FOREST PRACTICES BOARD
Regular Board Meeting – August 12, 2020
GoToWebinar

Meeting materials and subject presentations are available on Forest Practices Board's website.
https://www.dnr.wa.gov/about/boards-and-councils/forest-practices-board

Members Present
Stephen Bernath, Chair, Department of Natural Resources
Ben Serr, Designee for Director, Department of Commerce
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
Jeff Davis, Designee for Director, Department of Fish and Wildlife
Kelly McLain, Designee for Director, Department of Agriculture
Paula Swedeen, General Public Member
Rich Doenges, Department of Ecology
Tom Nelson, General Public Member
Vicki Raines, Elected County Commissioner

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

WELCOME AND INTRODUCTIONS
Chair Bernath called the Forest Practices Board (Board) meeting to order at 9:05 a.m. Roll call of
Board members occurred.

GOTOWEBINAR FORMAT BRIEFING
Marc Engel, DNR, described the process for listening and participating through the GoToWebinar
format.

REPORT FROM CHAIR
Chair Bernath reported on the following:
• DNR is submitting legislative capital budget requests for the Family Forests Fish Passage
  Program ($10 million), Forestry Riparian Easement Program (FREP) ($10.4 million) and Rivers
  and Habitat Open Space Program (RHOSP) ($6.1 million).
• DNR is submitting an operating budget request for $3.7 million to replace the Forest Practices
  Application Review System and move to an online system for electronic application submission,
  signature and payment.
• DNR is working with stakeholders to develop a legislative request to pursue a Northern Spotted
  Owl Safe Harbor Agreement with the federal government.

- DNR is developing improved guidance for aerial herbicide notification signage and clarifying existing buffer rules adjacent to residences and agricultural lands. The guidance will be shared once outreach to stakeholders is complete.
- Francine Madden with the Center for Conservation Peacebuilding will be reaching out to caucus leads to see if folks are ready to begin the next phase.
- Noel Willet's resignation from the Board due to his retirement.
- Staff vacancies in the FREP program have been filled.
- Marc Engel is the new Timber, Fish and Wildlife Policy Committee (Policy) co-chair replacing Curt Veldhuisen. Terra Rentz is stepping down as co-chair upon leaving the Department of Fish and Wildlife (WDFW) to take a new position with DNR. Court Stanley has replaced Scott Swanson as the county Policy caucus representative.

APPROVAL OF MINUTES
MOTION: Tom Nelson moved the Forest Practices Board approve the May 13, 2020 meeting minutes.

SECONDED: Vicki Raines

Board Discussion:
None.

ACTION: Motion passed unanimously.

PROPOSED 2021-2023 BIENNIAL MASTER PROJECT SCHEDULE BUDGET AND SCHEDULE COMPLIANCE
Mark Hicks, Adaptive Management Program Administrator (AMPA), presented the proposed Master Project Schedule (MPS) budget for the FY 21-23 biennium that had consensus support from Policy. He referred Board members to his memo dated July 30, 2020 for detailed information regarding specific line items.

Hicks reported that 43% of the proposed budget would go to participation grants, 27% would go to administrative and staff costs and 30% would be allocated to 16 active Adaptive Management Program (AMP) research projects. He told the Board that the amount of funding expected to be available from the Forests and Fish Support Account and what the legislature provided in the current biennium from General Fund-State (GF-S) would be insufficient. He noted that the recommendation asks for $7.0 million in GF-S to fund the program in the 21-23 biennium. He requested the Board approve the proposed FY 21-23 biennium MPS budget, and stated that once approved, DNR would use it as the basis for the legislative funding request.

PUBLIC COMMENT ON PROPOSED 2021-2023 MASTER PROJECT SCHEDULE BIENNIAL BUDGET AND SCHEDULE COMPLIANCE
None.

2021-2023 BIENNIAL MASTER PROJECT SCHEDULE BUDGET AND SCHEDULE
COMPLIANCE
MOTION: Bob Guenther moved the Forest Practices Board approve the proposed 21-23 biennium Master Project Schedule and its use by DNR to request funding from the legislature. He further moved that the Forest Practices Board finds that the Adaptive Management Program is in substantial compliance with the Master Project Schedule.

SECONDED: Brent Davies

Board Discussion:
None

ACTION: Motion passed unanimously.

TFW POLICY RECOMMENDATION ON SMALL FOREST LANDOWNER WESTSIDE
TEMPLATE PROPOSAL INITIATION
Mark Hicks, AMPA, outlined the AMP steps for accepting the proposal initiation (PI) for the Small Forest Landowner Alternate Prescription Template proposal. In May 2015, the Board accepted the PI and transmitted it to the AMPA for consideration. At that time, the AMPA recommended a three-step strategy:
1. Policy to perform a review to determine whether the proposed alternate plan template meets the criteria outlined in WAC 222-12-0403;
2. Cooperative Monitoring, Evaluation and Research (CMER) Committee to perform a literature synthesis on how the proposed riparian prescriptions in the PI would provide the rule-required riparian functions; and,
3. Recommend Policy bring forward recommendations to the Board through a combined AMP science and policy track process. He said the recommendations presented today are specific to the policy track.

Terra Rentz, Policy co-chair, said Policy, by consensus, found that the Small Forest Landowner Alternate Prescription Template as proposed does not meet the criteria of a template per the rule standards in WAC 222-12-0403(3), but may in part be a template or other form of prescription with more site-specific criteria. She said the Board asked Policy to evaluate other tools available to small forest landowners and to assess if sections of the proposal have merit. As a result, Policy created two workgroups, one to evaluate past conceptual alternate plan templates and another to evaluate the proposed 25, 50, 75-foot riparian buffer prescriptions. She said work is ongoing.

Rentz concluded by re-stating their request for the Board to accept Policy's recommendation that the template proposal does not meet the criteria of a template per the rule.

Board member Guenther asked for clarification regarding which portions of the task are complete.

Marc Engel, DNR, confirmed that the first task to review the template proposal as a whole is complete. He said that Policy, through the convening of two workgroups, is assessing if there are tools or options that might be available for developing a template(s) for small forest landowners and that Policy will be providing additional recommendations.

PUBLIC COMMENT ON TFW POLICY RECOMMENDATION ON THE SMALL FOREST LANDOWNER WESTERN WASHINGTON TEMPLATE PROPOSAL INITIATION

Ken Miller, Washington Farm Forestry Association (WFFA), acknowledged that Policy could not reach consensus. He requested the Board approve Policy's recommendations. He offered that Policy has initiated the dispute resolution process over the proposed buffer widths and that this will allow for further discussions and additional outcomes.

Jim Peters, Northwest Indian Fisheries Commission (NWIFC), said Policy spent a lot of energy on the proposed buffer widths and he believes the door is still open for continued work on other parts of the proposal. He said the western Washington tribes could not support the proposal due to the lack of site-specific examples for application. He said they support landowners retaining forestland and not converting, but acknowledged that some small forest landowners have a greater impact to aquatic resources and that the tribes do not want to compromise the fisheries resources.

Elaine Oneil, WFFA, reminded the Board of her testimony last November regarding how WFFA believes Policy committed a process foul in how their science supporting the template proposal was addressed. She said the science should have gone through a CMER review. She said the fact that the former AMPA allowed Policy to address the science track demonstrates some greyness in overseeing the review of the science. She said she hopes the science will be evaluated carefully this time and is hopeful for a better outcome.

Darin Cramer, Washington Forest Protection Association (WFPA), reminded the Board that the PI came to the Board five years ago. He said he has seen many PIs over the years and each time it tends to be handled differently. He believes that the recent AMP responses to PI's have become too unpredictable. He said he supports an effort to refine the AMP process to ensure proposals are accepted consistently and contain the same expectations.

TFW POLICY RECOMMENDATION ON SMALL FOREST LANDOWNER WESTSIDE TEMPLATE PROPOSAL INITIATION

MOTION: Kelly McLain moved the Forest Practices Board accept the TFW Policy recommendation that the Small Forest Landowner Alternate Prescription Template proposal, in whole, does not meet the criteria of a template per the rule standards in WAC 222-12-0403(3).

SECONDED: Ben Serr

Board Discussion:
Board member Guenther said he understands the motion, but wanted to make sure there is room for continued work and confirmation that the effort is not lost.

Engel confirmed that it is the intent of Policy to continue to engage and work on certain specific elements that had been included in the small forest landowner proposal.
Board member Davis said he hopes the viability of small forest landowners is part of the larger discussions with the Center for Conservation Peacebuilding.

Board member McLain said it should be a priority for the Board and Policy to ensure the continuity of the process is consistent so the target does not move.

2
3   **WATER TYPING COMMITTEE UPDATE**
4   Marc Engel, DNR, summarized the Water Typing Rule Committee (Committee) memo dated August
5   6, 2020. He said due to time constraints, the Committee was unable to review and approve their
6   report prior to the meeting. As such, they requested staff prepare a memo outlining the Committee's
7   involvement in overseeing the gathering of additional eastern Washington stream data. He said
8   Committee members would have an opportunity to share their view on the accuracy of the description
9   in the memo. His summary of the Committee's work included their request for the eastern
10   Washington technical team to continue working on evaluating the fish data and the presentation (to
11   the Committee) on the screening process and Qa/Qc results of the 2001 CMER fish data.
12
13   At the August meeting, the Committee discussed and acknowledged that:
14   • The screening process is consistent with how potential habitat breaks (PHB) will be used with the
15   fish habitat assessment method.
16   • It is appropriate to exclude data where the end of fish points are located at an impassable culvert
17   or at a transient woody barrier or where surveys were conducted when fish were seasonally
18   downstream.
19   • The Qa/Qc process is consistent with how the stream data was screened for the initial PHB spatial
20   analysis.
21   • The result brought forward approximately 150 stream points. DNR will have to confirm the
22   points are within areas of high quality lidar and acquire the geo-referenced data from the
23   contractor who performed the initial stream surveys.
24   • Funding will be required to obtain the geo-referenced spatial location for each eligible stream
25   point.
26
27   Engel said the Committee, by a four-to-one vote, moved the screened data forward for the Board's
28   consideration. The Committee acknowledged that the data provided by Yakama Nation and Kalispel
29   Tribe would be included along with the 150 points identified from the CMER data.
30
31   He said DNR received seven responsive bids to perform the anadromous fish floor GIS spatial
32   analysis. A scoring panel selected three finalists for oral interviews. Interviews and reference checks
33   are complete and DNR is in the process of finalizing the award of the contract.
34
35   Committee chair Guenther thanked all those involved in the effort to bring forward additional eastern
36   Washington fish data. He asked Committee members to weigh in on the accuracy of the information
37   in the DNR staff memo.
38
39   Committee member Nelson agreed that the memo's characterization is correct. He reminded the
40   Board that the Qa/Qc process and results do not have consensus from all technical team members. He
41   suggested it is premature to vote on a motion at this time because the spatial data is not currently
42   available and DNR does not have funding to acquire the spatial information.
43
44   Committee member Davis acknowledged that the Committee fully understands that DNR still needs
45   to acquire the spatial data and evaluate additional tribal data, which may result in fewer than 150
46   points. He said he supports advancing the screened data because some of the CMER points does not
47   capture accurate fish distributions such as those conducted late in the season, have blocking culverts
48   or dry stream channels. He said he does not support the concept of more data is better.

1   Committee member Herrera said he was under the impression that the tribal data was included in the
2   Committee motion. He questioned if the tribal data would be enough to supplement the existing 18
3   points without using the 150 CMER points. He said the data does need to be high quality data and
4   said he supports the Committee's recommendation.
5
6   Marc Ratcliff, DNR, said the Yakama Nation provided 20 points and the Kalispel Tribe provided
7   approximately 25 points. He said DNR staff will be able to perform an assessment to see if the tribal
8   data is within areas having high quality lidar and will be able to do the same for the CMER data once
9   the spatial locations are provided.
10
11 Committee member Swedeen said the result of this process is consistent with what the Committee
12 was tasked to do and suggested that the 150 points plus the tribal data is enough for DNR to move
13 forward. She said she views the motion as giving DNR the authority to proceed to begin the next
14 steps for acquiring the information needed to complete the PHB analysis.
15
16 **PUBLIC COMMENT ON COMMITTEE RECOMMENDATION TO ACCEPT**
17 **ADDITIONAL POINTS FOR EASTERN WASHINGTON STREAM DATA SUBJECT TO**
18 **LIDAR SCREENING AND IDENTIFYING GPS POINTS**
19 Darin Cramer, WFPA, referred to his memo dated August 10, 2020 and said he is not in support of
20 the recommendation. He said the discussion seemed to suggest that the tribal data does not need to
21 undergo Qa/Qc review in the same way as the CMER data, which indicates an error in the process.
22 He referenced RCW 79.09.370 which requires an assessment of the effectiveness of rules and said
23 unfortunately, that has never occurred. The lack of clarity for the performance targets and agreement
24 is problematic and is an indication why progress has been slow and why relationships are strained. He
25 urged the Board to have the discussion regarding how performance is measured before progressing
26 any farther.
27
28 Jim Peters, NWIFC, said he supports the on-going work on this topic.
29
30 Steve Barnowe-Meyer, WFFA, said he has some concerns with the motion passed by the Committee.
31 He believes the issues raised by Darin Cramer and Brian Fransen need to be addressed before any
32 additional work continues.
33
34 **COMMITTEE RECOMMENDATION TO ACCEPT EASTERN WASHINGTON STREAM**
35 **DATA**
36 MOTION: Brent Davies moved the Forest Practices Board accept the Board's Water Typing Rule
37   Committee recommendation to use the additional eastern Washington fish data
38   identified in the eastern Washington Qa/Qc technical group screening process and as
39   described in the July 1, 2020 Mendoza memo. Tribal data provided will be evaluated
40   in the same Qa/Qc process similar to how the CMER data was evaluated and added to
41   the potential data used by DNR. The additional potential data will be used by DNR in
42   the potential habitat break spatial analysis.
43
44
45 SECONDED: Paula Swedeen
46
47 Board Discussion:

1   Chair Bernath asked that a friendly amendment be made to add the word 'potential' before the word
2   data in the last sentence.

4   Board member Herrera asked for clarification regarding if the data submitted by Jim Matthews went
5   through the Qa/Qc process.

7   Ratcliff said Matthews used the same Qa/Qc criteria that was used for the 2001 CMER data. He
8   clarified that the Kalispel data has not been evaluated to the degree that was done for the CMER data,
9   but said Ray Entz used a similar screening evaluation.

11 Board member Swedeen suggested adding a sentence to include that a Qa/Qc evaluation be
12 conducted for the tribal data.

14 Chair Bernath suggested that the sentence, 'tribal data provided will be evaluated in the same Qa/Qc
15 process similar to how the CMER data was evaluated and added to the potential data used by DNR'
16 be included in the motion.

18 ACTION: Motion passed (10 support / 1 oppose (Nelson) / 1 abstention (Raines))

20 **RECOMMENDATION FOR NEW CMER MEMBER**
21 Mark Hicks, AMPA, said WDFW has nominated Aimee McIntyre to serve as a voting member on
22 CMER representing WDFW. He presented a summary of her qualifications. He said Aimee and Mark
23 Hayes would be dividing the work on CMER between themselves.

25 **PUBLIC COMMENT ON CMER MEMBERSHIP RECOMMENDATION**
26 Darin Cramer, WFPA, said they are pleased to support Aimee's nomination.

28 **RECOMMENDATION FOR NEW CMER MEMBER**
29 MOTION: Jeff Davis moved the Forest Practices Board approve the nomination of Aimee
30   McIntyre to be a voting member of CMER representing the Washington Department
31   of Fish and Wildlife.

33 SECONDED: Rich Doenges

35 Board Discussion:
36 Board member Davis said he appreciates the public comment made by WFPA and believes that
37 Aimee will help strengthen the AMP.

39 ACTION: Motion passed unanimously.

41 **ADAPTIVE MANAGEMENT PROGRAM BULL TROUT OVERLAY ADD-ON STUDY**
42 Marc Hicks, AMPA, presented the results of the Eastside Bull Trout Overlay (BTO) Add-On Study
43 prepared by Dave Schuett-Hames and Greg Stewart. The study uses an after, control and impact
44 study design to examine changes in stand structure within Type F waters following harvest under the
45 current forest practices rules. Specifically, the study examined changes in stand structure, tree
46 mortality, ingrowth, and wood recruitment over a five-year post-harvest period at 17 sites – eight
47 sites used the standard eastside harvest rule and nine were harvested using the all-available shade
48 protection for bull trout.

1
2 Hicks presented the key results:
3 • The standard rule treatment resulted in the greatest change in riparian stand structure, tree
4 mortality, and short-term wood recruitment compared to the unharvested reference sites.
5 • The responses to the all-available shade treatment were intermediate, but more similar to the
6 reference than to the standard rule treatments.
7 • The standard rule responses, including change in stand structure, tree mortality, and wood
8 recruitment were significantly different from both the all-available shade and reference
9 treatments; but there were no significant differences between the all-available shade and reference
10 responses.
11
12 Hicks said the results of the study do not provide direct evidence on the level of water quality or other
13 aquatic resource protection provided, nor do they show a failure to meet established performance
14 objectives. He concluded by saying that after reviewing and deliberating on the study findings, Policy
15 agreed by consensus to recommend the Board take no formal action in response to this study.
16
17 **PUBLIC COMMENT ON BULL TROUT OVERLAY ADD-ON STUDY**
18 None
19
20 **ADAPTIVE MANAGEMENT PROGRAM BULL TROUT OVERLAY ADD-ON STUDY**
21 MOTION: Jeff Davis moved the Forest Practices Board accept the Bull Trout Overlay Add-On
22   study as a final report and TFW Policy's recommendation to take no action at this
23   time.
24
25 SECONDED: Dave Herrera
26
27 Board Discussion:
28 None.
29
30 ACTION: Motion passed unanimously.
31
32 **GENERAL PUBLIC COMMENT**
33 Darin Cramer, WFPA, said their caucus had anticipated a more proactive approach for
34 communication and coordination from the agencies regarding the Northern Spotted Owl (NSO)
35 Board actions, particularly within the North Blewett Spotted Owl Special Emphasis Area (SOSEA).
36 He encouraged that better coordination with landowners occur in the future.
37
38 Ken Miller, WFFA, said now that their alternate plan template proposal moved into the formal
39 dispute resolution process, it is unlikely the Board will receive any additional recommendations on
40 this proposal until February 2021 at the earliest. He said they still believe in the process, so they have
41 continued to be agreeable to all the delays that seemed to have some potential for resolution within
42 the dispute resolution process. He said he is hopeful this will all matter and will be demonstrated by
43 bringing the Board a consensus recommendation.
44
45 Jim Peters, NWIFC, said he is in the process of getting approval from the Northwest Indian Fish
46 Commissioners to participate in a multi-caucus approach to educate legislators on the AMP
47 processes. He said everyone needs to work together to ensure the importance of the AMP is
48 conveyed so that monies are not taken away from one year to the next. He encouraged all caucuses to

1   strategize and work with all the state agencies to organize meetings with legislators. He also
2   encouraged stakeholders work to engage their principals to support the current momentum for
3   improved collaboration and efficiency.
4
5   Chris Mendoza, Conservation Caucus, clarified a few inconsistences in WFPA's memo dated August
6   10, 2020. He said technical participants had indeed reached consensus on the process to define fish
7   habitat and used the example of the multi-caucus concept for the fish habitat assessment. Speaking to
8   the eastern Washington fish data Qa/Qc, he said his initial screening process using the list of criteria
9   eliminated all but 26 available points, not more than half as the memo states. Only after a more
10   detailed screen assessing permanent barriers, late season surveys and gradients greater than 20%
11   above the last fish, did the effort provide the additional 125 points. He said he believes the screening
12   process is consistent with this fish habitat definition in rule, in that the criteria used for the Qa/Qc fits
13   not only the intent of the rule, but also guidance for conducting protocol electrofishing surveys. He
14   concluded by suggesting that the screening process used to identify additional fish data eliminates
15   introduced bias, not maximizes bias as the memo suggests.
16
17   (Provided at a later time in meeting) Kara Whitaker, Washington Forest Law Center, thanked the
18   North Central Washington Audubon Society for raising important NSO rule concerns. She said that a
19   number of issues with the forest practices rules have been known since at least 2005. She said one of
20   the primary ongoing concerns with the adequacy of the habitat definition and the strict interpretation
21   during a Forest Practices Applications (FPA) review is that the critical habitat definition was intended
22   to be interim. She said viable strategies for landscape management are needed to support the few
23   remaining owls. She requested DNR and WDFW explain what conservation options are being
24   developed for the North Blewett SOSEA and requested DNR report when it will reconvene the
25   Northern Spotted Owl Implementation Team (NSOIT) and when the Safe Harbor Agreement work
26   will be completed.
27
28   **ADAPTIVE MANAGEMENT PROGRAM BUFFER CHARACTERISTICS, INTEGRITY,**
29   **AND FUNCTION (BCIF) (WESTSIDE TYPE NP) STUDY**
30   Mark Hicks, AMPA, presented the results of the BCIF Study. He said the study was conducted to
31   evaluate the effectiveness of westside Type Np rule prescriptions. The objective was to determine the
32   magnitude and duration of change in riparian stands and riparian functions including change in
33   riparian stand structure, tree fall and wood recruitment, shade and stream-bank disturbances. The
34   study used an after, control and impact study design on 17 randomly selected sites along Type Np
35   streams.
36
37   Hicks said each treatment site contained a mixture of three prescriptions allowed under the westside
38   Type Np riparian rules. This included an evaluation of the unbuffered Np stream segments, the 50-
39   foot no-cut segments, and the 56-foot no-cut radius around perennial initiation points (PIP). They
40   also monitored reference sites where harvesting did not occur.
41
42   Hicks presented the study's key findings:
43   • The first five years post-harvest showed a decrease in density and basal area in the three treatment
44   sites due to tree mortality exceeding ingrowth of young trees (cumulative mortality as a
45   percentage of live basal area was 48.1% in PIP stands, 27.2% in no-cut buffer stands and 9.4% in
46   reference stands)

1   •   Tree fall and wood recruitment was driven by mortality with the highest rates five years post-
2   harvest and cumulative recruited wood in the buffer sites and PIP reaches was found to be four
3   times the reference volume.
4   •   Canopy closure was lower in the no-cut buffers (76%) and PIP (52%) reaches compared to the
5   reference reaches (89%) one year post-harvest and by year 10, canopy closure in the buffered
6   sites and PIP reaches increased to over 85%, which was similar to reference conditions.
7   •   All buffered and PIP reaches met the performance target (<10% of the equipment limitation zone
8   area with soil disturbance) – only one of eight clear-cut segment sites exceeded the 10% target.
9
10 Hicks said although the study does not provide direct evidence about the effects of application of
11 westside riparian rules on water quality or other aquatic resource protections, it can be used in
12 conjunction with other studies as deliberations continue about whether or not there is a need to
13 modify rules applicable to Np riparian management zones. He concluded by saying Policy agreed by
14 consensus not to recommend the Board take any formal action in response to the study.
15
16 Board member Nelson asked if any of the 50-foot Np rule buffer segments applied on either side of
17 the stream were associated with unstable areas.
18
19 Hicks confirmed that unstable areas were avoided in order to test the standard buffer rule.
20
21 Chair Bernath asked if the shade recovery on the clear-cut segments was a result of brush or tree
22 growth in the riparian zone.
23
24 Hicks stated that brush was the primary factor, but they found young trees providing shade towards
25 the end of the 10-year study period.
26
27 Board member Doenges asked if blow-down was concentrated in a few sites and if there are
28 comments about those site factors.
29
30 Hicks replied that he does not recall the study addressing contributing factors at specific sites and
31 added that blow-down occurred in a small number of sites. He said developing an overall summary of
32 related studies might show that a smaller percentage of sites consistently tend to have significant
33 blow-down.
34
35 **PUBLIC COMMENT ON BCIF STUDY**
36 None
37
38 **ADAPTIVE MANAGEMENT PROGRAM BCIF STUDY**
39 MOTION: Kelly McLain moved the Forest Practices Board accept the Buffer Characteristics,
40   Integrity and Functions study as a final report along with TFW Policy's
41   recommendation to take no action at this time. The Board recognizes this is one of the
42   studies that will be used by the TFW Policy's Type N Workgroup.
43
44 SECONDED: Tom Nelson
45
46 Board Discussion:
47 None
48

1   ACTION: Motion passed unanimously.
2
3   **STATUS OF NSO CONSERVATION OPPORTUNITIES FOR THE HABITAT AROUND**
4   **THE OWL PAIR WITHIN NORTH BLEWETT SOSEA**
5   Mary McDonald, DNR, reported that a landowner proactively completed a forest vegetation plot
6   inventory to assist DNR with a NSO habitat evaluation. She said DNR coordinated with Gary Bell
7   (WDFW) to complete a habitat assessment based on the landowner's forest stand inventory. The
8   information confirmed that the area in question met the parameters for NSO habitat. She stated that if
9   forest practices activities within the SOSEA are proposed within designated critical habitat and
10 within an owl circle that is below the minimum habitat threshold, the activity would result in the
11 Forest Practices Application (FPA) being classed in a Class IV-Special classification.
12
13 Gary Bell, WDFW, stated that one of his responsibilities in the Forest Habitats Section is screening
14 FPAs for potential impacts to owls. He said the landowner submitted vegetation plot data to assist in
15 determining if the forest stand met the definition of habitat. The stand was previously typed as young
16 forest marginal, closed canopy habitat. The additional information submitted confirmed that the stand
17 did indeed meet the definition of NSO habitat. Since the owl circle is below the minimum 40%
18 habitat threshold, no suitable habitat within the owl circle would be available for harvest unless the
19 applicant went through SEPA review. He said that the landowner and the US Forest Service detected
20 a male and female spotted owl (separately) near the NSO site center, but there was no confirmation of
21 nesting or breeding success.
22
23 McDonald said that since the area meets the criteria for a critical habitat designation, it would be
24 eligible for a conservation easement under the Rivers and Habitat Open Space Program. She
25 reiterated that this particular landowner is proactive in working with DNR through pre-application
26 reviews prior to submitting FPAs that could affect NSO habitat.
27
28 Board member Swedeen asked if there is an assessment of the total amount of habitat acres within the
29 site circle, which would be necessary information for considering FPAs proposed that were classed as
30 IV-Special and reviewed under SEPA.
31
32 Bell said the current amount of suitable habitat in the particular owl circle is 1,823 acres, which is
33 below the minimum threshold level.
34
35 **PROPOSED OUTLINE FOR EVALUATING THE NORTH BLEWETT SOSEA**
36 Mary McDonald, DNR, reminded Board members that at the May 13, 2020 meeting, the Board
37 requested staff work on an [assessment plan for the North Blewett SOSEA](#) to see if it is successfully
38 achieving the SOSEA goals. She said that Gary Bell and Joe Buchanan (WDFW) and she developed
39 the proposed outline. This type of assessment would serve as a pilot and they are open to input and
40 direction from the Board. She said the proposal contains three essential parts: an overview of the
41 Forest Practices rules, what is and is not included in the assessment and an estimated timeline for
42 completion and resources needed.
43
44 Joe Buchanan, WDFW, said the assessment would begin with a brief overview of the NSO rules
45 including a discussion on the conservation goals for the landscape. The assessment would also
46 include a discussion of when forest practice applications must be reviewed under SEPA, and the
47 definition of critical habitat.
48

1   Board member Swedeen asked for clarification of demographic support in relation to site-by-site
2   provisions and landscape management strategies for consistent reproduction. She asked that the
3   assessment include a discussion about the differences between landscape maintenance of owl
4   populations to provide demographic support versus the potential for falling short of the goal when
5   done by site-by-site management.
6
7   Buchanan agreed that more discussion of these differences could be added to the assessment on a
8   conceptual basis.
9
10 McDonald acknowledged that the Board asked for a 25-year assessment, but said that comprehensive
11 records do not extend back that far because forest practice applications have a retention schedule of
12 only ten years under the public records policy.
13
14 Buchanan said to ensure there is a clear understanding of expectations, they wanted to identify topics
15 they believe would not be helpful. They propose to exclude from analysis: forest management
16 activities on federal lands; conservation agreements such as habitat conservation plans or safe harbor
17 agreements; strategies for managing barred owls; and forest disturbances such as impacts from
18 insects, disease or fire.
19
20 Bell explained how DNR uses WDFW GIS information during the FPA screening process within
21 SOSEAs to identify potential issues. The initial screen determines if the proposed harvest is within
22 NSO habitat located within a median home range circle. If it is not, the proposal is usually a Class III
23 FPA. If the proposed activity is within a circle and within qualifying habitat, the next step is to
24 determine if at least 40% of the circle meets habitat. If the circle is above 40% and excess habitat is
25 available, harvesting can occur and the activity is classed as Class III. If it is below the 40% threshold
26 and there is no excess habitat available, and if the landowner proposes to remove habitat, the activity
27 is classified as Class IV-Special.
28
29 Bell provided an overview of the FPA review process and follow-up site inspections. DNR
30 encourages landowners to conduct a pre-application review before submitting an FPA related to owl
31 habitat. When the stand is in question of meeting habitat criteria, DNR and WDFW requests that the
32 landowner collect vegetation plot data and provide the data to help DNR and WDFW determine the
33 correct habitat determination. An interdisciplinary team on-site meeting helps confirm stand
34 characteristics, and the appropriate course of action is then taken by DNR as it evaluates an FPA
35 proposal.
36
37 McDonald said the assessment will also include scenarios of when field inspections of landowner
38 data indicated a habitat typing change or when an area was excluded from an FPA – the review
39 includes about 62 FPAs. She said they are sharing the outline to give the Board an idea how they
40 intend to address the Board's request for an assessment. She confirmed that they can complete the
41 assessment as proposed by February 2021 using existing staff.
42
43 Board member Swedeen asked for more clarification on how they propose to determine success for
44 meeting SOSEA goals given that circle management is the typical process. She believes that circle
45 management may be leading to an erosion of the amount of habitat over time. She asked if the group
46 could determine if, in the absence of landscape planning, application of the current rules are putting
47 the SOSEA on a trajectory towards meeting the goal of demographic support when a particular
48 landscape may never have enough habitat.

Buchanan said they have information from landscape modeling which was done to evaluate best opportunities for conservation strategies. The results showed that having more habitat – both within circles and within the landscapes – is beneficial to NSO. There would also need to be the addition of management of barred owls in order to lead to a general increase in abundance of NSOs. He said, however, that without landowners implementing voluntary strategies, DNR is obligated to implement "circle management" as directed by the applicable rules.

Board Chair Bernath suggested that the NSOIT could also address some of these issues up at upcoming meetings.

Board member Davies agreed the landscape level assessment could be addressed by the NSOIT. She suggested that the goal of NSO recovery should involve expanding more conservation options and incentives. She asked if current discussions with the landowner are occurring.

Chair Bernath said the current discussion with the landowner is related to whether the stand meets habitat definition and since it does, what options exist for conservation – the best option now seems to be the RHOSP. He said landscape-planning incentives is under the purview of the NSOIT.

Board member Davis suggested that the Board needs to figure out a more global way to provide resources and opportunities for landowners. He offered that WDFW could reach out to the Natural Resources Conservation Service to see what incentive options might exist.

Board member Nelson agreed with an investigation of potential landowner incentives. He questioned how those options would play out given the barred owl influence within NSO habitat.

Buchanan said the US Fish and Wildlife Service (USFWS) is putting together a barred owl strategy, which will include a landscape evaluation. He said he plans to follow up with USFWS.

Board member Guenther said he hopes the priority for barred owl management is within areas of known NSO habitat.

To recap, Chair Bernath acknowledged that Buchanan agreed to add to the assessment a discussion on the landscape approach and circle management practices for reaching SOSEA goals. He suggested that if stakeholders would like to submit additional concepts for the analysis they should reach out to McDonald with suggestions.

STAFF REPORTS
Board member Davis recognized Gary Bell's efforts in working with landowners on voluntary wildlife plans. He highlighted the successes with butterfly conservation efforts.

There were no questions regarding the following reports:
- Adaptive Management Program Update
- Small Forest Landowner Office Update
- Upland Wildlife Update
- Technical Type Np Workgroup Quarterly Report
- Taylor's Checkerspot Butterfly Biennial Report
- Western Gray Squirrel Annual Report

1
2   **2020 WORK PLAN**
3   Marc Engel, DNR, described the Board's completed projects for 2020 and several on-going projects
4   that will be carried over to 2021 within the AMP.
5
6   MOTION: Bob Guenther moved the Forest Practices Board approve the 2020 work plan as
7   amended.
8
9   SECONDED: Ben Serr
10
11   Board Discussion:
12   None.
13
14   ACTION: Motion passed unanimously.
15
16   Meeting adjourned at 2:20 p.m.

**DEPARTMENT OF
NATURAL RESOURCES**

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MEMORANDUM

TO: Forest Practices Board

FROM: Patricia Anderson, Rules Coordinator

DATE: October 19, 2020

SUBJECT: Expedited Rule Making to Correct Typographical Errors and Add Minor
            Clarification

On November 12, staff will request the Board's approval to file a CR-105 *Expedited Rule Making* with the draft language listed in the attached table. These rule changes qualify for expedited rule making under RCW 34.05.353 because the amendments are simple corrections of typographical errors, additions of clarifying language, or incorporation of other agencies' regulations or statutes for reference.

Expedited rule making does not require public hearings or economic analyses. Under expedited rule making, rules may be adopted if no written objections are filed within 45 days of the date they are published in the Washington State Register. Staff will likely seek your approval for adoption at your February 2021 meeting, pending any written objections.

If you have any questions please let me know.

PAA/
Attachment

WAC & Description of Issue	Proposed Change
1 222-08-010 **Spell out DNR.** DNR is defined in the WAC that follows this one.	**WAC 222-08-010 Purpose.** The purpose of this chapter is to describe the forest practices board, its organization and administrative procedures, and to provide rules implementing RCW 34.05.220 and chapters 42.52 and 42.56 RCW. The purpose of this chapter is also to set out department <u>of natural resources</u> procedures for administration of the forest practices regulatory program.
2 222-08-032(6) **Correct paragraph #.**	**WAC 222-08-032 Function, organization, and office.** . . . (6) Staff support is provided to the board as provided in RCW <u>76.09.030</u>(~~6~~5). Staff shall perform the following duties under the general authority and supervision of the board: . . .
3 222-12-030(5) **Correct RCW reference.**	**WAC 222-12-030 Application information and classes of forest practices.** . . . (5) In certain emergencies as defined in RCW <u>76</u>.09.060(7), the application or notification may be submitted within forty-eight hours after commencement of the practice.
4 222-16-080(1)(f)(i) **Correct subsection reference.**	**WAC 222-16-080 Critical habitats (state) of threatened and endangered species.** . . . (f) Northern spotted owl (*Strix occidentalis caurina*). (i) **Within a SOSEA boundary** (see maps in WAC <u>222-16-086</u>), except as indicated in (~~h~~f)(ii) of this subsection, harvesting, road construction, or aerial application of pesticides on suitable spotted owl habitat within a median home range circle that is centered within the SOSEA or on adjacent federal lands. . . .
6 222-16-080(1)(g) **Correct name of agency**	(g) Pacific pond turtle . . . documented by the department of <u>fish and</u> wildlife.
7 222-20-017(4) **Correct WAC reference to WDFW rules**	**WAC 222-20-017 *Applications that include forest practices hydraulic projects.** . . (4) **Review of forest practices hydraulic projects involving Type S and F Waters by the department of fish and wildlife.** The department of fish and wildlife's review of forest practices hydraulic projects is guided by WAC ~~220-110-085~~<u>220-660-060</u>, and summarized in (a) and (b) of this subsection: . . . (b) Concurrence review.

WAC & Description of Issue	Proposed Change
	(i) The following project types involving Type S and F Waters are subject to the department of fish and wildlife conducting a concurrence review according to the process outlined in WAC ~~220-110-085~~220-660-060(3): . . .
8 222-21-030(2)(d) **Clarify required documentation.** Removing "is harvested" is because qualifying timber is defined as trees that are required to be left after a harvest.	**WAC 222-21-030 Documentation and standards.** . . . (2) **Forestry riparian easement application.** . . . (d) Documentation that qualifying timber ~~is harvested,~~within or immediately adjacent to, or physically connected to a commercially reasonable harvest area, cannot be harvested because of forests and fish rule restrictions, or is uneconomic to harvest because of forests and fish rule restrictions. See WAC 222-21-032 for additional information about these eligibility criteria. The small forest landowner office may require additional information from the applicant to process the application and evaluate the eligibility of the proposed easement premises and the landowner. . . .
9 222-21-032 (4)(d) and (5)(d) **Clarify paragraphs.**	**WAC 222-21-032 Eligibility criteria**. . . . (4) Commercially reasonable harvest. The small forest landowner office will consider the following criteria to determine if an area covered by a forest practices application involves a commercially reasonable harvest. The proposed harvest must meet all five of the following requirements: . . . (d) The value of the timber in the harvest unit, excluding qualifying timber, equals or exceeds one thousand dollars~~, which is the minimum required by department of revenue for taxing purposes~~; and . . . (5) Commercially reasonable harvest is not possible. The small forest landowner office will consider the following criteria to determine if a forest practices application for harvest may qualify for the forestry riparian easement program because it involves an area where a commercially reasonable harvest is not possible. The proposed harvest must meet all four of the following requirements: . . . (d) The value of the qualifying timber equals or exceeds one thousand dollars~~, which is the minimum required by the department of revenue for taxing purposes~~.

WAC & Description of Issue	Proposed Change
10 222-21-045 (1)(b)(iv) **Clarify paragraph.**	**WAC 222-21-045 Valuation.** Existing language. (1)(b)(iv) The department determines the values of the timber species that exist in the easement premises will be valued, not the species in the harvest area. The timber species indepartment determines the easement premises will be valuedvalue by multiplying the determined cruise volume of qualified timber in the easement premises by the appropriate stumpage value of those species shown on the appropriate table used for timber harvest excise tax purposes per RCW 84.33.091. . . .
11 222-22-080 (3)(b) **Delete unnecessary comma.**	**WAC 222-22-080 *Approval of watershed analysis.** . . . *(3) The department shall approve the draft watershed analysis unless it finds: (a) For any level 1 assessment or level 2 assessment, that: (i) The team failed in a material respect to apply the methodology, indices of resource condition, or checklists set forth in the manual; or (ii) A team meeting the criteria promulgated by the department and using the defined methodologies, indices of resource conditions, and checklists set forth in the manual could not reasonably have come to the conclusions identified in the draft level 1 or level 2 assessment; and (b) The prescriptions, will not accomplish the purposes and policies of this chapter and chapter 76.09 RCW. . . .
12 222-30-020 (7)(d) **Correct subsection reference.**	**WAC 222-30-020 *Harvest unit planning and design.** . . . (7) (d) If the conditions described in (a) and (b) of this subsection are met, the distribution requirements for wildlife reserve trees and green recruitment trees (subsection (1112)(e) of this section) are modified as follows: For purposes of distribution, no point within the harvest unit shall be more than one thousand feet from a wildlife reserve tree and green recruitment tree retention area. . . .

DEPARTMENT OF
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October 22, 2020

TO: Forest Practices Board

FROM: Marc Engel, Senior Policy Planner, Forest Practices Division

SUBJECT: Northern Spotted Owl Conservation Advisory Group Update

The Forest Practices Board is required, per WAC 222-16-010, to annually determine whether the Northern Spotted Owl Conservation Advisory Group continues to be needed for spotted owl conservation. This group is convened when the Washington Department of Fish and Wildlife approves a northern spotted owl protocol survey demonstrating the absence of owl detections within the habitat supporting an owl site center. When convened, the group evaluates if the owl habitat needs to be maintained in support of northern spotted owl recovery.

Since the August 2019 status report, there were no northern spotted owl surveys submitted to WDFW for review and approval; as such, the group was not convened.

I will be requesting you confirm the Board's support of the Northern Spotted Owl Conservation Advisory Group at the upcoming November meeting.

Should you have any questions please feel free to contact me at marc.engel@dnr.wa.gov.

ME

M E M O R A N D U M

DATE: **21** October 2020

TO: Forest Practices Board

FROM: Garren Andrews, Compliance Monitoring Program Manager

SUBJECT: Compliance Monitoring Program 2018-2019 Biennial Report

Attached is the 2018-2018 Forest Practices Compliance Monitoring biennial report.

The 2018-2019 Compliance Monitoring Program biennial report contains data analysis and interpretation, and trend analysis of the nine standard sample prescriptions, and Unstable Slopes for the 2018-2019 sampling window. Trend analysis was conducted to detect compliance trends on data collected from 2010-2019.

2018-2019 Biennium Forest Practices Compliance Monitoring Report

···

October 2020

2018-2019 Biennium Forest Practices Compliance Monitoring Report

Table of Contents

1. Acknowledgments

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; Pete Grebowski, Chris Briggs, Chris Johnson, Wendy Neet, Jason Graham, Bob Penhale, and Brett Raunig. Also thanks to Donelle Mahan and Joseph Shramek who patiently reviewed various drafts. Finally, the Compliance Monitoring Program will always owe a debt of gratitude to Walt Obermeyer for all his hard work in helping guide the program.

2. Executive Summary

The Compliance Monitoring Program (CMP) is a key component of the Washington State Department of Natural Resources (DNR) Forest Practices Program (FP Program). Compliance monitoring is linked to DNR's responsibility to ensure that operators and landowners follow forest practices administrative rules (FP rules) when they conduct forest practice activities. Monitoring provides feedback to the FP Program about the pattern of on-the-ground compliance with forest practices rules and shows areas where there is a need for focus, training, guidance, or clarification.

The CMP informs the FP Program by providing an objective assessment of rule compliance. 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]). The CMP does not report on *effectiveness* of the rules; that responsibility lies with the Adaptive Management Program's Cooperative, Monitoring, Evaluation, and Research (CMER) committee.

This biennial CMP report covers data samples collected during the calendar year 2018 and 2019 field seasons. Two years are needed to obtain enough data to attain the desired level of statistical precision. The data from the 2018 and 2019 field seasons have been combined to satisfy the desired precision for statistical estimates.

Forest practices rule compliance is prioritized for evaluation based on which rules are considered to have the greatest potential adverse impact on public resources, which include water, fish, wildlife, and capital improvements of the state and its political subdivisions (defined in RCW 76.09.020(25)). The evaluated rule groupings pertain to riparian and wetland areas and to road construction and maintenance.

Sample Design and Methodology

For monitoring and appropriate statistical sampling, individual FP rules are grouped into categories of similar rules called "prescriptions." Separate samples are chosen for each prescription type that is monitored. The overall sample population for compliance includes forest practices applications (FPA/N) activities, such as timber harvest or road construction. The sample population for each prescription type consists of a subset of FPA/Ns containing the prescription. FP rules monitored annually are referred to as the Standard Sample.

The Standard Sample monitors the following rules:

- Riparian protection (WAC 222-16-031, 222-30-021 and 022)
- Wetland protection (WAC 222-16-031, 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)

The standard sample prescriptions monitored in the 2018-2019 biennium include: Roads, type A and B Wetlands, Forested Wetlands, No Inner Zone Harvest (NIZH), Desired Future Condition

Option 1 (DFC1), Desired Future Condition Option 2 (DFC2), Non-Fish-Bearing Perennial Waters (Np), and Non-Fish-Bearing Seasonal Waters (Ns).[1]

The CMP assesses the alignment of water and wetland typing documented on the FPAs with observations and measurements taken at a study site (WAC 222-16-031 & WAC 222-16-035). The physical parameters (for example, stream width, stream gradient, etc.) are recorded for all waters and wetlands on site to make this comparison.

Additional samples are included periodically to ensure non-standard sample rule groups are evaluated periodically. For this report, the CMP conducted a "potentially unstable slopes emphasis study" to evaluate compliance with the FPA/N.

Study Design

The CMP modified the 2014-2015 compliance study design to increase precision in statistical estimates for each prescription type observed. In preceding biennia, compliance rates were estimated by dividing fully compliant samples by the total number of samples for each prescription type. The current 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 approach changes the interpretation of compliance, increases statistical precision in results, and provides more information to help determine causes of noncompliance associated with rule interpretation and implementation.

The improved precision increases our ability to observe changes in compliance rates over time. The study 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. Further modifications include combining the No Inner Zone Harvest and No Outer Zone Harvest prescriptions to address rule overlap.

Trend analysis is used to assess varied rates in prescription and individual rule compliance over time. Data collected from 2010-2015 for the standard prescription types were converted to be consistent with current data collection and analytical protocols. Weighted least squares linear regression analysis was used to predict general trends in average prescription compliance through time.

Findings

Prescription Type	Compliant Rules	Evaluated Rules	Compliance Percentage
RMZ — Type Np Prescriptions	116	121	96%
RMZ — Type Ns Prescriptions	32	32	100%
RMZ — Type S or F No Inner Zone Harvest	126	129	98%
Forested Wetlands	33	34	97%
Type A and B Wetlands	164	172	97%
Western WA RMZ — Type S or F Inner Zone Harvest DFC2	80	84	95%
Western WA RMZ — Type S or F Inner Zone Harvest DFC1	130	141	92%
Roads	125	127.4	98%
Haul Routes	64.6 miles	66.8 miles	96%

The 2018-19 rule prescription compliance rates range from 92-100%, indicating generally high compliance with the forest practices rules selected for monitoring. Findings from the 2018-2019 sampling season are reported in Sections 5, 6, 7, 8, and 9 of this report.

Water Typing

During the 2018-19 biennium, the CMP evaluated 175 riparian-related prescriptions involving typed water or wetlands. The number of typed water and wetlands that were either accurately typed (164) or overtyped (protected) (3) totaled 167 compliant water types for a 95 percent compliance rating.

The compliance monitoring field team found discrepancies in eleven (equivalent to percent) typed waters or wetlands it observed in 2018-19. Seven waters were under-classified, or 4.0 percent of the 175 observed waters or wetlands. This means that 4.0 percent of the observed waters or wetlands may have received less protection than provided by Forest Practices Rules due to the misclassification error. Three waters or wetlands were over-classified, or 1.7 percent of the 175 observations. This means that 1.7 percent of the observed waters or wetlands may have received more protection than required by the Forest Practices Rules. There was 1, or 0.5 percent, indeterminate water typing observation of waters or wetlands.

- Seven waters were underclassified: 2 A wetlands, 4 B wetlands, and 1 forested wetland.
- Three waters were overclassified: 1 A wetland, 1 B wetland, and 1 Np.
- One water was indeterminate: 1 Ns.

Additional relevant data and results for water and wetland typing are located in Section 5.

Unstable Slopes

The Unstable Slopes FPA/N compliance sample was implemented in fall 2019. The Unstable Slopes Sample resulted in a compliance rate of 98%. Additional relevant data and results for unstable slopes are located in Section 9.

Trend Analysis

Trends of improving compliance were observed for four prescription groups and there are no trends showing declining compliance. Statistically significant trends were not observed for most of the prescription groups. Trends of year-to-year increasing prescription compliance rates (statistically significant at a two-tailed alpha-level of 0.10) were observed for DFC1 (compliance rates rose from 91% during 2010/2011 to 92% during 2018/19), DFC2 (compliance rates rose from 92% during 2010/2011 to 95% during 2018/2019)), NIZH (compliance rates rose from 90% during 2010/2011 to 98% during 2018/2019), and Ns (compliance rates rose from 96% during 2010/2011 to 100% during 2018/19). No statistically significant trends of decreasing prescription compliance were observed. Trend analysis is not performed on water typing data. Additional relevant data and results for trend analysis are located in Section 7.

Changes Made Based on CMP Results

An important goal of the CMP is to identify gaps in rule compliance and to try to understand why they exist. This helps the forest practices program develop training and education activities aimed at improving the rate of on-the-ground rule compliance in future forest practices activities. The following are some recent and on-going forest practices program adjustments aimed at addressing issues identified through compliance monitoring results:
- Forest Practices Board Manual modifications per clarification are currently being considered for guidance about outer zone leave tree, DFC, and RMZ length per sinuosity.
- Updates to the Forest Practices Application/Notification form and instructions for wetlands were implemented in October 2018.
- Forest Practices wetlands trainings regarding WAC interpretation and application have been updated to reflect Compliance Monitoring findings.

3.   Introduction

Photo by: Garren Andrews

Compliance monitoring is a component of the Washington State Forest Practices Program. Section 3 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, "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 CMP 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: 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. 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 DNR Forest Practices assistant division manager for operations directs the Compliance Monitoring Program. The program staff includes a program manager and a field coordinator, along with funded participation of 0.65 full-time staff person from the Washington State Department of Ecology. As of September 2017, the Washington Department of Fish and Wildlife has ceased Compliance Monitoring field participation because of budgetary issues. Tribal biologists and other Forest Practices staff provide additional assistance.

Reports

Field sampling of completed FPA/Ns occurs annually and findings are presented in a biennial report as required by WAC 222-08-160(4). This present report is a biennial CMP report and covers data samples collected during the 2018 and 2019 field seasons. The data have been combined to produce the desired precision for statistical estimates and resultant comprehensive findings, conclusions, and recommendations in this biennial report.

Forest Practices Activities and Prescriptions

All forest practices activities such as timber harvest and forest road construction 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.

Example: Forest practices activities such as road construction and timber harvest are evaluated based on the methods to implement a particular activity. Timber harvest in the riparian management zone has multiple models for desired future conditions (DFC) (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 provides the Forest Practices Program with 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 of prescription

compliance rates. This number of samples is then visited by the compliance monitoring field team for each of the FP rule prescription types over the course of the biennium.

Compliance

Each FPA/N is observed for compliance with two 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/N. The first is called "rule compliance" and the second is called "FPA/N compliance." The compliance monitoring field team finds that a deviation on an FPA/N can occur in one of the following three ways:

1) *The conditions on the ground are in compliance with FP rules but not with the FPA/N.* For example, a landowner/applicant states on the FPA/N that he or she will leave an RMZ along the entire 1,000-foot length of the Np waters 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 waters to be buffered. However, the 700-foot buffer is not in compliance with what the landowner stated would be done on the FPA/N.

2) *The conditions on the ground are in compliance with the FPA/N but deviate from the FP rules.* For example, a landowner/applicant incorrectly measures the width of the stream in the FPA/N area and states on the FPA/N 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 activity has deviated from FP rules but complies with what the landowner stated on the FPA/N.

3) *The conditions on the ground deviate from both the FP rules and the FPA/N.*

The main role of the CMP is to determine on-the-ground compliance with FP rules (rule compliance). Understanding a deviation from the FPA/N, or "FPA/N compliance," will help DNR determine what improvements should be made in FPA/N forms, FPA/N application instructions, or in other methods of landowner outreach and education. Knowledge of the type of deviation helps to inform the efforts of the FP Program to improve understanding of the rule to influence rule compliance.

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 (it focuses on two landowner groups: small and large forest landowners).

- Focus on individual regions and compliance specific to that region (it focuses on statewide rule and FPA/N compliance).
- Tracking rule violations. When field reviewers encounter rule violations, the appropriate DNR regional staff is notified for further review.
- Modification of water types. Field reviewers' record observed differences between water type documentation on FPA/Ns and physical channel features. See Section 5.1.

3.3   Forest Practices Rules

Considered broadly, FP rules provide protection for many riparian and upland species and their forest habitat, as well as water quality protection. Currently, compliance monitoring focuses on rules that protect habitat for aquatic and riparian species. These rules include:

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

Available funding and associated staffing levels impede the CMP's ability to monitor with statistical precision all FP rules that might affect the habitat of aquatic, riparian, and upland species. The CMP therefore prioritizes rule sampling based on the potential to adversely impact public resources.

The following are the prioritized rules chosen for sampling during the 2018-2019 field seasons.

Standard Sample

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

- Riparian rules — Western Washington and Eastern Washington RMZ rules (WAC 222-16-031, 222-30-021 and 022)
- Road construction and maintenance rules (WAC 222-24)
- Wetland rules (WAC 222-16-031, 222-30-020[6] and [7]; and WAC 222-24-015)
- Haul routes (WAC 222-24) for sediment delivery

Trend Analysis

For 2010-2019 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. 2010-2015 data). If compliance for a particular rule was:
- not assessed in accordance with current protocols,
- incomplete, or
- un-convertible.

The rule was not included in the trend analysis dataset. Data are combined and compared through time within each corresponding prescription type. Trends in average compliance within prescriptions and individual rule compliance are tracked based on current methods.

Additional sampling

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

During the 2019 sampling period, unstable slopes were sampled for FPA compliance. Unstable slopes will be sampled again in 2021 and reported on in the 2021-2022 biennial report.

4. Compliance Monitoring Design and Methodology

Photo by: Chris Briggs

The Compliance monitoring study 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 sample population is the set of approved forest practices applications (FPA/Ns) that had completed forest practices activities and expired between April 1, 2019, and March 31, 2021. Each FPA/N states all of the forest practices activities that the landowner is authorized to implement. This information allows the compliance monitoring field team to locate FPA/Ns that list the particular FP rule prescriptions sampled in a given year. The sample population for each prescription type is the subset of FPA/Ns that contains the prescriptions being evaluated.

Landowner Reporting 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. Confidence intervals 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 FPA/Ns for sample selection. Therefore, population sizes are determined by the frequency of individual prescriptions that occur as part of completed FPAs.

There are thousands of active (not expired) FPA/Ns every year because the majority of FPA/Ns have three years to be completed. Each FPA/N has an expiration date set based on date of receipt. For this report, all active FPA/Ns were available to be selected by setting sample dates for FPA/Ns that expire between April 1 of the preceding year and March 31 of the sample year. This timeframe increases the likelihood that the forest practices operations are complete before the primary compliance monitoring sampling months (February through November), and the compliance monitoring field team is given the opportunity to visit the site before the FPA/N expires.

For the 2018-19 sample population, this included 2,772 FPA/Ns in 2018, and 2,920 FPA/Ns in 2019 (included forest practices notifications; see Glossary).

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

All FPA/Ns in the population are ordered by the random number given, and categorized by region. Division staff review FPA/Ns in the order assigned for monitored activities that are completed. Region staff assess if the activities identified in the FPA/N have been completed. FPA/Ns that do not include monitored activities and FPA/Ns that are not complete are deleted from the population. Sample sizes are determined based on proportion to region population size for each prescription type.

For each riparian prescription, the population to be sampled consists of FPA/Ns that include that prescription. In some cases, a single FPA/N contains several of the same riparian prescription type. When this happens, one prescription implementation is randomly selected for assessment. Table 1 lists the Standard Sample prescriptions monitored in 2018 and 2019.

For roads prescriptions, compliance with a single rule on an FPA/N 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 percentage or ratio (a number between 0 and 1).

Example: If a single rule is applied 6 times on one FPA/N and is compliant 5 out of 6 times, the compliance is 0.833, not 0 or 1, for that road rule on that FPA/N. The remaining analysis is the same as riparian prescriptions.

Table 1. 2018-2019 Standard Sample Prescriptions Monitored

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

For efficiency, haul routes were sampled on a subset of FPA/Ns 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 employed 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: 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 using an assumption that the observed variance in compliance rates and average number of applicable rules within each prescription will be similar to historical observations. Estimates for population variance are updated after each biennium. Increases in these estimates will lead to increased sample sizes in the following year. The population of FPA/Ns in any given year is finite. Therefore, the size of the population affects 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." Meaning, a smaller sample is required than would be for an infinite population (Table 2, Appendix A).

Variance and cluster size (mean number of rules per prescription) were estimated based on the sample values from eight (8) years of data (2010–2017) prior to the 2018 sampling, and from nine (9) years of data (2010-2018) for the 2019 sample. Based on this data and the estimated biennial FPA/N population size, sample sizes were set, and 50% of this sample size was applied to 2018. The remaining 50% of the biennial sample was completed in 2019, after any adjustments for updated variance estimates. 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).

To provide closer adherence to the +/– 6% standard for the 95% CI, the CMP updated sample size estimates prior to 2019 sampling to include 2018 results in the variance and cluster size estimates. This two-year approach assumes that there is no change in compliance between the two years, so that no bias is introduced by having unbalanced population sampling.

Table 2. 2018-2019 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	14	3,048
	Haul Routes	22	n/a*
	RMZ — Type Ns Prescriptions	31	2,319
	RMZ — Type Np Prescriptions	38	2,040
	Type A and B Wetlands	40	402
	Forested Wetlands	19	657
	RMZ — Type S or F No Inner Zone Harvest	24	1,896
Western WA	RMZ — Type S or F Inner Zone Harvest DFC1	18	86
	RMZ — Type S or F Inner Zone Harvest DFC2	12	284

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

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

2019 Unstable Slopes Study

In the biennial compliance monitoring design for Unstable Slopes, a significance level of 90% is applied. The CMP set a desired half-width of the 90% confidence interval (CI) at 6%. A 90% 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 18 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 study year.

Table 3. 2018-2019 Periodic Sample Prescriptions Monitored

Year	Statewide
2019	Unstable Slopes Study

Table 4. 2018-2019 Periodic Sample Count by Prescription Type

Prescription Type	Sample Count	Estimated Population Size of FPAs with the Prescription
2019 Unstable Slopes Study	36	819

*Sample size calculated based off a 90% C.I.

4.2   Field Review and Data Collection

The compliance monitoring field team uses two data collection methods:

- field observations, and
- field measurements.

These 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 (BFW).

The following are examples of types of field observations and field measurements:

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) —The channel width is measured (using a tape measure) at even intervals along the stream reach within the boundaries of the FPA/N. The goal is to obtain a minimum of 10 evenly spaced measurements. [*Measured for Type S, F, and N waters, except where the waters 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)*]
  - Stream length — *Measured using a hip chain*. The length is used to determine the stationing for BFW measurements and RMZ width measurements.
  - RMZ /WMZ widths — RMZ and WMZ widths (there are three zones within the RMZ) 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 on the CMP Roads Field Form. The questions address observed site conditions based on the required management practices in the FP rules (WAC 222-24-010, 020, 030, and 040). Haul routes are assessed in two ways: observation of fulfillment of road rule requirements, and professional judgment from CMP participants. Observations are used to rate sediment delivery levels resulting from each haul route. Haul Route compliance is calculated by distance. Compliance rate is calculated as the distance compliant divided by the distance sampled.

4.3   Compliance Assessment and Ratings

Average compliance for a prescription (for each rule) among FPA/Ns is calculated by CMP instead of the proportion of completely compliant FPAs (rule groups). Each FPA/N is analyzed as a cluster of rules within each prescription. FPA/Ns are then grouped according to relevant riparian prescriptions or road activities.

- 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 and B Wetlands,
- Forested Wetlands, and
- Unstable Slopes

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 FPA/Ns.

Example: If a prescription has 17 rules that apply to it (across all sampled FPA/Ns), 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%). As a result of the Independent Scientific Peer Review (ISPR), this average compliance rate is then adjusted for potential bias using a jackknife estimation process (see Appendix E for further explanation). In some cases, the bias adjustment has been large enough to change the compliance rate by up to one percentage point (e.g., 86% is adjusted to 87%).

Haul Routes

Haul routes are not sampled in proportion to regional population sizes. A stratified mean ratio compliance estimate is 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. The sample size for haul routes is not based on statistical precision. Historically, sampling has not been done in a random manner, so there is potential for bias in the final estimate. Limiting potential conclusions based on statistical analysis of the Haul Route prescription is recommended. Conclusions could then be attributed in error to a phenomenon rather than to the method of sampling.

Compliant/Deviation Determination

Compliance percentages published in CMP reports do not necessarily represent the complete picture of compliance with FP rules because of varying levels of compliance that are difficult to quantify. The compliance terminology was clarified to improve recognition and response to this issue. In the past, 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 portray the fact that 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 (pg. 24) of this report explains that a prescription is a grouping of FP rules. These groups were determined for the purposes of estimating compliance.

Use the following example to help understand this concept:

The DFC2 prescription (leaving trees closest to Type S or F water in Western Washington) is not a single FP rule but a grouping of several rules. Some 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 FPA/Ns within the DFC2 sample that deviated from compliance on at least one of the FP rules included in the prescription type.

It is important 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 the relevant rule required.

Compliance Ratings and Reasons Descriptions

When assessing and rating compliance, the first step is to assess if the forest practice is Compliant or a Deviation (Indeterminate is an unquantifiable Deviation). After this step, the application of compliance ratings and reasons for deviation are applied.

- Compliance assessment:
  - Compliant, and
  - Exceeds Rule Requirements

- Deviation Rating assessment:
  - Low,
  - Moderate,
  - High, and
  - Indeterminate rating

- Reasons for a Deviation assessment
  - Layout,
  - Operational, and/or
  - Administrative

Compliant Rating Determinations

The Compliant rating means that an activity meets the requirements of the individual FP rule related to that activity. By signing and submitting an FPA/N, a landowner conveys the intention to conduct specific forest practices activities on lands with specific site characteristics as described on the FPA/N. The landowner signs the FPA/N acknowledging the understanding 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, landowner/applicant chooses to provide more protection than required by FP rules.

Deviation Rating Determinations

The Deviation rating is for 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 education and training efforts to improve compliance, the compliance monitoring field team uses professional judgment to rate deviations. Please note that these deviation ratings employ professional judgment and should not be used to excuse activities that violate FP rules or approved FPA/Ns. There are three Deviation categories — Low, Moderate, High — as well as an Indeterminate rating. The following guidelines are used to assist when rating the impact of deviation in the field:

- Low Deviation — Minor deviation from requirements of the rule. An example is:
  - Outer zone has less than the required number of leave trees after harvest.
- Moderate Deviation — Moderate deviation from requirements of the rule. An example is:
  - 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. An example is:
    - 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 made by the field team as 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.
    - A road cross drain is located such that increases sediment deposition.
- 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.
    - Erosion control measures not included on newly constructed road segments.
- 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.
    - Incomplete shade documentation.
    - Incorrect overstory species input into Desired Future Condition Worksheet.

> Note: Deviation ratings and determinations are not assessed for site characteristic rules (i.e. water type, site class, and dominant overstory tree species). These data points are also not recorded when the field team cannot make an accurate assessment of the rating or determination.

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 applied 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 waters 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
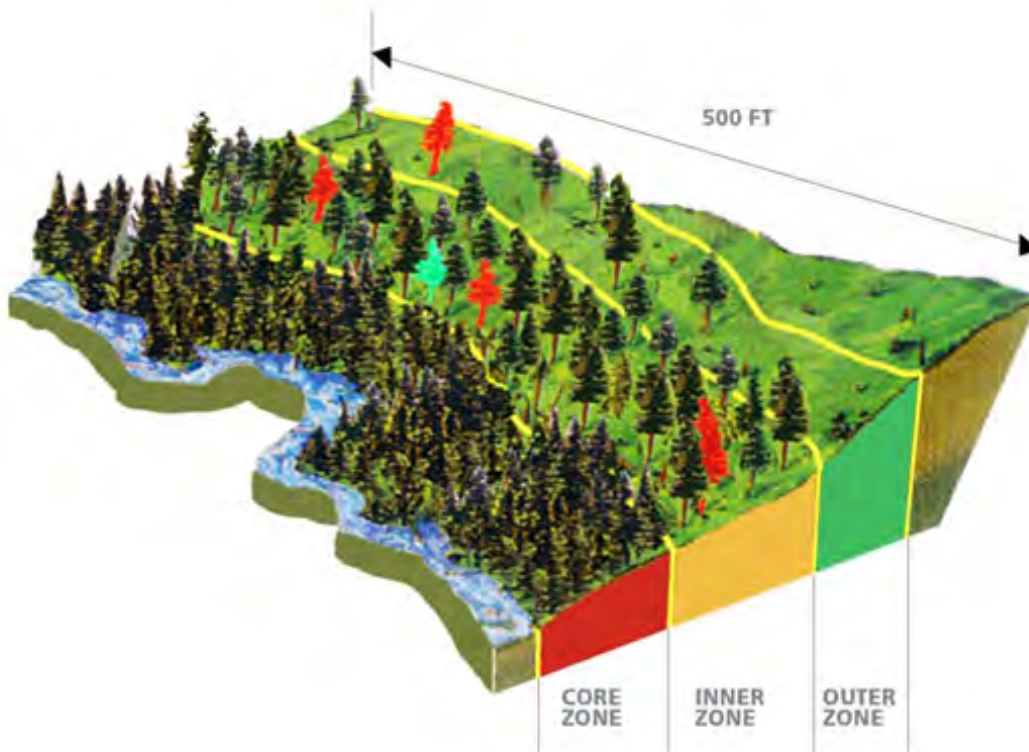
The red trees in the image represent trees that were required by rule to be left but were harvested. An offsetting factor in representing the average number of trees per acre required is that one tree per 500 feet was taken out of the outer zone, three trees too many were harvested from the inner zone, 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 three 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
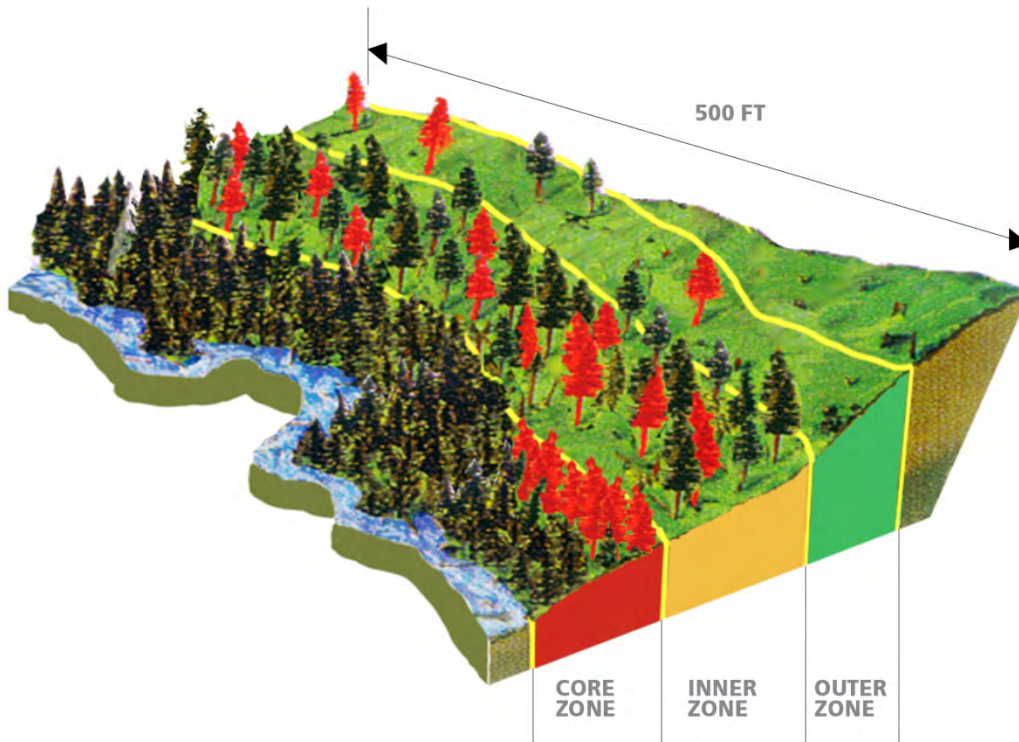
In Figure 2, eleven (11) trees are missing per 500 feet of the inner zone and three trees are missing per 500 feet of the outer zone. Additionally, some harvest occurred in the core zone.

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 improving ways to explain a complete picture of compliance in the reports.

4.4   Evaluation of Rule Compliance

The CMP utilizes cluster sampling. There are two levels of sampling units: the prescriptions and the rule application. The prescriptions are clusters of rule applications. In the previous method, only one assessment was made for each prescription per FPA/N, so the FPA/Ns were all clusters of size 0 or 1, and the zeros dropped out of the population for the prescription. The current sampling design evaluates multiple applications of rules on single FPA/Ns (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 FPA/Ns are treated as clusters.

The *average* compliance for a prescription or rule group among FPA/Ns is an estimate rather than the proportion of completely compliant activities among FPA/Ns. As discussed above, each

FPA/N 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 — FPA/Ns 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/N are not independent, the FPA/N 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). If there are many rules in a prescription, bad performance on a single rule will have little effect on overall average compliance. Compliance for each individual rule can be evaluated and tracked separately, although precision is not controlled for individual rule compliance.

4.5   Compliance Monitoring Challenges

For any complex assessment program, challenges are common. This section reviews 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 10 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 waters. 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.

Seasonal Effects on Water Typing Between Np/Ns

Seasonal conditions can impact the CMP's ability to accurately determine water typing between Ns and Np stream segments. In the spring, when FPA-typed Ns segments have observed water flow it is difficult to differentiate between seasonal and perennial water types. The CMP field team researches forester field notes, landowner-provided documentation, vegetative indicators, and professional judgement. When there is not enough information to make an accurate typing decision, the CMP field team marks the typing as Indeterminate. If new information becomes available at a later date, the CMP may review the Indeterminate typing decision.

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 good example of FP rules conflicting with on-site conditions is when a stream reach has rule-defined characteristics of both a Type Np water and a Type F water. Type Np waters are defined as perennial non-fish habitat waters. Type F waters are defined as having a gradient equal to or less than 20% (along with other criteria omitted here for the purposes of the example). When a stream reach meets the physical criteria for a Type F water, but also lies upstream of a portion of a stream reach that has a gradient greater than 20%, the water is considered Type F based on the physical characteristics defines in WAC 222-16-031. The only *exception* is when an approved Water Type Modification Form (WTMF) or supporting Interdisciplinary Team (ID Team) documentation exists and has resulted in a 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 intended to protect aquatic resources and related habitat adjacent to typed waters and wetlands when subject to forest practices. Riparian and wetland areas provide valuable habitat and protect water quality. The area adjacent to Types S, F, or Np waters is a riparian management zone (RMZ), where trees are retained to provide functions required by aquatic and riparian species, maintain water quality, and provide protection from disturbance. A wetland management zone (WMZ) is the area located around the perimeter of a wetland habitat. Trees are retained to provide functions required by wetland species, maintain water quality, and provide shade, nutrients and protection from disturbance. Both types of buffers provide for:

- Bank stability;
- Recruitment of woody debris;
- Leaf litter fall;
- Sediment filtering; and

- Shade.

The equipment limitation zone (ELZ) protects Type Np and Ns waters. An ELZ is a 30-foot-wide zone adjacent to Type Np and Ns waters. There are limitations on equipment use within the ELZ and if activities expose the soil on more than 10% of the zone on-site, mitigation measures are required

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

Sections 5.1 through 5.4 provide 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

Sampling for shade compliance began during the 2018-19 biennium. Compliance was measured through review of the provided shade documentation attached to the approved FPA/N. For sufficient documentation, the proponent had determined that shade would adequately be maintained from timber harvest.

5.1   Statewide Water Type Observations

The CMP focuses on consistency and accuracy of water and wetland type information on FPA/Ns. The width and length of riparian buffers required under FP rules are included in the different definitions of water and wetland types.

In the FP rules, water and wetlands classified in specific categories, or "types," based on several factors (WAC 222-16-030, 031, and 035).

Water type and wetland type classification is a basic step of determining what rules apply to forest practice activities adjacent to typed water. Specific rules apply to specific water and wetland types because different water and wetland types fulfill unique and cumulative functions for aquatic and riparian species and water quality. Waters and wetlands of the state were initially classified by type using local knowledge and orthophotos and were symbolized on water type maps. Today, the public can find information about the water or wetland type assigned to a particular water on the Forest Practices Application Review System (FPARS) mapping site.

Because waters and wetlands depicted on DNR water type maps were originally created without a field visit, the maps sometimes display incorrect water or wetland types or miss streams altogether and must be field verified by landowners as a condition of FPA/N approval.

FP Rules for Water Type

WAC 222-16-031 defines four types of streams (S, F, Np, and Ns) and WAC 222-16-035 defines three types of wetlands (forested and, non-forested type A [including bogs >0.25 acre], and non-forested type B).

The four stream types are classified in order based on stream function and level of protection required for the stream.

- Type S waters (highest level/most protective): "Shorelines" of the state as designated by the Department of Ecology.
- Type F waters (next highest level/protection): "Fish" presence, specifically defined human uses, or both.
- Type Np waters (next lowest level/protection): Non-fish-bearing waters that have a perennial flow of water *during a normal rainfall year* and intermittent dry portions of the perennial channel.
- Type Ns waters (lowest level/protection): Seasonal non-fish-bearing waters 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 and Wetland Types

Based on field observations, the CMP sometimes determines that water or wetland types shown on water type maps are incorrect. The only *exception* is when an approved Water Type Modification Form (WTMF) or supporting Interdisciplinary Team (ID Team) documentation exists and has resulted in a permanent change of the water type. Landowners may use existing DNR water type maps as a starting point for information as they prepare their FPA/N.

To submit a completed application to DNR, the proponent must verify water and wetland types located within the areas proposed for forest practices activities on the FPA/N. Correct water and wetland typing is required. When a stream segment or wetland is incorrectly underclassified, inadequate riparian protection measures may result and may negatively affect public resources. If a stream segment or wetland is overclassified, excessive protection may be provided, to the detriment of the proponent's objectives for the forest practice activity.

Water and wetland type verification means the on-site 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 guided by Forest Practices Board Manual, Section 13. Applicants are encouraged, but not required, to complete water type classification worksheets or document protocol surveys on water type modification forms and submit them with their FPA/N as supporting documentation for the water types indicated.

Proponents may propose changes to DNR water type maps when field observations (including protocol surveys) verify that the water or wetland type on the water type map is incorrect and/or if a water or wetland 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 or wetland type indicated on the DNR water type map, an individual submits a Water Type Modification Form (WTMF) to DNR. The Water Type Modification Form goes through a concurrence review 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 FPA/Ns 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/N. The information collected is not comprehensive enough to determine all water types and depends on the length and location of the water within the FPA/N. Water types can sometimes only be determined by continuing to observe and measure upstream or downstream of the FPA/N harvest unit boundary.

The Supplemental Water Information Form (SWIF) is developed specifically for recording potential water or wetland type and other water-related discrepancies. A SWIF is completed when the compliance monitoring field team identifies possible inconsistencies between on-the-ground measurements and observations and what is described in the FPA/N. This information is reported in the compliance monitoring report. If a rule violation occurred because of the water or wetland type inaccuracy observed (i.e., the riparian protection buffer width or length was inadequate), then the information relating to the violation is sent to the appropriate DNR region for regulatory follow up. The SWIFs are used to obtain a sense of both the overall magnitude of possible water and wetland typing discrepancies on the landscape and the potential incorrect implementation of riparian buffers.

The compliance monitoring field team does not do formal water typing (e.g., fish protocol surveys) to update water types. Water and wetland typing has a defined process beyond the scope of the compliance review. Landowners are responsible to ensure that the water and the wetland types on the FPA/N have been field-validated.

Findings for Statewide Water and Wetland Types

Water and wetland 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 or wetland should have been typed on the FPA/N and protected on the ground at a higher level of the hierarchical water typing system.
    - For example, the FPA/N shows a Type Np water that after observation is found to have Type F physical characteristics or observed fish.
- Overclassified — Physical characteristics show that the water or wetland should have been typed on the FPA/N and protected on the ground at a lower level of the water-typing scale.
    - For example, the FPA/N inaccurately shows a Type Ns water that after observation is found to be an untyped water.
- Indeterminate — Waters or wetlands 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 5. 2018-2019 Water and Wetland Typing Observation Information

Water Type on FPA	# Waters and Wetlands in Standard Sample	# Watersand Wetlands Recorded on SWIF	SWIF # Waters and Wetlands Underclassified	SWIF # Waters and Wetlands Overclassified	SWIF # Waters and Wetlands Indeterminate
F or S	45	0	*	0	0
Ns	31	1	0	0	1
Np	38	1	0	1	0
Type A Wetlands	14	3	2	1	0
Type B Wetlands	28	5	4	1	0
Forested Wetlands	19	1	1	0	0
Total	175	11	7	3	1

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

Water and wetland typing observations from 2018 and 2019

Of the 175 sampled waters and wetlands in 2018 and 2019, SWIFs were completed for 11 samples due to water and wetland typing discrepancies.

Seven samples were underclassified, resulting in an underclassification rate of approximately 4%. No approved Water Type Modification forms (protocol surveys) were contained within the paper records for the FPA/Ns with underclassified waters. Of the seven underclassified segments, two type B wetlands, and two type A wetlands were observed to be associated with fish waters. The underclassification of the four wetland segments was a result of administrative issues with completing the FPA/N. All four wetlands received adequate resource protection on the ground. Two type B wetlands and a Forested wetland were determined to be type A wetlands by the Compliance Monitoring field team. All three wetlands met the criteria for type A wetlands, with no supporting water type modification form or Interdisciplinary Team documentation to support lower order wetland typing, resulting in the underclassification of the sampled segments.

Three samples were overclassified, resulting in an overclassification rate of 1.7%. One type A wetland was determined to be a type B wetland, and measured to be smaller in area than reported on the FPA/N. One type B wetland was determined to be a forested wetland because on-site measurements indicated that there was greater than 30% crown closure and the wetland did not meet bog characteristics. An Np stream was determined to be an Ns stream because no stream flow was observed when the site was reviewed and no Perennial Initiation Point (PIP) was present.

One sample was indeterminate. Water flow was observed in an Ns stream segment during a site visit in April. A determination could not be made about the potential for year around flow within the segment (Table 5).

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

Section 5.2 provides two summary tables: Table 6 lists the RMZ, WMZ, and ELZ prescriptions sampled in 2018 and 2019; Table 7 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 6. RMZ, WMZ, and ELZ Prescriptions Sampled in 2018 and 2019

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

Each prescription has a specific set of timber harvest requirements and includes the use of a corresponding set of protocols and questions to determine compliance status for the individual rules that comprise the prescription. Rule prescriptions for Type F and N waters can differ between 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 FPA/Ns in Table 7 reflects the small proportion of total small forest landowner FPA/Ns within the total FPA/N population that included the prescriptions that were assessed.

Table 7. 2018-2019 Compliance with FP Rules for Riparian, Wetlands and Roads Prescriptions

	Status of Compliance	Western WA		Statewide					
		DFC1	DFC2	No Inner Zone Harvest	Np Activities	Ns Activities	Type A and B Wetlands	Forested Wetlands	Roads
Small Forest Landowners	# Compliant Rules	8	n/a	11	11	4	33	10	28
	# with Deviation	0	n/a	0	2	0	2	0	2
	% of Sample Compliant	100%	n/a	100%	85%	100%	95%	100%	94%
	Prescriptions Assessed	1	0	2	5	4	9	5	5
Large Forest Landowners	# Compliant Rules	122	80	115	105	28	131	23	96.6
	# with Deviation	11	4	3	3	0	4	1	0.4
	% of Sample Compliant	92%	95%	98%	97%	100%	97%	96%	99%
	Prescriptions Assessed	17	12	23	33	27	31	14	12
All Landowners	# Compliant	130	80	126	116	32	164	33	125
	# with Deviation	11	4	3	5	0	6	1	2.4
	% of Sample Compliant	92%	95%	98%	96%	100%	97%	97%	98%
	Confidence Interval	(88, 96)	(91, 100)	(95, 100)	(92, 99)	n/a	(94, 99)	(91, 100)	(96, 100)
	Prescriptions Assessed	18	12	25	38	31	40	19	14

5.3   Western Washington RMZs

5.3.1 Western WA Type S and F Waters

Section 5.3.1 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/N? If not, does it affect the inner zone width?

In addition to common questions relevant to all Type S and F 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 harvest to take place in the inner zone. DFC calculations indicate if a

forest stand meets basal area requirements. If the stand is on a developmental trajectory to meet the DFC requirement for 325 square feet of basal area per acre at a stand age of 140 years, then harvest is allowed. When DFC calculations allow harvest because the model projects more basal area is available than the target basal area required by rule, then the smallest diameter trees can be harvested, followed by the harvest of progressively larger trees until the surplus basal area limit has been reached (this is referred to as "thinning from below").

This selection process is used to establish a forest environment providing the opportunity for increased growth rate of leave trees in the inner zone. This provides the desired large wood, fish habitat, and water quality requirements in a protracted amount of time. The widths of the inner zone and outer zone vary depending on bankfull width and 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 at breast height (DBH) must be retained in the *outer zone*. The leave trees in the outer zone may be dispersed evenly or clumped around sensitive features such as seeps, springs, and forested wetlands. Starting in 2018, when harvest is allowed within 75' of bankfull width, the team evaluates documentation of shade requirements to determine rule compliance (WAC 222-30-040).

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 because of the number of requirements that must be met. This prescription is infrequently applied in practice. In the 2018-19 sample, 18 FPA/Ns were selected for review with DFC1 chosen as the harvest option from a total population of 86 FPA/Ns. The resulting DFC1 prescription sample size was 18, and a total of 141 rules were evaluated.

Table 8. 2018-19 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	High	No Applied Deviation Rating	Indeterminate
DFC1 (%)	16%	92%	3%	N/A	N/A	5%	1%
DFC1 (Rule Count)	23	130	4	0	0	7	1

Sample size = 18

Of the 141 rules sampled and analyzed, 130 were compliant for the DFC1 prescription sample, resulting in a 92% compliance rate +/- 4.2%. Of the 18 sites sampled, 11 were 100% compliant and seven showed deviation from at least one rule in the prescription type.

Field observations found 11 non-compliant determinations:

- There was one non-compliant determination for incorrect dominant overstory tree species. Douglas-fir was selected as the dominant overstory tree species per the DFC worksheet; however, western hemlock was observed as the dominant overstory tree species. The reason for

non-compliance was determined to be administrative for the non-compliant determination. No deviation severity rating is assigned for non-compliant site characteristic rules.

- There was a single non-compliant determination for observation of harvest of trees larger than allowed by the selected DFC harvest strategy. The reason for non-compliance was determined to be layout, resulting in a low deviation rating.

- A single non-compliant determination was recorded for retention of fewer than the required 57 residual trees per acre in the inner zone. The inner zone was missing 12 trees. The reason for non-compliance was determined to be layout. A low deviation rating was applied for the non-compliant observation.

- There were six non-compliant determinations for missing documentation about determining shade requirements not being met when harvest is conducted within 75' of the edge of bankfull width. Documentation or explanation of compliance with shade requirements was not included within the FPA/N for all six non-compliant sites. Due to the absence of documentation or explanation of compliance with shade from the proponents' FPA/Ns, the reason for non-compliance was determined to be administrative. No deviation rating was assigned for any of the non-compliant determinations.

- There were two non-compliant determinations for situations in which the outer zone retained fewer than the 20 trees per acre required by rule. As a result of mapping discrepancies, the reason for non-compliance was determined to be administrative for both non-compliant observations. Both non-compliant observations were applied a low deviation rating for one missing outer zone leave tree at one site, and 15 missing outer zone leave trees at the other site. (Table 8.)

Exceeds ratings were assigned in 23 instances: Extra inner zone leave trees were observed for 10 samples, more than the required 57 trees pre acre for were retained two samples, and excess outer zone leave trees were observed for 11 samples. (Table 8)

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

Desired Future Condition Option 2 can be used only with RMZs upon site classes I, II, and III along waters that are less than or equal to 10 feet wide and RMZs growing on site classes I and II adjacent to waters greater than 10 feet wide. For this option, DFC growth modeling is used to determine if there is an available surplus basal area that would allow partial harvest to within the inner zone.

Trees are selected for harvest starting from the outermost portion of the inner zone first and then progressively closer to the water. 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 waters less than or equal to 10 feet, a 30-foot no-harvest area extends outward from the outer edge of the core zone. For site classes I and II on waters greater than 10 feet, a 50-foot no-harvest extension begins 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 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 compared to DFC Option 1 and is applied more frequently. In the 2018-19 sample, 12 DFC2 prescriptions were sampled from an estimated population of 228. A total of 84 rules were evaluated.

Table 9. 2018-19 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**	**High**	**No Applied Deviation Rating**	**Indeterminate**
DFC2 (%)	11%	95%	3%	N/A	N/A	N/A	N/A
DFC2 (Rule Count)	15	80	4	0	0	0	0

Sample size = 12

Eighty of the sampled 84 rules were compliant for the DFC2 prescription, resulting in a 95% compliance rate +/- 4.3%. Of the 12 sites sampled, eight were 100% compliant and four showed deviation from at least one rule in the prescription type.

- Field observations resulted in four non-compliant determinations. A single non-compliant determination for observed harvest within the no-cut inner zone floor. The reason for non-compliance was determined to be layout. As a result of an unaccounted stream meander, a cut stump was observed and a deviation rating of low was determined for the non-compliant observation.

- There were three non-compliance determinations for the outer zone; in each case, fewer than the required 20 trees per acre were retained. The reason for non-compliance was determined to be layout, and a deviation rating of low was determined for all three of the non-compliant observations. Fourteen missing outer zone leave trees were observed at one site, six missing outer zone leave trees were observed at another site, and one missing outer zone leave tree were observed at the third site for the non-compliant observations.

Exceeds ratings were applied for leaving more than the required number of inner zone floor leave trees in eight samples. Additionally, exceeds ratings were applied for excess outer zone leave trees in seven samples. (Table 9).

5.4 Statewide RMZs, WMZs, and ELZs

5.4.1 Statewide Typed Waters

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

In Western Washington, timber harvest or road construction is prohibited from the 50-foot core zone on fish-bearing waters (zone closest to the water). Exceptions are for construction and maintenance of road crossings and for creation and use of yarding corridors used for timber extraction. The inner zone (middle zone, not including core zone) ranges from 10 to 100 feet, depending on the width of the water 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
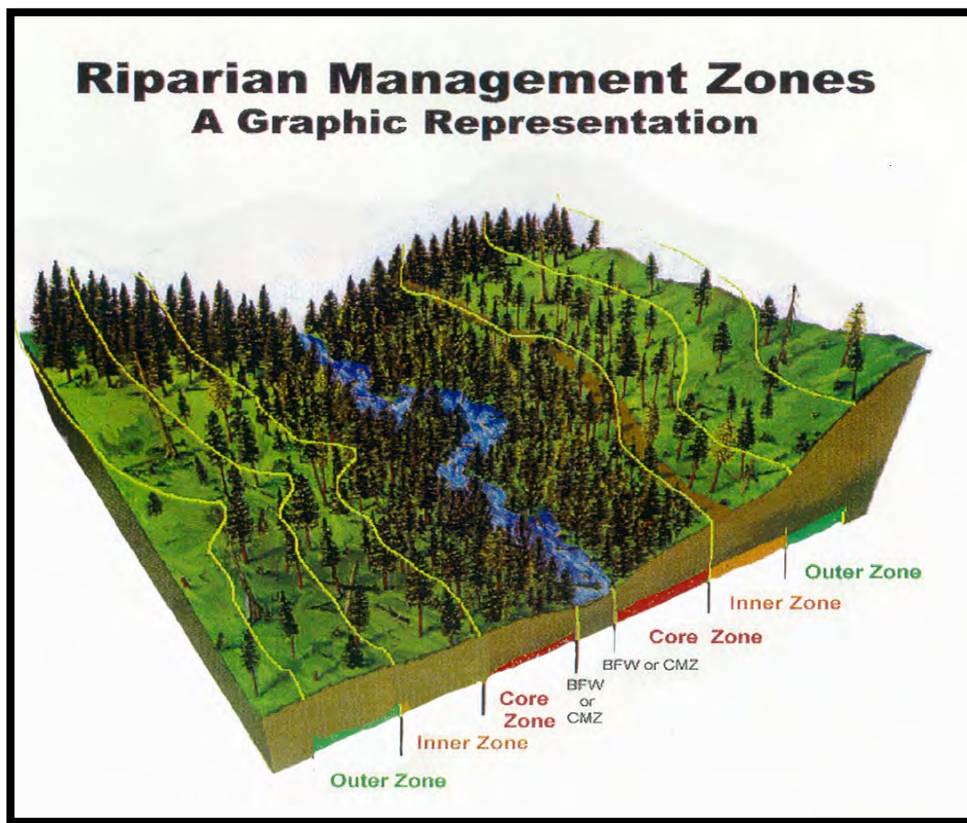
Protection along non-fish-bearing waters in Western Washington includes RMZs along at least 50% of the length of Type Np waters and around sensitive sites, and the establishment of ELZs for both Np and Ns waters. An ELZ is a 30-foot-wide area closest to steams where equipment use is prohibited to minimize ground and soil disturbance. The ELZ protects stream bank integrity and helps minimize sediment delivery to non-fish-bearing waters.

Riparian management includes retention of buffer areas of leave trees and other vegetation to maintain critical riparian functions (such as shade), contribution of large woody debris, streambank stability, sediment filtering, and litter leaf fall. In Eastern Washington, management is designed to mimic local disturbance regimes (such as wildfire) in a way that protects riparian function conditions and maintains general forest health. RMZ requirements adjacent to a Type S, F, or Np water is based on site productivity (site class), timber habitat type, basal area, and shade requirements. The no-harvest core zone along type S and F waters is 30 feet. Forest practices 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. Where harvest was permitted within 75' of BFW, documentation stating shade requirements were met was evaluated for rule compliance beginning in 2018.

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 1289 FPA/Ns in the 2018-19 population. The resulting NIZH prescription sample size was 25, and a total of 129 rules were evaluated.

Table 10. 2018-19 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 Applied Deviation Rating	Indeterminate
No Inner Zone Harvest (%)	10%	98%	2%	N/A	N/A	1%	N/A
No Inner Zone Harvest (Rule Count)	13	126	2	0	0	1	0

Sample size = 25

Of the 129 rules sampled, 126 were compliant for the NIZH prescription sample, resulting in a 98% compliance rate +/- 2.7%. Of the 25 sites sampled, 22 were 100% compliant and three deviated from at least one rule in the prescription type.

- Field observations found three non-compliant determinations. A single non-compliant determination was recorded for observed harvest within the no-cut inner zone. As a result of the no-cut RMZ boundary observed within the appropriate inner zone, the reason for the non-compliant observation was determined to be layout. A deviation rating of low was applied as a result of 11 observed cut stumps due to a missed stream meander.

- A single non-compliant determination for missing documentation per determining shade requirements being met when harvest is conducted within 75' of the edge of bankfull width. Documentation or explanation of compliance with shade requirements was not included within the FPA/N. Due to the absence of documentation or explanation of compliance with shade from the proponent's FPA/N, the reason for non-compliance was determined to be administrative. No deviation rating was assigned for any of the non-compliant determinations. Deviation ratings and determinations are not assigned for site characteristic rules (e.g., water type, site class, shade documentation, and dominant overstory tree species).

- A single non-compliant determination was recorded for fewer than 20 trees per acre remaining in the outer zone. Four required outer zone leave trees were missing, resulting in a deviation rating of low and the reason for non-compliance was determined to be layout. (Table 10.)

Exceeds ratings were applied for excess outer zone leave trees on 13 samples. Additional outer zone leave trees were remaining beyond what was required by rule. (Table 10)

5.4.1.2 Statewide Type Np Waters

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

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

In Western Washington, the total distance of the 50-foot buffer required along a Type Np water varies and depends on the length of the Type Np water from the confluence with the Type S or F water. Buffers on both sides of the water (two-sided buffers) must protect at least 50% of a Type Np water's length. If the Type Np water on the FPA/N 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 waters must also be protected with buffers or harvest restrictions. These include headwater springs or the uppermost point of perennial flow; the intersection of two 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 50 horizontal feet of the outer edge of bankfull width of an Np, the landowner must identify on the FPA/Neither a no-cut, partial-cut 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 clearcut strategies, a two-sided 50-foot no-harvest 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 waters 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% of the soil within the ELZ.

On-Site Review for Statewide Type Np Waters

Questions on the Field Form for Type Np waters differ from those for Type S and F fish-bearing waters. 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 water segment?

Findings for Statewide Type Np Waters

Type Np waters were commonly encountered, with an estimated 1505 FPA/Ns having one or more Np waters within their harvest boundaries. The resulting Np prescription sample size was 38, and a total of 121 rules were evaluated.

Table 11. 2018-19 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 Applied Deviation Rating	Indeterminate
Np Water (%)	2%	96%	2%	2%	N/A	1%	1%
Np Water (Rule Count)	3	116	2	2	0	1	1

Sample size = 38

Of the 121 rules sampled, 116 were compliant for the Type Np prescription sample, resulting in a 96% compliance rate +/- 2.5%. Of the 38 sites sampled, 33 were 100% compliant and five deviated from at least one rule in the prescription type.

Field observations resulted in five non-compliance determinations.

- Three non-compliant determinations were recorded for observed harvest within the 50-foot no-cut harvest buffer. As a result of recent post-wildfire changes to hydraulic conditions, a subsurface portion of an Np stream segment was observed to develop and run above ground in a 600' channel. Harvest occurred along the entirety of the newly formed Np channel. The field team was unable to determine the reason for non-compliance, and a deviation rating of high was applied. For the other two non-compliant observations, four cut stumps were observed within the no-harvest buffer at one site, while a single cut stump was observed within the no-harvest buffer at the other site. The reason for non-compliance for the first observation was layout, while operational error was determined to be the reason for non-compliance for the other observation. A deviation rating of moderate was applied for both of the observations.

- Two non-compliant determinations were recorded for observed harvest within the 56-foot Upper Most Point of Perennial Flow no-cut buffer. Two cut stumps at 38' and 51' were observed within the no-cut buffer, resulting in an indeterminate reason for non-compliance between layout and operational, and a deviation rating of low was applied at one site. A single cut stump at 49' was observed within the no-cut buffer, resulting in layout being the reason for non-compliance, and a deviation rating of low was applied for the second non-compliant observation. (Table 11.)

- One Indeterminate observation was recorded for the appropriate length of a 50-foot no cut buffer.

Exceeds ratings were applied for excess length of 50-foot no-cut buffer on 3 samples. (Table 11)

5.4.1.3 Statewide Type Ns Waters

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

Findings for Statewide Type Ns Waters

Forest practices in proximity to Type Ns waters are common, occurring in an estimated 1,662 FPAs in the statewide population for the 2018-19 sample. The resulting Ns prescription sample size was 31, and a total of 32 rules were evaluated.

Table 12. 2018-19 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 Applied Deviation Rating**	**Indeterminate**
Ns Water (%)	0%	100%	N/A	N/A	N/A	N/A	N/A
Ns Water (Rule Count)	0	32	0	0	0	0	0

Sample size = 31

All 32 of the sampled rules were compliant for the Ns prescription sample, resulting in a 100% compliance rate. There were zero observations of rule non-compliance for the Ns prescription type. However, only one rule is consistently evaluated as part of the Ns prescription type. (Table 12.)

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 five acres have a minimum 50-foot WMZ width, and an average 100-foot WMZ width;
- Type A Wetlands of 0.5 to 5 acres have a minimum 25-foot WMZ width and an average 50-foot WMZ width;
- Type B Wetlands of 0.5 to 5 acres have a minimum 25-foot WMZ width; and
- Type B Wetlands less than 0.5 acre along with Forested Wetlands require no WMZ.

Leave trees are required (by size and number) within the WMZ. Bogs, both forested and non-forested, are treated as type A wetlands when they are 0.25 acres or larger. There are no leave tree requirements for the Forested Wetlands prescription. Restrictions also apply regarding the maximum width of openings created by harvesting within the WMZ. Additionally, ground-based harvesting systems cannot be used within the minimum WMZ width without written approval from DNR.

On-Site Review for Statewide Wetlands

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

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

In addition, for type A and 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 three 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 and B WMZs

Findings for type A and B WMZs Statewide

Type A and B Wetlands are estimated to occur on 402 FPA/Ns statewide in the 2018-19 population. The resulting type A and B Wetlands prescription sample size was 41, and a total of 170 rules were evaluated.

Table 13. 2018-19 Compliance Ratings for Statewide type A and B WMZs

WMZ Prescription	FP Rule Compliance Ratings						
	Compliant Ratings		Deviation Ratings				
	Exceeds (Part of Compliant)	Compliant	Low	Moderate	High	No Applied Deviation Rating	Indeterminate
Type A and B (%)	19%	97%	1%	N/A	N/A	3%	1%
Type A and B (Rule Count)	32	164	1	0	0	5	1

Sample Size = 41

Of the 170 rules sampled, 164 were compliant for the type A and B WMZ sample, resulting in a 97% compliance rate +/- 2.6%. Of the 41 sites sampled, 35 were 100% compliant and six deviated from at least one rule in the prescription type.

Field observations resulted in six non-compliance determinations.

- Five of the non-compliant observations were for incorrectly typed and sized A and B wetlands. Two type B wetland segments were determined to be associated with type F waters. One type A wetland segment was determined to be associated with type F waters. The reason for non-compliance on the three type F associated wetland segments was determined to be

administrative. Additionally, a selected type B wetland segment was observed at 1.8 acres with greater than 0.5 acres of open water. The field team determined that the sampled segment met type A wetland physical requirements. The reason for non-compliance was determined to be administrative for non-compliant site characteristic rules. The fifth observation of incorrectly typed wetland non-compliance was the result of a type B wetland that was determined to be a forested wetland by the field team. The resource was adequately protected with a type B WMZ. The reason for non-compliance was administrative. No deviation rating is applied for non-compliant site characteristic rules.

- A single non-compliant determination for inadequate protection of overlapping WMZs and RMZs was observed. Cut stumps were observed within the minimum no-cut WMZ of a type B wetland overlapped by an F water RMZ. The reason for non-compliance was determined to be layout, and deviation rating of low was applied (Table 13).

5.4.2.2 Statewide Forested Wetlands

Findings for Statewide Forested Wetlands

Approximately 468 FPA/Ns statewide contained Forested Wetlands in the 2018-19 sample population. The resulting Forested Wetlands prescription sample size was 19, and a total of 34 rules were evaluated.

Table 14. 2018-19 Compliance Ratings for Statewide Forested Wetlands

Wetland Prescription	FP Rule Compliance Ratings						
	Compliant Ratings		**Deviation Ratings**				
	Exceeds (Part of Compliant)	**Compliant**	**Low**	**Moderate**	**High**	**No Applied Deviation Rating**	**Indeterminate**
Forested (%)	N/A	97%	N/A	N/A	N/A	3%	N/A
Forested (Rule Count)	0	33	0	0	0	1	0

Sample size = 19

Of the 34 rules sampled, 33 were compliant for the Forested Wetlands sample, resulting in a 97% compliance rate +/- 6%. Of the 19 sites sampled, 18 were 100% compliant and one deviated from rule in the prescription type.

Field observations from 2018 and 2019 resulted in one non-compliant determination. The single non-compliant observation was recorded for incorrectly typed and sized forested wetlands. The sampled wetland was larger than 0.5 acres and did not have greater than 30% crown closure. The reason for non-compliance was determined to be administrative for non-compliant site characteristic rules. No deviation rating is applied for non-compliant site characteristic rules. (Table 14)

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.

A well-designed, located, constructed, and maintained forest road system is essential to both forest management and protection of public resources and public safety. Washington state forest practices rules – which include those for road construction, maintenance, and abandonment, and for best management practices – are among the most stringent in the country. The 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

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

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

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

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/N.

FP Rules for Statewide Roads and Haul Routes-Rules Applied

The following are rules for road construction, landing construction, Type F and N water road crossings, road abandonment, and haul routes.

Forest Road Construction

Road rules require specific standards for road location, design, and construction. The Roads Field Form (defined in the on-site review section below) is written to gather the information needed to assess compliance for forest roads.

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 rule requirements related to road location are the requirement that the landowner/applicant minimize the number of water crossings and not locate roads in bogs/wetlands 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 water or the 100-year flood level of any typed water (WAC 222-24-035).

Type 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 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, although landowners are required to abandon roads in certain watersheds to maintain the legal road ratio. When a landowner chooses to abandon a forest road, specific standards delineated in the rules must be followed (additional technical guidance in Board Manual Chapter Section 3). 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 closure point at the time of abandonment, and water crossing structures must be removed (WAC 222-24-052[3]).

Haul Routes

The 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 and the level of sediment delivery.

On-site Review for Statewide Roads and Haul Routes

To determine road compliance, CMP field team visited FPA/N sites where forest road construction, landing construction, Type N water road crossings, abandoned roads, and haul routes are present. The field team used the Roads Field Form and the Haul Route Field Form to record information while on site. The field team does not confirm water typing during road assessments. The data recorded on the Roads Field Form and the Haul Route Field Form helped the team determine road compliance for each FPA/N sampled.

Roads Field Form

The Roads Field Form is used to record data observed for forest road construction, landing construction, Type N water road crossings, and abandoned roads. The initial series of questions on the 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. Water crossing questions helped guide systematic water 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 some of the 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 water 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 Haul Route Field Form is used 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 15), and the cause of the noncompliance (Table 16).

There are 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 15).

Table 15. 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. (Table 16)

Table 16. 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 2,346 FPA/Ns in the 2018-19 sample. The resulting Roads prescription sample size was 14 and a total of 127.4 rules were evaluated.

Table 17. FP Rule Compliance for 2018-2019 Road Activities

Statewide Road Activities for 2018 & 2019		
All Landowner Types	**Status of Compliance**	**Road Activities Rule Compliance**
	# of Rules Sampled	127.4*
	# Compliant Rules	125
	# with Deviation	2.4
	Compliance %	98%
	95% Confidence Interval	CI (96, 100)

Sample size = 14
* For roads prescriptions, compliance with a single rule on an FPA/N 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 percentage or ratio (a number between 0 and 1).

Of the 127.4 rules sampled, 125.5 were compliant for the Roads prescription sample, resulting in a 98% compliance rate +/- 2.1%. Of the 14 sites sampled, 10 were 100% compliant and four showed deviation from at least one rule in the prescription type.

Field observations resulted in 12 non-compliant road segments from four sites.

- Two non-compliant observations were recorded for failure to stabilize disturbed soils during road construction. The reason for non-compliance was determined to be operational, and a deviation rating of low was applied for both observations.

- A single non-compliant observation was recorded for failing to locate and design culverts to minimize sediment delivery to typed water. The reason for non-compliance was determined to be operational, and a deviation rating of low was applied.

- A single non-compliant determination was recorded for observation of drainage structures discharging to erodible soils without adequate outfall protection. The reason for non-compliance was determined to be operational, and a deviation rating of low was applied.

- A single non-compliant observation was recorded for an inadequately sized relief culvert in Western Washington, less than 18 inches. The CMP field team did not determine a reason for non-compliance, or applied a deviation rating.

- A single non-compliant observation was recorded for observation of inadequately stabilized erodible soils to prevent sediment delivery. The reason for non-compliance was determined to be operational, and a deviation rating of low was applied.

- A single non-compliant determination was recorded for the location of a landing within an Equipment Limitation Zone. The reason for non-compliance was determined to be operational, and a deviation rating of moderate was applied.

- A single non-compliant determination was recorded for observed alterations to stream bank, bed, and bank vegetation beyond what was necessary for the construction of the project. The reason for non-compliance was determined to be operational, and a deviation rating of low was applied.

- A single non-compliant observation was recorded for culvert installation that resulted in scouring and erosion to stream bank, and bed in the vicinity of the project. The reason for non-compliance was determined to be operational, and a deviation rating of low was applied.

- A single non-compliant observation was recorded for an abandoned road that was not left in a suitable condition for erosion control, resulting with increased sediment deposition. The reason for non-compliance was determined to the layout, and a deviation rating of low was applied.

Two non-compliant determinations were recorded for an installed culvert less than 24 inches in diameter on Np typed water. The reason for non-compliance was operational, and a deviation rating of low was applied for both observations (Table 17).

Haul Routes Findings

The Haul Route prescription sample included an inspection of haul routes along forest roads from the farthest points in the FPA/N to public access roads. If the entire route was 5 miles long or less, the entire road was observed. If the entire route was over 5 miles, 10 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 were recorded (Table 19). The CMP field team recorded compliance information for haul routes in general and 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 18. Haul Route Compliance Summary

Compliant		Deviation		
97.3% (93, 100) CI*		2.7% (0, 7) CI		
No Delivery	**De Minimis**	**Low**	**Medium**	**High**
96%	1.3%	1.4%	0.1%	1.2%

*CI is confidence interval at the 95% confidence level

Table 19. Haul Route Deviation by Cause

Primary Cause	% Deviation with This Primary Cause
Faulty cross drainage	50%
Obstructed of bermed ditch line	23%
Rutting/inadequate crown	5%
Sediment from stream adjacent parallel road	14%
Contaminated ditchwater	5%
Other (described in comments)	5%

*The "other" category is comprised of non-point source sediment delivery and blocked drainage structures.

For 64.6 miles of the 66.8 miles of haul routes evaluated, no delivery or de minimis sediment delivery was observed, resulting in a compliance rate of 97% (Table 18). "Faulty cross drainage" was the largest primary cause of sediment delivery, accounting for 50% of the total estimated linear distance of non-compliance (1.1 miles) (Table 19). An obstructed or bermed ditch line accounted for 23% or 0.5 miles of the observed deviation mileage. Sediment from stream adjacent parallel roads accounted for 14% or 0.3 miles of the observed deviation mileage. Contaminated ditchwater, rutting/inadequate crown, and other accounted for 5% or 0.1 miles of the observed deviation mileage each, respectfully (Table 19). For efficiency, haul routes were observed on FPA/Ns that had been selected for one of the standard sampled prescriptions.

7. Forest Practices Rule Trend Analysis

FPA/N 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. One of the goals of the current analytical methodology is to seek to detect trends in prescriptions, and in individual rule compliance.

The sample size for each year is determined based on achieving a specific precision level (+/- 6%, 95% Confidence Interval) for average compliance within a set of rules (a prescription) over a two-year period. Because the population of FPA/Ns available in any given year is finite and variable, the sample size necessary to achieve a specific precision level also varies by year. Differing priorities and compliance estimation methods have caused differences in precision levels that can be attained by the samples collected in different years. In addition, methods for determining compliance with some individual rules have changed since 2006. While these differences create challenges in evaluating trends through time, this report includes an analysis aimed at seeking to discern statistically meaningful patterns of changes in compliance rates over time.

Methods

For the 2010-2019 dataset, rule compliance was carefully tracked to ensure that compliance determination was consistently applied. The compliance data from 2006-2009 have not yet been matched to current rules. This data may be included in future reports. Results were reviewed to ensure consistent application of compliance determinations across the dataset.

Certain data were removed from the trend analysis dataset include:

- data not collected in accordance with current field protocols,
- rules no longer included in compliance estimates, and
- incomplete data.

Data for rules were combined and compared through time within each corresponding prescription type. The 2018-19 results were calculated using the jackknifed form of the ratio estimator. Trends in average compliance with prescriptions and individual rule compliance are tracked to maintain consistency with current methods.

Linear regression analysis predicts general trends in average compliance through time. Because of the varying precision levels among years, the regression assumption of homogeneous variance in average compliance was not satisfied. Generally, 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/N. Weighted least squares linear regression was employed to correct for the non-homogeneous variance (*where the average compliance is weighted by the inverse of the estimated mean standard error for each year*). The result is that years with better estimates of average compliance receive more weight in the regression, which compensates statistically for unequal variance. Statistical significance was determined with $\alpha = 0.10$. Residuals from regressions were 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.

The relative weights used for weighted linear regression were used to size the points in the regression plots (for example larger points were weighted heavier in the regression based on variance estimates).

> **Example**: A higher proportion of the population sampled (that is more rules per FPA/N) in any given year reduces the variance and more heavily weights the regression analysis. Slope estimates (that is average change in compliance per year) are given for weighted and unweighted regressions with p-values for significance tests, and a 90% confidence interval for the weighted regression slope.

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

Results

There is evidence of increasing compliance trends Western Washington riparian management zone DFC1 and DFC2 prescriptions, and for statewide NIZH and Ns prescriptions, with estimated average increases in compliance rates from 0.5 to 1% per year.[2]

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 95% over the course of the evaluation period. As a result of increasing prescription compliance rates, significant trend results (weighted $p = 0.096$) were observed for the weighted DFC1 prescription type. A year over year increase of 0.95% for the overall prescription compliance rate was observed (Figure 4).

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[2] Note that the residuals from the roads and forested wetlands weighed regressions displayed non-normal characteristics (Shapiro-Wilks test p-value 0.001), because compliance in most years has been 100%. Transformations were not successful in producing approximate normality, so the *normal regression* results are provided.

Figure 4. Annual rule compliance for the DFC1 prescription with a weighted linear regression overlaid. The point sizes reflect the relative weights given to each point in the regression based on variance differences among years.

Desired Future Condition 2

Trend analysis results for the DFC2 prescription type showed increasing 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 increasing prescription compliance rate, significant trend results (weighted $p = 0.066$) were observed for the weighted DFC2 prescription. A year over year increase of 0.7% for the overall prescription compliance rate was observed. (Figure 5)
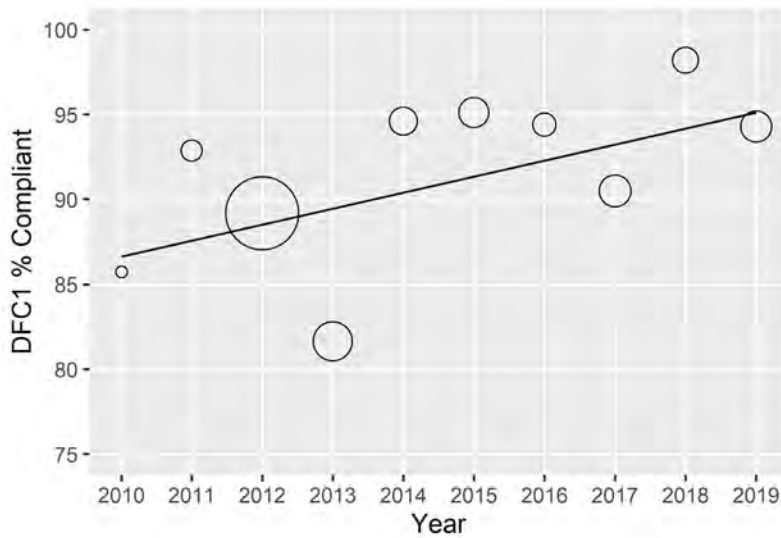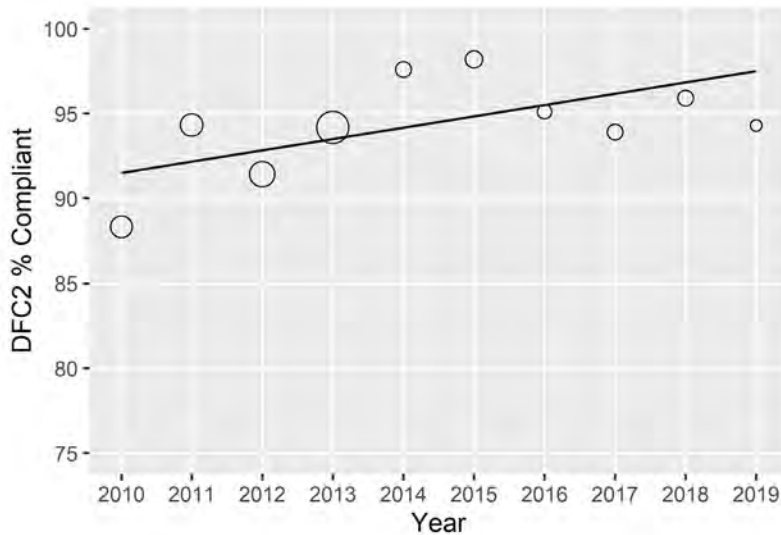

Figure 5. Annual rule compliance for the DFC2 prescription with a weighted linear regression overlaid. The point sizes reflect the relative weights given to each point in the regression based on variance differences among years.

No Inner Zone Harvest

Trend analysis results for the NIZH prescription type revealed relatively consistently increasing compliance rates for the prescription, and the associated rules from year to year. Prescription compliance rates varied from 89% to 99% over the course of the evaluation period. As a result of the increasing prescription compliance rate, significant trend results (weighted $p = 0.006$) were observed for the weighted NIZH prescription. A year-over-year increase of 0.92% of the overall prescription compliance rate was observed. (Figure 6)

Figure 6. Annual rule compliance for the NIZH prescription with a weighted linear regression overlaid. The point sizes reflect the relative weights given to each point in the regression based on variance differences among years.

Non-Fish-Bearing Perennial Waters

Np data collected from 2010 and 2011 were excluded from current trend analysis results because of data conversion issues. 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 77% to 98% over the course of the evaluation period. As a result of the oscillating prescription compliance rate, no significant trend results (weighted $p = 0.83$) were observed for the weighted Np prescription type. (Figure 7)

Figure 7. Annual rule compliance for the Np prescription with a weighted linear regression overlaid. The point sizes reflect the relative weights given to each point in the regression based on variance differences among years.

Non-fish Bearing Seasonal Waters

Trend analysis results for the Ns prescription type revealed increasing compliance rates for the prescription. Prescription compliance rates varied from 95% to 100% over the course of the evaluation period. The compliance rate has remained 100% over the past four years of observation. As a result of the recent steady compliance rates, significant trend results (weighted $p = 0.025$) were observed for the weighted Ns prescription type. A year-to-year increase of 0.54% of the overall prescription compliance rate was observed. (Figure 8)
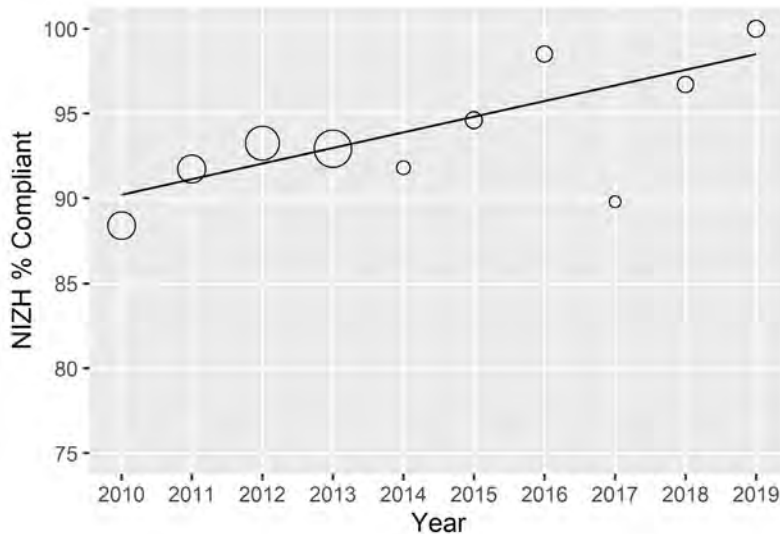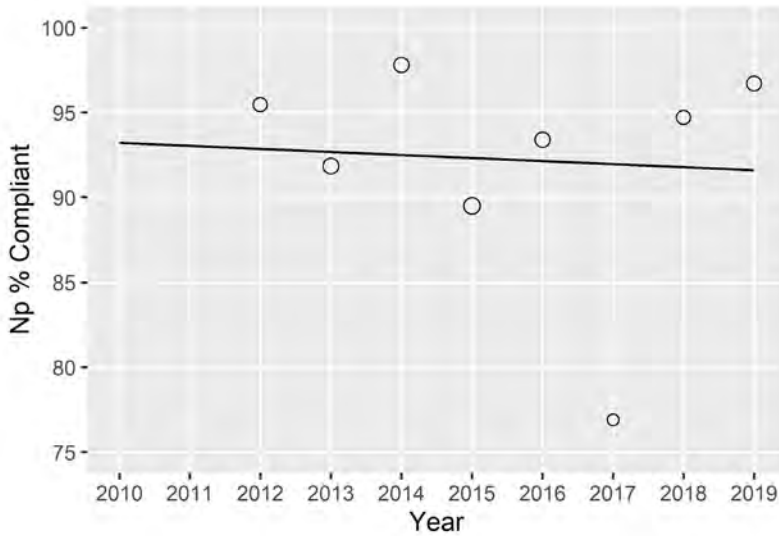

Figure 8. Annual rule compliance for the Ns prescription with a weighted linear regression overlaid. The point sizes reflect the relative weights given to each point in the regression based on variance differences among years.

A and B Wetlands

Trend analysis results for the A and 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 89% to 100% over the course of the evaluation period. As a result of the oscillating prescription compliance rate, no significant trend results (weighted $p = 0.43$) were detected for the weighted A and B Wetlands prescription type. (Figure 9)

Figure 9. Annual rule compliance for the A and B Wetlands prescription with a weighted linear regression overlaid. The point sizes reflect the relative weights given to each point in the regression based on variance differences among years.

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 $p = 0.85$) were observed for the weighted Forested Wetlands prescription type. A flat trend line for prescription compliance was observed. (Figure 10)

Figure 10. Annual rule compliance for the Forested Wetlands prescription with a weighted linear regression overlaid. The point sizes reflect the relative weights given to each point in the regression based on variance differences among years.

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 showed oscillating prescription compliance, and varying compliance for individual rules from year to year. Prescription compliance rates varied from 92% to 100% over the course of the evaluation period. No significant trend results for weighted regression analysis ($p = 0.27$) rate were observed for the Roads prescription type. (Figure 11)
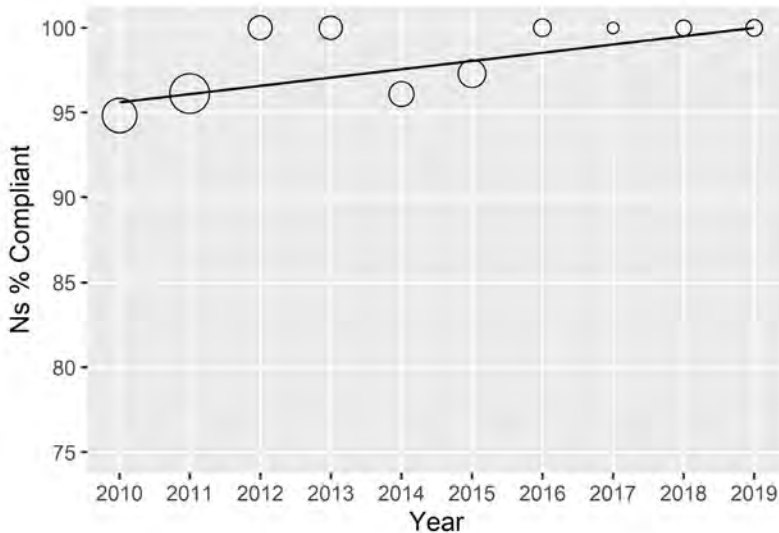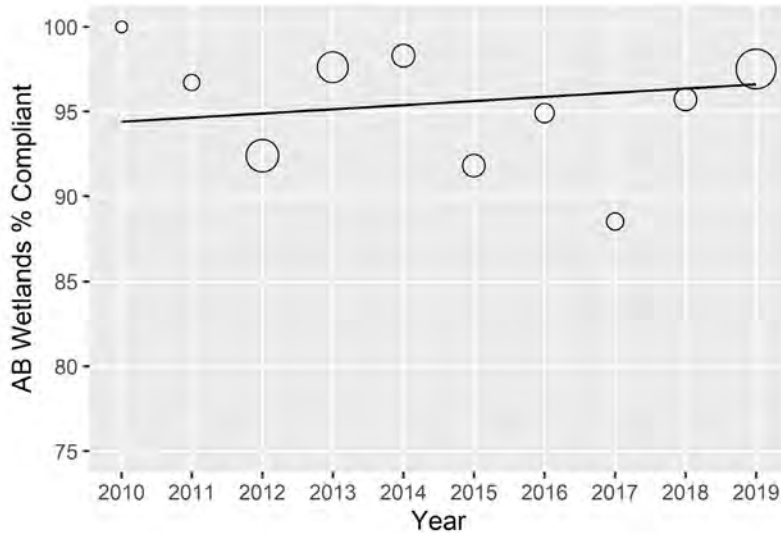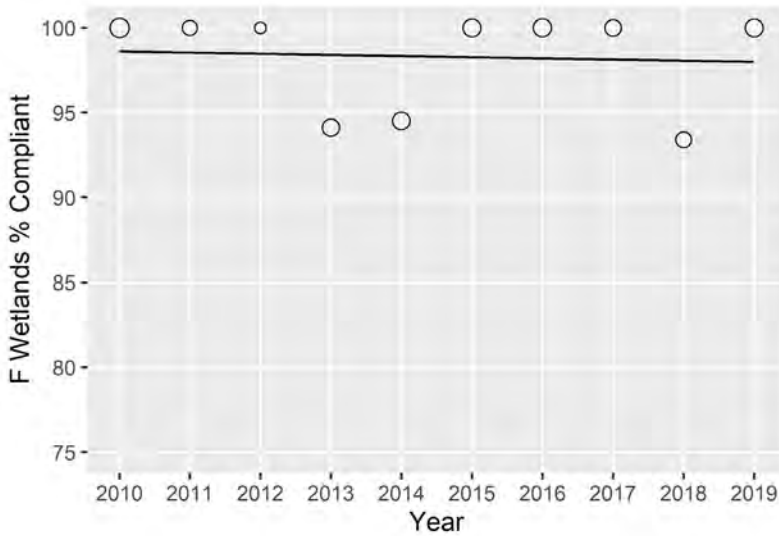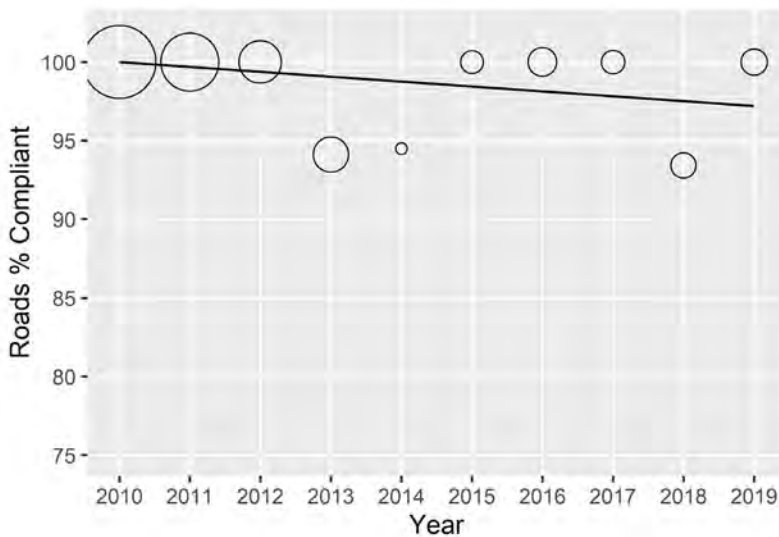

Figure 11. Annual rule compliance for the Roads prescription with a weighted linear regression overlaid. The point sizes reflect the relative weights given to each point in the regression based on variance differences among years.

Discussion

There have been statistically discernable linear or monotonic increases in compliance since 2010 for some prescriptions and, equally notable, no significant decreases in rates of compliance with FP rules. Compliance rates for both DFC1 and DFC2 prescriptions have increased since 2010. The increase was most apparent in the first five years, and the compliance rates for both prescriptions are relatively stable near 95% in the past five years. The NIZH prescription has had a stable increase in compliance since 2010 and is now close to 100%. The Np prescription has variable compliance but seems stable at about 93% (except for the low in 2017). Compliance with Ns rules has been at 100% for the past few years. Compliance with roads and wetlands rules appears to be stable with an average compliance about 98% for roads and forested wetlands and 95% for A and B type wetlands. Compliance with A and B wetlands rules is more variable across years.

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/N).

Overall FPA/N compliance generally mirrors FP rule compliance on individual FPA/Ns; however, occasionally one may be compliant while the other is not. Sometimes the FPA/N is compliant with rules but deviates from the landowner's stated protections on the FPA/N – what the landowner proposed and committed to. The CMP records FPA/N non-compliant observations. Future prescription samples sizes are not based on FPA/N compliance variance estimates, and cluster size (Table 20).

Table 20. 2018-19 Compliance with FPAs for Riparian and Wetland Prescriptions

	Status of Compliance	Western WA		Statewide						
		DFC1	DFC2	No Inner Zone Harvest	Np Activities	Ns Activities	Type A and B Wetlands	Forested Wetlands	Roads	Unstable Slopes
Small Forest Landowners	# Compliant Rules	5	n/a	7	7	n/a	30	5	28.0	11
	# with Deviation	0	n/a	0	3	n/a	1	0	2.0	1
	% of Sample Compliant	100%	n/a	100%	70%	n/a	97%	100%	94%	92%
	Confidence Interval	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Prescriptions Assessed	1	0	2	5	n/a	7	3	2	4
Large Forest Landowners	# Compliant Rules	74	44	69	72	1	113	11	91.8	89
	# with Deviation	9	4	3	4	0	1	0	3.2	1
	% of Sample Compliant	89%	92%	96%	95%	100%	99%	100%	97%	99%
	Confidence Interval	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Prescriptions Assessed	17	12	25	33	1	27	10	11	32
All Landowners	# Compliant Rules	79	44	76	79	1	143	16	120	100
	# with Deviation	9	4	3	7	0	2	0	5.2	2
	% of Sample Compliant	90%	92%	96%	92%	100%	99%	100%	96%	98%
	Confidence Interval	(84, 96)	(84, 99)	(92, 100)	(86, 97)	n/a	(97, 100)	n/a	(91, 100)	(95, 100)
	Prescriptions Assessed	18	12	25	38	1	34	13	13	36

Table 21. 2018-2019 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	25	0	0	0	0
	RMZ — Type Np Prescriptions	38	36	1	0	0	1
	ELZ — Type Ns Prescriptions	32	32	0	0	0	0
	WMZ — Type A and B Wetlands	41	40	1	0	0	0
	Forested Wetlands	19	19	0	0	0	0
	Roads	15	14	0	1	0	0
Western WA	RMZ — Type S or F Inner Zone Harvest DFC1	18	17	0	1	0	0
	RMZ — Type S or F Inner Zone Harvest DFC2	12	12	0	0	0	0

Findings for FPA/FP Rule Compliance Differences

The CMP notes observed differences between FP rule compliance and FPA/N compliance. FPA/N compliance focuses on terms of the approved FPA/N. There are few differences between FP rule compliance and compliance with an FPA/N for the 2018-2019 sample. Differences were found in the DFC1, Type Np waters, type A and B Wetlands, and Roads prescription samples. (Table 21)

Field observations resulted in the following differences between FPA/N compliance and FP rule compliance:

- Within the DFC option 1 prescription, the difference occurred as a deviation from the rule but was FPA/N compliant. The proponent incorrectly identified and treated the segment as a small type F water on the ground, but the stream was determined to be a large type F water by the CMP field staff. The outer zone had a sufficient number of leave trees per the FPA/N. However, with a large F water, the outer zone extended into the harvested area, leaving the outer zone 11 leave trees short of satisfying the requirements of the rule.

- Within the Np prescription, two samples deviated from the FPA/N, rule, or were indeterminate. For the first sample, the proponent reported a longer 50-foot no-cut buffer than was required. Harvest was observed within the proponent's no-cut buffer. However, no harvest was observed within the required no-cut buffer by rule. The sample was compliant with the rule but deviated from the FPA/N. For the second sample, the proponent underreported the required length of the 50-foot no-cut buffer. Per CMP field team stream length measurements, the proponent needed an additional 125 feet of no-cut buffer. The sample was compliant with the FPA/N but deviated from the requirement of the rule. For the third sample, because of the underreported 50-foot no-cut buffer length, harvest occurred within the required 50-foot no-cut buffer. The sample was compliant with the FPA/N but deviated from the requirement of the rule. For the fourth sample, the proponent over reported the required 50-foot no-cut buffer length. The CMP field team observed harvest within 50 feet of the water in the additional no-cut buffer. The sample was compliant with the rule but deviated from the FPA/N. For the fifth sample, the proponent treated the water as an Np but it was determined to be an F by the CMP field staff. Region FP staff received neither a Water Type Modification Form nor a related Interdisciplinary Team documentation noting a water type change. During the compliance monitoring field visit, the water met the criteria of a Type F water (> 2' wide and < 16% gradient), and fish were visually observed. The sample was determined to be compliant with the wording on the FPA/N, and non-compliant with the rule.

- Within the type A and B Wetlands prescription, one sample deviated from application compliance but was rule compliant. For the first sample, the proponent declared that the selected wetland was type A. However, during the compliance monitoring field review, it was determined that the wetland was a type B wetland, resulting in an incorrect no-cut buffer width per the FPA/N. The sample was determined to be compliant with the rule but deviated from the FPA/N.
- Within the Roads prescription, one sample deviated from rule compliance but was FPA/N compliant. There were four separate deviation observations at the same site; all four observations were FPA/N compliant but deviated from rule requirements. A culvert installation was deviated from the following four rules; The culvert was not designed to minimize sediment delivery, a drainage structure is discharging to erodible soils without adequate outfall protection, alterations to streambed and bank vegetation were not limited to what was necessary

for the construction of the project, and scouring to the streambed occurred as a result of culvert installation. All four of these observations were determined to be FPA/N compliant. (Table 21)

9. Potentially Unstable Slopes

The potentially unstable slopes emphasis study was developed in accordance with governance of the program to evaluate compliance with forest practices rules and the FPA/N. Forest Practices Applications (FPA/N) containing potentially unstable rule identified landforms (RILs) were the population of FPA/Ns assessed through this study. The design objective was to evaluate how well on-the-ground results related to avoiding or mitigating potential adverse impacts from forest practices on RILs were carried out compared to what was required by the subject FPA/N. The unstable slopes emphasis study was designed to evaluate overall FPA/N compliance, as opposed to individual rule compliance. Thus, the unstable slopes prescription was comprised of FPA/N "compliance only" questions. This focus differs from typical compliance monitoring analyses but was necessary because of the absence of rules metrics that are measurable in the field within the rule identified landform prescription type.

The population sampled for Unstable Slopes consisted of FPA/Ns containing RILs or that had then reported as being immediately adjacent to the forest practice. As defined in WAC 222-16-50(d)(i)), RILs include inner gorges, convergent headwalls, bedrock hollows, toes of deep-seated landslides, groundwater recharge areas for glacial deep-seated landslides, outer edges of meander bends along valley walls or high terraces of an unconfined meandering stream, and any areas containing landforms indicating the presence of potential slope instability which cumulatively indicate the presence of unstable slopes. Initial screening of FPA/Ns eligible for sampling consisted of those with a checked "Unstable Slopes" box located under the Resource Review section on the "Office Checklist Page 1." Following initial screening, FPA/Ns that contained RILs or had RILs bounded out of the FPA/N footprint were assigned a randomly generated number. Compliance Monitoring and Science Team staff reviewed these FPA/Ns for completeness, based on the random order assigned.

The Forest Practices Science Team consists of regulatory licensed engineering geologists ("qualified experts" per WAC 222-10-030(5)) who evaluate landowner proposals and provide advice to FP foresters who make decisions about FPA/N approval or disapproval. FPA/Ns that did not contain the RIL prescription, or FPA/Ns where forest practices activities had not been completed, were removed from the sample population. In some cases, the FPA/N contained multiple instances of the Unstable Slopes prescription type. If multiple occurrences of the same prescription type are contained on a single FPA/N, only one occurrence is selected, at random, and assessed through a CMP field review.

To qualify overall FPA/N compliance for unstable slopes prescriptions, yes/no determinations were produced by a DNR qualified expert (WAC 222-10-030(5)) and ECY LEG when answering the following questions related to FPA/N RIL compliance:

- Did the landowner identify all potentially rule identified unstable features in/around the harvest/activity area?

- Did the landowner apply mitigation for all potentially rule identified unstable features as identified on their FPA (Question 31)?

- Did NO harvest occur within the no harvest mitigation area associated with potentially rule identified unstable features?

Due to potential data redundancy, the question "If a Geotechnical memo, letter or report prepared by a QE was submitted as part of the FPA/N, was the mitigation, as identified in their report, implemented by the landowner?" was eliminated.

A **Yes/No** or **N/A** determination was applied for each individual question that makes up the Unstable Slopes prescription. These questions were answered during the Qualified Expert's field assessment, following a complete and thorough office review of the selected FPA/N. Questions were determined to be **compliant** when the QE confirmed all applicable rule identified landforms had been identified by the proponent and the completed harvest was observed to have correctly followed the approved FPA/N (for FPA/N compliance).

The **Exceeds** rating was not used.

The **deviation from compliance** determination means that implementation of the avoidance/mitigation actions in the approved FPA/N were not followed. As with the compliant determination, this determination was made for each individual question included in the Unstable Slopes prescription sample. If an answer to a question illustrated a deviation from compliance, then the proponent either did not identify all applicable rule identified landforms, or did not execute the stipulations stated in the FPA/N (for FPA/N non-compliance).

Deviation ratings (Low, Moderate, and High) were not used for the Unstable Slopes sample.

Findings for Unstable Slopes Study

In the 2019 Unstable Slopes sample, there was a total population of 978 FPA/Ns. The resulting sample size was 36, and a total of 102 questions were evaluated (Table 20).

Table 22. 2019 Statewide Unstable Slopes Emphasis Study Compliance Results

Unstable Slopes	
Sample Size	36
Mean Cluster Size	2.8
Questions Evaluated	102
Questions "yes"	100
Mean "yes"	98%
95% Confidence Interval	(95%, 100%)

Of the 102 questions, 100 were answered "yes" for the Unstable Slopes prescription sample, resulting in a 98% compliance rate +/- 2.7%. Of the 36 sites sampled, 34 had "yes" answers for all questions and two had "no" answers for at least one question in the prescription type. (Table 22)

Field observations from 2019 included for two deviation observations.

- One deviation was recorded for not identifying all potentially rule identified unstable landforms in or around the harvest area.

- One deviation was observed where harvest occurred within the no-harvest mitigation area associated with potentially unstable rule identified landforms.

10. Report Discussion

The 2018-19 rule prescription compliance rates range from 92-100%, indicating high compliance with forest practices rules. The uncertainty bounds maintain the half-width 95% confidence interval target of +/-6% for all sampled prescriptions during the biennium. Note that the jackknife-based confidence intervals are not symmetric.

Riparian and Wetland Compliance Proportioned across the Population

Tables that describe 2018-2019 riparian and wetland findings are in Sections 5.2, 5.3, 5.4, and 5.5 for individual prescription types. Section 5 also provides estimates of the population sizes for each prescription type. Table 23 (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 waters.

Table 23. 2018-19 Estimated Population Size and Associated FP Rule Compliance

Prescription Type	Estimated Population of FPAs with the Prescription	Compliance Percentage
RMZ — Type Np Prescriptions	2,040	96%
RMZ — Type Ns Prescriptions	2,319	100%
RMZ — Type S or F No Inner Zone Harvest	1,896	98%
Forested Wetlands	657	97%
Type A and B Wetlands	402	97%
Western WA RMZ — Type S or F Inner Zone Harvest DFC2	284	95%
Western WA RMZ — Type S or F Inner Zone Harvest DFC1	86	92%
Roads	3,048	98%
Haul Routes	N/A*	96%

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

Introduction of Jackknife Compliance Rate Estimator

The ratio estimator used prior to the 2016-17 biennia was biased due to high variance estimates, but the bias was disregarded, and assumed to be small. To correct for potential bias and reduce variance, the jackknife estimator was introduced and applied during the 2016-17 biennium onward. Variance estimates from the jackknife estimator are used to calculate future sample sizes. The biased ratio estimator is no longer used by the Compliance Monitoring Program.

Compliance Monitoring Program Challenges

Np Prescription Response

During the 2016-17 biennium, the Np prescription results missed the desired Confidence Interval half width of +/- 6%. The Np prescription had an estimated confidence C.I. half width of +/- 7.5%. As a result of the missed C.I. target, sample sizes were adjusted upward from 35 during the 2016-17 biennium to 38 for the 2018-19 biennium. This was done to narrow the C.I. half width to within the target for the 2018-19 biennium. The resulting 2018-19 Np prescription C.I. half width from the increased sample size was +/- 2.5%. The C.I. half width narrowed by 5% with the help of the increased sample size.

Representation of Complete Compliance

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

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 three 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 to better resolve questions associated with the variability in the natural environment.

Compliance vs. Resource Protection

The CMP study design has been developed to determine the how well actual on-the-ground results comply with specific sampled forest practices rules. The CMP does not evaluate effectiveness of the rules, nor the adequacy of the resource protection provided by the proponent's implementation of the forest practices rules.

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

As a direct result of 2018-19 Compliance Monitoring fieldwork, the Forest Practices Application form and instructions were updated for Wetland Management Zones to accurately reflect rule interpretation. Additionally, with the assistance of the Compliance Monitoring Program, the Forest Practices training program updated the Forest Practices Wetlands training materials and syllabus to more clearly present the relationship between wetlands and Forest Practices rules.

12. Glossary

Bankfull width (BFW)
    a) **For waters** — The measurement of the lateral extent of the water surface elevation perpendicular to the channel at bankfull depth. In cases where multiple channels exist, bankfull 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 one 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. The crowns of dominant trees crowd one or more sides of a co-dominant tree.

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 waters.

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/N). 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 class III or IV forest practice. Class III and IV forest practices have a higher potential to impact a public resource than does a 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.

Jackknife analysis. A resampling technique for variance and bias estimation. Each observation is systematically omitted from the dataset and the ratio estimate is recalculated, then the mean is determined from the recalculations.

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 to leave an uneven-aged stand of well-distributed residual, healthy trees that will reasonably use 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 Water, Non-Fish Bearing Seasonal Water, type A and 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 water, where trees are left to provide protection from disturbance when forest practices activities, such as timber harvests, are conducted.

Rule Identified Landforms (RILs). Inner Gorges, Convergent Headwalls, Bedrock Hollows, Toes of Deep-Seated Landslides, groundwater recharge areas for glacial deep-seated landslides, outer edges of meander bends along valley walls or high terraces of an unconfined meandering stream, and any areas containing landforms indicating the presence of potential slope instability that cumulatively indicate the presence of unstable slopes.

Seep. A moist or wet place where water reaches the earth's surface.

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 waters 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 water crossings where the alignment of the road continues to parallel the stream for more than 250 feet on either side of the water. 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/N.

Uppermost point of perennial flow (UMPPF). 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.

13. Appendix A: Sampling and Sample Size Estimation

SAMPLING STRATEGY

Quantitative objectives

The primary quantitative objective of the Compliance Monitoring Program is to estimate the statewide average compliance of forest practices activities with applicable forest practices rules within each biennium, with an error rate of +/-6%. A secondary objective is to compare changes in compliance through time.

Population description

The population designated for sampling consists of the total number of each prescription type identified on forest practices applications that have completed forest practices activities and expire April 1, through March 31 of the following year. The program uses these dates as the timeframe for each successive year of compliance monitoring. This consistent annual sampling period ensures that no FPA/Ns are excluded from selection due to submittal date.

FPA/Ns for annual field assessments include *completed* Class II, Class III, and Class IV–Special and Class IV–General non-conversion FPA/Ns expiring within a one-year period that contain a monitored standard prescription. Each application states all the forest practices activities that the landowner intends to implement. This information allows the compliance monitoring field team to locate forest practices applications (FPA/Ns) that list the particular FP rule prescriptions being sampled in a given year. Sample selections for each prescription type are produced from the FPA/Ns that contain the prescriptions being monitored that year.

Desired Future Condition Option 1, Desired Future Condition Option 2, Eastern Washington Inner Zone Harvest, No Inner Zone Harvest, Non-fish Bearing Perennial Waters, Non-Fish-Bearing Seasonal Waters, type A and B Wetlands, Forested Wetlands, Roads, and Haul Routes comprise the annual standard sample prescriptions. The overall prescription population size is often not known, but can be estimated based on the number of FPA/Ns that were reviewed and were found to be part of the population containing the given prescription. The CMP estimates N for an individual prescription as follows:

$$\widehat{N} = \frac{n_1 \times F_1}{f_1},$$

where
F_1 = the total number of FPA/Ns approved in Year 1,
f_1 = the number of FPA/Ns evaluated for membership in the population ("opened") in Year 1, and
n_1 = the number of FPA/Ns opened that contained completed activities in Year 1.

The finite population correction factor (FPCF):

$$1 - \frac{n}{\hat{N}}.$$

Sample selection methods

Each FPA/N is assigned an expiration date upon approval. There are thousands of active (not yet expired) FPA/Ns every year, because the majority of FPA/Ns have three years in which to be completed. Populations are grouped by prescriptions (DFC1, DFC2, NIZH, etc.) that have been identified by completed individual FPA/Ns to more accurately analyze the collected field data. Therefore, populations are determined by the frequency of prescriptions that occur as part of completed FPA/Ns.

To ensure all active completed FPA/Ns have an opportunity to be selected, the populations to be sampled are FPA/Ns that expire between April 1 of the preceding year and March 31 of the sampling year. The April 1 to March 31 window improves the likelihood that the forest practices operations will be completed prior to the primary compliance monitoring sampling months, February through November, and that the compliance monitoring field team attempts to conduct data collection before the FPA/N expires.

To ensure a random selection of FPA/Ns from the sampling population, FPA/Ns 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 consists of reviewing the FPA/Ns in this random order. Each FPA/N is reviewed to determine the sample FP rule prescription types, which can be sampled. This selection process continues through the ordered list of FPA/Ns until the target sample size is reached for each sampled prescription type.

All FPA/Ns in the population are ordered by the assigned generated random number and categorized by region. FPA/Ns that do not contain monitored activities and FPA/Ns that are not complete are removed from the population. Sample sizes are applied in proportion to statewide population size for each prescription type.

For each riparian prescription, the population to be sampled consists of FPA/Ns containing that prescription. In some cases, a single FPA/N contains multiple implementations of the same riparian prescription type. If this is the case, one prescription implementation is randomly selected for assessment. If multiple instances of the same prescription type are contained on a single FPA/N, one instance is randomly selected and assessed for the purposes of Compliance Monitoring field reviews.

The figure below displays a flow chart that illustrates how activities are selected for field assessment.

Figure 1. Flow Chart of FPA/N selection for Compliance Monitoring field reviews.
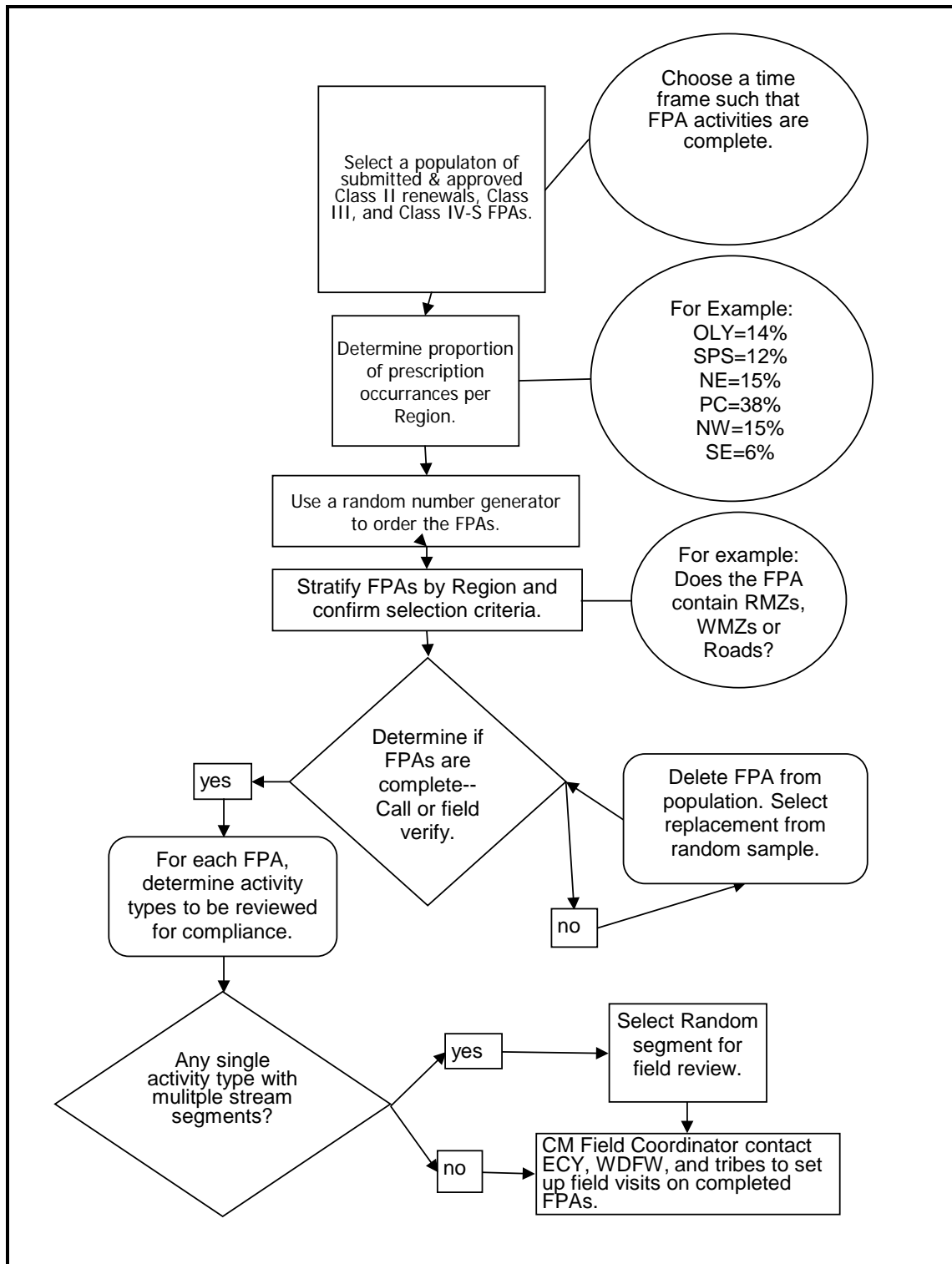
Sample size and allocation

The stated objective is to estimate compliance for each prescription with a precision of +/- 6% with a 95% confidence interval. We use data from previous biennia for each prescription to estimate compliance variance, the average number of rules among FPA/Ns, and the expected population sizes (overall and within each region). Because these population values can vary widely among biennia, it is important to update the estimates after one year of sampling for the biennium is completed. This two-year approach assumes that there is no change in compliance between the two years, so that no bias is introduced by having unbalanced sampling among the two years.

The estimated population values for variance, cluster size, and population size are used to estimate the sample sizes required to attain a width of +/- 6% for a 95% confidence interval using an iterative process based on a t-distribution confidence interval on average prescription compliance:

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

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

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,

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

and N is the estimated population size for the prescription.

Compliance and Variance Calculation Methods

In previous biennia, the average compliance was calculated according to the rules of estimation for cluster samples (See, for example, Cochran, 1977; Schaeffer et al., 1990). The mean compliance for a prescription was estimated by the ratio of the number of compliant rules divided by the total number of rules sampled across all FPA/Ns in the prescription:

$$\hat{R} = \frac{\sum\limits_{i=1}^{n} y_i}{\sum\limits_{i=1}^{n} x_i},$$

where *n* is the number of FPA/Ns sampled for the prescription, x_i is the number of rules applied on the *i*th FPA/N in the sample, and y_i is the number of rules complied with on the *i*th FPA/N.

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

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

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

$$\widehat{SE(\hat{R})} = \frac{\sqrt{n \cdot (1 - \frac{n}{N}) \cdot \sum\limits_{i=1}^{n} (y_i - \hat{R}x_i)^2}}{\sqrt{(n-1)} \cdot \sum\limits_{i=1}^{n} x_i} \text{ (Cochran, 1977),}$$

and *N* is the estimated population size for the prescription (i.e., total number of FPA/Ns containing the prescription).

The ISPR review found that this was a proper statistical estimation process. However, the review drew attention to the bias on the order of 1/n that is present in the ratio estimator, and recommended that the jackknife estimation procedure described by Cochran (1977) and Gregoire (1984) be applied to help reduce or eliminate any potential bias in the estimates. Therefore, beginning with the 2016-17 biennium, average compliance for each prescription is now estimated using a jackknife ratio estimator and associated confidence interval, as recommended by the ISPR review. For the jackknife estimator, each FPA/N was removed from the prescription sample in turn, and a ratio estimate of compliance was estimated on this reduced sample ($\widehat{R_{-j}}$).

The jackknife estimator for average compliance in a finite population is (Cochran, 1977, eqn 6.82):

$$\widehat{R_{JK}} = w \cdot \hat{R} - (w-1) \cdot \widehat{R_-}$$

Where $w = n\left[1 - \frac{(n-1)}{N}\right]$ is a finite population correction factor, and $\widehat{R_-}$ is the average of the n quantities $\widehat{R_{-J}}$. An estimate of variance is also given by Cochran (1977, eqn 6.86):

$$var(\widehat{R_{JK}}) = \left(1 - \frac{n}{N}\right) \cdot \frac{(n-1)}{n} \cdot \sum_{j=1}^{n}(\widehat{R_{-J}} - \widehat{R_-})^2$$

$$var(\widehat{R_{JK}}) = \left(1 - \frac{n}{N}\right) \cdot \frac{(n-1)^2}{n} \cdot var(\widehat{R_{-J}})$$

$$\widehat{SE(\widehat{R_{JK}})} = \sqrt{var(\widehat{R_{JK}})}$$

An approximate 95 percent confidence interval for the jackknife estimate was then formed as follows:

$$\widehat{R_{JK}} \pm t_{.025,(n-1)} \cdot \widehat{SE(\widehat{R_{JK}})},$$

where $t_{.025,(n-1)}$ is the 97.5[th] percentile of the student-t distribution with $(n-1)$ degrees of freedom, and N in the formulas above is replaced by $\hat{N}$.

14. Appendix B: 2018-2019 Biennium Individual Rule Compliance by Prescription

Table column headers may not reflect actual field form question wording

Desired Future Condition Option 1

DFC1 (n=18)	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)	CMZ not recorded on FPA/N 222-30-020(13)	If harvest planned within 75ft. of BFW/CMZ was shade doc' included? (222-30-040)	Correct # Outer Zone leave trees (222-30-021(iii)(c))
Compliance	17	18	18	18	16	17	0	10	16
Assessed	18	18	18	18	17	18	0	16	18
% compliant	94%	100%	100%	100%	94%	94%	N/A	63%	89%
95% CI	(75, 100)	(84, 100)	(84, 100)	(84, 100)	(74, 100)	(75, 100)	N/A	(39, 82)	(68, 98)

Desired Future Condition Option 2

DFC2 (n=12)	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))	CMZ not recorded on FPA/N 222-30-020(13)	Correct # Outer Zone leave trees (222-30-021(iii)(c))
Compliance	12	12	12	12	11	12	0	9
Assessed	12	12	12	12	12	12	0	12
% compliant	100%	100%	100%	100%	92%	100%	N/A	75%
95% CI	(74, 100)	(74, 100)	(74, 100)	(74, 100)	(62, 100)	(74, 100)	N/A	(44, 94)

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))	Observed CMZ 222-30-020(13)	If harvest planned within 75ft. of BFW/CMZ was shade doc' included? (222-30-040)
Compliance	25	25	25	24	24	3	0
Assessed	25	25	25	25	25	3	1
% compliant	100%	100%	100%	96%	96%	100%	0%
95% CI	(86, 100)	(86, 100)	(86, 100)	(80, 100)	(80, 100)	(30, 100)	(0, 97)

Non-Fish Bearing Perennial Waters

Np (n=38)	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/UMPPF & Confluence buffer (222-30-021(2)(b)(iv)(v))	No harvest on Alluvial fans (222-30-021(2)(b)(vi))
Compliance	38	0	26	30	2	2	0
Assessed	38	0	26	33	2	2	0
% compliant	100%	N/A	100%	91%	100%	100%	N/A
95% CI	(91, 100)	N/A	(87, 100)	(76, 98)	(17, 100)	(17, 100)	N/A

Non-Fish Bearing Seasonal Waters

| Ns (n=32)	Ns stream size (222-16-031(5))	Is ≤ 10% of ELZ exposed (222-30-021(2)(a))
Compliance	31	1
Assessed	31	1
% compliant	100%	100%
95% CI	(89, 100)	(3, 100)

Forested Wetlands

| Forested Wetlands (n=19)	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	18	9	6
Assessed	19	9	6
% compliant	95%	100%	100%
95% CI	(74, 100)	(67, 100)	(55, 100)

A and B Wetlands

A&B Wetlands (n=41)	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)	Openings less than 200' 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)	38 TPA GT 6in WW (4in EW) (222-30-020 (8)(b)(f*))	13 TPA GT 12in,where they exist (222-30-020 (8)(b)(f*))	75 TPA GT 6in, where they exist (222-30-020(8)(b))	25 TPA GT 12in, where they exist (222-30-020(8)(b))	3 TPA GT 20in, where they exist (222-30-020 (8)(b)(f*))	5 TPA GT 20in, where they exist (222-30-020(8)(b))
Compliance	35	29	5	3	26	6	5	0	0	21	20	0	14
Assessed	40	29	5	3	26	6	6	0	0	21	20	0	14
% compliant	88%	100%	100%	100%	100%	100%	83%	N/A	N/A	100%	100%	N/A	100%
95% CI	(74, 95)	(89, 100)	(51, 100)	(34, 100)	(88, 100)	(57, 100)	(39, 99)	N/A	N/A	(85, 100)	(84, 100)	N/A	(78, 100)

15. Appendix C: Trends of Individual Rules

Desired Future Condition 1
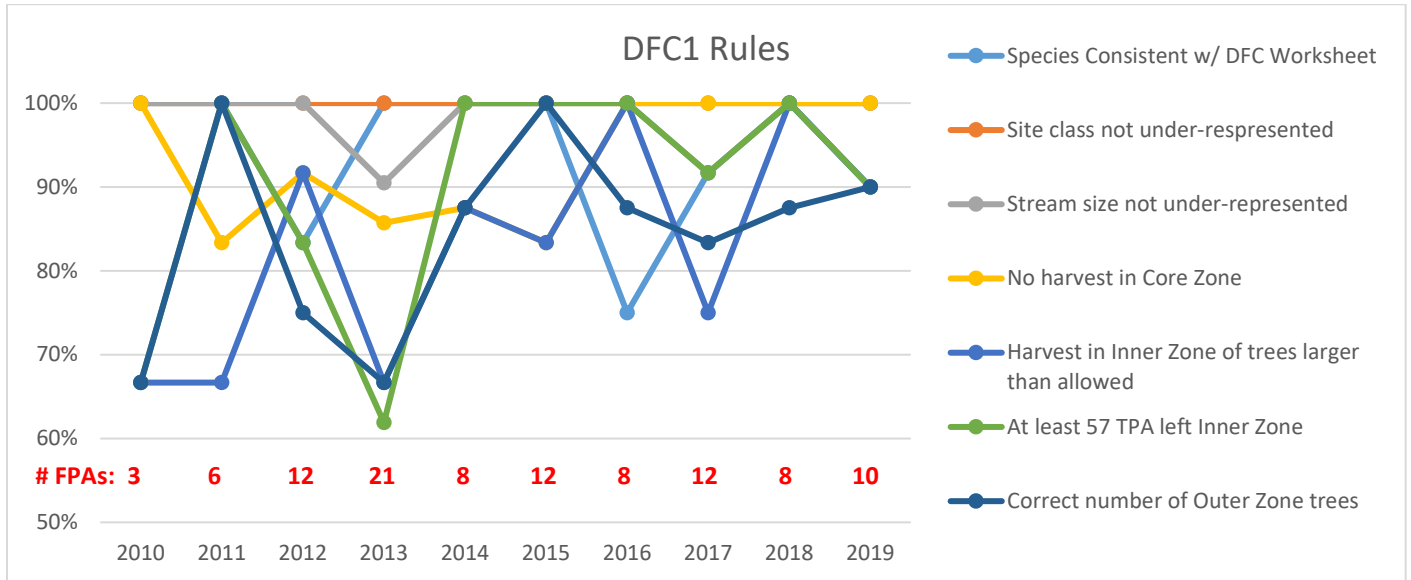
Desired Future Condition 2
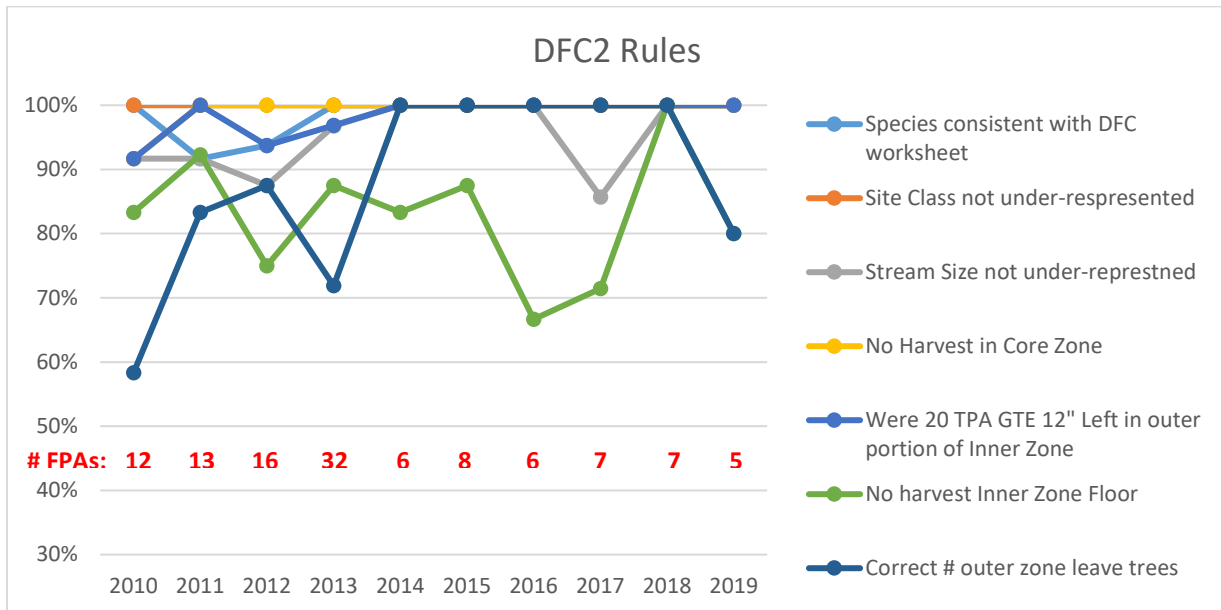
No Inner Zone Harvest
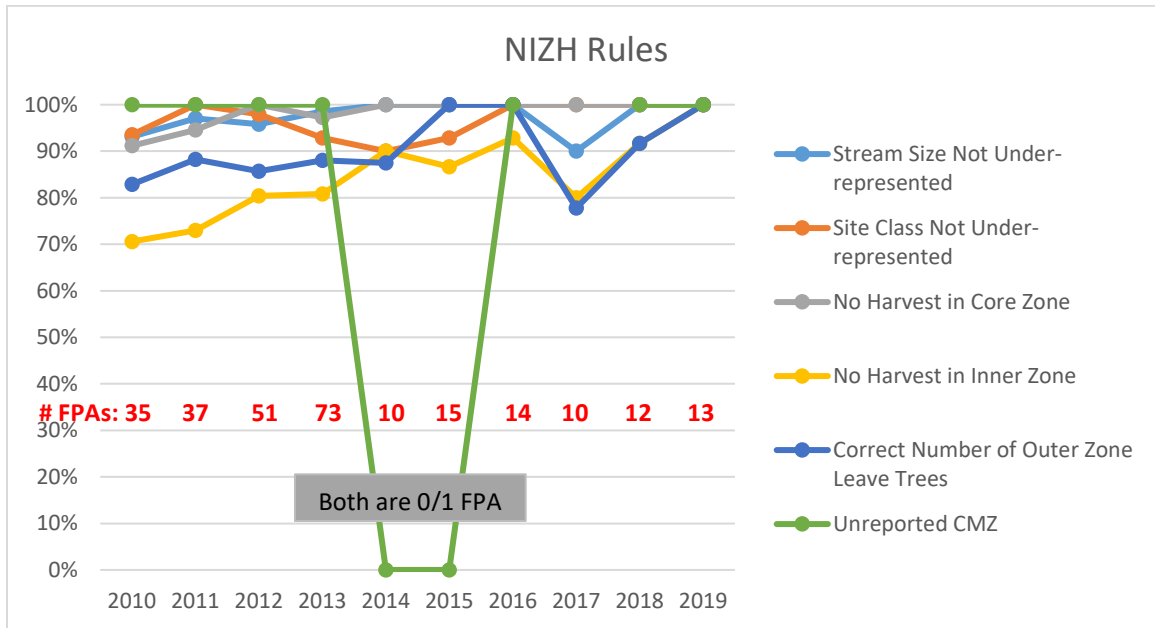
Non-Fish Bearing Perennial Waters

Non-Fish Bearing Seasonal Waters

Ns Rules

| # FPAs: | 32 | 9 | 13 | 11 | 14 | 21 | 19 | 12 | 16 | 16 |

A and B Wetlands

A&B Wetlands Rules

| # FPAs: | 6 | 8 | 23 | 16 | 14 | 21 | 21 | 22 | 21 | 20 |

Forested Wetlands

Forest Weltands Rules

Legend:
- Were Wetlands Typed and Sized Appropriately
- Low impact harvest systems
- FW Greater than 3 acres, was it mapped

FPAs: 6 8 23 16 14 21 21 22 8 11

Years: 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
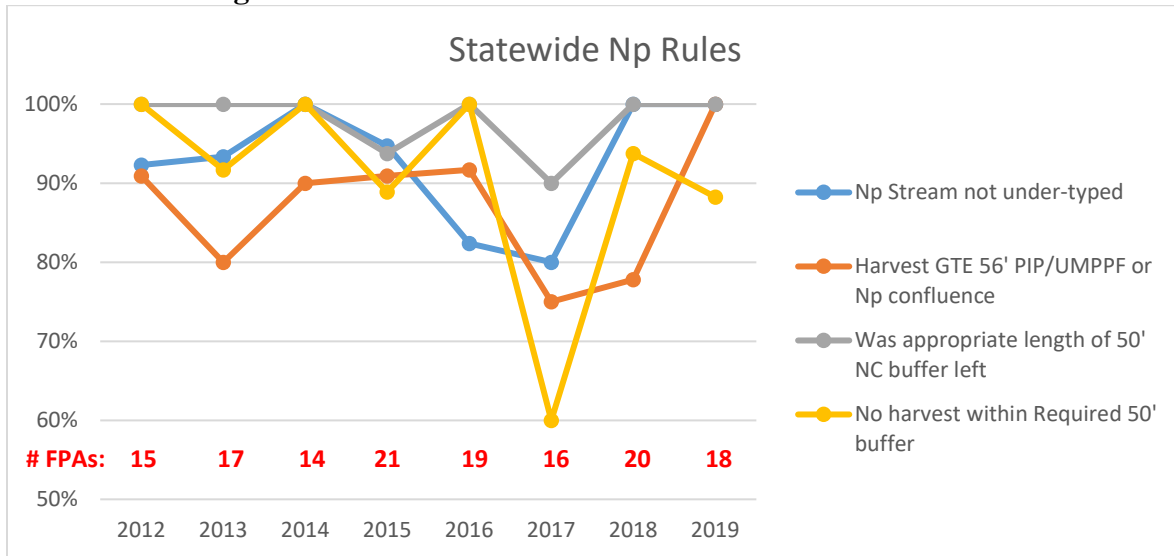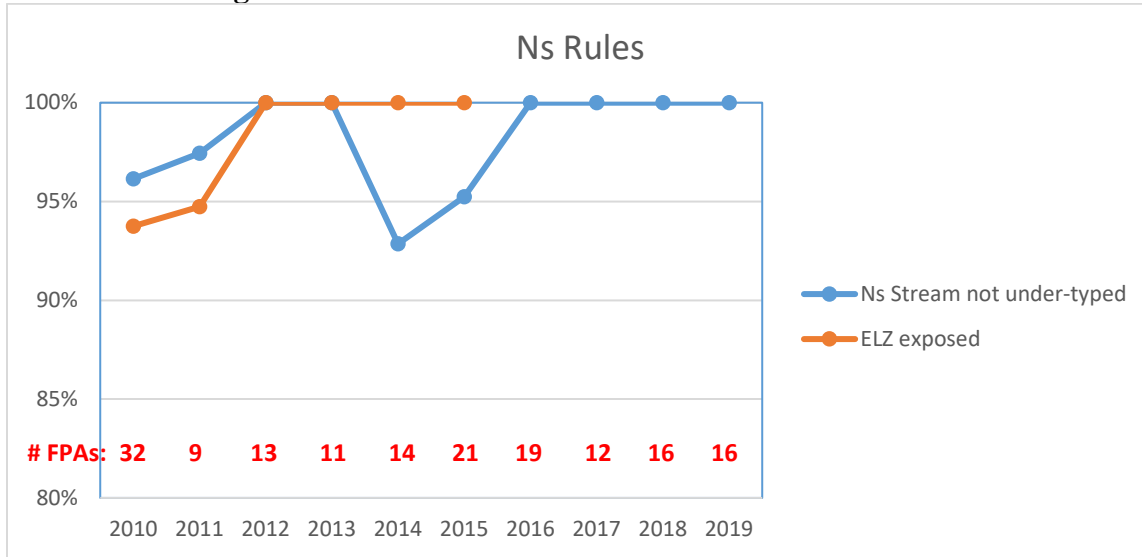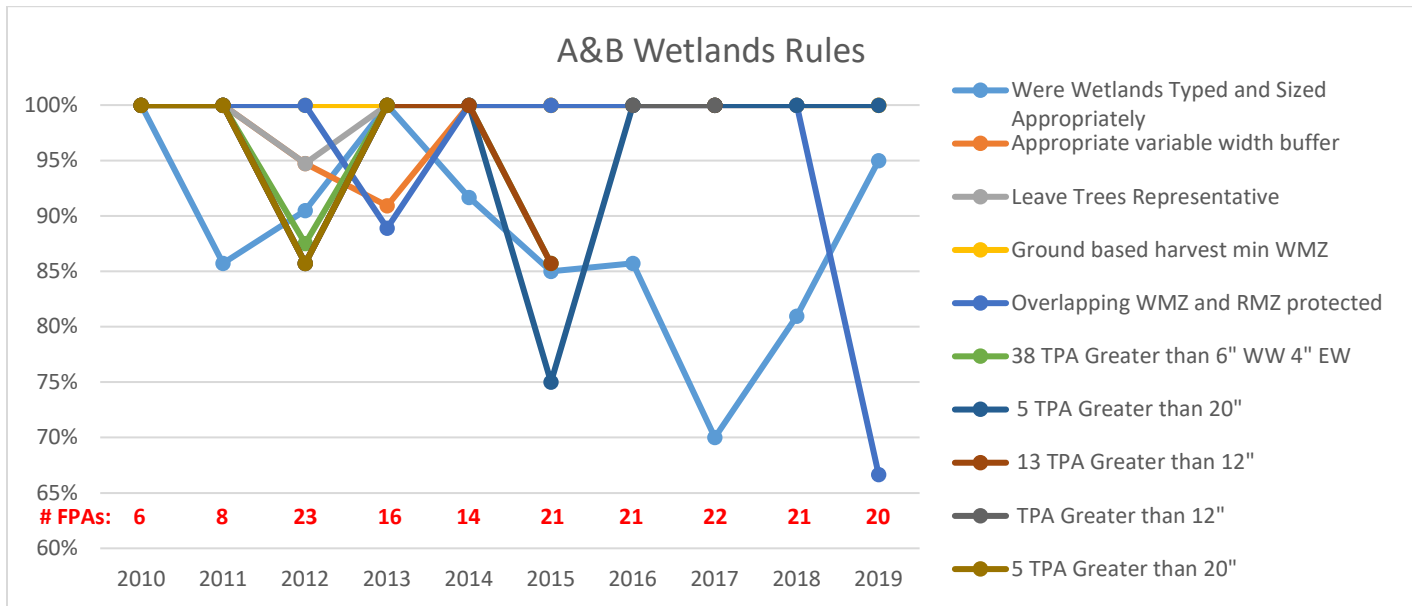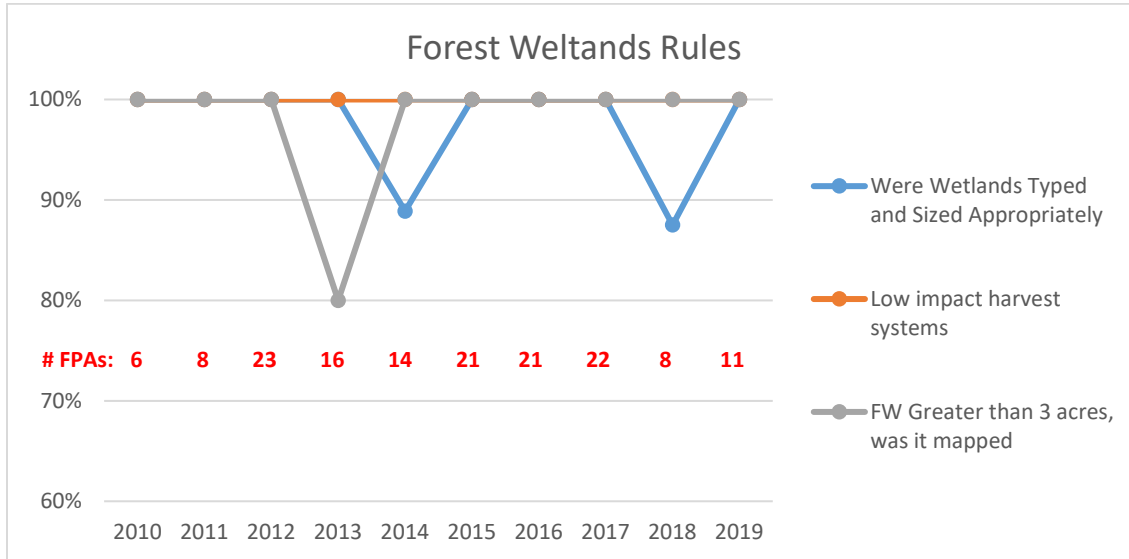
16. Appendix D: Independent Scientific Peer Review

As part of the 2014 redesign of the Compliance Monitoring data analysis methods, an Independent Scientific Peer Review was conducted on the new methodology, and the 2014-2015 data analysis and results.

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 Forest Practices Board established the independent scientific peer review process to determine if the scientific studies that address program issues are scientifically sound and technically reliable.

The review team consisted of three peer reviewers and the associate editor. Reviewers were selected by the associate editor in consultation with the managing editor of ISPR. In addition to reviewing the document, the Review Team met with the managing editor 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 were recognized scientists with combined expertise in statistics, quantitative ecology and resource management, forest biometry, and silviculture.

The List of Review Questions

Each reviewer were asked to specifically address the following 12 peer-review questions and sub-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 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/N is non-compliant for site class, the other rules are not applicable, so the FPA/N cluster has a size of one, with compliance = 0%. Because these FPA/Ns 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?

Overview of results

The statistical approach regarding the sampling procedure and construction of the ratio estimator for compliance was determined to be generally sound. The Review Team and the associate editor recommended that a more thorough appendix containing the technical details of the sample selection procedure be included in the biennial report. The expansion of the statistical methods appendix improves the reproducibility of the study and improves understanding of the sampling selection and data analysis process. The updated appendix details the entire compliance assessment process, from creation of the samples to obtaining the estimates, to be reproduced in another part of the country where FPA/Ns and prescriptions are used.

It was strongly recommended that use of a "jackknifed" form of the ratio estimator be incorporated into data analysis. By using a jackknifed form of the ratio estimator, bias may be reduced, yielding a more accurate variance estimate. This will require additional lines of coding in the data analysis, but will not change the sample selection procedure. A jackknifed ratio estimator can also be applied to older data sets.

Jackknife analysis requires recalculation of ratio estimates leaving out one sample each time. For example, if there were 13 samples being used to estimate DFC1 compliance, 13 ratio estimates would be calculated from the data, using 12 samples per estimate. The 13 estimates are then 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 can be compared to original ratio estimates to determine the sample size at which the difference between the two becomes negligible.

17. Appendix E: Technical Report on Jackknife Estimation Revisions and Trend Analysis, a Comparison between the 2014-15 and 2016-17 Biennia

Introduction

The 2014-2015 Forest Practices Compliance Monitoring Biennial Report was reviewed by an Independent Scientific Peer Review (ISPR) Panel from the University of Washington in 2017. One recommendation from the ISPR was to alter the method for estimating the biennial compliance statistic and the uncertainty around that estimate to correct for the known bias present in a ratio estimator. The recommendation was to use a jackknife estimator rather than the conventional estimator of a ratio. The jackknife estimator was therefore used to estimate compliance for the 2016-2017 and subsequent Biennial Reports. This technical appendix provides the details of the methods revisions, including a summary of the compliance results, a comparison between compliance using the previous method and the new method for the 2014-15 and 2016-17 biennia, and an assessment of linear trends in compliance through time.

Methods

2016-2017 Biennium

Prior to the 2016-17 biennium, the average compliance was calculated according to the rules of estimation for cluster samples (See, for example, Cochran, 1977; Schaeffer et al., 1990). The mean compliance for a prescription was estimated by the ratio of the number of compliant rules divided by the total number of rules sampled across all FPA/Ns in the prescription:

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

where n is the number of FPA/Ns sampled for the prescription, x_i is the number of rules applied on the ith FPA/N in the sample, and y_i is the number of rules complied with on the ith FPA/N.

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

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

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

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

N is the estimated population size for the prescription (i.e., total number of FPA/Ns containing the prescription).

The ISPR review found that this was a proper statistical estimation process. However, the review drew attention to the bias on the order of 1/n that is present in the ratio estimator, and recommended that the jackknife estimation procedure described by Cochran (1977) and Gregoire (1984) be applied to help reduce or eliminate any potential bias in the estimates. Therefore, beginning with the 2016-2017 biennium, average compliance for each prescription is now estimated using a jackknife ratio estimator and associated confidence interval, as recommended by the ISPR review. For the jackknife estimator, each FPA/N was removed from the prescription sample in turn, and a ratio estimate of compliance was estimated on this reduced sample ($\widehat{R_{-j}}$). The jackknife estimator for average compliance in a finite population is (Cochran, 1977, eqn 6.82):

$$\widehat{R_{JK}} = w \cdot \hat{R} - (w - 1) \cdot \widehat{R_-}$$

Where $w = n\left[1 - \frac{(n-1)}{N}\right]$ is a finite population correction factor, and $\widehat{R_-}$ is the average of the n quantities $\widehat{R_{-j}}$. An estimate of variance is also given by Cochran (1977, eqn 6.86):

$$var(\widehat{R_{JK}}) = \left(1 - \frac{n}{N}\right) \cdot \frac{(n-1)}{n} \cdot \sum_{j=1}^{n}(\widehat{R_{-j}} - \widehat{R_-})^2$$

$$var(\widehat{R_{JK}}) = \left(1 - \frac{n}{N}\right) \cdot \frac{(n-1)^2}{n} \cdot var(\widehat{R_{-j}})$$

$$SE(\widehat{R_{JK}}) = \sqrt{var(\widehat{R_{JK}})}$$

An approximate 95 percent confidence interval for the jackknife estimate was then formed as follows:

$$\widehat{R_{JK}} \pm t_{.025,(n-1)} \cdot SE(\widehat{R_{JK}}),$$

where $t_{.025,(n-1)}$ is the 97.5[th] percentile of the student-t distribution with $(n-1)$ degrees of freedom, and N in the formulas above is replaced by $\hat{N}$.

Comparison Between Ratio Estimates and Jackknife Estimates

The ratio estimator used for previous biennia is a biased estimator, but has been ignored in previous biennia, and assumed to be very small. We compare the jackknife estimates to the biased ratio estimates for the past three biennia to evaluate the consequences that using the biased estimator may have had on interpretation of compliance results in the past.

Compliance trends

FPA/N compliance has been monitored since 2006. In that time, there have been multiple changes (documented elsewhere) to the methods for monitoring compliance. The current compliance monitoring methods include tracking compliance with individual rules within prescriptions, while sampling the rule applications in clusters (FPA/Ns) for convenience of sampling.

The sample size for each year is set based on maintaining a set precision level for average compliance within a set of rules (a prescription) over a two-year period. Because the population of FPA/Ns available in any given year is finite and varying, the number or samples necessary to reach a given 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 cause some difficulty in estimating trends through time. However, the rules that have been consistently monitored since 2010 can be and have been compared through time in this report. The compliance data from 2006-2009 have not yet been matched to current rules, although these data may be included in future reports.

For the 2010-2017 data, each rule was reviewed to make sure that the compliance determination was consistently applied in all years. For example, in the earlier time periods, some rules did not have a possibility of being recorded as non-compliant: If they existed on the application, then they were compliant. Rules such as this are not currently included in the rule compliance estimates for prescriptions, and were therefore not included in the trend analysis. In addition, the label or compliance question for some rules may have changed over time, potentially causing inconsistencies in the application of compliance determination. These issues were carefully considered and resolved before the final set of rules to be tested for trend was selected for each prescription.

For the 2016-17 biennium, the method for estimating compliance and uncertainty around the compliance estimate was changed to the jackknife method, a less biased estimator. The comparison between the jackknife estimates and the conventional ratio estimates for 2016-17 and 2014-15 compliance showed minor differences. The trends in compliance are therefore unlikely to be affected by the choice of estimator. The jackknife estimators have been applied for annual compliance estimates for 2014-2017 at this point, and previous years with the conventional estimators.

Linear least-squares regression can be used to estimate general trends in average compliance through time. However, precision levels vary every year due to differences in sample sizes (proportion of population sampled) and in average cluster size (number of rules per FPA/N). In this case, the linear regression assumption of homogeneous variance is violated, which can cause biased estimates of trend. To adjust for this bias, we use weighted regression analysis, with the result in each year weighted by a relative variance estimate. In this way, years with more precise estimates of average compliance receive more weight in the regression, which compensates statistically for unequal variances. The trend estimates and significance level for both unweighted and weighted linear regression are supplied, with a 90% confidence interval for the annual trend (slope) for the weighted regression. Residuals from regressions are tested for approximate normality using Shapiro-Wilks test with alpha = 0.05.

Results

2016-2017 biennium results

The jackknife estimates of compliance with FPA/Ns and with Rules are displayed in Tables 1 and 2, respectively. The prescription compliance rates range from 87-100% indicated high compliance with forest practices rules. The uncertainty bounds maintain the target +/-6% width with the exception of the Np prescription, which had lower compliance and higher variance than expected based on historic estimates. The sample size relative to the expected population size will be adjusted for the next biennia to reflect these differences. Note that the jackknife-based confidence intervals are not symmetric. Also, sample size estimates will continue to be based on conventional ratio variance estimates.

Comparison Between Ratio Estimates and Jackknife Estimates

The standard ratio estimates and associated confidence intervals for rule compliance are compared for 2016-2017 biennium in Table 3, and for the 2014-2015 biennium in Table 4. The differences are generally very small. The maximum difference in average compliance for the 2016-2017 biennium is a 0.22% reduction in compliance for roads, paired with a similar 0.16% increase in compliance for AB Wetlands. For AB Wetlands, average compliance using the jackknife estimator is 91.98%, whereas average compliance with the biased estimator would be 91.82%. The confidence intervals for the AB Wetlands prescription are shifted up by a similar amount, indicating that the bias in the standard error estimate was minimal. The confidence interval is slightly (0.007%) narrower. For the roads prescription, the jackknife estimate is 94.85%, versus 95.08% for the biased estimator. The upper confidence interval is at 100% for both methods, but the lower confidence interval is lower by 0.8% for the jackknife interval, indicating the small downward bias in the original standard error estimate.

For the 2014-2015 biennium, the largest difference in compliance rate was for the roads rules, which had a compliance rate of 98.44% using the standard method, but a compliance rate of 98.54% using the jackknife method (a difference of 0.1%). The DFC2 prescription had the largest downward shift, going from 98.00% to 97.99% using the jackknife estimator, a difference of -0.01%. The width of the confidence intervals grew or shrank by similar amounts depending on bias in the standard error estimates. The largest increase in confidence interval width was for

AB Wetlands, which went from 10.47% wide to 10.61% wide, an increase of by 0.13%. In contrast, the confidence interval width for roads decreased by 0.19%.

Compliance trends

Change in annual rule compliance through time is displayed in Figure 1 and Figure 2, and trend statistics are given in Table 5. The relative weights used for weighted linear regression were used to size the points in the regression plots – larger points were weighted heavier in the regression based on variance estimates. For example, a higher proportion of the population sampled or a larger cluster size (i.e., more rules per FPA/N) in any given year reduces the variance and results in a heavier weight for the regression analysis. Slope estimates (i.e., average change in compliance per year) are given for weighted and unweighted regressions with p-values for significance tests, and a 90% confidence interval for the weighted regression slope. There is some evidence for increasing trends in compliance for Western Washington DFC2 prescriptions, and statewide NIZH and Ns prescriptions, with estimated average increases from 0.5 to 1% per year. Note that the residuals from the forested wetlands weighed regression displayed non-normal characteristics (Shapiro-Wilks test p-value 0.00006), but no further tests were conducted due to the obvious lack of trend displayed in Figure 2.

Discussion

The change to the jackknife estimator for compliance and uncertainty around compliance estimates has resulted in minor changes that do not affect the interpretation of compliance for this program, either for this biennium or historically.

There are some apparent increases in compliance since 2010 for some prescriptions, and no apparent decreases. Several caveats to these conclusions are needed: First, these methods are only testing for linear trends, and second, the 2010-2013 data have not yet been adjusted for the jackknife estimation method. The jackknife adjustments to earlier biennia are unlikely to result in large changes, but the annual trends observed are also small.

Table 1: 2016-2017 Compliance with Forest Practices Applications for Riparian and Wetland Harvest Prescriptions

	Status of Compliance	Western Washington		Statewide					Eastern WA
		DFC1	DFC2	No Inner Zone Harvest	Np Activities	Type A and B Wetlands	Forested Wetland	Roads	IZH (Census)
Small Forest Landowners	# Compliant Rules	1	n/a	8	8	16	3	27.5	5
	# with Deviation	3	n/a	0	3	0	0	4.5	0
	% of Sample Compliant	25%	n/a	100%	74%	100%	100%	82%	100%
	Prescriptions Assessed	1	0	3	5	5	2	3	1
Industrial Landowners	# Compliant Rules	75	50	57	70	74	14	98	30
	# with Deviation	3	3	5	8	2	0	2.0	1
	% of Sample Compliant	96%	94%	92%	90%	97%	100%	98%	97%
	Prescriptions Assessed	19	13	21	30	24	12	11	6
All Landowners	# Compliant[1]	76	50	65	78	90	17	125.5	35
	# with Deviation[1]	6	3	5	11	2	0	6.5	1
	% of Sample Compliant	93%	94%	93%	88%	98%	100%	95%	97%
	Confidence Interval	(85,100)	(88,100)	(86,100)	(80,96)	(95,100)	n/a	(87,100)	n/a
	Prescriptions Assessed	20	13	24	35	29	14	14	7

Table 2: 2016-2017 Compliance with Forest Practices Rules for Riparian and Wetland Harvest Prescriptions

	Status of Compliance	Western Washington		Statewide						Eastern WA
		DFC1	DFC2	No Inner Zone Harvest	Np Activities	Ns Activities	Type A & B Wetlands	Forested Wetland	Roads	IZH (Census)
Small Forest Landowners	# Compliant Rules	4	n/a	13	6	0	19	6	27.5	12
	# with Deviation	3	n/a	1	3	0	1	0	4.5	2
	% of Sample Compliant	57%	n/a	93%	74%	0%	96%	100%	82%	86%
	Prescriptions Assessed	1	0	3	4	0	9	3	3	2
Industrial Landowners	# Compliant Rules	124	86	99	90	26	82	28	98	37
	# with Deviation	8	5	5	12	0	8	0	2.0	0
	% of Sample Compliant	94%	95%	95%	88%	100%	91%	100%	98%	100%
	Prescriptions Assessed	19	13	21	31	26	34	14	12	5
All Landowners	# Compliant[1]	128	86	112	96	31	101	34	125.5	49
	# with Deviation[1]	11	5	6	15	0	9	0	6.5	2
	% of Sample Compliant	92%	95%	95%	87%	100%	92%	100%	95%	96%
	Confidence Interval	(87,97)	(89,100)	(90,99)	(79,94)	n/a	(87,97)	n/a	(88,100)	n/a
	Prescriptions Assessed	20	13	24	35	31	43	17	15	7

Table 3. Comparison of 2016-2017 rule compliance and confidence intervals using the standard ratio estimate method applied in previous biennia compared to the current jackknife method.

	Western Washington		Statewide					
	DFC1	DFC2	No Inner Zone Harvest	Np Activities	Ns Activities	Type A and B Wetlands	Forested Wetland	Roads
Prescriptions Assessed	20	13	24	35	31	43	17	15
# Rules Compliant[1]	128	86	112	96	31	101	34	125.5
# Rules with Deviation[1]	11	5	6	15	0	9	0	6.50
Standard Ratio Compliance Estimate	92.086%	94.505%	94.915%	86.49%	100%	91.82%	100%	95.08%
90% Confidence Interval — Lower Bound	87.17%	89.00%	90.40%	78.84%	n/a	86.50%	n/a	88.30%
90% Confidence Interval — Upper Bound	97.00%	100%	99.43%	94.13%	n/a	97.14%	n/a	100%
Jackknife Compliance Estimate	92.093%	94.507%	94.913%	86.60%	100%	91.98%	100%	94.85%
90% Confidence Interval — Lower Bound	87.18%	89.00%	90.40%	78.95%	n/a	86.66%	n/a	87.51%
90% Confidence Interval — Upper Bound	97.01%	100%	99.43%	94.25%	n/a	97.30%	n/a	100%
Jackknife - Standard Ratio Compliance	0.0069%	0.0016%	-0.0025%	0.1100%	0%	0.1590%	0%	-0.2231%
Jackknife Half-width of CI - Standard Ratio Half-width of CI	0.0013%	0.0013%	0.0030%	0.0044%	n/a	-0.0034%	n/a	0.5652%

Table 4. Comparison of 2014-2015 rule compliance and confidence intervals using the standard ratio estimate method applied in previous biennia compared to the current jackknife method.

		Western Washington		Statewide					
		DFC1	DFC2	No Inner Zone Harvest	Np Activities	Ns Activities	Type A & B Wetlands	Forested Wetland	Roads
Prescriptions Assessed		20	14	25	35	35	35	23	13
# Rules Compliant		131	98	116	128	59	120	38	81.7
# Rules with Deviation		8	2	8	8	2	7	1	1.29
Standard Ratio Compliance Estimate		94.24%	98.00%	93.55%	94.118%	96.72%	94.49%	97.44%	98.44%
90% Confidence Interval	Lower Bound	91.01%	95.22%	87.46%	89.40%	92.04%	89.25%	92.21%	95.30%
	Upper Bound	97.48%	100%	99.64%	98.84%	100.00%	99.73%	100.00%	100.00%
Jackknife Compliance Estimate		94.25%	97.99%	93.54%	94.122%	96.77%	94.55%	97.49%	98.54%
90% Confidence Interval	Lower Bound	91.02%	95.21%	87.45%	89.38%	92.13%	89.24%	92.35%	95.49%
	Upper Bound	97.48%	100.0%	99.64%	98.86%	100.00%	99.85%	100.00%	100.00%
Jackknife - Standard Ratio Compliance		0.0029%	-0.0070%	-0.0053%	0.0046%	0.0443%	0.0575%	0.0555%	0.0997%
Jackknife Width of CI - Standard Ratio Width of CI		-0.0026%	0.0156%	0.0072%	0.0444%	-0.0980%	0.1330%	-0.1443%	-0.1868%

Table 5. Results of analysis of linear trend through time on rule compliance

|	Estimate of Annual Change (% per year)	Unweighted Regression	Weighted Regression	90% Confidence Interval on Slope of Weighted Regression
DFC1	Estimate	0.80%	0.65%	(-0.078, 2.1)
	p-value	0.29	0.41	
DFC2	Estimate	0.76%	0.94%	(0.022,1.8)
	p-value	0.13	0.094	
NIZH	Estimate	0.50%	0.77%	(0.004,1.5)
	p-value	0.32	0.099	
Np	Estimate	-1.8%	-1.3%	(-5.0, 2.4)
	p-value	0.34	0.50	
Ns	Estimate	0.50%	0.55%	(0.004,1.1)
	p-value	0.15	0.102	
A and B Wetlands	Estimate	-1.0%	-0.49%	(-1.95, 0.96)
	p-value	0.08	0.54	
Forested Wetlands	Estimate	0.0%	0.0078%	(-0.87, 0.88)
	p-value	1.00	0.99	
Roads	Estimate	-0.19%	0.45%	(-0.39, 1.3)
	p-value	0.70	0.34	
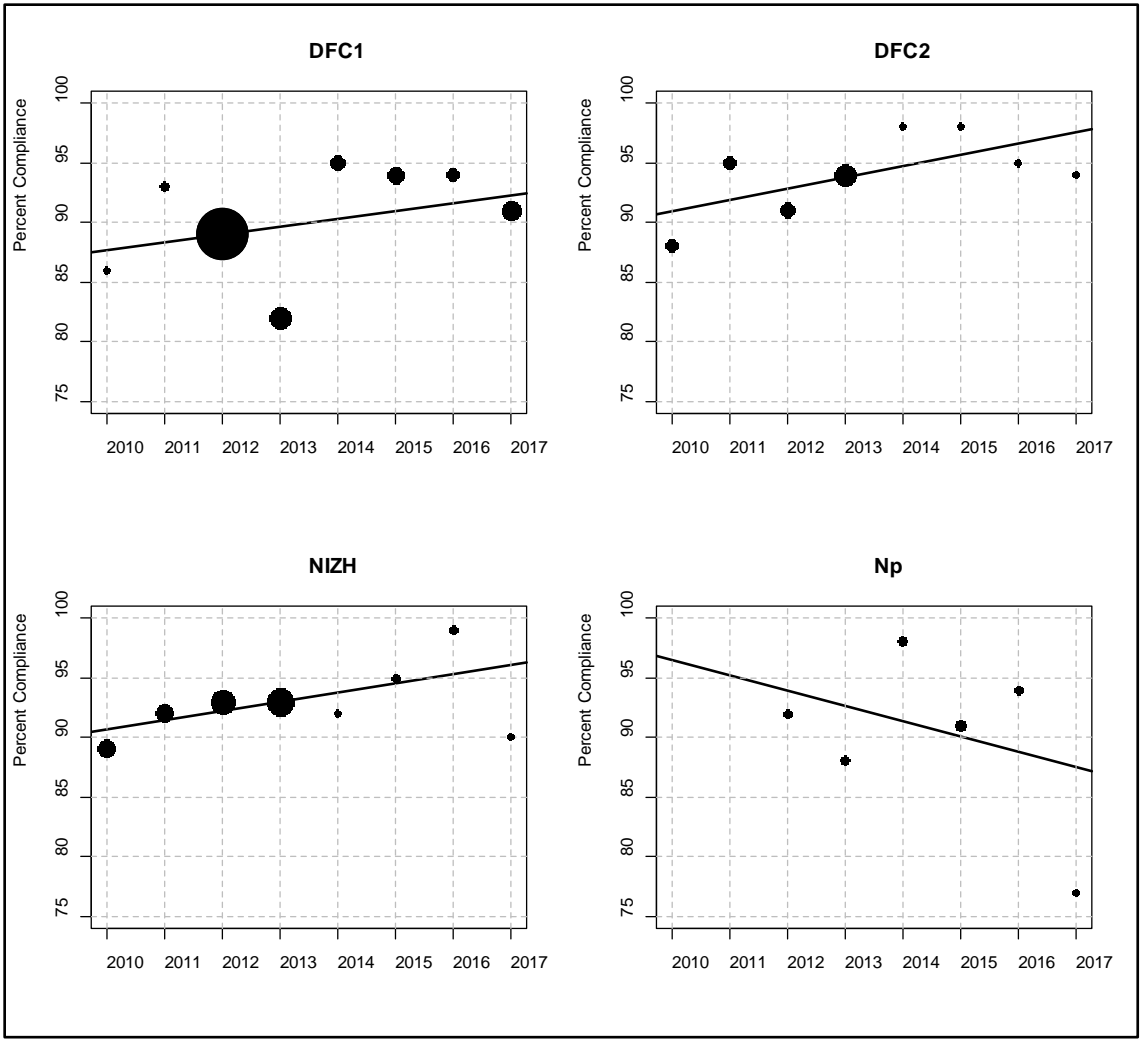
Figure 1. Annual rule compliance for four prescriptions with weighted linear regression line overlaid. The point sizes reflect the relative weights given to each point in the regression based on variance differences among years.
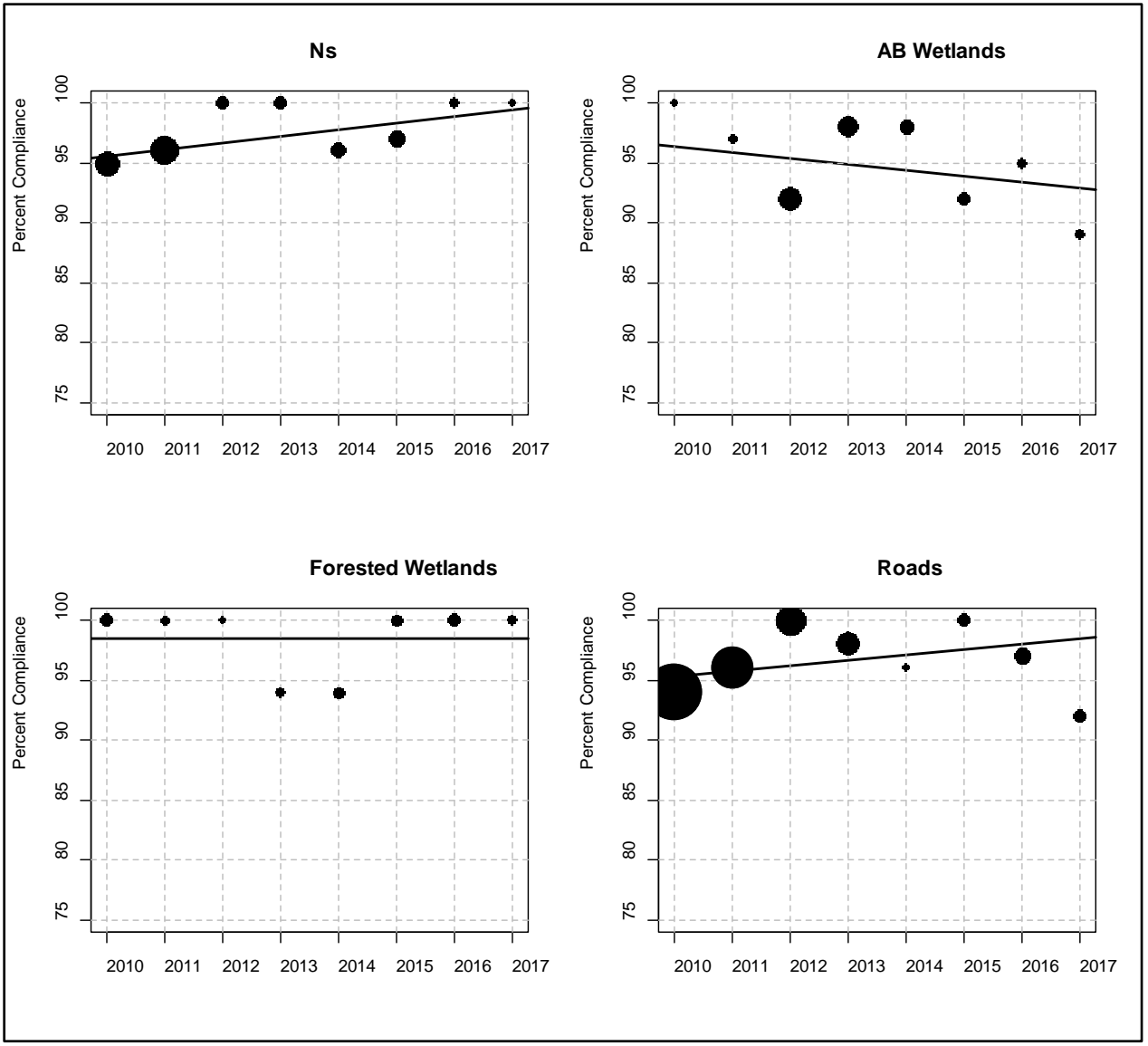
Figure 2. Annual rule compliance for four prescriptions with weighted linear regression line overlaid. The point sizes reflect the relative weights given to each point in the regression based on variance differences among years.

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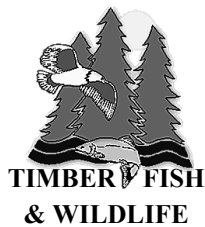
Timber, Fish and Wildlife Policy Committee
Forest Practices Board

PO BOX 47012, Olympia, WA 98504-4712

Policy Co-Chairs:
Marc Engel, Department of Natural Resources

Meghan Tuttle, Weyerhaeuser Company

TIMBER FISH
& WILDLIFE

October 23, 2020

TO: Forest Practices Board

FROM: Marc Engel and Meghan Tuttle

SUBJECT: TFW Policy Committee Report (June & July)

The Timber, Fish, & Wildlife Policy Committee (Policy) continues to manage an increasing workload driven by both internal process deadlines as well as priorities directed by the Forest Practices Board. To accomplish this, Policy continues to rely on additional meetings, email communications between meetings and the creation of technical and policy workgroups to address specific issues and meet deadlines.

The major topics before Policy in calendar year 2021 are summarized below:

Existing Policy Priorities

- **Adaptive Management Program (AMP)** budget and the **Master Project Schedule (MPS)**: Policy will review and prepare recommendations to present to the Board at the May 2021 meeting.
- **Technical Type NP Prescriptions Workgroup Riparian Management Zone (RMZ) buffer prescriptions for Type Np streams in western Washington:** A written update on the prescriptions prepared by the workgroup will be presented to Policy and the Board by July 2021.
- **WFPA Headwater Stream Smart Buffer Pilot Project**: The Cooperative Monitoring, Evaluation and Research Committee (CMER) is completing an on-going scientific review of the proposed study design that was provided by WFPA. The review is currently in the deliberation phase at CMER and it is uncertain when CMER will present the results of their review to Policy.
- **Small Forest Landowner Alternate Plan:** Completion of stage 1 and 2 of the dispute resolution process to prepare Small Forest Landowner Alternate Plan Template prescriptions will be completed and recommendations will be presented to the Board at the May 2021 meeting.
- **Small Forest Landowner Experimental Harvest Prescription:** The Policy workgroup will provide recommendations to Policy in January 2021 and policy will present recommendations to the Board at the May 2021 meeting.
- **Extensive Riparian Monitoring**: Policy is planning a workshop to tentatively be held in January 2021. Policy will develop a recommended extensive riparian monitoring strategy for inclusion in the MPS.
- **The Wetland Intrinsic Potential Tool Phase 2:** The final report and Policy recommendations are anticipated to be provided to the Board in August of 2021.

- **The Westside Type F Riparian Prescription Monitoring Pilot:** The report and Policy recommendations are anticipated to be provided to the Board in November of 2021.
- **Type N Experimental Buffer Treatment in Hard Rock Lithologies (Temperature, Sediment, Vegetation, Litterfall):** The report and Policy recommendations are anticipated to be provided to the Board in November of 2021.

CMER Priorities:

It is anticipated that the Cooperative Management Evaluation and Research Committee (CMER) will bring work products requiring action to Policy and these products include:

- **Unstable Slopes Criteria Project:** Object-based Mapping with High Resolution Topography project. This project is currently in implementation and a final report with the accompanying six questions is scheduled to be presented to Policy in December 2021. Policy will bring recommendations to the Board in calendar year 2022;
- **Deep Seated Research Strategy**: Physical, Groundwater and Evapotranspiration Modeling (including Toolkit Development) Charter is anticipated to be provided to Policy in June 2021;
- **Eastside Timber Habitat Evaluation Project (ETHEP):** The scoping document and the preliminary six questions document is anticipated to be provided to Policy in February of 2021 followed by a Charter in April of 2021;
- **Eastside Type N Riparian Effectiveness Project (ENREP):** Is in currently in implementation and a Charter is anticipated to be provided to Policy in January of 2021;
- **Eastside Modeling Evaluation Project (EMEP):** CMER and ISPR approved final report and the completed 6 questions document are anticipated to be provided to Policy in March of 2021;
- **The Wetland Intrinsic Potential Tool Phase 2:** The final report and the completed 6 questions document are anticipated to be provided to Policy in March of 2021.
- **Type N Experimental Buffer Treatment in Hard Rock Lithologies (Temperature, Sediment, Vegetation, Litterfall):** CMER and ISPR approved Phase II final report and the completed 6 questions document are anticipated to be provided to Policy in September 2021;
- **Wetlands Management Zone Effectiveness Monitoring project:** Charter is anticipated to be provided to Policy in September of 2021;
- **Type N Experimental Buffer Treatment in Soft Rock Lithologies:** The final report and the completed 6 questions document are anticipated to be provided to Policy in December of 2021;
- **The Westside Type F Riparian Prescription Monitoring Pilot:** Project final report and the completed 6 questions document are anticipated to be provided to Policy in August of 2021.

New Projects:

The Policy Committee workload is heavy, yet must also remain sensitive to the changes in various timelines and to new issues as they come up. The capacity for Policy to accept any new work as assigned by the Forest Practices Board or taken on for other reasons could require delaying existing priorities and/or scheduling additional meetings.

**DEPARTMENT OF
NATURAL RESOURCES**

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October 27, 2020

To: Forest Practices Board

From: Marc Engel, Senior Policy Planner, Forest Practices Division

RE: Staff report of Water Typing System Rule Board Committee work regarding the eastern
Washington stream data evaluation and the Anadromous Fish Floor GIS analysis

The Forest Practices Board accepted recommendations from the Water Typing Rule Committee
(Committee) and directed the Committee to oversee: the completion of the process to obtain
additional data to complete the spatial analysis of the proposed eastern Washington potential
habitat break options; and an anadromous fish floor (AFF) GIS analysis to inform the workgroup
in the development of an AFF proposal.

DNR staff provided updates on these two efforts in addition to updates on the AFF GIS analysis
contract at the October 7 Committee meeting. At the conclusion of the meeting, the Committee
requested staff prepare a memo for the Board highlighting the achievements to date. This memo
also includes relevant updates occurring after the October Committee meeting.

Eastern Washington Fish Habitat Data
At the August meeting the Board passed a motion directing the Committee to:
- Accept the screened eastern Washington fish data from the 2001 CMER study; and
- Perform a Qa/Qc evaluation on the fish data provided by the Yakama Nation and Kalispel
  Tribe for inclusion of additional eastern Washington data.

Additional information was needed from the Yakama Nation and the Kalispel Tribe in order to
complete the Qa/Qc evaluation. Results were not available to share at the October Committee
meeting, however, new information may be available to be presented at the November Board
meeting.

DNR had initially informed the Committee that funding might be needed to contract with the
company that had originally collected the 2001 CMER data for acquiring the GIS spatial data
locations. Fortunately, DNR staff was able to locate the GIS points and is in the process of
verifying the accuracy of the coding language from this older GIS data. At this time, DNR is
comfortable that acquiring the spatial locations from an outside source is not needed.

The Qa/Qc screening effort for the 2001 CMER data originally resulted in approximately 150 points. A critical step in the Qa/Qc process is to ensure the "highest most fish point" is used for any spatial analyses and consistent with the Board's request. Several of the stream segments sampled in 2001 were resampled in subsequent surveys during the season when fish are typically present in the stream system (e.g., March 1- July 15). As a result, the last fish (or highest fish) location for several of the resampled sites provide more accurate fish point locations on stream segments that were originally screened out from the 2001 CMER data. These points were initially screened out because the fish data collection occurred outside the typical survey window (e.g. August or September) and may not have captured accurate fish distributions.

These additional fish data points were presented to the Eastern Washington fish data group on October 19. These points combined with the initial screening from the 2001 CMER data set have increased the sample size to slightly more than half of the original 2001 CMER data points; 184 out of 310, or 59% of the total sites.

Anadromous Fish Floor GIS Analysis
The AFF GIS analysis contract was awarded to Terrainworks in August. The first deliverable was for the contractor to create synthetic stream networks using high quality lidar within the identified watersheds needed for the analysis. At the time of the October Committee meeting, the AFF project team members were finishing up their review of the initial stream networks produced by Terrainworks. Although the review took more time than anticipated, the project team does not foresee a problem with future targeted dates.

The first review of the synthetic stream networks was completed on October 13. Terrainworks has two weeks to make any necessary adjustments based on the project team's feedback. Once the final synthetic stream networks are complete, Terrainworks will begin populating fish data provided by the project team.

Proposed data used in the analysis include data from Skagit last fish analyses, US Forest Service fish populations, the Statewide Washington Integrated Fish Distribution dataset, Squaxin tribal data, water type modification data, WDFW road barriers and natural barrier data plus DNR's RMAP data. Terrainworks will supplement the this fish distribution data with their algorithm model, which can identify channel features such as slope gradient and natural fish obstacles. Both the data and lidar modeling will assist in locating the anadromous fish floor.

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MEMORANDUM

October 26, 2020

TO: Forest Practices Board

FROM: Mark Hicks, Adaptive Management Program Administrator

SUBJECT: Adaptive Management Program Quarterly Report

This memo highlights work completed and progress made in the Adaptive Management Program (AMP) since your August, 2020 meeting.

Biennial Report to the Legislature on the AMP

The biennial report to the legislative was transmitted outlining projects completed, their use in adaptive management, and a roll up of the 19-22 Master Project Schedule (MPS) budget highlighting State General Fund needs for the next biennium.

Cooperative Monitoring, Evaluation and Research Committee (CMER) Update

Projects with Key Stages Completed during this reporting period:

No projects have been completed or have passed through any discrete stages of development or approval during this period.

Status of Projects in Active Development:

Soft Rock Lithology -Type N Experimental Buffer Treatment Project (Phase I - 2-yr post-harvest). Report is in Independent Scientific Peer Review (ISPR) managed under our contract with the University of Washington.

Hard Rock Lithology- Type N Experimental Buffer Treatment Project (Phase II – Extended Monitoring). Study authors expect to provide responses to ISPR comments by the end of October. If accepted by the Associated Editor, the report will be ready to finalize for CMER concurrence and approval. Due to the size and complexity of the report and the request by ISPR that it be restructured, creating a final version for CMER concurrence will take substantial time.

Soft Rock Lithology -Type N Experimental Buffer Treatment Project (Phase II - Extended Temperature Monitoring). Data has been collected and is in final Quality Control (QC) by the Principal Investigator. Once completed CMER will determine if this data will be provided as a stand-alone report, or as an addendum to the Phase I Soft Rock report.

Unstable Slopes Criteria - (composed of 4 projects). The Project Team is working on the first project, Object-based Landform Mapping. If successful as expected in showing model can be trained to find known unstable slopes remotely, the project will be ready to move on to examine shallow landslide susceptibility and runout.

Eastside Type N Riparian Effectiveness (ENREP). ENREP is in active field implementation with pre-harvest data being collected at four pairs of study sites.

Westside Type F Riparian Prescription Monitoring (Phase I - Pilot Study). Draft pilot study report is being finalized. Phase II would be to use the findings of the pilot study to determine which issues to study using a rigorous study design to assess rule effectiveness. However, phase II was pushed out 4 years in the MPS due to a funding shortfall.

Large Woody Debris Recruitment Study. Although not on the MPS, RSAG is working to scope a Large Woody Debris Recruitment study that may be a stand-alone study or a component to consider adding to the Phase II Westside Type F Effectiveness Monitoring Study (currently on hold).

Road Prescription-Scale Effectiveness Monitoring. The study is in full field implementation and moving into the first full year of data collection.

Deep Seated Research Strategy (composed of 6 projects). TFW Policy received the Scoping Document for the Landslide Mapping and Classification Project and has chosen a preferred alternative to use as the basis for developing a study design.

Amphibians in discontinuously flowing Np reaches. A Scoping Document is in initial development within the Landscape and Wildlife Science Advisory Group (LWAG).

Eastside Timber Harvest Types Evaluation Project (ETHEP). A draft Scoping Document is in CMER review.

Water Typing Strategy (PHB Validation, Physicals, LiDAR Model Map). CMER remanded this work to the In-Stream Science Advisory Group (ISAG). ISAG has developed an overall strategy and is working to resolve concerns with the prior study designs drafted for these three projects. CMER would like to present an update to the Board in February 2021.

Fish/Habitat Detection using eDNA -- pilot project. The lead author is under contract to respond to comments on the draft report by ISAG. This pilot project should be used to help design any future scientific studies into the use of eDNA in water typing.

Wetlands Intrinsic Potential (WIP) Tool. This tool was developed to aid in remotely identifying landscape features having a high probability of being wetlands using LiDAR data sets. The tool has been developed and the final step of having a user manual prepared is under contract.

Riparian Characteristics and Shade Response. A revised draft study design being reviewed in the Riparian Science Advisory Group (RSAG).

Forested Wetlands Effectiveness Study (Phase I - Pilot Study). The study design has been approved and the Wetland Science Advisory Group (WetSAG) is assisting in the development of a field implementation plan.

Wetlands Management Zone Effectiveness Monitoring. WetSAG is working to develop a Scoping document for this research; although, the MPS does not establish funding for this project until 2029.

Eastside Modeling Effectiveness Project (EMEP). This study applies forest health and fire risk models to eastside riparian areas to identify issues needing investigation. The study has been approved by ISPR and is ready for CMER concurrence on the final draft.

LiDAR for Unstable Slopes and ENREP work. A contract is in place to collect LiDAR data in FY21 for study sites used in the ENREP study. LiDAR for the Unstable Slopes research will not be obtained until FY22

TFW Policy Committee Update

Master Project Schedule. In July, Policy approved by consensus recommended adjustments to the Master Project Schedule (MPS) budget for the 21-23 biennium. These were delivered to the Board for their August 2020 meeting.

Type Np Workgroup. TFW Policy commissioned this workgroup to suggest alternative riparian buffers for Type Np waters. The workgroup chairs report they are on track with having draft prescriptions by the end of 2020. Final completion of this work will be delayed until both the Type Np Hard Rock and Type Np Soft Rock studies are finalized.

Dispute Resolution on Small Forest Landowner Request for Smaller Riparian Buffers. On July 14th the Small Forest Landowner Caucus initiated Stage 1 of the dispute resolution process on work related to their proposed Alternate Plan Template. The dispute is focused on their dissatisfaction with progress of a Policy work group tasked with identifying situations in the field where allowing 25 foot buffers for Type Np waters, and 50 and 75 foot buffers for Type F waters would be appropriate. According to Rule and Board Manual, Policy has two months to try and informally work through the dispute. If that is not successful, the dispute enters Stage 2 which is by default outside mediation.

Participants to the dispute have agreed to extend Stage 1 until the end of October. In addition, a solicitation document has been prepared and is moving forward in an effort to secure a mediator who is available and capable of conducting the Stage 2 mediation. If Stage 2 does not result in a consensus recommendation, the parties will need to prepare position papers to bring to the Board for your decision.

If you have any questions, please feel free to contact me (mark.hicks@dnr.wa.gov, 360-819-0406).

October 12, 2020

TO: Forest Practices Board

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

SUBJECT: Small Forest Landowner Office and Advisory Committee

Small Forest Landowner Office Advisory Committee
Since my last report, the Small Forest Landowner Office Advisory Committee held two
meetings: July 21, and September 22, 2020 (via Zoom). Discussions focused on the following
topics:
- SFLO Program and Staff Updates; and
- Developing a "relatively low impact" harvest prescriptions definition to present to the
  DNR Small Forest Landowner Office (SFLO). There were minor changes to the draft
  definition of "relatively low impact", and all caucuses on the Committee voted in
  agreement to accept the updated definition. The Committee also discussed specific
  proposals that could apply as "relatively low impact" per the Committee's definition.

SFLO Program and Staff Updates
The end of the first year of the FY19-21 biennium, the Small Forest Landowner Office Programs
have completed a number of projects and purchased several conservation easements and
provided Rechnical assistance. The Family Forest Fish Passage Program (FFFPP) corrected 19
fish passage barriers opening 67 miles of upstream fish habitat, and the Forestry Riparian
Easement Program (FREP) purchased 13 easements this fiscal year. It is estimated the FFFPP
will correct another 19 fish passage barriers next fiscal year totaling 38 barriers to be removed
during the FY19-21 biennium. The FREP program purchased 19 easements by the end of
September 2020 and plans to purchase a total of 36 conservation easements during the FY19-21
biennium.

The Forestry Riparian Easement Program (FREP) hired 2 Natural Resource Specialists to fill
positions that had become vacant recently.

There are currently 138 small forest landowners who have volunteered to have the Regulation
Assistance Forester conduct road surveys on their forestland. A total of 70 surveys have been
completed which are distributed over 31 counties across the state. During the first half of the
biennium, the Regulation Assistance Forester assisted with 26 Forest Practices Applications
covering 4,284 acres, and has responded to 283 requests for assistance.

Definition of "Relatively Low Impact" Harvest Prescriptions

Long Term Applications (LTA)
There are a total of 290 approved long term applications, which is the same number of approved applications as of the end of the last reporting period (07/28/2020).

LTA Applications	LTA Phase 1	LTA Phase 2	TOTAL
Under Review	7	2	**9**
Approved	5	290	**295**
TOTAL	**12**	**292**	**304**

Upcoming Landowner Events

WSU Extension Forestry
Announcements and Events
2020 Washington State Forest Owners' Online Field Day
- October 24th, 2020, 10:00AM to 3:00PM

Fall 2020 Eastern WA Online Forest Stewardship Coached Planning Course
- October 13 – December 15, 2020

Winter 2021 Northwest WA Online Forest Stewardship Coached Planning Course
- January 27 – March 17, 2021

Other Events
Washington State Society of American Foresters 2021 Conference
Leavenworth, WA
Monday, April 19, through Wednesday, April 21, 2021
Qualified Tree Farm Inspector Training
Leavenworth, WA
Monday, April 19, 2021

For more information on these landowner events go to http://forestry.wsu.edu/

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

November 12, 2020

M E M O R A N D U M

To: **Forest Practices Board**

From: **Gary Bell, Wildlife Biologist, Forest Habitats Section**

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

Since 2001, the murrelet population has continued to decline approximately 4.9% annually and the status of the Marbled Murrelet in Washington has not improved since state listing in 1993. As a result of the 2017 state up-listing to Endangered status, the Washington Department of Natural Resources (WDNR), in consultation with Washington Department of Fish and Wildlife (WDFW), recommended that the Forest Practices Board (Board) support WDFW's initiation of a Marbled Murrelet forest practices rule (FP Rule) assessment involving a diverse group of stakeholders. WDFW established a Wildlife Working Group (WWG) to evaluate rule effectiveness in protecting murrelet habitat, identify weaknesses in rule language and on-the-ground implementation, consider potential habitat conservation incentives, and bring consensus recommendations regarding FP Rule improvements to the Board for their consideration.

The WWG began regular meetings in 2018, having held its most recent online meeting October 14, 2020. Work continued with gathering best available science to inform an appropriate definition of Marbled Murrelet habitat based on habitat characteristics and known use by murrelets. The updated science will inform the groups knowledge on murrelet ecology in Washington and help determine if the current Forest Practices (FP Rule) habitat definition identifies correct attributes that provide functional murrelet habitat. Once the appropriate habitat definition is identified, focus will shift to addressing necessary changes to processes and implementation aspects. Ultimately, the group will make recommendations to the FP Board for an appropriate murrelet habitat definition along with the FP Rule processes and implementation practices.

As part of the NW Forest Plan Effectiveness Monitoring Team, WDFW continues to monitor marbled murrelet populations at-sea in both Zones 1 (Puget Sound and Strait) and Zone 2 (Washington coast) during the nesting season. Each zone is monitored in alternating years and Zone 2 was monitored in 2019 (final report available) and Zone 1 was monitored in 2020 and the final analyses of those data are being completed now. We note that these are the only data available to assess murrelet abundance and trends for the listed

population.   The NW Forest Plan Effectiveness Monitoring team's 25-year report is currently in-press and expected to be released in early 2021. WDFW just started the ninth year of Navy funded non-breeding season surveys in Puget Sound. The 2019/2020 at-sea survey report is now available; however, the March/April 2020 season was cut short due to the COVID-19 Pandemic and the Governor's "Stay Home, Stay Healthy" emergency order. In addition and with US Navy funding, WDFW is in the process of drafting a manuscript examining non-breeding season at-sea abundance and trends in Puget Sound that we intend to submit to a journal for peer-review in 2021.

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

Lynx were uplisted from state threatened to endangered on February 4, 2017. At that time, WDFW recommended to WDNR (and WDNR in turn to the Board) that no action be taken to add lynx to the forest practices rule designation for critical habitats (state). WDFW also recommended maintaining the voluntary protection approach for lynx. Efforts continue to identify lynx conservation opportunities in collaboration with landowners, Canadian federal and provincial entities, US Fish & Wildlife Service (USFWS), US Forest Service (USFS), conservation organizations, tribes and academic partners. The goal is to refine recovery actions that can be implemented in the near- and long-term to benefit lynx conservation in Washington.

Forest Practice Application screening continues for potential impacts to lynx and WDFW maintains coordination with WDNR and other conservation partners to maintain awareness about the importance of protecting remaining habitat at risk to wildfires. WDFW participation also continues in the *Transboundary Lynx Work Group*, which is exploring conservation strategies that have included a feasibility assessment for translocating lynx into the Kettle Lynx Management Zone as well as coordination with southern British Columbia partners concerning demographic support for Washington's transboundary lynx population.

The November 2017 USFWS summary of the lynx 5-year Species Status Assessment determined that regulatory improvements addressed the threat that led to the original listing of the lynx distinct population segment (DPS). However, the proposal to remove lynx from the federal list of threatened and endangered species is still pending.

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

Recognized as a state endangered species, the Northern Spotted Owl (NSO) population has continued to decline primarily due to ongoing competitive interactions with Barred Owls. Habitat changes associate with timber management and forest health issues, as well as wildfires, have also affected NSO. Efforts continue to develop a programmatic Safe Harbor Agreement (SHA) for forest landowners that would provide federal assurances while protecting existing habitat and recruiting new habitat, but minimal progress has occurred lately. Recent Board discussions have touched on the need to reconvene the Northern Spotted Owl Implementation Team (NSOIT) and perhaps have this group work on SHA options.

The final field season of the Barred Owl removal experiment on the Cle Elum study area in the eastern Cascade Range has been completed. The analysis timeframe for this multi-year project is not currently known, although annual reports have been published each year of the project, so there may be an interim

update released prior to a comprehensive final analysis and report.

The U.S. Fish and Wildlife Service is preparing to address Barred Owl management options and implementation strategies related to Spotted Owl conservation. WDFW will be involved in that initiative.

Fisher
1998:   State listed as Endangered
2016:   Federal status: Final decision for west coast DPS - not warranted for listing (April 2016)
2018:   Northern District Court of California ruling on 2017 USFWS fisher ESA listing withdrawal
2019:   Federal publication of Candidate Notice of Review (October), including fisher

Fisher reintroductions into Washington have been completed by WDFW and its partners. A total of 260 fishers have been reintroduced, including 90 in Olympic National Park (2008-2010), and 165 in other federal lands within the southern and northern Cascade Mountains. A total of 81 fishers have now been released at Mount Rainier National Park and the Gifford Pinchot National Forest since December 2015. And, since December 2018, 89 fishers have been translocated from the Calgary Zoo and released into the North Cascades Recovery Area.

Combined with the Candidate Conservation Agreement with Assurances (CCAA) program administered by WDFW, the reintroductions have assisted the species return to the state. Non-federal landowners can continue to enroll in the CCAA and receive federal regulatory assurances if the fisher were to become listed under the ESA in the future. By signing on to the CCAA, landowners agree to follow basic conservation measures that protect fishers that may use private lands. To date, 60 landowners and 3,318,337 acres of non-federal forest lands are enrolled in the CCAA.

As mentioned in the last update, the USFWS published a revised proposed rule for listing fishers in November 2019 which replaces the 2014 proposed rule. As stipulated in the September 2018 court decision, USFWS was to deliver a final rule to the Federal Register by April 25, 2020. The final rule listing fishers in southern Oregon, northern California, and the Sierra Nevada as a threatened species under the ESA was published on May 15, 2020, excluding fishers in Washington state.

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, WDNR 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 WDNR continue coordinating to anticipate federal actions and to respond to changes in the status of any given species.

cc: Chris Conklin (WDFW)
       Hannah Anderson (WDFW)
       Taylor Cotten (WDFW)
       Wendy Connally (WDFW)
       Marc Engel (DNR)
       Colleen Granberg (DNR)
       Joseph Shramek (DNR)

**DEPARTMENT OF
NATURAL RESOURCES**

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October 21, 2020

TO: Forest Practices Board

FROM: Marc Engel, Senior Policy Planner, Forest Practices

SUBJECT: 2021 Work Plan

Attached for consideration at your November 12 meeting, are staff recommended priorities for your 2021 Work Plan.

The meeting dates for calendar year 2021 are February 10, May 12, August 11, and November 10, which occur on the 2nd Wednesday of those months. Staff will notify the Office of the Code Reviser of the dates for publication in the Washington State Register.

Also attached for your review is the work accomplished this past year.

Should you have any questions please feel free to contact me at 360-902-1309 or marc.engel@dnr.wa.gov.

ME

FOREST PRACTICES BOARD
2020 WORK PLAN

2020 Meeting Dates: February 12 / May 13 / August 12 / November 12

TASK	COMPLETION DATE/STATUS
Adaptive Management Program	
• CMER Master Project Schedule Compliance Review*	August - Completed
• CMER Master Project Schedule Review (FY 21-23)*	August - Completed
• CWA LWAG Type N Experimental Buffer Treatment – Genetics	February - Completed
• CWA Type N Experimental Buffer Treatment in Soft Rock Lithology	TBD
• Eastside Modeling Evaluation Project	TBD
• Hardwood Conversion Study	February - Completed
• Small Forest Landowner Western Washington Low Impact Template TFW Policy Recommendations*	August - Completed / ongoing
• State Auditor Performance Audit Report	February 2021
• Type N Experimental Buffer Treatment in Hard Rock Lithology	TBD
• Type Np Prescriptions Workgroup*	On-going
• Water Typing Strategy	Completed
• Water Typing Studies	TBD
• Extensive Riparian Status and Trends Monitoring – Temperature Study	February - Completed
Annual Reports	
WAC 222-08-160 Continuing review of FP rules (Annual Evaluations), *by tradition the Board has received an annual evaluation of the implementation of cultural resources protections*	TBD
• Northern Spotted Owl Conservation Advisory Group	November
• TFW Policy Committee Priorities*	November
• Western Gray Squirrel	August – Completed
• Taylor's Checkerspot Butterfly	August - Completed
Board Manual Development	
• Section 23 (Part 1) Field Protocol to Locate Mapped Divisions Between Stream Types*	On-going
• Section 23 (Part 2) Perennial Stream Identification*	On-going
• Section 12 Application of Forest Chemicals	TBD
CMER Membership	As needed
Compliance Monitoring 2018-2019 Biennial Report	November
Critical Habitat - State/federal species listings and critical habitat designations	As needed
Field Tour	On hold
Rule Making	
• Water Typing System	On-going
• Rule Clarifications	February 2021
Committee Recommendations on Water Typing System Rule	On-going
NSO Recommendations	update in August – Completed / ongoing

Italics = proposed changes
*= TFW Policy Committee

November 2020

FOREST PRACTICES BOARD
2020 WORK PLAN

Quarterly Reports	
• Adaptive Management Program*	Each regular meeting
• Board Manual Development	Each regular meeting
• 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	*To be determined*
• TFW Policy Committee Work Plan Accomplishments & Priorities*	Each regular meeting
• Upland Wildlife Working Group	Each regular meeting
• **Work Planning for 2021**	November

FOREST PRACTICES BOARD
2021 DRAFT WORK PLAN

2021 Meeting Dates: February 10 / May 12 / August 11 / November 10

TASK	COMPLETION DATE/STATUS
Adaptive Management Program	
• CMER Master Project Schedule *	May
• Wetland Intrinsic Potential Tool Phase 2	August
• Eastside Modeling Evaluation Project	November
• Small Forest Landowner Western Washington Low Impact Template TFW Policy Recommendations*****	May
• State Auditor Performance Audit Report	February
• Westside Type F Riparian Prescription Monitoring Pilot project	November
• Type N Experimental Buffer Treatment in Hard Rock Lithology	November
• Type Np Prescriptions Workgroup*	On-going
• Water Typing Studies	TBD
Annual Reports	
WAC 222-08-160 Continuing review of FP rules (Annual Evaluations), *by tradition the Board has received an annual evaluation of the implementation of cultural resources protections*	TBD
• Northern Spotted Owl Conservation Advisory Group	November
• TFW Policy Committee Priorities*	November
• Western Gray Squirrel	August
• Taylor's Checkerspot Butterfly (every 3 or 5 years??)	August
Board Manual Development	
• Section 23 (Part 1) Field Protocol to Locate Mapped Divisions Between Stream Types*	On-going
• Section 12 Application of Forest Chemicals	TBD
CMER Membership	As needed
Compliance Monitoring 2020 Annual Report	November
Critical Habitat - State/federal species listings and critical habitat designations	As needed
Field Tour	On hold
Rule Making	
• Water Typing System	On-going
• Rule Clarifications	February
Committee Recommendations on Water Typing System Rule	On-going
NSO Recommendations	Ongoing

FOREST PRACTICES BOARD
2021 DRAFT WORK PLAN

Quarterly Reports	
• Adaptive Management Program*	Each regular meeting
• Board Manual Development	Each regular meeting
• Compliance Monitoring	Each regular meeting
• 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	*To be determined*
• TFW Policy Committee Work Plan Accomplishments & Priorities*	Each regular meeting
• Upland Wildlife Working Group	Each regular meeting
• **Work Planning for 2022**	November