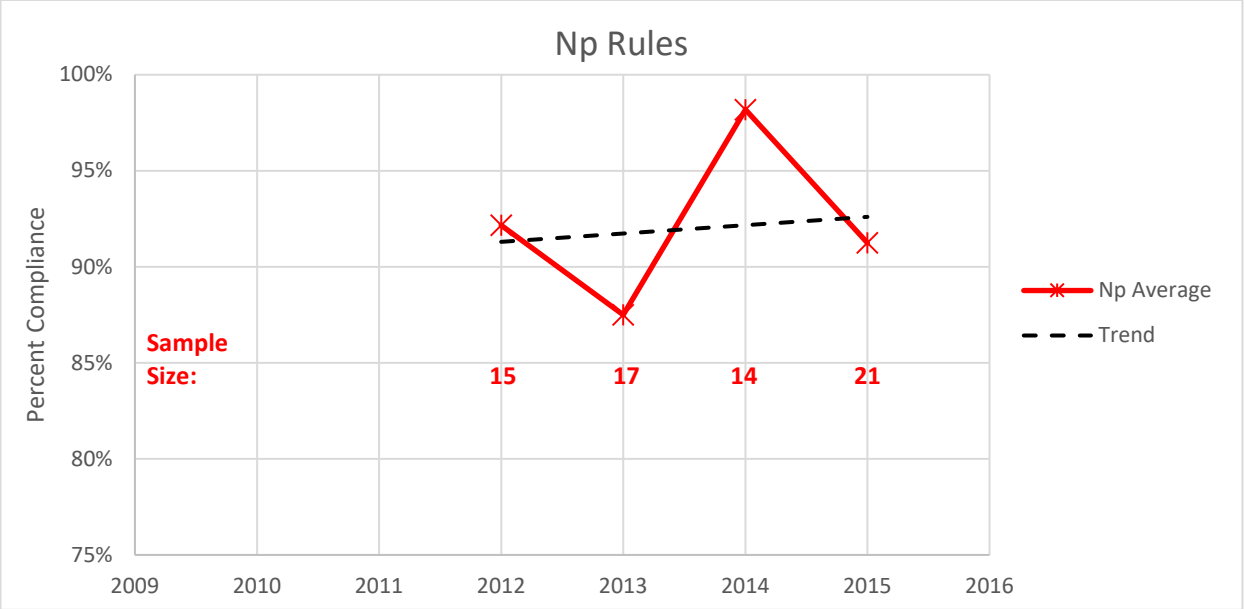
Figure 6. NIZH Trend Analysis Results.



Non-fish Bearing Perennial Streams

As a result of data transformation issues, Np data collected from 2010 and 2011 were excluded from current trend analysis results. Trend analysis results for the Np prescription type revealed varying compliance rates for the prescription, and the associated FP rules from year to year. Prescription compliance rates varied from 88% to 98% over the course of the evaluation period. As a result of the oscillating prescription compliance rate no significant trend results (weighted $p = 0.77$) were observed for the weighted Np prescription type. (Figure 7.)

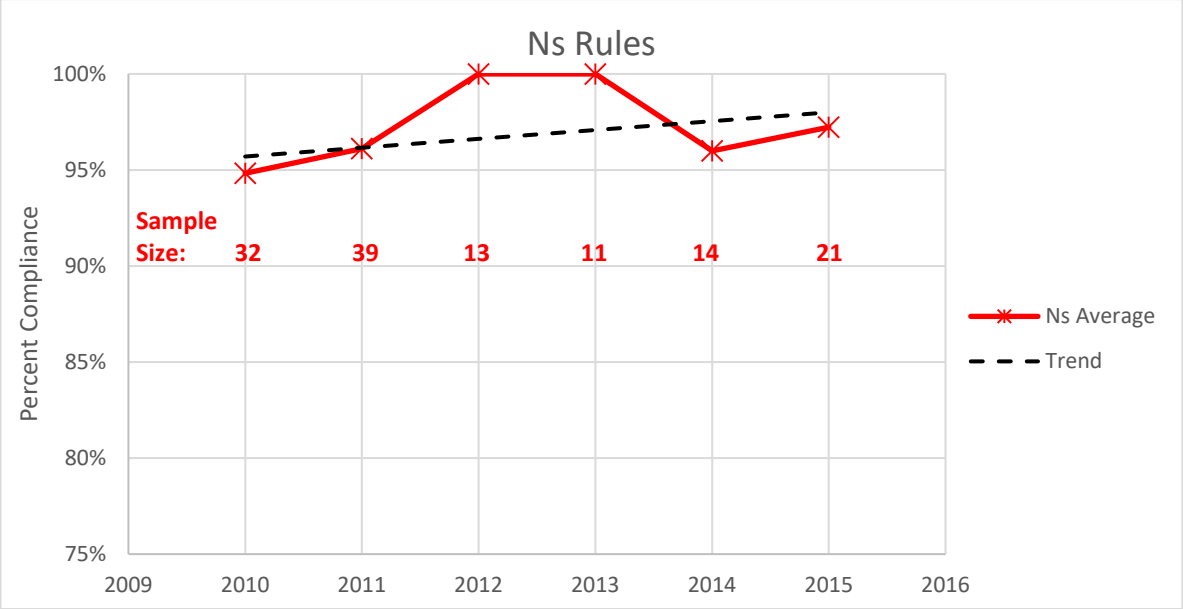
Figure 7. Np Trend Analysis Results



Non-fish Bearing Seasonal Streams

Trend analysis results for the Ns prescription type revealed increasing compliance rates for the prescription, and the associated FP rules from 2010 to 2012 and a decrease in compliance rates from 2013 to 2015. Prescription compliance rates varied from 95% to 100% over the course of the evaluation period. As a result of the oscillating prescription compliance rate no significant trend results (weighted $p = 0.30$) were observed for the weighted Ns prescription type. (Figure 8.)

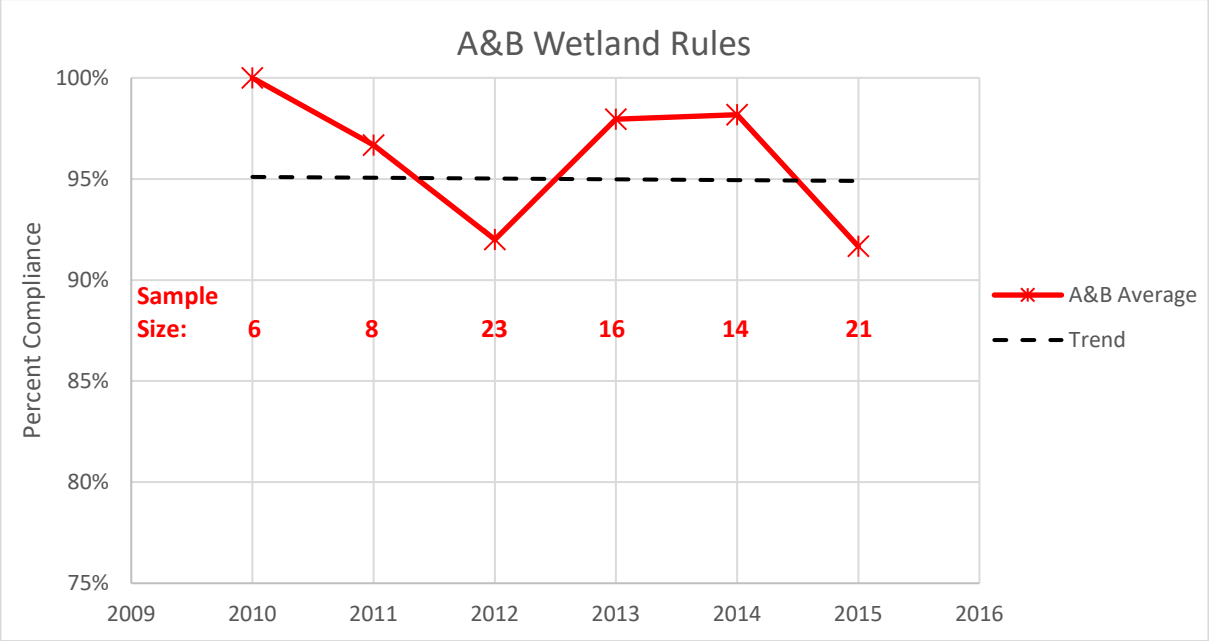
Figure 8. Ns Trend Analysis Results



A & B Wetlands

Trend analysis results for the A & B Wetlands prescription type revealed varying compliance rates for the prescription, and the associated FP rules from year to year. Prescription compliance rates varied from 92% to 100% over the course of the evaluation period. As a result of the oscillating prescription compliance rate no significant trend results (weighted $p = 0.97$) were detected for the weighted A & B Wetlands prescription type. A flat trend line for prescription compliance was observed. (Figure 9.)

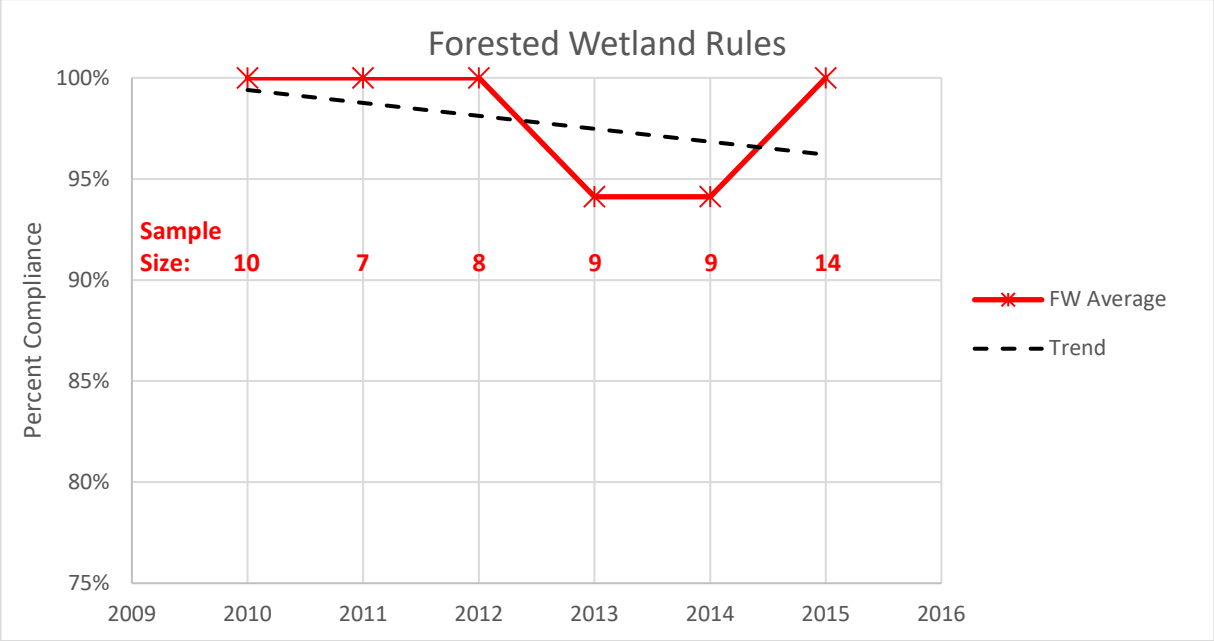
Figure 9. A & B Wetlands Trend Analysis Results



Forested Wetlands

Trend analysis results for the Forested Wetlands prescription type revealed 100% compliance rates for the prescription, and the associated FP rules from 2010 to 2012, and varying compliance rates from 2013 to 2015. Prescription compliance rates varied from 94% to 100% over the course of the evaluation period. As a result of the oscillating prescription compliance rate no significant trend results (weighted $p = 0.41$) were observed for the weighted Forested Wetlands prescription type. (Figure 10.)

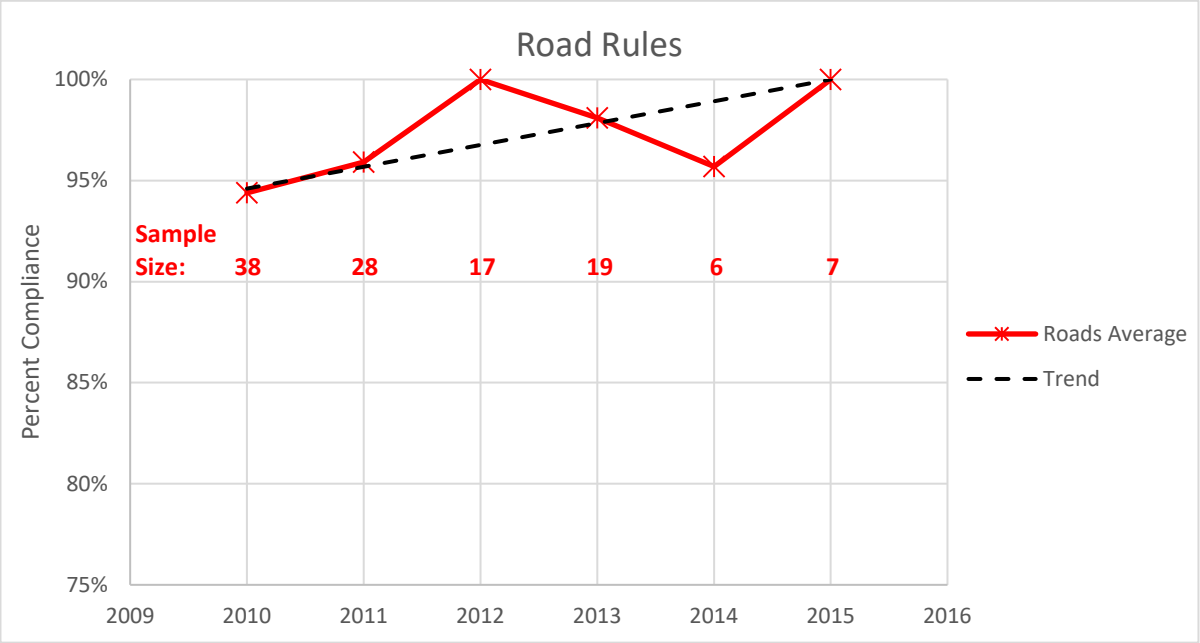
Figure 10. Forested Wetlands Trend Analysis Results



Roads

Due to the large number of individual rules that comprise the Roads prescription (42), only prescription compliance is visually represented in the report. Trend analysis results for the Roads prescription type revealed a possible increasing trend in prescription compliance, and varying compliance for individual rules from year to year. Prescription compliance rates varied from 94% to 100% over the course of the evaluation period. As a result of the relatively increasing prescription compliance rates, significant trend results for weighted regression analysis (p = 0.035) depicting a year over year increase of 1.4% of the overall prescription compliance rate were observed for the Roads prescription type. (Figure 11.)

Figure 11. Roads Trend Analysis Results



Additional results that depict the relationship between individual rules and the prescription types they comprise can be found in Appendix C.

8. Forest Practices Application Compliance

Section 8 addresses compliance with the forest practices application (FPA).

Overall FPA compliance generally mirrors FP rule compliance on individual FPAs; however, occasionally one may be compliant while the other is not. When the prescription deviates from the FP rules but is compliant with the FPA, per professional opinion the deviation is a result of the timber harvest design layout and/or approval process. When the FPA is compliant with FP rules but deviates from the landowner's stated protections on the FPA, typically what the landowner proposed, and committed to, conduct activities that were more conservative than what was implemented. (Table 18.)

Table 18. 2014-15 Compliance with FPAs for Riparian and Wetland Harvest Prescriptions

		Western WA		Statewide					
	Status of Compliance	DFC1	DFC2	No Inner Zone Harvest	Np Activities	Ns Activities	Type A&B Wetlands	Forested Wetlands	Roads
Small Forest Landowners	# Compliant Rules	4	0	9	1	4	33	4	n/a
	# with Deviation	1	0	1	0	0	1	0	n/a
	% of Sample Compliant	80%	n/a	91%	100%	100%	97%	100%	n/a
	Confidence Interval	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Prescriptions Assessed	1	0	4	1	4	9	4	0
Large Forest Landowners	# Compliant Rules	68	56	61	99	25	73	13	70
	# with Deviation	6	2	4	8	0	5	0	1.3
	% of Sample Compliant	92%	97%	94%	93%	100%	94%	100%	98%
	Confidence Interval	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Prescriptions Assessed	19	14	21	34	25	27	12	12
All Landowners	# Compliant Rules	72	56	71	100	29	106	17	69.7
	# with Deviation	7	2	5	8	0	6	0	1.3
	% of Sample Compliant	91%	97%	93%	93%	100%	95%	100%	98%
	Confidence Interval	(88, 94)	(92, 100)	(88, 99)	(87, 99)	n/a	(88, 100)	n/a	(95, 100)
	Prescriptions Assessed	20	14	25	35	29	36	16	12

Table 19. 2014-2015 Comparison between FPA and Rule Compliance Assessments by Count

	RMZ Prescription	Total Prescriptions Sampled	FPA and Rule Compliance the Same	Deviation from FPA and Rule Compliant	FPA Compliant and Deviation from Rule	Deviation from Rule and FPA Indeterminate	FPA Compliant / Rule Indeterminate
Statewide	RMZ — No Inner Zone Harvest	25	123	1	1	0	0
	RMZ — Type Np Prescriptions	35	34	0	1	0	0
	RMZ — Type Ns Prescriptions	35	34	0	0	1	0
	WMZ — Type A&B Wetlands	35	31	2	3	0	0
	WMZ — Forested Wetlands	23	22	0	1	0	0
	Roads	13	13	0	0	0	0
Western WA	RMZ — Type S or F Inner Zone Harvest DFC1	20	19	0	1	0	0
	RMZ — Type S or F Inner Zone Harvest DFC2	14	14	0	0	0	0

Findings for FPA/FP Rule Compliance Differences

There are few differences between FPA compliance and FP rule compliance for the 2014-2015 sample. Differences were found in the statewide NIZH, DFC1, Type Np, Ns, Type A&B Wetlands, and Forested Wetlands prescription samples. (Table 19.)

2014 and 2015 field observations resulted in the following differences between FPA compliance and FP rule compliance:

Within the DFC option 1 prescription, the difference occurred as a deviation from FPA compliant/ Rule non-compliant, where, the landowner incorrectly measured the RMZ length resulting in the harvest within the Inner Zone not meeting the requirements of the Inner Zone leave tree strategy by diameter class. Using the correct RMZ length in the DFC software program revealed that Inner Zone harvest is not supported at the site, and no DFC harvest option would have been allowed.

Within the NIZH prescription, 2 samples deviated from either rule or application compliance. For the first sample, the landowner incorrectly identified site class on their FPA resulting in harvest occurring within the Inner Zone. The landowner met the requirements based on the site class identified on their FPA. However, the compliance monitoring field team determined that the site class was incorrect resulting in an insufficient Inner Zone buffer. The sample was compliant with the FPA, and non-compliant with the rule. For the second sample, as a result of an incorrectly identified site class on their FPA the landowner left a no-cut Inner Zone buffer larger than required. The landowner indicated that the harvest area was within site class 2, however, the compliance monitoring field team determined that site class 5 was correct for the area in question. Resulting in wider buffers than required. The sample was compliant with the rules, and non-compliant with the FPA.

Within the Np prescription, the difference occurred as a deviation from the Rule/FPA Compliant, where the landowner treated the stream as an Np but it was determined to be an F by the CMP field staff. Neither a Water Type Modification Form nor related Interdisciplinary Team documentation was received by region FP staff. During the compliance monitoring field visit, the stream met the criteria of a Type F stream (> 2’ wide and < 16% gradient). The sample was determined to be compliant with the wording on the FPA, and non-compliant with the rule.

Within the statewide Type Ns prescription, the difference occurred as a deviation from the Rule/FPA Indeterminate, where the landowner treated the stream as an Ns but it was determined to be an Np by the CMP field review. The landowner used ambiguous “typing” related language on the FPA. The FPA indicated that if no flowing water was observed in the channel, the stream would be typed Ns for harvest related operations. Neither a Water Type Modification Form nor related Interdisciplinary Team documentation was received by region FP staff. During the compliance monitoring field visit, flowing water was observed in the channel, resulting in the determination of Type Np water. The field visit occurred in September, near to the time of seasonally low water flows. The sample was concluded to be a deviation from FP rules; however, due to the ambiguous language on the FPA, application compliance was rated Indeterminate.

Within the Type A&B Wetlands prescription, 5 samples deviated from either rule or application compliance. For the first sample, the landowner declared on the FPA that a 50-foot no-cut buffer would be utilized around a Type B wetland, when only a 25-foot no-cut buffer was required by FP rules. During the compliance monitoring site visit, it was observed that the landowner met the 25-foot requirement but harvested within 50 feet of the wetland. The sample was compliant with FP rules but not compliant with the language on the FPA. For the second sample, the landowner declared that the

selected wetland was Type A. However, during the compliance monitoring field review, it was determined that the wetland was an associated wetland of a fish-bearing water. This determination resulted in the sample being compliant with the FPA but non-compliant with the FP rules. For the third sample, the difference occurred as a deviation from the Rule/FPA Compliant, where the landowner treated the water as an A wetland, but it was determined to be an F water by the CMP field staff. A stream flowing into the wetland met the criteria for Type F per was observed by the compliance monitoring field team. The wetland was determined to be associated with the F stream. Neither a Water Type Modification Form nor related Interdisciplinary Team documentation was received by region FP staff. The sample was determined to be compliant with the wording on the FPA, and non-compliant with the rule. For the fourth sample, the difference occurred as a deviation from the rule/FPA Compliant, where the landowner treated the water as an A wetland, but it was determined to be an F water by the CMP. A stream flowing through the wetland was typed as an F stream on the DNR hydro layer. The wetland was determined to be associated with the F stream. Neither a Water Type Modification Form nor related Interdisciplinary Team documentation was received by region FP staff. The sample was determined to be compliant with the wording on the FPA, and non-compliant with the rule. For the fifth sample, the variable buffer width was not appropriate relative to the WMZ. The landowner left a buffer that was wider than required. The sample was compliant with the rules, and non-compliant with the FPA.

9. Report Discussion

Riparian and Wetland Compliance Proportioned across the Population

Tables that describe 2014-2015 riparian and wetland findings are located in Sections 5.2, 5.3, and 5.4 for individual prescription types. Section 5 also provides estimates of the population sizes for each prescription type. Table 20 (below) summarizes FP rule compliance according to these estimated populations. The sampling methodology employed provides desired precision for a biennial sample but does not support an unbiased approach to combine rates and weight by their proportion in the population. Therefore, CMP cannot offer, for example, an overall compliance rate for fish-bearing streams.

Table 20. 2014-15 Estimated Population Size and Associated FP Rule Compliance

Prescription Type	Estimated Population of FPAs with the Prescription	Compliance Percentage
RMZ — Type Np Prescriptions	929	94%
RMZ — Type Ns Prescriptions	1018	97%
RMZ — Type S or F No Inner Zone Harvest	737	94%
Forested Wetlands	322	97%
Type A&B Wetlands	237	95%
Western WA RMZ — Type S or F Inner Zone Harvest DFC2	157	98%
Western WA RMZ — Type S or F Inner Zone Harvest DFC1	55	94%
Roads	1405	98%
Haul Routes	NA*	90%

*The Haul Routes prescription does not have an estimated population.

Compliance Monitoring Program Challenges

Representation of Complete Compliance

In most scenarios where there is deviation from at least one FP rule within a specific prescription there is compliance with the remaining FP rules in that prescription. In fact, it is not unusual for prescriptions rated a minor deviation to also exceed rule requirements for some other FP rules in that prescription. For example, with DFCs, if there were too few outer zone trees, there were often also excess trees in the inner zone, where trees have greater riparian benefits to streams. In this example, although letter of the rule was not met, more trees remained within the RMZ than the minimum required by rule.

The expectation is for landowners to follow all FP rules. However, there is more to evaluating compliance with FP rules than simply a compliance rating for prescription types. The CMP continues to work toward finding better ways to report a more complete picture of the results.

Sample and Measurement Error

The CMP resolves the inability to determine statistical variability for average values by assigning a standard absolute 5% measurement error tolerance. This measurement error tolerance applies for only 3 specific measurements: when determining 1) stream bankfull width; 2) leave tree to edge of bankfull width; and 3) buffer widths and lengths or floors within RMZs. When a landowner's buffer is within 5% of the compliance monitoring field team's measured buffer, the values are considered the same. If the landowner's buffer value falls outside the 5% error tolerance, the compliance monitoring field team's measured buffer is assumed to be correct and the landowner's buffer incorrect.

Variation in Natural Conditions

Because natural features are variable, on-site conditions sometimes do not fit neatly into FP rule categories. When this occurs, review team members may opt to record the compliance as Indeterminate. The challenge is to improve understanding of the conditions and rule to minimize and ultimately eliminate indeterminate determinations. This may involve revisiting rule interpretation and how to apply the rules in imprecise situations or developing suggested changes to make clarification in FP rules and/or board manual guidance.

Shade

Shade is a key function provided by the RMZ and as such is of interest to the CMP for monitoring. However, compliance monitoring of riparian shade rules has presented challenges that have precluded the ability to monitor for shade compliance.

Checking shade documentation for compliance and taking measurements in the field to determine if the required amount of vegetation was left to meet temperature standards both continue to be issues. Measurement repeatability is of concern when using a densiometer (the instrument used to determine shade). Also, when the compliance monitoring field team conducts an on-site review, the trees have been harvested, so it is impossible to re-create original conditions. Currently, the CMP does not take shade measurements in the field.

10. Forest Practices Program/Forest Practices Rule Changes Based on Compliance Monitoring Feedback

Several rule and Board Manual updates are currently in process as a result of the 2012–2013 CMP biennium report. Leave tree, DFC, and RMZ length rule and Board Manual clarifications are currently under review and have been scheduled in the 2017 Forest Practices Board work plan. Rule and Board Manual clarifications were presented at the May 2015 and 2016 Forest Practices Board meeting.

11. Glossary

bankfull width (BFW).

a) **For streams** — the measurement of the lateral extent of the water surface elevation perpendicular to the channel at bankfull depth. In cases where multiple channels exist, bank full width is the sum of the individual channel widths along the cross section (see Board Manual, Section 2).
b) **For lakes, ponds, and impoundments** — the line of mean high water.
c) **For tidal water** — the line of mean high tide.
d) **For periodically inundated areas of associated wetlands** — The line of periodic inundation, found by examining the edge of inundation to ascertain where the presence and action of waters are so common and usual, and of so long a duration in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland.

Basal area. The area in square feet of the cross section of a tree bole measured at 4.5 feet above the ground.

Bull Trout Habitat Overlay. Those portions of Eastern Washington streams containing bull trout habitat as identified by the Department of Fish and Wildlife's bull trout map.

Channel migration zone (CMZ). The area within which the active channel of a stream is prone to move, resulting in a potential near-term loss of riparian function and associated habitat adjacent to the stream, except as modified by a permanent levee or dike. For this purpose, "near-term" means the time scale required to grow a mature forest. (See Board Manual, section 2, for descriptions and illustrations of CMZs and delineation guidelines.)

Clear-cut. A harvest method in which the entire stand of trees is removed in 1 timber harvesting operation (except for trees required by rule or law to be left uncut).

Confidence interval. A type of interval estimate of a population parameter, used to indicate the reliability of an estimate. Confidence intervals consist of a range of values (interval) that act as good estimates of the unknown population parameter.

Crown closure. The percentage of canopy overlying the forest floor.

Desired future condition (DFC). The stand conditions of a mature riparian forest at 140 years of age, the midpoint between 80 and 200 years. Where basal area is the only stand attribute used to describe 140-year-old stands, these are referred to as the "target basal area." The DFC is a reference point on a pathway and not an endpoint for forest stands.

Diameter breast height (DBH). The diameter of a tree at 4.5 feet above the ground measured from the uphill side.

Dominant and co-dominant trees.

a) **Dominant** — Trees or shrubs with crowns receiving full light from above and partly from the side. Typically larger than the average trees or shrubs in the stand, with crowns that extend above the general level of the canopy and are well developed but possibly somewhat crowded on the sides.

b) **Co-dominant** — a tree that extends its crown into the canopy and receives direct sunlight from above and limited sunlight from the sides. One or more sides of a co-dominant tree are crowded by the crowns of dominant trees.

Equipment limitation zone (ELZ). A 30-foot-wide zone measured horizontally from the outer edge of the bankfull width of Type Np or Ns waters. ELZ rules apply to all perennial and seasonal non-fish-bearing streams.

End hauling. The removal and transportation of excavated material, pit or quarry overburden, or landing or road cut material from the excavation site to a deposit site not adjacent to the point of removal.

Finite population correction factor. A formula frequently used in statistics and probability that allows adjustment to a population from larger to smaller or to indicate no change in the population. The result of the formula's calculation is called the "z-factor."

Forest practices application or notification (FPA or FPN). The DNR form used by forest landowners to apply for approval of a class III or IV forest practice or to notify DNR that they are conducting a class II forest practice.

a) **FPA** — an application for a permit to conduct a site class III or IV forest practice. Site class III and IV forest practices have a higher potential to impact a public resource than does a site class II forest practice.
b) **FPN** — a notification to DNR that a class II forest practice will take place. Class II forest practices have less than ordinary potential to damage a public resource.

Forest road. Since 1974, lanes, roads, or driveways on forestland used for forest practices. "Forest road" does not include skid trails, highways, or local government roads except where the local governmental entity is a forest landowner. For road maintenance and abandonment planning purposes only, "forest road" does not include forest roads used exclusively for residential access located on a small forest landowner's forestland.

Full bench road. A road constructed across a slope without using any of the material removed from the hillside as part of the road. This construction technique is usually used on steep or unstable slopes.

Laser hypsometer. An instrument that measures the distance to the top and bottom of an object and that measures the angle between the lines from the observer to each top and bottom to calculate height of the object.

100-year flood level. A "100-year" event means a calculated flood event flow based on an engineering computation of flood magnitude that has a 1% chance of occurring in any given year.

Partial cut strategy. The removal of a portion of the merchantable volume in a stand of timber so as to leave an uneven-aged stand of well-distributed residual, healthy trees that will reasonably utilize the productivity of the soil.

Prescription. A grouping of similar rules by forest practices activity type (e.g., No Inner Zone Harvest, Desired Future Condition Option 1, Desired Future Condition Option 2, Non-Fish-Bearing Perennial Stream, Non-Fish Bearing Seasonal Stream, Type A&B Wetlands, Forested Wetlands, Roads, and Haul Routes).

Public resources. Water, fish, and wildlife; also, capital improvements of the state or its political subdivisions.

Riparian function. Includes bank stability, the recruitment of woody debris, leaf litter fall, nutrients, sediment filtering, shade, and other riparian features important to both riparian forest and aquatic system conditions.

Riparian management zone (RMZ). The area located on each side of a Type S, F, or N stream, where trees are left to provide protection from disturbance when forest practices activities such as timber harvest are conducted.

Sensitive sites. Areas near or adjacent to Type Np water and that have one or more of the following:

a) **Headwall seep** — a seep located at the toe of a cliff or other steep topographical feature and at the head of Type Np water, connecting to the stream channel network via overland flow and characterized by loose substrate and/or fractured bedrock with perennial water at or near the surface throughout the year.
b) **side-slope seep** — a seep within 100 feet of Type Np water located on side slopes with grades greater than 20%, connected to the stream channel network via overland flow and characterized by loose substrate and fractured bedrock, excluding muck with perennial water at or near the surface throughout the year. Water delivery to the Type Np channel is visible by someone standing in or near the stream.
c) **Type Np intersection** — the intersection of 2 or more Type Np waters.
d) **Headwater spring** — A permanent spring at the head of a perennial channel. Where a headwater spring can be found, it will coincide with the uppermost extent of Type Np water.
E) **Alluvial fan** — a depositional landform consisting of a cone-shaped deposit of waterborne, often coarse-sized sediments.

Sidecast. The act of moving excavated material to the side and depositing such material within the limits of construction or dumping it over the downhill side and outside the limits of construction.

Significance level. A fixed probability of wrongly rejecting the null hypothesis H0, when the hypothesis is in fact true. The smaller the significance level, the better the protection for the null hypothesis. Including a significance level prevents the investigator, as far as possible, from inadvertently making false claims.

Site class. A growth potential rating for trees within a given area based on soil surveys. The designated site class along Type S or F streams will determine the width of the RMZ.

Site index. An index based on ranges of site classes. For example:

50-year site index range (state soil survey)

Site class	Years
I	137+
II	119–136
III	97–118
IV	76–96

V < 75

Stand requirement. The number of trees per acre, the basal area, and the proportion of conifers in the combined core and inner zone such that the growth of the trees would meet the desired future condition.

Stream adjacent parallel roads. Roads (including associated right-of-way clearing) in an RMZ on a property that have an alignment parallel to the general alignment of the stream, including roads used by others under easements or cooperative road agreements. Also included are stream crossings where the alignment of the road continues to parallel the stream for more than 250 feet on either side of the stream. Not included are federal, state, county, or municipal roads not subject to forest practices rules, or roads of another adjacent landowner.

Temporary road. A forest road constructed and intended for use during the life of an approved FPA or FPN.

Uppermost point of perennial flow. The point in the stream where water begins to flow perennially (year-round) downstream.

Wetland management zone (WMZ). The area located around the perimeter of a wetland where trees are left to provide protection from disturbance, as well as shade and nutrients for the wetland.

Yarding corridor. A narrow, linear path through an RMZ to allow suspended cables necessary to support cable logging methods, or to allow suspended or partially suspended logs to be transported through these areas by cable logging methods.

12. Appendix A: Statistical Methods

Methods for Calculation of Compliance and Confidence Intervals

Estimation of Compliance

The mean or average compliance and the variance of the mean are calculated according to the rules of estimation for cluster samples (See, for example, Cochran, 1963; Schaeffer et al., 1990). The mean compliance for a prescription is the ratio of the number of compliant rules divided by the total number of rules sampled across all FPAs in the prescription:

$$\hat{p} = \frac{\sum_{i=1}^{n} y_i}{\sum_{i=1}^{n} x_i},$$

Where n is the number of FPAs sampled for the prescription, x_i is the number of rules applied on the ith FPA in the sample, and y_i is the number of rules that were complied with on the ith FPA.

A 95 percent confidence interval for the proportion compliant is formed as follows:

$$\hat{p} \pm t_{.025,(n-1)} \cdot SE(\hat{p})),$$

where $t_{.025,(n-1)}$ is the 97.5th percentile of the student-t distribution with (n-1) degrees of freedom,

$$SE(\hat{p}) = \frac{\sqrt{n \cdot (1 - \frac{n}{N}) \cdot \sum_{i=1}^{n} (y_i - \hat{p} x_i)^2}}{\sqrt{(n-1)} \cdot \sum_{i=1}^{n} x_i}$$ (Cochran, 1977),

and N is the estimated population size for the prescription.

These confidence intervals are symmetric. It is possible for the upper confidence bound to exceed 100% - in these cases the confidence bound is set to100%.

Ratio Proportions

Some compliance proportions are estimated using a ratio proportion. This is necessary when both the numerator and the denominator of the proportion are random variables. The only estimation that used a ratio proportion was the haul route analysis. The haul route compliance for each FPA is the length of road that is compliant divided by the length of road evaluated. The denominator of the compliance ratio is a random variable because the length of road being evaluated differs among FPAs. In this case, the estimated compliance proportion is

$$\hat{p} = \frac{\sum_{i=1}^{n} y_i}{\sum_{i=1}^{n} x_i},$$

which is the total length of compliant haul route segments divided by the total length of haul route segments that were sampled across all FPAs (*n* is the number of FPAs sampled).

A 95% confidence interval for the proportion compliant is formed as follows:

$$\hat{p} \pm t_{.025,(n-1)} \cdot SE(\hat{p})),$$

where $t_{.025,(n-1)}$ is the 97.5th percentile of the student-*t* distribution with (*n*–1) degrees of freedom, *n* is the number of sampled FPAs, and

$$SE(\hat{p}) = \frac{\sqrt{n \cdot (1 - \frac{n}{N}) \cdot \sum_{i=1}^{n} (y_i - \hat{p}x_i)^2}}{\sqrt{(n-1)} \cdot \sum_{i=1}^{n} x_i}$$ (Cochran 1977: 32).

These confidence intervals are symmetric. Note that the FPCF is already built in to this equation. It is possible for the upper confidence bound to exceed 100% — in these cases the confidence bound is set to 100%.

13. Appendix B: 2014-2015 Biennium Individual Rule Compliance by Prescription

Table column headers may not reflect actual field form question wording

Desired Future Condition Option 1

DFC1 (n=20)	Overstory Tree Species match DFC worksheet (222-30-021(ii)(B)(I))	Site Class (222-16-010)	Stream Size (222-16-031(2)(3))	No harvest in Core Zone 222-30-021(a)	Inner Zone meets diameter leave tree strategy (222-30-021(ii)(B)(I))	Largest 57 TPA left in Inner Zone (222-03-021(ii)(B)(I)	Unstable slopes bounded out (222-16-050(d))	Correct # Outer Zone leave trees (222-30-021(iii)(c))
Compliance	19	20	20	17	17	19	0	19
Assessed	19	20	20	20	20	19	1	20
% compliant	100%	100%	100%	85%	85%	100%	0%	95%
95% CI	(85, 100)	(86, 100)	(86, 100)	(66, 95)	(66, 95)	(85, 100)	n/a	(79, 100)

Desired Future Condition Option 2

DFC2 (n=14)	Overstory Tree Species match DFC (222-30-021(ii)(B)(II))	Site Class (222-16-010)	Stream Size (222-16-031(2)(3))	No harvest in Core Zone (222-30-021(a))	No harvest in floor Zone (222-30-021(ii)(B)(II)	20 conifer TPA in outer portion of IZ (222-30-021(ii)(B)(II))	Unstable slopes bounded out (222-16-050(d))	Correct # Outer Zone leave trees (222-30-021(iii)(c))
Compliance	14	14	14	14	12	14	2	14
Assessed	14	14	14	14	14	14	2	14
% compliant	100%	100%	100%	100%	86%	100%	100%	100%
95% CI	(78, 100)	(78, 100)	(78, 100)	(78, 100)	(58, 98)	(78, 100)	(19, 100)	(78, 100)

No Inner Zone Harvest

NIZH (n=25)	Stream Size (222-16-031(2)(3))	Site Class (222-16-010)	No harvest in Core Zone (222-30-021(a))	No harvest in Inner Zone (222-30-021(b)	Correct # Outer Zone leave trees (222-30-021(iii)(c))	Unstable slopes bounded out (222-16-050(d))	Observed CMZ 0222-30-020(13)
Compliance	24	22	25	22	22	1	0
Assessed	24	24	25	25	23	1	2
% compliant	100%	92%	100%	88%	96%	100%	0%
95% CI	(86, 100)	(73, 99)	(86, 100)	(69, 97)	(78, 100)	n/a	n/a

Non-Fish Bearing Perennial Streams

Np (n=35)	Np stream size (222-16-031(4))	Is ≤ 10% of ELZ exposed (222-30-021(2)(a))	Appropriate Length of 50 foot buffer (222-30-021(2)(b)(vii))	No harvest within required 50 foot buffer (222-30-021(2)(b)(i))	No harvest 50 feet from headwall seeps & springs (222-30-021(2)(b)(ii)(iii))	56ft PIP & Confluence buffer (222-30-021(2)(b)(iv)(v))	Unstable slopes bounded out (222-16-050(d))	Salvage within the Np RMZ (222-30-045(5))
Compliance	32	15	26	26	3	19	4	3
Assessed	35	15	27	28	3	21	4	3
% compliant	91%	100%	96%	93%	100%	90%	100%	100%
95% CI	(77, 98)	(79, 100)	(81, 100)	(77, 99)	(30, 100)	(70, 99)	(41, 100)	(30, 100)

Non-Fish Bearing Seasonal Streams

Ns (n=35)	Ns stream size (222-16-031(5))	Is ≤ 10% of ELZ exposed (222-30-021(2)(a))
Compliance	33	26
Assessed	35	26
% compliant	94%	100%
95% CI	(81, 99)	(87, 100)

A & B Wetlands

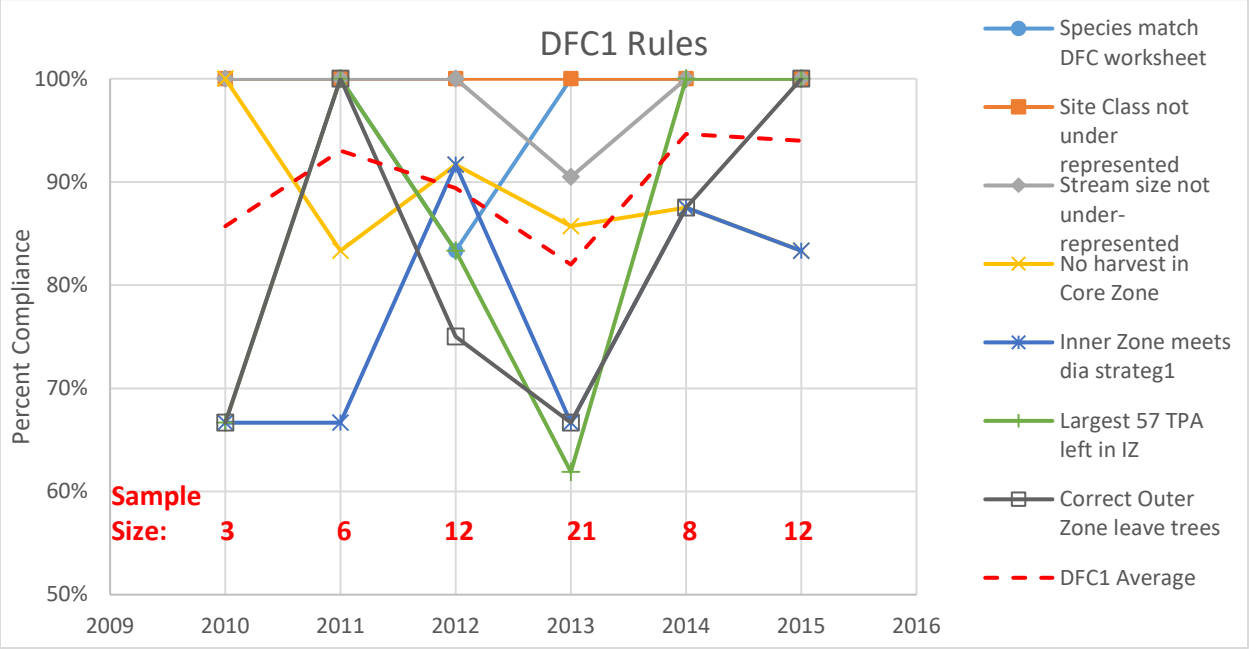
A&B Wetlands (n=35)	Wetlands type & size (222-16-035(1)(a) &(b))	Variable buffer width appropriate (222-30-020(8)(a))	Openings less than 100' wide (222-30-020(8)(d)	Leave trees species represent pre-harvest (222-30-020(6))	Ground based in min WMZ had approval (222-30-020(8)(e))	WMZ-RMZ overlap-best protection used (222-30-020(8)	50 TPA GT 6in WW (4in EW) (222-30-020(8)(b))	20 TPA GT12in,where they exist (222-30-020(8)(b))	5 TPA GT20in, where they exist (222-30-020(8)(b))
Compliance	28	22	1	24	3	3	14	14	11
Assessed	32	22	1	24	3	3	15	15	12
% compliant	88%	100%	100%	100%	100%	100%	93%	93%	92%
95% CI	(72, 96)	(86, 100)	(6, 100)	(87, 100)	(33, 100)	(33, 100)	(70, 100)	(70, 100)	(64, 100)

Forested Wetlands

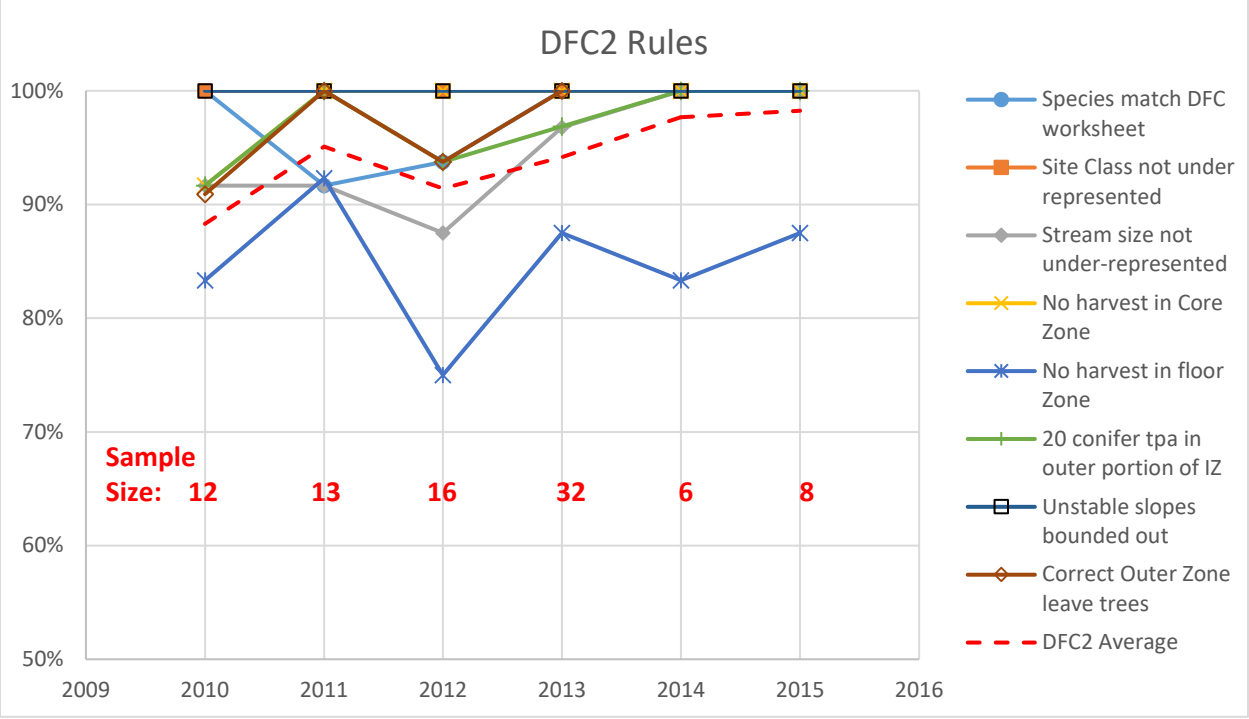
Forested Wetlands (n=23)	Wetlands type & size consistent (222-06-035(2))	If harvest occurred, low impact used (222-30-020(7))	If greater than 3 acres, was it mapped (222-16-036(3))
Compliance	22	11	5
Assessed	23	11	5
% compliant	96%	100%	100%
95% CI	(79, 100)	(72, 100)	(49, 100)

14. Appendix C: Trends of Individual Rules

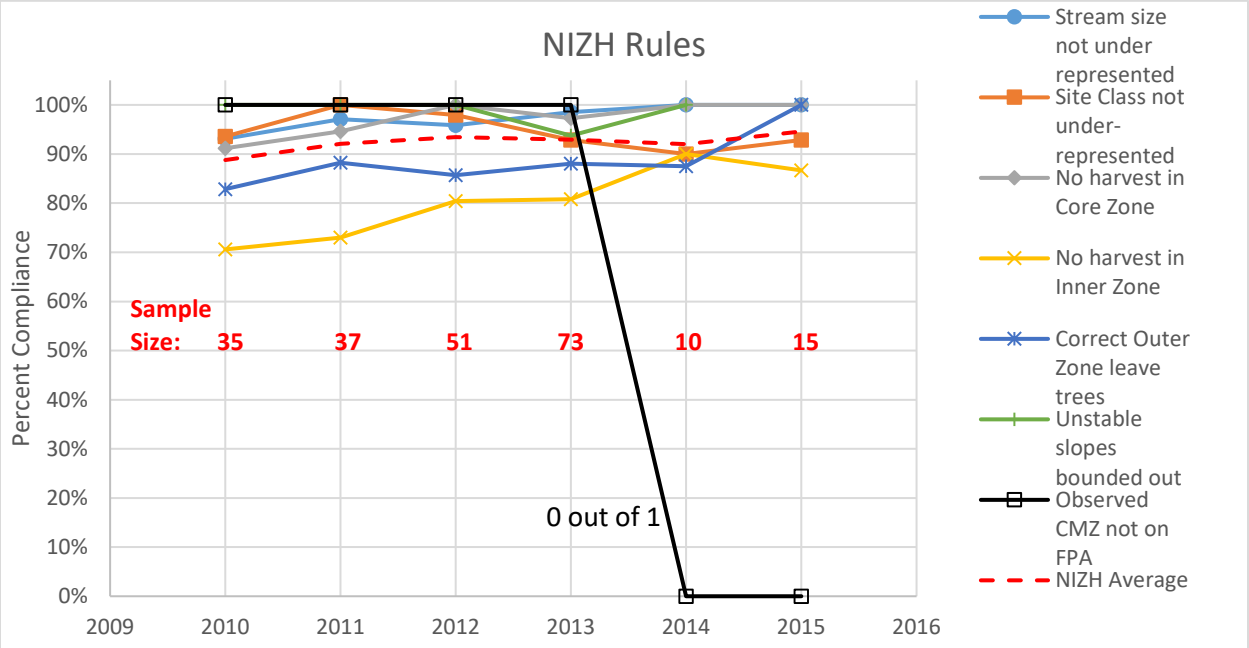
Desired Future Condition 1



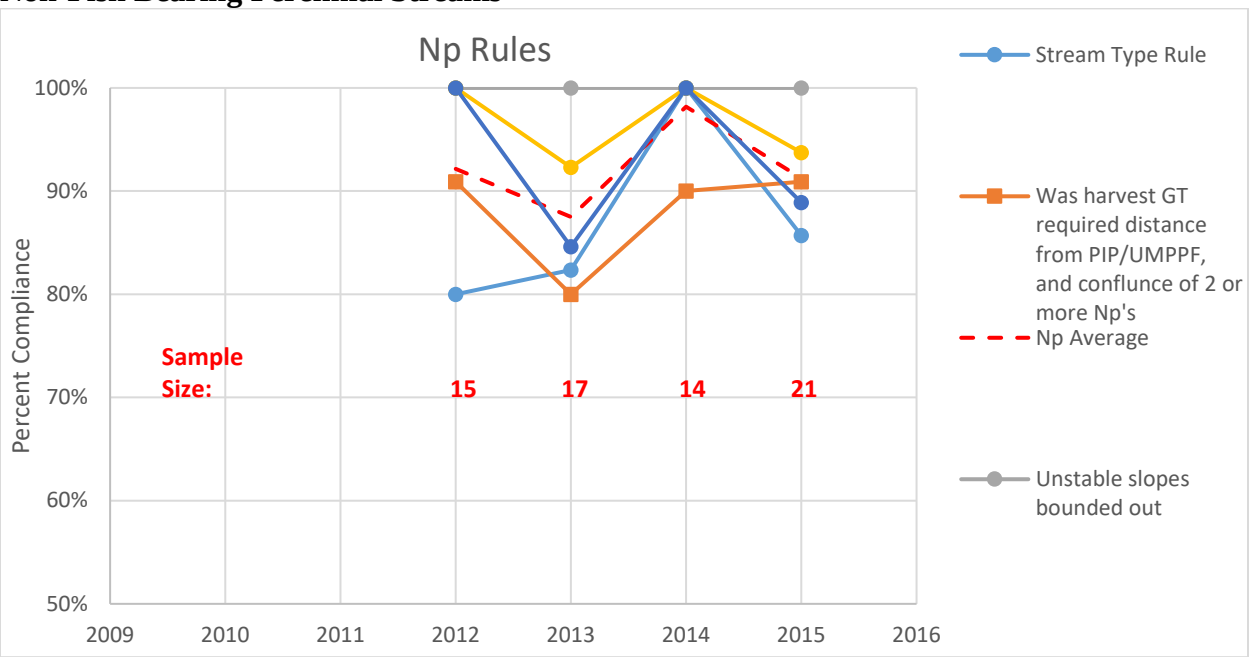
Desired Future Condition 2



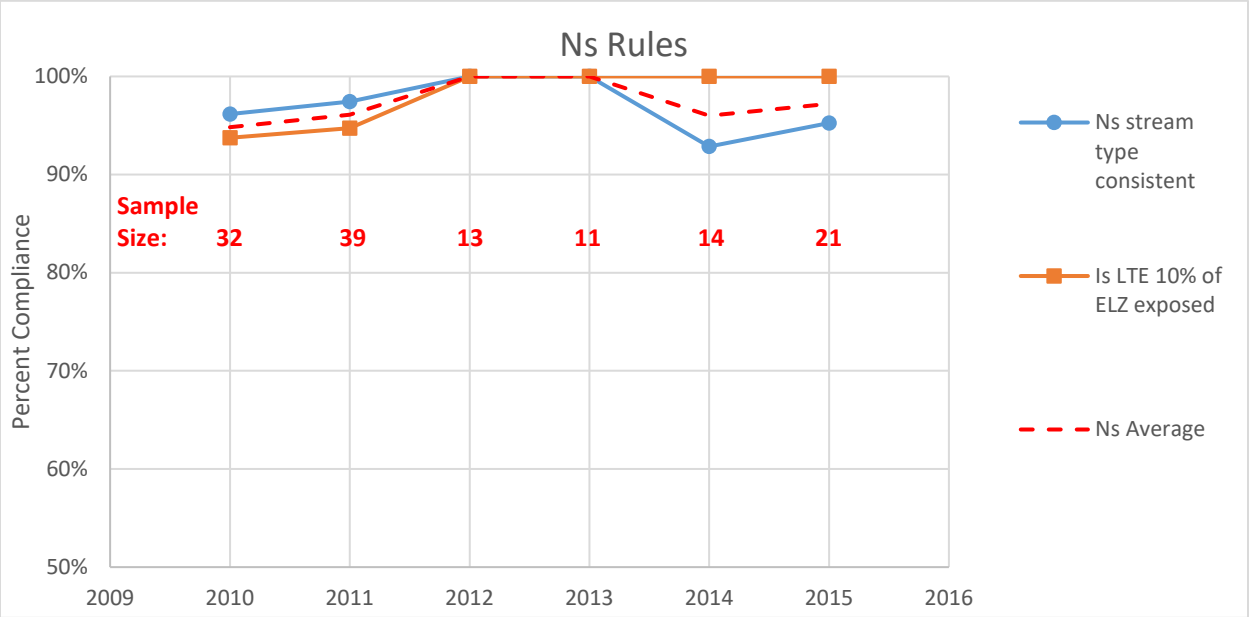
No Inner Zone Harvest



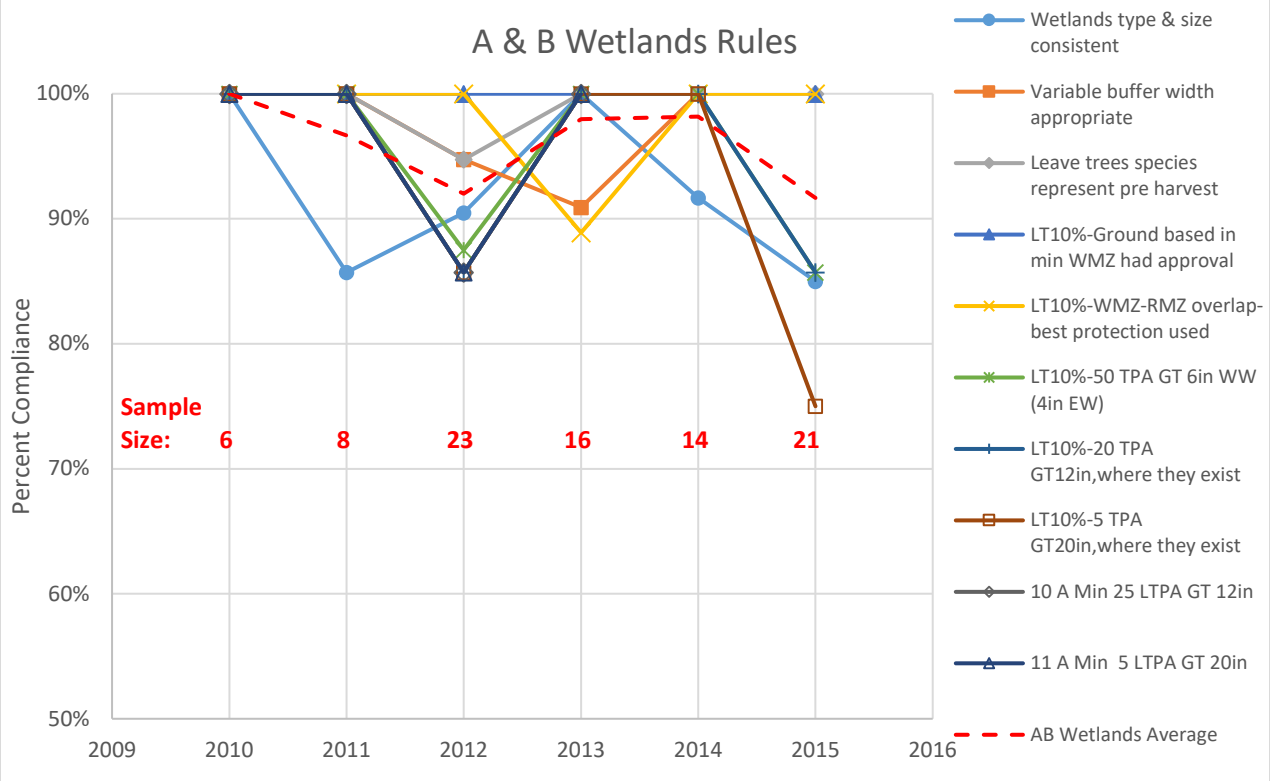
Non-Fish Bearing Perennial Streams



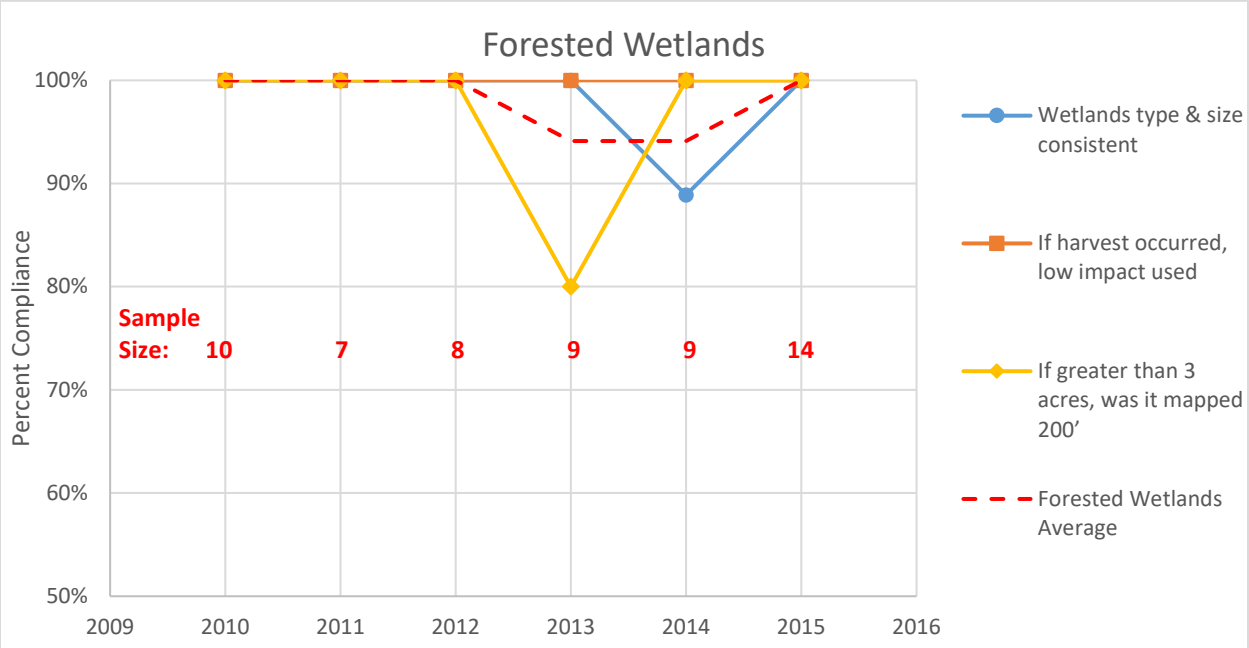
Non-Fish Bearing Seasonal Streams



A & B Wetlands



Forested Wetlands



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Hans Berge
Adaptive Management Program Administrator
Forest Practices Division
WDNR

Reviews for: (**ISPR 16-17_01)**
for WaDNR

Jun 1, 2017

Dear Hans Berge

Attached with this email you will find 4 files (besides a copy of this letter). One attached pdf file is the summarization by Associate Editor (AE), Dr. Loveday Conquest, of the reviews of "2014-2015 Biennium Forest Practices Compliance Monitoring Report-August 2016*"* for WaDNR. Three other attached pdf files are the three reviewers' comments. WaDNR asked for 3 reviewers to review this report. This was an 'open' type review (interaction between AE, reviewers and WaDNR). As stated by the AE about all the reviewers, they are ".. recognized scientists with combined expertise in statistics, quantitative ecology and resource management, forest biometry, and silviculture."

The Associate Editor and reviewers have presented their comments relative to the *revised* basic questions for ISPR's reviews for this Forest Practices Compliance Monitoring Report. In synthesizing the reviews, the AE stated that all the reviewers and she concluded that "*The statistical approach regarding the sampling procedure and construction of the ratio estimator for compliance is generally sound."* The AE went on to say that they *"recommend that a longer Appendix A containing the technical details of the sample selection procedure, including how one gets from the FPA, to the prescription, to the rules within the prescription, and ultimately to the estimate of compliance rate, be included."* Also that they "*strongly recommended that use of a "jackknifed" form of the ratio estimator be considered*." The AE and reviewers also included additional comments to consider for improvement of the compliance monitoring procedure.

If you have any other questions, let me know!

Sincerely

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Synthesis and Assessment from Independent Scientific Peer Review (ISPR 16-17-01)

2014-2015 Biennium Forest Practices Compliance Monitoring Report

for the

Cooperative Monitoring, Evaluation and Research Committee (CMER)
and
Washington Department of Natural Resources (DNR)

by
Dr. Loveday L. Conquest
Associate Editor for the Independent Scientific Peer Review Committee

Executive Summary

The 2014-2015 Biennium Forest Practices Compliance Monitoring Report is a result of the analysis of data from a probability sample, based upon completed forest practice applications (FPAs) over the two-year period. For each of the various categories of similar forest practice rules (known as prescriptions): Roads, Type A&B Wetlands, Forested Wetlands, No Inner Zone Harvest [NIZH], Desired Future Condition Option 1 [DFC1], Desired Future Condition 2 [DFC2], Non-Fish-Bearing Perennial Stream [Np], Non-Fish-Bearing Seasonal Stream [Ns]), the statewide rate of compliance with the associated forest practice rules is estimated. Statewide compliance rate is also estimated for Haul Routes, whose sample is obtained in a different manner. (Details regarding the sample selection procedure and the estimator for compliance rate appear in the Responses to Questions below.)

The statistical approach regarding the sampling procedure and construction of the ratio estimator for compliance is generally sound. The Review Team and the Associate Editor recommend that a longer Appendix A containing the technical details of the sample selection procedure, including how one gets from the FPA, to the prescription, to the rules within the prescription, and ultimately to the estimate of compliance rate, be included. This needs to occur in order for anyone to attempt to reproduce the study or simply to truly understand the sampling selection and data analysis process. Some of the requested information could be gathered from current DNR documents. It would be helpful to see another chapter titled “The Life of a Completed FPA” (details below), but this is not as important as the need for an expanded Appendix A.

It is strongly recommended that use of a “jackknifed” form of the ratio estimator be considered. This could reduce bias and yield much better variance estimates. This would require additional

lines of code in the data analysis, but would not change the sample selection procedure. A jackknifed ratio estimator could also be applied to older data sets.

Review Process and Participants

A peer review was conducted through the Independent Scientific Peer Review Committee (ISPR) of the University of Washington (UW) of the 2014-2015 Biennium Forest Practices Compliance Monitoring Report for Washington State's Department of Natural Resources and for the Cooperative Monitoring, Evaluation and Research (CMER) Committee in spring 2017. The review team consisted of three peer reviewers and the Associate Editor (**AE**) Dr. Loveday Conquest (UW). Reviewers were selected by the **AE** in consultation with Dr. Daniel Vogt, Managing Editor (ME) of ISPR. In addition to reviewing the document, the Review Team met with the ME and DNR personnel (including an outside consultant for the DNR Compliance Program) in April 2017 to obtain further information and clarification on issues such as the sample selection procedure, the process for creating the database, and estimation of compliance rates.

The **AE** and the three reviewers are recognized scientists with combined expertise in statistics, quantitative ecology and resource management, forest biometry, and silviculture. Dr. Tamre Cardoso (**TC**) is a Principal Consultant with TerraStat Consulting Group and is a part-time Lecturer in the UW's Department of Statistics. For over twenty years, she has provided statistical consulting services for natural resource studies to both government agencies and private companies. Dr. James Flewelling (**JF**) is a consulting forest biometrician with extensive experience in growth and yield modeling, and forest inventory. Dr. Eric Turnblom (**ET**) holds the B. Bruce Bare Endowed Chair in Forest Resources and is Director of the Stand Management Cooperative in UW's School of Environmental and Forest Sciences. Turnblom is Associate Professor of Quantitative Silviculture and Forest Biometrics and has a long teaching career in forest measurements and statistics. Associate Editor Conquest is Director Emeritus of the Quantitative Ecology and Resource Management Program at UW, in addition to being Professor Emeritus of the College of the Environment's School of Aquatic and Fishery Sciences. A Fellow of the American Statistical Association, Conquest researched and taught experimental design and statistical methods for forty years through the Center for Quantitative Science in Forestry, Fisheries, and Wildlife.

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General Comments

It is helpful to set down a brief summary of the process concerning an FPA, from the time that it is filled out, to its role in the sample selection process. The **AE** concurs with Reviewer **ET's** following observations about the process concerning an FPA:

[1] A given FPA is filled out by a single entity (e.g., a forest manager, landowner, contracted firm) that pertains to one or more planned forest practices (e.g., building a road, implementing a DFC1 prescription). Each FPA involves a set of rules, although not every rule that could apply to an FPA actually does apply for that particular instance.

[2] Only completed FPAs in the stated biennial window (here, 2014-2015) are eligible for inclusion in the population for a particular prescription type in that biennium. A given FPA may contain a combination of forest practices. There may be more than one occurrence of a prescription type in a given FPA, and these multiple occurrences may not be statistically independent.

[3] The goal is to provide a statewide average compliance rate for each prescription. Compliance is defined as the proportion of correctly applied rules in the set of applicable rules used for that prescription.

[4] DNR wishes to select a statistically representative sample of prescriptions of a given type, as represented in completed FPAs. DNR also desires spatial coverage of landowner/contractor/operator combinations appearing in FPAs across the six regions of Washington. This process is coordinated with knowledge of DNR field effort available across the six regions.

[5] The sample selection process has several stages, beginning with a random selection of FPAs containing a given prescription. Completion of each FPA must be verified, applicable rules noted, compliant rules noted, ending with a compliance assessment for an instance of a forest practice event on the ground. Costs are incurred at each successive step.

[6] In keeping with considerations of labor costs and spatial coverage, within a given FPA, DNR samples a single instance of a prescription type, even if a prescription type appears more than once in an FPA. This maintains control over allocation of forest practice event samples to the six regions and also enables the balancing of the compliance assessment workload across regions.

The **AE** agrees with the three Reviewers that the current sample selection procedure should be maintained in order to have consistency through the years when assessing temporal trends in compliance rates.

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The List of Review Questions

Each reviewer was asked to specifically address the following twelve peer-review questions from CMER:

1. Are rigorous, transparent and sound research and statistical methods followed?
    a. Is the estimator used to estimate average compliance a proper statistical estimator?
    b. If the answer to a) is no, what estimator would you propose as an alternative estimate of average compliance for a prescription?
2. Is the statistical design (using the described estimator) a sound method for method for determining compliance with forest practices rules?
3. Is there sufficient detail in the document to reproduce the study?
4. Were data reasonably interpreted?
5. Do the literature citations include the latest applicable information and represent the current state of scientific understanding on this topic?
6. Are uncertainties and limitations of the work stated and described adequately?
7. Are assumptions stated and described adequately?
8. Is the information presented in an accurate, clear, complete, and unbiased manner and in a proper context?
9. Currently, there are several rules included in compliance calculations that are based on the proper classification of a site rather than on compliance with the rules specific to a particular classification. Thus, if an FPA is non-compliant for site class, the other rules are not applicable, so the FPA cluster has size one, with compliance = 0%. Because these FPAs have only one rule applied, they are not given high weight in the ratio estimate of average compliance. Specific questions:
    a. Does this amount to a bias in the estimate of average compliance for a prescription?
    b. If the answer to a) is yes, what would be the best way to remove this bias:
        i. Separate the compliance estimates into classification versus operational rules for those affected prescriptions
        ii. Change the method for estimating average compliance
10. Should compliance be calculated separately for administrative (site characteristics) versus layout and operational (on the ground) rule applications?
11. Recognizing there is a relationship between cost and sampling precision objectives, do you have suggestions for narrowing sampling statistic confidence intervals without significantly increasing the biennial sample size in order to improve the ability to discern trends over time?
12. What suggestions do you have for improving the clarity of the report narrative for an audience with general understanding of natural resources management: (1) the results of the report's two-year data; and (2) the description of trends?

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In these following responses to the questions, any citations referred to are references cited and presented in the Compliance Monitoring Report, unless otherwise noted. The response to Question 5 contains new literature citations with explanations. A list of references also appears at the end of this review.

1. Are rigorous, transparent and sound research and statistical methods followed?

There is general agreement that sound research and sound statistical methods are used. The underlying methodology uses a design-based approach; design-based estimators require no assumptions about the population. The ratio estimator used is well studied, nearly unbiased, and documented in many statistics textbooks (the Report references Cochran [1963, 1977] and Scheaffer et al. 1990). However, many of the details are not that transparent in the Report itself; hence the recommendation for an expanded *Appendix A*. As expected, things became much clearer for the Review Team following the meeting with DNR. See the response to Question 3 for suggestions regarding making more details about the statistical methods more transparent.

Reviewer **JF** argues for a clearer definition of the population of interest and of the population attribute of interest. Assuming that a site has been properly classified (addressed in Question 9), the Report states (p. 12), "For each riparian prescription, the population to be sampled consists of FPAs that included that prescription." The **AE** agrees with the Report; the issue of a valid sample selection process is addressed elsewhere. The Report (p. 2) states the (updated) method for calculating average compliance: "divide[s] the number of compliant rules by the number of total sampled rules within each prescription type, resulting in an average compliance rate." The issue of how to define a prescription's "overall compliance" arises because a given prescription type may appear more than once in an FPA. This is discussed below in the response to Question 1b.

a. Is the estimator used to estimate average compliance a proper statistical estimator?

Overall, the three Reviewers feel that as implemented, the ratio estimator used to estimate average compliance is a proper statistical estimator. When estimates rates or proportions are the objective, ratio estimators are often used. That said, there is room for improvement. The **AE** agrees with the statements by Reviewers **TC** and **JF** that ratio estimates carry some bias. **TC** points out that the amount of bias associated with the standard ratio estimator goes down on the order of (1/n) as the sample size n increases. For large n this is not a problem; for small n this could be problematic. To help reduce this bias, a jackknifed version of the ratio estimator in suggested below in 1b.

Another issue (noted by **JF**, **TC**, and the **AE**) arises from the use of the standard finite population correction, (1 – n/N), where n is the sample size and N is the population size. What is used in the calculation of standard errors is $\widehat{N}$, the estimated population size as shown in the Report's Table 2 (p. 15). This adds another random component to the formula for the standard error of $\hat{p}$, the estimated proportion of compliance for a given prescription. Thus, SE($\hat{p}$) in the Appendix should really denoted as $\widehat{SE}(\hat{p})$. Reviewer **JF** offers further comments concerning the (estimated) proportion sampled, that as n approaches N (which means that the sample selection is approaching an actual census), n/N will approach 1.0 and the calculated standard error will approach zero. The (estimated) proportion sampled for the prescription types in Table 2 are respectively (excluding Haul Routes): Roads 0.01, Ns 0.03, Np 0.04, Type A & B Wetlands 0.15, Forested Wetlands 0.07, NIZH 0.03, DFC1 0.36, 0.09. The maximum value of 0.36 is that for DF1, so there does not appear the possibility of attaining a zero standard error. Regarding the statement from Reviewer **JF**: "[T]he formula for standard errors is correct only if the population of interest is defined as the set of prescriptions consisting of one prescription on each FPA having exactly one prescription of a given type, and a randomly selected prescription from every FPA having more than one prescription of that type", the **AE** agrees with the definition from the Report's p. 12 (stated above). The number of prescriptions of a given type contained in an FPA is rather an issue of subsampling; all FPAs containing at least one prescription of a given type are included in the population to be sampled.

b. If the answer to a) is no, what estimator would you propose as an alternative estimate of average compliance for a prescription?

TC suggests the use of a jackknife ratio estimator (Cochran 1977, cf. p. 175) to help reduce potential bias in estimating average rule compliance for prescriptions using a smaller number of FPA samples. In this scenario, for a given prescription, jackknife estimation would require recalculation of ratio estimates leaving out one FPA each time. For example, if there were 13 FPAs being used to estimate DFC1 compliance, 13 ratio estimates would be calculated from the data, using 12 FPAs per estimate. The 13 estimates would then be averaged to come up with a less biased estimate of DFC1 compliance. Estimator variance may increase for the jackknifed ratio, but only on the order of $1/n^2$ (Cochran 1977). Use of the jackknife would not necessarily reduce any bias to zero. However, jackknife ratio estimates could be compared to original ratio estimates to, say, determine the sample size at which the difference between the two becomes negligible. The **AE** concurs and believes that further evidence from forestry studies (see Question 5) promotes the use of the jackknife estimator here. Additional coding steps would be needed to obtain the estimator and the associated variance; the **AE** sees this as entirely doable. Jackknife ratio estimates on datasets from previous years could also be calculated.

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In Reviewer **JF's** response to Question 1 and Appendix A (not to be confused with Appendix A from the Report itself), "Compliance percentage: definition and estimator", **JF** considers two different ways of calculating the compliance estimate. The first estimator involves weights that vary according to the number of times a prescription type occurs in an FPA. The second one is the one used by DNR. For illustration, considering a small population of four FPAs, suppose only two are sampled for a given prescription, yielding six possible combinations ("4 choose 2" = 6) of FPAs being chosen. Some FPAs indeed have more than one occurrence of a prescription type, and according to DNR sampling protocol only one of the multiple occurrences is sampled. Since here one is looking at the entire population of four FPAs, the actual compliance for the population can be computed under **JF's** Option A and Option B. Further, the expected value of each of the two estimators (based on all possible samples of two FPAs) can also be computed. Each estimator yields an expected value close to its population value for this defined population. For a single FPA, if all prescriptions of a given type were sampled, the compliance estimate would be the same for both estimators. As an example, consider FPA 2 from **JF's** example, with a double occurrence of a given prescription. There are 6 and 5 rule applications respectively, and 4 and 4 compliant rule applications respectively. One can compute the compliance rate as:
(# of compliant rule applications)/(# of rule applications) = (4+4)/(6+5).
Alternatively, one can compute the compliance rate as:
(average # of compliant rule applications)/(average # of rule applications) = ((4+4)/2) / ((6+5)/2).
The answer is the same, 0.73, in both cases. However, when they are summed up over than one FPA (summing up the "straight number" of occurrences in both numerator and denominator versus summing up the average number of occurrences in both numerator and denominator), the numbers do change. **JF's** discussion following the computations notes that the choice between the two estimators is really administrative rather than statistical (the **AE** concurs and therefore there is no reason to change from the current ratio estimator). **JF** further notes DNR's desire to spread the sampling out among FPAs, rather than allowing multiple prescriptions of the same type to be sampled from the same FPA.

Reviewer **JF** also offers an alternative calculation to the finite population correction (FPC, currently based on n/$\widehat{N}$, # of sampled FPAs containing one or more of that prescription type/estimated FPA population size for that prescription type). **JF** suggests using a single, overall FPC: # of sampled FPAs/estimated FPA population size. If each FPA had at most one occurrence of a prescription type, these two FPCs would be the same. (As an alternative, **JF** recommends calculating a variance first assuming an infinite population, then reducing the variance using an FPC whose value is known with certainty; but this would necessitate knowing the exact count of a given prescription type). The **AE** notes that the crux of this issue has to do with, when a prescription type occurs more than once in a single FPA, how representative a

single prescription (chosen at random) for analysis is of the other prescriptions of that type that did not end up in the sample. If multiple prescriptions of the same type in an FPA are "well mixed", the random sampling argument may be all that is needed. The **AE** sees no association between the number of occurrences of a prescription type in an FPA and the prescription's compliance rate for that FPA.

JF's discussion noted, the **AE** concludes that DNR's present use of the ratio estimator is still a good way for DNR to proceed, with the added recommendation noted above that DNR consider using a jackknifed version of the present ratio estimate.

2. Is the statistical design (using the described estimator) a sound method for determining compliance with forest practice rules?

Recognizing the need to meet objectives for compliance monitoring while staying within the bounds of budget constraints, the Review Team agrees that the statistical design is a sound method for the eight standard prescription types. Furthermore, sampling proportional to available regional effort should result in a random sample of FPAs with statewide spatial coverage.

The FPAs are clusters (in the statistical sense) of prescriptions, since a given FPA may contain a variety of prescriptions. It is also true that two or more prescriptions of the same type may contain different rules, and differing numbers of rules. DNR states that a prescription is itself a "cluster of rules", since the number of rules is random and since the particular rules may differ. The **AE** agrees with Reviewer **TC** that it is nonetheless important to note that the sample selection procedure is still single-stage cluster sampling and not two-stage cluster sampling, since (for a given prescription type) the random sample is a sample of FPAs containing that prescription. Reviewer **ET** refers to the sampling procedure as a "modified single-cluster sampling strategy" (the modification being how multiple occurrences of a prescription are handled), which the **AE** views as a good way to describe things. While some may view this point as largely an issue of "statistical semantics", the Report must do all it can to provide clarity on what exactly is involved in the sampling procedure.

"Haul routes" is different from the standard prescription types, since for efficiency reasons haul routes are sampled on a subset of FPAs that have already been selected for other prescription compliance sampling. (In the example given on the Report's p. 49, haul routes were observed on FPAs selected for the harvest prescription sample.) Thus, one may question whether the harvest-prescription-based haul route sample is statistically representative (in the way a random sample of FPAs with haul route prescriptions would be) of the haul route prescription applications throughout the state. The Report does make note of this, for example, when it points out that

there is no population estimate for haul routes (p. 15). But Table 16 (p. 49) lists haul route CIs for percent compliance and other parameters in the standard "assuming a random sample" way. While the **AE** does not recommend deletion of these CIs for haul routes, a qualifier similar to that on p. 15 should be added here too.

3. Is there sufficient detail in the document to reproduce the study?

In its present form, the Report does not provide enough detail to reproduce the study. This statement holds both for obtaining the random sample of FPAs for a prescription across the six regions throughout the state, and for using the data from the sample to obtain an estimate of compliance. The 2 ½-hour meeting with DNR in April 2017 (including handouts, and discussions around schematics drawn on a whiteboard) proved extremely helpful in deepening the Review Team's understanding of the Compliance Monitoring Program. Without that meeting, the Review Team would not have been able to properly interpret the Report.

The Review Team is keenly aware that the Report must serve a variety of audiences. Thus, it would not be a good idea to add to Chap. 4 the extensive level of statistical detail required to completely understand the sampling process and how to get to the compliance estimates. This is better done in the Report's Appendix A. An expanded Appendix A could include:

[1] a description of the random selection of the FPAs for a given prescription, including the stratification across Washington State's six regions for purposes of spatial coverage and labor efficiency;

[2] an explanation of why the simple random sampling estimate approach, even though the sample was obtained via stratified random sampling, "works" statistically (as was explained at the meeting and via handouts);

[3] an example for the "roads" prescription, from sample selection to obtaining the compliance estimate from the sample (because the way roads compliance is measured is slightly different from the other prescriptions;

[4] a further example for a prescription other than roads, where each applied rule is scored as either a 0 or a 1;

[5] an example of how sample sizes are determined. Much of this is in the information that was conveyed to the Review Team at the meeting with DNR. The handouts and notes from the meeting could be used as a starting point for expanding Appendix A, which could be updated yearly or biennially. To minimize additional writing effort, the **AE** notes that information similar to the handouts is available in existing DNR publications, which could be referenced with specific page numbers. For example, pp. 11-13 of the DNR Compliance Monitoring Program Description (Lingley et al. 2010, see Question 5)

lists the sample selection steps in place at that time, along with a flow chart. An updated version of this was presented at the meeting with DNR staff.

Ideally, the Report, with its current appendices and the expanded Appendix A, could allow the entire compliance assessment process, from creation of the samples to obtaining the estimates, to be reproduced in another part of the country where FPAs and prescriptions are used. The **AE** concurs with the Reviewers that while this request may appear to call for an excessive level of documentation, the documentation would also serve as the basis to explore other sampling designs and estimation methods.

A suggestion for another Appendix is the inclusion of "The Life of a Completed FPA". This would take a particular completed FPA through the entire process. A listing of its associated prescriptions would reveal in which populations of prescriptions this FPA would end up. For each unique prescription, the computing of the compliance rate could be illustrated. For a prescription that appears more than once, one would be chosen at random and its compliance rate computation illustrated. The Review Team saw schematics illustrating some of this at the DNR meeting. It certainly would be helpful to anyone trying to get a firm grip on the sampling process, what kinds of data go into the database, and the process to get to the compliance estimates. The written summary from the meeting with DNR would be a good start on such an Appendix.

4. Were the data reasonably interpreted?

The **AE** concurs with the Reviewers that the data do appear to have been reasonably interpreted. The report presents a summary of rule compliance rates, with 95% CIs by prescription types. The Report does not judge whether a stated level of compliance is "good" or "bad". That interpretation is left to those who will make use of the Report, which is as it should be. The **AE** notes that the additional information categorizing the level of deviation from compliance, and the level of compliance, was illustrated very well.

5. Do the literature citations include the latest applicable information and represent the current state of scientific understanding on this topic?

For the most part, yes. The **AE** will not attempt to add to the Report's list of texts on sampling, except to note that for readers who find the level of mathematics in Cochran (1977, the classic sampling text) difficult to digest, Scheaffer et al. (1990) provides a good starting point to understanding sampling, including cluster sampling and stratified sampling. A reference from

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Reviewer **TC** regarding use of the jackknife statistic in forestry is given below. Three references from Reviewer **JF** dealing with applications, effectiveness, and compliance with forestry management practices, including sample selection procedures, are also presented. The **AE** has added Lingley et al. (2010), a DNR publication. Each reference appears with a descriptive comment.

Gregoire, T.G. 1984. The jackknife: an introduction with applications in forestry data analysis. *Canadian Journal of Forest Research 14(4)*: 493-497.
This article introduces the notion of a statistic called the "jackknife" (due to its handy nature requiring no further additional sampling), and illustrates its usefulness in terms of a ratio estimator in forestry applications, completely relevant to DNR's Compliance Monitoring Program.

Egan, A.F., R.D. Whipkey and J.P. Rowe. 1998. Compliance with forestry best management practices in West Virginia. *Northern Journal of Applied Forestry 15(4):* 211-215.
This study features a well-defined sampling frame: "The focus was to randomly select harvested sites for investigation. . . . Based on records developed from logging operation notification forms, sites were randomly selected from lists of retired operations provided by each of the six WVDOF Forest Districts." This is the sample selection procedure used later by Wang and Goff (2008).

Phillips, M. J. and C. R. Blinn, 2007. Practices evaluated and approaches used to select sites for monitoring the application of best management practices: a regional summary. *Journal of Forestry 105(4):* 179-183.
This survey article summarizes various state monitoring programs. Because they are so different, the idea of a "compliance monitoring clearinghouse" is put forth, along with regional meetings among natural resource managers and agencies. A clearinghouse would "permit states to compare and contrast approaches and to share information about what does and does not work," with the goal being continuous improvement of states' programs.

Wang, J. and W.A. Goff, 2008. Application and effectiveness of forestry best management practices in West Virginia. *Northern Journal of Applied Forestry 25(1)*: 32-37.
This article reports the results of a compliance monitoring program in West Virginia. The program bases its sample selection process on Egan et al. (1998).

Lingley, L., A. Shelly and W. Obermeyer. 2010. Washington State Department of Natural Resources Compliance Program Description. 34 pp.
Material from this document could be added to the recommended expanded Appendix A. Appears as a .pdf under http://www.dnr.wa.gov/programs-and-services/forest-practices/rule-implementation

6. Are uncertainties and limitations of the work stated and described adequately?

Generally, yes. For the prescriptions whose samples were obtained by random sampling from a population of FPAs containing a given prescription type (this excludes haul routes), the 95% CIs are quite suitable for describing the uncertainty. Limitations such as the use of professional judgement or potential biases in estimates are noted many times throughout the report, to the authors' credit.

Reviewer **JF** would like to see an estimate of the number or proportion of FPAs not considered for sampling due to one or more prescriptions being incomplete. **JF's** Appendix B offers further comments regarding keeping this number as low as possible, including revisiting an FPA in a subsequent year to assess completion, or by each FPA having a completion date recorded. If budgetary constraints allow, the **AE** encourages DNR to find a way to include the completion date information, which would essentially make this a non-issue.

7. Are assumptions stated and described adequately?

For the most part, yes. Various assumptions are noted in the Report and seem clear. Reviewer **JF's** comments regarding the definition of percent compliance are under Question 1. See Question 12 below regarding some extra statements needed regarding the weighted regression model in Chap. 7. For the sample selection procedure and computation of compliance rate, the assumptions would probably appear in Appendix A.

8. Is the information presented in an accurate, clear, complete, and unbiased manner and in a proper context?

The **AE** concurs with the Reviewers that the answer is "Yes". The report is logically organized, and the history and context is useful for readers with less familiarity with the objectives of the Compliance Monitoring Program. The **AE** echoes the comment from Reviewer **ET** that the context and tone of the Report are outstanding. Considerable effort by the authors has been made to present results for the reader without any "editorial spin".

That said, the Review Team reiterates that Chapter 4, Compliance Monitoring Design and Methodology, needs its expanded Appendix A so that interested readers (who may actually wish to reproduce the study) can get the technical details (including diagrams) on determining sample size, selecting the sample using random sampling of FPAs containing a particular prescription,

estimating the compliance rate, and computing an accompanying CI for the rate. To save effort, the **AE** recommends the use of text and diagrams from existing DNR documents.

Reviewer **JF** suggests that more details might appear in Appendix C: Trends of Individual Rules. These are presented without counts of individual rule applications, nor level of compliance. Nonetheless, they allow a reader to look for possible trends, or to see which rules do better than others in terms of compliance over the years. (*The **AE** notes that overall level of compliance can be read from the graph without too much difficulty*). **JF** recommends including a table of results by individual rule, including the number of rule applications assessed, the compliance rate, and counts by the various levels of compliance, thus allowing the reader to see which rules were causing problems. The **AE** notes that Appendix B does contain compliance information on certain rules (Standard Sample rules, Site Class, Physical Criteria of Waters, and others); however, the "roads" prescription is not included. In Appendix C, the number of FPAs sampled is given, but not the number of rules monitored. The **AE** agrees that this would be useful information if labor costs permit.

9. Currently, there are several rules included in compliance calculations that are based on the proper classification of a site rather than on compliance with the rules specific to a particular classification. Thus, if an FPA is non-compliant for site class, the other rules are not applicable, so the FPA cluster has size one, with compliance = 0%. Because these FPAs have only one rule applied, they are not given high weight in the ratio estimate of average compliance. Specific questions:

a. Does this amount to a bias in the estimate of average compliance for a prescription?

That depends upon how often this occurs. From the DNR meeting, the Review Team got the idea that this does not occur very often. Reviewer **ET** views this as less a question of bias and more of a question of information (rules other than site classification) not being allowed to be used. At any rate, occurrences like these (with the resulting 0% compliance estimate) would not contribute to any upward inflation of a compliance estimate, but rather the opposite. Rare instances of misclassification should have little downward effect on a compliance estimate. The **AE** concurs with Reviewer **TC** that frequent classification errors could lower the estimate of compliance rate, not from actual lack of compliance with forest practices, but from errors in classification; this could be more pronounced for prescriptions with smaller sample sizes. In terms of looking for temporal trends, it is likely the case that the data for each biennium would have the same small proportion of FPAs wrongly classified for site class. Thus, any downward effect present would likely be the same from year to year.

b. If the answer to a) is yes, what would be the best way to remove this bias:

i.) Separate the compliance estimates into classification versus operational rules for those affected prescriptions.

The **AE** concurs with the Reviewers that FPAs that are non-compliant for site class should be separated out. Reviewer **JF** notes that if analyzed, this separated group would likely exhibit small sample sizes, so confidence intervals should not be required. To what degree they should be further analyzed depends upon whether DNR feels that it makes sense to assess operational rules for compliance on a misclassified prescription (**TC**).

The **AE** concurs with Reviewer **TC** that if an FPA is found to be non-compliant for site class, it could be discarded and another one further down the list of FPAs (recall the list is in a random order) substituted instead. This essentially changes the population of inference for a given prescription to "those FPAs classified correctly with respect to site class". Misclassified FPAs could be tracked and percentages reported. Simulation could be used to look at effects of varying levels of misclassification on compliance rate estimates. See also the response to Question 10.

ii.) Change the method for estimating average compliance.

No. The Review Team agrees with that exceptions need to be noted, but a consistent method to estimate compliance over all prescriptions is essential.

10. Should compliance be calculated separately for administrative (site characteristics) versus layout and operational (on the ground) rule applications?

Reviewer **JF** refers the reader back to Question 9, and Reviewer **ET** asks for more specifics. Reviewer **TC** notes that this should be an easy exercise to test but that the question, "how will the resultant compliance rates be used?" should be answered first.

The **AE** offers the following: to investigate this issue, let us assume that there is interest in presenting compliance rates for [1] administrative; i.e., noting correct site characteristics, separate from [2] on-the-ground rule applications. There would be additional effort involved in classifying each rule as (say) "A for Administrative" vs. "L for Layout/Operational" and entering this information into a database. Then, for a given obtained sample of FPAs for a prescription, compliance rates could be estimated for both "A" type rules and "L" type rules. However, the number of rules (i.e., the denominator of the compliance estimate) for each rule type, "A" or "L", would naturally be smaller than that for the combined "A + L" set of rules. Smaller denominators lead to larger variance estimates, which could have an effect upon the stated +/- 6% error desired in a 95% CI (**TC**). If larger sample sizes are needed, that means sampling more FPAs for a given

prescription—more effort and more labor costs. Thus, one needs to think about how the separate compliance rates would be used, and if any particular forest land management practices or procedures might change as a result. If little change would actually result, then the additional effort required to get information into the database for the separate calculations may not be worth the effort.

One way to gauge additional labor costs would be to choose a prescription and actually use the above procedure on currently existing data to generate separate compliance rates for that prescription. That would also yield an example of by how much sample sizes decrease when the rules are split into "A" and "L" types.

11. Recognizing that there is a relationship between cost and sampling precision objectives, do you have suggestions for narrowing sampling statistic confidence intervals without significant increasing the biennial sample size in order to improve the ability to discern trends over time?

The data points necessary to improve the ability to discern trends over time are simply--more time points, which means more years of data. Over short time periods, trends have to be quite strong (big year-to-year changes) in order to be detected (**TC**). Without more years of data, the only way to narrow the CI would be to lower the level of confidence to, say, 90% from 95%. This would be an administrative rather than a statistical decision. If there are prescription types that are more important than others, Reviewer **JF** suggests that the target confidence intervals and sample sizes could be changed to better focus on the prescription types most in need of improved compliance information. If administrative changes allowed for the recording of actual FPA completion dates, and all review and monitoring occurred after those recorded dates, less effort would be spent in visiting unsuitable sites, and the population of interest would be better defined. The **AE** adds that if differing levels of confidence are used (say, both 90% and 95%) and/or differing levels of the allowable error (e.g., +/-5% and +/-6%), DNR will have to provide good reasons for this.

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12. What suggestions do you have for improving the clarity of the report narrative for an audience with general understanding of natural resources management: (1) the results of the report's two-year data; and (2) the description of trends?

(1). Results of the Report's two-year data.

The reader is referred back to the response to Question 8. Review **JF** adds that tables showing results by individual rule could be helpful. The **AE** concurs, keeping in mind the need to balance the benefit of DNR and others being able to view results to that level of detail, versus the cost to produce them.

(2). The description of trends (Chap. 7 of the Report).

Some clarification is required in the Methods section of Chap. 7 regarding the regression method used. The word "multivariate" should be dropped from paragraph 2 under Methods (p. 50, paragraph 2, lines 1 and 6), as it caused more than one Reviewer (and the **AE**) to wonder whether the response term consisted of a multivariate vector. It was clarified at the DNR meeting that for each of the eight prescription types, the response variable in the weighted regression analysis is the statewide percent compliance. Also, since this is "ordinary weighted regression", that means the usual assumptions about the error structure are present; therefore they should be clearly stated. That includes normally distributed (i.e., Gaussian) random error, but with nonhomogeneous variance. Paragraph 2 discusses the nonhomogeneous variance and the structure of the weights, so the only things requiring specific mention are the assumed normal distributions and the independence of the random error terms.

A suggestion that has come up in discussion is considering the use of logistic regression. This could be appropriate for those prescriptions where compliance rate is the ratio of two integers. A quick way to assess the feasibility of this would be to plot the logit of compliance rate (log(p/(1-p)) against time to see if things tend to "look more linear" than before. If so, logistic regression might be appropriate, or even ordinary weighted regression using logits instead of the rates themselves as the response (this from the **AE**). Still, this will not make up for the small number of years available to assess trends.

Page 9 of the Report and comments at the DNR meeting have made it clear that DNR is not focusing on individual regions, but rather statewide. If in future DNR is interested in regional variation regarding compliance rates, then the following comments from Reviewer **JF** may be pertinent (details may be found in **JF's** response to Question 12):

Reviewer **JF** posits a hypothesis that every rule has a constant compliance rate over time, but that rate may vary by region (space). If that were the case, then depending upon the regional

distribution of FPAs, variation (possible trends) in the rate of compliance over space (regions) might be interpreted as variation (possible trends) over time. A statistical model is offered with terms for region, rule, and year, which could potentially be analyzed via logistic regression, using random effects to account for the fact that various rules within a given prescription would likely be correlated.

References

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Gregoire, T.G. 1984. The jackknife: an introduction with applications in forestry data analysis. *Canadian Journal of Forest Research 14(4)*: 493-497.

Lingley, L., A. Shelly and W. Obermeyer. 2010. Washington State Department of Natural Resources Compliance Program Description. 34 pp.

Phillips, M. J. and C. R. Blinn, 2007. Practices evaluated and approaches used to select sites for monitoring the application of best management practices: a regional summary. *Journal of Forestry 105(4):* 179-183.

Wang, J. and W.A. Goff, 2008. Application and effectiveness of forestry best management practices in West Virginia. *Northern Journal of Applied Forestry 25(1)*: 32-37.

Review of ISPR 16-17-01
2014-2015 Biennium Forest Practices Compliance Monitoring Report
AE Synthesis – L Conquest

Comments to Specific Pages in the Report

Regarding color coding found below and in the Reviewers' Comments:
Green = recommend for consideration to improve the manuscript,
Turquoise = strongly suggested for improvement,
Yellow = required change to the manuscript.

From Reviewer TC (also listed under **TC's** Comments):

1) Page 2, second paragraph under "Changes in Study Design" change last sentence to correctly reflect the applied regression methods to something like, "Weighted least squares linear regression was used to assess general trends in average compliance rates through time."
2) Page 2, footnote 1. A 95% CI means that if the sample was repeated 20 times … The +/- 6% has nothing to do with the interpretation of the confidence level. The +/- 6% is the targeted margin of error that is used to estimate requisite sample sizes.
3) Page 7, paragraph under "Reports". Last sentence, add "that" before are detailed in this biennial report.
4) Page 12, "Sample Selection" section. Needs to reference a new Appendix or specific sections of an expanded Appendix A.
5) Page 12, second to last paragraph, last sentence. May want to explain rationale behind the statement, "Sample sizes are applied in proportion to region population size for each prescription size." During the meeting, I left believing that regions only enter the sample selection as a means to distribute effort, and regions are not really strata of interest.
6) Page 14, first paragraph. Need to decide if rules per prescription are going to be referred to as clusters. The primary level of sampling are FPAs and FPAs are treated as clusters in the sampling sense. To alleviate any confusion with two-stage cluster sampling, you may want to refer to groups or sets of rules per prescription. It's a bit confusing because the mean number of rules per prescription is used in the sample size estimation procedure.
7) Page 16, first paragraph under "Compliance Assessment and Ratings". Reference any updated/new Appendix with details/example.
8) Page 17, first paragraph, last sentence. Change "…that to the method of sampling." to "…than to the method of sampling."
9) Page 39, Table 9 and first paragraph after the table. Change Np water Compliant from 93.4% to 94.1%. Similarly, change the value in the first sentence of paragraph below the table. The value reported in Table 5, page 30 appears to be correct.
10) Page 50, second paragraph under "Methods" section. Update to reflect regression method that was applied, weighted least squares regression of compliance rate on time.

Review of ISPR 16-17-01
2014-2015 Biennium Forest Practices Compliance Monitoring Report
AE Synthesis – L Conquest

From the AE:

1) Page 12, Changes in Study Design, 2nd paragraph, delete "multivariate" so that it reads "Weighted least squares linear regression analysis …".
2) Page 16. Keep the CIs for haul routes but add a qualifier similar to that on p. 15.
3) The word "multivariate" should be dropped from paragraph 2 under Methods (p. 50, paragraph 2, lines 1 and 6)
4) In Appendix B, whenever only a single rule occurrence has been assessed, the resulting compliance percentage is either 0% or 100%, and there should be no accompanying 95% CI. This is displayed correctly once under DFC1 and once under NIZH. However, under A & B Wetlands, a 95% CI appears for "Openings less than 100' wide" even though only a single rule has been assessed; the CI here should read "n/a".
5) For NIZH "Observed CMZ", two rules have been assessed with 0% compliance. Even with only two rules assessed, a (wide) 95% CI should still be calculable, as for "Unstable slopes bounded out" in DFC2.
6) Also in Appendix B, the results for the "Roads" prescription are missing. If there is a valid reason for this, it should be stated.

Timber, Fish & Wildlife Policy Committee
Forest Practices Board

PO BOX 47012, Olympia, WA 98504

Policy Co-Chairs:
Ray Entz, Kalispel Tribe
Scott Swanson, Washington Association of Counties

July 21, 2017

TO: Forest Practices Board

FROM: Ray Entz, Co-Chair
Scott Swanson, Co-Chair

SUBJECT: Policy Committee Priorities

The Timber, Fish, & Wildlife Policy Committee (Policy) continues to manage a workload in excess of capacity driven by internal process deadlines and priorities directed by the Forest Practices Board. The major topics are summarized below.

Existing Priorities

Permanent Water Typing Rule

Policy has completed both stages of dispute resolution. Through this process, consensus was reached on several outstanding Type F elements including agreement on the definition of off-channel habitat, acceptance of approved water type modification forms as the regulatory water type break, and conceptual fish habitat assessment method framework (FHAM). To complete the remaining technical aspects for the FHAM, the Adaptive Management Program Administrator's (AMPA) convened group is working to determine those elements that would constitute a barrier and/or potential habitat break (PHB). It is anticipated that the group's recommendations will be shared with Policy and provided the Board in August.

Small Forest Landowners' Alternate Template

Policy has reconvened the subcommittee on SFLO Alternate Template and has already entertained a presentation by Luke Rogers on patterns of forest ownership in the State of Washington.

Unstable Slopes Proposal Initiation

Several of the tasks outlined in Policy's recommended actions will be addressed and informed through:

- a literature review for glacial and non-glacial DSLs
- the completion of the Unstable Slopes Criteria TWIG
- UPSAG's Deep-Seated Research Landslide Strategy

Pending further information on the outcomes above, no further action will occur on the development of the Weekes Landslide Screening Tool, shallow-rapid landslide coarse screen, the landslide risk flow chart or climate change impacts to reactivation.

CMER

Type N Hard Rock

The Type N Hard Rock study is comprised of many different chapters and will require an elaborate process for both CMER approval and Policy review. CMER has developed a process and schedule to move it through to Policy in July/August 2017. Policy and CMER Co-chairs will be meeting with the AMPA to discuss how best to facilitate both the flow of technical information and the Policy response timeframe.

New Priorities

Policy has formed a subcommittee that has already started meeting and discussing criteria necessary to prioritize Policy's future work in relation to the Master Project Schedule. These priorities will also help Policy develop future AMP budget recommendations.

- Type N – In conjunction with the initial presentations of the chapters of the Hard Rock CMER study, Policy will conduct a field tour of landowner property in western WA during the first part of October 2017
- CWA – Policy is reviewing how the outcome of CWA projects will meet the CWA assurances milestones in the near term

Budget Review

Policy continues to support the work of the existing budget subgroup as they review the expenses of the AMP, with the AMPA, as an ongoing process throughout the biennium.

FOREST PRACTICES BOARD
2017 WORK PLAN

TASK	COMPLETION DATE/STATUS
Adaptive Management Program	
• Alternate Plan Template: Recommended Review Process & Timeline*****	*November*
• Buffer/Shade Effectiveness Study (amphibian response)	*November*
• CMER Master Project Schedule Progress*	February & November
• Hardwood Conversion Study	November
• 2017-2019 CMER Master Project Schedule Review*	May
• Final 2017-2019 CMER Master Project Schedule Approval*	August
• Development of OCH, physicals recommendations*	May
• TFW Policy Committee's funding decisions*	February
• *PHB recommendation from science/technical experts*	*August*
Annual Reports	
• Clean Water Act Assurances	*November*
• Compliance Monitoring 2014-2015 Biennial Report (w/ISPR Review)	August
• Compliance Monitoring 2016 Annual Report	August
• Northern Spotted Owl Conservation Advisory Group	*November*
• Taylor's Checkerspot Butterfly Report	May
• TFW Cultural Resources Roundtable including WAC 222-20-120	August
• TFW Policy Committee Priorities*	August
• Western Gray Squirrel	May
• 303D Listing Update	February
Board Manual Development	
• Section 23 Field Protocol to Locate Mapped Divisions Between Stream Types and Perennial Stream Identification*	*February 2018*
CMER Membership	As needed
Critical Habitat - State/federal species listings and critical habitat designations	As needed
Field Tour	*To be Determined*
Forest Chemicals	February
Washington Geologic Survey	*November*
Rule Making	
• Water typing System	*February 2018*
• Electronic FPA/N, Signature and Payment	November
• *Public Records Fee Schedule*	*February 2018*
Subcommittee Recommendations on AMP Improvements	*August*
TFW Cultural Resources Roundtable Recommendations on Cultural Resources Protection	
Cultural Resources	
Upland Wildlife - Northern Spotted Owl	On-going
Quarterly Reports	
• Adaptive Management Program*	Each regular meeting
• Board Manual Development	Each regular meeting

Italics = proposed changes *Updated May 2017*
**= TFW Policy Committee*

FOREST PRACTICES BOARD
2017 WORK PLAN

TASK	COMPLETION DATE/STATUS
• Compliance Monitoring	Each regular meeting
• Clean Water Act Assurances	February
• Legislative Activity	February & May
• NSO Implementation Team	Each regular meeting
• Rule Making Activities	Each regular meeting
• Small Forest Landowner Advisory Committee & Office	Each regular meeting
• TFW Cultural Resources Roundtable	Each regular meeting
• TFW Policy Committee Work Plan Accomplishments & Priorities*	Each regular meeting
• TFW Policy Committee Progress Report on Unstable Slopes Recommendations	Each regular meeting
• Upland Wildlife Working Group	Each regular meeting
Work Planning for 2018	November

Italics = proposed changes *Updated May 2017*
**= TFW Policy Committee*

DEPARTMENT OF
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MEMORANDUM

July 5, 2017

TO: Forest Practices Board

FROM: Marc Ratcliff
Forest Practices Policy Section

SUBJECT: Board Manual Development Update

This memo provides information on anticipated development of the Forest Practices Board Manual.

Section 23, *Guidelines for Field Protocol to Locate Mapped Division Between Stream Types and Perennial Stream Identification.* Staff will begin the work to complete this section once the Board accepts the final recommendations on the remaining elements for conducting a fish habitat assessment methodology (otherwise known as FHAM). When complete, Section 23 will consist of two parts. The first part will provide guidelines for locating the division between Type F and N waters, which includes guidance for delineating fish habitat through a FHAM and improved practices for conducting electrofishing protocol surveys. The development of this section will occur concurrently with the development of rule language for the new water typing system.

The second part of Section 23 involves guidelines for locating the division between Type Np and Ns waters – locating the upper most point of perennial flow. Policy will resume work to develop recommendations on a wet season method to locate the uppermost point of perennial flow when the Type F habitat delineation processes in the first part is complete.

The current guidance for conducting protocol surveys in Board Manual Section 13, *Guidelines for Determining Fish Use for the Purposes of Typing Waters*, will be incorporated into Section 23 in conjunction with the Board's acceptance of the final elements for delineating fish habitat. Section 13 will then become obsolete.

Section 12, *Guidelines for Application of Forest Chemicals*. In acknowledgement of the forest chemical technical group's efforts presented to the Board in February 2017, DNR staff recommends amending this section of the manual. Work to amend Section 12 will occur after the development of Board Manual Section 23.

MR

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MEMORANDUM

TO: Forest Practices Board

FROM: Garren Andrews, Compliance Monitoring Program Manager

SUBJECT: Current status of the Compliance Monitoring Program

Compliance Monitoring completed spring 2017 data collection June 30th.

Fall 2017 field data collection is expected to commence during the first week of September 2017.

The Compliance Monitoring Program will incorporate Unstable Slopes field sampling into fall 2017 field work.

The Independent Study Peer Review has been completed for the 2014-2015 biennial report and the program's analytical methods. Major recommendations from the ISPR are being incorporated into 2016-2017 data analysis and biennial report.

If you have any questions please contact me at (360) 902-1366 or garren.andrews@dnr.wa.gov

GA/

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MEMORANDUM

July 12, 2017

TO: Forest Practices Board

FROM: Marc Engel
Forest Practices Assistant Division Manager, Policy and Services

SUBJECT: Rule Making Activity

Permanent Water Typing

In anticipation of the recommendations for the new water typing system, the Board directed staff to file a CR-101 *Preproposal Statement of Inquiry* at the November 2016 meeting.

At the August meeting, the Board will receive recommendations from the AMPA regarding the final elements needed to prepare the draft Water Typing System rule. It is expected the Board will approve the initiation of rulemaking at the November 2017 meeting.

Electronic Signature and Payment

A CR-101 was filed on March 21, 2017 to amend the application and notification rule to clarify that an electronic signature and payment process will be an accepted method for applicants when submitting Forest Practices Applications. Accepting electronic transactions will provide an additional option for landowners wanting to utilize this technology under DNR's future business system.

Staff is drafting rule language and will request your approval to initiate rule making at the August 2017 meeting.

Public Records

With 2017 legislation amending the Public Records Act, the existing rules (WAC 222-08-090) on collecting fees for public record requests must be amended. The new legislation provides agencies two options:

- The actual cost method requires an agency to provide sufficient data justifying their rates, publication of the data and rates, and conduct public hearings
- The statutory fee schedule requires an agency to adopt rules explaining why it is infeasible to use actual costs

Staff will request Board approval to file a CR-101 to notify the public the Board's intention of rule making on this subject.

I look forward to answering any questions you may have on August 9.

DEPARTMENT OF NATURAL RESOURCES

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MEMORANDUM

July 6, 2017

TO: Forest Practices Board

FROM: Tami Miketa, Manager, Forest Practices Small Forest Landowner Office

SUBJECT: Small Forest Landowner Office and Advisory Committee

Small Forest Landowner Office Advisory Committee (SFLOAC)

Since my last staff report, the Small Forest Landowner Office Advisory Committee met on May 17, 2017. This meeting focused on the following topics:

1. Status of the proposed WFFA west side template for riparian thinning.
2. Brainstorm on how to make the FPA Activity Map process more user friendly for small forest landowners.
3. Discussion regarding the East side Long-term Application Step 2 question 15.
4. SFLOAC Action Plan update.

Forestry Riparian Easement Program (FREP)

Since FREP began, funding has not kept up with demand. There remains a backlog of eligible applications waiting funding for the cost of acquiring the easements. During the 2017 fiscal year, 28 new applications were received and 24 conservation easements were acquired. The backlog of unfunded FREP applications is 134. Using private contractors, the FREP qualifying timber has been cruised on 87 of the 134 applications.

For the FY15-17 biennium, the Forestry Riparian Easement Program received $3.5 million from the State Capital Budget. The funding in the 2015-2017 biennium purchased 39 conservation easements covering 516 acres.

The table on the following page summarizes the Forestry Riparian Easement Program's acquisition activity over time.

State of WA, Dept. of Natural Resources
Forest Practices Division

Small Forest Landowner Office
Forestry Riparian Easement Program

Easement Application Numbers by Fiscal Year

	FY 2001-2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	Totals
Queue Balance at Start of Fiscal Year	-	98	89	101	112	132	125	134	-
Applications Received	409	15	16	26	33	24	21	30	574
Easements Purchased	278	12	0	13	6	19	9	30	367
Applications Ineligible / Rejected	33	12	4	2	7	12	3	12	85
Queue Balance at End of Fiscal Year	98	89	101	112	132	125	134	122	-
Conservation Acres Purchased	4,793	148	0	110	122	166	133	383	5,855

Rivers and Habitat Open Space Program (R&HOSP)

DNR screens applications, prioritizes qualifying applications, and acquires conservation easements based on available funding each biennium for the Rivers and Habitat Open Space Program. Applications for conservation easements for channel migration zones are prioritized separately from applications for critical habitat of threatened and endangered species. Applications are prioritized based on conservation benefits and landowner management options. There are currently13 qualifying applications, five for channel migration zones easement applications and eight for Critical Habitat State easement applications. This biennium the program received four new qualifying applications; three CMZ easement applications and one Critical Habitat State easement applications.

The State Capital budget appropriated the R&HOSP $1 million for the FY15-17 biennium. Just under 40% of the funds in the program were allocated to CMZ habitat and the remaining 60% of the funds were used to purchase a Conservation Easement on habitat recognized as Critical Habitat State.

Family Forest Fish Passage Program (FFFPP)

The State Capital budget appropriated $5 million to the Family Forest Fish Passage Program for the FY15-17 biennium. During this biennium, the FFFPP corrected 33 fish passage barriers opening up approximately 62 miles of habitat for fish.

Family Forest Fish Passage Program Accomplishments Since 2003*

Numbers and Costs	**FY 2016**	**Cumulative Since 2003**
Eligible Small Forest Landowner Applications	90	1018
Eligible Barriers	129	1,433
Barriers Corrected	16	384
Stream Miles Opened Up	35	919
Cost of Completed Projects	$1.8 million	$35.1 million

***** This year, changes in reporting results from previous HCP Reports are a result of the use of a new data set that has been updated and verified to reflect more accurate numbers of barriers corrected and stream miles opened.

Long Term Applications (LTA's)

There are now a total of 242 approved long term applications; which is an increase of 5 approved applications since the end of the last reporting period (04/24/2017).

LTA Applications	LTA Phase 1	LTA Phase 2	TOTAL
Under Review	5	2	**7**
Approved	2	242	**244**
TOTAL	**7**	**244**	**251**

Technical Assistance for Small Forest Landowners

The Small Forest Landowner Office revised the SFLO Outreach/Grant Writer Specialist position. This position still conducts outreach activities in support of the Small Forest Landowner Office programs, but the majority of the duties are related to serving as the designated Technical Assistance Forester in western Washington who assists small forest landowners in understanding the Forest Practices Rules, timber harvest systems, small forest landowner alternate plan templates, 20-acre exempt harvest rules, long-term applications, low impact harvest activities, road construction techniques, and any other Forest Practices Rule related issues.

Since the time this position was filled in July 2016, the Technical Assistance Forester has received almost 200 inquiries from small forest landowners. Some of the most common questions received are those regarding alternate plans, long-term applications, riparian buffers, and stream typing. This position has worked, or is currently working, with landowners on 7 Alternate Plans, and has helped 13 small forest landowners complete their Long-term Forest Practices Applications.

Upcoming Landowner Events

The WSU Forestry Extension program, in coordination with DNR, provides education and information about forest management to private forest landowners as well as the general public. They offer classes, workshops, and field days as well as publications, videos, and online resources to help landowners achieve their various land management objectives. Below is a list of upcoming events designed to aid small forest landowners.

The Annual Western Washington Forest Owners Field Day is scheduled for August 19th in Oakville, WA.

The Whidbey Island Forest Owners Field Day is September 9, 2017 at the Swanson Tree Farm In Clinton, WA 98236.

Forest Stewardship Coached Planning –
WSU's flagship class teaches landowners how to assess their trees, avoid insect and disease problems, attract wildlife, and take practical steps to keep their forest on track to provide enjoyment and even income for years to come. In this class landowners will develop their own Forest Stewardship Plan, which brings state recognition as a Stewardship Forest and eligibility for cost-share assistance, and may also qualify them for significant property tax reductions. For more information on these courses go to http://forestry.wsu.edu/

The following are scheduled Forest Stewardship Coached Planning classes:

- Preston – September 12 to November 14, 2017
  Class Sessions 6:30-9:30 PM Tuesday evenings
  Where: Sessions will be held at the Preston Community Center, 8625 310th Ave SE, Preston, WA 98027
- Sedro Woolley – October 5 to November 30, 2017
  Class Sessions are 6:00-9:00 PM Thursday evenings
  Where: Sessions will be held in the conference room at the DNR Northwest Region Office, 919 N Township St, Sedro Woolley, WA 98284.

Please contact me at (360) 902-1415 or tamara.miketa@dnr.wa.gov if you have questions.
TM/

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July 17, 2017

M E M O R A N D U M

To: **Forest Practices Board**

From: **Terry Jackson, Forest Habitats Section Manager** TJ

Subject: **Upland Wildlife Update**

The following provides a brief status update for ongoing or pending actions pertaining to priority wildlife species in forested habitats.

Marbled Murrelet
1992: Federally listed as Threatened
1993: State listed as Threatened
1996: Federal critical habitat designated by USFWS
1997: FPB enacted State Forest Practices Rules
2017: State up-listed to Endangered

The up-listing of the Marbled Murrelet from state threatened to endangered became effective on February 4, 2017. Primary threats to the Marbled Murrelet include loss of old forest nesting habitat from timber harvest and mortality associated with net fisheries and oil spills. Estimates for Washington nesting habitat losses are approximately 30% for non-federal lands. At-sea population monitoring from 2001 to 2015 indicated a 4.4% decline annually. The magnitude of the population decline indicates that the status of the Marbled Murrelet in Washington has become more imperiled since state listing in 1993. Without strategies to address threats to the species it is likely the Marbled Murrelet could become functionally extirpated in Washington within the next several decades. WDNR, in consultation with WDFW, recommended that the Forest Practices Board (Board) support WDFW's initiation of a Marbled Murrelet rule assessment involving a diverse group of stakeholders. This group will evaluate rule effectiveness in protecting Marbled Murrelet habitat (e.g. Is it facilitating habitat loss? Is it inhibiting habitat recruitment?), identify potential shortcomings in rule language and/or on-the-ground implementation, consider potential landowner incentives, and strive to bring consensus recommendations to the Board.

WDFW is working with partners to conduct at-sea monitoring surveys and pursuing other critical research regarding sea diet. USFWS and WDFW are also revisiting the Federal Recovery Plan and considering possible recovery actions for protection of the Murrelet.

Canada Lynx
1993: State listed as Threatened
1994: FPB enacted voluntary management approach
2000: Federally listed as Threatened
2017: State up-listed to Endangered

The up-listing of the lynx from state threatened to endangered became effective on February 4, 2017. Current information indicates that the distribution of lynx in Washington has contracted significantly from its historic extent and that the boreal forests in western Okanogan County provide the only habitat in

Washington that supports a resident lynx population. Threats to lynx include loss and fragmentation of habitat, small population size, demographic stochasticity, and the potential effects of climate change. Habitat may be lost as a result of timber harvest, but the bulk of habitat loss is due to large wildfires within the last 10 years. Estimates of lynx population size suggest it may include approximately 54 individuals. There are no indications that the conservation status of Washington's lynx population has improved since it was state and federally listed.

As a result of the uplisting, WDFW recommended to WDNR (and subsequently, WDNR to the Board) that no action be taken, at this time, to add Canada Lynx to the forest practices rule designation for critical habitats (state). It was also recommended that the voluntary cooperative protection approach for lynx be continued, contingent upon WDFW and landowners collaboratively updating existing lynx habitat management plans (State DNR lands and private industrial lands). These collaborative discussions are currently ongoing. WDFW is also currently working with academic partners, Canadian federal and provincial entities, USFWS, conservation organizations and tribes to define recovery actions that can be implemented in the near term to benefit lynx.

Northern Spotted Owl
1988: State listed as Endangered
1990: Federally listed as Threatened
1996: FPB enacted State Forest Practices Rules
2012: USFWS designation of revised critical habitat
2016: State retention of Endangered status

The Washington Fish and Wildlife Commission, at its February 2016 meeting, voted to retain the Northern Spotted Owl as endangered in the state of Washington. The species' population has continued to decline, primarily from ongoing habitat loss from timber harvest and wildfires, as well as competitive interactions with Barred Owls. The Northern Spotted Owl Implementation Team (NSOIT) continues working towards developing a Safe Harbor Agreement (SHA) for forest landowners to provide federal assurances while protecting existing habitat and recruiting new habitat. The group will also explore other opportunities for landowner incentives.

Woodland Caribou
1982: State listed as Endangered
1984: Federally listed as Endangered
2001: FPB enacted State Forest Practices Rules
2017: State retention of Endangered status

In January 2017, the Washington Fish and Wildlife Commission voted to retain the endangered status of the Woodland Caribou, based on the results of WDFW's periodic status review.

The Selkirk Mountains in northeastern Washington provide suitable habitat for this unique type of woodland caribou. Selkirk mountain caribou are distinguishable from other populations of woodland caribou by their habitation of mountainous areas with deep snow accumulations and their primary winter diet of arboreal lichens. These caribou were once considered abundant, possibly numbering in the hundreds in the late 1800s. The population decreased to an estimated 25 to 100 animals between 1925 and the mid-1980s. This isolated subpopulation declined rapidly from 46 to 12 caribou between 2009 and 2016. Most recently, 2016/17 mid-winter survey efforts counted only 11 individuals presently residing in British Columbia. Primary threats to these caribou include high levels of predation, collisions with vehicles on highways, human disturbance in the form of backcountry winter recreation, and climate change.

Wolverine
1998: State status: Candidate
2010: Federal status: Candidate
2013: USFWS proposal to list the North American Wolverine as threatened
2014: USFWS withdrew their proposed rule to list the wolverine as threatened
2016: USFWS initiated new status review and reopened public comment on proposed listing

On October 18, 2016, the USFWS reinitiated a status review for the North American wolverine and

reopened the public comment period on its 2013 proposed rule to list the wolverine as threatened under the Endangered Species Act. The original USFWS proposal to list the wolverine as threatened was withdrawn, based on their conclusion that the factors affecting the distinct population segment (DPS - within the contiguous United States) as identified in the proposed rule were not as significant as believed at the time that the rule was proposed. Following publication of the 2013 proposed rule, there was scientific disagreement and debate about the interpretation of the habitat requirements for wolverines and the available climate change information used to determine the extent of threats to the DPS. Since that time, the USFWS was sued by environmental groups, and in April 2016, a court ruling sided with the plaintiffs resulting in the reopening of the status review process.

The public comment period closed on November 17, 2016. The USFWS will use the information from the status review to determine whether the wolverine DPS meets the definition of an endangered or threatened species, a process that will take about a year.

Fisher
1998: State listed as endangered
2016: Federal status: Final decision for west coast DPS - not warranted for listing (April 2016).

The fisher, a member of the weasel family, is returning to the state after disappearing from Washington's forestlands during the last century. To date, WDFW and its partners have successfully relocated a total of 159 fishers from British Columbia to the Olympic National Park and other federal lands within the southern Cascade Mountain Range. Sixty-nine (69) fishers have been released at Mount Rainier National Park and the Gifford Pinchot National Forest since December 2015. Confirmation of a denning female ("Lilly") with a kit was captured on camera in early June 2017 on federal land.

These recovery efforts were one reason why the USFWS determined that the state's fisher population did not require protection under the federal Endangered Species Act (ESA). Another factor in their decision was Washington State's leadership in working together with forest industry, private landowners and other conservation entities to develop a voluntary program that provides forest landowners an incentive to work as partners in the recovery effort. This voluntary program is called a Candidate Conservation Agreement with Assurances (CCAA). Landowners who choose to enroll in the CCAA receive federal regulatory assurances in the event that the fisher becomes listed in the future. By signing on to the CCAA, which is administered by WDFW, landowners agree to follow basic conservation measures that protect fishers that may use habitat on their private lands. To date, 45 landowners and 2.9+ million acres of non-federal forest land are enrolled in the CCAA and additional landowners can enroll at any time.

Future Updates to the Board
The forest practices rules require that when a species is listed by the Washington Fish and Wildlife Commission and/or the U.S. Secretary of the Interior or Commerce, DNR consults with WDFW and makes a recommendation to the Forest Practices Board as to whether protection is needed under the Critical Habitat (State) rule (WAC 222-16-080). WDFW and DNR continue to coordinate in order to anticipate federal actions and/or state action in response to changes in the status of any given species.

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