

Regular Board Meeting – August 14, 2019

Natural Resources Building, Room 172, Olympia

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

DRAFT AGENDA

9:00 a.m.	Welcome and Introductions Safety Briefing – Patricia Anderson, Department of Natural Resources (DNR)
9:05 a.m.	Approval of Minutes <i>Action: Consider approval of May 8 & 9, and June 4, 2019 meeting minutes.</i>
9:15 a.m.	TFW Recommitment Update – Invited Panel
9:45 a.m.	Report from Chair
10:00 a.m.	Public Comment – This time is for public comment on general Board topics.
10:15 a.m.	Break
10:30 a.m.	Small Forest Landowner Demographic and Forest Practices Data Presentation – Tami Miketa and Marc Engel, DNR
11:30 a.m.	TFW Policy Committee Response to the Board’s June Motion – Curt Veldhuisen and Terra Rentz, Policy co-chairs
12:00 p.m.	Lunch
1:00 p.m.	Public Comment – This time is for public comment on general Board topics for those that were not able to attend the morning session.
1:15 p.m.	Water Typing System Board Committee Status Report – Bob Guenther, Committee Chair
1:55 p.m.	Water Typing System Rule Materials Staff Status Report – Marc Engel, DNR
2:10 p.m.	Adjusted Adaptive Management Program Budget and CMER Work Plan – Mark Hicks, AMPA and Curt Veldhuisen and Terra Rentz, Policy co-chairs
2:25 p.m.	Public Comment on Adjusted Adaptive Management Program Budget and CMER Work Plan
2:40 p.m.	Adjusted Adaptive Management Program Budget and CMER Work Plan – Mark Hicks, AMPA and Curt Veldhuisen and Terra Rentz, Policy co-chairs <i>Action: Consider approval of a revised budget and MPS.</i>
3:00 p.m.	TFW Policy Committee Update of Type Np Workgroup – Curt Veldhuisen and Terra Rentz, Policy Co-chairs
3:15 p.m.	TFW Policy Committee Priorities for Calendar Year 2020 – Curt Veldhuisen and Terra Rentz, Policy Co-chairs

Future FPB Meetings

Next Meeting: 2nd Wednesday of February, May, August and November

Special Meeting: May 9, 2019, June 4, 2019

Check the FPB Web site for latest information: <http://www.dnr.wa.gov/>

E-Mail Address: forest.practicesboard@dnr.wa.gov

Contact: Patricia Anderson at 360.902.1413

3:25 p.m.	Break
3:40 p.m.	Northern Spotted Owl Conservation Advisory Group – Marc Engel, DNR
3:50 p.m.	Public Comment on NSO Conservation Advisory Group
3:55 p.m.	Northern Spotted Owl Conservation Advisory Group – Marc Engel, DNR <i>Action: Consider retaining NSO Conservation Advisory Group.</i>
4:05 p.m.	Western Gray Squirrel Annual Report – Teresa Ann Ciapusci, DNR and Gary Bell, WDFW
4:20 p.m.	Staff Reports A. Adaptive Management Quarterly Report – Mark Hicks, AMPA B. Compliance Monitoring – Garren Andrews, DNR C. Small Forest Landowner Office Update -Tami Miketa, DNR D. Upland Wildlife Update – Gary Bell, Washington Department of Fish and Wildlife
4:30 p.m.	2019 Work Plan – Marc Engel, DNR <i>Action: If needed, consider approval of amendments to 2019 Work Plan.</i>
	Executive Session To discuss anticipated litigation, pending litigation, or any other matter suitable for Executive Session under RCW 42.30.11.

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1 **FOREST PRACTICES BOARD**
2 **Regular Board Meeting – May 8, 2019**
3 Natural Resources Building, Room 172, Olympia, WA
4

5 Meeting materials and subject presentations are available on Forest Practices Board’s website.
6 <https://www.dnr.wa.gov/about/boards-and-councils/forest-practices-board>
7

8 **Members Present**

9 Stephen Bernath, Chair, Department of Natural Resources
10 Ben Serr, Designee for Director, Department of Commerce
11 Bob Guenther, General Public Member/Small Forest Landowner
12 Brent Davies, General Public Member
13 Carmen Smith, General Public Member/Independent Logging Contractor
14 Dave Herrera, General Public Member
15 Jeff Davis, Designee for Director, Department of Fish and Wildlife
16 Lisa Janicki, Elected County Official
17 Noel Willet, Timber Products Union Representative
18 Patrick Capper, Designee for Director, Department of Agriculture
19 Paula Swedeen, General Public Member
20 Tom Laurie, Designee for Director, Department of Ecology
21 Tom Nelson, General Public Member
22

23 **Staff**

24 Joe Shramek, Forest Practices Division Manager
25 Marc Engel, Forest Practices Assistant Division Manager
26 Patricia Anderson, Rules Coordinator
27 Phil Ferester, Senior Counsel
28

29 **WELCOME AND INTRODUCTIONS**

30 Chair Stephen Bernath called the Forest Practices Board (Board) meeting to order at 9 a.m.
31 Introductions of Board members and staff were made.
32

33 **REPORT FROM CHAIR**

34 Chair Bernath thanked Hans Berge for his service as the Adaptive Management Program
35 Administrator (AMPA). He mentioned that Jean Fike, Northwest Region Manager, is leaving the
36 Department of Natural Resources (DNR) and recognized Boyd Norton’s retirement after 42 years
37 of service.
38

39 Chair Bernath provided an update on passed legislation:

- 40 • SB 5330 provides funds to University of Washington to analyze impacts to small forest
41 landowners,
42 • SB 5597 creates a work group to assess chemical applications and
43 • HB 1324 extends the surcharge on the Business and Occupation Tax to year 2045 to fund the
44 Adaptive Management Program (AMP).

45 He said a facilitator has been hired to assist the Timber, Fish and Wildlife (TFW) principals in
46 participating in a capacity building exercise to restore relationships between caucuses. The hope is

1 to recommit to the TFW values and take a look at what the process should look like for the next
2 20-30 years. The workshop will occur between June 12 and 17.

3
4 **PUBLIC COMMENT (AM)**

5 Ken Miller, Washington Farm Forestry Association (WFFA), said today's topics are too complex
6 for most small forest landowners to comprehend or follow in a meaningful way. His takeaway
7 from these discussions is that some folks believe non-fish buffers are too narrow and that the
8 water type break between F and Np should be located further upstream. He is relying on the AMP
9 to sort this out in understandable terms and use statistically sound science before the Board makes
10 any significant decisions. He said small forest landowners support a map-based water typing
11 system.

12
13 Peter Goldman, Washington Forest Law Center (WFLC), urged the Board to consider their
14 decisions in light of human impacts on the environment. Referring to a court case that determined
15 Board Manual guidance is not enforceable, he asked the Board to ensure the water typing rules are
16 prescriptive, clear enough for folks to understand the concepts and sufficiently guides people on
17 how to do things repeatedly.

18
19 **APPROVAL OF MINUTES**

20 **MOTION:** Carmen Smith moved the Forest Practices Board approve the November 13 & 14,
21 2018 meeting minutes.

22
23 **SECONDED:** Bob Guenther

24
25 Board Discussion:

26 Ben Serr noted the error that his predecessor, Heather Ballash, was listed as present at the meeting.

27
28 **ACTION:** Motion passed unanimously.

29
30 **ADAPTIVE MANAGEMENT PROGRAM TYPE N EXPERIMENTAL BUFFER**
31 **TREATMENT PROJECT IN HARD ROCK LITHOLOGIES STUDY RESULTS**

32 Bill Ehinger, Department of Ecology and Howard Haemmerle, AMPA, presented the phase 1
33 results of the Type N Experimental Buffer Treatment Project in Hard Rock Lithologies study
34 (known as the 'hard rock' study).

35
36 Ehinger said the study's goal was to evaluate the effectiveness of the current western Washington
37 Type Np stream riparian buffers. The study used a before-after-control-impact procedure by
38 studying sites featuring a control stream segment, a 100% buffered segment, a standard forest
39 practice rule buffered segment, and a 0% buffered segment. Of the initial three hundred fifty sites
40 selected, only 17 sites meeting the amphibian and basalt lithology criteria were included in the
41 study. Post-harvest data was collected between 2009 and 2011.

42
43 Ehinger summarized the results: the 100% buffered stream segments were the most effective at
44 preventing measurable responses to the water, and the forest practice rule buffered and the 0%
45 buffered streams were the least effective in preventing measurable responses to the water. He said

1 the phase 2 study report has been through the initial review by the Cooperative Monitoring,
2 Evaluation, and Research Committee (CMER). The next report draft should be out in June 2019.

3
4 Board member Davies asked what trends the group might expect to see with the phase 2 extended
5 monitoring.

6
7 Ehinger said they expected to see stream temperature increases immediately post-harvest and then
8 expected to see stream temperatures go down over time. They also expected to see stream nutrient
9 exports to go down relatively quickly over time. He said the initial amphibian results may have
10 been influenced by initial migration responses to harvest practices, but the longer term results do
11 not account for or address the influence of amphibian reproduction.

12
13 Amy McIntyre, Department of Fish and Wildlife (WDFW) said two different amphibian density
14 tests were conducted—basin wide and along tributaries. The density results found little change in
15 the population of giant salamanders. In the lower Type Np stream reaches, they found a decrease
16 in the number of giant salamanders in the forest practices buffered areas only. They assumed this
17 decrease may be from amphibian migration within the stream system.

18
19 Ehinger said phase 1 assessed stream temperature responses through 2011. Phase 2 involves
20 response assessments through 2017. Once CMER review of phase 2 is complete, the report will
21 then go through an independent science peer review (ISPR).

22 23 **CONSENSUS PROPOSAL IN RESPONSE TO TYPE NP STUDY RESULTS IN** 24 **WESTSIDE BASALT LITHOLOGY**

25 Chair Bernath mentioned that the recommendations by the TFW Policy Committee (Policy) are
26 consensus recommendations.

27
28 Curt Veldhuisen, Policy Co-Chair, said Policy’s review involved two steps. Step one – review the
29 hard rock study’s findings; Step two – determine if action is needed. He said Policy formed a
30 workgroup to develop a charter and evaluate the study’s findings. Based on the workgroup
31 evaluation of the study results, Policy decided that the report findings regarding the water quality
32 standards related to stream temperature should be addressed. Draft Type Np buffer proposals for a
33 potential rule were developed by a number of caucuses for Policy’s consideration.

34
35 Veldhuisen acknowledged that additional ongoing studies in western Washington, such as the
36 Type N Experimental Buffer Treatment in Soft Rock Lithologies study (soft rock study), may also
37 inform additional next steps regarding Type N buffers. He said Policy consensus was reached to
38 form a technical workgroup to assess how to mitigate the increased stream temperature responses
39 found in the hard rock study with the understanding the technical workgroup will be a multi-year
40 effort since additional studies are forthcoming. He said Policy is evaluating how to compensate the
41 technical workgroup members for their time to review the study results and draft
42 recommendations.

43
44 Board member Nelson asked how the cancellation of the February Board meeting affected their
45 proposed timeline.

1 Veldhuisen said that with the cancellation of the February meeting, three months would need to be
2 added to the charter timeline but the final report timeline should not change.

3
4 Veldhuisen added that four additional studies are being conducted that could provide additional
5 information on shade and temperature responses. These are: hard rock phase 2; soft rock; Westside
6 Type N Buffer Characteristics, Integrity, and Function; and the Buffer Integrity, Shade
7 Effectiveness (Amphibian) Project.

8
9 Terra Rentz, Policy Co-Chair, clarified that the timeline may need to be adjusted as a result of the
10 required review process by ISPR and CMER for each additional Type N study. The timeline may
11 shift by 12 to 18 months for the soft rock study and the hard rock extended monitoring. As each
12 final study is completed, Policy will begin their 180-day review period to develop
13 recommendations.

14
15 Haemmerle said the timeline is built on required additional AMP review steps. Policy does not
16 always know how long a certain CMER approval step will take and may have to adjust the
17 timeline as new information is made available.

18
19 Board member Davies asked about the potential for additional Type N studies or studies from
20 other states to influence the decision and evaluate the potential to provide varying information.

21
22 Board member Nelson urged the group to evaluate other study methods and science previously
23 done to form the basis for various measurements and final results.

24
25 Rentz said section five in the Type N charter directs the workgroup to evaluate other studies, but
26 not re-evaluate the results from hard rock study. Policy has agreed action is needed based on
27 stream temperature increases. Policy also agrees the workgroup may be able to use the findings of
28 the additional studies to inform on proposed actions.

29
30 Board member Janicki asked if the consensus budget contains funding for the Type N workgroup.

31
32 Rentz said the budget does include the anticipated work for developing Type N buffer
33 recommendations and compensation for workgroup members.

34
35 Board member Swedeen asked how far off the Type N workgroup timeline is from the June 2020
36 deliverable.

37
38 Rentz said Policy initially expected to receive the final reports in the spring of 2020. However,
39 Policy has now been informed not to expect the report findings until 2021, shifting the timeline
40 out an additional six months.

41
42 Board member Swedeen said an extension to 2021 is cause for concern since the study results
43 identified a need for response given the Clean Water Act requirements. She asked if Policy could
44 make recommendations sooner since they have the initial soft rock study results.

1 Rentz said the Board could adjust Policy’s timeline. The workgroup could separate the hard rock
2 and soft rock study results and provide different Type N rule recommendations. The general
3 decision at Policy was to provide a landscape approach rather than presenting separate rule
4 recommendations based on the hard and soft rock study results.

5
6 Board member Nelson said the hard rock study looked at approximately 30% of the geology in
7 western Washington and suggested separating the two geographical areas may miss the other 70%
8 of the land base in western Washington.

9
10 Haemmerle acknowledged that the CMER process is not a fast process. Although there is no way
11 to guarantee a fast track, encouraging collaboration may speed up the process.

12
13 Rentz said another way to speed up the process is to send the final report findings directly to the
14 Type N workgroup eliminating the additional 180-day review/decision process. She mentioned
15 that CMER does not follow the required timelines Policy follows in relation to final study reviews
16 and steps to develop recommendations.

17
18 Chair Bernath suggested that Policy provide an update of the Type N workgroup’s progress at
19 each regular Board meeting.

20
21 **PUBLIC COMMENT ON CONSENSUS PROPOSAL IN RESPONSE TO TYPE NP**
22 **STUDY RESULTS IN WESTSIDE BASALT LITHOLOGY**

23 Darin Cramer, Washington Forest Protection Association (WFPA), reminded the Board that they
24 have a consensus hard rock study recommendation from Policy. He said although temperature
25 response is concerning, there is a lot of information to consider. He added that cumulatively over
26 time, the adaptive management program is taking significant steps forward to reduce scientific
27 uncertainty.

28
29 Ray Entz, Kalispel Tribe, said Policy’s recommendation should not be considered consensus since
30 two caucuses are not at the table. He said the science track and policy track within the AMP is the
31 closest it has ever been to breaking the firewall between science and policy. He said the status quo
32 of delaying decisions occurs when the firewall is down.

33
34 Alec Brown, Washington Environmental Council (WEC), said consensus was reached for those
35 caucuses presently at the Policy table. He said the conservation caucus is concerned with the
36 increase in stream temperature and believes the Board should act quickly. He questioned if a
37 delayed 2021 timeline for rule recommendations meets the statutory requirement which directs the
38 Board to act quickly when scientific results show a need to amend the rules to protect public
39 resources.

40
41 **CONSENSUS PROPOSAL IN RESPONSE TO TYPE Np STUDY RESULTS IN**
42 **WESTSIDE BASALT LITHOLOGY**

43 **MOTION:** Tom Nelson moved the Forest Practices Board accept the Type Np Study Results in
44 Westside Basalt Lithology as complete and accept TFW Policy’s recommendations
45 and amended timeline to address Type Np buffer prescriptions through a Policy
46 work group.

1 **SECONDED: Lisa Janicki**

2
3 Discussion

4 Board members and Policy co-chairs discussed altering the dates contained in the Type N
5 workgroup timeline.

6
7 Board member Swedeen asked if the Board should have a discussion at a future Board meeting
8 given that the statute [RCW 76.09.370(7)] directs the Board to ‘act quickly’.

9
10 Board member Nelson said he believed the motion contained an adequate timeline and suggested
11 any motion should contain the most accurate timeline as possible to let folks know the intended
12 outcome.

13
14 **ACTION: Motion passed unanimously.**

15
16 **TYPE N PROPOSED ACTION AND WORK GROUP CHARTER**

17 Curt Veldhuisen and Terra Rentz, TFW Policy Committee Co-Chairs, acknowledged the efforts
18 by the conservation and industry representatives to find common ground. Rentz walked the Board
19 through the main purpose and structure associated with the Type N Workgroup Charter.

20
21 Rentz said the charter had consensus from Policy. The purpose is to develop proposed riparian
22 management zone (RMZ) buffer prescriptions for Type Np streams that meet the following
23 objectives: (1) maintain water temperatures, (2) are repeatable and enforceable, (3) are
24 operationally feasible, (4) provide wood to the stream, (5) account for wind throw, (6) consider
25 options that allow for management (e.g. selective harvest) in the RMZ; and (7) minimize
26 additional economic impacts. The main focus includes the development of prescriptions for Type
27 N buffers and evaluate the effectiveness of the prescriptions. She said Policy will update the Board
28 as the Type N workgroup timelines are adjusted. At this time, Policy has not identified co-chairs
29 or workgroup members.

30
31 Veldhuisen said Policy envisions the technical members would not be from any advocacy group.
32 He said Policy has not finalized their selection criteria or process.

33
34 **ADAPTIVE MANAGEMENT PROGRAM ROLES AND RESPONSIBILITIES**

35 Joe Shramek, DNR, provided a refresher on the AMP structure, requirements to change aquatic-
36 related forest practices rules and how those involved with the AMP program relate to each other.
37 His overview of the Policy Committee included how representatives are selected and how
38 recommendations are formed and delivered to the Board. His overview of the CMER process
39 included the Board’s role in selecting CMER members, how decisions are made and their task of
40 maintaining the CMER work plan.

41
42 He described the role of the AMPA and how the individual functions as the liaison between
43 CMER, Policy and the Board. He said the administrator determines, through a proposal initiation,
44 which track a proposal should follow, either through policy or science. He briefly outlined the
45 process of each track.

1 Board member Swedeen questioned if the only way to hold the AMP accountable or ensure
2 deliverables are met is to perform an overhaul of the program.

3
4 Shramek said he did not think a change to the program is the only way. He said reviewing the
5 options available to the Board and reviewing the past AMPA's options for making program
6 improvement may help arrive at ways to hold the AMP to task.

7
8 **PUBLIC COMMENT (PM)**

9 Chris Mendoza, Conservation Caucus, reminded the Board that CMER has gone through a couple
10 of efficiency processes to make their work more efficient and has recently updated their protocols
11 and standards manual which includes timelines for the review and handoff of reports to Policy. He
12 said while CMER has made efforts to make the system more efficient, additional improvements
13 may be possible. He also reminded the Board of the list of improvements created by Hans Berge
14 for the Board's consideration.

15
16 Jamie Glasgow, Conservation Caucus, encouraged the Board to consider the nexus of Board
17 decisions with the impacts from climate change. He indicated that current extreme climate
18 conditions have a negative impact on fish.

19
20 Ray Entz, Kalispel Tribe, said CMER did not approve the budget, the budget came directly from
21 Policy. One example he gave was the decision by Policy to defund the Potential Habitat Break
22 (PHB) validation study. He said the lack of agreements demonstrates the Board does not have
23 control of AMP. He said the Board has the opportunity to provide leadership and suggested the
24 Board take charge of the AMP rather than involving the principals.

25
26 **UPDATE ON PROGRESS ON DRAFT WATER TYPING SYSTEM RULE**

27 Marc Engel, DNR, provided a chronological review of the processes to arrive at recommendations
28 for a water typing system rule. He discussed how concepts were developed and recommendations
29 delivered to the Board beginning in November 2011 up to and including Policy recommendations
30 and final results from dispute resolution in May 2017 and the acceptance of the PHB options and
31 the anadromous fish floor in February 2018. The most recent action taken by the Board occurred
32 in November 2018, which included the Board's acceptance of the PHB validation study design.
33 He said the goal is to adopt a permanent rule to fulfill the legislative intent of Forests and Fish
34 legislation and the commitments of the Forest Practices Habitat Conversation Plan.

35
36 Marc Ratcliff, DNR, presented an overview on the progress to develop the draft rule. WAC 222-
37 16-030 was used as the foundation for the draft language and incorporated the Board-approved
38 elements, Policy recommendations and final results from dispute resolution. He outlined the
39 structure of WAC 222-16-0301, which describes the two methods applicants can use to determine
40 the water type break between Type F and N waters. He said the default physicals which define the
41 presumed end of fish habitat will reside as a Type F classification, but the description for applying
42 the stream physical metrics will be in the new section.

43
44 Engel said the new language in WAC 222-24-040 acknowledges the work completed under road
45 maintenance and abandonment plans to upgrade stream crossings. The intent was to address water
46 crossing replacements should a fish assessment find the Type F break moved upstream of the

1 crossing and take into consideration the functionality of the structure. He said the concept was
2 discussed by Policy, but was not brought forward as a recommendation.

3
4 Board member Davies questioned the validity of this section if it was not a recommendation from
5 Policy.

6
7 Chair Bernath confirmed that the Board would not take action on the language contained in WAC
8 222-24-040 until Policy has provided a recommendation.

9
10 Ratcliff presented an overview on the progress to develop Board Manual Section 23 to accompany
11 the water typing rule. Section 23 will provide guidance for three main topics: (1) how to conduct
12 the fish habitat assessment method (FHAM) including how to measure PHBs, (2) best
13 management practices for conducting electrofishing surveys and (3) the process to identify off-
14 channel habitat using bankfull width or ordinary high water line indicators.

15
16 Ratcliff said the board manual work group has done a lot of work to develop the draft guidance
17 thus far. However, the group has been unable to complete several components for measuring
18 PHBs since the Board has not finalized which anadromous fish floor/PHB option will be used in
19 the rule. He said the draft guidance being developed will be useful when the rule elements are
20 clarified.

21
22 Board member Nelson suggested it would make more sense to complete the deliberations on the
23 options including the updated spatial analysis, then draft the rule and finalize the cost/benefit
24 analysis (CBA) based on those final decisions. He said the Board should have thought a little more
25 about the feasibility of including the various options.

26
27 Chair Bernath said the options are required for the Board to take rule action. He said DNR has
28 always attempted to ensure the technical guidance accompanies a rule so that the public
29 understands how to comply with the rule.

30
31 Board member Swedeen said the Board needs to determine whether the anadromous floor was
32 discussed as part of the Policy recommendations or if there is a lack of science supporting the
33 anadromous fish floor.

34
35 Board members Herrera said he believes discussions did occur within Policy regarding an
36 anadromous fish floor concept. He said the Western Washington tribes intended to use PHB
37 option nine in the expert panel's report as their proposed anadromous fish floor.

38
39 Chair Bernath said he understands that most folks agree that a goal of the water typing rule is to
40 capture low elevation, low gradient streams as fish habitat, but is unclear how the anadromous fish
41 floor concept came about. His understanding of the table in the expert panel's report was to
42 address PHBs as part of the application of FHAM in the upper portions of streams, but not
43 necessarily applied in streams close to salt water.

44
45 Board member Swedeen said her review of the record showed that a discussion on the anadromous
46 fish floor concept, did occur in Policy. She said she believes option nine was intended to function

1 as an anadromous floor below a certain gradient regardless of the terminology used to describe the
2 starting point.

3
4 Engel provided an update on the work to complete the spatial analysis for comparing the process
5 to determine the water type break between Type F and N waters under the current rule with the
6 process using FHAM for each PHB option. He said DNR staff began the process to gather data
7 points and evaluate each PHB option after gaining clarification on each PHB option after the
8 Board's August 2018 meeting.

9
10 Engel said the data to inform the spatial analysis came from existing water type modification
11 points gathered across seven eco-regions where high quality lidar was available. The GIS analysis
12 used 214 points statewide to inform the spatial analysis. He said in most cases, the GIS analysts
13 were able to identify the various PHBs with lidar. However, the width-based PHBs could not be
14 precisely identified with a reasonable degree of confidence.

15
16 Kia Ross, Cramer Fish Sciences, briefly described the methodology to locate a PHB to perform
17 the spatial analysis. He said they only looked at gradient and barrier PHBs, they did not have
18 confidence in the width PHBs, and therefore width PHBs were not analyzed.

19
20 Board member Nelson asked Ross if the group compared notes with Lee Benda's group working
21 on a spatial analysis since Benda's process analyzed width metrics.

22
23 Ross said they did not consult with Benda.

24
25 Board member Swedeen asked what the implication would be for not having confidence in
26 identifying certain PHBs.

27
28 Ross agreed that not applying a PHB width analysis may result in missing lower stream points
29 than strictly relying on gradient PHBs. He was unsure if the economics would change since
30 gradient PHBs were captured adequately.

31
32 Board member Laurie asked if the distances for the Type F and N points changed for the PHB
33 options in DNR's analysis and specifically asked how Lee Benda's analysis compared to DNR's
34 analysis.

35
36 Engel said the DNR analysis established the distance for each PHB option and said he is unaware
37 of the final results of Benda's work. He added that DNR shared their spatial analysis approach and
38 information with stakeholders in December 2018 and made the data available to the public via a
39 'box' website.

40
41 Engel said DNR hired a contractor to prepare a CBA and small business economic impact
42 statement. He said DNR convened an economic stakeholder advisory group to review and provide
43 advice on pertinent information for the CBA. The draft preliminary analyses were shared with the
44 economic advisory group. The goal was to provide workgroup members two weeks to review the
45 documents before scheduling a meeting to discuss the report outcomes.

1 He said as a requirement of the Administrative Procedures Act, the Board must determine that the
2 probable benefits of the rule are greater than its probable costs. The Board must weigh both the
3 quantitative and qualitative benefits and costs when making their decision. The preliminary CBA
4 has primarily provided a quantitative analysis. DNR has not yet prepared a qualitative analysis.
5

6 Engel concluded the update by stating that DNR is still gathering the data to inform the
7 environmental analysis including the specific effects regarding fish benefits. The concerns
8 regarding the clarification necessary to support the anadromous fish floor and PHB criteria affects
9 the SEPA analysis as well. He said it is important for the responsible official to have all the
10 environmental information to make an appropriate threshold determination.
11

12 **VALIDATION STUDY DESIGN**

13 Howard Haemmerle, AMPA, and authors of the PHB validation study provided an update on the
14 study. Science panel members include: Phil Roni, Pat Trotter, Phil Kershner, Pete Bison and Joe
15 Maroney. He said the authors received and addressed over 450 comments on the study throughout
16 the entire study design development process.
17

18 Chair Bernath mentioned that Policy voted not to fund the PHB validation study.
19

20 Haemmerle said the implementation plan for conducting the validation study was intended to be
21 developed in consultation with the Instream Scientific Advisory Group. The AMPA had several
22 meetings with the United States Department of Agriculture, Forest Service and the United States
23 Geologic Service — agencies the AMPA was looking to lead project implementation. A final
24 implementation plan and contracts needed for project implementation are not in place at this time.
25

26 Board member Swedeen said she understands the rule includes language related to where one
27 might start looking for PHBs or the anadromous floor. She asked if the study included the ‘starting
28 point’ for fish or would the study need additional elements to assess looking for the first PHB.
29

30 Roni said there is nothing in the data the group is collecting for the validation study that would
31 prohibit defining the starting point or other PHBs.
32

33 Chair Bernath asked if there was an opportunity to combine the physical stream criteria study with
34 the PHB validation study to increase efficiencies between the two.
35

36 Roni said the physical stream criteria assessment study is not necessarily a different study and data
37 collection could inform both studies. He suggested the physicals study could help answer
38 additional questions related to the anadromous floor. He added that both studies could help
39 validate the lidar-based mapping project.
40

41 Roni clarified that both studies include the collection of the same data. He added that the lidar
42 regression study involves additional costs including acquiring additional lidar and the collection of
43 randomly selected Type F and N breaks. Assuming the group does not have to acquire additional
44 lidar data, the additional cost would be a few hundred thousand dollars.
45

1 **PUBLIC COMMENT ON DRAFT WATER TYPING SYSTEM RULE AND OTHER**
2 **MATERIALS**

3 Vic Musselman, WFFA, said the cost analysis performed by Industrial Economics Incorporated
4 shows an impact of nearly 29% more for small forest landowners, 42% more than large forest
5 landowners. He urged the Board to fast track the lidar-based water type maps and default physical
6 assessment study so that these approaches can be implemented by small forest landowners.
7

8 Darin Cramer, WFPA, said the PHB analysis needs to include a width component and it needs to
9 be completed before any additional work occurs. He said WFPA's anadromous fish floor is
10 incorrectly described in the proposed rule nor was an analysis performed. He said their spatial
11 analysis is different than DNR's outcome. He suggested that the Board ensure the PHB analysis is
12 completed correctly, get folks together to discuss the goals for the anadromous fish floor, provide
13 fish effects in the CBA and support a collaborative approach to problem solving. He said the
14 Board is not set up to manage a process this complex and make decisions on issues they have little
15 understanding.
16

17 Ray Entz, Kalispel Tribe, said it might be difficult to get folks back to the table to continue
18 collaborative discussions. He would like to see the process be sent back to Policy, but it must be
19 balanced and include accountability. He suggested this rule is beyond the Board's capacity and
20 staffing level. He said they believe the PHB validation study should occur. He questioned the
21 ability for a PHB to be a viable end of habitat given fish migration and seasonality. He said he
22 believes that since the eastside tribes have left the table, their vacancy has been embraced. He does
23 not feel like the eastside tribes would be welcomed back to Policy. He said it would be important
24 to have the federal caucus back at the table as well.
25

26 Steve Barnowe-Meyer, WFFA, strongly encouraged the Board to retain the goal of a lidar-based
27 fish habitat model in rule and maintain the goal for refining the default physicals. He said the off-
28 channel habitat definition still needs work to align with Policy's recommendation. All paths
29 forward should include a collaborative process, clearly define the problems to solve, objectives of
30 the water typing rule, sort out remaining technical and policy issues, determine outstanding data
31 gaps and use credible spatial analysis. He suggested stakeholder with expertise need to meet and
32 collaboratively arrive at correct PHB spatial analysis and said DNR should utilize the CMER
33 eastside data to help inform the gaps in the PHB analysis. Regarding the anadromous fish floor, he
34 said the data gaps need to be filled and the goal needs to be articulated clearly.
35

36 Alec Brown, WEC, acknowledged that the PHB validation study did not go through the normal
37 process from CMER to Policy. Since Policy did not design the questions, he doubted the study
38 would answer the questions and eventually validate the water typing rule. He reminded the Board
39 of their goal to move away from a fish presence system adopted twenty years ago and noted that
40 the program is still without a process to adequately determine fish habitat. He voiced concern with
41 the Board's lack of ability to make a decision and encouraged the Board to act on the rule quickly.
42 His caucus believes the anadromous fish floor did go through the adaptive management process.
43 He encouraged the Board to continue the rule making process and then decide if the rule is
44 erroneous or not.
45

1 Peter Goldman, WFLC, asked the Board to not bifurcate the anadromous fish floor and not send it
2 back to Policy. Addressing the direction in RCW 76.09.370, he said the Board is tasked to make
3 changes to the rules covering aquatic resources if the changes are consistent with a scientifically
4 based adaptive management process. He said section seven of the statute directs the Board to use
5 best available science. He said that since the anadromous fish floor contains a gradient concept, it
6 demonstrates it is worthy of a legitimate rule for defining habitat. He suggested the Board has
7 enough science-based information to pass an adequate rule that protects fish habitat now.

8
9 Joe Maroney, Kalispel Tribe and science panel member, encouraged the Board to move forward
10 with the PHB validation study. He reminded the Board that the science panel provided what the
11 Board had asked for. Given his history with past fish habitat projects, he said it is difficult to
12 assume progress is being made when it has taken twenty years to arrive at a permanent rule.

13
14 Kevin Godbout, Weyerhaeuser Company, suggested there is uncertainty in what the rule should
15 look like because in part, we are establishing a regulatory rule where we as humans are attempting
16 to determine with accuracy where fish reside. He asked the Board to direct staff to work with
17 stakeholders—either Policy or workgroups—to identify the unanswered questions and come back
18 in August with a plan to move forward. He suggested collaboration is better than simply counting
19 votes to arrive at the outcome. He suggested the Board retain ownership in the process, but that
20 DNR needs to be the driver, coordinating with both technical and professional folks.

21
22 Jim Peters, Western Washington tribes, said the anadromous fish floor concept, which was
23 intended to be option nine, would define a stream below 10% as fish habitat and reduce
24 electrofishing. He said the floor needs to be part of the PHBs and not bifurcated. He said the
25 western tribes are working on a product to provide DNR to take through the AMP and will be
26 reaching out to other caucuses to arrive at a consensus product. He said it may be a three to five
27 month process. He said if their concept does not go forward, the western tribes would like to see
28 the adoption of FHAM as rule, hold off on adopting PHB criteria and anadromous fish floor until
29 a validation study is done, put the 10% fish habitat gradient into the board manual and rely on
30 using default stream physicals in conjunction with electrofishing. Additionally, he said the western
31 tribes would welcome back those caucuses that have left the Policy table.

32
33 Ash Roorbach, Northwest Indian Fisheries Commission, reiterated that the western tribes are
34 working to bring data and an analysis forward that could inform on the development of an
35 anadromous fish floor, but added it could take six months. He said the alternative is a validation
36 study that could take years. They would support moving forward with FHAM in rule and have the
37 PHB criteria and anadromous floor as part of the board manual. He clarified that a 10% gradient
38 and their anadromous fish floor would include interdisciplinary teams and natural barriers but
39 capture where fish habitat is most commonly found.

40 41 **BOARD DISCUSSION ON DRAFT WATER TYPING SYSTEM RULE MATERIALS**

42 Chair Bernath attempted to capture takeaways from the discussion. He said he heard most folks do
43 not want to give this back to Policy, DNR should continue with the rule making process and to
44 convene a Board committee to help DNR and stakeholders resolve outstanding issues. He
45 suggested the Board hold a special meeting to discuss this further.

1 A conceptual motion was presented for Board consideration. Several ideas were discussed
2 regarding the various components necessary for a motion and options for meeting the intent of a
3 water tying rule. No action was taken.

4
5 It was agreed that DNR staff would draft a motion on next steps for the Board to consider at a
6 special meeting in late May/early June.

7
8 **EXECUTIVE SESSION**

9 None.

10
11 Meeting adjourned at 6:10 p.m.

1 **FOREST PRACTICES BOARD**
2 **Special Board Meeting – May 9, 2019**
3 Natural Resources Building, Room 172, Olympia, WA
4

5 Meeting materials and subject presentations are available on Forest Practices Board’s website.
6 <https://www.dnr.wa.gov/about/boards-and-councils/forest-practices-board>
7

8 **Members Present**

9 Stephen Bernath, Chair, Department of Natural Resources
10 Ben Serr, Designee for Director, Department of Commerce
11 Bob Guenther, General Public Member/Small Forest Landowner
12 Brent Davies, General Public Member
13 Carmen Smith, General Public Member/Independent Logging Contractor
14 Dave Herrera, General Public Member
15 Jeff Davis, Designee for Director, Department of Fish and Wildlife
16 Lisa Janicki, Elected County Official
17 Noel Willet, Timber Products Union Representative
18 Patrick Capper, Designee for Director, Department of Agriculture
19 Paula Swedeen, General Public Member (participated by telephone)
20 Tom Laurie, Designee for Director, Department of Ecology
21 Tom Nelson, General Public Member
22

23 **Staff**

24 Joe Shramek, Forest Practices Division Manager
25 Marc Engel, Forest Practices Assistant Division Manager
26 Patricia Anderson, Rules Coordinator
27 Phil Ferester, Senior Counsel
28

29 **WELCOME AND INTRODUCTIONS**

30 Chair Bernath called the Forest Practices Board (Board) meeting to order at 8:00 a.m.
31 Introductions of Board members and staff were made.
32

33 **PUBLIC COMMENT**

34 Ken Miller, WFFA, provided an update on their Westside Riparian Template proposal which
35 Policy was supposed to have to the Board at this meeting. He indicated that the target date is now
36 November 2019 and doubted consensus is achievable by then. In order for the November due date
37 to work, dispute resolution would need to be invoked at the June Policy meeting.
38

39 Elaine Oneil, WFFA, shared that they were able to get a \$500,000 request through the legislature
40 to update the current landowner database, conduct a trends analysis and an analysis of the reasons
41 for observed trends including how regulatory impacts affected those trends. The bill (SB 5330) is
42 currently waiting for the Governor’s signature and if signed into law would direct those funds to
43 the University of Washington School of Environmental and Forest Sciences. She also provided an
44 update on their Eastside Riparian Template which includes a change in direction to develop a
45 series of alternate plans with a forest health focus.
46

1 Darin Cramer, WFPA, requested the Board ensure that the spatial analysis is re-run to include a
2 width component with the results included in the economic and environmental analyses. He said
3 the intent of an anadromous floor needs to be clarified and a validation component for both PHBs
4 and the floor is necessary. He identified other components of the rule that need to be addressed
5 and asked the Board to ensure stakeholders are involved in all the steps. He said all elements need
6 to be integrated into a timeline and brought back to the Board at the August or November meeting.
7

8 **RELATIVE PRIORITIES FOR THE ADAPTIVE MANAGEMENT PROGRAM**

9 Terra Rentz, TFW Policy Committee Co-Chair, described Policy’s decision-making process for
10 developing the consensus recommended priorities for the master project schedule budget.
11

12 She acknowledged the good work of Policy representatives over the past fourteen months. She
13 said the group is a highly-functioning team of respectful people who strive for finding common
14 ground. She expressed the importance for Board members to understand how well Policy is
15 functioning now, so they can weigh the relative feedback that this group provides.
16

17 Rentz provided an overview of the core projects recommended by Policy to be included in the
18 master project work schedule for the next biennium. She conveyed that given the responsibility to
19 continue funding for core projects that are underway and nearly complete, funding for the PHB
20 validation study could not be recommended at this time. Policy requests additional direction from
21 the Board.
22

23 **2019-2021 CMER PROPOSED BIENNIAL BUDGET**

24 Howard Haemmerle, AMPA and Terra Rentz, Policy Committee Co-Chair, presented the
25 proposed CMER budget and highlighted the following:

- 26 • Program Administrative staff – \$261,000 is allocation for administrative assistance supporting
27 the AMP. Includes hiring DNR staff (Administrative Assistant 2) rather than having the duties
28 performed under a contract. A contract would occur for mediation.
- 29 • CMER scientists – four positions need funding: ecologist, geologist, riparian and wetlands
30 scientists. These positions will be housed at the Northwest Indian Fisheries Commission. The
31 program is also working to recruit an eastside scientist position. This position would report
32 directly to the AMPA.

33 Joe Shramek, DNR acknowledged the delay in getting the eastside scientist position filled. He
34 said once DNR fills the AMPA and support positions, they hope to complete the process for
35 the eastside scientist.

36 Rentz said the reduction of \$41,000 reflects retirements and cost savings of bringing on new
37 staff.

- 38 • Funding for CMER conference – the \$5,000 reflects the two day preparation for conducting
39 the CMER science workshop.
- 40 • Type N workgroup – \$200,000 is allocated for bringing on technical folks to help with Type N
41 buffer prescriptions. Not all the logistics are worked out for this process or how the money will
42 be spent.
- 43 • Extended monitoring projects – the completion of hard rock and soft rock studies are
44 reflections of the cost associated with this line item. The increase in 2021 reflects additional
45 staff time to complete the report.

- 1 • Eastside Type N Riparian Effectiveness Project (ENREP) – the contractors adjusted costs
2 given equipment needs and access issues. The team may add six additional basins along the
3 east slope of the Cascades.
- 4 • Roads Prescription Monitoring Project – the costs reflect public works contract logistics not
5 previously anticipated.
- 6 • Deep-Seated Landslide Research Strategy – the objectives include spatially mapping
7 landslides and the landslide classification project.
8 Chair Bernath suggested providing an update at the August Board meeting.
- 9 • Clean Water Act – concepts for the Amphibians in Intermediate Stream study have begun, but
10 the project has not started to date.
- 11 • Water Typing Strategy – the budget reflects Policy’s decision not to fund the PHB validation
12 study, but maintain funding for other water typing projects.

13
14 Board member Nelson asked for clarification on the amounts allotted for AMP administrative
15 staff.

16
17 Haemmerle said the administrative costs are paid for by the program, but it is not \$625,000, rather
18 \$180,000 (\$92,500/year), which reflects a cost savings. The savings however, cannot be
19 automatically moved into other research projects.

20
21 Shramek clarified that the \$288,000 might have been a calculation error and initially unavailable
22 for spending. He said a more accurate figure will be included in time for Policy to adjust the
23 budget to reflect the governor’s budget.

24
25 Board member Janicki asked what the reversed fund shift refers to.

26
27 Chair Bernath said the Board is required to provide the Office of Financial Management and
28 legislative budget committees anticipated carry over funds. The money that supports the AMP is
29 from the Forests and Fish Support Account and General Fund State. The legislature reduced the
30 General Fund State amount by \$1.1 million.

31
32 Board member Nelson asked since the PHB validation study is not being funded, where is the
33 money coming from for other items the Board wants to achieve—PHB study, lidar-based model
34 and default physical stream assessment study.

35
36 Rentz said at the time they were to provide their summary sheets, they were not given any
37 allocations related to the PHB study, lidar or the physicals study. She said those products could fit
38 nicely in the placeholder for the PHB validation study.

39
40 Haemmerle said there is a cost saving by combining the default physical study with the PHB
41 validation study. Saving could be done depending on the approach the Board chooses.

42
43 Board member Nelson said he would like to see more money allocated for the water typing
44 strategy to reflect the Board’ intent to retain water typing as a priority, specific to the PHB
45 validation study, lidar and default physical studies.

46

1 Board member Davies asked if the co-chairs could put budgetary numbers associated with the
2 priorities and identify how many staff are working on these projects.

3
4 Rentz said for the upcoming biennium, Policy has \$4.8 million to work with for the research
5 program. She said \$55 million is allocated for additional Clean Water Act assurance projects, \$23
6 million is allocated for additional type N projects, \$33 million is allocated for deep-seated
7 landslide projects and finally, \$2.1 million is allocated for the PHB validation study, lidar and
8 physical studies.

9 10 **CLEAN WATER ACT ASSURANCES**

11 Mark Hicks and Heather Bartlett, Department of Ecology, provided a status update on how well
12 the corrective milestones for maintaining the Clean Water Act assurances are going. Since August,
13 there has been a combination of milestones completed as well as ones that have moved forward in
14 the process. These include:

- 15 • A plan was completed to survey small forest landowner roads;
- 16 • Buffer Integrity Shade Study was completed, a combination water quality amphibian study
17 intended to tie in well to the overall Type N Strategy conversations planned in future;
- 18 • A reviewed draft was completed on the soft rock study;
- 19 • CMER is reviewing the extended hard rock study;
- 20 • Begun implementing the assurance milestone for the Eastside Type N Effectiveness
21 Monitoring Study; and
- 22 • Initiating a process to achieve an independent review of the AMP, which is the performance
23 audit that Ecology has wanted to be part of the 2010 milestones.

24
25 Bartlett shared some of Ecology's perspectives as the Board considers and makes decisions on
26 work currently underway. She said Director Maia Bellon, takes seriously the upcoming decision
27 on next steps regarding the Clean Water Act assurances beyond the end of 2019.

28
29 She indicated that the Forests and Fish Report rules, use of the AMP to test those rules and the
30 assurances are all important and indicated that Ecology would like to see these continue together
31 as the model. She said with less than a year remaining of the ten-year extended assurances,
32 Ecology is looking to the Board to secure a more predictable path for identifying improvements to
33 the AMP.

34 35 **PUBLIC COMMENT ON PROPOSED BIENNIAL BUDGET**

36 Chris Mendoza, Conservation Caucus, said the CMER work plan was delivered to Policy in
37 January 2019. He said the work plan would provide in-depth information Board members may
38 have on individual projects. CMER does not necessarily follow Policy's priorities and vice versa.
39 Two examples include ENREP and the Amphibians in Intermittent Streams study. He said the 2-
40 day budget retreats were helpful to understand priorities and decide on appropriate paths forward.
41 He did not think a facilitator was necessary at Policy, but a coordinator position similar to CMER
42 may be a better option.

43
44 Darin Cramer, WFPA, recommended the budget retreat concept be enacted again. He said his
45 organization mostly supports the consensus budget. He cautioned spending money on the PHB
46 validation study until there is buy-in by stakeholders. He said he has concerns that the pass

1 through and overhead monies were not adequately explained in the budget or at Policy. He said
2 allocations related to the balance for Forest and Fish Support Account, the fund shift for Model
3 Toxics Control Act and the proviso language needs to get sorted in the supplemental budget. He
4 requested staff provide an update at a later time.

5
6 Alec Brown, WEC, said the conservation caucus has concerns with how the budget does not
7 necessarily meet the Clean Water Act assurance milestones. He acknowledged that the PHB
8 validation study did not go through the normal CMER process and reminded the Board that the
9 Conservation Caucus did not vote down the PHB validation study, but voted sideways.

10 11 **2019-2021 CMER PROPOSED BIENNIAL BUDGET**

12 Board member Janicki said she is concerned with passing a budget with funding uncertainty
13 related to water typing strategies, the PHB validation study and facilitator needs. She suggested
14 the Board approve the budget today and revise the budget at the upcoming special meeting.

15
16 Chair Bernath asked what is the latest date the Board can pass the budget to account for biennial
17 dollars and have money available for current contracts.

18
19 Shramek did not think the participation grant funding for tribes and state agencies would be
20 affected.

21
22 Haemmerle said they are continuing to address money for contractors in order to ensure funds are
23 available for implementing contracts by July 1, even if the budget was passed closer to July than
24 in May.

25
26 Board member Nelson suggested staff look into clarifying and possible revisions for cost saving
27 for PHB validation study, lidar-based model and physicals study including staff overhead and
28 facilitator.

29
30 Board member Laurie questioned if Policy could evaluate the need for the Amphibian in
31 Intermittent Stream study. He said he would like to see a cost comparison between a phased
32 project and one conducted through the normal CMER process. He suggested the effort for this
33 would include the PHB validation study, the physical study and the lidar-regression study.

34
35 Chair Bernath suggested some things could be done quickly like send out the CMER work plan to
36 Board members. He asked if Policy could provide better financial numbers by ‘scrubbing’ line
37 items.

38
39 Rentz said Policy could provide what the Board requested related to the budget. She added that
40 the Amphibian in Intermittent Stream study is a Clean Water Act assurance and may provide
41 important information.

42
43 Board member Serr asked about the \$1.5 million for ENREP and acknowledged the concerns for
44 the cost. He asked if the dollar amount reflected the workshop.

1 Haemmerle said a workshop was held and clarified that no changes occurred for ENREP funding
2 resulting of the workshop. The workshop was held to help clarify if adjustments were warranted.
3 He added that a revisited budget is possible after the principal investigators assess the need for
4 any adjustments.

5
6 Rentz suggested Board members provide focused budget questions so Policy can respond
7 appropriately. She suggested the CMER work plan may provide information to inform the budget
8 decision. She said Policy is unable to decide the priorities for the Board unless they understand the
9 questions Board members are seeking to answer.

10
11 Chair Bernath said these water typing studies have been in place for several years and have been
12 identified as a priority for the Board. He encouraged all to work together to resolve these issues.

13
14 Board member Swedeen suggested that the bigger question is to assess how to fund these larger
15 studies, such as the PHB validation study given the shortfall budget in the future. She did not
16 think funding will be available for such studies down the road.

17
18 Board member Herrera said since the Board shifted to the Board-directed science panel, CMER
19 folks and Policy folks have been left out of the process. As a result, he understands why there is
20 confusion on what the question is. He suggested \$40,000 is appropriate to allocate for water
21 typing moving forward.

22
23 Haemmerle offered that one way for Board members to understand specific questions the studies
24 seek to address is to re-read the studies. He said this should help members to be better informed as
25 to what the priority question are. He said both the physical study design and PHB validation study
26 design offer some suggestions to improve efficiencies and reduce potential overlap.

27
28 **MOTION:** Brent Davies moved the Forest Practices Board approve the 19-21 biennium Master
29 Project Schedule and Budget for the Adaptive Management Program.

30
31 She further moved the Board direct the AMPA to work with Policy and CMER to
32 revise the budget and implement a new line item for AMP improvement facilitation
33 of \$150,000 and move remaining excess funds into the water typing strategy line
34 item.

35
36 The Board will consider approval of a revised budget and CMER work plan at the
37 August meeting.

38
39 **SECONDED:** Tom Nelson

40
41 Discussion

42 Several Board members assisted with refining the wording of the motion and discussed options
43 for approving the budget once clarifications were made on the water typing strategies, facilitation
44 and other studies/projects.

1 The options for addressing the budget at today’s meeting ranged from not approving the budget
2 and waiting until Policy refined the dollar amounts, then take action at a special meeting to
3 approve the budget or have Policy provide clarifications in August.

4
5 **ACTION:** Motion passed unanimously.

6
7 **STAFF REPORTS**

8 No questions on the following reports:

- 9 • Adaptive Management
10 • Compliance Monitoring
11 • Small Forest Landowner Office
12 • Upland Wildlife

13
14 The Board requested time at the August meeting to address questions on the Western Gray
15 Squirrel report.

16
17 **2019 WORK PLANNING**

18 Marc Engel, DNR, presented amendments to the work plan as a result of yesterday and today’s
19 meeting.

20
21 **MOTION:** Tom Laurie moved the Forest Practices Board approve the 2019 Proposed Work
22 Plan as amended.

23
24 **SECONDED:** Carmen Smith

25
26 **ACTION:** Motion passed unanimously.

27
28 **SMALL FOREST LANDOWNER DEMOGRAPHIC AND FOREST PRACTICES DATA**
29 **PRESENTATION**

30 Due to time constraints this presentation was moved to the August meeting.

31
32 Meeting adjourned at 12:30 p.m.

1 **FOREST PRACTICES BOARD**
2 **Special Board Meeting – June 4, 2019**
3 Natural Resources Building, Room 172, Olympia, WA
4

5 **Members Present**

6 Stephen Bernath, Chair, Department of Natural Resources
7 Bob Guenther, General Public Member/Small Forest Landowner
8 Carmen Smith, General Public Member/Independent Logging Contractor
9 Dave Herrera, General Public Member
10 Jeff Davis, Designee for Director, Department of Fish and Wildlife
11 Patrick Capper, Designee for Director, Department of Agriculture
12 Paula Swedeen, General Public Member
13 Tom Nelson, General Public Member
14

15 **Members Participating by Phone**

16 Ben Serr, Designee for Director, Department of Commerce
17 Brent Davies, General Public Member
18 Lisa Janicki, Elected County Official
19 Noel Willet, Timber Products Union Representative
20

21 **Members Absent**

22 Tom Laurie, Designee for Director, Department of Ecology
23

24 **Staff**

25 Joe Shramek, Forest Practices Division Manager
26 Marc Engel, Forest Practices Assistant Division Manager
27 Patricia Anderson, Rules Coordinator
28 Phil Ferester, Senior Counsel
29

30 **WELCOME AND INTRODUCTIONS**

31 Chair Bernath called the Forest Practices Board (Board) meeting to order at 10:30 a.m.
32 Introductions of Board members and staff were made.
33

34 **NEXT STEPS FOR THE WATER TYPING SYSTEM RULE**

35 Chair Bernath said the purpose for today's special meeting is to decide next steps for the permanent
36 water typing system rule.
37

38 Marc Engel, Department of Natural Resources (DNR), presented DNR staff recommendations for
39 the Board's consideration to develop a motion on next steps for the water typing system rule. The
40 recommendations were based on the concepts discussed by Board members and input from public
41 testimony at the May 2019 meeting. The recommendations included support for forming a Board
42 committee to retain Board ownership of the development for the rule, topics for committee
43 discussions and items to resolve including:

- 44 • Understanding the potential habitat break (PHB) spatial analysis and resolving whether the
45 width-based PHB metric can be precisely estimated for the economic and environmental
46 analyses;

- 1 • Determining if the Board can move toward fewer PHB options for inclusion in the rule
2 analysis;
- 3 • Assessing whether the eastern Washington data used for the PHB spatial analysis is
4 sufficient for rule making;
- 5 • Determining whether the PHB validation study should be implemented and, if so, should it
6 be combined with the physicals stream study; and
- 7 • Determining the feasibility of moving toward a lidar-based model in rule language or non-
8 rule options.

9
10 Engel recommended that the committee report back to the Board on progress at the August 2019
11 meeting and provide committee recommendations on how to move forward on the rulemaking at the
12 November 2019 meeting.

13
14 Engel also recommended that the Board request the Timber, Fish and Wildlife (TFW) Policy
15 Committee (Policy) provide objectives for an anadromous fish floor and existing road crossing
16 structures for possible inclusion into the draft rule. To do this, Policy would develop either a final
17 consensus recommendation or a majority/minority report as soon as possible. He suggested that
18 staff continue working toward completing those aspects of the water typing system rule which are
19 not dependent on the spatial analyses for the anadromous fish floor or PHB options, including the
20 technical guidance, preliminary cost/benefit analysis (CBA), Small Business Economic Impact
21 Statement (SBEIS) and environmental analysis based on the draft rule.

22
23 Board member Swedeen voiced concerns that these recommendations will create months of delay.
24 She questioned the relevancy in the different spatial analysis outcomes performed by DNR and the
25 industry caucus. She asked why DNR is recommending more time if DNR supposedly has all the
26 necessary information.

27
28 Engel said that DNR provided the data and the methodology for the spatial analyses in December,
29 2018 to all stakeholders. The draft CBA was completed based on DNR's spatial analysis. However,
30 stakeholders have stated concerns about the spatial analysis. Staff recommendations are aimed at
31 providing clarity on the intent of each proposed PHB option and may help the Board finalize one
32 PHB for consideration. He reiterated that a full understanding of the PHB width metric and the
33 anadromous fish floor concept is still unresolved between DNR and TFW caucuses.

34
35 Board member Swedeen asked if consensus is necessary for an analysis to go forward and asked
36 where in rule or law it says every stakeholder needs to agree with DNR's process.

37
38 Board member Nelson felt that gaining consensus was not the request, but that the Board had
39 requested [August 2018 meeting] DNR check with each caucus to ensure DNR captured their
40 proposal correctly. He felt that a revised rulemaking timeline would address these concerns and
41 create a rule that is implementable.

42
43 Engel said additional work is needed on the economic analysis to ensure the values within the
44 analysis are succinct enough for a thorough evaluation and to convene the work group to finish a
45 qualitative analysis. He stated a precise timeline for completion is unknown, but said a status report
46 could be provided at the August 2019 Board meeting. He said staff was waiting for the results of the
47 spatial analysis performed for the CBA in order to complete the environmental analysis.

1
2 Board member Swedeen asked why the SEPA analysis is not complete since DNR has had the
3 results of the spatial analysis since December.

4
5 Engel said there were elements in the CBA which addressed the environment and DNR wanted
6 those results in order to complete the SEPA analysis.

7
8 Chair Bernath said the recommendation is to send the anadromous fish floor back to Policy and for
9 Policy to report back to the Board through either a consensus recommendation or a
10 majority/minority report as soon as possible.

11
12 Board member Davis said he does not foresee consensus being reached in Policy. He questioned the
13 ability of Policy to provide a majority/minority report to the Board in a timely manner.

14
15 Engel briefly described the formal stages of dispute resolution. Per the process outlined in Board
16 Manual Section 22, he said the fastest track would take approximately five months.

17
18 Terra Rentz, Policy co-chair, said Policy could delay work on Type N to address the issues being
19 discussed today to accommodate the Board's request. She said two to three meetings might be
20 needed given the contentious issue.

21
22 **PUBLIC COMMENT ON NEXT STEPS FOR THE WATER TYPING SYSTEM RULE**

23 Ken Miller, Washington Farm Forestry Association (WFFA), said the issues before the Board are
24 complex and that he believes the Board lacks understanding without a clearly defined problem. As a
25 result, he suggested the 'take no action option' is looking to be a better rule option. He said small
26 forest landowners need both technical assistance and a mapped-based rule for identifying Type F
27 waters.

28
29 Jim Peters, Northwest Indian Fisheries Commission, said the Western tribes are working on a path
30 forward for an anadromous fish floor. He said the process would follow the normal TFW ground
31 rules and that the process would be governed by a charter with progress reports provided to the
32 Board. He said the tribes intend to look at a few more watersheds and continue to work with the
33 TFW caucuses to provide an anadromous fish floor recommendation in six months or perhaps at the
34 November 2019 Board meeting.

35
36 Alec Brown, Washington Environmental Council, said he is frustrated to learn that the Board does
37 not have a clarification on PHBs after all the work that has been done. He said he has not seen a
38 clear problem statement defining this issue. He questioned why DNR has not provided the CBA to
39 stakeholders yet. He used off-channel habitat as an example of a rule element that does not need to
40 go back to Policy since the definition for off-channel habitat has already been decided through
41 Policy.

42
43 Steve Barnowe-Meyer, WFFA, said all paths forward must be based on open collaboration and
44 suggested future discussions should be opened to all caucuses. He implored the Board to clarify the
45 problems with the current interim rule, clearly state the performance objectives for any new Type F
46 rule, foster collaboration for understanding the spatial analysis, seek a single PHB alternative that

1 meets the objective of a water typing system, develop cost effective evaluations for PHBs and the
2 anadromous fish floor and fully fund the lidar-based model for depicting Type F waters.

3
4 Darin Cramer, Washington Forest Protection Association (WFPA), said the Board needs to be clear
5 on performance objectives for this rule process. He requested that the spatial analysis be completed
6 utilizing width parameters, and WFPA's anadromous fish floor be included in the analysis, and that
7 a field component for measuring PHBs and the anadromous fish floor occur. He concluded by
8 suggesting all caucuses be involved in this process and for the Board to establish a timeline as soon
9 as possible.

10
11 Martha Wehling, WFPA, encouraged the Board to review the minutes from the two water typing
12 workshops held in 2016 and 2018 since many of these decisions have already been made. She said
13 after review of three years of Board motions, WFPA was able to determine that the Board has
14 completed three out of sixteen tasks—only 19%. She suggested the Board committee first address
15 how the current rule is not meeting the goals and objectives of the Forest Practices rules. She asked
16 the Board to request DNR provide complex motions to the public ahead of time so they can review
17 the language and comment appropriately.

18
19 **NEXT STEPS FOR THE WATER TYPING SYSTEM RULE**

20 Board members discussed and deliberated on the appropriate language to refine a Board motion
21 based on the recommendations presented by DNR staff.

22
23 Board member Nelson suggested that the Board committee be made up of an odd number of
24 participants to avoid a stalemate when decisions are made, and suggested that the committee work
25 under a charter or other formal process.

26
27 Board member Swedeen questioned why the lidar-based mapping element is mentioned in the
28 recommendation. She believes the lidar study was already funded and prioritized. She questioned
29 why the recommendation includes having staff continue working on the water typing system rule.

30
31 Chair Bernath acknowledged that the study design for lidar-based mapping project has been
32 provided to Instream Scientific Advisory Group and said it is in response to small forest landowner
33 concerns. In response to the rule, he suggested it would be beneficial to determine if 18 data points
34 provide adequate information to support adoption of a new water typing rule for eastern
35 Washington. He also stated that it would be helpful to explore the possibility of narrowing down
36 the number of rule options that are being evaluated by staff. He said the list of outstanding issues
37 proposed for resolution is intended to address comments made by Board members and by the
38 public.

39
40 Board member Swedeen asked the Board to specify that the spatial analysis issue be made a priority
41 and addressed first in order to complete the CBA and SEPA analysis as soon as possible.

42
43 Board member Davis agreed with Swedeen and suggested that the eastside data issue is another
44 important item to address first.

45
46 Board member Nelson suggested that the Board committee and stakeholders come up with
47 recommendations to resolve these issues rather than the Board.

1
2 Board member Davis felt that leaving the issues to the committee is ‘too loose’, but suggested
3 adding language stating the committee’s role in coming up with recommendations would capture the
4 Board’s intent.

5
6 Board member Swedeen said that she believes the anadromous fish floor was adequately discussed
7 at Policy. She said that giving the floor concept back to Policy to resolve might take several months,
8 which would extend the timeline beyond November 2019. She asked if Policy could simply make a
9 determination that it would take them a long time to sort out the anadromous fish floor concepts and
10 recommend that the Board committee make the decision for a path forward.

11
12 Chair Bernath stated that Policy needs to clearly determine if they can reach consensus and if not,
13 provide a majority/minority report in order to be properly before to the Board.

14
15 Board member Nelson said that he hesitates sending the anadromous fish floor concept back to
16 Policy as a procedural process especially since they may be receiving additional analysis and
17 information relevant to the anadromous fish floor.

18
19 Board member Herrera said he believes the concept for an anadromous fish floor was previously
20 discussed at Policy, but was unsure if formal dispute resolution occurred. He anticipated, with
21 further discussions, that Policy could decide on appropriate floor criteria.

22
23 Board member Swedeen suggested that Policy be tasked to determine if the anadromous fish floor
24 was discussed as a concept and that if they found that no clear consensus was reached, Policy could
25 recommend that the Board committee work on the floor using the tribes’ analysis to resolve this
26 issue.

27
28 Rentz sought clarification regarding how the Board intends Policy to determine if sufficient
29 discussions on the anadromous fish floor occurred. She asked for the Board to provide the threshold
30 for determining the record on Policy’s discussions.

31
32 Board member Herrera said he believes the Board’s February 2018 motion which requested DNR to
33 evaluate the three PHB options did include an anadromous fish floor. If a Policy discussion is
34 necessary for the Board’s consideration, he said that the Board needs to be clear and have Policy fix
35 it. He also asked for the Board to make the lidar model a stronger commitment.

36
37 Board members discussed the options for Policy to combine both decision points—anadromous fish
38 floor and water crossing structures—and make a recommendation at one time or separate the two
39 items and report on the water crossing item once the anadromous fish floor item was completed.
40 Board members agreed that the floor concept was the priority and should be completed first.

41
42 Rentz felt that a discussion on the anadromous fish floor could occur within Policy in time for the
43 Board’s August 2019 meeting, but did not think resolution on road crossing structures could occur
44 by August. She said that Policy would have to adjust priorities to make this happen.

1 **MOTION:** Tom Nelson moved the Forest Practices Board establish a Board committee to
2 facilitate staff and Policy caucuses' discussions in order to make recommendations
3 on outstanding issues associated with the proposed water typing system effort,
4 specifically to:

- 5 ○ Priority one is to understand the spatial analysis and work to resolve whether
6 width can be precisely estimated for the purposes of the required economic
7 and environmental analyses;
- 8 ○ Determine how the rule making should be applied in eastern Washington;
- 9 ○ Determine if and when the PHB validation study should be done and whether
10 it should be combined with the study to determine physicals; and,
- 11 ○ Determine if rule language, Board resolution, or other non-rule options would
12 suitably encourage moving toward a Lidar modelled map-based water typing
13 rule.
- 14 ○ Board committee shall work with stakeholders to resolve any outstanding
15 issues regarding the anadromous floor.
- 16 ● Request the Board committee to report back to the Board on progress at the
17 August 2019 meeting; with recommendations on how to move forward on the
18 water typing system rule at the November 2019 meeting.
- 19
- 20 ● The Board directs TFW Policy to address first the anadromous floor and then
21 road water crossing structures to recommend whether these items should be part
22 of the water typing system rule. TFW Policy will report back to the Board
23 committee as quickly as possible on each item.
- 24
- 25 ● Request the Board chair to ensure that staff continues working toward
26 completing those aspects of the water typing system rulemaking guidance,
27 preliminary CBA/SBEIS and environmental analysis as the Board committee
28 resolves outstanding issues. Board staff will provide an update at the August
29 Board meeting.
- 30

31 **SECONDED:** Carmen Smith

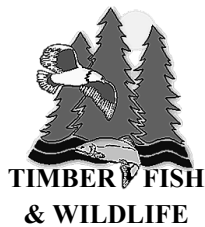
32
33 **Board Discussion:**

34 Rentz said that she understands the motion's intent is to request that Policy determine if an
35 anadromous fish floor should be included in the water typing system rule and make a formal yes or
36 no recommendation back to the Board. Policy will also determine if water crossing structures with a
37 nexus of a water typing change should be addressed in rule.

38
39 **ACTION:** Motion passed unanimously (Janicki not available for vote).

40
41 The Board committee will be chaired by Board member Guenther and include Board members
42 Davis, Herrera, Nelson and Swede.

43
44 Meeting adjourned at 2:10 p.m.



**Timber, Fish and Wildlife Policy Committee
Forest Practices Board**

PO BOX 47012, Olympia, WA 98504-4712

Policy Co-Chairs:

Terra Rentz, WA Department of Fish & Wildlife

Curt Veldhuisen, Skagit River System Cooperative

June 12, 2019

TO: Forest Practices Board
FROM: Curt Veldhuisen and Terra Rentz
SUBJECT: TFW Policy Committee Report (June & July)

SUMMARY OF POLICY RECOMMENDATIONS TO THE BOARD

Action Items

Policy recommends the Forest Practices Board adopt the Adaptive Management Program budget (*also known as the Master Project Schedule*) as amended at the 11 July 2019 Policy Meeting ([Attachment 1](#))

In response to the Forest Practices Board's motion on 4 June 2019:

- 1. Policy recommends that an anadromous floor should be considered for inclusion as a component of the water typing system rule.**
- 2. Policy recognizes that existing rule language and actions may provide adequate considerations for landowners and recommends that additional water-crossing structure language not be included in the water typing system rule. Policy also recommends that an evaluation of potentially affected water-crossing structures be further considered by Policy but is not an immediate need at this time.**

Requested Materials

Policy has provided the following materials for the Board as they relate to current or recent action items:

1. FY20/21 Master Project Schedule – Revised ([Attachment 1](#))
2. CMER Work Plan ([Attachment 2](#))
3. Updated Type Np Prescriptions Charter ([Attachment 3](#))
4. TFW Policy Annual Work Plan ([Attachment 4](#))

Recommended Inclusion on November Agenda

1. Review and accept of Policy and CMER's recommended strategy for extended monitoring;
2. Review and approve updated MPS for reallocation of unspent funds.

Recommended Inclusion on February Agenda

1. Review and accept Policy's recommendation on the Small Forest Landowners' Low Impact Template;
2. Presentation on the Stream-Associated Amphibian Response to Manipulation of Forest Canopy Shading project (also known as the *Buffer Integrity – Shade* (Amphibian) project);
3. Review and accept of Policy's recommendation regarding the Buffer Integrity-Shade project.

EXISTING PRIORITIES AND UPDATES

1. *Master Project Schedule Update for 2019*

During the May 2019 Board Meeting, amendments were requested of the Master Project Schedule. Specifically, the Board asked Policy to (1) update revenue to reflect the final legislative budget, (2) correct the FFSA indirect estimation for DNR, (3) create a new line item for AMP Principles Facilitation, and (4) direct all remaining excess funds to the Water Typing Strategy Line Item. In addition to those changes, modifications to staff related expenses to capture vacancy savings and more accurate personnel costs were included.

Policy approved, through consensus, a revised MPS on 11 June 2019 with the following changes:

- **Line 9 – Administrative Assistant 2:** Increased from \$87,000 to \$89,000 as the baseline cost to accurately reflect the cost of an AA2 employed by DNR; reduction to \$60,000 in FY20 due to vacancy savings
- **Line 17 – Contingency Fund:** Decreased from \$140,606 to \$140,000 in FY 21 to try to honor the Board’s intent of increasing the Water Typing Strategy line item
- **Line 21 – AMP Principals Facilitation (Center for Conservation Peacebuilding):** New line item with \$150,000 allocated for FY20
- **Lines 45-46 – Deep Seated Research Strategy –** Fund shift of \$35K from the suite of projects from FY20/21 to FY22 to due project timeline assessment
- **Line 52 – Water Typing Strategy:** Increase in FY20 from \$40,000 to \$68,850; increase FY21 from \$450,000 to \$552,456
- **Line 82 – Subtotal of Revenue:** Corrected to reflect legislative budget of \$1.897 M in FY20 and \$1.817 per year in GFS for all other years, and \$5.677 in FFSA per year for all years.
- **Line 89 – FFSA DNR Indirect:** Decreased from \$312,850 per year to \$236,500 per year.

Policy recommends the Board adopt the AMP budget (also known as the Master Project Schedule) as amended at the 11 July 2019 Policy Meeting (Attachment 1).

2. *Board Water Typing Motions*

During the 4 June 2019 Special Board Meeting, the Board passed the following motion along with additional interpretation directed towards the TFW co-chairs for communication to TFW Policy:

The Board directs TFW Policy to address first the anadromous floor and then road water crossing structures to recommend whether these items should be part of the water typing system rule. TFW Policy will report back to the Board committee as quickly as possible on each item.

During the 6 June 2019 Policy Meeting Policy formed an ad hoc workgroup consisting of Jim Peters, Steve Barnowe-Meyer, Alec Brown, Marc Engel, Darin Cramer, and Terra Rentz, to assess the motion and prepare relevant materials to ensure a robust and informed discussion could occur at the July meeting.

Consequently, Policy was able to meet that intent on 11 July 2019 and respond to the board motions:

Policy recommends that an anadromous floor should be considered for inclusion as a component of the water typing system rule.

Policy recognizes that existing rule language and actions may provide adequate considerations for landowners and recommends that additional water-crossing structure language not be included in the water typing system rule. Policy also recommends that an evaluation of potentially affected water-crossing structures be further considered by Policy but is not an immediate need at this time.

During the discussion there was agreement around the discomfort posed by this request from the Board as such a decision is clearly outside of the adaptive management process. Policy encourages either the Board or the designated Water Typing Committee to seek AG guidance on whether or not previous dispute resolution processes or other actions meet the necessary requirements for decision-making.

3. *Stream-Associated Amphibian Response to Manipulation of Forest Canopy Shading*

On 6 June 2019, Policy formally accepted, via full consensus vote, the Findings Report for the Stream-Associated Amphibian Response to Manipulation of Forest Canopy Shading Study, also known as the *Buffer Integrity-Shade Effectiveness Study*. Policy has 180 days, per Board Manual 22, to process the findings and determine if an alternative action should be recommended. Specifically, Policy will adhere to the following timeline (*no later than*):

- August 14, 2019 – Determine if the information merits taking action (consensus required)
- October 30, 2019 – Develop potential action alternatives
- December 14, 2019 – Select alternative action(s) to recommend to the Forest Practices Board (consensus required)
- February 2020 – Board considers policy’s recommendation

This study is the first in a suite of affiliated Type N studies. It is the current goal of Policy that if action is warranted, then Policy will recommend to the Board that addressing the results of this study be integrated, as a formal component of the Type Np Technical Workgroup process and the Charter will be modified accordingly.

4. *Technical Type Np Workgroup*

As requested by the Board in May 2019, the Type Np Workgroup Charter has been updated to reflect the most current timeline, participant compensation, and the participation selection process. (Attachment 3)

During the 11 July 2019 Policy meeting discussion occurred around 17 qualified candidates submitted by caucuses for consideration. Policy decided that candidates cannot be current AMP related staff (such as CMER scientists or AMP project managers), must have been contacted to verify interest, and must be available for the duration of the workgroup – narrowing the list to 15 candidates. During the month of July, Policy representatives will review and rank candidates and a final selection will be made at the August 2019 meeting. As outlined in the Charter, workgroup participation is not to exceed 8 members, plus 2 Policy liaisons (Darin Cramer and Jim Peters), with equal representation of expertise.

Policy will update the Charter to reflect participants once selected and confirmed.

5. *Small Forest Landowners’ Low Impact Template*

At March Policy, the Template Group appealed for additional time to identify a viable proposal. Despite consternation from several caucuses toward additional time (evidenced by sideways thumbs), the extension was approved, moving the deadline to September Policy. Additional motions to resolve several problematic components were not approved at that time.

In July, the workgroup provided a status update to Policy. The workgroup received the ISPR reviewed riparian science synthesis and feels like substantial progress and positive collaboration has occurred. To that end, the workgroup sought an extension of the timeline from Policy to the end of October (October 30, 2019), which Policy approved with full consensus. Policy would then deliberate the recommendations of the workgroup at the November Policy meeting.

The Board should anticipate a recommendation from Policy at the February 2020 meeting.

6. *AMP Performance Audit*

At the January 2019 Policy meeting, Policy prioritized the pursuit of a Performance Audit through the state Auditor's office. Specifically, Policy reflected on the 9 May 2018 motion by the Board to direct the Board Chair to contact the State Auditor's office to conduct an independent audit of the AMP. Upon Direction from the Board, Policy will convene a workgroup with AMPA and other DNR staff to understand the process steps and needs of the State Auditor's Office and to develop specific questions to guide a Performance Audit.

Policy encourages the Board to receive a formal report and update on the Performance Audit and provide that information to Policy as a tool to improve performance and operations.

7. *Westside Type F Riparian Effectiveness Study*

On 6 June 2019, Policy approved the Charter for the Westside Type F Riparian Prescriptions Effectiveness Project Pilot Study. Currently no Westside Type F Effectiveness Studies are being conducted by CMER. While CMER has tested the effectiveness of Eastside Type F riparian prescriptions and the Bull Trout Overlay All Available Shade Rule, the current Westside rule remains based on untested assumptions that riparian prescriptions are functioning as intended. The intent of this pilot study is to assess the distribution of stand conditions and prescription variants – this information will be used to design a Westside Type F Riparian Prescription Effectiveness Before-After-Control-Impact (BACI) study.

Per the CMER Protocol and Standards Manual, each project requires a charter that describes the problem/purpose statement of the project, goals, critical questions, deliverables, team roles and responsibilities, a timeline, and budget. CMER and Policy must approve each charter prior to project implementation.

8. *Evaluation of Extended Monitoring*

At the August 2018 Board Meeting, the FPB tasked both Policy and CMER to develop a proposal regarding how to address extended monitoring. The impetus for this request was a lack of clarity on the process and rationale for extending the Type N Hard Rock study. A joint CMER-TFW workgroup was formed as a result to deliberate and develop guidelines and a process for proposing and evaluating extended monitoring needs affiliated with an ongoing CMER research project. That workgroup has made substantial progress and is nearing completion for a recommendation to both Policy and CMER

Although the framework description is not yet finalized, the basic approach appears to have broad support. The framework would include input and approval roles for CMER (e.g. methods, certainty), Policy (e.g. competing priorities, policy questions) and AMPA/Project Management staff (e.g. staff availability, timing). The final approval of extension proposals would optimally be completed at the time of annual MPS review to allow consideration of implications of the extension (cost, staffing, timelines, added certainty) in context of impacts to other priorities.

Policy had anticipated delivery of the Extended Monitoring proposal at the August 2019 board meeting. However, due to more immediate needs identified by the Board at the May and June meetings, this item has been delayed for discussion until the August 2019 Policy meeting.

The Board should anticipate a product from Policy at the November Board meeting.

9. *AMP Improvement*

During the 6 June 2019 Policy Meeting, a joint CMER-Policy Workshop occurred to review and understand CMER's Protocols and Procedures Manual. During that workshop Policy members identified numerous practices that (a) lacked efficiencies, (b) were in conflict between levels (e.g., between CMER and Policy or AMPA), (c) were outdated, or (e) had procedural gaps. As a result, Policy decided to focus effort over the next year on reviewing Board Manual 22 and improving

operations. Further, Policy felt it was timely to assess and recommend clarifications to AMPA roles in the PSM Chapter 3 & & and Board Manual 22 so that the new AMPA can be as supported as possible to serve as a strong steward of the AMP processes and operations.

10. *Eastside Type N Effectiveness Project (ENREP)*

As discussed at the May Board meeting, Policy is evaluating the financial needs and necessary components of ENREP due to the substantial cost increased projected for this project. In July Policy discussed specific questions to direct to CMER that will help with an evaluation of tradeoffs and implications for decision-making. These questions will be approved and directed towards CMER in August. Further, Policy asked the Principle Investigators in May 2019 to evaluate remaining sites during the summer field season and to report to Policy with the results of their assessment.

Evaluation of CMER's responses and feedback from the principle investigators is scheduled for September 2019 with the aim to have an updated ENREP budget for Board consideration in November 2019.

CMER Related Updates of Interest

Policy appreciated the contributions of former CMER co-chair, Jenny Knoth (SFLO Caucus), for her work to help improve coordination and communication between Policy and CMER. As of June 2019, Chris Mendoza (Conservation Caucus) has assumed the role of CMER Co-Chair, replacing Jenny.

Per the Board approved Budget, the Northwest Indian Fisheries Commission continues to recruit for and hire qualified individuals to fill the vacant CMER Scientist positions. As of July 15, 2019 Greg Stewart was hired to rejoin NWIFC and the AMP as the new CMER Geologist.

2019–2021 BIENNIUM CMER WORK PLAN

Prepared by:
COOPERATIVE MONITORING, EVALUATION AND RESEARCH COMMITTEE
January 2019



Comments or questions, contact:

Jenny Knoth, CMER Co-Chair
(jenny@greencrow.com)

Doug Hooks, CMER Co-Chair
(dhooks@wfpa.org)

EXECUTIVE SUMMARY

The 2019–2021 Biennium Cooperative Monitoring, Evaluation and Research Committee (CMER) Work Plan and associated budget have been approved by the Forest Practices Board (Board) based on recommendations from the Timber, Fish and Wildlife Policy Committee (Policy) and CMER. The CMER Work Plan presents an integrated strategy for conducting research and monitoring to provide scientific information to support the Forest Practices Adaptive Management Program (AMP). The overarching purpose of the Work Plan is to inform CMER participants, Policy constituents, the Board and interested members of the public about CMER research and monitoring activities. Revisions are completed biennially to update the research findings of CMER and the changes in policy priorities and funding.

One-hundred and one (101) projects (including multiple phases of a project) are listed in the Work Plan. See Appendix A: CMER Projects, Objectives, and Targets for a listing of projects. The projects cover a range of topics related to the forest practices rules and are at various stages of development or completion. Approximately 44 projects are complete and 22 projects are ongoing or to be initiated (i.e., undergoing study design development or currently being implemented or reviewed). Projects originated as priority research topics in Schedule L-1 of the Forests and Fish Report (April 1999), which was later revised and adopted by the Board in February 2001 and incorporated into the Washington Forest Practices Habitat Conservation Plan (FP HCP).

The Work Plan is organized hierarchically into rule groups, programs, and projects. Section 2.0 describes the CMER research and monitoring strategy and approaches used to address critical questions relevant to the AMP. Section 3.0 describes CMER and Policy procedures for prioritization at the program and project level, and Section 4.0 presents the Board approved 2019–2021 biennium projects and budget allocations. Proposed budget allocations for 2019–2021 projects and activities can be found in Table 4. Section 5.0 describes the CMER research and monitoring program, with program and project descriptions organized by rule group. Appendix A contains a table titled “CMER Projects, Objectives, and Targets,” which links specific resource objectives and key riparian functions (e.g., in-stream temperature, large woody debris, litter, sediment, etc.) to CMER projects, organized by programs within rule groups.

For the 2019–2021 biennium, there are 3 projects in the Stream Typing Rule Group, 8 projects in the Type N Riparian Prescriptions Rule Group, 5 in the Type F Prescriptions Rule Group, 2 in the Unstable Slopes Rule Group, 1 in the Roads Rule Group, and 3 in the Wetlands Protection Rule Group. Of the 22 projects listed in the table below, 17 are ongoing and 5 are being scoped. Two ongoing Type N Riparian Prescriptions Rule Group projects include extension of monitoring for a limited set of functions (e.g., water temperature, sediment, windfall, and amphibian demographics) for time periods beyond those contained in the initial study phase. Specific project descriptions can be found on the pages listed below; however, reading the entire subsection describing a rule group is recommended to both better understand the programs and projects in that rule group and comprehend how they are integrated to answer critical research and monitoring questions.

Table ES-1. 2019–2021 Biennium CMER Projects

Project	Status	Page
Default Physical Criteria Assessment Project	Study Design Development	18
Fish/ Habitat Detection Using Environmental DNA (eDNA)	Lab analysis and final report writing	18
Evaluation of physical features that define fish habitat in forested landscapes (PHB)	Study Design being reviewed	19
Westside Type N Buffer Characteristics, Integrity, and Function (BCIF)	ISPR review process	28
Type N Experimental Buffer Treatment in Hard Rock Lithologies (Extended Monitoring)- Amphibian Demographics/Channel Metrics	ISPR review process	29
Type N Experimental Buffer Treatment in Hard Rock Lithologies (Extended Monitoring)- Temperature, Sediment, Vegetation, Litterfall	Report writing	29
Type N Experimental Buffer Treatment in Soft Rock Lithologies	Field implementation	30
Eastside Type N Riparian Effectiveness Project (ENREP)	Project Implementation	33
Extensive Riparian Status and Trends Monitoring – Temperature, Type F/N-Westside	ISPR review process	46
Extensive Riparian Status and Trends Monitoring- Vegetation, Type F/N- Westside and Eastside Projects	Pending funding availability	46
Riparian Characteristics and Shade Response Study	RFQQ out for study design development	47
Eastside Modeling Evaluation Project (EMEP)	ISPR review process	63
Eastside Timber Habitat Evaluation Project (ETHEP)	Drafting scoping document	63
Westside Type F Riparian Prescription Monitoring Project	Project Implementation	69
Eastside Type F Riparian Effectiveness Monitoring (BTO add-on)	ISPR review process	72
Riparian Hardwood Conversion Project	ISPR review process	74
Unstable Slope Criteria Project	ISPR review process	89
Deep-Seated Landslide Research Strategy Project	First project being scoped	90
Road Prescription-Scale Effectiveness Monitoring Project	Field implementation	99
Forested Wetlands Effectiveness Project	ISPR review process	116
Wetland Management Zone Effectiveness Monitoring	Scoping	119
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ACRONYMS AND ABBREVIATIONS

AMP	Adaptive Management Program
AMPA	Adaptive Management Program Administrator
BACI	Before After / Control Impact study
bapa	basal area per acre
BCIF	Westside Type N Buffer Characteristics, Integrity, and Function Project
BMP	Best Management Practice
Board	Forest Practices Board
BTO	Bull Trout Habitat Overlay
BTSAG	Bull Trout Scientific Advisory Group
CMER	Cooperative Monitoring, Evaluation and Research Committee
CMZ	Channel Migration Zone
CWA	Clean Water Act
DEM	Digital Elevation Model
DFC	Desired Future Condition (riparian)
DNR	Department of Natural Resources
Ecology	Washington State Department of Ecology (also WDOE)
eDNA	environmental DNA
EIS	Environmental Impact Statement
ELZ	Equipment Limitation Zone
EMEP	Eastside Modeling Evaluation Project
ENREP	Eastside Type N Riparian Evaluation Project
EPA	Environmental Protection Agency
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
ESA	Endangered Species Act – Federal law
ESICCS	Eastside Type F Channel Wood Characterization Study
ETHEP	Eastside Timber Habitat Evaluation Project
EWRAP	Eastern Washington Riparian Assessment Project
FFR	Forest & Fish Report
FHS	Eastside Type N Forest Hydrology Project
FPA	forest practices application
FPARS	Forest Practices Application Review System (FPARS)
FP HCP	Forest Practices Habitat Conservation Plan
GIS	Geographic Information System
HCP	Habitat Conservation Plan
hgm	hydrogeomorphic
HPA	Hydraulics Permit Approval – WDFW Permits
ISAG	In-Stream Scientific Advisory Group
ISPR	Independent Scientific Peer Review
IWT	Initial Writing Team
LCBAPA	Mean live conifer basal area per acre
LHZ	Landslide Hazard Zone
LWAG	Landscape and Wildlife Scientific Advisory Group
LWD	Large Woody debris – logs in streams-sometimes called LOD (Large Organic Debris)
MDT	Monitoring Design Team
NCASI	National Council for Air and Stream Improvement (timber industry research group)

NWIFC	Northwest Indian Fisheries Commission
OSU	Oregon State University
PIP	Perennial Initiation Point (Survey)
Policy	Timber, Fish and Wildlife Policy Committee
QA/QC	Quality Assurance / Quality Control
RCW	Revised Code of Washington – Statute, Laws
RFQQ	Request for Qualifications and Quotations
RIL	Rule-Identified Landforms
RLIP	Regional Unstable Landforms Identification Project
RMAP(s)	Road Maintenance and Abandonment Plans
RMZ	Riparian Management Zone
RSAG	Riparian Scientific Advisory Group
SAA	Stream-Associated Amphibians
SAG	Scientific Advisory Group, a sub-group of CMER
SAGE	Scientific Advisory Group- Eastside
SEPA	State Environmental Policy Act
TFW PC	Timber/Fish/Wildlife Policy Committee
TFW	Timber, Fish and Wildlife
THT	Timber Habitat Types
tpa	trees per acre
TWIG	Technical Writing Implementation Group
UMA	Upland Management Area
UPSAG	Upslope Scientific Advisory Group
USFWS	United States Fish and Wildlife Service
WAC	Washington Administrative Code – Rule
WARSEM	Washington State Road Surface Erosion Model
WAU	Watershed Administrative Unit
WDFW	Washington Department of Fish and Wildlife
WetSAG	Wetlands Scientific Advisory Group
WMZ	Wetland Management Zone

1.0 INTRODUCTION

The Washington State Forest Practices Board (Board) adopted an adaptive management program (Washington State Forest Practices Rules, WAC 222-12-045) in concurrence with the 1999 Forests and Fish Report (FFR) legislation (RCW 76.09.370). This legislation, guided primarily by the Washington Forests and Fish Report, formed the basis for the federally approved Washington Forest Practices Habitat Conservation Plan (FP HCP) in 2006. The purpose of the Forest Practices Adaptive Management Program (AMP) is to:

“provide science-based recommendations and technical information to assist the Board in determining if and when it is necessary or advisable to adjust rules and guidance for aquatic resources to achieve resource goals and objectives.”

To provide the science needed to support adaptive management, the Board established the Cooperative Monitoring, Evaluation and Research Committee (CMER). The Board appoints core CMER members and empowers CMER to implement research per guidelines established by the FFR and implemented under the FP HCP.

Currently, CMER is supported by six active scientific advisory groups (SAGs). One former SAG (the Bull Trout Scientific Advisory Group, or BTSAG) has been merged with another SAG (the Riparian Scientific Advisory Group [RSAG]). The SAGs consist of both core voting CMER members and additional scientific participants representing the various stakeholders of the forest practices rules. The purpose of the SAGs is to design and implement the research and monitoring prioritized by CMER. Each SAG focuses on specific aspects of the forest practices rules, according to their areas of scientific expertise. Table 1 provides a brief description of the SAGs.

Table 1. CMER Scientific Advisory Group Structure

Active Scientific Advisory Group	Acronym	Develops and Oversees Projects Related To:
In-Stream Scientific Advisory Group	ISAG	In-stream issues, including stream typing and fish passage.
Landscape-Wildlife Advisory Group	LWAG	Wildlife, including stream-associated amphibians
Riparian Scientific Advisory Group	RSAG	FP HCP riparian strategy
Scientific Advisory Group – Eastside	SAGE	Issues specific to eastside of the Cascade Mountains
Upland Processes Scientific Advisory Group	UPSAG	Roads, mass wasting, and channel processes
Wetlands Scientific Advisory Group	WetSAG	Wetland issues, including identification and protection
Inactive Scientific Advisory Group	Acronym	Develops and Oversees Projects Related To:
Bull Trout Scientific Advisory Group	BTSAG	Bull trout biology and the forest practices rules designed to maintain bull trout habitat. In 2008, this SAG was merged with RSAG.

In 2012, the Forest Practices Board directed CMER to conduct a pilot process to test if the application of a Lean approach would result in increasing the efficiency and reducing the time of

developing the scoping and study design phases of CMER projects. The pilot process replaced the role of the SAGs in study design with smaller Initial Writing Teams (IWTs) and Technical Writing and Implementation Groups (TWIGs). The premise was that smaller groups of scientists and technical experts along with fewer review steps would be more efficient in developing research study designs. The pilot program included five projects. By late 2018, three of the five projects have been completed (study designs approved); the Eastside Type N Riparian Effectiveness Project, the Roads Prescription-Scale Effectiveness Monitoring Project, and the Westside Type F Riparian Prescription Monitoring Project. The study designs of the remaining two projects (Unstable Slopes Criteria and Forested Wetlands Effectiveness) are in ISPR review. Following completion of scoping and study design, project implementation will transition back into CMER's process outlined in the PSM. The revised PSM incorporates many parts of the Lean process.

The goal of the CMER Work Plan is to present an integrated strategy for conducting research and monitoring that will provide credible scientific information to support the Forest Practices Adaptive Management Program. The purpose of the Work Plan is to inform CMER participants, TFW Policy Committee (Policy) constituents, the Board, and interested public about CMER activities. The plan is now revised each biennium in response to research findings of CMER or the scientific community, changing technology, changes in policy objectives, and funding. This version supersedes the Biennial 2017-2019 CMER Work Plan.

The remainder of the document describes the CMER research and monitoring program as well as CMER recommendations for the Work Plan. Section 2.0 describes the organization of the CMER research and monitoring strategy and the approaches used to address research and monitoring questions relevant to Forest Practices Adaptive Management. Section 3.0 describes CMER procedures for prioritizing programs (topic areas) and projects. Section 4.0 presents the Board-approved CMER Work Plan, including project prioritization, scheduling, and budget allocations. Section 5.0 describes the CMER research and monitoring program, with program and project descriptions organized by rule group. Appendix A contains the table titled "CMER Projects, Objectives, and Targets," which links specific resource objectives and key riparian functions (e.g., in-stream temperature, large woody debris, litter, sediment, etc.) to CMER projects, organized by programs within rule groups.

2.0 CMER RESEARCH AND MONITORING STRATEGY

The CMER Work Plan consists of 101 projects (including multiple phases of a given project) covering a range of topics related to the forest practices rules. See Appendix A: CMER Projects, Objectives, and Targets for a listing of projects. These projects are at various stages of development or completion. Approximately 44 projects are complete and 22 projects are ongoing or to be initiated (i.e., undergoing study design development or currently being implemented or reviewed). The Work Plan is organized hierarchically into rule groups, programs, and projects, as described below.

2.1 FOREST PRACTICES RULE GROUPS

At the highest level, the CMER Work Plan is organized by forest practices “rule groups.” A rule group is a set of forest practices rules relating either to a particular resource, such as wetlands or fish-bearing streams, or to a particular type of forest practice, such as road construction and maintenance. The ten rule groups are shown in Table 2. Although the rule group divisions are somewhat arbitrary, they provide a useful framework for developing a research and monitoring strategy.

Table 2. Description of the Rule Groups Used as a Framework for the CMER Work Plan

Rule Group	Description	Rule Context
Stream Typing	Prescriptions for identifying fish-bearing and non-fish-bearing streams	WAC 222-16
Type N Riparian Prescriptions	Prescriptions for identifying non-fish-bearing streams and management of adjacent riparian areas	WAC 222-30
Type F Riparian Prescriptions	Prescriptions for managing fish-bearing streams and adjacent riparian areas	WAC 222-30
Channel Migration Zone	Prescriptions for delineating channel migration zones	WAC 222-30
Unstable Slopes	Prescriptions for identifying and managing areas potentially susceptible to mass wasting/erosion processes	WAC 222-24, -30
Roads	Prescriptions for identifying and managing erosion and runoff from forest roads	WAC 222-24
Fish Passage	Prescriptions for identifying and preventing fish passage barriers	WAC 222-24
Pesticides	Prescriptions for application of forest chemicals	WAC 222-38
Wetlands Protection	Prescriptions for identifying and managing wetlands	WAC 222-30
Wildlife	Prescriptions for protecting wildlife	WAC 222-10, -30

2.2 RESEARCH AND MONITORING PROGRAMS

Critical research and monitoring questions are identified at the rule group level to address information gaps related to scientific uncertainty and resource risk associated with the rules. Once these research and monitoring questions are identified, programs are developed to address them. Programs consist of one or more related projects designed to strategically address a set of

related scientific questions. The CMER Work Plan lists 34 programs containing multiple projects at various stages of development.

CMER research and monitoring programs utilize a variety of approaches to address critical questions at different spatial and temporal scales. The Work Plan incorporates an integrated research and monitoring approach as recommended by the Monitoring Design Team (MDT) Report (MDT 2002). This includes **effectiveness monitoring** to evaluate prescription effectiveness at the site or landscape scale; **extensive status and trends monitoring** to evaluate status and trends of resource condition indicators across FP HCP lands; and **intensive/validation monitoring** to identify causal relationships and document cumulative effects at the watershed scale. CMER also conducts **rule implementation tool projects** to develop, refine, or validate science-based management tools necessary for implementing the rule(s) (e.g., predictive models, protocols, etc.) or for establishing performance standards. These four approaches are summarized below:

Effectiveness Monitoring:

Effectiveness monitoring programs are designed to evaluate the performance of the prescriptions in achieving resource goals and objectives. Effectiveness monitoring differs from the other approaches in that it is directed at prescription effectiveness, primarily at the site scale.

Extensive Status and Trends Monitoring:

Extensive monitoring programs evaluate the current status of key watershed input processes and habitat condition indicators across FP HCP lands, and document trends in these indicators over time as the forest practices prescriptions are applied across the landscape. Extensive monitoring provides a statewide, landscape-scale assessment of the effectiveness of forest practices rules to attain specific performance targets on FP HCP lands. Extensive monitoring is designed to provide report-card-type measures of rule effectiveness (i.e., to what extent are FP HCP performance targets and resource condition objectives being achieved on a landscape scale over time). These measures can then be used to determine the degree to which progress is meeting expectations.

Intensive Monitoring (Cumulative Effects) and Validation Monitoring:

Intensive monitoring is designed to evaluate cumulative effects of multiple forest practices at the watershed scale. Analysis of these effects improves our understanding of the causal relationships and effects of forest practices rules on aquatic resources. Intensive monitoring integrates the effects of multiple management actions over space and through time within the watershed. Evaluation of monitoring data requires an understanding of the effects of individual actions on a site, and the interaction of those responses through the system. Evaluating biological responses is similarly complicated, requiring an understanding of (1) how various management actions and site conditions interact to affect habitat conditions, and (2) how aquatic resources respond to these habitat changes. Taken together, these evaluations will address the adaptive management program's objectives for validation monitoring. This sophisticated level of understanding of physical and biological systems can be achieved with an intensive, integrated monitoring effort.

Rule Implementation Tool Development:

Rule implementation tool projects are designed to develop, refine or validate tools used to implement the forest practices rules.

1. Methodology Tool Development Projects develop, test, or refine protocols, models, and guidance that are designed to identify and locate management features specified in the forest practices rules, such as the Last Fish/Habitat Model, landslide screens, Np/Ns breaks and sensitive sites, or the achievement of specified stand conditions (e.g., the desired future condition [DFC] basal area target).
2. Target Verification Projects consist of studies designed to verify assumptions and targets developed during FFR negotiations that authors identified as having a weak scientific foundation (such as the DFC basal area targets for Type F streams), or that have been established in the Methodology Tool Development Projects.

Rule implementation tools differ from tools needed to implement a specific monitoring program or project. For example, the Road Surface Erosion Model is a tool necessary to implement several projects in the Roads Rule Group Effectiveness Monitoring Program. Monitoring implementation tools are typically included with the effectiveness monitoring programs.

3.0 PRIORITIZATION OF CMER PROJECTS

3.1 CMER PRIORITIZATION PROCESS

CMER's long-term goal is to address the full range of critical questions identified in the CMER Work Plan, while recognizing that availability of funding, time, and human resources will limit the number of projects that can be developed and implemented each year. In order to focus effort and resources on the most critical issues for Forest Practices Adaptive Management, CMER prioritizes proposals for research and monitoring at both the program and project levels. Establishing priorities allows CMER to pursue the most pressing issues in an orderly manner.

The first step in CMER's prioritization process was to rank the relative importance of proposed programs in meeting FP HCP goals and objectives. CMER projects have since gone through several rankings in response to budget priorities and changes in workload allocation. The program prioritization strategy was to:

1. Rank effectiveness/validation monitoring and extensive status and trend monitoring programs on the basis of scientific uncertainty and risk to aquatic resources.
2. Evaluate the importance of rule implementation tool programs by consulting with DNR and then establish priorities on a project basis.
3. Defer integration of the intensive monitoring program into the CMER Work Plan until further scoping and coordination with other efforts occurs.

CMER members attending the December 19, 2002 CMER meeting provided an initial ranking of programs for effectiveness monitoring and extensive status and trend monitoring. The group evaluated each program by asking two questions:

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

These questions were selected as the criteria to rank programs, because the need for scientific information to inform adaptive management is most critical when there is a high level of scientific uncertainty concerning the interaction between forest practices, watershed processes, and aquatic resources; and where the sensitivity of the processes and aquatic resources to potential disturbance creates the greatest risk of resource impacts.

Uncertainty is a measure of confidence in the science underlying a rule, including the causal relationships providing the conceptual foundation for the prescriptions and assumptions about prescription effectiveness and resource response when the prescription is applied on the ground. High uncertainty (low certainty) indicates that little is known about the underlying science and the rule is likely based on assumptions that have not been validated. It may also indicate that the prescription is untested and performance under field conditions is unknown. Low uncertainty (high certainty) indicates that the science underlying the rule is well known and accepted or that the prescription (or similar treatment) has been evaluated under similar conditions. Risk is a

measure of the potential for detrimental impacts to aquatic resources, including fish, stream-associated amphibians, and water quality. High risk indicates the activity covered by the prescription has a greater potential to affect aquatic resources due to its magnitude, frequency, or direct linkage to the resource. Low risk indicates the rule has less potential to affect resources.

CMER averaged individual scores to obtain mean risk and uncertainty scores for each program. These were multiplied to get a combined score that was used to rank the programs (Table 3). Policy accepted the rankings and instructed CMER to use them to prioritize projects on effectiveness/validation and extensive status and trend monitoring.

Table 3. Rankings for Effectiveness Monitoring and Extensive Status and Trends Monitoring Programs (completed December 19, 2002).

Program Title	Overall Ranking	Uncertainty		Risk	
		Mean	Rank	Mean	Rank
Effectiveness/Validation Programs					
Type N Buffer Characteristics, Integrity Function	1	4.4	1	3.9	1
Eastside Type F Desired Future Range and Target	2	4.2	2	3.8	2
Type N Amphibian Response	3	4.2	2	3.7	3
Road Sub-Basin-Scale Effectiveness Monitoring	4	3.4	5	3.4	4
Type F Statewide Prescription Monitoring	5	3.2	7	3.1	6
Mass Wasting Effectiveness Monitoring	6	3.2	6	2.9	8
Eastside (BTO) Temperature	7	3.0	9	3.2	5
Wetlands Revegetation Effectiveness	8	3.5	4	2.7	11
Road Prescription-Scale Effectiveness Monitoring	9	2.6	14	3.1	6
Hardwood Conversion	10	3.0	8	2.6	12
Wetlands Mitigation	11	2.8	11	2.7	10
Fish Passage Effectiveness Monitoring	12	2.6	14	2.9	9
Wildlife Program	13	2.9	10	2.4	14
Wetland Management Zone Effectiveness Monitoring	14	2.8	12	2.5	13
CMZ Effectiveness Monitoring	15	2.7	13	2.1	15
Forest Chemicals	16	2.0	16	2.1	16
Extensive Status and Trends Monitoring Programs					
Extensive Riparian Monitoring	1	3.5	2	3.5	1
Extensive Mass Wasting Monitoring	2	3.7	1	2.9	3
Extensive Fish Passage Monitoring	3	3.1	3	3.1	2

CMER used program rankings shown in Table 3, as well as information from DNR consultations on the relative importance of rule implementation tool programs, to provide guidance to the SAGs on where to focus time and energy in scoping and developing programs and projects. Since 2002, when Table 3 was developed, some program titles within the Work Plan have been changed to clarify research strategies within the rule group and program structure. However, the basic prioritization has not changed.

The second stage of prioritization occurs at the project level in order for CMER to make recommendations to Policy concerning scheduling and allocation of funding among the projects developed by the SAGs. Projects are prioritized based on (1) the extent to which they are deemed essential to inform the Forest Practices Adaptive Management Program, (2) input from DNR on their importance in improving implementation of forest practices rules, (3) status of projects relative to Policy decisions on adaptive management, and (4) the need to follow through and complete work already underway. CMER and the Adaptive Management Program Administrator (AMPA) develop each fiscal year's proposed projects based on those criteria.

3.2 POLICY PRIORITIZATION

Policy is responsible for reviewing and approving each CMER Work Plan before submitting it to the Board for approval. Policy is also responsible for providing guidance to CMER on project prioritization, consistent with directions outlined in WAC 222-12-045 and in Section 22, "Guidelines for Adaptive Management Program," in the Forest Practices Board Manual.

Policy's process for prioritizing projects may not always be consistent with CMER's process regarding scientific uncertainty and potential risk to aquatic resources. While Policy has in past years approved CMER's Work Plan priorities, Policy must also consider annual/biennial state budget fluctuations and other factors associated with meeting milestones in accordance with the FP HCP and/or Clean Water Act (CWA) assurances.

In 2009, due to delays in meeting deadlines for determining if forest practices rules met CWA assurances, Policy decided to prioritize CMER projects according to whether they were answering critical questions associated with the CWA assurances. Due to substantial budget shortfalls expected in 2010 and beyond, Policy directed CMER to implement only ongoing projects in FY 2010, and delay new projects until adequate funding was available. Active projects in the current CMER Work Plan reflect these priorities, based on Policy's input concerning CMER's annual budget and the CWA.

The Washington State Department of Ecology (Ecology) is charged with overseeing the CWA assurances milestones. Ecology has developed a document outlining specific CMER projects targeted at answering critical questions associated with the CWA. Ecology's document also lists timelines and anticipated completion dates for those CMER projects.

In 2012, in response to a threat of a lawsuit, a settlement was reached that further affected CMER's project priorities. This settlement agreement included a project work schedule (CMER Master Project Schedule) that can be changed with consensus by the full Policy committee and is approved annually by the Board. In general, the settlement work schedule maintained CMER's prior priorities, with emphasis on CWA projects.

4.0 2019–2021 BIENNIUM CMER WORK PLAN PROJECTS AND BUDGETS

Table 4 presents information on ongoing and new CMER projects for the 2019–2021 biennium, organized by rule group. Project budgets are categorized as either Tier 1 or Tier 2 projects. Tier 1 projects are those projects CMER is certain to implement in 2019–2021. Tier 2 projects are those projects that CMER may initiate in 2019–2021, but that have not yet been approved by CMER and/or Policy and may still require additional work on study design, review, and/or accurate costs.

Table 4. 2019–2021 Biennium CMER Projects and Budget

	Tier 1	Tier 2
Stream Typing Rule Group		
Default Physical Criteria Assessment Project	0	
Fish/Habitat Detection Using eDNA	0	
Evaluation of physical features that define fish habitat in forested landscapes (PHB)	1,990,452	
Type N Rule Group		
Westside Type N Buffer Characteristics, Integrity, & Function (BCIF)	0	
Type N Experimental Buffer Treatment Project in Hard Rock Lithologies – Amphibian Demographics/Channel Metrics	0	
Type N Experimental Buffer Treatment in Hard Rock Lithologies (Temperature, Sediment, Vegetation, Litterfall)	0	
Type N Experimental Buffer Treatment in Soft Rock Lithologies	255,000	
Eastside Type N Riparian Effectiveness Project (ENREP)	1,256,205	
Extensive Riparian Status and Trends Monitoring – Temperature, Type F/N -Westside	0	
Extensive Riparian Status and Trends Monitoring- Vegetation, Type F/N- Westside and Eastside	15,000	
Riparian Characteristics and Shade Response Study	0	
Type F Rule Group		
Eastside Modeling Evaluation Project (EMEP)	0	
Eastside Timber Habitat Evaluation (ETHEP)	0	
Westside Type F Riparian Prescription Monitoring Project	195,000	
Eastside Type F Riparian Effectiveness Monitoring (BTO add-on)	0	
Riparian Hardwood Conversion Project	0	
Unstable Slopes Rule Group		
Unstable Slope Criteria Project	132,000	
Deep-Seated Landslide Research Strategy Project	200,000	
Roads Rule Group		
Road Prescription-Scale Effectiveness Monitoring Project	705,000	

	Tier 1	Tier 2
Wetlands Rule Group		
Forested Wetlands Effectiveness Project	465,000	
Wetland Management Zone Effectiveness Monitoring	50,000	
Wetland Intrinsic Potential Tool (WIP)	0	
Subtotal Projects (by Tier 1 and Tier 2)	\$5,263,657	0
Total Project (both Tier 1 and Tier 2)	\$5,263,657	
Project Staffing		
CMER Principal Investigator Staff at NWIFC (4, including Eastside)	1,354,862	
Project Support		
Contingency Fund for Active Projects	0	
Policy Information/Analysis Support or Grant Writer or Facilitation/Mediation	150,000	
CMER Project Managers (4)	620,000	
TFW Policy Committee Technical Support	0	
Program Administration		
AMP Administrator and Contract Specialist / CMER Coordinator	523,000	
Independent Science Review Panel	135,000	
CMER Conference	5,000	
Technical Editor	15,000	
Subtotal Staffing, Support, and Administration	\$2,802,862	
Total 2019–2021 Biennium Expenditures for Projects, Staffing, Support, and Administration (by Tier 1 and Tier 2)	\$8,066,519	0

5.0 RULE GROUP DESCRIPTIONS AND MONITORING STRATEGIES

This portion of the Work Plan includes research and monitoring strategies for each forest practices rule group. Information on each rule group is presented separately, in a similar format. The “Rule Overview and Intent” briefly describes the rule; the “Rule Group Resource Objectives and Performance Targets” lists the objectives and targets from Schedule L-1, adopted by the Board in 2001; and the “Rule Group Strategy” describes the programs within a given rule group and how they work together to answer the rule group critical questions.

The programs for each rule group are organized by approach (i.e., rule implementation tools, effectiveness monitoring, extensive monitoring, and intensive monitoring). The “Program Strategy” section describes how the specific research and monitoring projects work together to answer the rule group’s specific critical questions. Some programs include additional sub-questions to the rule group critical questions. These questions are identified in tables under each program strategy. The description, goals and status of each project are also described under each program.

Because of the complexity of the riparian strategy, it is divided into four rule groups: Stream Typing Rule Group (Type F/N delineation), Type N Rule Group (non-fish-bearing streams), Type F Rule Group (fish-bearing streams and associated wetlands), and Channel Migration Zone Rule Group. The remaining rule groups are Unstable Slopes, Roads, Fish Passage, Pesticides, Wetlands Protection, and Wildlife. The last section in this chapter describes the intensive monitoring/cumulative effects program, which addresses cumulative effects and validation of performance targets/resource objectives.

5.1 STREAM TYPING RULE GROUP

5.1.1 Rule Overview and Intent

The Forest Practices Board adopted rules delineating waters of the state into three categories, Type S waters (shorelines of the state), Type F waters (fish-bearing), and Type N waters (non-fish-bearing). Distinguishing the upstream limits of Type F (or S) waters is particularly important, because presence or absence of fish and fish habitat in streams creates differences in the aquatic resources of concern, the forest management strategies, and the prescriptions applied.

Prior to the rules associated with the Forests and Fish Report (1999), stream typing was based on a set of physical and beneficial-use criteria. Due to questions about the accuracy of this system, the forest practices rules require development of a statewide stream map using a multiparameter, field-verified, GIS logistic regression model to identify the upper extent of Type F streams.

The intent of the Stream Typing Rule Group is to develop a statewide stream typing map, described as follows in the forest practices rules:

“The department will prepare water type maps showing the location of Type S, F, and N (Np and Ns) Waters within the forested areas of the state. The maps will be based on a multiparameter, field-verified geographic information system (GIS) logistic regression model. The multiparameter model will be designed to identify fish habitat by using geomorphic parameters such as basin size, gradient, elevation and other indicators. The modeling process shall be designed to achieve a level of statistical accuracy of 95% in separating fish habitat streams and nonfish habitat streams. Furthermore, the demarcation of fish and nonfish habitat waters shall be equally likely to over and under estimate the presence of fish habitat. These maps shall be referred to as ‘fish habitat water typing maps’ and shall, when completed, be available for public inspection at region offices of the department. Fish habitat water type maps will be updated every five years where necessary to better reflect observed, in-field conditions.”

Until the fish habitat water type maps described above are adopted by the Board, WAC 222-16-031—the Interim Water Typing System—will continue to be used.

5.1.2 Rule Group Resource Objectives and Performance Targets

Resource Objectives:

- Streams and their associated wetlands should be typed to include fish habitat. Fish habitat is defined in the forest practices rules to mean “habitat, which is used by fish at any life stage at any time of the year, including potential habitat likely to be used by fish, which could be recovered by restoration or management, and including off-channel habitat.”
- The rules also direct that DNR will prepare water typing maps, which will be based on a multiparameter, field-verified, peer-reviewed, geographic information system (GIS) logistic regression model. The multiparameter model will be designed to identify fish

habitat by using geomorphic parameters such as basin size, gradient, elevation, and other indicators.

Performance Target:

- The predictive fish habitat model should have a statistical accuracy of +/- 5% with the line of demarcation between fish and non-fish-habitat waters equally likely to be over- and under inclusive.

5.1.3 Rule Group Strategy

The Forests and Fish Report (FFR) provided rationale and guidance for a strategy related to the stream typing system. The FFR indicated that the current approach to stream typing was not adequately precise, defined a modeling approach for developing a new map, and set specifications for the accuracy of the model. It also called for development of a field protocol for inclusion in the Forest Practices Board Manual.

The In-Stream Scientific Advisory Group (ISAG) was tasked in 2003 with developing and validating a GIS-based model to predict the upstream extent of fish habitat (Table 5). This task fell under the Stream Typing Program, which is categorized as a rule tool.

Table 5. Stream Typing Rule Group Critical Questions and Programs

Rule Group Critical Questions	Program Name	Task Type	SAG
How can the line demarcating fish- and non-fish-habitat waters be accurately identified?	Stream Typing Program	Rule Tool	ISAG
To what extent do current default physical criteria for Type-F waters, considering potential geographic differences, accurately identify the upstream extent of (detected) fish presence (all species) and/or fish habitat?	Stream Typing Program	Rule Tool	ISAG
Can alternative (to current) default physical criteria for Type-F waters, considering potential geographic differences, be identified that would more accurately and consistently identify the upstream extent of (detected) fish presence (all species) and/or fish habitat?	Stream Typing Program	Rule Tool	ISAG
Are there sustained gradient or stream size thresholds alone that serve as default physical criteria?	Stream Typing Program	Rule Tool	ISAG
How well and under what conditions does eDNA sampling accurately and consistently identify the upstream extent of fish presence, abundance, and/or fish habitat?	Stream Typing Program	Rule Tool	ISAG

Rule Group Critical Questions	Program Name	Task Type	SAG
To what extent can LiDAR be used with the current fish habitat model to develop a new model for predicting the upstream extent of fish habitat sufficient to meet the requirements of the Forest and Fish Agreement?	Stream Typing Program	Rule Tool	ISAG
What constitutes a 'permanent natural barrier' (PNB) to different species of fish at different life stages?	Stream Typing Program	Rule Tool	ISAG
To what extent does the current water typing survey window capture seasonal and annual variability in fish distribution considering potential geographic differences?	Stream Typing Program	Rule Tool	ISAG
How do different fish species use seasonal habitats (timing, frequency, duration)?	Stream Typing Program	Rule Tool	ISAG
How does the upstream extent of fish use at individual sites vary seasonally and annually?	Stream Typing Program	Rule Tool	ISAG
How does the delineation of the upstream extent of fish habitat change seasonally?	Stream Typing Program	Rule Tool	ISAG
What are the most appropriate/effective methods (include electrofishing) for documenting fish presence/absence in lotic habitats?	Stream Typing Program	Rule Tool	ISAG
How do species interactions influence the upper extent of fish habitat?	Stream Typing Program	Rule Tool	ISAG
What, if any, biological indicators can be effectively used to help identify fish presence and/or fish habitat?	Stream Typing Program	Rule Tool	ISAG
Has the upstream extent of fish distribution been affected in managed forests?	Stream Typing Program	Extensive Status and Trends Monitoring	ISAG
To what extent do anthropogenic blockages downstream affect fish occupancy in habitats at/near the upstream extent of fish distribution?	Stream Typing Program	Extensive Status and Trends Monitoring	ISAG
To what extent do depressed fish stocks influence electrofishing detections, fish distribution, and habitat identification?	Stream Typing Program	Extensive Status and Trends Monitoring	ISAG
What are the rates of fish recolonization and habitat recovery in systems impacted by natural disturbance (debris flow, mass wasting, fire, etc.), and what are the variables that influence those rates?	Stream Typing Program	Extensive Status and Trends Monitoring	ISAG
To what extent could altered flow regimes, caused by climate change, effect fish distributions, fish populations and/or fish habitat?	Stream Typing Program	Extensive Status and Trends Monitoring	ISAG

5.1.4 Stream Typing Program (Rule Tool)

5.1.4.1 Program Strategy

The purpose of the Stream Typing (Rule Tool) Program is to identify projects that will refine and/or validate the water typing process, specifically as the process relates to identifying the regulatory Type-F/N break.

Table 6. Stream Typing Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
How can the line demarcating fish- and non-fish-habitat waters be accurately identified?	Last Fish/Habitat Prediction Model Development Project
	Annual/Seasonal Variability Project
	Last Fish/Habitat Prediction Model Field Performance Project
To what extent do current default physical criteria for Type-F waters, considering potential geographic differences, accurately identify the upstream extent of (detected) fish presence (all species) and/or fish habitat?	Default Physical Criteria Assessment Project
Can alternative (to current) default physical criteria for Type-F waters, considering potential geographic differences, be identified that would more accurately and consistently identify the upstream extent of (detected) fish presence (all species) and/or fish habitat?	
Are there sustained gradient or stream size thresholds alone that serve as default physical criteria?	
How well and under what conditions does eDNA sampling accurately and consistently identify the upstream extent of fish presence, abundance, and/or fish habitat?	Fish/Habitat Detection Using eDNA Project
To what extent can LiDAR be used with the current fish habitat model to develop a new model for predicting the upstream extent of fish habitat sufficient to meet the requirements of the Forest and Fish Agreement?	No projects developed at this time.
What constitutes a ‘permanent natural barrier’ (PNB) to different species of fish at different life stages?	No projects developed at this time.
To what extent does the current water typing survey window capture seasonal and annual variability in fish distribution considering potential geographic differences?	No projects developed at this time.

Rule Group Critical Questions	Project Names
How do different fish species use seasonal habitats (timing, frequency, duration)?	No projects developed at this time.
How does the upstream extent of fish use at individual sites vary seasonally and annually?	No projects developed at this time.
How does the delineation of the upstream extent of fish habitat change seasonally?	No projects developed at this time.
What are the most appropriate/effective methods (include electrofishing) for documenting fish presence/absence in lotic habitats?	No projects developed at this time.
How do species interactions influence the upper extent of fish habitat?	No projects developed at this time.
What, if any, biological indicators can be effectively used to help identify fish presence and/or fish habitat?	No projects developed at this time.

5.1.4.2 Last Fish/Habitat Prediction Model Development Project

Description:

A GIS-based logistic regression model was developed, associating geomorphic parameters (i.e., basin size, gradient, elevation, and other indicators) with last fish points to determine and map the upstream boundary of Type F (fish-habitat) streams. The forest practices rules specified that once the model was developed, with an accuracy of 95%, the resulting map would be used as rule.

Status:

The model was completed in 2006. The model results did not achieve the target accuracy of 95%. In response, DNR developed new water type maps based on the model in March 2006, but the maps are only to be used as a starting point for delineating fish habitat, not as rule. The DNR maps are currently used as part of the forest practices application process in combination with the Interim Water Typing System (WAC 222-16-031). This water typing rule specifies physical criteria for identifying fish-bearing streams (channel width, channel gradient, and contributing basin area), unless overridden by a protocol survey for determining fish use.

Based on the results of this project, and the CMER recommendation that further efforts to improve the model would likely not increase its level of accuracy, Policy decided that additional CMER work on the model was not necessary at this time. Policy has identified stream typing as a task to be resolved on their Policy work list.

5.1.4.3 Annual/Seasonal Variability Project

Description:

The Annual/Seasonal Variability Project was conducted to help validate the Last Fish/Habitat Model. The project goal was to assess whether the upstream extent of fish distribution in eastern Washington varies annually and/or by season. The study sampled for changes in fish movement

at both “terminal” (midstream) and “lateral” (tributary junctions) fish distribution points. Key questions related to this project include the following:

- Does the upstream extent of fish distribution vary with seasons?
- What is the magnitude of the variation in the upstream extent of fish distribution between seasons?
- Are there trends in fish movement upstream or downstream related to season or year?
- What is the magnitude of observed variability?
- Is there a drought impact on fish distribution?

Annual variability estimates were obtained from two years of summer data, collected during the low-flow period (2001–2002). Project results indicated a range of observed annual variability from 943 meters (m) downstream to 400 m upstream of terminal last fish points (n=172). Last fish points did not change from 2001 to 2002 at 51 of 172 locations; and, when movement occurred (in either direction), the last fish point shifted by 25 m or less at 61 of the 172 terminal points. Last fish points shifted by more than 100 m in either direction at 17 of 172 locations, and moved more than 200 m at only 8 locations. Last fish points shifted by more than 500 m at only 3 locations; all of these were downstream movements. For all last fish points in 2002 (terminal and lateral combined), 94% of last fish points shifted by 50 m or less. Of 309 terminal and lateral sites resurveyed in 2002, last fish points did not change at 150 sites.

Seasonal/annual variability estimates were obtained in the summer and fall of 2005; these estimates were compared, to the extent possible, with the annual variability estimates from 2000–2002. Project results showed similar differences in the seasonal variability of fish movement between years, with the majority occurring within 100 m of the original survey. Seasonal variability results included the average upstream/downstream movements, as well as trends in upstream/downstream movement.

The project also assessed the sampling error to help determine the degree to which the field survey protocol (using a single-pass electroshocking survey) was likely to detect the “last fish” at the maximum upstream extent of fish distribution.

Status:

Work began in 2000–2001 to identify annual and seasonal variability of last fish points and also to assess sampling error. Additional field survey data were collected in 2002 and 2003. In 2005, a seasonal variability study was completed and a final report was provided in the spring of 2006. This study was conducted as a subproject to inform the Last Fish/Habitat Prediction Model Field Performance Project. However, since the model did not meet the required target accuracy (95%), Policy decided that additional CMER work on annual and seasonal variability was not necessary at this time.

5.1.4.4 Last Fish/Habitat Prediction Model Field Performance Project

Description:

The objective of the Last Fish/Habitat Prediction Model Field Performance Project was to assess the performance of the model predictions in western Washington. ISAG developed a study design, which was approved by CMER, and a pilot field test of the study design was performed. This test primarily included resurveying a randomized sample of last fish points and comparing those points to the predicted model point. If the field-identified last fish point occurred upstream of the model-predicted point, the prediction was considered to be an underestimation of fish habitat; if the field-identified last fish point occurred downstream of the model-predicted point, the prediction was considered to be an overestimation of fish habitat. ISAG compiled existing information related to water typing and presented this, along with the model performance assessment's study design and pilot field effort results, to the Policy Subgroup on Water Typing.

Status:

Because the model did not achieve the level of accuracy specified in the forest practices rules (95%), and because further work was unlikely to improve upon that level of accuracy, Policy decided that no additional CMER work was necessary at this time.

5.1.4.5 Default Physical Criteria Assessment Project

Description:

The accuracy of the current default physical criteria has not been validated, and research describing the physical characteristic at the upstream extent of fish distribution is limited. Also, protocol survey practitioners have frequently observed differences between the upstream extent of (detected) fish presence and the default physical criteria. The magnitude of difference between the last fish and the default physicals has not been assessed. Therefore, research is needed to (1) compare and quantify how the current default physical criteria correspond to the uppermost point of fish presence and potential fish habitat; (2) determine the physical characteristics of habitat likely to be used by fish, and (3) determine if sustained gradient or stream size thresholds alone serve as default physical criteria.

Status:

The Board initiated in November 2016 the development of a study design to evaluate default physicals that will be provided to the Board in May 2019. The Contractor will present work at the ISAG meeting in January 2019. ISAG may further partner with the Contractor pending Board approval at the February 2019 Board meeting.

5.1.4.6 Fish/Habitat Detection Using Environmental DNA (eDNA)

Description:

Genetic material shed by all living organisms and found in the environment is referred to as environmental DNA or eDNA. In the last two decades, noninvasive genetic sampling has been recognized as an effective conservation and management tool for monitoring the presence and distribution of specific species and to assist in quantifying biodiversity within a specific environmental system. Environmental DNA sampling methods are being developed that may contribute to more accurate demarcation between fish- and non-fish-habitat waters.

Guidelines for the application of eDNA sampling methods and assays need to be established to assure consistent application of this tool for the detection and monitoring of aquatic species across FP HCP lands. Some of the more critical methodology considerations include sampling protocols and study design that prevent contamination in the field and laboratory, choosing the most appropriate sample analysis method (e.g., qPCR probe for specific species or metabarcoding with an array designed for multiple species), minimum reporting guidelines, natural inhibitors for DNA extraction and amplification, and the validation of assays. Also paramount is the consideration of the limitations on inference including temporal and spatial processes, correlation of eDNA with abundance, probability of uncertainty of results, and potential for allochthonous DNA.

Recent and ongoing projects are establishing the empirical and experimental data needed to address these concerns. There is a rapidly growing body of research and methodology reports concerning the application of eDNA analysis that should be consulted as CMER moves forward in the development of projects aimed to test eDNA as a Stream Typing tool. Some key questions that can be answered by literature review and collaborative projects include the following:

- How does eDNA sampling compare with electrofishing for overall effectiveness, costs, and accuracy for identifying fish presence?
- What sampling conditions accurately and consistently identify fish presence?
- How well could eDNA sampling be used to better characterize fish presence as it relates to fish habitat?

Status:

A collaborative field project labeled “Fish/Habitat Detection Using eDNA Project” was approved by CMER in the spring of 2018. In this study, streams were surveyed for fish detection using both electrofishing and eDNA techniques. The fieldwork was completed in 2018 and the laboratory and analysis work are due for completion and final report in 2019.

5.1.4.7 Evaluation of physical features that define fish habitat in forested landscapes across Washington State (PHB)

Description:

The purpose of the proposed study is to determine which combinations of gradient, channel width, barriers to migration, and other physical habitat and geomorphic conditions can be used to most accurately define potential habitat breaks (PHBs). Additionally, this study is intended to evaluate how PHBs proposed by the Washington Forest Practice Board may vary across ecoregions, seasons, and years. The study will be conducted across three years and three seasons (spring, summer, and fall) at 35 sites in each of seven forested EPA Level III ecoregions in Washington State. A total of 245 randomly selected sites from approved water type modification forms on the DNR hydro layer will be surveyed repeatedly every year for three years. Upstream fish distribution limits (i.e., EOF locations) will be determined during each season at each site using electrofishing. During the second year, 82 sites will be sampled seasonally to allow comparison between electrofishing results and eDNA samples. Data from this study will be analyzed to determine the combinations of gradient, channel width, and other geomorphic

features that best define PHBs, fish habitat, and whether these vary by ecoregion, season, or across years. The results of this study will be used to evaluate the effectiveness of PHB criteria in determining the regulatory break between fish (Type F) and non-fish bearing (Type N) waters.

Status:

The study design for this project has been reviewed by stakeholders, approved by ISPR, and delivered to the Board in November 2018. Currently, the study design is being reviewed by ISAG and CMER and it is expected to start in the spring of 2019.

5.1.5 Stream Typing Program (Extensive Status and Trends Monitoring)

5.1.5.1 Program Strategy

The purpose of the Stream Typing (Extensive Status and Trends Monitoring) Program is to identify projects for evaluating the current status of key watershed processes and/or habitat conditions that relate to the water typing at the landscape scale.

Table 7. Stream Typing Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
Has the upstream extent of fish distribution been affected in managed forests?	Recoverable/Restorable Fish Habitat Project
What type, and how much, fish habitat has been restored and recovered through forest management practices and to what degree has it affected fish distribution and abundance?	Recoverable/Restorable Fish Habitat Project
To what extent do anthropogenic blockages downstream affect fish occupancy in habitats at/near the upstream extent of fish distribution?	No projects developed at this time.
To what extent do depressed fish stocks influence electrofishing detections, fish distribution, and habitat identification?	No projects developed at this time.
What are the rates of fish recolonization and habitat recovery in systems impacted by natural disturbance (debris flow, mass wasting, fire, etc.), and what are the variables that influence those rates?	No projects developed at this time.
To what extent could altered flow regimes, caused by climate change, affect fish distributions, fish populations, and/or fish habitat?	No projects developed at this time.

5.1.5.2 Recoverable/Restorable Fish Habitat Project

Description:

“Fish habitat” means habitat which is used by fish at any life stage at any time of the year including potential habitat likely to be used by fish which could be recovered by restoration or management and includes off-channel habitat (WAC 222-16-010). The primary intent of this project will be to assess potential landscape-scale differences in fish distribution patterns within managed and unmanaged forestlands. In addition, the project will identify and quantify different types of fish habitat that have been recovered and/or restored through forest management practices (e.g., riparian buffer prescriptions, RMAPs) since the FP HCP was implemented.

Where possible, the project will also investigate the degree to which fish distribution and abundance has changed from pre- to post-restoration and recovery.

Status:

This project is proposed for inclusion by ISAG (2016) in the CMER Master Project Schedule for the 2017–2019 biennium. Due to a shift in the FP Board priorities this project has been put on hold and will be re-evaluated and new priorities will be determined by ISAG before the end of the 2019-2021 biennium.

5.2 TYPE N RIPARIAN PRESCRIPTIONS RULE GROUP

5.2.1 Rule Overview and Intent

Type N streams are protected under forest practices rules for several reasons. First, they provide habitat for stream-associated amphibians (SAA) covered by the agreement. Second, water quality standards pertaining to these streams need to be met. Finally, Type N streams contribute water, nutrients, woody debris, and sediment that affect downstream fish habitat and water quality.

Two buffering strategies are prescribed for Type Np streams: the clear-cut and the partial-cut strategies. The clear-cut strategy is prescribed for the westside, whereas landowners on the eastside have the flexibility to use either clear-cut or partial-cut strategies. The clear-cut strategy on the westside involves a patch buffering system where portions of the riparian stand can be clear-cut to the stream, but remaining areas are protected with a 50-foot (ft.) wide no-cut patch buffer. The patch buffer includes fixed and flexible components. Fixed components include 50-ft. buffers around the sensitive sites (e.g., connected springs and seeps, Np initiation points, and stream junctions) and on both sides of the stream 300-500 ft. upstream from the Type F/Type Np junction. The flexible component allows the landowner to choose where to place the remaining buffer to bring the total buffer length to 50% of the Type Np length. Eastside landowners have the second option of using the partial-cut strategy, a continuous 50-ft. buffer along the length of the Type Np stream. The partial-cut buffer can be thinned, provided that the appropriate basal area and leave tree requirements are met. A 30-ft.-wide equipment limitation zone (ELZ) is established on all Type N streams (Np and Ns) statewide to minimize sediment input from bank and soil disturbance. Operations within the ELZ are designed to avoid soil disturbance, and sediment delivery must be mitigated.

The Type N rules are based on the assumption that riparian buffering strategies will result in aquatic conditions that meet resource objectives and consequently achieve the three Forests and Fish Report performance goals. However, a high level of uncertainty exists in the science underlying these assumptions because the functional relationships between riparian management practices, riparian functions, and aquatic resource response are not well studied or understood. Several major areas of uncertainty include the following:

1. How to identify the upper boundary of perennial flow in Type N streams.
2. How riparian stands and the inputs and functions they provide respond to management practices and the level of protection provided by the prescriptions.
3. The habitat utilization patterns of SAAs and their response to riparian management practices.
4. The effects of Type N riparian management practices on sediment, large woody debris (LWD), temperature, and nutrient regimes in downstream fish-bearing streams.

5.2.2 Rule Group Resource Objectives and Performance Targets

Resource Objectives:

The Type N riparian prescriptions are designed to accomplish the following FP HCP resource objectives:

- Provide cool water by maintaining shade, groundwater temperature, flow, and other watershed processes controlling stream temperature.
- Provide complex in- and near-stream habitat by recruiting LWD and litter.
- Prevent delivery of excessive sediment to streams by protecting stream-bank integrity, providing vegetative filtering, protecting unstable slopes, and preventing routing of sediment to streams.
- Provide conditions that sustain SAA population viability within occupied sub-basins.

Performance Targets:

- Stream Temperature: To be developed
- Water quality standards: To be developed
- Sediment: Target related to harvest and activities in the ELZ has yet to be developed.
- Groundwater Temperature: To be developed.

5.2.3 Rule Group Strategy

As mentioned above, the forest practices Type N riparian prescriptions were based on assumptions that contain scientific uncertainties. The Type N riparian strategy is designed to address those areas of scientific uncertainties by focusing on critical questions related to delineation of Np/Ns streams, characterization of Np streams, identification and characterization of sensitive sites, and the effectiveness of the rules in achieving FP HCP goals and resource objectives. The critical questions, programs, task types, and responsible scientific advisory groups (SAGs) are listed in Table 8. The first step in the strategy involves rule tool programs that address how to delineate and characterize Type N streams and sensitive sites. The Type N Delineation Program addresses how to characterize and delineate the uppermost boundaries of Type N streams, including perennial and seasonal streams. The purpose of the Sensitive Site Program is to refine the descriptions of SAA sensitive sites in the forest practices rules and to estimate their importance to SAAs.

After rule tools have been developed to characterize and/or delineate Type N streams, the next step in the strategy is to assess the effectiveness of the riparian prescriptions in meeting resource goals and performance targets. The Type N Riparian Effectiveness Program assesses how the forest practices riparian prescriptions, as well as alternative buffer prescriptions, address the FP HCP resource objectives (i.e., riparian processes and functions) within Type N streams, as well as their contribution to downstream Type F streams. The Type N Amphibian Response Program addresses how SAA population viability is maintained by the Type N prescriptions on the westside. The Extensive Riparian Status and Trends Monitoring Program is then designed to

provide a snapshot of temperature and riparian vegetation conditions in Type N streams across the FP HCP landscape and to document how those conditions change over time.

Table 8. Type N Riparian Prescriptions Rule Group Critical Questions and Programs

Rule Group Critical Questions	Program Names	Task Type	SAG
How should the initiation point of Type Np streams be identified for management purposes?	Type N Delineation Program	Rule Tool	UPSAG
Can the methods used to identify and characterize sensitive sites be improved?	Sensitive Site Program	Rule Tool	LWAG
Are rule-identified sites valuable for amphibians?	Sensitive Site Program	Rule Tool	LWAG
Are sites important to amphibians correctly identified by rule?	Sensitive Site Program	Rule Tool	LWAG
How do survival and growth rates of riparian leave trees change following Type Np buffer treatments? Are riparian processes and functions provided by Type Np buffers maintained at levels that meet FP HCP resource objectives and performance targets for shade, stream temperature, LWD recruitment, litterfall, and amphibians? How do other buffers compare with the forest practices Type N prescriptions in meeting resource objectives? How do the Type N riparian prescriptions affect water quality delivered to downstream Type F/S waters? Are the Type N performance targets valid and meaningful measures of success in meeting resource objectives? What is the frequency and distribution of windthrow in forest practices buffers on Type N and F streams? What site and habitat conditions are associated with sites with significant blowdown? What is the effect of buffering or not buffering spatially intermittent stream reaches in Type Np streams?	Type N Riparian Effectiveness Program	Effectiveness	RSAG SAGE
Is stream-associated amphibian (SAA) population viability maintained by the Type N prescriptions?	Type N Amphibian Response Program	Effectiveness	LWAG
What is the current status of riparian conditions and functions in Type N streams on a statewide scale, and how are conditions changing over time?	Extensive Riparian Status and Trends Monitoring Program	Extensive	RSAG
Are forest practices riparian prescriptions effective at protecting groundwater flow and temperature?	Groundwater Conceptual Model Project Type N Riparian Effectiveness Program	Effectiveness	UPSAG RSAG SAGE WetSAG

5.2.4 Type N Delineation Program (Rule Tool)

5.2.4.1 Program Strategy

Because the Type N protections differ between perennial and seasonal stream reaches, it is important that perennial and seasonal reaches can be identified before management activities occur. This is difficult because determining a flow regime requires walking extensive stream lengths during the summer dry season. The need for a simpler year-round determination method led to the basin area default method contained in the FFR. The Type N Delineation Program was designed to determine whether regulatory delineation methods were sufficiently accurate and whether there were preferable alternatives.

The Type N Delineation Program evaluated existing and alternative delineation methods using observational field studies. In 2001, a pilot study (administered by UPSAG) was conducted to validate existing methods for defining perennial and seasonal streams for both western and eastern Washington, as described below. Based on the results of the study, in November 2006 the Forest Practices Board adopted the rule that eliminated the option to use a default basin size. Though the Board Manual was to be relied upon to provide guidance for determining the uppermost point of perennial flow, the proposed Board Manual language for providing this guidance was not approved at that time. Currently, no further action is being taken by CMER on this issue.

Table 9. Type N Delineation Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names	SAG
How should the initiation point of Type Np streams be identified for management purposes?	Perennial Initiation Point Survey: Pilot Study	UPSAG

5.2.4.2 Perennial Initiation Point Survey: Pilot Study

Description:

The Perennial Initiation Point (PIP) pilot study was initiated in 2001 to evaluate field methods and inform sampling needs for a subsequent statewide field study. The field portion of the study was done by Forests and Fish cooperators (tribes, timber companies, and the Washington Department of Fish and Wildlife [WDFW]) on a voluntary basis. CMER staff performed data analysis and reporting under the direction of the Np technical subgroup and UPSAG.

Completion of the pilot study in 2004 was followed by independent scientific peer review (ISPR), and revisions and the preliminary scoping of a coordinated statewide study.

Status:

The pilot study was completed in 2004. A coordinated statewide study has not been scoped or initiated based on direction from Policy.

5.2.5 Sensitive Site Program (Rule Tool)

5.2.5.1 Program Strategy

The Sensitive Site Program, which began in 1999, consists of two rule-tool implementation projects. The purpose of this program is to refine the descriptions of stream-associated amphibian (SAA) sensitive sites in the forest practices rules and to estimate their importance to SAAs. The strategy is to first develop a field methodology to assist forest managers in identifying sensitive sites, and then characterize sensitive sites that are the most important to the SAAs addressed in the FP HCP. See Table 10 for critical questions and associated projects.

Table 10. Sensitive Site Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
Are sites important to amphibians correctly identified by rule?	SAA Sensitive Sites Characterization Project
Are rule-identified sites valuable for amphibians?	SAA Sensitive Sites Characterization Project
Can the methods used to identify and characterize sensitive sites be improved?	SAA Sensitive Sites Identification Methods Project

5.2.5.2 SAA Sensitive Sites Identification Methods Project

Description:

The purpose of this project is to develop a practical methodology for identifying SAA sensitive sites, such as headwall seeps, side-slope seeps, and headwater springs. This project is intended to inform the Type N riparian rule by providing a standard methodology (field guide) for field managers to identify SAA sensitive sites when designing harvest units.

Status:

This project was completed in 2007. One manuscript has been submitted to a peer-reviewed journal and two additional manuscripts are in preparation. This project is administered by the Landscape and Wildlife Advisory Group (LWAG).

5.2.5.3 SAA Sensitive Sites Characterization Project

Description:

The purpose of this project is to document the distribution and characteristics of sensitive sites as described by the forest practices rules and to verify their use and habitat value for SAAs. The project will generate information on the characteristics of sensitive sites, validate the extent to which they are used by amphibians, and determine if other sensitive sites exist. Information from this project could result in changes to the sensitive site criteria in the rules to better focus buffer protection on areas important to SAAs.

Status:

This project was completed in 2006. One manuscript has been approved by CMER and published, and another manuscript is in preparation. This project is administered by LWAG.

5.2.6 Type N Riparian Effectiveness Program

The effectiveness of the prescription package for Type N riparian management is uncertain because there are many gaps in the scientific understanding of headwater streams, their aquatic resources, and the response of riparian stands, amphibians, water quality, and downstream fish populations to different riparian management strategies. Consequently, prescriptions are based on assumptions that have been neither thoroughly studied nor validated. This program is ranked first among the 16 CMER programs. This program has been divided into two sections, one for the westside and one for the eastside, due to differences in the prescriptions and critical questions, which lead to unique program strategies.

5.2.6.1 Program Strategy (Westside)

The purpose of this program is to evaluate the westside Type N riparian management prescriptions, including response of riparian vegetation, growth and mortality of buffer trees, level of riparian functions provided, biotic and water quality responses to prescriptions (both within the Type N system and in downstream fish-bearing waters), and the prescriptions’ effectiveness in achieving performance targets and meeting water quality standards. Critical questions for this program, along with the projects designed to answer them, are shown in Table 11.

Three CMER projects are currently underway to evaluate the effectiveness of the westside Type N riparian prescriptions. These projects use different but complementary approaches to inform adaptive management. The Westside Type N Buffer Characteristics, Integrity, and Function (BCIF) Project examines a random sample of westside Type N forest practices applications (FPAs) after harvest to evaluate the performance of Type N prescriptions as they are applied operationally over the range of conditions occurring in the FP HCP landscape. The Type N Experimental Buffer Treatment Project in Hard Rock Lithologies (Hard Rock project) and Type N Experimental Buffer Treatment Project in Soft Rock Lithologies (Soft Rock project) focus on aquatic resource response to Type N prescriptions in streams with competent (i.e., less erodible, or hard rock) and relatively incompetent lithologies in western Washington. Both studies use a manipulative experimental design that compares the effectiveness of the riparian buffers left in harvested watersheds to unharvested control sites. The Type N Experimental Buffer Treatment Project in Soft Rock Lithologies serves as a companion study to the Hard Rock project. The Soft Rock project provides important confirmation of the effect of forest practices prescriptions on the more erodible substrates that were not included in the Hard Rock project.

Table 11. Type N Riparian Effectiveness Program – Westside: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
How do survival and growth rates of riparian leave trees change following Type Np buffer treatments?	Westside Type N Buffer Characteristics, Integrity, and Function (BCIF) Project Type N Experimental Buffer Treatment Projects (Hard Rock and Soft Rock projects)

Rule Group Critical Questions	Project Names
Are riparian processes and functions provided by Type Np buffers maintained at levels that meet FP HCP resource objectives and performance targets for shade, stream temperature, LWD recruitment, litterfall, and amphibians?	Westside Type N Buffer Characteristics, Integrity, and Function (BCIF) Project Type N Experimental Buffer Treatment Projects (Hard Rock and Soft Rock projects); the Soft Rock project does not include amphibians or litterfall
How do other buffers compare with the forest practices Type N prescriptions in meeting resource objectives?	Type N Experimental Buffer Treatment Project in Hard Rock Lithologies (the Soft Rock project tests only the forest practices rule buffer, no alternative buffers)
How do the Type N riparian prescriptions affect water quality delivered to downstream Type F/S waters?	Type N Experimental Buffer Treatment Projects (Hard Rock and Soft Rock projects; the Soft Rock project does not include fish)
What is the frequency and distribution of windthrow in forest practices buffers? What site and habitat conditions are associated with sites with significant blowdown?	Westside Type N Buffer Characteristics, Integrity, and Function (BCIF) Project Type N Experimental Buffer Treatment Projects (Hard Rock and Soft Rock projects) Windthrow Frequency, Distribution, and Effects Project
Are forest practices riparian prescriptions effective at protecting groundwater flow and temperature?	No project identified
Are the Type N performance targets valid and meaningful measures of success in meeting resource objectives	No project identified
What is the effect of buffering or not buffering spatially intermittent stream reaches in Type Np streams?	No project identified

5.2.6.2 Westside Type N Buffer Characteristics, Integrity, and Function (BCIF) Project

Description:

The Westside Type N Buffer Characteristics, Integrity, and Function Project was designed to evaluate the effectiveness of the westside Type N riparian prescriptions, including survival of buffer leave trees, stand condition and trajectory over time, and changes in riparian functions, including shade, LWD recruitment, and soil disturbance/stream-bank protection. A random sample of 15 Type Np treatment sites were selected from forest practices applications (FPAs) and paired with unharvested reference sites to provide an unbiased estimate of the magnitude of change following application of the clear-cut and 50-ft. buffer prescriptions. Data were also collected on the PIP buffer prescription.

Status:

Initial post-harvest sampling at 15 treatment/reference pairs in the western hemlock zone strata of western Washington was initiated in the fall of 2003. Low-altitude photography and field measurements of canopy conditions were collected post-harvest in 2004. After a pilot project to evaluate feasibility of aerial photography, the Riparian Scientific Advisory Group (RSAG) determined that field data were needed to accomplish the project objectives. Field data were

collected on riparian stand conditions, fallen trees, LWD recruitment, shade, channel wood loading, and soil disturbance from windthrown trees. Field data were collected three and five years after timber harvest in the summer/fall of 2006 and 2008. A draft report was submitted for ISPR in October 2010. The report was revised to address ISPR comments and the final report was approved by RSAG and CMER in December 2011. The ten-year, post-harvest data collection effort was completed in the summer of 2013. The draft final report was approved by CMER early 2018 and sent to ISPR for review.

5.2.6.3 Type N Experimental Buffer Treatment Project in Hard Rock Lithologies (Hard Rock Project)

Description:

This study (also described in 5.2.7.3) is a field experiment that assesses the effects of clearcut harvest of Type N basins with three riparian buffer strategies (compared to unharvested reference basins) during Phase 1 (2006–2011) and extended monitoring, Phase 2 (2012–2016). Study responses included riparian stand structure, tree mortality, wood recruitment and loading, stream temperature and cover, discharge, nutrient export, suspended sediment export, stream channel characteristics, litterfall input and detritus export, biofilm and periphyton, macroinvertebrate export, and stream-associated amphibian density. Data on downstream effects on stream temperature and fish populations were also assessed, where possible. Study sites were limited to basins with basalt or other hard rock lithologies, where the target amphibian species are more likely to be found. The BACI (Before-After / Control-Impact) study design includes randomized blocks, with sites assigned to one of four treatments, including the reference.

Status:

This study consisted of three years of pre-harvest and two years of post-harvest data collection spanning from 2006–2011. The Phase 1 report is complete and five findings reports (one covering findings of the entire study, with separate reports for stand structure and tree mortality, wood recruitment and loading, stream temperature and cover, and stream-associated amphibians) have been transmitted to Policy.

Results of the detection probability method used in this study were published in the journal *Forest Ecology and Management* in 2012. Stream temperature and amphibian response results were presented at the American Fisheries Society conference in Portland, Oregon in August 2015 and at the National Council on Air and Stream Improvement meeting in September 2015, and at the CMER Science Conferences in October 2016 and May 2018. Results were presented to Policy in late 2017.

The extended monitoring, Phase 2 (2012 and later; through eight years post-harvest), included responses for riparian stand structure, tree mortality, wood recruitment and loading, stream temperature and cover, discharge, nutrient export, suspended sediment export, stream channel characteristics, and stream-associated amphibian density. The timing of data collection varied among the many study variables depending upon the expected response time and expense. A report is anticipated for review in the 2019 fiscal year.

Because of the long generation time of stream-associated amphibians, the genetic component of this study spans the interval of 2006–2016. The genetic report draft has been reviewed by ISPR and is currently in revision. The ISPR-review process is expected to be completed in FY 2019.

We recommend additional future monitoring for stream-associated amphibians (Phase 3). Preliminary results from Phase 2 suggest significant declines in Coastal Tailed Frog populations 7 and 8 years post-harvest that were not apparent in the initial post-harvest period Phase. Monitoring would be most appropriate 7 to 8 years after the last monitoring period, in FY2022 through 2024 (years 14 and 15 post-harvest); however, the exact timing is flexible. Future monitoring would allow identification of longer-term effects of harvest on Coastal Tailed Frog populations. Riparian stand structure, tree mortality, wood recruitment and loading, stream temperature and stream channel characteristics monitoring may also be of interest. This recommendation is consistent with the study design, which included the potential to monitor effectiveness through time. Under the current recommendation, data analysis and report writing for the continued/future monitoring would extend until 2026. We recommend that the potential benefits of continued/future monitoring be evaluated after completion and approval of the extended monitoring Phase 2 report.

5.2.6.4 Type N Experimental Buffer Treatment Project in Soft Rock Lithologies (Soft Rock Project)

Description:

This study is a field experiment analogous to the Hard Rock project but implemented on more erodible (soft rock, largely marine sedimentary) lithologies. This project differs from the Hard Rock project in that it:

- employs a Multiple Before-After/Control-Impact design (e.g., multiple control sites);
- tests only the forest practices rule buffer treatment (no alternative buffers are tested);
- does not include any amphibian, fish, litterfall, or drift measurements; and
- includes benthic macroinvertebrate sampling rather than macroinvertebrate drift.

Status:

A grant from the Environmental Protection Agency (EPA) was awarded to the Washington State Department of Ecology (Ecology) in October 2010 that partially funded the design and first two years implementation of the Soft Rock project. The Quality Assurance Project Plan is complete and was published in September 2011.

Site selection was completed in August 2012 and temperature monitors were installed. Montana flumes were installed in four basins by Oct 9, 2012 and instrumented by January 2013 to measure stage height and turbidity.

Stream temperature data have been successfully downloaded as scheduled in spring and fall from spring 2013 to fall 2018. Channel measurements and riparian stand data were collected both pre-

harvest and post-harvest. The last treatment site was harvested in July 2015. To date the project is on schedule and all data are stored at Ecology on a server and backed up daily.

Landowners agreed to hold the reference sites until 2020 to support potential extended monitoring.

5.2.6.5 Windthrow Frequency, Distribution, and Effects Project

Description:

Preliminary results of the Westside Type N BCIF Project indicate that windthrow mortality in westside Type N buffers is widespread. Many land managers have observed this as well. In response to this concern, RSAG plans to scope the inclusion of a windthrow assessment into existing Type N riparian projects.

Status:

To be scoped within existing Type N riparian projects.

5.2.6.6 Program Strategy (Eastside)

The purpose of the eastside program is to evaluate Type N riparian management prescriptions, including response of riparian vegetation, growth and mortality of buffer trees, level of riparian functions provided, biotic and water quality responses to prescriptions (both within the Type N system and in downstream fish-bearing waters), and the prescriptions' effectiveness in achieving performance targets and meeting water quality standards. Critical questions for this program, along with the projects designed to answer them, are shown in Table 12.

RSAG was overseeing a project called Eastside Type N Buffer Characteristics, Integrity and Function (BCIF) Project. As part of the project, RSAG intended to examine a random sample of eastside Type N riparian FPAs to evaluate the performance of Type N prescriptions as they were applied operationally over the range of eastside Type N streams. However, this study has been placed on hold due to a lack of suitable study sites.

The Eastside Type N Forest Hydrology Project developed by SAGE contains a series of follow-up studies that will examine eastern Washington headwater streams with the final intent of effectiveness monitoring. Given the importance of flow as a transport mechanism between non-fish-bearing and fish-bearing streams and the unique functions these streams exhibit, SAGE, through the ENREP study, decided that determining the hydrology of Type N streams would be the first step in laying the groundwork for additional studies. By understanding forest hydrology we will better understand spatially intermittent reaches and where they are likely to occur across eastern Washington, thus providing additional information to help correctly delineate the Type Np/Ns break.

A Technical Writing and Implementation Group (TWIG) was formed in 2013 to develop options for addressing questions related to the effectiveness of riparian prescriptions for non-fish bearing (Type N) streams in eastern Washington. This study (ENREP) is needed to determine if, and to

what extent, the prescriptions found in the Type N Riparian Prescriptions Rule Group are effective in achieving performance targets and water quality standards, particularly as they apply to sediment and stream temperature in eastern Washington. ENREP moved forward into implementation, so the TWIG group has converted into an active project team.

Table 12. Type N Riparian Effectiveness Program – Eastside: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions		Project Names	SAG
How do survival and growth rates of riparian leave trees change following Type Np buffer treatments?		Eastside Type N Buffer Characteristics, Integrity and Function (BCIF) Project	RSAG
Are riparian processes and functions provided by Type Np buffers maintained at levels that meet FP HCP resource objectives and performance targets for shade, stream temperature, LWD recruitment, litterfall, and amphibians?		Eastside Type N Riparian Effectiveness Project (ENREP)	SAGE
Program Research Questions	<i>What are the characteristics of eastern Washington Type N stream channels and riparian areas and how do they vary across eastern Washington?</i>	Eastside Type N Forest Hydrology Project	SAGE
	<i>Do different types of Type N channels explain the variability in the response of Type N channels to forest practices?</i>	Eastside Type N Riparian Effectiveness Project	
What is the effect of buffering or not buffering spatially intermittent stream reaches in Type Np streams?		Eastside Type N Riparian Effectiveness Project	SAGE TWIG
How do the Type N riparian prescriptions affect water quality delivered to downstream Type F/S waters?		No projects yet scoped	SAGE
Are forest practices riparian prescriptions effective at protecting groundwater flow and temperature?		No projects yet scoped (see Groundwater Conceptual Model Project)	UPSAG RSAG SAGE WetSAG

5.2.6.7 Eastside Type N Buffer Characteristics, Integrity, and Function (BCIF) Project

Description:

The Eastside Type N Buffer Characteristics, Integrity, and Function (BCIF) Project, managed by RSAG, is designed to evaluate the effectiveness of the eastside Type N riparian prescriptions, including survival of buffer leave trees, stand condition and trajectory over time, and changes in riparian functions, including shade, LWD recruitment, and stream-bank protection. RSAG proposes to examine a random sample of eastside Type N riparian FPAs to evaluate the performance of Type N prescriptions as they are applied operationally over the range of eastside Type N streams.

Status:

RSAG attempted to implement this project in 2004 and again in 2006, but was unable to find an adequate number of study sites because there were very few FPAs where landowners proposed to apply the eastside Type N prescriptions. Most landowners opted to simply stay out of the 50-ft

Type N management zone rather than implement the thinning or patch-cut prescription. RSAG documented these findings in a series of memos. Due to the lack of suitable study sites, this study has been placed on hold.

5.2.6.8 Eastside Type N Forest Hydrology Project (FHS)

Description:

The Eastside Type N Forest Hydrology Project was designed to determine the spatial characteristics of late summer surface-water discharge across eastern Washington FP HCP lands. The project explored whether there was a set of readily identified external characteristics that could be used to group and/or remotely identify stream reaches that exhibit similar hydrologic characteristics.

Status:

The study design for the FHS project was approved by CMER in December 2009. Field work was completed in 2012. The FHS report was completed in 2014, and sent to ISPR for review in late 2014. The report was updated and approved by SAGE and CMER in 2015 and was received by Policy in 2016.

5.2.6.9 Eastside Type N Riparian Effectiveness Project (ENREP)

Description:

The ENREP study will determine if, and to what extent, the prescriptions found in the Type N Riparian Prescriptions Rule Group are effective in achieving performance targets and water quality standards, particularly as they apply to stream temperature and discharge in eastern Washington. A TWIG was formed to identify critical questions, review the best available science, and write the study design. The study design has received final approval from CMER and a project team has been assigned to implement the study.

The objectives of the ENREP study are as follows: (1) quantify the magnitude of change in stream flow, canopy closure, water temperature, suspended sediment transport and wood loading within eastern Washington riparian management zones (RMZ) following harvesting within current rule constraints; and (2) evaluate the effects of these changes on downstream waters where possible.

Status:

In 2013, a TWIG was appointed to develop objectives, critical questions, and study design options. In June 2013, Policy approved the objectives and critical questions while asking the TWIG to consider additional issues including the effects of harvesting along seasonally dry reaches. The TWIG evaluated research alternatives and conducted a preliminary research effort (the “Forest Hydrology Study [FHS] Extension”) to examine the spatial and temporal consistency of channel wetting and drying in a set of basins known to include seasonal drying of non-fish bearing perennial (Type Np) reaches. The research alternatives document was approved by Policy in November 2013. Over the summer of 2014, the TWIG supervised data collection under the FHS Extension. The original FHS survey found that 21% of the Np channel network was dry by late summer. The FHS Extension focused on a subset of these same basins that were known to have seasonal channels and found that approximately one-third of the late summer dry

Np channel was dry over the course of the entire summer while the remaining two-thirds dried out incrementally. Additionally, the Extension showed general consistency in the location of drying from year to year. As a result, the TWIG concluded that the ENREP study could include treatments that targeted seasonally dry reaches for harvest.

Policy was informed of the FHS Extension results in February 2015 and they directed the TWIG to develop a study design. In July 2015, the TWIG presented a draft study design to CMER. The first draft included a treatment focused on harvesting dry reaches in accordance with current FFR rule. That design met with resistance within CMER. In August 2015, Policy retracted their previous guidance and told the TWIG to develop treatments based on best available science.

The ENREP study design was approved by CMER to go to ISPR in November 2016. While the study design was at ISPR, CMER staff evaluated potential sites during the summer of 2017. The design was modified to incorporate site specific information as requested by ISPR and ISPR approved the study design on January 24, 2018. The study design, prospective findings reports, and implementation plan were approved by CMER on March 27 2018 and project implementation began late summer 2018.

5.2.6.10 Eastside Ns Effectiveness Project

Description:

The Eastside Ns Effectiveness Project will determine if and to what extent the prescription found in the Type N Riparian Prescription Rule Group for Ns streams in Eastern Washington maintain performance targets and water quality with a particular focus on effects in downstream typed waters. A substantial number of stream channels in the forested areas of Eastern Washington are managed as Ns streams (non-fish-bearing seasonally dry). Some of these channels flow directly into Type F waters (fish-bearing), while others occur directly above the point in the channel defined as the uppermost point of perennial flow. These channels are not protected by leaving treed buffers, and the effect to downstream channel stability and riparian functions remains largely untested.

This project's objective is to develop a literature review. The review will inform a field study to examine the effect of applying the Ns rules on the Type Np and Type F waters lying downstream.

Project Critical Questions:

The literature review seeks to answer the following critical questions:

- To what extent does applying the Eastern Washington Type Ns riparian prescriptions affect the water quality, quantity, and stream channel stability of downstream Typed waters?
- To what extent if any does not buffering Ns stream channels decrease the base-flow or increase magnitude or frequency of scouring flows in downstream Typed waters?
- To what extent if any does not buffering Ns stream channels increase water temperature, turbidity, or sediment in downstream Typed waters?

- To what extent, if any, does not buffering Ns streams affect the amount of channel stabilizing wood, and is there evidence this leads to changes in channel stability or sediment production and routing to downstream typed waters?

Status:

Not currently being scoped. Study design development is planned following the ENREP study.

5.2.6.11 Literature Review and Synthesis Related to the Salvage of Fire Damaged Timber

Description:

This project was intended to provide current peer-reviewed science related to the practice of salvaging fire damaged timber on Washington forests. The focus was on literature evaluating timber salvage after fire damage and its effects in and near riparian areas located in Eastern Washington and other regions throughout the country, and also studied what helps identify the best available science as it relates to various methods of timber salvage and the resulting regeneration of upland sites.

With the increased severity of wildfires, insect damage, and high wind events there is an associated increase in salvage FPAs. There is a need to understand if these approved salvaged harvests are adequate at maintaining water quality and performance targets. As required under WAC, approved salvage permits must meet or exceed the protections and functions provided by existing rules.

This summary will serve as the basis for discussion within the AMP about the need and ability to identify and test best management practices for salvage logging.

Project Critical Questions:

The literature synthesis seeks to answer the following critical questions:

- What are the effects of salvage logging on riparian forest stands and how can ecological damage to riparian functions from salvage logging be reduced?
 1. Are there any significant differences between harvest methods in burned areas that potentially pose a greater risk to aquatic resources?
 - a. To what extend does application of logging slash on skid trails affect sediment delivery to streams?
 - b. Is there a difference in sediment delivery between salvage logging on snow covered versus non-snow covered land?
 2. Does soil disturbance from logging in burned areas increase erosion and delivery of sediment to streams?
 - a. Do different logging methods change these impacts?
 - b. What effects does hydrophobic soil have on erosion and sediment delivery?
- How can riparian forest stands and associated riparian functions be restored after fire?
 1. To what extent does leaving standing and dead trees within the RMZ contribute to riparian function?

- a. To what extent does down wood reduce erosion and sediment delivery to streams and wetlands? To what extent does the risk of sediment delivery change with stream and side slope gradients, different soil types, or with the intensity of the burn?
- b. To what extent do live standing trees and dead standing trees immediately adjacent to or over the stream bank contribute to bank stability? Are there any differences in the benefits provided by standing trees vs. stumps?
- c. To what extent does standing trees provide levels of shade that will mitigate the warming of streams or wetlands? Is buffer width critical and does this vary by stream size?
- d. To what extent are there differences between the rates of large woody delivery over time to streams where the burned RMZ is left in place, compared with one that is harvested and then replanted or allowed to reseed naturally after fire? Are there biogeographic areas that require or do not require replanting after salvage harvest?
- e. To what extent does excessive dead standing and/or down wood post fire affect the reforestation of the upland forest stand and the riparian area?
- f. To what extent do standing dead or down trees help promote the establishment of new seedlings post fire (whether planted or naturally re-seeded)?

Status:

The literature review proposal was approved by SAGE in December 2016. CMER and Policy approved this project and funding for the project in January 2017. A contractor was selected and the operating contract completed in March 2017. The project was completed and CMER approved in March 2018.

5.2.6.12 Seep Sensitive Sites, and Amphibian Project

This project proposes to use existing data from a combination of the Hard Rock Study, SAA Sensitive Sites Identification Methods Project, and SAA Sensitive Sites Characterization Project to synthesize information on characteristics of FP-Sensitive Sites and riparian sites important to amphibians. If desired, a second field phase of this project would focus on remaining uncertainties associated with seeps, including identification, characterization and amphibian use on the Type N landscape.

Project Critical Questions:

Are rule-identified sites valuable for amphibians?

Are sites important to amphibians correctly identified by rule?

Can the methods used to identify and characterize sensitive sites be improved?

Status:

This project has not been initiated or scoped yet.

5.2.6.13 Slash in Type N Streams Project

The purpose of this project is to evaluate the functional role of slash in Type N streams. In the Hard Rock Study, PIs observed high loads of harvest-related slash in unbuffered stream reaches, along with what appeared to be higher densities of torrent salamander utilizing these reaches. However, preliminary results suggest that these increased densities in slash reaches did not extend through years 7 and 8 post-harvest. The function and physical characteristics of instream slash have not been studied extensively, and has not been systematically studied from an amphibian use perspective. This project intends to evaluate the biotic and abiotic variables associated with instream slash in Type N streams. To evaluate how slash changes through time, we propose identifying study sites representing various stand ages and time since harvest that could be used in a chronosequence study of slash characteristics. To evaluate how amphibian use of slash changes through time, we propose the additional inclusion of study sites where baseline data for amphibian densities already exists (i.e., Type N Study sites).

Project Critical Questions:

What are the physical characteristics and functions of accumulations of instream slash through time?

How does amphibian use of reaches with accumulations of instream slash vary through time?

Status:

This project has not been initiated or scoped yet.

5.2.7 Type N Amphibian Response Program (Effectiveness)

5.2.7.1 Program Strategy

The restricted distribution of stream-associated amphibians (SAAs) and the lack of information about them required development of an amphibian response strategy that differs from that of many other rule groups or programs. The Type N Amphibian Response Program began with development of tools needed to implement the Type N buffer rule for sensitive sites (i.e., methods for identifying and characterizing SAA sensitive sites) and procedures to detect and determine the relative abundance of SAAs for monitoring purposes. During this time, other projects were undertaken that were designed to determine critical monitoring questions for some species (i.e., tailed frog literature review and meta-analysis) or to answer species-specific L-1 questions (i.e., related to Dunn's and Van Dyke's salamanders). This program is administered by LWAG. This program is ranked third among the 16 CMER programs.

The uneven abundance and distribution of SAAs limit study options for the amphibian response program. LWAG determined that an extensive monitoring project for SAAs would not provide useful information for the AMP, and the uneven distribution of SAAs prevented effective integration with other monitoring projects. LWAG concluded that any monitoring program must focus on those physical factors (e.g., geology) that appear to affect SAA distribution, abundance,

and response to timber harvest (i.e., the Type N Experimental Buffer Treatment Project in Hard Rock Lithologies).

The purpose of this program is to address critical questions about the response of SAAs to forest practices, particularly the Type N riparian prescriptions. Many uncertainties exist about SAAs’ distribution, life history, habitat-utilization patterns, and population dynamics. Uncertainties also exist on the effects of forest practices on SAA habitats and the response of SAA populations to these changes. Consequently, the Type N riparian rule is based on the assumption that buffering of perennial Type N streams around “sensitive” sites (sites thought to provide high-quality SAA habitat) will contribute to maintaining the viability of SAA populations. These assumptions and uncertainties have been examined and used to develop a series of sub-questions under the main critical question (Table 13).

Table 13. Type N Amphibian Response Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions		Project Names
Is stream-associated amphibian (SAA) population viability maintained by the Type N prescriptions?		
Program Research Questions	<i>Do SAAs continue to occupy and reproduce in the patch buffers?</i>	SAA Detection/Relative Abundance Methodology Project
	<i>Do SAAs continue to occupy and reproduce in the equipment limitation zone (ELZ)-only reaches?</i>	
	<i>If SAAs do not continue to occupy the ELZ-only reaches, do they re-occupy those reaches before the next harvest?</i>	
	<i>How does SAA habitat respond to the sensitive site buffers?</i>	
	<i>How does SAA habitat respond to variation in inputs; e.g., sediment, litterfall, wood?</i>	
	<i>How do SAA populations respond to the Type N prescriptions over time?</i>	Type N Experimental Buffer Treatment Project in Hard Rock Lithologies
	<i>What are the common findings and inconsistencies in published studies on the effects of timber harvest on tailed frogs?</i>	Tailed Frog Literature Review Project
	<i>What can be learned from a meta-analysis of published data and unpublished data on tailed frogs in managed forests?</i>	Tailed Frog Meta-Analysis Project
	<i>Are published generalizations on the relationship between parent geology and tailed frog abundance correct and consistent?</i>	Tailed Frog and Parent Geology Project
	<i>What are the common findings and inconsistencies in published studies on the habitat associations of Dunn’s and Van Dyke’s salamanders?</i>	Dunn’s Salamander Project
<i>Does territoriality confound interpretation of SAA relative abundance in relation to specified habitats?</i>	Van Dyke’s Salamander Project	
<i>How does large wood and decay class affect the distribution and abundance of Van Dyke’s salamander?</i>		

Rule Group	Critical Questions	Project Names
	<p><i>What are the effects of various levels of shade retention on the stream-breeding SAAs?</i></p> <p><i>Is there an optimum level of shade retention?</i></p>	<p>Buffer Integrity – Shade Effectiveness Project</p>
	<p><i>What are the effects of three buffer treatments on SAAs two years post-harvest?</i></p>	<p>Amphibian Recovery Project</p> <p>Type N Experimental Buffer Treatment Project in Hard Rock Lithologies</p>
	<p><i>How do SAAs utilize intermittent stream reaches at or near the origins of headwater streams?</i></p>	<p>Amphibians in Intermittent Streams Project</p>
	<p><i>Does sufficient SAA-occupied area exist in Eastside managed lands that is under FFR jurisdiction to justify study attention?</i></p>	<p>Eastside Amphibian Evaluation Project</p>
	<p><i>How do site-specific factors (e.g., streams dominated by ground water) affect abundance and condition of amphibian populations?</i></p>	<p>No current project</p>
<p>Program Research Questions</p>	<p><i>What is the effect of road-generated sediment on in-stream amphibians?</i></p>	<p>No current project</p>
	<p><i>What is the effect of fertilizer and herbicides applied as a silvicultural treatment on amphibians?</i></p>	<p>No current project</p>
	<p><i>What are the exposure risks of herbicides applied as a silvicultural treatment to amphibians?</i></p>	<p>No current project</p>
	<p><i>Does the distribution of SAA on Forests and Fish lands across Eastern Washington warrant inclusion in CMER effectiveness research?</i></p>	<p>Eastside Amphibian Evaluation Project</p>
	<p><i>How should changes in detection across soil and air temperature ranges affect use of previously completed studies?</i></p>	<p>No current project</p>

5.2.7.2 SAA Detection/Relative Abundance Methodology Project

Description:

The SAA Detection/Relative Abundance Methodology Project is designed to evaluate and develop a standard methodology for sampling SAAs in headwater forest streams. It addresses the need for a research/monitoring methodology to detect amphibians and determine their relative abundance. The most widely used methods produce high-variance estimates, and detection probabilities are unknown.

Status:

This project was completed in 2006, and details have been published in Journal of Wildlife Management.

5.2.7.3 Type N Experimental Buffer Treatment Project in Hard Rock Lithologies (Hard Rock Project)

Description:

This study (also described in 5.2.6.3) is a field experiment that assesses the effects of clearcut harvest of Type N basins with three riparian buffer strategies (compared to unharvested reference basins) during Phase 1 (2006–2011) and extended monitoring, Phase 2 (2012–2016). Study responses included riparian stand structure, tree mortality, wood recruitment and loading, stream temperature and cover, discharge, nutrient export, suspended sediment export, stream channel characteristics, litterfall input and detritus export, biofilm and periphyton, macroinvertebrate export, and stream-associated amphibian density. Data on downstream effects on stream temperature and fish populations were also assessed, where possible. Study sites were limited to basins with basalt or other hard rock lithologies, where the target amphibian species are more likely to be found. The BACI (Before-After / Control-Impact) study design includes randomized blocks, with sites assigned to one of four treatments, including the reference.

Status:

This study consisted of three years of pre-harvest and two years of post-harvest data collection spanning from 2006–2011. The Phase 1 report is complete and five findings reports (one covering findings of the entire study, with separate reports for stand structure and tree mortality, wood recruitment and loading, stream temperature and cover, and stream-associated amphibians) have been transmitted to Policy.

Results of the detection probability method used in this study were published in the journal *Forest Ecology and Management* in 2012. Stream temperature and amphibian response results were presented at the American Fisheries Society conference in Portland, Oregon in August 2015 and at the National Council on Air and Stream Improvement meeting in September 2015, and at the CMER Science Conferences in October 2016 and May 2018. Results were presented to Policy in late 2017.

The extended monitoring, Phase 2 (2012 and later; through eight years post-harvest), included responses for riparian stand structure, tree mortality, wood recruitment and loading, stream temperature and cover, discharge, nutrient export, suspended sediment export, stream channel characteristics, and stream-associated amphibian density. The timing of data collection varied among the many study variables depending upon the expected response time and expense. A report is anticipated for review in the 2019 fiscal year.

Because of the long generation time of stream-associated amphibians, the genetic component of this study spans the interval of 2006–2016. The genetic report draft has been reviewed by ISPR and is currently in revision. The ISPR-review process is expected to be completed in FY 2019.

We recommend additional future monitoring for stream-associated amphibians (Phase 3). Preliminary results from Phase 2 suggest significant declines in Coastal Tailed Frog populations 7 and 8 years post-harvest that were not apparent in the initial post-harvest period Phase. Monitoring would be most appropriate 7 to 8 years after the last monitoring period, in FY2022 through 2024 (years 14 and 15 post-harvest); however, the exact timing is flexible. Future monitoring would allow identification of longer-term effects of harvest on Coastal Tailed Frog populations. Riparian stand structure, tree mortality, wood recruitment and loading, stream temperature and stream channel characteristics monitoring may also be of interest. This recommendation is consistent with the study design, which included the potential to monitor

effectiveness through time. Under the current recommendation, data analysis and report writing for the continued/future monitoring would extend until 2026. We recommend that the potential benefits of continued/future monitoring be evaluated after completion and approval of the extended monitoring Phase 2 report.

5.2.7.4 Tailed Frog Literature Review Project

Description:

Of the seven SAAs addressed in the FP HCP, the two tailed frog species are the most extensively studied due to their wide distribution in the coastal Pacific Northwest. There are enough published studies on this species that a synthesis of those results will be useful in helping LWAG develop a research and monitoring program. A draft literature review was completed in 2011. The recent reclassification of the tailed frog into two species required the review to be restructured while in progress, to reflect that taxonomic revision.

Status:

The draft review was completed in 2011. It was submitted to LWAG for review in December 2011 and it went to CMER in March 2012. It was approved to go to ISPR in October 2012. It was returned from ISPR review in June 2013. The final report was finalized in 2015.

5.2.7.5 Tailed Frog Meta-Analysis Project

Description:

Published and unpublished data are being subjected to a meta-analysis that will relate tailed frog abundance with habitat conditions created by timber harvest. This analysis may or may not support the conclusions of the tailed frog literature review described above, and will likely identify other factors related to tailed frog distribution and response to timber harvest that will be useful in developing the Type N Amphibian Response Program. The recent reclassification of the tailed frog into two species required the meta-analysis to be restructured while in progress, to reflect that taxonomic revision.

Status:

The six data sets were formatted, checked for quality assurance / quality control (QA/QC), and analyzed in a pilot study that was published as a CMER report in 2002. LWAG decided not to continue development of a potentially larger project because of issues with non-conforming datasets, and inability to integrate corrections addressing detectability, both of which prevented rigorous analysis.

5.2.7.6 Tailed Frog and Parent Geology Project

Description:

Recent studies in managed forests have emphasized the relationship between parent geology, stream substrate composition, and tailed frog abundance. A general hypothesis has emerged that tailed frogs are most abundant in streams on lithologies that produce hard or competent rock (e.g., volcanic basalt) versus those that do not (e.g., marine sandstones). However, a study in Olympic National Park found that tailed frogs were abundant on both marine and volcanic parent material, and a broader regional study, performed in 2008, did not find a clear pattern with

regard to lithologies. These studies were largely observational and the distinction between geologies was extrapolated from the results. The Tailed Frog and Parent Geology project would test the parent geology hypothesis throughout Washington.

Status:

This project has not been scoped and scoping efforts are currently on hold.

5.2.7.7 *Dunn's Salamander Project*

Description:

The FP HCP indicates that LWD may be important for Dunn's and Van Dyke's salamanders. However, general habitat descriptions for both species emphasize the importance of streamside rocky substrates. A literature review to determine the basis for the LWD connection to these species was completed external to CMER in 2000. The initial field phase of this project, completed in cooperation with the Forest Service in 2001, was designed to provide additional information on the role of LWD in these species' habitats. The initial field phase collected data across too few sites to complete an effective analysis, so a second phase of field data took place in 2003.

Status:

Analysis of data from both phases has been completed and a peer-reviewed, submittal-ready final report was approved by CMER in 2011. That lengthy manuscript is being partitioned into acceptable lengths for peer-reviewed submittal.

5.2.7.8 *Buffer Integrity – Shade Effectiveness (Amphibians) Project*

Description:

Timber harvests result in two important, immediate physical changes: reduction in shade levels and increased sedimentation. During harvests these changes are coupled, so it is typically not possible to partition their respective contributions. Understanding their individual effects is important because sediment is suspected of having largely negative effects, whereas shade reduction has potentially positive effects. The Buffer Integrity – Shade Effectiveness Project examined the effects of reducing shade on a scale that minimizes sedimentation effects. This project examined the effects of three levels of shade reduction on SAA density, body condition, and spatial distribution, as well as water temperature, primary productivity, litterfall and macroinvertebrates. This is a cooperative project between Longview Timberlands LLC and CMER. Longview Timberlands LLC completed a pilot study in 2003 and initiated a broader study in 2004. The study area was increased with CMER approval to include WDFW-monitored sites on the Olympic Peninsula. Though the original study was intended to address all major groups of SAAs (i.e., tailed frogs, torrent salamanders, and giant salamanders), the available SAA-occupied sites on the eastern Olympia Peninsula lacked the giant salamander species—Cope's giant salamander—present on much of the peninsula. Hence, the Olympic portion of the study addressed only tailed frogs and torrent salamanders.

Status:

The first two years of pre-treatment sampling occurred in 2006 and 2007. Treatments were implemented during the winter of 2007–2008, and two years of post-treatment sampling were

completed in 2008 and 2009. A draft report was completed in 2012, underwent CMER review, and went to ISPR in mid-2013. The report was revised several times, approved by ISPR in August 2018, and final approval by CMER occurred in October 2018.

5.2.7.9 Amphibian Recovery Project

Description:

In 1998, the National Council for Air and Stream Improvement (NCASI) funded a study by Dr. Rhett Jackson on the effects of three buffer treatments on headwater streams in the Willapa Hills and Olympic Peninsula. Many of the FP HCP SAAs occurred on these sites. The NCASI funding covered a year of pre-treatment data and immediate post-harvest sampling. CMER funding allowed for the collection of an additional two years of post-harvest data.

Status:

This project was completed in 2003, and four journal articles have been published. One of the publications addresses amphibian response and contains information pertinent to the Type N Amphibian Response Program.

5.2.7.10 Amphibians in Intermittent Streams Project

Description:

This project examines amphibian use of the stream segments with discontinuous perennial flow; these stream conditions often occur at or near the origins of headwater streams. This project will directly inform the efficacy of buffering these stream segments in terms of SAA occupancy and ecology. The study plan includes three phases: (1) an assessment of data collected under previous CMER-funded projects for data applicability to the project's goals and objectives; (2) an analysis of the data, if applicable, identified in Phase 1; and (3) collection of additional data, if needed based on the results of Phases 1 or 2.

Status:

Phase 1 identified only ten streams from previous LWAG-sponsored western Washington work with data appropriate to the project; thus LWAG determined there were not enough data to warrant undertaking Phase 2 and that Phase 3 should be implemented. Phase 3 scoping and study design has been completed. However, LWAG's re-evaluation of the need for this project has shifted it to a low priority status. For this reason, the project is currently being withheld from CMER review until higher priority projects have been addressed. Data from the Type N Experimental Buffer Treatment Project in Hard Rock Lithologies could inform revisiting this project with limited further analysis without additional field effort.

5.2.7.11 Van Dyke's Salamander Project

Description:

The Van Dyke's salamander is the least studied of the seven Forests and Fish amphibian species; it is not adequately addressed by any previous or current study. The Van Dyke's salamander is a former Survey and Manage Species under the Northwest Forest Plan; survey protocols under the Survey and Manage Program emphasize that Van Dyke's salamander is a stenothermic (requires a narrow temperature range), cool-adapted species. Sampling conditions for the species must fall

under narrow moisture, relative humidity, and temperature ranges. Conflicting information exists regarding the occurrence of Van Dyke's salamander on managed landscapes (ranging from total absence to fairly broad distribution). At least part of the disparity observed in this species' distribution across managed and unmanaged landscapes may reflect its seasonal detectability that arises from the species' thermal requirements.

This study is proposed as three phases:

1. Phase 1: Assemble available information to characterize current (and sometimes conflicting) information and provide the background for focal question(s).
2. Phase 2: Develop a study plan that incorporates detectability, and/or a geographic modeling approach to identify important co-variates.
3. Phase 3: Implement a BACI-type manipulative study comparing harvested and unharvest units across the landscape.

Status:

Phase 1, a literature review that also addressed known distribution, was completed in FY 2019. Initiation of Phase 2 efforts are preliminarily planned for the 2021-2023 biennium.

5.2.7.12 Eastside Amphibian Evaluation Project

Description:

The Type N Experimental Buffer Treatment Project in Hard Rock Lithologies focused entirely on managed landscapes in western Washington, because most FFR-designated amphibians have westside distributions, and those with eastside distributions are believed to have little overlap with eastside managed landscapes. However, this latter assumption is based on limited coarse-level data available from Washington GAP Analysis modeling. A focused inventory would be required to determine the actual distribution overlap in managed landscapes.

The Eastside Amphibian Evaluation Project is a relatively simple occupancy study being considered to address the distribution of FFR-designated amphibians, to determine if their distribution on eastside managed landscapes deserves larger study attention. The study would incorporate the probability of detection to ensure accurate occupancy descriptions across the eastside FFR landscape. Note: This project is listed under Type N Amphibian Response Program, but its assessment may encompass at least some of the Type F landscape.

Status:

This project is under consideration and has not yet been scoped.

5.2.8 Extensive Riparian Status and Trends Monitoring Program

5.2.8.1 Program Strategy

The purpose of the Extensive Riparian Status and Trends Monitoring Program is to provide data needed to evaluate landscape-scale effects of implementing forest practices riparian prescriptions, and needed by state and Federal regulatory agencies to assure that forest practices rules can meet Clean Water Act requirements and riparian resource objectives. Critical questions for this program are shown in Table 14.

The projects of this program will obtain an unbiased estimate of the distribution of stream temperature and shade and of riparian stand characteristics on streams across FP HCP lands and, with resampling, the projects will identify trends in these indicators.

The Extensive Riparian Status and Trends Monitoring Program includes projects stratified by region (eastside/westside) and by stream type (fish-bearing and perennial non-fish bearing). Stratification at this coarse scale recognizes that riparian buffer requirements and forest stands differ across the state. Organizing this way allows strata to be tested separate from one another, creating projects of a manageable size.

Table 14. Extensive Riparian Status and Trends Monitoring Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions		Project Names
What is the current status of riparian conditions and functions in Type F/N streams on a statewide scale, and how are conditions changing over time?		
Program Research Questions	<i>What is the distribution of maximum summer stream temperature and 7-day mean maximum daily water temperature on FP HCP lands, and how is the distribution changing over time as the forest practices prescriptions are implemented?</i>	Extensive Riparian Status and Trends Monitoring – Temperature, Type F/N Westside Extensive Riparian Status and Trends Monitoring – Temperature, Type F/N Eastside
	<i>What proportion of stream length on FP HCP lands meets specific benchmarks for water temperature, and is this proportion changing over time as the forest practices prescriptions are implemented?</i>	
	<i>What are current riparian stand attributes on FP HCP lands, and how are stand conditions changing over time as the forest practices prescriptions are implemented?</i>	
How does stream shading change with buffer width and intensity of management across a range of stand types and characteristics in Washington?		
Program Research Question	<i>How does stream shading change with buffer width and stand conditions (e.g., basal area, density, age, height)?</i>	Riparian Characteristics and Shade Response Study

5.2.8.2 Extensive Riparian Status and Trends Monitoring – Temperature, Type F/N Westside

Description:

This project is intended to develop unbiased estimates of the frequency distribution of Type F/N stream temperatures across FP HCP lands in western Washington. Stream temperatures are monitored upstream and downstream from the study site. Along with stream temperature measurements, air temperature, shade, riparian vegetation type, LWD, and several channel measurements are collected

Status:

Sampling has been completed. The report was initially reviewed by RSAG and CMER then revised again based on the ISPR review of the Eastside Type F report. The updated copy was reviewed by RSAG and is awaiting revision based on comments received. The report was reviewed by ISPR, revised, and reviewed again by ISPR in 2018. Final revisions will be completed by December 2018.

5.2.8.3 Extensive Riparian Status and Trends Monitoring – Temperature, Type F/N Eastside

Description:

This project is intended to develop unbiased estimates of the frequency distribution of Type F/N stream temperatures across FP HCP lands in western Washington. Stream temperatures are monitored upstream and downstream from the study site. Along with stream temperature measurements, air temperature, shade, riparian vegetation type, LWD, and several channel measurements are also collected.

Status:

Approximately 50 sites were sampled in Type F streams over the 2007 and 2008 summer seasons. The revised report was completed and approved by Policy in June 2013.

Initial site screening occurred in the summer of 2008 in Type N streams. Only 10% of the sites inspected had flow during the summer monitoring season (site requirement), when peak temperatures occur. Site screening may follow the hydrology study report. Policy decided to deprioritize this Eastside N strata as part of their negotiated settlement of the Master Project Schedule in 2014.

5.2.8.4 Extensive Riparian Status and Trends Monitoring – Vegetation, Type F/N Westside and Eastside Projects

Description:

The Type F/N eastside and westside studies will be performed concurrently. These projects will assess riparian conditions in randomly selected Type N, F, and S stream reaches across FP HCP lands in the state in order to estimate conditions statewide. The vegetation assessment component will use the recommendations from the pilot study which is being conducted by Precision Forestry Cooperative at the University of Washington. The feasibility of using the same sites used in the Extensive Riparian Status and Trends Monitoring temperature study will be investigated.

Status:

In 2006 a pilot study evaluated the accuracy of deriving riparian stand metrics from different scales of aerial photos compared to stand data from ground surveys. The contractor concluded that large-scale aerial custom photography could meet riparian assessment needs if combined with other remote sensing (e.g., Lidar) to accurately locate streams. Further study to evaluate the utility and cost effectiveness of using other remote sensing technology including satellite imagery was recommended, but no new work was planned at the time.

A literature synthesis was completed by the Precision Forestry Cooperative at the University of Washington in June 2015 under the direction of RSAG. Dr. Moskal's group reviewed articles on the use of remote sensing to evaluate the cost and value of various remote sensing tools to quantify 13 riparian forest metrics. This literature review was specifically requested by Policy to inform decision makers on what remote sensing methods they may want to test in a pilot project. The purpose of the pilot project was to determine if remote sensing can be used in place of traditional field work to accomplish the purposes established in the CMER Work Plan for extensive status and trend vegetation analysis. CMER and Policy approved the first pilot project for riparian extensive vegetation monitoring and it was started in November 2015. This project looked at riparian vegetation on all stream types—S, F, Np and Ns—and all ownerships in the Mashel watershed. This project was completed July 2017.

A new scoping proposal was completed by Precision Forestry Cooperative in June 2018. The scoping document and prospective findings report were delivered to Policy for the “Extensive Riparian Vegetation Monitoring Implementation (second) Pilot Project.” Further action on implementation depends on the outcome of CMER and Policy deliberation and funding availability.

5.2.8.5 Riparian Characteristics and Shade Response StudyDescription:

The Riparian Characteristics and Shade Response Study has been scoped. The study will use a PoPPPP stratified sampling framework to create regionally robust estimates of the effect that buffer width, and intensity of management within the buffer, has on shade under a range of stand conditions.

Critical questions identified in the scoping document include:

1. How does stream shade change in response to a range of no-cut and thinned buffer zones used alone and in combination?
2. How does the shade provided by the tested buffer configurations vary by stand type (e.g., Douglass fir, hemlock-spruce, Ponderosa pine)?
3. What stand metrics (e.g., stand height, relative density, trees per acre, basal area, and crown ratio) alone or in combination, are the best predictor of shade and light attenuation; and how do these predictor variables vary by stand type?
4. What parameter input values and/or changes in the Ecology SHADE.xls model (e.g., canopy density, light extinction, stream overhang) would improve prediction

accuracy for timber stand types common to commercial forestlands covered under the FPHCP in Washington?

Status:

Project scoping document was developed by RSAG (February 2018), approved by CMER (June 2018), and sent to TFW Policy (August 2018) for consideration. Policy requested and received additional information on how spreading one study design alternative out for more years affects the overall project costs, and approved developing the study design for completion by June 30, 2019.

5.2.8.6 Wood Recruitment Volume and Source Distances from Riparian Buffers Project

Description:

Forest Practices Habitat Conservation Plan (FPHCP) uses riparian buffers to meet the functional resource objective for large wood recruitment/ habitat complexity. Source-distance curves and volume estimates developed with data from unmanaged forests in western Oregon (McDade et al. 1990) and various wood recruitment models were used to design the FPHCP riparian buffers. It seems reasonable to expect that wood recruitment volumes and source distances in riparian buffers consisting of second- growth stands characteristic of managed forest lands would differ from unmanaged stands or models, due to factors such as tree height, species composition, and disturbance in buffers exposed to wind and other disturbances when the adjacent stand is harvested. This project would reduce scientific uncertainty and risk for the FP-HCP riparian strategy due to this information gap by obtaining data on the relationship between buffer width and wood recruitment volume and source distance in forest stands typically of lands managed under the Forest Practices HCP.

Status:

This project has not been initiated or scoped yet.

5.3 TYPE F RIPARIAN PRESCRIPTIONS RULE GROUP

5.3.1 Rule Overview and Intent

The FP HCP recognizes differences in riparian systems and processes between eastern (eastside) and western (westside) Washington. However, though the Type F riparian rules prescribe different protection strategies for eastern and western Washington riparian management zones (RMZs), they also share some basic characteristics. The common characteristics are RMZs equal in width to a site-potential tree height and divided into three zones: core, inner, and outer. All zones are intended to provide key riparian functions, including bank stability, shade, wood recruitment, litterfall, and preventing sediment delivery to streams caused by surface erosion. The core zone is adjacent to the stream and is a no-harvest zone. The core zone is intended to provide most key riparian functions. The inner zone extends outward from the core zone and is primarily intended to provide additional shade and large woody debris (LWD) recruitment. The outer zone extends the RMZ out to one site-potential tree height.

During development of the Forests and Fish Rules, the protection of bull trout was determined to be an area of special concern because the species was listed under the Endangered Species Act (ESA) as threatened throughout its geographical distribution in Washington. A main factor contributing to bull trout's threatened status is the degradation of habitat, especially increasing stream temperatures. Bull trout require cooler stream temperatures than other salmonids. The water quality standards in place at the time of forest practices rule development were assumed to be too warm for bull trout. The proposed rule protection strategies for shade and stream temperature were assumed to be more at risk in eastern Washington than in western Washington because of the potential for more shade removal from within eastside RMZs, combined with warmer eastside air temperatures. Therefore, an additional shade rule to be applied within the bull trout habitat overlay (BTO) was prescribed for eastern Washington riparian rules in order to provide adequate stream temperature protection for bull trout (see section below on eastside Type F rules for further details). The additional shade rule does not apply to western Washington.

The specific rule protection strategies for western and eastern Washington are described separately in the sections below.

Westside Type F Rules:

The FFR described the goal of the riparian strategies for westside Type F (fish-bearing) streams as follows:

“Riparian silvicultural treatments and conservation measures that are designed to result in riparian conditions on growth and yield trajectories towards what are called ‘desired future conditions.’ As used in this report, desired future conditions are the stand conditions of a mature riparian forest, agreed to be 140 years of age (the midpoint between 80 and 200 years) and the attainment of resource objectives.... These desired future conditions are a reference point on the pathway to restoration of riparian functions, not an endpoint of riparian stand development.”

The western Washington Type F riparian rules are based upon the following assumptions:

- The desired future condition (DFC) basal area targets adequately describe mature riparian forest conditions (140 years old).
- Stands meeting the DFC targets will provide the aquatic habitat conditions needed to achieve functions and to meet the overall performance goals and resource objectives.
- The growth model used for DFC adequately projects riparian growth and mortality.
- Some hardwood-dominated riparian stands need to be converted to conifer in order to achieve DFC.

Western Washington RMZs consist of three zones, including the following:

1. A 50-ft.-wide no-harvest core zone.
2. An inner zone extending from 10 to 100 ft. beyond the core zone (depending on the site class and stream size) where the timber harvest management objective is to place the combined core and inner zone on a trajectory to grow into the DFC.
3. An outer zone extending beyond the inner zone to the edge of the RMZ where timber harvest is managed to protect special sites and wildlife habitat, and to provide for one site-potential tree height, required by the Federal Services under the FP HCP.

Eastside Type F Rules:

The goals for the eastern Washington Type F riparian rules are to provide for stand conditions that (1) vary over time within the range of historical disturbance regimes; (2) provide riparian functions needed to meet resource goals for fish, amphibians, and water quality; and (3) maintain forest health by minimizing risk of catastrophic damage from insects, disease, or fire.

The eastern Washington Type F riparian rules are based upon the following assumptions:

- The management strategies in the Type F rules will put stands in the RMZ on a trajectory that is within the range of natural variability.
- The defined elevation bands are reasonably accurate reflections of the spatial distribution of historical disturbance regimes and species compositions.
- The management strategies will minimize risk of catastrophic events within the RMZs.
- The management strategies will put stands on a trajectory that will provide the riparian functions needed to support harvestable populations of fish.
- The shade/temperature overlays are necessary to provide stream temperatures that meet the state water quality standards and the needs of bull trout.

Eastern Washington Type F rules consist of three riparian zones, including the following:

1. A 30-ft.-wide no-harvest core zone.
2. An inner zone that is 45 to 70 ft. wide (depending on site class and stream size).

3. An outer zone between 0 and 55 ft. wide.

The sum of the core, inner, and outer zones approximates the height of a site-potential tree, which varies with site class. Allowable harvest within the inner and outer zones is different for each of three elevation bands, referred to as timber habitat types in the rules. These elevation bands were intended to emulate variations in natural disturbance regimes, variations in species distributions, and other riparian characteristics. Guidance for selecting RMZ leave trees based on size and species are intended to move riparian stand conditions toward larger trees of fire- and disease-resistant species.

Two shade rules exist for the eastside Type F riparian rule package. The first is the Standard Shade Rule, which defines the amount of shade needed to meet state water quality standards (in place at the time of rule development) using the nomograph in Section 1 of the Forest Practices Board Manual. The second is the all available shade rule, which applies to areas within the BTO. The BTO is an area defined on a map that depicts the distribution of known and potentially suitable bull trout habitat in eastern Washington. When a timber harvest unit is located within the BTO, all available shade (as determined by a densiometer) must be retained within 75 ft. of the bankfull channel width or channel migration zone (CMZ), whichever is greater. Outside of the BTO, prescriptions fall under the Standard Shade Rule, which can allow for harvest of a portion of shade trees within the 75 ft., depending on elevation and the amount of canopy cover prior to harvest.

The FP HCP assumes that riparian forests managed in accordance with western and eastern Washington riparian rule strategies will provide adequate levels of key riparian functions (providing LWD, bank stability, shade, and nutrients and preventing sediment input to streams) necessary to meet the resource objectives and performance targets outlined in the FP HCP.

5.3.2 Rule Group Resource Objectives and Performance Targets

Resource Objectives:

- Heat/Water Temperature: Provide cool water by maintaining shade, groundwater temperature, flow, and other watershed processes controlling stream temperature.
- LWD/Organic Inputs: Develop riparian conditions that provide complex habitats for recruiting LWD and litter.
- Sediment: Provide clean water and substrate and maintain channel-forming processes by minimizing to the maximum extent practicable the delivery of management-induced coarse and fine sediment to streams (including timing and quantity) by protecting stream-bank integrity, providing vegetative filtering, protecting unstable slopes, and preventing the routing of sediment to streams.
- Hydrology: Maintain surface and groundwater hydrologic regimes (magnitude, frequency, timing, and routing of stream flows) by disconnecting road drainage from the stream network, preventing increases in peak flows causing scour, and maintaining the hydrologic continuity of wetlands.

Performance Targets:

- Stream Temperature: Meet water quality standards.
- Shade:
 - In type F and S streams, except eastside bull trout habitat, meet targets produced by the shade model or, if this model isn't used, reach 85–90% of all effective shade.
 - Eastside target is all available shade within 75 ft. of designated bull trout habitat per predictive model.
- Riparian Condition:
 - In westside and high-elevation eastside habitats, riparian stands are on pathways to meet DFC targets (species, basal area, trees per acre, growth, and mortality).
 - On the eastside, except high elevation, the target is the desired future condition (DFC); and current stands on pathways to achieve eastside condition ranges for each habitat series.
- Pool Frequency: Meet target of less than 2 channel widths per pool.
- Sediment:
 - Mass wasting – target is virtually none triggered by new roads, and a favorable trend on old roads.
 - Timber harvesting-related—target is no increase over natural background rates from harvest on a landscape scale on high-risk sites.
 - Old roads are not to exceed 0.15-0.25 (ratio of road length delivering to streams/total stream length in miles) in the coast (spruce) zone and west of the crest; 0.08-0.12 east of the crest. Old roads are not to exceed 6-10 T/yr (ratio of road sediment production delivered to streams/total stream length in tons/year/mile) in coast (spruce) zone; 2-6 T/yr west of the crest; and 1-3 T/yr east of the crest.
 - Targets include no stream-bank disturbance outside road crossings on S/F streams; less than or equal to 10% of the equipment limitation zone (ELZ); and less than 12% embedded fines (< 0.85 millimeters).
- In-stream LWD:
 - Westside – 5% of recruitment potential for stands on the trajectory toward DFC, with additional recruitment from trees in the outer zone. See Schedule L-1 for details on numbers of pieces¹.
 - Eastside – To be developed, based on eastside disturbance regimes.

¹ Details for the number of in-stream LWD pieces are found in the Schedule L-1 version adopted by the Forest Practices Board on 02-14-01.

- Residual Pool Depth: See Schedule L-1 for details².
- Stream/ELZ disturbance: No stream-bank disturbance outside road crossings.
- Peak Flows: Westside – target is not to cause a significant increase in peak flow recurrence intervals resulting in scour that disturbs stream-channel substrates that provide actual or potential habitat for salmonids, attributable to forest management activities³. Increases in two-year peak flows related to forest management (roads and harvest) are less than 20%⁴.
- Groundwater Temperature: To be developed.

5.3.3 Rule Group Strategy

Uncertainties exist about the validity of the above-mentioned assumptions and effectiveness of the rules to achieve resource objectives and performance targets; this uncertainty leads to a series of critical questions and programs to address them (Table 15). The programs include the following:

1. The DFC Validation Program, a rule tool program that addresses the validity of the westside DFC performance targets and the accuracy of the DFC model that is used to project stand trajectory to age 140. The purpose of this program is to validate the DFC approach for management of western Washington, conifer-dominated riparian stands on fish-bearing streams.
2. The Eastside Riparian Type F Rule Tool Program, which assesses current riparian stand and stream conditions on Type F streams across the eastside to provide a baseline for effectiveness monitoring and for establishing eastern Washington targets.
3. The Eastside Type F Riparian Effectiveness Program, which addresses the effectiveness of eastside Type F prescriptions in meeting riparian functions and resources conditions.
4. The Westside Type F Riparian Effectiveness Program, which addresses effectiveness of the Type F riparian rules in meeting performance targets and achieving resource objectives.
5. The Bull Trout Habitat Identification Program, which is a rule tool program. The primary goal of this program was to develop protocols and/or predictive models for determining sampling efficiency, presence/absence of bull trout, and habitat suitable to support bull trout. Site-specific data on bull trout presence/absence above barriers or habitat suitability would help to identify areas that might be added or removed from the bull trout habitat overlay, as defined in the rule. The work for this program has been completed and no further work is planned at this time.

² Details for residual pool depths are found in the Schedule L-1 version adopted by the Forest Practices Board on 02-14-01.

³ From Schedule L-1, Appendix H to Forests and Fish Report.

⁴ From Schedule L-1, version adopted by Forest Practices Board on 01-14-01.

6. The Hardwood Conversion Program, which addresses uncertainty regarding strategies and prescriptions for managing hardwood-dominated riparian stands by harvesting the hardwood and reforesting the area with conifer.
7. The Extensive Riparian Status and Trends Monitoring Program, which documents status and trends of riparian conditions on Type F streams on a regional scale.
8. The Intensive Monitoring/Cumulative Effects Program, which is designed to evaluate the cumulative effects of multiple forest practices on a watershed-scale, and to improve our understanding of causal relationships and the biological effects of forest practices rules on aquatic resources.

Table 15. Type F Riparian Prescriptions Rule Group Critical Questions and Programs

Rule Group Critical Questions	Program Name	Task Type	SAG
Does the DFC model adequately project stand basal area growth to age 140? Do the basal area targets adequately describe mature riparian forest conditions?	DFC Validation Program	Rule Tool	RSAG
What is the current range of conditions for eastside riparian stands and streams? What are appropriate LWD performance targets? Can the shade/temperature relationships in the eastside temperature nomograph be refined? How does stream shading change with buffer width and intensity of management across a range of stand types and characteristics in Washington? Will application of the prescriptions result in stands that achieve eastside FP HCP objectives (forest health, riparian function, and historical disturbance regimes)?	Eastside Type F Riparian Rule Tool Program	Rule Tool	RSAG/ SAGE
How can habitat suitable for bull trout be identified?	Bull Trout Habitat Identification Program	Rule Tool	Former BTSAG
Are the Type F riparian rules effective in meeting the performance targets, resource objectives, and overall performance goals of the FP HCP? Are current Type-F buffer prescriptions effective in providing/maintaining fish habitat necessary to support fish populations?	Westside Type F Riparian Effectiveness Program	Effectiveness	RSAG ISAG

Rule Group Critical Questions	Program Name	Task Type	SAG
<p>Are the Type F riparian rules effective in meeting the performance targets, resource objectives, and overall performance goals of the FP HCP?</p> <p>Will application of the prescriptions result in stands that achieve eastside FP HCP objectives (forest health, riparian function, and historical disturbance regimes)?</p> <p>Are both the standard eastside prescriptions and the all available shade rule effective in protecting shade and stream temperature and in meeting water quality standards?</p> <p>Are there differences between the standard eastside rule and the BTO all available shade rule in the amount of shade provided and their effect on stream temperature?</p> <p>Is all available shade actually achieved with the densiometer methodology under the BTO shade rule?</p> <p>Are forest practices riparian prescriptions effective at protecting groundwater flow and temperature?</p>	<p>Eastside Type F Riparian Effectiveness Program</p>	<p>Effectiveness</p>	<p>SAGE</p> <p>RSAG</p> <p>ISAG</p>
<p>Where and how should hardwood conversion projects be conducted, and what are the ecological outcomes?</p>	<p>Hardwood Conversion Program</p>	<p>Effectiveness</p>	<p>RSAG</p>
<p>What is the current status of riparian conditions and functions in Type F and S streams on a regional scale, and how are conditions changing over time?</p>	<p>Extensive Riparian Status and Trends Monitoring Program</p>	<p>Extensive</p>	<p>RSAG</p>
<p>How do aquatic organisms respond to changes in habitat and water quality associated with changes in riparian inputs and functions?</p> <p>What are the cumulative effects of forest practices on fish habitat and/or fish populations at the watershed scale?</p> <p>How do riparian buffer prescriptions for forest health affect fish habitat and fish populations?</p> <p>Will more frequent drought and flood events, associated with climate change, influence the effectiveness of current riparian buffers?</p>	<p>Intensive Monitoring/ Cumulative Effects Program</p>	<p>Intensive</p>	<p>RSAG</p> <p>ISAG</p>

5.3.4 DFC Validation Program (Rule Tool)

5.3.4.1 Program Strategy

The DFC Validation Program is administered by RSAG and is designed to address uncertainties about the DFC approach, including uncertainties about (1) how well the current targets reflect mature unmanaged riparian conditions for conifer and mixed stands; (2) how prescription options and constraints affect leave tree requirements and future basal area; (3) the accuracy of site class maps; (4) how accurately the DFC model predicts growth of riparian stands to age 140; (5) what sort of habitat conditions will be provided by mature riparian stands; and (6) how young stands of different composition and density develop as they mature.

The program consists of several projects designed to answer a series of critical questions (Table 16). The DFC Target Validation Project was identified as a high priority by CMER and the Monitoring Design Team. To manage conifer and mixed riparian stands to achieve functions associated with mature stands, the DFC approach requires stand targets that reflect mature stand conditions and a model that can accurately predict the trajectory of young stands to maturity.

Work on the DFC Target Validation Project began in 2000, and the project results were transmitted to Policy in March 2005. In response to the DFC report, Policy requested that CMER undertake three additional tasks: (1) conduct scoping for a project to standardize the width of the plots used in the DFC study to address concerns raised in the ISPR (DFC Plot Width Standardization Project); (2) prepare a scoping document to identify and evaluate potential approaches for validating the accuracy of the DNR site class maps in riparian areas (DFC Site Class Map Validation Project); and (3) complete a study, originated by the Northwest Indian Fisheries Commission (NWIFC) staff, to determine how the westside Type F riparian prescriptions are being applied by landowners and to evaluate how the different prescription options and constraints influence the amount of timber available for harvest and projected future basal area (the FPA Desktop Analysis Project).

Validation of the DFC model is another important issue to be addressed by this program. Development of a study to quantify the growth and dynamics of riparian buffers created by implementation of the DFC rule was put on hold while RSAG waited to assess the feasibility of the regional cooperative effort to study growth and mortality in riparian stands, to address this issue in a cost-effective manner. The DFC Aquatic Habitat Project was ranked as a lower priority. Consequently, scoping on this project has not begun, although RSAG proposed conducting this study as part of the DFC Plot Width Standardization Project (Policy rejected this recommendation). The Pathways of Riparian Stand Development to Maturity Project is an outgrowth of the DFC Target Validation Project, based on the realization that many young, low-density stands of mixed composition may not achieve DFC on a timeline consistent with policy objectives without some form of intervention. Finally, a better understanding of the development of such stands is needed to identify appropriate management approaches.

Table 16. DFC Validation Program: Rule Group Critical Questions and Associated Research Projects

Rule Group Critical Questions		Project Names
Does the DFC model adequately project stand basal area growth to age 140?		
Do the basal area targets adequately describe mature riparian forest conditions?		
Program Research Questions	<i>Do the DFC targets accurately reflect stand conditions for mature, unmanaged conifer-dominated west-side riparian stands?</i>	DFC Target Validation Project DFC Plot Width Standardization Project
	<i>How are the westside Type F riparian prescriptions being applied by landowners? What is the effect of various prescription options and constraints on current harvest and projected future basal area?</i>	FPA Desktop Analysis Project
	<i>What is the accuracy of the DNR site class maps in riparian areas, and what factors influence map accuracy?</i>	DFC Site Class Map Validation Project
	<i>Does the DFC growth and mortality model accurately predict the trajectory of westside conifer-dominated riparian stands to age 140?</i>	DFC Trajectory Model Validation Project
	<i>What aquatic habitat conditions are associated with mature westside riparian stands?</i>	DFC Aquatic Habitat Project DFC Plot Width Standardization Project
	<i>How do mature stand structures develop from younger stands in a variety of stand compositions and densities?</i>	Pathways of Riparian Stand Development to Maturity Project
	<i>What growth trajectories and successional pathways are characteristic of hardwood-dominated riparian stands?</i>	Red Alder Growth and Yield Model Project

5.3.4.2 DFC Target Validation Project

Description:

The purpose of this project was to collect data on stand characteristics from a random sample of mature (140 years) unmanaged conifer-dominated riparian stands in western Washington; to compare basal area per acre from the field sample with the current DFC targets in rule; and to evaluate alternative parameters for characterizing DFC.

Status:

This project has been completed. The results are available in a CMER document titled “Validation of the Western Washington Desired Future Conditions (DFC) Performance Targets in the Washington State Forest Practices Rules with Data from Unmanaged, Conifer-Dominated Riparian Stands.” The results were transmitted to Policy for consideration in the summer of 2005. In 2009, the Board adopted rule changes based on the results of the DFC Target Validation Project.

5.3.4.3 DFC Plot Width Standardization Project

Description:

In response to the DFC Target Validation Project described above, Policy requested that CMER undertake several additional tasks, including scoping a follow-up sampling effort to standardize the width of the plots used in the DFC study to address concerns raised in the ISPR regarding grouping plots by field-measured site class.

Status:

RSAG completed scoping of this document in the spring of 2006. CMER approved a scoping paper with options for follow-up sampling and simultaneously conducting aquatic habitat validation research; this paper was presented to Policy in the summer of 2006. Policy has not approved moving forward with this project.

5.3.4.4 FPA Desktop Analysis Project

Description:

This project was intended to determine how westside Type F prescriptions are being applied by landowners and to evaluate the effect of various riparian prescription options and constraints on timber available for current harvest and on projected future basal area. Although originated by NWIFC staff outside of the adaptive management program, Policy requested that CMER complete a desktop analysis of a random set of forest practices applications (FPAs) that had active management of the inner zone, and to conduct a field-verification project on a subsample of those FPAs. From FPAs approved for harvest in 2003 and 2004, 75 were randomly selected in each year, and the associated stand inventory data were entered in the concurrent DFC model. As part of the quality assurance process, data from 15 randomly selected FPAs were compared to field data collected by CMER staff (i.e., FPA Field Check Report).

Status:

A draft report on the desktop analysis was presented to RSAG in December 2005. Data collection for the field-verification project occurred in the winter of 2006, and a draft report was submitted to RSAG in the spring of 2006. Later in 2006, CMER approved a contract to finalize the desktop analysis, field check, and model and manual reports, along with a document that synthesized findings from each of the reports. This work was completed in 2007 and the desktop analysis and field check reports underwent ISPR in 2009. A final report was submitted to Policy and the Board in 2010.

5.3.4.5 DFC Site Class Map Validation Project

Description:

The third request from Policy was to prepare a scoping document that identifies and evaluates approaches for validating the accuracy of the DNR site class maps in riparian areas.

Status:

CMER staff prepared a scoping document that was approved by CMER and presented to Policy in the summer of 2006. Policy has not approved moving forward with this project.

5.3.4.6 DFC Trajectory Model Validation Project

Description:

This project will assess the accuracy of the desired future condition (DFC) model in predicting riparian stand growth and trajectory from harvest age to the DFC target (age 140). This project will be designed to validate the DFC model as a tool to predict trajectory to the DFC target for both conifer-dominated and mixed stands.

Status:

This study has neither been scoped nor designed. RSAG does not plan to begin scoping on this project at this time.

5.3.4.7 DFC Aquatic Habitat Project

Description:

The purpose of this project is to determine the range of aquatic habitat associated with mature (DFC) riparian forest conditions.

Status:

This study has been neither scoped nor designed, except for the work proposed in the DFC Plot Width Standardization Project. RSAG does not plan to begin scoping on this project or implementing the DFC Plot Width Standardization Project unless directed by Policy.

5.3.4.8 Pathways of Riparian Stand Development to Maturity Project

Description:

The purpose of this project is to determine the development sequence of younger stands of various species compositions and densities to mature stands. The study is intended to inform management of uneven-aged stands and those of low density or mixed composition.

Status:

RSAG does not plan to begin scoping this project at this time.

5.3.4.9 Red Alder Growth and Yield Model Project

Description:

The purpose of this project is to develop a growth and yield model for red alder. Existing models either do not include red alder among the species simulated or use equations that are based on too few field data. In this project, cooperators from across the Pacific Northwest have contributed data that were compiled and edited at the Oregon State University (OSU) Hardwood Silviculture Cooperative. A growth and yield model for red alder will be developed from these data in a second phase of the project. Red alder is a dominant component of many riparian forests, and although the model is not specific to riparian areas, it will provide better information on the growth dynamics of this species in riparian stands than is currently available.

Status:

CMER contributed project development funds to this cooperative effort in the past, and in the fall of 2006 received a request from the Washington Hardwood Commission to fund additional sampling at some existing sites. This request was approved and the work occurred in the winter of 2007. The model was completed by the Hardwood Commission (or OSU) in 2010.

5.3.5 Eastside Type F Riparian Rule Tool Program

5.3.5.1 Program Strategy

The Eastern Washington Riparian Assessment Project consists of the following studies: Phase 1 and Phase 2 of the riparian assessment study, and the Eastside Type F Channel Wood Characterization Study. Both the Phase 1 and the channel wood characterization study are designed to sample the current condition of riparian and in-stream conditions (baseline conditions) on FP HCP lands. Phase 2 of the riparian survey is designed to complete the analysis of the information collected in Phase 1 to answer the critical questions of the study. Phase 2 also contains a modeling approach in which the Phase 1 data will be analyzed to help address the rule group critical question, “Will application of the prescriptions result in stands that achieve eastside FP HCP objectives (forest health, riparian function, and historical disturbance regimes)?” By modeling the riparian data collected in Phase 1, SAGE can begin to explore what conditions are sustainable when the current forest practices rules are applied to various stand conditions in eastern Washington.

Based on the final results of Phase 2, SAGE will then decide what additional data are needed before desired future conditions can be developed for riparian forest stands. Still in the study plan stage, the In-Stream Channel Wood Characterization Project and its results will be evaluated similarly in order to determine the next steps necessary for developing desired future conditions for LWD. Once these desired future conditions have been established, effectiveness monitoring can begin.

Uncertainties about the validity of assumptions and effectiveness of the rule led to the critical questions listed in Table 17.

Table 17. Eastside Type F Riparian Rule Tool Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
What is the current range of conditions for eastside riparian stands and streams?	Eastern Washington Riparian Assessment Project – Phase 1
	Eastside Type F Channel Wood Characterization Study
	Eastern Washington Riparian Assessment Project – Phase 2
What are appropriate LWD performance targets?	Eastside LWD Literature Review Project
	Eastside Type F Channel Wood Characterization Study

Can the shade/temperature relationships in the eastside temperature nomograph be refined?	Eastside Temperature Nomograph Project
Will application of the prescriptions result in stands that achieve eastside FP HCP objectives (forest health, riparian function, and historical disturbance regimes)?	Eastside Disturbance Regime Literature Review Project Eastside Timber Habitat Evaluation Project (ETHEP)

5.3.5.2 Eastside Disturbance Regime Literature Review Project

Description:

A literature review titled “A Review and Synthesis of Available Information on Riparian Disturbance Regimes in Eastern Washington” was produced to gain an understanding of what disturbance regimes existed in the past and how they affected riparian forests. The information from this review will help determine whether we can apply these past conditions to present riparian stands and meet the desired future conditions for riparian function.

The literature review indicates that, despite a very large information base on historical and current disturbance regimes within eastern Washington forests, differences in riparian and upslope forest disturbance regimes and post-disturbance responses are not well known. Much of the scientific literature describing eastern Washington disturbance regimes and forest responses is at the forest series or plant association group level and does not distinguish between riparian and upslope communities. The differences between current and historical disturbance regimes for fire are better defined than for insects, pathogens, and other disturbance types. No clear consensus exists on whether there is a difference between disturbance regimes and forest responses of riparian and upslope areas. In fact, available information on riparian ecosystem disturbance regimes and responses was often contradictory. Additional research is recommended on forest stand disturbance processes at the regional-scale, to supplement existing data and better define the role of disturbance in riparian and upslope forest habitats. The likelihood of duplicating historical disturbance regimes, to reestablish historical forest conditions, is low given current forest stand conditions and global climate change.

Status:

This document was approved by CMER in June 2002.

5.3.5.3 Eastside LWD Literature Review Project

Description:

A literature review titled “A Review of the Available Literature Related to Wood Loading Dynamics in and around Streams in Eastern Washington Forests” was undertaken to help gain an understanding of the dynamics of functional stream wood and, to a lesser degree, the linkage between the level of LWD recruitment and the health of aquatic habitat. Addressing the uncertainty will require additional information on the relationship of LWD recruitment and habitat function. There is uncertainty about the response of aquatic habitat to different types or levels of LWD input and loading and about how much LWD riparian buffers need to produce.

SAGE's literature review consisted of 41 questions concerning channel wood issues in eastern Washington. Ten of the 41 questions were answered at least in part by studies in eastern Washington, but these were usually limited to a few specific regions of eastern Washington. The other questions could not be answered by literature currently available for eastern Washington.

Status:

This document was approved by CMER in 2004.

5.3.5.4 *Eastside Temperature Nomograph Project*

Description:

The Eastside Temperature Nomograph Project developed an eastern Washington-specific nomograph using existing data and identified gaps for future study. The study identified site characteristics necessary to produce a better predictive model of stream temperatures in eastern Washington.

Status:

The report was reviewed by SAGE and CMER and was not accepted as an approved project because technical shortcomings were identified. The document was retired to the file with comments noted. The data used in the analysis have been obtained and archived for potential future use and analysis.

5.3.5.5 *Eastern Washington Riparian Assessment Project (EWRAP)*

Description:

Eastern Washington has a wide range of climatic conditions, elevations, forest types, riparian zones, and management history. The focus of the Eastern Washington Riparian Assessment Project is to document the current range of conditions of riparian stands on eastside forestlands. Information gathered through this project provided CMER and Policy with a common understanding of status and characteristics of riparian stands in lands managed under the eastside Type F prescriptions. The data were analyzed to identify patterns in the distribution of riparian stand types across eastern Washington, and relationships between riparian stand conditions and factors such as precipitation, elevation, and geology.

Due to the perceived variability of forest stand attributes being high in eastside Type F streams, Phase 1 of this study was designed to test proposed methodologies; determine appropriate sample size with current riparian data; provide a data set that could be used for future studies, such as extensive monitoring and an in-stream characterization study; and to provide a baseline for future monitoring.

Variability was lower between sites than expected; thus, Phase 2 of this study is entirely a desktop project, which analyzes data from the 103 Phase 1 sites. This work characterized the accuracy of forest practices rules and habitat types, and included an assessment of how much harvest can occur on each site given stand densities and tree size.

Status:

The report for the Phase 1 was approved by CMER in 2007. The Phase 2 final report was completed in late 2015; it was approved by both SAGE and CMER and was approved with no action taken by Policy in 2016.

5.3.5.6 Eastside Modeling Evaluation Project (EMEP)Description:

This project was initially part of Phase 2 of the EWRAP. Due to multiple contracting issues this component was never completed and was submitted to the Adaptive Management Program as a separate project from SAGE.

The EMEP modeling uses the riparian stand data collected from Phase 1 of the EWRAP project to assign fire and disease risk ratings (current and projected), under current or alternate plan, between eco-regions and within the 240-foot transect length from which riparian stand data were collected. Growth and yield models were used to extrapolate future stand conditions and provide detailed data about present and future stand structure and composition.

In summary, the EMEP was designed to model current riparian stand conditions to estimate the extent to which current riparian stands achieve the three FFR eastside riparian objectives (provide necessary riparian functions, are within the range of historic stand conditions, and to reduce risk of catastrophic damage due to disease or insect outbreaks).

Status:

A Request for Qualifications and Quotations (RFQQ) was released in early 2016; a contractor was selected. A draft final report was approved by CMER in November 2016 and sent to ISPR review. The contractor is reviewing and responding to ISPR comments with an estimated completion date in late 2018.

5.3.5.7 Eastside Timber Habitat Evaluation Project (ETHEP)Description:

A set of management prescriptions were developed by eastside forest and aquatic resource managers during the negotiations of the Forest and Fish Report rule package. The prescription packages created a classification system that places riparian stands into one of three Timber Habitat Types (THT) and these three THTs are determined by the specific elevation zone of the Riparian Management Zone (RMZ). Specific harvest management prescriptions were developed for each THT. Validation of whether these THTs accurately represent the actual habitat type has not occurred and many resource managers feel that they may not be accurate.

The issues that supported the initial EWRAP study were assigned a high priority by CMER due to a high level of scientific uncertainty with the prescriptions, as well as the potential risk to aquatic resources (CMER 2004). Critical question #2, sub-question #4 in the EWRAP scoping document specifically stated, "Is the current riparian timber habitat type classification system valid?" Data collected and reviewed in EWRAP Phase 1 and Phase 2 support the concern over the accuracy of the Timber Habitat Type divisions in the current forestry rules. SAGE members

strongly feel that this question remains important and needs further focused research to inform the question.

Status:

A scoping document was approved in SAGE in October 2015, but was not reviewed by CMER for movement to Policy. This project was ranked #2 by CMER in April 2016 to be funded by the Mid-year CMER Project List. A sub-group was formed in August 2018 to work on an updated scoping document for this project based on feedback from subject experts.

5.3.5.8 Eastside Type F Channel Wood Characterization Study (ESICCS)

Description:

Characterizing eastern Washington's Type F streams is important, because information is scarce or simply does not exist that describes the current status of channel wood conditions and that condition's influence on in-stream habitat conditions. SAGE has identified three primary problems due to this lack of information. First, the scarcity of data limits the ability to make informed management decisions required of land managers and regulators. Second, a lack of information hinders the ability to address forest health risks (insects, disease, and fire) in upland and riparian forests. Finally, land managers and regulators have little guidance or context to evaluate alternate plans to meet necessary stream and riparian functions.

SAGE believes that better information is needed to determine the appropriate frequency and distribution of channel wood for meeting properly functioning aquatic habitat conditions. In addition, desired channel wood conditions need approximate the historical disturbance regimes.

Status:

Study design was approved by CMER in 2009 to accompany the EWRAP project, but the ESSICS project was removed as a priority due to budgetary constraints. It is unknown whether it will be completed.

5.3.6 Bull Trout Habitat Identification Program (Rule Tool)

5.3.6.1 Program Strategy

The Bull Trout Habitat Identification Program is a rule tool program. This program was developed to address possible modifications of the bull trout habitat overlay, as defined in the rule. Because knowledge of the current and potential distribution of the species is imprecise, large areas of forestland in eastern Washington may be included in the bull trout habitat overlay (BTO). These areas may result in excessive restrictions and in riparian conditions that do not meet the intent of the eastside riparian strategy. Site-specific data on bull trout presence/absence or habitat conditions were thought to be helpful in identifying areas to add or remove from the BTO.

Two primary tasks have been identified for this program: (1) develop sampling efficiency models and protocols for detecting bull trout; and (2) developing habitat prediction models for helping to make determinations of habitats unsuitable to support bull trout.

This program was originally administered by the former BTSAG. The work for this program has been completed. Because of the difficulty in stakeholder agreement regarding removing areas from the BTO, efforts have moved to comparing and assessing the effectiveness of the two shade rules in protecting and maintaining shade and stream temperature. Results from this effort could lead to modifications of the BTO, in part or as a whole. No further work is planned for this program at this time.

Table 18. Bull Trout Habitat Identification Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
How can habitat suitable for bull trout be identified?	Bull Trout Presence/Absence Protocols
	Bull Trout Habitat Prediction Models
	Yakima River Radiotelemetry

5.3.6.2 Bull Trout Presence/Absence Protocols

Description:

Because sampling efficiency and probability of detection for bull trout were believed to be less than that known for other salmonids, work was focused first on developing sampling efficiency models for bull trout specifically. These sampling efficiency models were intended to prescribe the effort necessary to be able to detect bull trout, using three different survey methods (electroshocking, day snorkeling, and night snorkeling). The models also included the influence of physical channel features on the response of bull trout to sampling activities and compared probabilities of detection with and without the use of blocknets.

Status:

Sampling efficiency models for detecting bull trout have been developed as part of the presence/absence protocols. Two papers were finalized and approved by CMER, relating to sampling efficiency models: (1) “Development of Bull Trout Sampling Efficiency Models,” by Thurow et al., March 2004; and (2) “Analysis of Movement Patterns of Stream-Dwelling Salmonids in Response to Three Survey Methods,” by Peterson et al., July 2003. These papers provide valuable information on the probability of detection and associated effort needed to survey for bull trout presence under various habitat conditions; some of the findings could be included in a bull trout field protocol, but additional work would be needed to achieve the program goal of developing this protocol. The two CMER reports have been forwarded to Policy, who accepted the reports and decided that no further action was needed at this time.

5.3.6.3 *Bull Trout Habitat Prediction Models*

Description:

This project was designed to develop habitat suitability models for bull trout, which would help in identifying those areas on the BTO that might actually be “unsuitable” for supporting the species. According to the forest practices rules, if areas were found to be unsuitable for potentially supporting bull trout, those areas could be exempt from the requirements of the all available shade rule. This project focused on bull trout juveniles; it did not include adult bull trout. The model’s preliminary results showed that the primary habitat predictor of suitable habitat for juvenile bull trout was stream temperature.

Status:

To date, preliminary draft models have been found to be too coarse for forest practices purposes. One report from this project was finalized and approved by CMER: “Models to Predict Suitable Habitat for Juvenile Bull Trout in Washington State,” by Dunham and Chandler, July 2001. This report provided valuable information pertaining to habitat suitability for juvenile bull trout. However, the study only resulted in a preliminary model, which was too coarse of a screen for determining what would represent unsuitable bull trout habitat within forested lands. Predictive models tend to be more appropriate for determining “suitable” habitat rather than “unsuitable” habitat. Additional work is needed to incorporate additional variables, resulting in a finer screen for determining what might be suitable or unsuitable habitat. It is likely, however, that a model would not be adequate by itself to determine habitat suitability; additional field surveys would probably be needed on a site-by-site basis. The CMER report has been forwarded to Policy, who accepted the report and decided that no further action was needed at the time.

5.3.6.4 *Yakima River Radiotelemetry*

Description:

This project was designed to evaluate the migratory patterns of adult bull trout and to identify their distribution and habitat preferences in the Yakima River watershed. The information gained from this project informed bull trout presence/absence protocols and habitat prediction models.

Status:

This project was contracted through the US Fish and Wildlife Service (USFWS) and was only partially funded with CMER funds. The final report, “An Investigation into the Migratory Behavior, Habitat Use and Genetic Composition of Fluvial and Resident Bull Trout (*Salvelinus confluentus*) in the Yakima River Basin” was completed in December 2015. The report was delivered to the AMP in late 2017 and added to the IMS system even though there is not an official CMER report number.

5.3.7 Westside Type F Riparian Effectiveness Program

5.3.7.1 Program Strategy

The purpose of this program is to undertake research and monitoring to evaluate the effectiveness of westside Type F riparian prescriptions, to compare and evaluate alternative westside Type F buffer treatments, and to validate westside Type F performance targets. The program is designed to address scientific uncertainty about FFR/HCP prescriptions for westside Type F streams, including the following:

- Survival of buffer trees and rates of buffer tree mortality from competition, windthrow, disease, insects, and other factors.
- Post-harvest changes in conifer-dominated westside RMZs, and whether westside stands will remain on trajectory to achieve DFC performance targets.
- Uncertainty about the level of riparian functions provided by riparian stands produced by Type F prescriptions, and whether FP HCP resource objectives and performance targets will be achieved.
- Efficacy of alternative buffer designs in providing riparian functions and meeting resource objectives and performance targets.
- Validity of performance targets for Type F streams.

Table 19 lists the critical questions for the Westside Type F riparian effectiveness program, and identifies specific projects to address them.

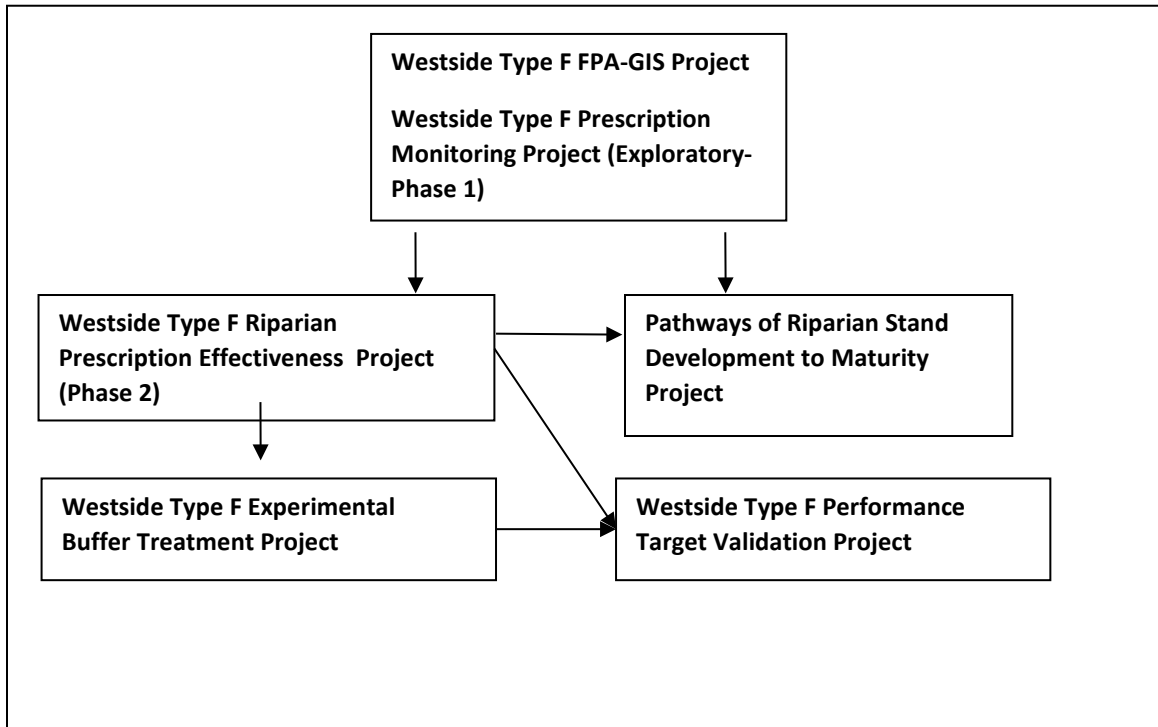
Table 19. Westside Type F Riparian Effectiveness Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions		Project Names
Are the Type F riparian rules effective in meeting the performance targets, resource objectives, and overall performance goals of the FP HCP?		
Program Research Questions	<i>Riparian Stand Characteristics and Riparian Functions</i> <i>How do the RMZ and no-RMZ harvest prescriptions affect riparian stand characteristics and riparian functions?</i>	Westside Type F Riparian Prescription Monitoring Project (Phase 1)
	<i>How do the characteristics of riparian forest stands and associated riparian functions in areas with RMZ and without RMZ harvest change over time?</i>	Westside Type F Riparian Prescription Effectiveness Project (Phase 2)
	<i>Do riparian forest stands in areas with RMZ and without RMZ harvest remain on trajectory to achieve DFC targets?</i>	Pathways of Riparian Development to Maturity Project (DFC Validation)

Rule Group Critical Questions	Project Names
<p><i>Physical Stream Characteristics and Processes</i></p> <p><i>How do physical stream characteristics and processes respond to changes in riparian functions in areas with RMZ and without RMZ harvest?</i></p> <p><i>Do physical stream characteristics and processes meet performance targets?</i></p>	
<p><i>Aquatic Biological Response</i></p> <p><i>What is the aquatic biological response to changes in riparian functions in areas with RMZ and without RMZ harvest?</i></p>	
<p><i>Would alternative approaches to the westside Type F prescriptions be more effective in meeting FP HCP resource objectives and performance targets, while reducing costs or increasing flexibility for landowners?</i></p>	Westside Type F Experimental Buffer Treatment Project
<p><i>Are Westside Type F performance targets valid and meaningful measures of success in meeting resource objectives?</i></p>	Westside Type F Performance Target Validation Project
<p><i>Are forest practices riparian prescriptions effective at protecting groundwater flow and temperature?</i></p>	Groundwater Conceptual Model Project

We propose implementing these projects in a sequence such that each project will help to inform the design and implementation of subsequent projects (Figure 1). The Westside Type F Riparian Prescription Monitoring Project is the first phase of the project in the sequence. This project began by analyzing information from forest practice applications and GIS data to determine how frequently westside Type F FPAs occur in different management categories (e.g., RMZ inner zone harvest, no RMZ inner zone harvest, site class, stream width). This informed the scoping and study design phases of the Project; the data should also be useful in the study design for the Pathways of Riparian Stand Development to Maturity Project in the DFC Validation Program, and the Westside Type F Performance Target Validation Project. The first phase of the project will provide information on the effectiveness of the current FP HCP prescriptions in achieving resource objectives and performance targets. Once completed, the results will help RSAG decide if there is a need to design and implement the Westside Type F Experimental Buffer Treatment Project, which would test the effectiveness of alternative treatments that are currently not included in the FFR/HCP prescriptions.

Figure 1. Relationship of projects in the Westside Type F Riparian Effectiveness Program.



5.3.7.2 Westside Type F Riparian Prescription Monitoring Project

Description:

The purpose of this project is to determine how stand conditions respond over time to the Westside Type F riparian prescriptions and to evaluate the effectiveness of the prescriptions in meeting FP HCP resource objectives and performance targets. We anticipate that the project would evaluate both stands where active management of the inner zone will occur (based on meeting DFC basal area/acre targets), as well as stands where no management of the inner zone will occur when the adjacent stand is harvested. The project is anticipated to focus on the response of riparian stands, riparian inputs (such as heat energy and large wood), channel habitat, and aquatic biota to answer the critical questions.

Status:

CMER assembled a technical writing and implementation group (the Westside Type F Riparian Prescription Effectiveness Monitoring TWIG) and a charter to initiate the scoping and study design process. The TWIG's initial tasks were to review and revise the critical questions for this project, review relevant literature, and develop and evaluate study design options to address the critical questions. In December 2015, Policy approved a “hybrid phased-approach” to answer the critical questions related to Riparian Stand Characteristics and Riparian Functions, Physical Stream Characteristics and Processes, and Aquatic Biological Response.

Step 1 (FY 2016) of the scoping and study design phase involved an office review and analysis of forest practice applications and GIS data to determine the following: how frequently different riparian prescription variants were being implemented; regional distribution patterns; and limited

information on the characteristics of the sites and adjacent streams where the prescriptions are being applied. Step 1 was completed in FY 2016.

Step 2 the study design, was completed and reviewed by ISPR and then approved by CMER in spring of 2018. The pilot study uses an after impact approach that focuses on assessing riparian stand conditions and selected riparian functions across a range of prescription variants and site conditions. This will provide a large-scale, coarse-level assessment of current riparian stand conditions that focuses on addressing scientific uncertainty about mortality, stand trajectory (DFC), and riparian functions associated with different prescription variants following harvest (see *Riparian Stand Characteristics and Riparian Functions* in Table 19). This assessment will be done in the context of detecting potential differences in site conditions across the landscape. The pilot study is being implemented in the fall of 2018 and will be completed in approximately three years.

Step 3 will utilize results from the pilot study to estimate the direction and magnitude of change associated with the prescription variants, and determine the potential influence of site conditions on riparian stand conditions and functions following treatments. This information would be used to tailor and focus the study design to provide fine-scale assessments of treatment effects for a select set of prescription variants and site conditions. This study would improve our understanding and decrease scientific uncertainty about the linkage between riparian prescriptions, changes in riparian stands and riparian functions, and the aquatic resource response (habitat, wood recruitment, temperature, and aquatic organisms). This study could be completed in approximately eight years.

5.3.7.3 Westside Type F Experimental Buffer Treatment Project

Description:

The purpose of this project is to test the effectiveness of alternative treatments, which are not part of the current FFR/HCP prescription package. RSAG will recommend whether to pursue this project after reviewing the results of the Westside Type F Riparian Prescription Effectiveness Project.

Status:

This project has been neither scoped nor designed.

5.3.7.4 Type F Performance Target Validation Project

Description:

This project will evaluate the validity of the Type F performance targets and the measures of success in meeting resource objectives.

Status:

This project has been neither scoped nor designed.

5.3.8 Eastside Type F Riparian Effectiveness Program

5.3.8.1 Program Strategy

The purpose of the Eastside Type F Riparian Effectiveness Program is to conduct research and monitoring to evaluate the effectiveness of the eastside Type F riparian rules in meeting resource objectives and riparian functions. The goals of the eastern Washington Type F riparian rules are to provide for stand conditions that (1) vary over time within the range of historical disturbance regimes; (2) provide riparian functions needed to meet resource goals for fish, amphibians, and water quality; and (3) maintain forest health by minimizing risk of catastrophic damage from insects, disease, or fire.

Six rule group critical questions are covered under the Eastside Type F Riparian Effectiveness Program (see Table 20). Four projects are identified to address those critical questions. The BTO Temperature (Eastside Riparian Shade/Temperature) Project evaluated the effectiveness of the two shade rules (the standard shade rule using the nomograph, and the all available shade rule within the bull trout habitat overlay) for protection of stream temperature. A companion study (the Solar Radiation/Effective Shade Project) focused on effectiveness of the densiometer methodology for actually achieving all available shade within the bull trout habitat overlay. The Eastside Type F Riparian Effectiveness Monitoring Project (BTO add-on) uses the same sites as the Eastside Riparian Shade/Temperature Project and the Solar Radiation/Effective Shade Project to assess changes in stand conditions, buffer integrity, and LWD recruitment. In order to understand how effectively the forest practices rules protect groundwater temperature and flow, a conceptual model needs to be developed to understand where the areas of sensitivity might be. The Groundwater Conceptual Model Project would provide guidance on where effectiveness monitoring should be focused. Table 20 lists the rule group critical questions and the projects identified to address each of those critical questions.

Table 20. Eastside Type F Riparian Effectiveness Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
Are the Type F riparian rules effective in meeting the performance targets, resource objectives, and overall performance goals of the FP HCP?	Bull Trout Overlay [BTO] Temperature (Eastside Riparian Shade/Temperature) Project Solar Radiation/Effective Shade Project Eastside Type F Riparian Effectiveness Monitoring Project (BTO add-on)
Will application of the prescriptions result in stands that achieve eastside FP HCP objectives (forest health, riparian function, and historical disturbance regimes)?	BTO Temperature (Eastside Riparian Shade/Temperature) Project Solar Radiation/Effective Shade Project Eastside Type F Riparian Effectiveness Monitoring Project (BTO add-on)

Rule Group Critical Questions	Project Names
<p>Are both the standard eastside prescriptions and the all available shade rule effective in protecting shade and stream temperature and in meeting water quality standards?</p> <p>Are there differences between the standard eastside rule and the BTO all available shade rule in the amount of shade provided and their effect on stream temperature?</p> <p>Is all available shade actually achieved with the densiometer methodology under the BTO shade rule?</p>	<p>BTO Temperature (Eastside Riparian Shade/Temperature) Project</p> <p>Solar Radiation/Effective Shade Project</p>
<p>Are forest practices riparian prescriptions effective at protecting groundwater flow and temperature?</p>	<p>Groundwater Conceptual Model Project</p>

5.3.8.2 Bull Trout Overlay Temperature (Eastside Riparian Shade/Temperature) Project

Description:

The Eastside Riparian Shade/Temperature Project was designed to evaluate the effectiveness of both the all available shade rule and the standard eastside riparian prescriptions in meeting FP HCP resource objectives. The project aimed at determining if a difference exists between shade and stream temperature provided by the BTO all available shade prescriptions and the standard shade requirements. The field study was originally implemented by BTSAG but is currently administered by RSAG. The study design specified a two-year, pre-harvest data collection period, a year for harvesting, and a two-year, post-harvest data collection period. This study was combined with the Solar Radiation/Effective Shade Project.

Status:

Post-harvest data collection was completed during the 2010 field season. The draft report has been through CMER and ISPR review. RSAG approved sending the post ISPR draft to CMER for approval in March 2014. The final CMER report #02-214.

5.3.8.3 Solar Radiation/Effective Shade Project

Description:

The Solar Radiation/Effective Shade Project was designed to evaluate whether all available shade is actually achieved under the BTO shade rule. This study was conducted in conjunction with the BTO Temperature (Eastside Riparian Shade/Temperature) Project.

Status:

This project is complete. CMER report #02-212..

5.3.8.4 Eastside Type F Riparian Effectiveness Monitoring Project (BTO add-on)

Description:

The original RSAG study design for eastside Type F riparian prescription effectiveness monitoring called for random sampling of Type F forest practices applications (FPAs) paired

with untreated control sites to determine the effectiveness of the prescriptions as applied operationally across the range of conditions on FP HCP lands. The eastside was to be sampled as a separate stratum. However, the Eastside Riparian Shade/Temperature Project demonstrated the great expense and difficulty in finding suitable treatment and control sites in eastern Washington. Consequently, the decision was made to utilize the BTO temperature study sites for the eastside riparian prescription monitoring component, even though they were not randomly selected, in order to save money, expedite implementation of the project, and provide an integrated package of results for the adaptive management process. This will be accomplished by collecting additional data on changes in vegetation, buffer integrity, and LWD recruitment at the BTO temperature study sites. (Consequently, the Eastside Type F Riparian Effectiveness Monitoring Project is sometimes referred to as the BTO add-on project.)

Status:

Draft final report has been sent to ISPR in January 2018 and is pending review.

5.3.8.5 Groundwater Conceptual Model Project

Description:

The Groundwater Conceptual Model Project was designed to investigate the potential impacts of timber harvest on groundwater temperatures; these groundwaters could have the potential to discharge to streams and thereby affect the temperature regime of fish habitat. A draft literature review has been completed. However, the draft conceptual model developed from the original contract did not meet the expectations or objectives described by the former BTSAG to identify areas that might be highly susceptible to groundwater heating after timber harvest. CMER and the USFWS were able to make additional progress on developing the intended conceptual models; however, due to limited staffing availability and higher priorities, the models have not yet reached completion.

Status:

This project has currently been put on hold, and it is unknown whether further CMER work will occur.

5.3.9 Hardwood Conversion Program (Effectiveness)

5.3.9.1 Program Strategy

The purpose of the Hardwood Conversion Program is to inform the FP HCP strategy for converting riparian stands from hardwood to conifer-dominated. These riparian stands may include a variety of hardwood species, although red alder (*Alnus rubra*) is typically the most common in western Washington. Presence of alder-dominated riparian stands on the landscape is sometimes the result of past forest management practices, which historically did not always include conifer reforestation after harvest.

Table 21 presents the critical questions and projects of the Hardwood Conversion Program. The program began by implementing the Riparian Hardwood Conversion Project to provide

information for Policy about the effectiveness of hardwood conversion treatments to regenerate conifers successfully, and about the economic costs and benefits of hardwood conversion. In response to guidance from Policy, a component to examine stream temperature response was added to the project after the silvicultural study design had been adopted.

In spring of 2005, another project was initiated in response to a request from the Small Forest Landowners Advisory Committee that was developing a small forest landowner hardwood conversion template. This group requested information on the effect of hardwood conversion on stream temperature as a function of buffer width and stream length treated. In response to this request, Ecology submitted a proposal to CMER for the Hardwood Conversion Water Temperature Modeling Project. The project was carried out and is described below under Ecology Water Temperature Modeling Project.

Table 21. Hardwood Conversion Program: Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions		Project Names
Where and how should hardwood conversion projects be conducted, and what are the ecological outcomes?		
Program Research Questions	<i>How effective are different hardwood conversion treatments in reestablishing conifers in hardwood-dominated riparian stands?</i>	Riparian Hardwood Conversion Project
	<i>When is hardwood conversion in riparian stands operationally feasible, and what are the economic costs and benefits of the hardwood conversion treatments?</i>	
	<i>What effects do hardwood conversion treatments in riparian stands have on shade, stream temperature, and LWD recruitment?</i>	Riparian Hardwood Conversion Project – Temperature Component Annotated Bibliography: Riparian Hardwood Conversion ¹
	<i>What is the effect of hardwood conversion practices on stream temperature as a function of buffer width and length of stream treated?</i>	Ecology Water Temperature Modeling Project

¹In 2011, RSAG decided to terminate the Annotated Bibliography: Riparian Hardwood Conversion. See status update below for explanation.

5.3.9.2 Riparian Hardwood Conversion Project

Description:

The Riparian Hardwood Conversion Project is a series of case studies at eight sites. Each site consists of landowner-designed and implemented site-specific harvests of hardwood trees in riparian buffers. In each case, harvest is followed by reforestation with conifers. Data about tree regeneration and residual stand condition are collected at each site. Data collection also includes annually asking participating landowners to document their silvicultural strategies and the costs and benefits associated with each conversion.

Status:

Harvest has occurred at all sites, and four years after harvest, monitoring of regeneration is complete. CMER reviewed a draft interim report describing the pre-harvest, harvest, silviculture, and costs and benefits of the harvests at six of the eight sites. This report is titled “The Draft Case Study Reports: Hardwood Conversion Study,” and the principal investigator was Frank Brown of Pacific Rim Forestry. Final drafts of the eight case study reports were received in spring of 2012 and were reviewed and approved by CMER. An interim summary report synthesizing the results and findings from the eight case studies was reviewed and approved by RSAG and CMER in 2014.

RSAG requested and received Policy approval to revisit the eight sites in FY 2016 to collect year ten regeneration and general buffer condition data. The ten-year resample is in response to concerns that four-year post-harvest stocking data do not reliably determine the likely future conifer stocking levels at these sites. RSAG approved the case study reports and the synthesis report. The reports went to CMER for review and approval and was sent to ISPR in early 2018.

5.3.9.3 Riparian Hardwood Conversion Project – Temperature ComponentDescription:

Stream temperatures were measured upstream and downstream and at 25-m intervals along stream reaches at the same eight study sites used in the Riparian Hardwood Conversion Project. These temperature measurements occurred before and after harvests. Pre-harvest data collection began in 2003, with the final post-harvest data collected in 2006. The minimum buffer width was 25 ft., but ranged from 25 ft. to more than 100 ft. This project was contracted with WDFW.

Status:

The final report has been reviewed and approved by CMER. This report did not undergo ISPR since it provided the data and site descriptions only and did not include a statistical evaluation of harvest effects on stream temperature. High inter- and intra-site variability in both the treatment and control sites before and after harvest prevented CMER from using the data in a statistical analysis of treatment effects. CMER therefore agreed to finalize the study as a data collection report and archive all of the supporting documentation for potential future use.

5.3.9.4 Annotated Bibliography: Riparian Hardwood ConversionDescription:

The proposed bibliography was meant to assemble literature citations, including comments about the value and findings of each citation. This bibliography would describe silviculture and effects of hardwood conversion on riparian functions, including shade, stream temperature, and nutrient inputs.

Status:

Initial drafts of the annotated bibliography were considered inadequate; and after several revisions and discussions by RSAG on the scope, intent and overall usefulness of the bibliography in the adaptive management program, RSAG decided to terminate this project in 2011.

5.3.9.5 Ecology Water Temperature Modeling Project

Description:

This study used an existing stream temperature and shade model to explore the relative effect on stream temperature of different hardwood conversion strategies. The management strategies that were evaluated include a one-sided harvest with continuous 30-ft. and 50-ft.-wide buffers with treated stream lengths ranging from 500 to 1,500 ft. A sensitivity analysis was performed on a range of modeled stream conditions (width, flow, gradient, groundwater, and hyporheic flow).

Status:

A draft report was completed in 2006 and was reviewed and approved by CMER. The report was completed in 2007 and submitted to the Small Forest Landowners Advisory Committee, who forwarded the report on to Policy with a recommendation of no further action warranted at this time.

5.3.10 Intensive Monitoring/Cumulative Effects Program

5.3.10.1 Program Strategy

Intensive monitoring is watershed-scale research designed to evaluate the cumulative effects of multiple forest practices and to improve our understanding of causal relationships and the biological effects of forest practices rules on aquatic resources (validation monitoring). The evaluation of cumulative effects of multiple management actions on a system requires an understanding of how individual actions influence a site and how those responses propagate through the system. This sophisticated level of understanding can only be achieved with an intensive, integrated monitoring effort. Evaluating biological responses is similarly complicated, requiring an understanding of how various management actions interact to affect habitat conditions and how aquatic organisms respond to these habitat changes. This program was identified in the Monitoring Design Team (MDT) Report (MDT 2002) as an essential component of an integrated monitoring program.

CMER is in the process of scoping its intensive monitoring needs but currently has not finalized a strategy for the Intensive Monitoring/Cumulative Effects Program. Contacts with outside programs with similar interests in intensive monitoring (such as the state's Intensively Monitored Watersheds Program) are being pursued to identify opportunities for collaboration.

5.4 CHANNEL MIGRATION ZONE RULE GROUP

5.4.1 Rule Overview and Intent

The channel migration zone (CMZ) is an area within a river or stream valley where the active channel is prone to move laterally. The intent of the CMZ rule is to maintain riparian forest functions (e.g., woody debris recruitment, bank reinforcement, shade, and litter) along migrating channels, in their present or future location. No timber harvest, salvage, or road construction (except for road crossings) is allowed within CMZs without an alternate plan that specifies the conditions that will provide equal and overall effective protection of public resources as described in the forest practices rules and the Forest Practices Act.

5.4.2 Rule Group Resource Objectives and Performance Targets

Resource Objectives:

- Same as for Type F riparian prescriptions (see Section 5.3).

Performance Targets:

- Same as for Type F riparian prescriptions (see Section 5.3).

5.4.3 Rule Group Strategy

The strategy for the CMZ Rule Group is intended to answer a set of critical questions that address uncertainties concerning CMZ delineation and effectiveness (Table 22). The first question arises from the need to identify and delineate the CMZ so that the prescriptions can be implemented as intended. The rule assumes that the CMZ can be identified and that the extent of the CMZ can be and will be consistently delineated by landowners. This assumption has high uncertainty because, although many CMZs are relatively easy to recognize, their boundaries are difficult to define in the field. Incorrect delineation of the CMZ edge results in incorrect placement of the adjacent riparian management zone (RMZ), making it potentially vulnerable to channel disturbance. The second question addresses the future patterns of channel migration. The CMZ rule is based on the assumption that the area subject to channel migration during the last 100 years will not shift during the next 100 years. A high level of uncertainty exists for this assumption because changes in land use and other factors (i.e., in channel wood, sediment, and flow) during the next 100 years could change the frequency of channel avulsion (the most common form of channel migration in forested conditions).

Table 22. CMZ Rule Group Critical Questions and Programs

Rule Group Critical Questions	Program Names	Task Type	SAG
What field/map criteria allow consistent, repeatable delineation of the CMZ lateral boundaries (“edge”)?	CMZ Delineation Program	Rule Tool	UPSAG
Will the physical processes that drive channel migration change appreciably due to the application of forest practices rules?	CMZ Validation Program	Intensive	UPSAG

5.4.4 CMZ Delineation Program

5.4.4.1 Program Strategy

The purpose of the CMZ Delineation Program is to assess the available methods and criteria for accurately identifying and delineating CMZs. The program will develop materials and procedures to aid field managers in the consistent and accurate delineation of CMZs. The program consists of two projects (see Table 23. CMZ Delineation Program: Applicable Rule Group Critical Questions with Associated Research Projects). The first would provide a screening tool to locate areas with potential CMZs, and the second would provide a methodology to accurately delineate their boundaries once located. The program is not being actively developed because of its low ranking in the CMER priority list.

Table 23. CMZ Delineation Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
What field/map criteria allow consistent, repeatable delineation of the CMZ lateral boundaries (“edge”)?	CMZ Screen and Aerial Photograph Catalog Project and CMZ Boundary Identification Criteria Project Consistency and Accuracy of CMZ Boundary Delineations

5.4.4.2 *CMZ Screen and Aerial Photograph Catalog Project and CMZ Boundary Identification Criteria Project*

Description:

The need for the CMZ delineation project, which was outlined in the 2005 work plan, may have been resolved with the 2004 revision of the Forest Practices Board Manual for CMZs (i.e., Section 2 in the Manual), which provides more detailed guidance. This is not an active project.

Status:

Aside from the preliminary scoping, no CMER work on these topics has been proposed.

5.4.4.3 *Consistency and Accuracy of CMZ Boundary Delineations*

Description:

The recent development of revised CMZ delineation guidelines (i.e., Board Manual, Section 2) leaves open questions as to whether new methods result in accurate and consistent CMZ delineations. Although this project has not yet been scoped, it would likely involve field evaluation of a sample of CMZ delineations.

Status:

The project is not yet scoped. This issue may be included in the DNR Forest Practices Compliance Monitoring Program.

5.4.5 CMZ Validation Program (Intensive)

5.4.5.1 Program Strategy

There is general interest in learning how the protection and recovery of mature forests in CMZs will influence channel migration rates, aquatic habitat formation, and other functions. These questions could presumably be addressed by field and/or remote-based (photos, LIDAR) studies. Such issues have never been elevated among CMER priorities and thus no studies have been scoped to date.

Table 24. CMZ Validation Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
Will the physical processes that drive channel migration change appreciably due to the application of forest practices rules?	No projects scoped at this time

5.5 UNSTABLE SLOPES RULE GROUP

5.5.1 Rule Overview and Intent

The FP HCP goal for the management of potentially unstable slopes is to prevent forest practices from increasing or accelerating mass wasting (landslides) beyond the naturally occurring rates. The intent of the goal and its related rules is to protect water quality, aquatic habitat, and public safety by minimizing sediment delivery from management-related increases in mass wasting.

The rules assume the following: (1) the administrative process of identifying, reviewing, and regulating forest practices on potentially unstable slopes will maintain a naturally occurring rate of mass wasting following forest practices; (2) implementation of the unstable slopes prescriptions will achieve the Schedule L-1 resource objectives of clean water and substrate and will maintain channel-forming processes; and (3) implementation of the unstable slopes prescriptions will meet FP HCP landscape-scale performance targets (there are no site-scale targets).

The forest practices rules' default protective measure for potentially unstable slopes is avoidance. The rule protection strategy begins with definition of unstable landforms and the identification of unstable slopes. Based on the Forest Practices Board's recommendation, in 2014 DNR developed and implemented the Slope Stability Information Form to be completed by applicants that propose harvest on or near rule-identified landforms (RIL) and included with their forest practices application (FPA). This form provides additional information on the screening tools used by applicants and includes potentially unstable slopes within and adjacent to proposed forest practice activities. The strategy then is either to avoid the area or conduct a risk evaluation through the State Environmental Protection Act (SEPA) process (WAC 222-10-030).

WAC 222-16-050(1) defines "Class IV-special," which includes timber harvest or road construction, on RIL that have been field verified by the department and have the potential to deliver sediment or debris to a public resource or threaten public safety. Section 222-16-050(1)(d)(i) lists the five RILs and directs the reader to Section 16 of the board manual where RILs and their criteria are described in detail. The rule protection strategy relies on the ability of forest managers and regulators to recognize and mitigate for unstable slopes within the FPA and approval process. If forest practices are planned on potentially unstable slopes, the FPA process includes a SEPA review.

5.5.2 Rule Group Resource Objectives and Performance Targets

Resource Objectives:

- Sediment: Provide clean water and substrate and maintain channel-forming processes by minimizing to the maximum extent practicable the delivery of management-induced coarse and fine sediment to streams (including timing and quantity), by protecting streambank integrity and unstable slopes, providing vegetative filtering, and preventing sediments from routing into streams.

Performance Targets (for landslides):

- Road-related: Virtually none triggered by new roads; favorable trend on old roads.
- Timber harvesting-related: No increase over natural background rates from harvest on a landscape-scale on high-risk sites.

5.5.3 Rule Group Strategy

Table 25 contains critical questions for the Unstable Slopes Rule Group and identifies a series of programs to address them. The strategy is to immediately implement an unstable-landform identification program to address the first two critical questions, and then to design and implement programs for mass wasting effectiveness monitoring and validation, to assess the effectiveness of landform recognition and mitigation at various scales. All effectiveness, extensive, and intensive tasks are administered by UPSAG; rule tools are administered by DNR in collaboration with UPSAG.

Table 25. Unstable Slopes Rule Group Critical Questions and Programs

Rule Group Critical Questions	Program Names	Task Type	SAG
What screening tools can be developed to assist in the identification of potentially unstable landforms that minimize the omission of potentially unstable landforms?	Unstable Landform Identification Program	Rule Tool	UPSAG
Does harvesting of the recharge area of a glacial deep-seated landslide promote its instability? Can relative levels of response to forest practices be predicted by key characteristics of glacial deep-seated landslide and/or their groundwater recharge areas?	Glacial Deep-Seated Landslide Program	Rule Tool	UPSAG
Are unstable landforms being correctly and uniformly identified and evaluated for potential hazard? How does the rate of landsliding on managed lands compare to an estimate of the natural (background) rate? Are the forest practices unstable-landform rules effective at reducing the rate of management-induced landsliding at the landscape scale? Are the mass wasting prescriptions and mitigation measures effective in preventing landslides from roads and harvest units? Does windthrow on mass wasting buffers (leave areas) increase mass wasting?	Mass Wasting Effectiveness Monitoring Program	Effectiveness	UPSAG
What levels of cumulative sediment inputs are harmful to aquatic resources at the basin scale? How does turbidity associated with contemporary forest practices affect salmonid populations (e.g., growth, survival, movement)?	Mass Wasting Validation Program	Intensive	UPSAG ISAG

5.5.4 Unstable Landform Identification Program (Rule Tool)

5.5.4.1 Program Strategy

The purpose of the Unstable Landform Identification Program is to provide a set of screening tools to identify forested areas containing potentially unstable slopes and to focus field verification activities on potential problem areas, thereby improving our ability to avoid them.

The management strategy for regulating forest practices on unstable slopes consists primarily of an administrative process for identifying and reviewing forest practices on potentially unstable slopes. The main elements of the strategy include defining and screening unstable slopes, and improving the FPA classification process. The success of the management strategy for unstable slopes is dependent on early recognition of potentially unstable slopes by forest managers in order to avoid or mitigate the hazards posed by them. The projects in this program are specifically referenced in the FP HCP as necessary for implementing forest practices that meet resource objectives.

This program consists of five projects below, which provide statewide information on the distribution of unstable landforms. Because the projects develop screening tools that are used for information only and not as regulatory tools, we do not anticipate that program results will require Policy action.

Table 26. Unstable Landform Identification Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names	Status
What screening tools can be developed to assist in the identification of potentially unstable landforms that minimize the omission of potentially unstable landforms?	Shallow Rapid Landslide Screen for GIS Project	Completed (SLPSTAB)
	Technical Guidelines for Geotechnical Reports Project	Completed
	Regional Unstable Landforms Identification Project (RLIP)	Completed
	Landform Hazard Classification System and Mapping Protocols Project	Completed
	Landslide Hazard Zonation Project	On hold

5.5.4.2 Shallow Rapid Landslide Screen for GIS Project

Description:

This project has three phases. The first phase compared different slope stability models. Based on the results of Phase 1, Policy directed DNR to develop a GIS-based screen of modeled slope stability based on digital elevation model (DEM) topography for the westside. This first phase was completed in 2001 and was released as Timber, Fish and Wildlife (TFW) Report 118 titled, “Comparison of GIS-Based Models of Shallow Landsliding for Application to Watershed Management.” The second phase produced a modeled slope stability screen, which is available

on the DNR forest practices website (SLPSTAB). A third phase has been proposed to identify topographic model(s) appropriate for similar mapping on the eastside, but it was never initiated.

Status:

- Phase 1 — Complete
- Phase 2 — Complete
- Phase 3 — On hold

5.5.4.3 Technical Guidelines for Geotechnical Reports Project

Description:

This project develops technical guidelines for geotechnical reports used in the SEPA review process. The guidelines include identification of analytical tools and techniques that are appropriate for different projects and at different scales.

Status:

Complete.

5.5.4.4 Regional Unstable Landforms Identification Project (RLIP)

Description:

This completed project provided a coordinator to work with TFW cooperators within each DNR region in order to identify unstable landforms that do not meet the statewide landform descriptions. Its results also serve as an interim screen for deep-seated landslides by identifying lithologies that promote this type of slide; however, the project did not actually map individual deep-seated landslides but rather the areas where they occur in abundance. CMER and UPSAG recommended that the information created by the RLIP be incorporated into the Landslide Hazard Zonation (LHZ) Project. In 2005, data from this project were distributed to DNR regions.

Status:

Complete.

5.5.4.5 Landform Hazard Classification System and Mapping Protocols Project

Description:

This project developed a detailed protocol for mapping landslides and potentially unstable landforms in a consistent manner, leading to the assignment of hazard to unstable slopes in the forested environment. This project was completed in 2004; the protocol has subsequently been used to implement the Landslide Hazard Zonation (LHZ) Project (described below). State lands geologists have also applied the protocols to analysis of large blocks of land under state ownership.

Status:

This project was completed in 2004 and has been utilized in the LHZ Project.

5.5.4.6 *Landslide Hazard Zonation (LHZ) Project*

Description:

The Landslide Hazard Zonation (LHZ) Project had three phases. During Phase 1, all mass wasting modules from completed watershed analyses and other information on unstable landforms, landslides, and unstable slopes were collected and compiled in a GIS database. This database has been made available for free download to the public and is used as a screening tool in the forest practices application process. During Phase 2, mass wasting modules from incomplete watershed analyses were either finished, reviewed, and added to the database or were rejected. During Phase 3, the protocol was applied at the watershed scale following a list of priority watersheds; these watersheds were prioritized based on presence of steep slopes and FP HCP lands.

The LHZ Project was suspended in 2009 due to budgetary constraints. For Phase 2, there were 27 watershed administrative units (WAUs) identified as priorities for review and completion by the LHZ Project; nine were rejected during LHZ review.. During Phase 3, 39 LHZ projects (WAUs and/or State Land blocks) were completed. An additional 33 of the WAUs on the Phase 3 priority list have not been completed, although, some were partially completed within State Land blocks.

Status:

- Phase 1 — Complete
- Phase 2 — Complete (with nine WAUs rejected)
- Phase 3 — Suspended, waiting for additional funding

5.5.5 Glacial Deep-Seated Landslides Program (Rule Tool)

5.5.5.1 *Program Strategy*

The purpose of the Glacial Deep-Seated Landslides Program is to develop science, tools, and/or guidance for assessing the potential of forest practices to change groundwater hydrology in landslide recharge areas and accelerate or reactivate deep-seated landslides in glacial sediments. The seven listed projects develop tools or science that help us address the two critical questions: “Does harvesting of the recharge area of a glacial deep-seated landslide promote its instability?” and “Can relative levels of response to forest practices be predicted by key characteristics of glacial deep-seated landslides and/or their groundwater recharge areas?” See Table 27.

Policy and Forest Practices Board Requests:

At the budget retreat in 2006, Policy requested that UPSAG investigate pathways to resolve difficulties in the application of rules governing timber harvest on groundwater recharge areas of deep-seated landslides. In 2007, UPSAG hired a contractor to assist in scoping several alternative studies. UPSAG evaluated the scoped projects and presented their findings to CMER in the fall of 2007. No further progress on this program occurred until efforts were revitalized in the spring of 2014. The Forest Practices Board drafted several motions directing Policy and

CMER to review and update their mass wasting research strategy. A Mass Wasting Subcommittee of TFW Policy was formed; three UPSAG members participated and a document titled “Unstable Slopes – Glacial Deep-Seated Landslides and Their Groundwater Recharge Areas: Considerations for the CMER Work Plan” was written. These considerations have been added to the FY 2017 CMER Work Plan. Of key note are the addition of a second critical question, the initiation of the Literature Synthesis of the Effects of Forest Practices on Glacial Deep-Seated Landslides and Groundwater Recharge, and modifications to the Landslide Classification Project.

Table 27. Glacial Deep-Seated Landslides Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
Does harvesting of the recharge area of a glacial deep-seated landslide promote its instability?	Model Evapo-Transpiration in Deep-Seated Landslide Recharge Areas Project
	Evapo-Transpiration Model Refinement Project
	Literature Synthesis of the Effects of Forest Practices on Glacial Deep-Seated Landslides and Groundwater Recharge
	Groundwater Recharge Modeling Project
Can relative levels of response to forest practices be predicted by key characteristics of glacial deep-seated landslides and/or their groundwater recharge areas?	Glacial Deep-Seated Landslide Map Project
	Landslide Classification Project
	Board Manual Revision Project

5.5.5.2 Model Evapo-Transpiration in Deep-Seated Landslide Recharge Areas Project

Description:

This completed project developed an analytical model for assessing the evapo-transpiration changes resulting from timber harvest. The model was intended to be applied to timber harvest within the recharge area of deep-seated landslides in glacial sediments. The model has been developed but was not directly validated and refined because of insufficient field data to verify model parameters. As such, UPSAG and CMER did not recommend a policy change, even though the results of the model suggest that there is likely a significant, detectable change in water availability when converting an entire groundwater recharge area from mature forest to a clear-cut. A follow-up validation/refinement study could be pursued as a second phase, as described below.

Status:

Complete, but there has been no use of the model due to a general lack of available data required to run the model in the forested environment.

5.5.5.3 *Evapo-Transpiration Model Refinement Project*

Description:

This potential project would use fine-scale meteorological data to validate or refine the existing evapo-transpiration model, and would develop materials to facilitate application of the model. UPSAG presently recommends that this project not be pursued due to the low likelihood that fundamental scientific uncertainties will be resolved.

Status:

Scoped and on hold.

5.5.5.4 *Literature Synthesis of the Effects of Forest Practices on Glacial Deep-Seated Landslides and Groundwater Recharge*

Description:

This project is a focused literature review to summarize the best available science on the effects of forest practices on deep-seated landslides in glacial materials. The literature review includes an annotated database, a GIS map product, and a synthesis report. UPSAG undertook the first phase of the project, Literature Synthesis of the Effects of Forest Practices on Glacial Deep-Seated Landslides and Groundwater Recharge, in 2015 to provide updated background information to help address the question: “does harvesting of the groundwater recharge area of a glacial deep-seated landslide promote its instability?” The synthesis found that the sensitivity of glacial deep-seated landslides to forest practices is poorly understood and that many of the effects of forest practices must be inferred using measurements for different land-cover types (Miller 2016).

Status:

The Literature Synthesis of the Effects of Forest Practices on Glacial Deep-Seated Landslides and Groundwater Recharge was presented to UPSAG in June 2016 and approved by CMER and delivered to Policy in July 2016. UPSAG will use this literature review and synthesis to further develop a deep-seated landslide research strategy for inclusion in future updates to the CMER Work Plan.

5.5.5.5 *Groundwater Recharge Modeling Project*

Description:

This potential project would use groundwater modeling to determine whether there are ways of evaluating which parts of the groundwater recharge zone are most influential on landslide movement. This project might be useful if modeling efforts were focused on the common and probably sensitive types of stratigraphic and geomorphic situations, as might be identified by the Landslide Classification Project.

Status:

Scoped and on hold.

5.5.5.6 Glacial Deep-Seated Landslide Map Project

Description:

This project would identify all glacial materials and compile all existing map layers that contain deep-seated landslides. With the use of LiDAR, existing map layers would be corrected and currently unmapped areas would be added. This project is a simple rule tool that will be useful to land managers, stakeholders and regulators; it is also needed for implementation of the Landslide Classification Project.

Status:

On hold; a portion of this effort may occur outside CMER as the DNR utilizes new LiDAR data.

5.5.5.7 Landslide Classification Project

Description:

This potential project, as scoped in 2007, would categorize the common stratigraphic and geomorphic situations present among deep-seated landslides in glacial sediments to hypothetically evaluate which situations are most sensitive to changes in groundwater produced by upslope timber harvest. The 2014 Policy recommendations clarify that the first step would bin glacial deep-seated landslides by landslide type, by stratigraphic section, by size of the landslide and size of its groundwater recharge area, and by proximity to a river channel as these attributes hypothetically have variable sensitivity to forest practices. Policy recommended a second step, as long envisioned by UPSAG, that the range of potential sensitivities be empirically analyzed to test the degree to which forest practices have influence on one or more of the bins.

Status:

Preliminary scoping exists. This project is on hold until the program strategy can be further informed by the Literature Synthesis of the Effects of Forest Practices on Glacial Deep-Seated Landslides and Groundwater Recharge.

5.5.5.8 Board Manual Revision Project

Description:

This potential project would involve revisions of the Forest Practices Board Manual (Section 16) to more clearly describe which deep-seated landslides are at risk and what intensity of study might be needed based on the activity level of the landslide described by the groundwater recharge rule. In 2014, DNR convened an “Expert Panel” to revise portions of the Board Manual. A section on landslide run out and potential delivery was later revised by a TFW stakeholder group of qualified experts. The Board adopted the revised version of Section 16 in March 2015, and the section on run out and delivery in November 2015, but additional revisions are ongoing. The 2014–2015 revisions to Section 16 provided new guidance regarding the amount of study needed to address different situations. A review of existing geotechnical reports might provide additional ideas about analysis and interpretation of field evidence. Ultimately, the Landslide Classification Project will provide information about hazards and sensitivities.

Status:

Ongoing.

5.5.6 Mass Wasting Effectiveness Monitoring Program

5.5.6.1 Program Strategy

The purpose of the Mass Wasting Effectiveness Monitoring Program is to assess the degree to which implementation of the forest practices rules is preventing or avoiding an increase in landsliding beyond natural background levels. Natural background rates are difficult to determine. The Mass Wasting Effectiveness Monitoring Program will address the critical question that defines the program: “Are the mass wasting rules effective in preventing an increase in landslides that deliver to public resources or impact public safety?” The program strategy is to (1) evaluate the effectiveness of identifying unstable slopes for applying prescriptions (avoidance or mitigation); and (2) evaluate effectiveness at two scales: the landscape scale (extensive monitoring) and the site scale (effectiveness monitoring).

Five projects are proposed to address five critical questions (Table 28). The first, the Unstable Slope Criteria Project (which replaced the Testing the Accuracy of Unstable Landform Identification Project), was re-scoped as a pilot project under the LEAN process in response to Board direction and Policy feedback. The second, The Mass Wasting Effectiveness Monitoring Project, was an examination of the landslide response to the December 2007 storm in Southwestern Washington. This project was submitted as a non-consensus report to Policy. The third, the Mass Wasting Landscape-Scale Extensive Monitoring Project, has been preliminarily scoped. The fourth, Mass Wasting Buffer Integrity and Windthrow Assessment Project, is on indefinite hold. The fifth, the Literature Synthesis of the Effects of Forest Practices on Non-Glacial Deep-Seated Landslides and Groundwater Recharge Project, was completed in June 2017.

Table 28. Mass Wasting Effectiveness Monitoring Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
<p>Are unstable landforms being correctly and uniformly identified and evaluated for potential hazard?</p>	<p>Unstable Slope Criteria Project (which replaced the Testing the Accuracy of Unstable Landform Identification Project)</p> <p>Literature Synthesis of the Effects of Forest Practices on Non-Glacial Deep-Seated Landslides and Groundwater Recharge Project</p> <p>Deep-Seated Landslide Research Strategy Project</p>
<p>How does the rate of landsliding on managed lands compare to an estimate of the natural (background) rate?</p> <p>Are the forest practices unstable slopes rules effective at reducing the rate of management-induced landsliding at the landscape scale?</p> <p>Are the mass wasting prescriptions and mitigation measures effective in preventing landslides from roads and harvest units?</p>	<p>Mass Wasting Effectiveness Monitoring Project</p> <p>Mass Wasting Landscape-Scale Extensive Monitoring Project</p>
<p>Does windthrow on mass wasting buffers (leave areas) increase mass wasting?</p>	<p>Mass Wasting Buffer Integrity and Windthrow Assessment Project</p>

5.5.6.2 Unstable Slope Criteria Project: An Evaluation of Hillslopes Regulated under Washington Forest Practices Rules

Description:

This project will evaluate the degree to which the landforms described in the unstable slopes rules identify potentially unstable areas with a high probability of impacting public resources.

The project is being designed to evaluate the original Forests and Fish Report Schedule L-1 research topic: “Test the accuracy and lack of bias of the criteria for identifying unstable landforms in predicting areas with a high risk of instability” (FFR p. 127). The project replaces the Testing the Accuracy of Unstable Landform Identification Project, based on feedback from Policy at the November 2010 meeting. At that meeting, UPSAG presented two interpretations of the original Forests and Fish Report Schedule L-1 topic and asked for direction as to how to proceed and prioritize efforts. The TWIG is currently developing alternatives, and understands that Policy’s direction is to evaluate the landslide susceptibility of different slopes/landforms in the interest of evaluating current rule-identified landforms and identifying/characterizing additional potentially unstable landforms.

Status:

The TWIG received CMER approval for a document titled “Unstable Slope Criteria Project – Research Alternatives” on February 28, 2017 and then presented the alternatives to TFW Policy on March 2, 2017. Policy chose the TWIGs recommended alternative on April 6, 2017. The

TWIG's study plan for the first phase of the project has gone through the first ISPR review step. The TWIG is currently reviewing the ISPR comments.

5.5.6.3 Literature Synthesis of the Effects of Forest Practices on Non-Glacial Deep-Seated Landslides and Groundwater Recharge

Description:

This project was a companion project to the literature synthesis focused on deep-seated landslides in glacial materials, but focuses on non-glacial materials. UPSAG undertook the project in October 2016 to address questions related to the effects of harvesting of the groundwater recharge area of non-glacial deep-seated landslides on slope stability. An Unstable Slopes Proposal Initiation (PI), generated by the Forest Practices Board led to a memo "Recommendations from TFW Policy Committee to Forest Practices Board", dated August 4, 2016, informing the questions posed for the literature synthesis. This literature review builds on the annotated database and landslide inventory created for the glacial deep-seated literature review and includes a separate synthesis report to address additional questions about slope stability in non-glacial materials.

Status:

The glacial deep-seated landslide project contract was amended in October 2016 to include a second phase that addressed forest practices effects on non-glacial deep-seated landslides. The second phase is complete. UPSAG is using this literature review and synthesis to further develop the Deep-Seated Landslide Research Strategy..

5.5.6.4 Deep-Seated Landslide Research Strategy Project

Description:

This project is intended to use the results of the literature reviews for forest harvest effects on glacial deep-seated landslides (completed August 2016) and non-glacial deep-seated landslides (completed June 2017) to form a research strategy to address key knowledge gaps identified during the literature reviews and to address questions from the Forest Practices Board and Policy regarding the potential effects of forest practices on deep-seated landslides. This strategy included a description of projects, identified their priority, timeline, sequence, and estimated cost, and describes the relationship between the project and the critical questions. The strategy will evaluate the existing CMER deep-seated landslide work plan projects and revise, add or replace projects.

Status:

The strategy is complete and composed of several projects. The first of these projects is being scoped.

5.5.6.5 Mass Wasting Effectiveness Monitoring Project

Description:

This project was designed to statistically compare landslide rates among five harvest treatments and five road treatments. The treatments were sets of prescriptions associated with the period in which different forest practices rules were in effect. In late 2007, a storm produced a significant

population of landslides. Landslide data were collected within 4-square-mile blocks, and all area encompassed by the blocks was classified into one of the five harvest and five road treatments. Harvest and road landslides were analyzed separately, and primary statistical analyses were made relative to the block response to account for differences in geomorphology and rainfall intensity. Tests were conducted to determine whether there are differences in the density of landslides associated with each of the harvest and road treatments. The statistical design aimed to answer two critical questions in Table 28: “are the forest practices unstable slopes rules reducing the rate of management-induced landsliding at the landscape scale?” and, “are the mass wasting prescriptions and mitigation measures effective in preventing landslides from roads and harvest units?” The detailed data collection at individual landslides was used to help evaluate the effectiveness of specific best management practices.

Status:

The final report was submitted to CMER and Policy in May 2013 as CMER Publication 08-802. The report was submitted to Policy as a non-consensus report, which includes minority reports.

5.5.6.6 Mass Wasting Landscape-Scale Extensive Monitoring Project

Description:

This project will be designed to evaluate trends in the number and volume (or area) of landslides over time at the watershed scale using landslide inventory methods similar to those of watershed analysis. In broad terms, the trend monitoring will include sites that sample statewide variability in the factors that control landslide occurrence. These sites will consist of tracts containing both FP HCP-regulated lands and other forestlands under no or less extensive management (representative of natural or background conditions). Landslide rates and volume fluxes from both will be compared. Data to infer status and trends may consist of an inventory of landslides using data collected through the LHZ Project, complemented with aerial photography and maps of terrain, topography, forest cover, and road networks. Once this project is prioritized, UPSAG will work towards designing a study that can isolate the mass wasting trends associated with the forest practices rules from the dynamic noise of the natural system.

Status:

Preliminarily scoped and on hold because it is currently considered to be infeasible.

5.5.6.7 Mass Wasting Buffer Integrity and Windthrow Assessment Project

Description:

This project will be designed to test the effect of windthrow in mass wasting leave areas on overall landslide rates. One school of thought suggests that mass wasting leave areas are especially prone to windthrow. If that is true, then mass wasting leave areas may be counterproductive for reducing sediment load to streams. However, downed timber from windthrow has been documented as being effective at slowing the rate of sediment movement on the hillslope. How these two divergent effects affect actual sediment yield to streams is not known.

Status:

There has been no action on this project. In 2012, Policy requested that CMER further investigate the potential for windthrow on FP HCP lands for projects listed in the Work Plan. UPSAG recommends removing this project from the work plan in favor of focusing on more viable studies or incorporating it in the RSAG work plans.

5.5.7 Mass Wasting Validation Program (Intensive)

5.5.7.1 Program Strategy

No program strategy has been developed, but it is presumed that when UPSAG and/or ISAG have time to work on this program, the efforts of the Monitoring Design Team will be a useful starting point.

Table 29. Mass Wasting Validation Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
What levels of cumulative sediment inputs are harmful to aquatic resources at the basin scale? How does turbidity associated with contemporary forest practices affect salmonid populations (e.g., growth, survival, movement)?	No projects have been developed

5.6 ROADS RULE GROUP

5.6.1 Rule Overview and Intent

The intent of the rules for roads is to protect water quality and riparian/aquatic habitat by minimizing sediment delivery to Type S, F, and N waters from road erosion and mass wasting, as well as minimizing road-related changes in hillslope and stream hydrology. Fish passage at road crossing structures is treated as a separate rule group. The road rules protect water quality and riparian/aquatic habitats through prescriptions and best management practices (BMPs).

Implementation of these prescriptions through road maintenance and abandonment plans (RMAPs) is intended to minimize road surface sediment production and the hydrologic connection between the road system and the stream network, and the risk of road-related landslides caused by inadequately built and maintained roads. The road rules specify prescriptions for road construction, maintenance and abandonment, landings, and stream crossing structures. In addition, the Forest Practices Board Manual identifies BMPs for roads and landings. The rules required RMAPs for all forest roads to be developed by 2006 for large forest landowners and timed with timber harvest activity for small forest landowners. Unstable slope rules also minimize management activities, including road construction, in landslide-prone locations. Monitoring conducted under the Unstable Slopes Rule Group programs includes mass wasting associated with roads. The Roads Rule Group programs are primarily directed toward monitoring surface erosion and hydrologic disconnection.

The basic assumptions of the road rules are the following:

1. Implementation of road prescriptions will result in achieving FP HCP performance goals and resource objectives, including the following:
 - a. Meeting water quality standards.
 - b. Providing clean water and substrate, and maintaining channel-forming processes by minimizing the delivery of management-induced coarse and fine sediment to streams by protecting stream-bank integrity, providing vegetative filtering, protecting unstable slopes, and preventing the routing of sediment to streams and associated wetlands.
 - c. Minimizing the effects of roads on surface and groundwater hydrologic regimes (magnitude, frequency, timing, and routing of stream flow). This will be accomplished by disconnecting road drainage from the stream network, preventing increases in peak flows causing scour, and maintaining the hydrologic continuity of wetlands.
2. Assessment and planning using RMAPs is the best method to assure effective implementation of BMPs, and this will achieve the above objectives.
3. Roads differ in their degree and importance of impact to the resources of concern, and landowners and other Forests and Fish cooperators can identify and prioritize roadwork based on these differences.
4. Appropriately identified BMPs are effective at achieving functional objectives.

5.6.2 Rule Group Resource Objectives and Performance Targets

Resource Objectives:

- Sediment: Provide clean water and substrate and maintain channel-forming processes by minimizing to the maximum extent practicable the delivery of management-induced coarse and fine sediment to streams (including timing and quantity) by protecting stream-bank integrity, providing vegetative filtering, protecting unstable slopes, and preventing the routing of sediment to the streams.
- Hydrology: Maintain surface and groundwater hydrologic regimes (magnitude, frequency, timing, and routing of stream flows) by disconnecting road drainage from the stream network, preventing increases in peak flows causing scour, and maintaining the hydrologic continuity of wetlands.

Performance Targets:

- Road sediment delivered to streams: New roads — Virtually none.
- Ratio of road length delivering to streams/total stream length (miles/mile):
 - Old roads not to exceed — Coast (spruce), 0.15–0.25;
 - West of crest, 0.15–0.25; east of crest, 0.08–0.12
- Ratio of road sediment production delivered to streams/total stream length (tons/year/mile):
 - Old roads not to exceed — Coast (spruce), 6–10 T/yr;
 - West of crest, 2–6 T/yr; east of crest, 1–3 T/yr.
- Fines in gravel: Less than 12% embedded fines (< 0.85 mm).
- Road runoff: Same targets as road-related sediment; significant reduction in delivery of water from roads to streams.

5.6.3 Rule Group Strategy

The effectiveness monitoring program for roads is planned for two scales: the sub-basin scale and the site scale (or prescription scale). The FP HCP contains performance targets at the sub-basin scale. At this scale, road monitoring assesses the effectiveness of the rules at meeting the FP HCP performance targets for surface erosion sediment delivery and hydrologic connectivity across ownerships and regions of the state. Site-scale effectiveness monitoring assesses the effectiveness of individual prescriptions.

Site-scale effectiveness monitoring provides more insight into the success of individual road prescriptions than does sub-basin-scale monitoring. The timetable for forest landowners to implement forest practices prescriptions is tied to RMAPs. The site-scale monitoring program requires site-specific road performance measures (developed per prescription objectives), tests for site-level effectiveness using RMAP-implemented areas as a sampling stratum, and field protocols for site-scale performance measures. This site-scale monitoring will inform the rules at

several levels by determining the degree to which strategies are achieving resource objectives at the site scale, assessing the need to modify individual RMAPs to achieve resource objectives, and assessing the need to modify guidelines and rules for road maintenance and abandonment planning.

Assessment of the rules leads to five critical questions, which are addressed by three monitoring and validation programs (Table 30). The monitoring strategy is based on CMER’s experience with road sediment problems, BMPs, and implementation realities, as well as on the data from many watershed analyses that were used to develop the forest practices road performance targets for sediments. The effectiveness monitoring strategy includes both a site-scale program and a basin-scale program. Validation of the road performance targets, which is more complex and time-consuming, will come later. This approach will first inform the uncertainties about BMP effectiveness and BMPs’ ability to meet performance targets. If BMPs are ineffective, validation monitoring is unwarranted. If BMPs are proving to be effective, then validating the performance targets should begin (i.e., do we have the right target?).

Table 30. Roads Rule Group Critical Questions and Programs

Rule Group Critical Questions	Program Names	Task Type	SAG
Are road prescriptions effective at meeting sub-basin-scale performance targets for sediment and water? (Exclusive of mass wasting prescriptions, which are covered under the Unstable Slopes Rule Group)	Road Sub-Basin-Scale Effectiveness Monitoring Program	Effectiveness	UPSAG
Does the RMAP process correctly identify and prioritize road problems for repair? Are road prescriptions effective at meeting site-scale performance targets for sediment and water? (Exclusive of mass wasting prescriptions, which are covered in the Unstable Slopes Rule Group section)	Road Prescription-Scale Effectiveness Monitoring Program		
Have the correct performance targets for sediment delivery and connectivity been identified? What levels of cumulative sediment inputs are harmful to the resource at the basin scale? How does turbidity associated with contemporary forest practices affect salmonid populations (e.g., growth, survival, movement)?	Roads Validation Program and Cumulative Sediment Effects	Intensive	UPSAG / ISAG

5.6.4 Road Sub-Basin-Scale Effectiveness Monitoring Program

5.6.4.1 Program Strategy

The purpose of the Road Sub-Basin-Scale Effectiveness Monitoring Program is to determine the degree to which the road rule package is effective at meeting performance targets for surface erosion sediment and water established at the sub-basin scale as a whole across the state. This program is ranked fourth among the 16 CMER programs.

The Road Sub-Basin-Scale Effectiveness Monitoring Program currently consists of three projects that are related to critical questions in Table 31. Two projects, the Road Surface Erosion Model Update Project and the Road Surface Erosion Model Validation/Refinement Project, revise and validate the analytical model to estimate road surface erosion (the Washington State Road Surface Erosion Model, or WARSEM) that is used in the monitoring program to estimate sediment contributions and connectivity from selected road segments and road systems. The third project, Road Sub-Basin-Scale Effectiveness Monitoring Project, uses WARSEM to measure changes in the road conditions known to generate sediment and hydrologic connectivity between those road segments and the stream-channel network.

Because the rules provide a 20-year window for implementation of RMAP upgrades, this program is long-term and results will provide a periodic evaluation of the trend and the trajectory toward meeting the performance targets by 2021.

Table 31. Road Sub-Basin-Scale Effectiveness Monitoring Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions		Project Names
Are road prescriptions effective at meeting sub-basin-scale performance targets for sediment and water?		Road Sub-Basin-Scale Effectiveness Monitoring Project
Program Research Questions	<i>Are field or analytical methods needed to support the monitoring program?</i>	Road Surface Erosion Model Update Project
	<i>How accurate is the road surface erosion model in predicting average road sediment from runoff at the site scale?</i>	Road Surface Erosion Model Validation/Refinement Project

5.6.4.2 Road Sub-Basin-Scale Effectiveness Monitoring Project

Description:

This project is intended to provide data that can be used to assess the degree to which sub-basin-scale performance targets, and therefore resource objectives, are being met throughout the state. This project also characterizes the extent of road conditions that reduce surface erosion (e.g., improved surfacing, reduced runoff to streams). Data collected at the sub-basin scale will determine the status and assess trends of key indicators of road connectivity using WARSEM sediment delivery through time. This project does not address performance targets for road performance relative to mass wasting erosion processes, which are more readily evaluated through other monitoring projects. Forest road systems in randomly selected sample areas that are proportionately distributed statewide in areas under forest practices rules, independent of

ownership, are being monitored. Small forest landowner properties are included in the study whenever they fall within the sampling blocks. Data are collected to determine the degree to which roads meet established performance targets and the strength of the relationship between those reported measures and the percentage of sample area under implemented RMAPs. Because road monitoring at the sub-basin scale extends through the 15-year road rule implementation period, this piece was put in place before model validation and performance target validation.

Status:

Results from Phase 1 underwent ISPR and were approved by CMER in early 2010. Re-measurement of Phases 2 and 3 are scheduled to occur, respectively, later within the RMAP implementation period and following completion currently scheduled for 2021 (this deadline was extended for up to 5 years from 2016). Due to the 5-year RMAP extension, Policy decided to postpone the resample until most RMAPs are completed as reflected by the CMER Master Project Schedule.

5.6.4.3 Road Surface Erosion Model Update Project

Description:

The Surface Erosion Module of the Washington Forest Practices Board Manual on Standard Methodology for Conducting Watershed Analysis (version 4.0, November 1997) contains an empirically derived road erosion model widely used for estimating surface erosion and sediment delivery to streams from forest roads.

The primary purpose of the Road Surface Erosion Model Update Project was to refine and adapt the manual's model for use in forest road monitoring and as an assessment method. Revisions included standardizing input variables and developing repeatable application protocols. This project also included developing, testing, and refining standardized protocols for field application of the revised road surface erosion model for use at the site and road-segment scale.

Status:

This project was completed in 2003 and produced the Washington State Road Surface Erosion Model (WARSEM).

5.6.4.4 Road Surface Erosion Model Validation/Refinement Project

Description:

WARSEM is based on a range of empirically derived data available in 2003. The Road Surface Erosion Model Validation/Refinement Project would measure sediment from selected Washington road sites to evaluate the accuracy of modeled sediment delivery rates. This study could be designed to also evaluate the effectiveness of individual sediment control strategies, such as sediment traps, silt fences, or enhanced outslope vegetation, but the Road Prescription-Scale Effectiveness Monitoring Project, currently in the study design phase, may accomplish sufficient empirical research.

Status:

Timing of scoping and study design is planned to follow completion of the Roads Prescription-Scale Effectiveness Monitoring Project. The need for this project will depend largely on results

from the Road Prescription-Scale Effectiveness Monitoring Project and on the expansion of available relevant road erosion data sets and/or modeling tools due to research occurring outside of CMER.

5.6.5 Road Prescription-Scale Effectiveness Monitoring Program

5.6.5.1 Program Strategy

The dual purposes of the Road Prescription-Scale Effectiveness Monitoring Program are to (1) determine the degree to which maintenance activities within RMAPs have been appropriately identified; and (2) assess the effectiveness of specific BMPs in meeting their intended objective(s).

As described in Table 32, an important issue related to road effectiveness monitoring is the degree to which maintenance activities targeted in the RMAP assessments are appropriately identified and prioritized based on rule language to fix the “worst first.” Monitoring this aspect of the prescription strategy for roads is important because individual or collective prescriptions that are effective in meeting resource protection goals, if not applied to the right locations, may not achieve resource objectives and yet might still incur cost to the landowner. Equally important is the assessment of the degree to which BMPs are effective in meeting their stated objective of either reducing sediment delivery or disconnecting roads from DNR typed waters. This program is ranked ninth among the 16 CMER programs.

We anticipate that the results of these studies will inform the forest practices adaptive management process about the effectiveness of RMAP rules in achieving the FP HCP goals. Should RMAPs prove to be ineffective, Policy may have to revisit the rule to refine its requirements and application.

Table 32. Road Prescription-Scale Effectiveness Monitoring Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
Does the RMAP process correctly identify and prioritize road problems for repair?	Effectiveness of RMAP Fixes Project
Are road prescriptions effective at meeting site-scale performance targets for sediment and water?	Road Prescription-Scale Effectiveness Monitoring Project

5.6.5.2 Effectiveness of RMAP Fixes Project

Description:

The primary purpose of this project is to evaluate the degree to which RMAP road repairs have been appropriately identified and implemented. The project is envisioned to follow the completion of the Road Sub-Basin-Scale Effectiveness Monitoring (for surface erosion and connectivity issues) and Mass Wasting Effectiveness Monitoring projects (for road instability

issues), so that results of these studies can be used to refine the list of treatments to be investigated and inform a sampling design for the RMAP project described here.

This project would determine the extent to which identified road problems were located in areas where RMAP repairs had been implemented. The project would also attempt to determine why site-scale benefits were not achieved.

Status:

This project has not been scoped.

5.6.5.3 Road Prescription-Scale Effectiveness Monitoring Project

Description:

The objectives of monitoring forest roads at the prescription scale are to (1) evaluate the effectiveness of road maintenance categories in meeting road performance targets; and (2) identify sensitive situations where prescriptions are not effective. This project would address surface erosion sediment reductions from site-specific measures recognizing that significant efforts in both empirical research and modeling have been accomplished and can be built upon.

Status:

In 2014, CMER formed a technical writing and implementation group (TWIG) to begin scoping this project. In September 2014, Policy approved the initial scoping document. A second draft of the Best Available Science and Alternatives Document was submitted to CMER and accepted in January 2016. In February 2016, Policy picked Alternative #4, the TWIG’s preferred alternative. The Study Design was submitted for CMER review in December 2016 and approved on February 28, 2017.

ISPR occurred over the next year and the Study Design was finalized and approved by CMER on February 27, 2018. Site selection is ongoing and installation of all 80 sites is anticipated in the spring/summer of 2019.

5.6.6 Roads Validation Program and Cumulative Sediment Effects

5.6.6.1 Program Strategy

Validation of road effects and performance targets is envisioned to occur with CMER research in coordination with external cumulative effects research. This is because of the need to coordinate research on sediment generation with parallel study of potentially affected biota, including fish and amphibians.

Table 33. Roads Validation Program and Cumulative Sediment Effects: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
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<p>Have the correct performance targets for sediment delivery and connectivity been identified?</p> <p>What levels of cumulative sediment inputs are harmful to the resource at the basin scale?</p> <p>How does turbidity associated with contemporary forest practices affect salmonid populations (e.g., growth, survival, movement)?</p>	<p>Intensive Watershed-Scale Monitoring to Assess Cumulative Effects</p>
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5.6.6.2 Intensive Watershed-Scale Monitoring to Assess Cumulative Effects

Description:

For a preliminary study description, see this work plan’s Section 5.11.

Status:

Initial scoping began in 2008. Additional effort depends on prioritization.

5.7 FISH PASSAGE RULE GROUP

5.7.1 Rule Overview and Intent

Fish passage blockages at road crossing structures are to be addressed as part of the road maintenance and abandonment plan (RMAP) process. Road crossing structures will be inventoried and evaluated, and those functioning as fish barriers are to be prioritized based on the quantity and quality of a potential fish-bearing stream being affected upstream of the barrier. Those structures that do not provide fish passage must be repaired or replaced within 15 years, typically on a “worst first” basis. WDFW’s hydraulic code rules, the associated barrier-assessment manual, and DNR’s forest practices rules apply to crossing structures on forest roads.

The fish passage rule is based on the following assumptions:

- Achieving the objective of no fish barriers is critical for recovery of depressed stocks and the health of fish at all life history stages.
- Implementation of the forest practices rules will result in achieving the objective to maintain or provide passage for fish in all life history stages and to provide for the passage of some woody debris likely to be encountered.
- Assessment, prioritization, and implementation of RMAPs will achieve the objectives in a timely manner.
- Current stream crossing replacement standards are adequate to address fish passage at all life history stages.
- Hydraulic rules are effective at achieving resource objectives.
- Performance targets can be developed for fish at all life history stages.
- Stream-simulation methods provide passage for fish (definition WAC 222-16-010) at all life history stages.

5.7.2 Rule Group Resource Objectives and Performance Targets

Resource Objectives:

- Maintain or restore passage for fish in all life stages and provide for the passage of some woody debris by building and maintaining roads with adequate stream crossings.

Performance Targets:

- Eliminate road-related access barriers over the time frame for road management plans.
- Test the effectiveness of fish passage prescriptions at restoring and maintaining passage.

5.7.3 Rule Group Strategy

Based on an analysis of the forest practices rules, CMER identified assumptions and uncertainties underlying the rules. ISAG developed critical questions in 2003 to address these

uncertainties. Two programs were set up to address these critical questions (Table 34). The Fish Passage Effectiveness/Validation Monitoring Program aims to validate the assumptions and test the effectiveness of the forest practices rules in providing passage at road crossings for fish (as defined by WAC 222-16-010) at all life history stages. The Monitoring Design Team (MDT) defines extensive monitoring as a population-scale assessment of the effectiveness of the forest practices rules in attaining forest practices-related performance targets across FP HCP lands (MDT 2002). The implied FP HCP performance target for fish passage, based upon the requirements for RMAPs, is to eliminate fish blockages on FP HCP-regulated lands. The purpose of this program is to evaluate status and trends in fish passage conditions at forest road crossings.

Table 34. Fish Passage Rule Group Critical Questions and Programs

Rule Group Critical Questions	Program Names	Task Type	SAG
Are the corrective measures effective in restoring fish passage for fish at all life history stages?	Fish Passage Effectiveness/ Validation Monitoring Program	Effectiveness	ISAG
What is the current status of fish passage on a regional scale, and how are conditions changing over time?	Extensive Fish Passage Monitoring Program	Extensive	ISAG

ISAG presented the proposed CMER research strategy for fish passage to Policy. Stakeholders differed in their perspectives on what the CMER research strategy should focus on; therefore, Policy designated a subgroup to determine which important issues and/or critical questions should be prioritized for the Fish Passage Rule Group. The Policy subgroup decided that if and when important policy and/or management issues are determined, Policy will then define an appropriate research and monitoring strategy for CMER.

The following sections describe ISAG efforts to date on the fish passage research and monitoring strategy.

5.7.4 Fish Passage Effectiveness/Validation Monitoring Program

5.7.4.1 Program Strategy

There are key questions concerning the adequacy of current fish passage design methods, existing fish passage criteria, and the definition of a fish passage barrier. This is particularly true for the forest practices rules for passing “all species and life stages.” Some of these questions are applicable to high-gradient headwater streams where only resident fish species are present. This was a particular area of interest for ISAG because information on these headwater streams is lacking.

The primary purpose of the Fish Passage Effectiveness/Validation Monitoring Program is to address scientific uncertainties surrounding fish passage in headwater streams. The Fish Passage

Effectiveness/Validation Monitoring Program was originally (2005) composed of three principal elements:

1. Fish movement capability
2. Fish life history and movement ecology
3. Designs for road crossing structures that provide fish passage (barrier solutions)

As part of this strategy, ISAG worked on study designs for two primary projects: the Fish Passage Capability – Culvert Test Bed Project; and the Effectiveness of Design Criteria for Stream Simulation Culverts. ISAG also developed questions about headwater fish ecology and movement that would be answered by a literature review.

ISAG completed the study designs for the two proposed studies in 2007. CMER delivered the study designs to Policy. Policy was uncertain about the direction and focus of the proposed fish passage research strategy, as well as the proposed studies. A Policy subgroup was formed to further assess the fish passage research and monitoring strategy. During the interim, Policy directed CMER to send both study designs through the ISPR process. After CMER reviewed the results of the ISPR in May 2008, Policy decided to not proceed with either study (i.e., the Culvert Test Bed Project or Stream Simulation Project).

In June 2009, Policy agreed that (1) no fish passage research should be planned for FY 2010; (2) further discussion should occur on extensive fish passage monitoring; and (3) Policy should consider waiting for more information to come out of efforts currently underway within WDFW relative to fish passage under the hydraulic permit application (HPA) habitat conservation plan (HCP) development and fish passage effectiveness research. By 2018, WDFW was no longer pursuing an HCP for their HPA program. However, WDFW has continued fish passage effectiveness research and in late 2018 was working to complete a 5-year progress report for the implementation and effectiveness monitoring of hydraulic projects, specifically culverts and marine shoreline armoring. Since 2007, the two studies and the literature review have been funded through sources outside of the Forest Practices Adaptive Management Program (AMP). A pilot for the Culvert Test Bed Project, funded through the National Council for Air and Stream Improvement (NCASI), was implemented in the summer of 2009. The Stream Simulation Project, funded through DNR and carried out by WDFW, was implemented on DNR state lands. The literature review for headwater fish ecology and movement was funded by WDFW and contracted with the Forest Service. Although the study designs for these studies were primarily developed through CMER, these studies are no longer considered CMER studies. The scientific results, however, may still be considered in future efforts in the AMP.

Table 35. Fish Passage Effectiveness/Validation Monitoring Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
Are the corrective measures effective in restoring fish passage for all life history stages?	
<i>What is fish passage capability (e.g., probability of passage) through culverts under different flow</i>	Formerly proposed CMER study: Fish Passage Capability – Culvert Test Bed Project

Program Research Questions	<i>and slope conditions for native headwater species and life stages?</i>	
	<i>How well does laboratory-derived passage-capability criteria apply to fish passage through culverts in the field?</i>	No project defined yet
	<i>Are the solutions (existing tools) we are implementing working to provide fish passage as needed?</i>	Formerly proposed CMER study: Effectiveness of Design Criteria for Stream Simulation Culverts
	<i>Are our assumptions about fish movement and fish passage in headwater streams correct?</i>	Formerly proposed by CMER: Literature review of headwater fish ecology and movement
	<i>What variables effect the rates of fish recolonization and degree of habitat utilization in stream habitats upstream from fixed anthropogenic blockages?</i>	No project defined yet

5.7.5 Extensive Fish Passage Monitoring Program

5.7.5.1 Program Strategy

In 2005, ISAG completed an extensive study design for fish passage monitoring. CMER delivered the study design to Policy. Policy decided not to fund the project due to budget considerations and also limitations in scope due to the absence of small forest landowners in the sampling design. Implementation of the study design has been delayed indefinitely. A single critical question has been developed for the program (Table 36).

Table 36. Extensive Fish Passage Monitoring Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
What is the current status of fish passage on a regional scale, and how are conditions changing over time?	Extensive Fish Passage Trend Monitoring Project

5.7.5.2 Extensive Fish Passage Trend Monitoring Project

Description:

A study design for fish passage trend monitoring was developed using guidelines consistent with the Forests and Fish Report and supplied by ISAG. The contractor (WDFW) reviewed possible monitoring approaches and presented a recommended study design and methodology that was reviewed and approved by ISAG and CMER.

In addition to the WDFW study proposal, ISAG explored the potential of collecting data on stream crossing conditions in conjunction with the UPSAG Road Sub-Basin-Scale Effectiveness

Monitoring Project. ISAG recognized that this approach would not provide all of the information needed to address the critical question but considered it a cost-effective opportunity to get supplemental information about culvert conditions from a statewide random sample. ISAG developed a set of questions for assessing culvert suitability and these questions were added to the UPSAG road survey.

Status:

Due to budgetary considerations and potential limitations in scope, Policy has delayed implementation of the WDFW design indefinitely. The UPSAG road survey was completed in 2008, and culvert conditions data were collected from approximately 1,300 stream crossings. These data have not been analyzed, and further investigation is pending Policy direction.

5.8 PESTICIDES RULE GROUP

5.8.1 Rule Overview and Intent

The objectives of the Pesticides Rule Group are to manage pesticide use to achieve water quality standards, meet label requirements, and avoid harm to riparian vegetation. In the context of the forest practices rules, pesticide means “any insecticide, herbicide, fungicide or rodenticide, but does not include nontoxic repellents or other forest chemicals.”

The pesticide rules include a series of regulations that cover (1) aerial application of pesticides, (2) ground application of pesticides with power equipment, and (3) hand application of pesticides. The rules for aerial application of pesticides prescribe a setback (offset) to prevent application of pesticides within the core and inner zones of Type F and S streams, or the wetland management zone (WMZ) of Type A or B wetlands. In these cases, the offset is from the outer edge of the inner zone or the WMZ. Offsets are also prescribed for flowing Type N streams and Type B wetlands smaller than 5 acres; however, in these cases the offsets are measured from the edge of the bankfull channel or wetland. The offset distances vary depending on water type, the type of nozzle used, and wind conditions at the time of application. Separate guidelines govern ground application of pesticides with power equipment and hand equipment within RMZs and WMZs.

The main assumption is that the pesticide rules will be effective in achieving the objectives of meeting water quality standards, label requirements, and preventing damage to vegetation in RMZs and WMZs. A level of uncertainty exists for the aerial application of pesticides because of the potential difficulties caused by terrain and wind conditions.

5.8.2 Rule Group Resource Objectives and Performance Targets

Resource Objectives:

- Provide for clean water and native vegetation (in the core and inner zones) by using forest chemicals in a manner that meets or exceeds water quality standards and label requirements by buffering surface water and otherwise using best management practices.

Performance Targets:

- Entry to water: No entry to water for medium and large droplets; minimized for small droplets (drift).
- Entry to RMZs: Core and inner zone — Levels cause no significant harm to native vegetation.

5.8.3 Rule Group Strategy

Three critical questions have been developed to eventually shape corresponding effectiveness and validation programs (Table 37).

Table 37. Pesticides Rule Group Critical Questions and Programs

Rule Group Critical Questions	Program Name	Task Type	SAG
Do the pesticide rules protect water quality and vegetation within the core and inner zones of Type S and F RMZs, the WMZs of Type A or B wetlands, and Type N streams and buffers?	Forest Chemicals Program	Effectiveness	RSAG
What is the exposure of aquatic organisms to herbicides that reach Type S, F, and N waters, and Type A and B wetlands? (How much gets in and for how long is it present?)	Forest Chemicals Program	Validation	LWAG ISAG
Do sublethal effects exist that affect the survival of a population of aquatic organisms from herbicide level reaching Type S, F, and N waters, and Type A or B wetlands?	Forest Chemicals Program	Validation	LWAG ISAG

5.8.4 Forest Chemicals Program (Effectiveness and Validation)

5.8.4.1 Program Strategy

The purpose of the Forest Chemicals Program is to address uncertainty concerning the effectiveness of the chemical application rules in protecting water quality and vegetation in riparian and wetland buffers. Alternative strategies with lower costs will also be considered.

CMER held a science conference in October 2016 to inform the members about the current use and related science concerning chemicals used in Forest Practices. This program is ranked last among the 16 CMER programs. No projects are proposed at this time.

5.9 WETLANDS PROTECTION RULE GROUP

5.9.1 Rule Overview and Intent

The intent of the WAC 222 wetland rules is to achieve no net loss of wetland function (e.g., water quality, water quantity, fish and wildlife habitat, timber harvest and regeneration) by avoiding, minimizing, and/or preventing sediment delivery and hydrologic disturbances from roads, timber harvest, and timber yarding, and by buffering wetlands with wetland management zones (WMZs). The application of WAC 222 rules is assumed to achieve and protect aquatic conditions and processes that meet resource objectives and consequently achieve the three Forests and Fish Report (FFR) performance goals. WetSAG understands that there is uncertainty regarding this assumption because the functional relationships between forest practices, wetland functions, and aquatic resource responses have not been well studied and are not fully understood.

Areas of uncertainty include: (1) how to quantify the functions and connectivity of wetlands to streams and functions related to fish and amphibian habitat; (2) how wetlands contribute to base-flow, or provide flood storage and attenuate downstream peak flows; (3) how wetlands contribute to water quality; (4) the effects of road management practices on sediment delivery to wetlands; and (5) the contribution of large woody debris (LWD) and exchange of nutrients between wetlands and streams.

The rules contain several additional assumptions:

- Implementation of the wetland prescriptions for timber harvest (WAC 222-30-010) will result in no net loss of wetland functions over the length of a timber harvest rotation, assuming that some wetland functions may be reduced until the midpoint of a timber rotation cycle.
- Application of the mitigation sequence in WAC 222-24-015 for road construction will result in no net loss of wetland function.
- Appropriately identified best management practices (BMPs) are effective at achieving resource objectives.
- Forested wetlands will successfully regenerate following timber harvest.

Several uncertainties exist about the validity of these assumptions based on a lack of applied research and accurate wetland mapping and typing. These uncertainties include the following:

1. The response of wetlands and wetland functions to management practices and the level of protection provided by prescriptions is not known.
2. The DNR wetland typing system (A, B, Forested) does not reflect the full complexity of different wetland functions across the landscape, potentially reducing the ability to target rule protection to aquatic resources (e.g., water quality, hydrology, and rule-covered species) in different, specific types of wetlands.

3. Forested wetlands as a class are not recognized by WAC 222-16-30 as “typed” waters. Some forested wetlands receive alternate protections such as those that are inundated fish habitat. However, other forested wetlands not covered under these alternate protections may not receive water quality protection measures and BMPs during road construction or harvest.
4. It is not known to what degree current rules for wetland mitigation related to road construction will achieve the “no net loss of wetland functions.”

Quantifying “no net loss” is difficult because there are no criteria available for determining:

- The range of wetland functions affected by road construction or harvest;
- Net loss or gain of these functions over time;
- Net loss of one or more functions with concurrent net gains in other functions;
- The cumulative impact across the FP HCP landscape of filling or draining individual wetlands that are less than 0.10 acre in size;
- The cumulative effect of creating or expanding wetlands through forest practices activities.

The forest practices rules (WAC 222-16-035) classify wetlands into three general categories: Type A, B, and Forested depending on soils, vegetation, canopy closure, wetland size, and acreage of open water.

Mapping and delineation requirements in WAC 222-16-036 must be performed as outlined in the Forest Practices Board Manual, Section 8, for several wetland groups:

- Wetlands greater than 0.1 acre that will be impacted by filling and where mitigation for such filling is required;
- Forested wetlands greater than three acres;
- All forested wetlands in a riparian management zone, unless entry within the riparian management zone is not proposed as part of the harvest application.

Wetland management zones (WMZs) and harvest methods in WAC 222-30-020 are as follows: WMZs are prescribed for all Type A and Type B wetlands greater than 0.5 acre, or 0.25 acre for bogs. WMZ widths vary based on the wetland type and area; harvest is allowed within the maximum-width WMZ. The specific leave tree requirements within WMZs differ for eastern and western Washington. The use of ground-based harvesting equipment is restricted within WMZs. Harvest methods are limited to low-impact harvest or cable systems within forested wetlands, and landowners are encouraged to leave a portion of the wildlife reserve tree requirement within the wetland.

Road construction in wetlands (WAC 222-24-015) is as follows: A mitigation sequence applies to road construction to address no net loss of wetland function. The preferred option is to prevent

impacts by locating roads outside of wetlands (avoidance). However, where this is not possible, the mitigation sequence and Board Manual guidelines seek to minimize and mitigate potential impacts.

5.9.2 Rule Group Resource Objectives and Performance Targets

Resource Objectives:

The wetland WMZ and road prescriptions are intended to accomplish the following stated FP HCP functional objectives under the Hydrology Resource Objective as stated in Schedule L-1:

- Maintain surface and groundwater hydrologic regimes (magnitude, frequency, timing, and routing of stream flows) by disconnecting road drainage from the stream network.
- Prevent increases in peak flows causing scour, and maintain hydrologic continuity of wetlands.

Performance Targets:

There are two performance targets under the Hydrology Resource Objective that include wetlands:

- Westside: Do not allow forest management activities to cause a significant increase in peak flow recurrence intervals resulting in scour that disturbs stream channel substrates providing actual or potential habitat for salmonids.
- No net loss in the hydrologic functions of wetlands.

A number of other FP HCP resource objectives specific to streams may also apply to wetlands but are not explicitly stated in either Schedule L-1 of the FFR or in the FP HCP. Schedule L-2 refers to the following functional objectives, performance targets, and projects regarding wetlands:

1. Heat Temperature Functional Objective: Provide cool water by maintaining shade, groundwater temperature, flow, and other watershed processes controlling stream temperature.
 - a. Performance targets: Stream temperature, groundwater, and shade.
2. Large Woody Debris/Organic Inputs Functional Objective: Provide complex and productive in- and near-stream habitat by recruiting large woody debris and litter.
 - a. Performance targets: Riparian conditions, litterfall, in-stream LWD targets, residual pool depth.
3. Hydrology Functional Objective: Maintain surface and groundwater hydrologic regimes (magnitude, frequency, timing, and routing of stream flows) by disconnecting road drainage from the stream network, preventing increases in peak flows causing scour, and maintaining the hydrologic continuity of wetlands.
 - a. Performance targets: Peak flows and wetlands.

These objectives are discussed in more detail in the Wetlands Rule Group critical questions outlined below. Not all Performance Targets listed in the FP HCP are fully developed. The Wetland Research and Monitoring Strategy includes suggestions for some new wetland performance targets that will better inform the degree to which Resource Objectives outlined in the FP HCP are being met.

These performance targets are as follows:

1. Return to pre-harvest levels of wetland functions
2. No net loss of water storage and streamflow maintenance
3. Return to pre-harvest levels of water storage and streamflow maintenance
4. No net loss of temperature regulation and water quality maintenance
 - a. Provide cool water by maintaining shade, groundwater temperature, flow, and other watershed processes controlling water temperature
5. Provide complex and productive in-stream and wetland habitat by recruiting large woody debris and litter
6. No net loss of hydroperiod maintenance
7. No significant increase in peak flow recurrence intervals of downgradient streams such that scour disturbs stream channel substrates providing actual and potential habitats for salmonids
8. No net loss of native species diversity
9. No net loss of state listed sensitive species or communities

5.9.3 Rule Group Strategy

An updated literature review was completed in 2013 and included all available literature on forest practices and wetlands in the Pacific Northwest (Adamus 2013). The results of the literature review were used to create a Wetland Research and Monitoring Strategy that outlined a comprehensive, scientifically sound approach to addressing whether forest practices rules are effective at protecting wetlands and wetland functions. This strategy guided the revision of the Work Plan's program and project structure, as well as the critical questions.

The strategy separated the effects of forest practices on wetlands into three categories; forest harvest, roads, and silvicultural chemicals. Forest harvest addresses effects of harvest within and outside of wetlands on both the wetland and downstream processes. Roads address the effects of road construction in a wetland as well as runoff from roads into adjacent wetlands. Additionally, the effectiveness of the wetland mitigation sequence was incorporated into the Forest Roads and Wetlands program since mitigation is generally triggered by road construction. Silvicultural chemicals will address the impacts of the application of pesticides and fertilizers in and adjacent to wetlands.

There are six wetland programs:

- Forested Wetlands Effectiveness Program
- Wetland Management Zone Effectiveness Monitoring Program
- Forest Roads and Wetlands
- Wetlands Intensive Monitoring Program
- Wetlands Mapping Program
- Silvicultural Chemicals and Wetlands

The Wetland Research and Monitoring Strategy prioritizes programs that are consistent with both Policy guidance and research needed to better develop and test hypotheses. The aim of the strategy is to examine the effectiveness of the rules at maintaining no net loss of wetland functions. Therefore, the highest priority reflects the hypothesized largest potential impact to wetland functions given the current forest practices rules. Subsequently, the remaining projects are organized in a phased approach. For example, Wetland Intensive Monitoring will be a subsequent project because it will be designed around the results and improved fundamental understanding yielded by the Forested Wetlands Effectiveness and Monitoring Program and the Wetland Management Zone Effectiveness Program.

Priority will be placed on scoping projects identified in the Clean Water Act (CWA) assurances milestones, specifically the Forested Wetlands Effectiveness Program and the Wetland Management Zone Effectiveness Program.

The Forested Wetlands Effectiveness Program is the top priority program because forested wetlands receive the least amount of protection compared to other wetland types (A and B). Forested wetlands can be clearcut and drained during reforestation under the Forest Practices Rules. The hydrologic and ecological functions that forested wetlands provide are not well understood and it is even less well-known how harvest in and around forested wetlands impacts those functions. The level to which forest regeneration restores pre-harvest wetland functions is also not known. Any improvements in understanding forested wetlands and how they change following timber harvest activities will help Policy to better understand the effectiveness of Forest Practices Rules.

Projects under the Wetland Management Zone Effectiveness Program are prioritized to follow the Forested Wetlands Effectiveness Program because it is not known whether buffering Type A and B wetlands under the current prescriptions successfully allows for no net loss of wetland functions. The Wetland Management Zone Effectiveness and Forested Wetlands Effectiveness Programs will provide fundamental information about the nature of forested, Type A and Type B wetlands. This information will inform research questions in future studies and foster a systematic understanding of wetlands across the landscape.

After wetland functions have been characterized more thoroughly, the Forest Roads and Wetlands Program will commence to determine the effects of forest roads on those functions. The effects of silvicultural chemicals on wetland functions will follow. The final program will be the Wetlands Intensive Monitoring Program, which is dependent on information yielded by preceding studies.

The assumptions and uncertainties described above guided the development of critical questions and research and monitoring programs to address them (Table 38). The revised project plan and priorities are consistent with the Ecology CWA assurances milestones for the Adaptive Management Program.

The Wetlands Rule Group strategy began in 2005 by conducting a comprehensive literature review with the Forested Wetlands Literature Review and Workshop Project. These efforts were undertaken to establish the current scientific basis for evaluating forested wetland functional relationships for salmonids, FPHCP-covered species, and water quality and quantity. WetSAG then conducted a pilot study, the Statewide Forested Wetlands Regeneration Pilot Project, to evaluate regeneration of forested wetlands after harvest.

In combination, these efforts concluded that many research gaps exist around forested wetlands and that, in order to locate wetlands in a systematic and unbiased manner and study the effects of forest practices activities on these wetlands, the mapping data available needed improvement. A recommendation that emerged from the Statewide Forested Wetlands Regeneration Pilot Project led to creation of an additional pilot project, the DNR GIS Wetlands Data Layer Project. This second project added 165,000 polygons to the Forest Practices Application Review System (FPARS). Work on a process for continued improvement of the wetland data layer was redirected by Policy to DNR Forest Practices Division. A lack of funding and staff resources currently limits or prevents much progress on this task at DNR. A crosswalk between Forest Practices Wetland Classification and Hydrogeomorphic (HGM) Wetlands Classifications will be created in the future under the Hydrogeomorphic (HGM) Wetlands Classification System Project (which was folded into the Wetlands Intensive Monitoring Project). The HGM classification system defines wetlands based on landscape position and the source and connectivity of water to other water bodies. The crosswalk will facilitate better characterization, description, and assessment of impacts to wetland functions.

The 2010 strategy of completing the study design for the pilot project and Phases 1 and 2 of the Wetlands Mitigation Effectiveness Project was reprioritized in 2011 based on CMER review of the study design, FPA review, and discussions during field visits in follow-up meetings that led to returning the focus to the Forested Wetlands Effectiveness Program. Two main issues led to the recommendation of delaying the Wetlands Mitigation Effectiveness Program and reprioritizing how WetSAG proceeds in the wetland research program.

1. It is difficult, if not impossible, to know whether a landowner's decision on locating road segments is based on meeting the mitigation sequence; making the assessment on the effectiveness of the sequence problematic.
2. The effects of harvesting forested wetlands are uncertain and the risks to wetland functions may be greater than the effects of road construction/maintenance under current rules.

Ecology is charged with overseeing the CWA assurances milestones. In July 2009, Ecology developed the document 2009 Clean Water Act Assurances Review of Washington's Forest

Practices Program, which outlines specific CMER projects targeted at answering critical questions associated with the CWA. Based on this review, research projects were reprioritized to improve the adaptive management program in meeting the intent of the CWA. Ecology’s document also lists timelines and anticipated completion dates for those CMER projects. One of the CWA milestones was to develop a revised research strategy.

The first step in developing a revised research strategy was to conduct an up-to-date literature review. The Forest Practices and Wetlands Systematic Literature Review looks at how forest practices affect the capacity of wetlands to sustain fish, amphibians, and water quality in a watershed context. The Literature Review was intended to evaluate risk and uncertainty to wetland functions associated with harvesting and road construction in and around wetlands. The Literature Review identifies data gaps and developed testable hypotheses for other WetSAG projects to inform the scoping and design of future field studies. Projects identified in the CWA assurances milestones that needed to be addressed in a revised research strategy include the Forested Wetlands Effectiveness Study, Temperature and hydrologic connectivity will be addressed as metrics in all projects.

Table 38. Wetlands Rule Group Critical Questions and Programs

Rule Group Critical Questions	Program Names	Task Type	SAG
<p>Are current forest practices rules for timber harvest in and around forested wetlands effective at meeting the Forest and Fish aquatic resource objectives and performance targets, and the goal of no-net-loss of functions of those wetlands?</p> <p>Are forested wetlands regenerating sufficiently to maintain no net loss of wetland functions?</p>	Forested Wetlands Effectiveness Program	Effectiveness	WetSAG
<p>Are current forest practices rules-specified wetland buffers (WMZ) for Type A and B wetlands effective at meeting the Forest and Fish aquatic resource objectives and performance targets, and the goal of no-net-loss of functions of those wetlands?</p>	WMZ Effectiveness Monitoring Program	Effectiveness	WetSAG
<p>Are road construction and maintenance activities in wetlands adequately mitigated to achieve no net loss of wetland functions?</p> <p>How and to what degree does forest road construction and maintenance near wetlands alter the water regimes, water quality, and habitat functions of the wetlands and downstream waters?</p>	Forest Roads and Wetlands	Effectiveness	WetSAG
<p>What are the magnitude and duration of effects of silvicultural chemicals on wetland processes, functions, and aquatic resources within the wetlands and connected waters?</p> <p>Do the pesticide and fertilizer Rules protect processes, functions, and aquatic resources within wetlands and connected waters?</p>	Silvicultural Chemicals and Wetlands	Effectiveness	WetSAG LWAG

Rule Group Critical Questions	Program Names	Task Type	SAG
<p>What are the spatial and temporal cumulative effects of multiple forest practices on wetlands connected waters at the watershed-scale level?</p> <p>What are the causal relationships and effects of forest practices on wetlands and connected waters?</p>	Wetlands Intensive Monitoring Program	Intensive Monitoring	WetSAG
Under Review	Wetlands Mapping Program	Rule Tool	WetSAG

5.9.4 Forested Wetlands Effectiveness Program

5.9.4.1 Program Strategy

This program consists of three projects (Table 39) that address uncertainty concerning the net loss of hydrologic function, water quality, fish and amphibian use, and recovery capacity of forested wetlands following timber harvest.

Table 39. Forested Wetlands Effectiveness Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions		Project Names
<p>Are current forest practices rules for timber harvest in and around forested wetlands effective at meeting the Forest and Fish aquatic resource objectives and performance targets, and the goal of no-net-loss of functions of those wetlands?</p> <p>Are forested wetlands regenerating sufficiently to restore wetland functions?</p>		
Program Research Questions	<p><i>1. What are the effects, and their magnitudes and durations, of forest practices on water regimes, water quality, plant and animal habitats, and watershed resources in forested wetlands and linked (via surface or subsurface flow) downstream waters?</i></p> <p><i>a. How does timber harvest in forested wetlands alter processes that influence hydrologic regimes in those wetlands, in downgradient waters, and the connectivity between them?</i></p> <p><i>b. How does timber harvest in forested wetlands alter processes that influence water quality in those wetlands and in downgradient waters?</i></p> <p><i>c. How does timber harvest in forested wetlands alter processes that influence plant and animal habitat functions in wetlands, in connected waters, and in surrounding uplands?</i></p>	Forested Wetlands Effectiveness Project
	<p><i>2. How well do current forest practices rules in forested wetlands meet the Forest and Fish aquatic resource objectives and performance targets, and the goal of no-net-loss of functions of those wetlands by half of a timber rotation cycle?</i></p>	Forest Practices and Wetlands Systematic Literature Review

	<i>How do post-harvest stand conditions and associated wetland functions compare with pre-harvest stand conditions and functions?</i>	Statewide Forested Wetlands Regeneration Pilot Project
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5.9.4.2 Forested Wetlands Effectiveness Project

Description:

The Forested Wetland Effectiveness Project (FWEP) is a keystone program within the WetSAG’s workplan as it provides a scientific foundation from which to evaluate how forest harvest undertaken under current forest practice rules changes forested wetland hydrology and ecology. CMER and Policy recommended prioritizing this program following a WetSAG field trip with Ecology Wetlands Program staff that raised concerns about the potential effects of timber harvest on the function of forested wetlands and their hydrologically connected streams. Currently, the rules give limited protection to forested wetlands, and little is known about the effects of harvest on forested wetland hydrology and ecology. This project will look at the effectiveness of forest practices prescriptions to protect, maintain, and restore aquatic resources, namely water quality and wetland hydrologic and ecological functions.

This study is predicated upon hypotheses and questions developed in the Forest Practices and Wetlands Systematic Literature Review (below) and is designed to inform numerous WetSAG priority projects that will follow in future years. The FWEP will include two potential stages:

1. A chronosequence study designed to evaluate how forested wetland hydrology and ecology change over half a timber rotation cycle, using a space-for-time approach. This study is observational and capitalizes on DNR’s forest practice application database to find sites of various ages, evaluating whether or not harvested forested wetlands’ condition and function converge with unharvested wetlands over the half timber rotation timeframe.
2. A before-after-control-impact (BACI) study that will prescribe manipulative forest harvest treatments and measure how forested wetlands’ ecological and hydrologic functions change in real time following harvest. By tracking forested wetlands prior to harvest, during harvest, and immediately following harvest, this study will build on the chronosequence portion of the FWEP, reducing uncertainty associated with harvest practices, regeneration, and landscape variability that may arise in an observational study.

Status:

The project alternative was approved by Policy in early 2017. The study design was developed by the Forested Wetlands Effectiveness Project Technical Writing and Implementation Group (FWEP TWIG). The history of the FWEP and anticipated future timeframes through this biennium are listed below.

- Chronosequence Study Design-
Design- Final design presented January 2018 and revised in July for CMER before being sent to ISPR in August 2018

Review and Approval- Anticipated ISPR revision and final CMER approval late 2018 or early 2019

Implementation- Anticipated to begin in spring 2019 and run through fall/winter 2020.

- **BACI Study Design-**
Design- First design presented January 2018; revised in summer 2018 and will be revised following ISPR and CMER feedback around chronosequence.
Review and Approval- To be determined
- **Implementation-** To be determined

5.9.4.3 Forest Practices and Wetlands Systematic Literature Review

Description:

The Forest Practices and Wetlands Systematic Literature Review was intended to address the uncertainty about how harvesting wetlands and constructing roads in and adjacent to wetlands affects the capacity of wetlands to contribute to watershed processes that support fish, amphibians, and water quality. This project reviewed and synthesized scientific literature to identify and evaluate effects on wetland functions, with a primary focus on harvesting trees from forested wetlands and on road construction and maintenance activities. This project will allow WetSAG to develop testable hypotheses for future WetSAG projects; to evaluate risk and uncertainty about protecting wetland function; to inform prioritizing, scoping, and designing of future field studies; and to fill data gaps identified in the previous wetland literature review.

A Wetland Research and Monitoring Strategy was developed based on findings from the literature review; priority will be placed on scoping projects identified in the Strategy.

Status:

This project was completed in 2014 and the report is available online (CMER #12-1202).

5.9.4.4 Forested Wetlands Literature Review and Workshop Project

Description:

The Forested Wetlands Literature Review and Workshop Project was intended to perform a literature review and synthesis of relevant forested wetland research. The project focused on literature with an emphasis on interactions between commercial forest management activities and forested wetland functions, emphasizing topics listed in the WDNR Forests and Fish Report.

Status:

This project was completed in 2005 and the report is available online (CMER #04-406).

5.9.4.5 Statewide Forested Wetlands Regeneration Pilot Project

Description:

The pilot project was conducted in Olympic Region and finalized in 2004. This pilot study was initiated to characterize regeneration in forested wetlands, develop research methodologies,

examine current methodologies of forested wetland regeneration, and determine the success of their implementation. The pilot study had two primary objectives:

1. Develop a process for identifying suitable sites to sample. This included working with landowners to identify forested wetlands that have been harvested.
2. Develop and test methods for site selection, a test sampling protocol, measures of regeneration success, and methods for data analysis; and collect some preliminary information about regeneration in forested wetlands to guide study design for a full-scale study.

Status:

This pilot project was completed in July 2004. CMER approved the “Forested Wetland Regeneration Pilot Summary Report” (CMER #03-303).

This project showed the difficulty in finding forested wetlands in an unbiased manner. A full-scale study was not recommended by WetSAG upon completion of the pilot study and no such study is planned at this time. Future studies of wetland prescription effectiveness, wetland and stream temperature interactions, and hydrologic connectivity will further explore wetland functions and impacts associated with timber harvest.

5.9.5 Wetland Management Zone Effectiveness Monitoring Program

5.9.5.1 Program Strategy

The Wetland Management Zone Effectiveness Monitoring Program will be designed to assess the effectiveness of wetland management zones (WMZs) in meeting FP HCP resource objectives and performance targets (5.9.2). The WMZ rules are based on a number of assumptions, including the following:

- Meeting the wetland performance targets will achieve functional objectives.
- We can determine the effectiveness of BMPs, to a generalized degree, and standardize how we measure and document this effectiveness.
- Reaching BMP objectives at the site scale (i.e., applying WMZs and disconnecting road drainage to Type A and B wetlands) will lead to meeting sub-basin and watershed-scale functional objectives. (Note: Forested wetlands do not receive WMZs but may influence functional objectives at the sub-basin and watershed scale.)

These uncertainties form the basis for the critical questions that the program will be designed to address (Table 40).

Table 40. Wetland Management Zone Effectiveness Monitoring Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
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Are current Forest Practice Rules-specified wetland buffers (WMZ) for Type A and B wetlands effective at meeting the Forest and Fish aquatic resource objectives and performance targets, and the goal of no-net-loss of functions of those wetlands?		
Program Research Questions	<p><i>What are the magnitude and duration of effects of timber harvest occurring upslope of Type A and B wetlands on processes, functions, and aquatic resources within and downstream of those wetlands?</i></p> <p><i>How effective are current forest practice wetland buffers at facilitating no net loss in wetland functions following timber harvest?</i></p>	Wetland Management Zone Effectiveness Project

5.9.5.2 Wetland Management Zone Effectiveness Monitoring Project

Description:

This project will evaluate wetland functions to determine if the target of no net loss of hydrologic function, Clean Water Act assurance targets, and hydrologic connectivity are being achieved. This would include informing two of the Schedule L-2 research questions listed below:

- TH8: Test whether the wetland prescriptions are effective in preventing downstream temperature increases beyond targets.
- LWD15: Evaluate the effectiveness of current WMZs in meeting in-stream LWD targets.

Status:

The effectiveness of buffers was researched during the Forest Practices and Wetlands Systematic Literature Review. However, most existing literature addresses stream buffers, which are not the same buffering prescriptions required for wetlands under current Forest Practices Rules. This project is in early scoping stages by WetSAG with the Project Charter approved by at the April 2017 CMER meeting. The Best Available Science document is expected by June 2021, a study design by late 2022, and a science team by late 2022.

5.9.6 Forest Roads and Wetlands Program

5.9.6.1 Program Strategy

The Forest Roads and Wetlands Program seeks to examine the effects of road construction, operation, and maintenance in and near wetlands. This program was created as a separate program outside of the Forest Roads Rule Group in order to examine the implications for wetlands specifically. The effects of roads are separated from timber harvest in order to understand how roads influence water regime, water quality, and habitat functions of all typed wetlands. The decision to separate the effects of roads was guided by the Wetland Research and Monitoring Strategy.

In order to achieve “no net loss of wetland function” when filling or draining more than 0.10 acre of wetland during road construction, forest practices rules require implementation of a mitigation

sequence including avoidance and minimization (WAC 222-24); and replacement or restoration if filling more than 0.5 acre of wetland. Information on the effectiveness of these mitigation requirements is not currently available.

The Forest Roads and Wetlands Program has two projects: Road Effects on Wetlands and the former program, now-project, Wetlands Mitigation Effectiveness. The wetland mitigation sequence is primarily triggered by filling of wetlands for the construction of roads and landings. Because of this, and because the mitigation sequence is inextricably linked to forest roads, they are under the same program.

To address the performance target of “no net loss of hydrologic functions of wetlands” and Clean Water Act assurances, the Wetland Mitigation Effectiveness Project will evaluate several critical questions, including whether avoidance, minimization and replacement of lost functions are successful in achieving stated goals and objectives. This information can then be used to recommend any changes to the current process of wetland mitigation.

The Road Effects on Wetlands Project will test the effectiveness of Forest Practice Rules at meeting the performance target functional objectives and Clean Water Act Assurances.

Table 41. Forest Roads and Wetlands Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions		Project Names
Are road construction and maintenance activities in wetlands adequately mitigated to achieve no net loss of wetland functions?		
To what degree does forest road construction and maintenance near wetlands alter the water regimes, water quality, and habitat functions of the wetlands and downstream waters?		
Program Research Questions	<i>Is the implementation of the wetland mitigation sequence ensuring no net loss of wetland functions?</i>	Wetland Mitigation Effectiveness Project
	<i>What are the magnitude and duration of effects of forest roads near wetlands on hydrologic regimes, water quality, habitat and aquatic organisms within and downstream of the wetlands?</i>	Roads Effects on Wetlands Project

5.9.6.2 Roads Effects on Wetlands

Description:

The Roads Effects on Wetlands project is a new project under the Wetlands Rule Group, and was identified as an important project in the Strategy. This project will seek to identify wetland functions that are altered by road construction, operation, and maintenance, and to determine the magnitude and duration of those changes.

Status:

This is a new project (and program) under the Wetlands Rule Group. During the Forest Practices and Wetlands Systematic Literature Review, the effects of forest roads on wetlands was examined in current literature. Few studies exist on how forest roads impact wetlands. The

literature synthesis inferred that road impacts to wetlands may include increased delivery of sediments, changes in water regimes, and impacts to biota.

At this time, no further scoping is being done, but will be done in the future.

5.9.6.3 Wetlands Mitigation Effectiveness Project

Description:

The Wetlands Mitigation Effectiveness Project will answer the question of whether the current forest practices road construction rules are effective at preventing net losses to wetland functions. Also, studies may be needed depending upon the frequency of mitigation sequence occurrences in forest practice activities. Documentation of how often and what types of wetlands are being impacted by road construction and mitigation sequences are not readily available.

This project was initially scoped as a single study with multiple phases. After CMER review, it evolved into four projects that make up the Forest Roads and Wetlands Program. The projects include the following:

- Development and testing of site selection, data collection, and data analysis methods.
- A pilot study to refine and finalize the field methods developed in the first project; the study is intended to test the usefulness of using FPA maps to identify wetlands in site selection, and test the feasibility of using remote sensing tools (LIDAR, aerial photography, etc.) to identify and classify wetlands.
- A statewide survey in which the tested and finalized methods will be used to describe and quantify forest road and wetland interactions, and assess and rank risks to wetland functions from specific road construction/maintenance activities.
- Further actions to build on the results of the statewide study and directly test whether following the “wetland mitigation sequence” when constructing or maintaining roads in or near wetlands prevents a net loss of wetland functions.

Status:

The scoping document was approved by CMER in June 2008. The study design for the pilot project was developed and CMER review was initiated in the spring of 2010. The review generated a lot of discussion on several of the project’s design elements as well as some of the basic questions being addressed by the project. As a result, WetSAG set aside implementing the Wetlands Mitigation Effectiveness Project and instead conducted a Forest Practices and Wetlands Systematic Literature Review in 2014. In the future, Policy would like WetSAG to revisit this study if the practice of roads mitigation pertaining to wetlands becomes more common.

5.9.7 Wetlands Intensive Monitoring Program

5.9.7.1 Program Strategy

The Wetlands Intensive Monitoring Program will assess the spatial and temporal cumulative effects of multiple forest practices across a landscape. The program is meant to look at the long-term or residual, as well as the synergistic, effects of forest practices carried out under forest practices rules. Upon recommendation from the Wetland Research and Monitoring Strategy, this program will be delayed until the completion of other wetlands programs. In order to determine what functions will be assessed in this program, baseline information needs to be collected through the execution of other programs—the functions that have significant change or are subject to change because of interactions with the effects of multiple forest practices or accumulation across time and space will be considered in the Wetlands Intensive Monitoring Program. Until baseline information is collected during other programs, the projects for this program will not be fleshed out.

Table 42. Wetlands Intensive Monitoring Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
What are the spatial and temporal cumulative effects of multiple forest practices on wetlands and connected waters at the watershed scale? What are the causal relationships and effects of forest practices on wetlands and connected waters?	Wetlands Intensive Monitoring Project

5.9.7.2 Wetlands Intensive Monitoring Project

Description:

Wetland functions are broadly defined in WAC 222-24 and -30 as water quality, water quantity, fish and wildlife habitat, and timber production, without specific species-related, wetland-type habitat criteria, narrative, or quantitative standards. Little to no research has been conducted within wetlands specific to forestlands or forest management in the Pacific Northwest relative to the species, resources, and critical processes (i.e., movement of surface and subsurface water) occurring within different types of wetlands and covered by the FP HCP. Without baseline information about expected species use, development and maintenance of structural habitat components, and connectivity of water through surface or subsurface flowpaths, and without numeric or narrative standards, it is not possible to evaluate whether the three performance goals of the FP HCP are being met through the application of forest practices regulations.

This project will evaluate the full suite of wetland functions in different ecoregions on both the eastside and the westside, stratified by HGM classification, forest practices type, Ecology wetland rating, and size. The HGM Wetlands Classification System Project was folded into this project.

Status:

To be scoped in the future and to be informed by the Wetland Management Zone Effectiveness Monitoring Project, Forested Wetlands Effectiveness Project, and Forest Practices and Wetlands Systematic Literature Review Project.

5.9.8 Wetland Mapping Program

5.9.8.1 Program Strategy

This program is intended to address gaps in existing data on the location, distribution, size, and geophysical characteristics of wetlands, especially for forested wetlands. More accurate spatial data could enhance the design and implementation of projects examining the effects of forest practices rules on wetland functions. Specifically, the data could provide context for (1) focusing research on wetlands and associated typed-waters that may be vulnerable to harvest and road impacts, and (2) assessing the spatial applicability (inference) of study findings to other landscapes. The use of remote sensing and associated geospatial modeling with GIS is a potentially viable tool to fill these data needs; however, no suitable GIS model is currently available for grouping wetlands by functional type or landscape position.

Table 43. Wetland Mapping Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
How should wetlands be located, classified, and mapped?	Wetland Mapping Tool

5.9.8.2 Wetland Intrinsic Potential Tool (WIP)

- Phase 1 developed a beta wetland intrinsic potential (WIP) identification model that interfaces as an ArcMap tool.
- Phase 2 will calibrate the wetland identification model (i.e., using field data) to predict the probability of wetlands by type (including forested wetlands) on forest lands of western Washington.

Phase I developed the GIS-based wetland identification tool by linking pixel-based and object-based approaches for delineating forested wetlands. Pixel-based approaches utilize topographic attributes inferred from high-resolution elevation data (e.g., LiDAR DEMs) with soils and geologic mapping to identify hydro-geomorphic attributes associated with wetlands. Object-based approaches use a variety of data sources, potentially including the pixel-based results, with eCognition⁵ software to delineate visual (from optical imagery) and topographic features associated with forested wetlands. To apply these tools, the project team built an add-in tool kit for ArcGIS that enables a user to (1) generate the pixel-based attributes, (2) optionally import

⁵ eCognition is a commercial software program widely used for object-based analyses.

eCognition-produced files, and (3) map potential wetlands. The wetland intrinsic potential identification tool works either with or without object-based, eCognition-provided data files, although inclusion of the object-based results provides better wetland identification and more accurate delineation than can be achieved with the pixel-based results alone.

Phase 2 of this project will focus on refining the WIP tool through new data collection, inclusion of additional remote sensing methods and statistical analysis, and calibration of the WIP tool in new areas. The tool development will include revisions with new datasets and methods, testing the tool on multiple watersheds, troubleshooting the revised tool, and updating the user manual and report from Phase 1.

Status:

Phase 1 was approved for funding by Policy in November 2015. Phase 1 was completed in April 2018. Adaptive Management funding for this project enabled CMER to join with a larger wetlands mapping project led by Ecology with funding from EPA and in collaboration with other state and federal agencies. Phase 2 began in July 2018 and is scheduled to be completed in April 2019.

5.9.9 Silvicultural Chemicals and Wetlands Program

5.9.9.1 Program Strategy

The Silvicultural Chemicals and Wetlands Program was developed in response to direction from the Wetland Research and Monitoring Strategy. It focuses on the forest practices rules on pesticide, herbicide, and fertilizer application on or near wetlands. The wetlands strategy did not specifically mention forested wetlands as being a priority ecotype when examining the effects of forest chemicals, and the Pesticide Rule Group does not cover the effects of fertilizers used during tree regeneration. This program seeks to examine the effects of forest chemicals on wetland functions.

CMER held a science conference in October 2016 to inform the members about the current use and related science concerning chemicals used in Forest Practices. No projects are proposed at this time.

Table 44. Silvicultural Chemicals and Wetlands Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
What are the magnitude and duration of effects of silvicultural chemicals (e.g., pesticide and fertilizers) practices on wetland processes, functions, and aquatic resources within the wetlands and connected waters? Do the pesticide and fertilizer rules protect processes, functions, and aquatic resources within wetlands and connected waters?	None scoped.

5.10 WILDLIFE RULE GROUP

Historically, Policy has funded a number of wildlife research projects since the late 1980s. These projects have addressed general multispecies and statewide issues, as well as species-specific concerns about the effects of forest practices.

Although the FP HCP is focused on water quality, fish, and stream-associated amphibians (SAAs), both Policy and CMER acknowledge that wildlife issues are important and need attention. To address this concern, CMER recently funded additional sampling and analyses of a study that examines wildlife use of two streamside buffer designs. However, because CMER's focus is currently on FP HCP priorities, the only funding available for additional wildlife projects is from the State General Fund.

5.10.1 Rule Overview and Intent

Forest practices rules directed at wildlife conservation take two approaches: (1) general statewide requirements; and (2) species-specific strategies. In addition, forest practices rules may benefit wildlife through the retention or enhancement of habitat, such as riparian buffers, upland management areas, channel migration zones, etc. The only statewide forest practices rule specifically directed at wildlife conservation is the provision for managing wildlife reserve trees (WAC 222-30-020[11]). Specifications for retaining wildlife reserve trees, green recruitment trees, and downed logs are provided for both eastern and western Washington.

Species-specific forest practices rules are closely tied to state and federal endangered and threatened species programs. Habitat of listed species is defined as critical habitat (state), and any proposed forest practices activity in critical habitat becomes a Class IV special forest practices under the State Environmental Policy Act (SEPA) (WAC 222-10-040), requiring consultation, evaluation, an environmental impact statement (where appropriate), and mitigation. There are currently 10 species for which these rules apply (including the bald eagle [*Haliaeetus leucocephalus*], grizzly bear [*Ursus arctos*], northern spotted owl [*Strix occidentalis*], and marbled murrelet [*Brachyramphus marmoratus*]).

In some cases, the Forest Practices Board (Board) has endorsed a species-specific approach that avoids rule-making. This approach usually involves developing and adopting management plans or specifying “voluntary” guidelines. The Federal listing of the lynx (*Lynx canadensis*) prompted the state and a few large private landowners in northeastern Washington to develop and adopt lynx management plans. Similarly, the state listing of the Taylor's checkerspot butterfly (*Euphydryas editha taylori*) resulted in landowner commitments to develop management plans to protect, and possibly help restore, the few occupied sites. After the state listing of the western gray squirrel (*Sciurus griseus*), landowners agreed to apply forest practices guidelines developed by the Washington Department of Fish and Wildlife (WDFW) in areas known to contain the species. These species-specific rules and associated guidelines are very complex, with details on habitat definitions, monitoring methods, and provisions for site protection varying by species. In addition, the Board often adopts rule options that allow landowners to develop their own species-specific management plans.

5.10.2 Rule Group Resource Objectives and Performance Targets

No resource objectives or performance targets exist for wildlife rules.

5.10.3 Rule Group Strategy

Wildlife research pertaining to fish and amphibians (aquatic and riparian-dependent) are covered under the Type N Riparian Prescriptions Rule Group, specifically within the Sensitive Site Program and the Type N Amphibian Response Program. The Wildlife Rule Group contains only one active program, which focuses on wildlife species within upland management areas (UMAs) or riparian management zones (RMZs). This rule group’s critical question is listed in Table 45.

Table 45. Wildlife Rule Group Critical Questions and Programs

Rule Group Critical Questions	Program	Task Type	SAG
What roles do RMZs, UMAs, and other forest patches play in maintaining species and providing structural and vegetative characteristics thought to be important to wildlife?	Wildlife Program	Effectiveness Validation	LWAG

5.10.4 Wildlife Program

The purpose of the Wildlife Program is to (1) determine the species of wildlife that use managed forests; (2) estimate habitat conditions associated with wildlife use of managed forests; (3) assess the efficacy of regulations designed to provide habitat for wildlife in managed forests; and (4) identify emerging forestry-wildlife issues and develop research projects that address those issues.

5.10.4.1 Program Strategy

With the current emphasis of CMER on the Forest Practices Adaptive Management Program, there is little opportunity to fund projects for wildlife other than those species that are covered under the FP HCP (i.e., aquatic species and riparian-dependent amphibians). LWAG has identified and prioritized several wildlife issues (upland and/or riparian) that need attention. These issues are described in the rule group critical question in Table 46 and are primarily addressed with the RMZ Resample Project.

Table 46. Wildlife Program: Applicable Rule Group Critical Questions with Associated Research Projects

Rule Group Critical Questions	Project Names
What roles do RMZs, UMAs, and other forest patches play in maintaining species and providing structural and vegetative characteristics thought to be important to wildlife?	RMZ Resample Project

5.10.4.2 RMZ Resample Project

Description:

In 1990, CMER funded a BACI-based manipulative study to examine the effects of two buffer configurations (state regulations and “smart buffers”) on birds, small mammals, and amphibians. The study produced two years of pre- and post-harvest data and a final report that was completed in 2000. The results were species-specific and equivocal, and raised numerous questions about the long-term response of wildlife to the treatments. Because the smart buffer was similar to the forest practices buffer for Type F streams, and more than five years had elapsed since last sampling in the RMZ, another two years of sampling was initiated in 2003 to document changes over time. The extension was intended to provide additional data on riparian conditions and some SAAs.

Status:

The final report was completed in 2008 and was reviewed by LWAG, CMER, and ISPR. The contract with the consultant that collected the data and prepared the final report was not renewed; therefore, the final report has not been revised based on ISPR comments. LWAG developed a memorandum that summarized the complex issues surrounding the inability to finalize the RMZ Resample report and its tentative conclusions, and LWAG provided suggestions for addressing any useful information that might be extracted from the project’s results. That memorandum and the ISPR comments were attached as an addendum to the final report and submitted to CMER for final approval. Since that time, LWAG has examined the report and available data, and determined that only the bird and amphibian data have potential for further analysis and for useful additional products. The bird data have a higher priority for further analysis, due to the methods used for data collection. A report on the bird data was developed in 2013, has gone through LWAG, CMER, and ISPR review, and been finalized and approved by Policy. The product was a peer-reviewed, submittal-ready report that was accepted in PLOS in December 2015.

5.10.5 Other Wildlife Programs/Projects

Wildlife research priorities were developed as part of the original TFW stakeholder process. These research priorities were in place prior to adoption of the current adaptive management program developed in concurrence with the Forests and Fish Report. Under the current Forest Practices Adaptive Management Program, and to fulfill requirements of the FP HCP, research is prioritized and funded to primarily address aquatic resources. However, TFW stakeholders continue to see the importance of addressing effectiveness and monitoring of nonaquatic wildlife, and they hope to incorporate priority wildlife research in the future. Table 47 lists the critical wildlife research questions developed by TFW stakeholders.

Table 47. Wildlife Rule Group Critical Questions and Associated Programs (Developed as Part of TFW)

Rule Group Critical Questions	Program	Task Type
<p>What are the values of snags retained in upland management units and riparian management zones (RMZs)?</p> <p>Is there a threshold response by wildlife to snag density?</p> <p>What are the fates of wildlife reserve trees (WRT) and green recruitment trees (GRT) in managed forests?</p> <p>What are the most effective ways of retaining and replacing snags?</p>	Effectiveness of snags for wildlife	Effectiveness Validation
<p>What are the effects of variation in stand establishment practices, herbicides, thinning, fertilization, and rotation lengths on vegetation and wildlife?</p> <p>Does the concept of the steady-state shifting mosaic apply, and how does that process affect wildlife?</p>	Conifer management effects on wildlife	Effectiveness Validation
<p>What roles do RMZs, upland management areas (UMAs), and other forest patches play in maintaining species and providing structural and vegetative characteristics thought to be important to wildlife?</p> <p>What are the functions of large legacy trees (snags, down wood, high stumps) as compared to the smaller complements produced in intensively managed forests?</p> <p>What are the roles and fates of special sites (e.g., rock outcrops, cliffs, talus slopes, isolated small wetlands, etc.) in managed forests?</p>	Legacy features and their effect on wildlife	Effectiveness Validation
<p>What are the movement patterns, processes, and distances of amphibians in managed forests?</p> <p>Do amphibians persist in refugia following timber harvest, or is subsequent occupancy related to movements from other areas?</p> <p>How quickly do amphibians recolonize areas, particularly habitat outside the stream network?</p> <p>What are the roles of ponds created by beaver, slumps, rotational failures, road ditches, sediment traps, and off-channel habitats in the distribution and abundance of still-water-breeding amphibians?</p>	Amphibian movement and distribution effectiveness monitoring	Effectiveness
<p>What are the status and trends of bats in managed forests?</p>	Forest Bats	Extensive
<p>What are the roles of WRTs and GRTs in bat ecology?</p> <p>What are the relationships between forest management and bat foraging and roosting?</p>	Forest Bats	Effectiveness
<p>What is the relationship between the abundance and productivity of wildlife and gradients in the composition and structure of ponderosa pine stands?</p>	Ponderosa Pine Habitat	Effectiveness
<p>What are the effects of forest practices on the western gray squirrel and oviposition sites of egg-laying reptiles?</p> <p>What are the roles of isolated oak trees and small patches of oaks?</p>	Oak Woodland Habitat	Effectiveness

Rule Group Critical Questions	Program	Task Type
What are the appropriate management approaches to maintaining and restoring oak woodlands at stand and landscape levels?		

5.11 INTENSIVE WATERSHED-SCALE MONITORING TO ASSESS CUMULATIVE EFFECTS

Intensive monitoring is watershed-scale research designed to evaluate the cumulative effects of multiple forest practices and to provide information that will improve our understanding of causal relationships and the biological effects of forest practices rules on aquatic resources. The evaluation of cumulative effects of multiple management actions on a system requires an understanding of how individual actions influence a site, and how those responses propagate through the system. This understanding will enable the evaluation of the effectiveness of management practices applied at multiple locations over time. This sophisticated level of understanding can only be achieved with an intensive, integrated monitoring effort. Evaluating biological responses is similarly complicated, requiring an understanding of how various management actions interact to affect habitat conditions, and how system biology responds to these habitat changes. This program was identified in the Monitoring Design Team (MDT) Report (MDT 2002) as an essential component of an integrated monitoring program. CMER and Policy will be scoping intensive monitoring needs for the adaptive management program.

5.11.1 Resource Objectives and Performance Targets

Resource objectives and performance targets have not yet been identified.

Rule Group/ Program	CMER Projects	Status	Task Type	Direct Measure of FFR Goals			Direct or Indirect Measurement ⁽¹⁾ of Objectives & Targets (D = direct; I = indirect; L = literature; ? = probable if implemented in future)													Other Important Issues		
				Fish	Amphib	WQ	In-Str Temp	Rip/ Wet Shade	Rip/ Wet Stand ⁽²⁾	In-Str/ Wet LWD	Rip/ Wet Litter	In-Str/ Wet Hab ⁽³⁾	Strm ELZ ⁽⁴⁾	Mass Wast- ing	Rd Sed Runoff	Peak Flow	Wet- land	Fish Passage	Wind- throw	Ground- water	Intermit Flow ⁽⁵⁾	
Type F Riparian Prescriptions Rule Group																						
DFC Validation Program (Rule Tool)																						
	DFC Target Validation	complete	RIT	---	---	---	---	---	D	---	---	---	---	---	---	---	---	---	---			
	DFC Plot Width Standardization (scoping)	delayed	R&D	---	---	---	---	---	?	?	?	---	---	---	---	---	---	---	---			
	FPA Desktop Analysis (includes field analysis)	complete	RIT	---	---	---	---	---	D	---	---	---	---	---	---	---	---	---	---			
	DFC Site Class Map Validation (scoping)	delayed	RIT	---	---	---	---	---	?	---	---	---	---	---	---	---	---	---	---			
	DFC Trajectory Model Validation	delayed	R&D	---	---	---	---	---	?	?	---	---	---	---	---	---	---	---	---			
	DFC Aquatic Habitat	delayed	R&D	---	---	---	---	---	?	?	---	?	---	---	---	---	---	---	---			
	Pathways of Riparian Stand Development to Maturity	delayed	R&D	---	---	---	---	---	?	---	---	---	---	---	---	---	---	---	---			
	Red Alder Growth and Yield Model (coop. contribution)	complete	R&D	---	---	---	---	---	D	---	---	---	---	---	---	---	---	---	---			
Eastside Type F Riparian Rule Tool Program																						
	Eastside Disturbance Regime Literature Review	complete	R&D	---	---	---	---	L	L	L	L	---	L	---	---	---	---	L	---			
	Eastside LWD Literature Review	complete	R&D	---	---	---	---	L	L	L	L	---	L	---	---	---	---	L	---			
	Eastside Temperature Nomograph	incomplete	RIT	---	---	yes	D	D	---	---	---	---	---	---	---	---	---	---	---			
	Eastern WA Riparian Assessment (EWRAP)	complete	R&D	---	---	---	D	D	D	D	D	---	---	---	---	---	---	D	---			
	Eastside Modeling Evaluation (EMEP)	in prog	RIT	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
	Eastside Timber Habitat Evaluation (ETHEP)	scoping	RIT	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
	Eastside Type F Channel Wood Characterization	delayed	R&D	---	---	---	---	D	I	D	I	D	---	---	---	---	---	D	---			
Bull Trout Habitat Identification Program (Rule Tool)																						
	Bull Trout Presence/Absence Protocols	complete	RIT	yes	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
	Bull Trout Habitat Prediction Models	complete	RIT	yes	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
	Yakima River Radiotelemetry	complete	R&D	yes	---	---	---	---	---	---	D	---	---	---	---	---	---	---	---			
Westside Type F Riparian Effectiveness Program																						
	Westside Type F Riparian Prescription Monitoring	in prog	EFF	---	---	---	?	?	?	?	---	?	?	---	---	---	---	?	---			
	Westside Type F Experimental Buffer Treatment	delayed	EFF	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
	Type F Performance Target Validation	delayed	EFF	---	---	---	---	---	?	?	---	?	?	---	---	---	---	---	---			
Eastside Type F Riparian Effectiveness Program																						
	BTO Temperature (Eastside Riparian Shade/Temperature)	complete	EFF	---	---	yes	D	D	D	---	---	---	---	---	---	---	---	---	D			
	Solar Radiation/Effective Shade	complete	EFF	---	---	---	I	D	---	---	---	---	---	---	---	---	---	---	---			
	Eastside Type F Riparian Effectiveness Monitoring (BTO add-on)	in prog	EFF	---	---	---	---	---	D	D	---	I	D	---	---	---	---	D	---			
	Groundwater Conceptual Model	delayed	R&D	---	---	---	I	---	---	---	---	---	---	---	---	---	---	---	I			
Hardwood Conversion Program (Effectiveness)																						
	Riparian Hardwood Conversion	in prog	EFF	---	---	---	---	---	D	---	---	---	---	---	---	---	---	---	?			
	Riparian Hardwood Conversion - Temperature Component	complete	EFF	---	---	yes	D	D	---	---	---	I	---	---	---	---	---	---	---			
	Annotated Bibliography: Riparian Hardwood Conversion	incomplete	R&D	---	---	---	?	---	L	---	---	---	---	---	---	---	---	---	---			
	WDOE Water Temperature Modeling	complete	R&D	---	---	---	I	I	I	---	---	---	---	---	---	---	---	---	---			
Intensive Monitoring/Cumulative Effects Program: No projects yet identified.																						

Rule Group/ Program	CMER Projects	Status	Task Type	Direct Measure of FFR Goals			Direct or Indirect Measurement ⁽¹⁾ of Objectives & Targets (D = direct; I = indirect; L = literature; ? = probable if implemented in future)											Other Important Issues			
				Fish	Amphib	WQ	In-Str Temp	Rip/ Wet Shade	Rip/ Wet Stand ⁽²⁾	In-Str/ Wet LWD	Rip/ Wet Litter	In-Str/ Wet Hab ⁽³⁾	Strm Bnk ELZ ⁽⁴⁾	Mass Wast- ing	Rd Sed Runoff	Peak Flow	Wet- land	Fish Passage	Wind- throw	Ground- water	Intermit Flow ⁽⁵⁾
Channel Migration Zone Rule Group																					
CMZ Delineation Program																					
	CMZ Screen and Aerial Photo Catalog and CMZ Boundary Identification Criteria	delayed	RIT	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	Consistency and Accuracy of CMZ Boundary Delineations	delayed	RIT	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
CMZ Validation Program: No projects yet identified.																					
Unstable Slopes Rule Group																					
Unstable Landform Identification Program (Rule Tool)																					
	Shallow Rapid Landslide Screen for GIS (Westside)	complete	RIT	---	---	---	---	---	---	---	---	I	---	---	---	---	---	---	---	---	
	Shallow Rapid Landslide Screen for GIS (Eastside)	delayed	RIT	---	---	---	---	---	---	---	---	I?	---	---	---	---	---	---	---	---	
	Technical Guidelines for Geotechnical Reports	complete	RIT	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	Regional Unstable Landforms Identification (Deep-Seated Screen)	complete	RIT	---	---	---	---	---	---	---	---	I	---	---	---	---	---	---	---	---	
	Landform Hazard Classification System and Mapping Protocols	complete	R&D	---	---	---	---	---	---	---	---	I	---	---	---	---	---	---	---	---	
	Landslide Hazard Zonation (priority 1 and 2 watersheds)	complete	RIT	---	---	---	---	---	---	---	---	D	---	---	---	---	---	---	---	---	
	Landslide Hazard Zonation (priority 3 watersheds)	delayed	RIT	---	---	---	---	---	---	---	---	D	---	---	---	---	---	---	---	---	
Glacial Deep-Seated Landslides Program (Rule Tool)																					
	Model Evapo-Transpiration in Deep-Seated Landslide Recharge Areas	complete	RIT	---	---	---	---	---	---	---	---	I	I	---	---	---	---	---	---	I	
	Evapo-Transpiration Model Refinement	delayed	R&D	---	---	---	---	---	---	---	---	---	I?	---	---	---	---	---	---	---	
	Glacial Deep-Seated Landslides and Groundwater Recharge Literature Synthesis	complete	RIT	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	L	
	Groundwater Recharge Modeling	delayed	R&D	---	---	---	---	---	---	---	---	---	I?	---	---	---	---	---	---	D	
	Glacial Deep-Seated Landslide Map	delayed	RIT	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	Landslide Classification	delayed	RIT	---	---	---	---	---	---	---	---	---	I?	---	---	---	---	---	---	I	
	Board Manual Revision	complete	RIT	---	---	---	---	---	---	---	---	---	I?	---	---	---	---	---	---	I	
Mass Wasting Effectiveness Monitoring Program																					
	Unstable Slopes Criteria	in prog	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	Non-Glacial Deep-Seated Landslides and Groundwater Recharge Literature Synthesis	complete	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	Deep-Seated Landslide Research Strategy	scoping	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
	Mass Wasting Effectiveness Monitoring (aka Post-Mortem)	complete	EFF	---	---	---	---	D	---	I	I	D	D	I	---	---	---	---	---	---	
	Mass Wasting Landscape-Scale Extensive Monitoring	delayed	EFF	---	---	---	---	---	---	---	---	---	D?	---	---	---	---	---	---	---	
	Mass Wasting Buffer Integrity and Windthrow Assessment	delayed	EFF	---	---	---	---	---	---	---	---	---	D?	---	---	---	---	---	---	D?	
Mass Wasting Validation Program (Intensive): No projects yet identified.																					
Roads Rule Group																					
Road Sub-Basin-Scale Effectiveness Monitoring Program																					
	Road Sub-Basin-Scale Effectiveness Monitoring (Phase 1)	complete	EFF	---	---	I	---	---	---	---	---	---	---	---	D	I	---	I	---	---	
	Road Surface Erosion Model Update	complete	RIT	---	---	---	---	---	---	---	---	---	---	---	D	---	---	---	---	---	
	Road Surface Erosion Model Validation/Refinement	delayed	R&D	---	---	---	---	---	---	---	---	---	---	---	D?	---	---	---	---	---	
Road Prescription-Scale Effectiveness Monitoring Program																					
	Effectiveness of RMAP Fixes	delayed	EFF	---	---	---	---	---	---	---	---	---	---	---	D?	D?	---	D?	---	---	
	Road Prescription-Scale Effectiveness Monitoring	in prog	EFF	---	---	---	---	---	---	---	---	---	---	---	D	D	I	---	---	---	
Roads Validation Program and Cumulative Sediment Effects																					
	Intensive Watershed-Scale Monitoring to Assess Cumulative Effects	delayed	INT	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

Rule Group/ Program	CMER Projects	Status	Task Type	Direct Measure of FFR Goals			Direct or Indirect Measurement ⁽¹⁾ of Objectives & Targets (D = direct; I = indirect; L = literature; ? = probable if implemented in future)													Other Important Issues		
				Fish	Amphib	WQ	In-Str Temp	Rip/ Wet Shade	Rip/ Wet Stand ⁽²⁾	In-Str/ Wet LWD	Rip/ Wet Litter	In-Str/ Wet Hab ⁽³⁾	Strm Bnk ELZ ⁽⁴⁾	Mass Wast- ing	Rd Sed Runoff	Peak Flow	Wet- land	Fish Passage	Wind- throw	Ground- water	Intermit Flow ⁽⁵⁾	
Fish Passage Rule Group																						
Fish Passage Effectiveness/Validation Monitoring Program: No projects yet identified.																						
Extensive Fish Passage Monitoring Program																						
	Extensive Fish Passage Trends Monitoring (Design)	complete	EXT	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
Pesticides Rule Group																						
Forest Chemicals Program (Effectiveness and Validation): No projects yet identified.																						
Wetlands Protection Rule Group																						
Forested Wetlands Effectiveness Program																						
	Forested Wetlands Effectiveness	in prog	EFF	---	---	yes	D?	D	D	D?	---	D	---	---	---	---	D	---	---	---		
	Forest Practices and Wetlands Systematic Literature Review	complete	R&D	yes	yes	yes	L	L	L	L	L	L	---	L	L	L	L	L	L	L		
	Forested Wetlands Literature Review and Workshop	complete	R&D	---	---	---	L	L	L	L	L	L	---	L	L	L	L	L	L	L		
	Statewide Forested Wetlands Regeneration Pilot	complete	EFF	---	---	---	---	---	D	---	---	---	---	---	---	---	D	---	---	---		
Wetland Management Zone Effectiveness Monitoring Program																						
	Wetland Management Zone Effectiveness Monitoring	scoping	EFF	yes	yes	yes	D	D	D	D	D	D	D	D	D	I?	D	D	D	D		
Forest Roads and Wetlands Program																						
	Roads Effects on Wetlands	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	Wetlands Mitigation Effectiveness (Pilot Study)	delayed	EFF	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	Wetlands Mitigation Effectiveness (Phase 1)	delayed	EFF	---	---	yes	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	Wetlands Mitigation Effectiveness (Phase 2)	delayed	EFF	yes	yes	yes	D?	D?	D?	?	?	I?	---	D?	D?	I?	D?	I?	D?	D?		
Wetland Intensive Monitoring Program																						
	Wetlands Intensive Monitoring	delayed	INT	yes	yes	yes	D?	D?	D?	D?	?	D?	?	D?	D?	D?	D?	D?	D?	D?		
Wetland Mapping Program																						
	Wetland Intrinsic Potential Tool (WIP)	in prog	RIT	---	---	I?	---	---	---	---	---	D?	---	---	---	---	D?	---	---	I?		
Silvicultural Chemicals and Wetlands Program: No projects yet identified.																						
Wildlife Rule Group																						
Wildlife Program																						
	RMZ Resample	complete	EFF	---	yes	---	---	---	D	---	---	---	---	---	---	---	---	---	---	---		
Intensive Watershed-Scale Monitoring to Assess Cumulative Effects: No projects yet identified.																						

NOTES

Status:

In Progress: Site selection, data collection, analysis, or report writing (in prog)

Complete: Final CMER approved report (complete)

Scoping: Currently being scoped (scoping)

Delayed: Planned, but not yet scoped; or delayed due to funding, prioritization, etc. (delayed)

Task Type:

Monitoring Type: Effectiveness (EFF); Intensive/Cumulative Effects (INT); Extensive Status and Trends (EXT)

Rule and Project Tools: Rule Implementation Tools (RIT) needed to correctly implement the rules; includes accurately delineating prescription boundaries
Research & Development (R&D) includes literature reviews and development of research protocols

⁽¹⁾ Direct or Indirect Measurement: Direct = actual field measurement; Indirect = modeling/correlations, etc.

⁽²⁾ Riparian/Wetland Stand Objectives/Targets include windthrow, potential LWD recruitment, DFC basal area targets, and other stand conditions, etc.

⁽³⁾ In-Stream/Wetland Habitat Objectives/Targets include fish and amphibian habitat ID, substrate, flow, etc.

⁽⁴⁾ Stream Bank/Equipment Limitation Zone (ELZ) includes bank erosion, delivery of sediment from the ELZ

⁽⁵⁾ "Intermit Flow" refers to spatially intermittent flow below the uppermost point of perennial flow in Type Np streams.

⁽⁶⁾ Type N Exp Buffer Treatment in Hard Rock Lithologies: This project is repeated in two programs (Type N Effectiveness and Amphibian Response); however, the designation of functions is shown only once in order to not overdesignate projects that address those functions. The functions are designated under the Type N Effectiveness Program.

CHARTER: TECHNICAL TYPE NP PRESCRIPTIONS WORKGROUP

- I. **Date:** March 7, 2019
Updated version (v.2) approved by Policy 06-08-2019
- II. **Project Duration:** March 7, 2019 through completion.
Completion is to occur six months after receipt of final affiliated report, estimated June 19, 2020

III. Introduction

This charter is intended to guide the formation and efforts of a Technical Type Np Prescriptions Workgroup (hereafter: Workgroup), which is a sub-group of the Timber, Fish and Wildlife (TFW) Policy Committee (hereafter: Policy). The Workgroup will be formed as an outcome of alternative actions proposed by Policy in response to the study entitled *Effectiveness of Experimental Riparian Buffers on Perennial Non-fish-bearing Streams on Competent Lithologies in Western Washington* (hereafter: Hard Rock Study; Attachment 1). The purpose of the workgroup is to develop proposed Riparian Management Zone (RMZ) buffer prescriptions for Type Np streams in western Washington for Policy's consideration. Based on the scope of the Hard Rock Study, the initial focus is on western Washington streams in areas of hard rock lithology, to achieve temperature protection objectives. However, this scope may be expanded per the direction of Policy as more information becomes available.

Policy affirmed, through consensus, that the Hard Rock Study indicated there was a temperature increase associated with the buffer treatments tested. Therefore, Policy agreed the findings warrant action and proposed the following process components:

1. Formation of a technical workgroup, governed by a charter, to develop and deliver a set of proposed RMZ buffer prescriptions for Type Np streams that meet a suite of resource protection, feasibility, and economic objectives.
2. The workgroup will utilize all relevant information to inform proposed RMZ buffer prescriptions for Np streams, including available literature and data while adhering to the timeline.
3. Inclusion of additional Type N related projects currently in the CMER process including the *Buffer Integrity – Shade Effectiveness (Amphibian)* project, *Westside Type N Buffer Characteristics, Integrity and Function (BCIF)* study, *Type N Experimental Buffer Treatment in Hard Rock Lithology - Phase II Extended Monitoring* study, and the *Type N Experimental Buffer Treatment in Soft Rock Lithologies* study. These products would be available for the workgroup upon delivery to Policy from CMER.
4. Expedited funding and implementation of the *Buffer Characteristics and Shade* study to both inform, and be informed by, the workgroup
5. Adherence to a timeline that is expected to run concurrently with the CMER process associated with remaining Type N projects and conclude within 6 months of receipt of the final study. At the time of drafting, the *Type N Soft Rock* study is anticipated to be the final study delivered by CMER in this series.

Policy anticipates that rulemaking will be needed to implement RMZ buffer prescriptions for Type Np streams that result from recommended actions.

IV. Workgroup Purpose

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

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

Although the site specificity of the *Hard Rock Study* applies to above ground stream components in basalt (hard rock) lithology, Policy may expand the objectives and/or geologic/geographic applicability of proposed prescriptions if findings from subsequent Type N projects warrant action.

The workgroup shall understand results of the *Hard Rock Study* and utilize all available information to inform the development of proposed RMZ buffer prescriptions for Np streams as described above, including best available science and related documents from within the Adaptive Management Program (AMP), and additional final CMER-approved findings reports from Type N projects. These studies include:

- A. Buffer Integrity – Shade Effectiveness (Amphibian) Project
- B. Westside Type N Buffer Characteristics, Integrity and Function (BCIF)
- C. Type N Experimental Buffer Treatment in Hard Rock Lithology - Phase II Extended Monitoring
- D. Type N Experimental Buffer Treatment in Soft Rock Lithologies

As each study becomes available, the Workgroup will assess its implications and incorporate the new results into the Workgroup's ongoing work, per Policy's direction. These studies and their associated findings are the products of an agreed upon process within WAC 222-12-045. It is not the role of the Workgroup to reanalyze the Hard Rock Study, or the additional Type N projects listed above, to refute the findings produced through the CMER process.

Policy expects the Workgroup to understand the findings and full reports of the Hard Rock Study, and subsequent projects and, if needed, solicit additional input from project Principal Investigators (PIs) or outside experts to identify knowledge gaps and gain a better understanding of the CMER research. The Workgroup may employ any necessary information gathering, synthesis, and/or understand cause and effects to inform prescription development. However, Policy expects the Workgroup to adhere to the timeline established in Section VI of the Charter.

V. Deliverables

1. Development of one or more forest practice RMZ prescriptions for perennial, non-fish bearing (Type Np) streams in western Washington that meet the objectives in Section IV.
2. Estimate the level of effectiveness of proposed Type Np water RMZ buffer prescriptions at meeting resource objectives identified in The Forest Practices Board approved Schedule L1 of the Forest and Fish Report and affirmed in the Forest Practices Habitat Conservation Plan using literature, modelling or other methods.
3. Submission of final report no later than 6 months post-receipt of final Type Np study (estimated June 19, 2020) to Policy that articulates Deliverables 1 and 2, any major process findings, and any areas of non-consensus.

VI. Timeline and Milestones

Task	Anticipated Timeline*
Board acceptance of Policy Proposal	May 7, 2019
Receipt of Buffer-Shade Amphibian Response study	June 2019
Workgroup is convened	July 2019
Workgroup members become familiar with Type N Hard Rock study results and Washington State water quality standards.	August 2019
Receipt of Buffer Characteristics, Integrity & Function study	Fall 2019
Written update for Policy and Board (I)	October 25, 2019
Written update for Policy and Board (II)	January 24, 2020
Written update for Policy and Board (III)	April 24, 2020
Receipt of Hard Rock Phase II Extended study	September 2020
Workgroup drafts new Type Np prescriptions for initial Policy review	December 2021
Receipt of type N Soft Rock study and findings	March 2021
Workgroup update, if necessary, proposed Type Np water RMZ buffer prescriptions based on review of Type Np Soft Rock study findings	3 months post Soft Rock (<i>June 2021</i>)
Written update for Policy and Board (IV)	July 19, 2021
Final submission of deliverables to policy	6 months post final Type Np study (estimated September 2021)

*The dates in this timeline are subject to change based on the dates of receipt of the Type Np studies and will be updated as new information becomes available. The Workgroup will adjust as necessary to accomplish its deliverables within the allotted overall schedule.

Process and Milestones

The following process steps are recommended to complete the deliverables:

1. Review the completed Hard Rock report and associated findings;
2. Review and understand Forest Practice rules associated with Type Np streams and how Washington's water quality standards apply to forest practices;
3. Identify information gaps and assess available information to assist Workgroup in deriving proposed RMZ buffer prescription for Type Np streams;
4. On an ongoing basis, review newly completed Type N related studies and their associated findings; integrate relevant information into decision making process; consider field visits/practical field application time as needed;
5. Develop a suite of possible alternatives and assess on-the-ground feasibility;
6. Through consensus, select final prescription(s) for recommendation to Policy;
7. Develop associated language that articulates how/where to implement a given prescription;
8. Aggregate proposed prescriptions and a description of the process pursued, additional resources utilized, and any other relevant information into a final proposal for Policy's consideration.

VII. Membership & Composition

Workgroup Name	Focal Area	Role
Darin Cramer	Policy Liaison	Chair (non-voting)
Jim Peters	Policy Liaison	Vice Chair (non-voting)
[To be determined August 2019]		Voting Member
Health Gibbs	AMP	Project Manager (non-voting)

Expectations

The anticipated time commitment for workgroup members is approximately three days per month, on average, for the full duration of the workgroup, approximately 2 years.

Composition

The workgroup consists of two representatives of Policy, one of whom will serve as Chair and up to eight experts with the following areas of expertise: biological and physical stream processes, and silviculture/field forestry.

An Adaptive Management Program Project Manager, Heather Gibbs (Heather.Gibbs@dnr.wa.gov; 360-902-2897), will serve as staff support for the workgroup. Specifically, the Project Manager will be responsible for assisting with meeting logistics, providing necessary materials related to the AMP process, and securing resources, as necessary, to achieve the workgroup's objective.

Compensation

Workgroup members will be selected using the Collaborative Research Approach to contracting. Specifically, all members of the Workgroup have been selected through the consensus process by Policy at the [DATE] meeting.

Each workgroup member, excluding Policy co-chairs will be compensated in an amount not to exceed \$20,000 for their active participation and adherence to the Charter. Compensation is intended to cover any expenses incurred during the duration of the project and to compensate members for professional contributions and time. As with all other contracts through the Adaptive Management Program, the Department of Natural Resources will award and manage these Collaborative Research Contracts.

Co-chairs will be compensated via reimbursement requests to DNR for expenses associated with travel, lodging, and/or per diem if necessary.

Expectations

The anticipated time commitment for workgroup members is approximately three days per month, on average, for the full duration of the workgroup, approximately 2 years.

All workgroup members shall operate as technical experts and will not serve as representatives for any specific caucus. However, an understanding of the field and policy context will be valuable. Because familiarity and continuity among members are crucial to timely completion, meetings will require participation by all members. With Workgroup approval, members may invite associates to provide additional information. Associates' role will be technical, short-term, and specific.

Workgroup members agree to:

- Acquire a deep understanding of past and incoming CMER studies on Type N streams;
- Familiarize themselves with other related materials in preparation of the meeting;
- Assist in the identification and evaluation of relevant non-CMER studies;
- Read and understand Forest Practices WACs relevant to Type Np prescriptions;

- Meet on a regular and timely schedule;
- Attend all meetings (in-person or by phone);
- Adhere to the timeline; and
- Assist in reporting regularly to policy.

VIII. Group Process and Governance

Norms

The Workgroup will follow standard Policy norms and ground rules. However, the small size and technical nature of the work may allow for a more informal approach than occurs at Policy meetings. Members of the Workgroup agree to collectively provide a collaborative space to foster the development and presentation of proposed RMZ buffer prescriptions for Type Np streams that achieve the aforementioned objectives.

Meetings will be open to the public, but with no public comment.

Governance

The Workgroup will actively work toward consensus. If there is a lack of consensus, a simple majority vote can occur to move a decision forward. Majority-minority reports will be catalogued for all non-consensus decisions.

It is the role of Workgroup co-chairs to inform Policy of non-consensus issues and to elevate those issues, if needed, for Policy resolution.

Roles and Responsibilities

Chair & Alternate

- Run workgroup meetings that maintain open and productive discussion and decision making;
- Work with Project Manager (PM) to set up meeting schedule in advance;
- Work with PM and Workgroup members to develop a work plan that meets deliverables, expectations, and timelines as articulated in the Charter;
- Work with PM to ensure that meeting announcements and meeting summaries are prepared and distributed;
- Provide written and oral updates to TFW Policy on Workgroup progress, issues, and decisions according to the timeline;
- Provide updates to the Workgroup on status of affiliated CMER studies and/or pertinent decisions or discussions made by Policy; and
- Identify if the workgroup is at an impasse and notify Policy immediately with a recommended course of action.

Project Manager

- Serves as staff support to the Workgroup;
- Assist Chair with meeting logistics and providing necessary materials related to the AMP process;
- Post on the TFW Policy Website Workgroup meetings, agendas, and relevant materials for the public; and
- Work with AMP Administrator (AMPA) to identify and secure any necessary resources to achieve the Workgroup's objectives – if funding is needed, work with the AMPA and Policy to determine availability of funds.

Workgroup Technical Members

- Provide expertise that helps solve technical problems related to developing new Type Np prescriptions that meet the objectives articulated in the Charter;

- Along with the Hard Rock Study results, become familiar with the other CMER Type N study results when available;
- Attend in person or via conference line/video link all regularly scheduled workgroup meetings;
- Participate in organized field trips;
- Be prepared for regularly scheduled workgroup meetings and complete assigned tasks within agreed upon deadlines;
- As requested by Workgroup Chair, attend Policy meetings and provide updates to Policy members;
- Follow guidelines established by the workgroup Charter; and
- Adhere to Workgroup ground rules.

Attachment 1: Approved Action Alternative

TFW Policy Consensus Proposal to the Board on a response to study results of the *Effectiveness of Experimental Riparian Buffers on Perennial Non-fish-bearing Streams on Competent Lithologies in Western Washington*

Approved by TFW Policy v. 12-6-18
Approved by Forest Practices Board v. 5-7-19

The *Effectiveness of Experimental Riparian Buffers on Perennial Non-fish-bearing Streams on Competent Lithologies in Western Washington* study (hereafter: Type Np Hardrock) indicates there is a temperature increase associated with the buffer treatments tested. Therefore, Policy agrees action is warranted. Policy recommends the following components:

1. Formation of a technical workgroup.
 - a. This workgroup shall be governed by a charter. The charter will be drafted by Policy member(s) and approved by Policy.
 - b. For efficient decision-making, the composition of the workgroup will include no more than 10 members:
 - i. Two representatives of Policy caucuses, one of whom will chair the process. The primary role of Policy members will be to manage the process. The policy members are non-voting in the workgroup.
 - ii. Up to eight people balanced among the following areas of expertise: biological and physical stream processes, and silviculture/field forestry.
 - iii. Additional experts can be added on a temporary, ad-hoc basis as needed per the direction of the workgroup.
 - iv. The caucuses and AMPA will put together a list of names for Policy to approve. Policy will choose potential members by least objectionable. In the event of a tie, there will be a random draw.
 - v. This workgroup will be staffed by a project manager from the AMP.
 - c. Expectations of the workgroup:
 - i. Meet on a regular and timely schedule
 - ii. Adhere to a timeline [established by the Board]
 - iii. Report regularly to Policy
 - d. The deliverable of the workgroup is a set of proposed Type Np Riparian Management Zone (RMZ) prescriptions that meet the following objectives.
 - i. Protect water temperature to meet the rule (WAC 173-201A-200, -300-320)
 - ii. Are repeatable and enforceable
 - iii. Are operationally feasible
 - iv. Provide wood to the stream over time
 - v. Account for windthrow
 - vi. Consider options that allow for management in the RMZ
 - vii. Minimize additional economic impact
2. The workgroup shall utilize all relevant information to inform proposed RMZ prescriptions for Np streams, including available literature and data while adhering to the timeline.
3. Additional Type N projects currently in the CMER process shall also inform the workgroup, upon receipt of approved findings reports from CMER. Policy agrees to support timely completion of these projects, including regular status reports at Policy meetings. The projects include:

- a. Buffer-Shade Amphibian Response (anticipated Feb '19)
 - b. Buffer Characteristics, Integrity and Function (BCIF) (anticipated Spring '19)
 - c. Type N Experimental Buffer Treatment in Hard Rock Lithologies- Extended (anticipated September '19)
 - d. Type N Experimental Buffer Treatment Project in Soft Rock Lithology (anticipated December '19)
4. Policy agrees the Riparian Characteristics and Shade study should be funded and initiated as soon as possible. This study does not necessarily need to be completed for decision-making by the workgroup (see below), but it is expected that the study can inform the workgroup and vice-versa. It is anticipated that rulemaking will be needed to implement prescriptions that result from Policy's recommended actions.
 5. The workgroup process is expected to run concurrently with the CMER process associated with the remaining Type N projects, and conclude within 6 months of receipt of the final Type N study. A final Policy recommendation to the FPB is anticipated in mid to late 2020.
 6. By the January 2019 Policy meeting, Policy will consider a draft charter for the technical workgroup reflective of the elements described in this proposal and that clearly articulates the manner in which the workgroup will conduct their analysis and their deliverables to Policy.

August 2019	September 2019	October 2019	November 2019	December 2019	January 2020
<p>August Policy meeting</p> <ul style="list-style-type: none"> Review framework from Extended Monitoring WG Form a workgroup for PSM Chapter 3 & 7, WAC and Board Manual 22 AMPA roles review Accept Buffer-Shade findings report (decision will have implications for future agendas) Approve Type N workgroup members 	<p>September Policy meeting</p> <ul style="list-style-type: none"> Respond to Board requests Discussion on unspent funds strategy 	<p>October Policy meeting</p> <ul style="list-style-type: none"> Quarterly budget update Financial and performance audits update Approve <i>Riparian Characteristics and Shade project charter</i> Assess Buffer Shade action alternatives Hear ENREP response from CMER or SAG ENREP recommendation to the Board 	<p>November Policy meeting</p> <ul style="list-style-type: none"> Update from Type N Workgroup Discuss collaboration with DNR State Lands Climate change and Policy: continued dialogue on incorporating climate change into Policy processes and decision-making BCIF Findings Report Presentation Receive final recommendations from SFL Template Workgroup 	<p>December Policy meeting</p> <ul style="list-style-type: none"> Respond to Board requests Hard Rock extended findings reports Soft Rock findings reports Select action alternative for Buffer Shade Legislative priorities for upcoming session Extensive Status and Trends Monitoring Strategy review Vote on recommendation to the Board on Small Forest Landowner Template Review budget for unspent funds 	<p>January Policy meeting</p> <ul style="list-style-type: none"> Legislative updates Determine if BCIF findings merit action Review CMER workplan
<p>Additional meetings: <i>SFL Template Workgroup</i></p>	<p>Additional meetings: Technical Type Np Prescriptions Workgroup</p>	<p>Additional meetings: Technical Type Np Prescriptions Workgroup</p>	<p>Additional meetings: Technical Type Np Prescriptions Workgroup</p>	<p>Additional meetings: Budget workgroup</p>	<p>Additional meetings: Budget workgroup</p>
<p>Forest Practices Board mtg</p>			<p>Forest Practices Board mtg</p>	<p>Technical Type Np Prescriptions Workgroup</p>	<p>Technical Type Np Prescriptions Workgroup</p>

February 2020	March 2020	April 2020	May 2020	June 2020	July 2020
February Policy meeting <ul style="list-style-type: none"> Legislative updates Update from Type N Workgroup MPS and budget Updates 	March Policy meeting <ul style="list-style-type: none"> Legislative updates Respond to Board requests 	April Policy meeting <ul style="list-style-type: none"> Co-chair nominations Legislative summary Assess BCIF Action alternatives Finalize MPS and budget for FY 21 	May Policy meeting <ul style="list-style-type: none"> Update from Type N Workgroup 	June Policy meeting <ul style="list-style-type: none"> Co-chair elections Select action alternative for BCIF Respond to Board requests 	July Policy Meeting <ul style="list-style-type: none"> Quarterly budget update Approve budget for Board’s August meeting
Additional meetings: Budget workgroup Technical Type Np Prescriptions Workgroup	Additional meetings: Budget workgroup Technical Type Np Prescriptions Workgroup	Additional meetings: Budget workgroup Technical Type Np Prescriptions Workgroup	Additional meetings: Technical Type Np Prescriptions Workgroup Forest Practices Board mtg	Additional meetings: Technical Type Np Prescriptions Workgroup	Additional meetings:

“Parking lot” topics.

- Parking lot topics from PSM workshop:
 - Revision of Schedule L-1 including Performance Targets
 - Conducting periodic review of compliance monitoring
 - Chapter 3 & 7 AMPA roles and Board Manual Section 22
 - Proposal Initiation (PI)/workplan:
 - WAC 222-12-045 PI roles
 - Board Manual 22 (including prospective findings and AMPA role)
 - CMER workplan updates and Policy process
- Presentation on Bull Trout Overlay (BTO) Add-On / Approve BTO add on findings report and 6 questions [1 month after presentation]
- Presentation on BCIF Report

TFW Attachment 4 - Timber, Fish, & Wildlife Policy Committee – **Monthly Workload**

Draft 7/16/19

- Soft Rock (est. 2020)
- Respond to Board requests regarding water typing strategy




**DEPARTMENT OF
NATURAL RESOURCES**

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July 1, 2019

TO: Forest Practices Board 

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

SUBJECT: Northern Spotted Owl Conservation Advisory Group Update

The Forest Practices Board is required, per WAC 222-16-010, to annually evaluate the need to maintain the Northern Spotted Owl Conservation Advisory Group. This group is convened when the Washington Department of Fish and Wildlife (WDFW) 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 is to be maintained in support of northern spotted owl recovery.

Since the August 2018 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 August meeting.

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

ME



**DEPARTMENT OF
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MEMORANDUM

August 1, 2019

TO: Forest Practices Board
FROM: Howard Haemmerle, 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 May 2019. The areas of emphasis for this quarter include updates on the general updates on CMER and TFW Policy work.

WFFA's Alternate Plan Template Proposal Initiation

The Policy workgroup continues to meet on the Washington Farm Forestry Association Alternative Plan template proposal. The ISPR review of the science has been completed and the final report has been provided to the workgroup.

CMER Update

UPSAG continues to work on a draft Scoping Document and Alternatives document for the Deep-Seated Landslide Research Strategy for the Landslide Mapping & Classification Project. The document should be transmitted to CMER before the end of September.

SAGE is drafting a Scoping document for the Eastside Timber Habitat Evaluation Project (ETHEP). They are continuing their discussions on finalizing objectives, critical questions, and Best Available Science components of the document.

Sage is the science advisory group overseeing the Eastside Type N Riparian Effectiveness Project (ENREP). First year pre-harvest and aquatic life monitoring of biophysical variables at all sampling locations is in progress at the Northern Rockies Ecoregion sites. The project team has been working with State Lands to select basins in the East slope Cascade Ecoregion Sites. Basins have been identified in the Coxit Mountain, Rattlesnake Ridge and Sedge Ridge areas. The project team is in the process of evaluating those locations to determine if they meet the projects established selection criteria.

RSAG continues work on Extensive Status and Trends Monitoring project. Policy approved utilizing unspent funds from FY 19 to contract with the University of Washington to test the transferability of several forest inventory models developed in the Mashel watershed under the Extensive Riparian Vegetation Monitoring – Remote Sensing Pilot Study. The models were

tested using forest inventory plots that were established in the Olympic Experimental State Forest. The fieldwork was completed in April 2019 and the University of Washington is processing the data. The project is moving forward on schedule.

RSAG and CMER completed a concurrent review of the Riparian Characteristics and Shade Response Study plan. The contractor completed a response matrix and revised the study plan. RSAG and CMER are currently re-reviewing the report to ensure their comments were addressed. Budget for FY 20 only included funds for ISPR but the RSAG/CMER review was not completed in FY 19 as hoped. A request for \$5,000 was approved at the July RSAG meeting to finish the RSAG and CMER review in FY 20. This request will be coming to the July CMER meeting for approval.

The PIs continue to work on the Soft Rock Report. It anticipated that the report will be returned to CMER in September.

Extensive Riparian Status and Trend Monitoring Type F – Westside (temp) final report was approved at the April 2019 CMER meeting. RSAG is working on the Finding Report.

The PIs of the Hard Rock Extended report had a conference call with two of the CMER reviewers to discuss their comments and concerns. A revised draft of the report will be brought back to CMER for approval to send to ISPR at the August meeting.

The Forested Wetland Effectiveness Study (FWEP) have completed their revision of the study design based on ISPR comments. The study design is again in ISPR review.

TFW Policy Update

Policy has been actively working on making recommendations to the Board regarding the results of the Type N Hard Rock study results. Towards that goal, Policy established two new workgroups: the Type N Alternatives Workgroup and the Extended Monitoring Workgroup. Both groups are actively working on this activity.

If you have any questions, please feel free to contact me (howard.haemmerle@dnr.wa.gov or 360-902-2142).



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MEMORANDUM

TO: Forest Practices Board
FROM: Garren Andrews, Compliance Monitoring Program Manager
SUBJECT: Current status of the Compliance Monitoring Program

Peter Grebowski has been offered and accepted the Compliance Monitoring Field Coordinator position. Mr. Grebowski is expected to begin his appointment August 16th 2019.

2019 Compliance Monitoring Spring field reviews completed June 2019. 2018/2019 biennial standard sample data collection has been completed. Data will be compiled and analyzed fall 2019.

Field work for the Unstable Slopes prescription is expected to commence September, 17th 2019.

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

GA/

A handwritten signature in black ink, appearing to read "Garren Andrews". The signature is written in a cursive style with a large initial "G" and "A".




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July 3, 2019

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 one meeting on May 21, 2019. Discussions focused on the following topics:

- Potential Low Impact Harvest Prescriptions
- FPA Forms and Updates
- Update of Small Forest Landowner Office Advisory Committee Action Plan.

SFLO Program Updates

Forestry Riparian Easement Program

The Forestry Riparian Easement Program (FREPP) received \$2.5 million from the State Capital Budget for the FY2019-2021 biennium. The program's funding is used for two main purposes: 1) purchase of easements and 2) valuation of easements. The \$2.5 million allotted will be used to purchase 33 easements and establish the value of another 158 easement applications.

Family Forest Fish Passage Program

The Family Forest Fish Passage Program (FFFPP) received \$5 million from the State Capital Budget for the FY2019-2021 biennium. The program currently has in its queue over 1,000 eligible projects. The \$5 million will result in correction of an estimated 38 fish passage barriers, opening an estimated 135 miles of stream habitat.

Rivers and Habitat Open Space Program

The Rivers and Habitat Open Space Program (RHOSP) received \$1 million from the State Capital Budget for the FY2019-2021 biennium. This funding will purchase one conservation easement containing an eligible channel migration zone, and one conservation easement containing critical habitat for a state listed threatened or endangered species.

Long Term Applications (LTA)

There are a total of 272 approved long term applications, which is an increase of 0 approved applications since the end of the last reporting period (04/16/2018).

LTA Applications	LTA Phase 1	LTA Phase 2	TOTAL
Under Review	4	2	6
Approved	5	272	277
TOTAL	9	274	283

Upcoming Landowner Events

Forest Stewardship Coached Planning Short Courses

WSU Extension's flagship course will teach landowners how to assess their trees, avoid insect and disease problems, attract wildlife, and take practical steps to keep their forest on track to provide enjoyment and even income for years to come. In this course landowners will develop their own Forest Stewardship Plan, which brings state recognition as a Stewardship Forest and eligibility for cost-share assistance, and may also qualify them for significant property tax reductions.

- Preston, WA September 10, 2019
- Vashon, WA September 25, 2019

Forest Health Seminars

Dead and dying trees have proliferated throughout western Washington. Trees were particularly hard-hit in 2018, especially western redcedars, causing concern for many property owners.

Washington State University (WSU) Extension Forestry will be giving a free public seminar to explain why so many trees are dying right now and what property owners can do.

Learn what makes forests healthy or unhealthy and how to recognize when there's a problem on your property. Topics include insects, diseases, and drought, including their environmental roles and the important interactions between them. Learn about what property owners should do (and not do) to increase tree resilience and mitigate impacts. The seminar will be taught by Kevin Zobrist, associate professor of forestry at WSU and author of the book *Native Trees of Western Washington*. Then Forest Health Seminars will be held: on July 10th in Longview and on July 22nd in Enumclaw.

Family Forest Owners Field Days

Two Western WA Forest Owners Field Days - Saturday, August 10, 2019 in Arlington, WA and August 24, 2019 in McCleary, WA

For more information regarding these 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/



State of Washington
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WA

August 14, 2019

MEMORANDUM

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

The up-listing of the Marbled Murrelet from state threatened to endangered became effective February 4, 2017. With an observed 4.4% annual population decline since 2001 the status of the Marbled Murrelet in Washington has not improved since state listing in 1993. 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 Marbled Murrelet 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 for FP Rule improvements to the Board.

The WWG held its most recent meeting July 31, 2019, the results of which were not available prior to preparation of this memo. The group continues to evaluate the FP Rule definition of Marbled Murrelet habitat by gathering best available science on murrelet habitat characteristics and selection. This information will provide updated knowledge on murrelet ecology and help the group evaluate if the current habitat definition is appropriate or if other characteristics may better reflect murrelet habitat, and possibly better align the FP Rule with the Federal and Pacific Seabird Group definitions. Progress from this will then lead to evaluation of the FP Rule processes and implementation aspects associated with the recommended habitat definition.

The USFWS completed its species status assessment (SSA) for the distinct population segment in Washington, Oregon, and California. The SSA concluded that there is no change needed to the Marbled

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

The fisher, a member of the weasel family, continues to be re-introduced to Washington after disappearing from its forestlands during the last century. To date, WDFW and partners have successfully relocated 189 fishers to the Olympic National Park and other federal lands within the southern and northern Cascade Mountains. 73 (73) fishers have been released at Mount Rainier National Park and the Gifford Pinchot National Forest since December 2015.

Beginning in December 2018, 26 Alberta fishers were translocated from the Calgary Zoo and released into the North Cascades Recovery Area. Fishers have been released in North Cascades National Park at Newhalem, Washington (7 fishers on December 5, 2018), and at Buck Creek Campground on the Mt. Baker-Snoqualmie National Forest, near Darrington, Washington (5 fishers on December 13, 2018; 6 fishers on January 17, 2019; 6 fishers on February 6, 2019; 2 fishers at Whitechuck R./Sauk R. confluence on March 7, 2019). In total, 26 fishers were released in the North Cascades during winter 2018/2019.

Combined with the Candidate Conservation Agreement with Assurances (CCAA) program administered by WDFW, the reintroductions are assisting the species return to the state. Non-federal landowners can continue to enroll in the CCAA and receive federal regulatory assurances in the event that the fisher becomes 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, 56 landowners and 3,027,528 acres of non-federal forest lands are enrolled in the CCAA.

In September 2018, the Northern District Court for California ruled that the 2017 USFWS decision to withdraw their proposed rule to list fishers under the ESA was arbitrary and capricious. The result is that the fisher is once again a candidate for listing under ESA and USFWS is required to review their decision and publish findings by September 21, 2019.

Future Updates to the Board

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

cc: Hannah Anderson (WDFW)
Taylor Cotten (WDFW)
Terra Rentz (WDFW)
Chris Conklin (WDFW)
Marc Engel (DNR)
Sherri Felix (DNR)
Joseph Shramek (DNR)

FOREST PRACTICES BOARD
2019 WORK PLAN

2019 Meeting Dates: May 8 & 9 / August 14 / November 13

TASK	COMPLETION DATE/STATUS
Adaptive Management Program	
• Buffer/Shade Effectiveness Study (amphibian response)	February
• CMER Master Project Schedule Review*	May
• CMER Master Project Schedule Compliance Review*	August
• Hardwood Conversion Study	May
• TFW Policy Committee Progress Report on Unstable Slopes Recommendations from the Board approved Proposal Initiation	As needed
• Small Forest Landowner Western Washington Low Impact Template: TFW Policy Recommended Review Process & Timeline*	November
• Hard Rock Study	August
• Extended Monitoring and Reporting*	November
Annual Reports	
• WAC 222-08-160 Continuing review of FP rules (Annual Evaluations), <i>by tradition the Board has received an annual evaluation of the implementation of cultural resources protections</i>	August
• Clean Water Act Assurances	August
• Northern Spotted Owl Conservation Advisory Group	August
• TFW Policy Committee Priorities*	August
• Western Gray Squirrel	May
Board Manual Development	
• Section 23 (Part 1) Field Protocol to Locate Mapped Divisions Between Stream Types*	Move to 2020 work plan
• Section 23 (Part 2) Perennial Stream Identification*	Move to 2020 work plan
CMER Membership	
As needed	
Critical Habitat - State/federal species listings and critical habitat designations	
As needed	
Field Tour	
late summer/early fall	
Rule Making	
• Water Typing System – CR102	Move to 2020 work plan
• Water Typing System – CR103	Move to 2020 work plan
Committee Recommendations on AMP Efficiency & Improvements	
On-going	
Cultural Resources Recommendations from Facilitated Process (progress reports)	
On-going	
Quarterly Reports	
• Adaptive Management Program*	Each regular meeting
• Board Manual Development	Each regular meeting
• Compliance Monitoring	Each regular meeting
• Clean Water Act Assurances	February

Italics = proposed changes
* = TFW Policy Committee

FOREST PRACTICES BOARD
2019 WORK PLAN

TASK	COMPLETION DATE/STATUS
• 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	<i>To be determined</i>
• TFW Policy Committee Work Plan Accomplishments & Priorities*	Each regular meeting
• Upland Wildlife Working Group	Each regular meeting
Work Planning for 2020	November