

Addendum to
Anadromous Fish Floor (AFF) Policy Memo

Prepared for
The Water Typing System Rule Committee of the Washington State Forest
Practices Board

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Policy Memo Addendum

Introduction

The AFF Policy members in the development of potential AFF alternatives are utilizing the definition of the ‘anadromous fish floor’ (AFF) found in the Board approved Anadromous Fish Floor Workgroup Charter, where the AFF is defined as measurable physical stream characteristics downstream from which anadromous fish habitat is presumed and an agreement that, for the permanent forest practices water typing system rule, the AFF would establish the location upstream of which protocol fish surveys to determine the water type may begin under the Fish Habitat Assessment Methodology, thereby reducing electrofishing in waters that are presumed to have anadromous fish habitat.

This addendum supplements the findings and recommendations of the Anadromous Fish Floor Policy memo, dated December 8, 2021 and the subsequent actions of the Water Typing System Rule Committee (Committee) at their December 14, 2021 meeting. The Committee accepted the AFF Policy member recommendations for:

- No further consideration by the Board Committee and Board of AFF Alternatives A, C5%, C7%, C10%, E5%, E7%, E10%, and A3 to establish the location where protocol fish surveys to determine water type may begin;
- Continued consideration of Alternative D and A4 (10%);
- Additional analysis by the AFF Principal Investigators of two new AFF alternatives, Alternative A4 (7%) and Alternative A4 (5%); and,
- Consideration by the AFF Policy members of AFF Alternatives D, A4 10%, A4 7% and A4 5%.

The general outline of the two new AFF alternatives for analysis are as follows:

Alternative A4 (7%) as waters within anadromous fish floor as defined:

- All waters included in the SWIFD GIS database of documented (observed) and presumed anadromy, plus upstream associated waters occurring below a sustained channel gradient of **7%** or a permanent natural barrier, whichever comes first. For the purposes of Alternative A4 (**7%**), permanent natural barrier as defined using the barrier definition (below); and
- All waters connected to saltwater and extending upstream to a sustained **7%** gradient or a permanent natural barrier as defined using the barrier definition (below) within streams with no anadromous fish data.

Alternative A4 (5%) as waters within anadromous fish floor as defined:

- All waters included in the SWIFD GIS database of documented (observed) and presumed anadromy, plus upstream associated waters occurring below a sustained channel gradient of **5%** or a permanent natural barrier, whichever

comes first. For the purposes of Alternative A4 (5%), a permanent natural barrier is defined using the barrier definition (below); and

- All waters connected to saltwater and extending upstream to a sustained 5% channel gradient or a permanent natural barrier as defined using the barrier definition (below) within streams with no anadromous fish data.

Both of the A4 (7%) and A4 (5%) alternatives share the same barrier definitions, as follows:

Non-vertical Barrier:

- Channels < 5 feet in width: sustained gradient $\geq 20\%$ for ≥ 100 feet (30 meters) without resting areas.
- Channels 5 – 10 feet in width: sustained gradient $\geq 20\%$ for ≥ 250 feet (76 meters) without resting areas.
- Channels > 10 feet in width: sustained gradient $\geq 20\%$ for ≥ 525 feet (160 meters) without resting areas.

Vertical Barrier (permanent natural features):

- Channels < 5 feet in width: near vertical drop ≥ 5 feet in height (1.5 meters)
- Channels 5 – 10 feet in width: near vertical drop ≥ 8 feet in height (2.5 meters)
- Channels > 10 feet in width: near vertical drop ≥ 12 feet in height (3.7 meters)

The Committee unanimously passed a motion on December 14th to “accept the anadromous fish floor (AFF) policy members’ recommendation for additional analysis of:

- Alternative D and A4 (10%); and
- Alternative A4 (7%) and Alternative A4 (5%).”

And to “allow additional time for the AFF Workgroup to work with the Northwest Indian Fisheries Commission to have Terrainworks perform appropriate spatial analyses (as defined in a Scope of Work developed with the principal investigators) and have maps of the sample watersheds produced showing all components of all AFF alternatives analyzed for the purpose of informing the Board Committee and Board.”

The AFF Policy members received from the AFF Project Team an Addendum to the Anadromous Fish Floor Spatial Analysis Findings Report, dated February 2, 2022. The addendum representing consensus agreement from the principal investigators contained additional analysis to:

- (1) Conduct the additional AFF model runs for AFF alternative A4 7% and 5%;
- (2) Create .pdf maps (1:24,000) for selected basins that display in layers the following:
 - a. The ‘Anadromous Core’ (upper most extent of SWIFD) as a unique line feature.
 - b. The extent of each AFF alternative (D, A(4) 5%, A(4) 7%, A(4) 10%) as unique line features.
 - c. The reason for the termination of each AFF alternative as unique point features.

- d. Fish reference data (upper most SWIFD anadromous, upper most Other Anadromous, upper most Unknown Life history, upper most F/N point, upper most Resident) as both unique point features and as unique line features.
- (3) Describe with histograms and box and whisker plots the distributions of total stream lengths for each AFF alternative (A, D, A(4) 5%, A(4) 7%, A(4) 10%) that occur (1) above the upper most anadromous fish points (SWIFD), (2) above and below the upper most 'Other Anadromous' points; and (3) above and below the upper most F/N break points.

The AFF Policy members, in the review of the Addendum to the Anadromous Fish Floor Spatial Analysis Findings Report, have noted that maps were provided for selected basins and not maps of the sample watersheds used in the AFF spatial analysis.

Caucus Anadromous Fish Floor Preferred Alternatives, Recommendations and Rationale

The AFF Policy members upon receipt of the Addendum to the Anadromous Fish Floor Spatial Analysis Findings Report met throughout the month of February to review the additional AFF alternative analysis, to identify points of agreement, and to develop AFF recommendation(s) to bring forward to the Water Typing System Rule Committee for consideration and recommendation to the full Forest Practices Board. The AFF Policy members failed to reach consensus on an AFF Alternative(s) and have determined that each caucus can bring forward their preferred or recommended AFF Alternative for Committee and Forest Practices Board consideration. The Small Forest Landowner, western Washington Tribal, Conservation Caucus and Industrial Landowner caucus' preferences, recommendations and rationale follow:

Small Forest Landowner Caucus’ rationale for preferring AFF Alternative D and Additional AFF recommendations

I. Context for including Anadromous Fish Floor in a permanent water typing system rule

Water Typing Problem Statements:

A CR-101 filed on December 6, 2016 notified the public that the Forest Practices Board (FPB) “is considering rulemaking to amend the water-typing rules. Rule amendments will provide a consistent, stable system to determine the water type classification for all typed waters. The emphasis of the water type system is to establish fishbearing / non-fishbearing habitat, or Type -F Water designation.

The TFW Policy Committee continues to evaluate components needed to establish a singular water typing rule and is expected to make additional recommendations to the Board in mid-2017 on how to establish the break between fish and non-fish-bearing habitat waters or the Type F/N regulatory water type break. Included in these recommendations will be a Fish Habitat Assessment Methodology (*FHAM*), how to identify Off-Channel habitat, and when to use default physical criteria for fish use.”

At their February 14, 2018 Regular Board Meeting, the FPB directed FPB staff, in consultation with stakeholders, to incorporate Anadromous Fish Floor (AFF) alternatives into rule language, guidance and required analyses to accompany the draft water typing system. At the time of that meeting, the Small Forest Landowner Caucus understood the objective of the AFF to be minimizing electroshocking in small, low gradient streams which may have seasonal anadromous fish use, upstream from which FHAM may be used.

From July 2, 2019 “Charter - Forest Practices Board Water Typing System Rule Committee”, the FPB made clear that “The main goal of the new water typing system is to shift from a process based upon fish presence to a more robust and repeatable process relying on fish habitat as the guiding principle for delineating the break between Type F and N waters ...”.

At their September 24, 2019 meeting, members of the Board’s Water Typing Rule Committee (Board Committee) discussed their objective for an anadromous fish floor, as well as whether the definition of AFF is to be based on “presumed” or “likely” habitat, but did not finalize their discussion with a motion or vote. In their discussion captured in their meeting summary, the Board Committee generally agreed that “presumed” more accurately reflects what they were looking for, comes from the present situation where there is anadromy all of the time and where there is no need to electrofish.

II. Anadromous Fish Floor Workgroup findings

From the December 3, 2021 “Anadromous Fish Floor Spatial Analysis Findings Report”:

- “The ‘anadromous fish floor’ (AFF) in the permanent forest practices water typing rule would establish the location where protocol fish surveys to determine water type may begin under the Fish Habitat Assessment Methodology (being developed

concurrently), thereby reducing electrofishing in waters that are presumed to have anadromous fish use.”

- “The general approach used was to assemble a database of existing known and presumed fish occurrence data to serve as reference points for comparing our AFF alternatives. This method of model comparison against independent field data is a standard approach used in the physical and biological sciences. It allows for evaluation of model “success” as judged in comparison with the data. Relative performance may be judged by the distances between the model prediction and the fish data. Specific to the AFF analysis, this means model ‘error’ may be evaluated by tallying the length of stream where modeled AFF alternatives fall short of or extend beyond the various types of fish distribution data.”
- “The AFF project team focused on conducting the analyses to compare the AFF alternatives; the balance of risk between underestimating known anadromous stream length and overshooting the fish-non-fish habitat break point locations is the subject of the associated policy report.”

From the February 2, 2022 “Anadromous Fish Floor Spatial Analysis Addendum to Findings Report”:

Alternative D

- a. Total modeled AFF channel length was lower under alternative D than any of the A4 alternatives (*Addendum Figure 1; Addendum Figure 7*).
- b. The total AFF channel length predicted by the model to occur above the fish reference points (SWIFD, Other Anadromy, F/N Break Points, Other Fish) was lower under alternative D than any of the A4 alternatives (*Addendum Figure 2; Addendum Figure 3; Addendum Figure 5; Addendum Figure 6*).
- c. The occurrence of the AFF terminating downstream of uppermost Other Anadromy reference data was higher under Alternative D than any of the A4 alternatives (*Addendum Figure 3; Addendum Figure 4*).

III. Rationale for the Small Forest Landowner Caucus preferring Alternative D over AFF Alternatives A4 7% or A4 10%; and additional Small Forest Landowner Caucus AFF recommendations:

- Of the AFF alternatives analyzed, Alternative D has the lowest number and percentage of exceedances of concurred F/N break points, 9 exceedances and a 2.1% error rate (see Appendix A), almost 9 times less than Alternative A4 7% (error rate 18.4%) and almost 16 times less than Alternative A4 10% (error rate 34.0%). The total length in kilometers Alternative A4 7% and A4 10% exceeds concurred F/N break points compared to Alternative D, are also unacceptably high, 4.4 times and 8.3 times, respectively.
- Alternative A4 7% and A4 10% are estimated to overshoot within unsurveyed streams 8.8 times and 19.8 times greater, respectively, compared to Alternative D. Again, see Appendix A.

- These actual and estimated “overshoot” error rates associated with Alternatives A4 7% and A4 10%, will place landowners (and surveyors that they employ) in the unenviable position of having to call for ID team meetings to attempt to convince regulators to allow them to start FHAM further downstream in the inevitable event that the modelled AFF on unsurveyed streams are in error. Unless adequate implementation procedures are instituted in guidance, these modelled error rates may require protocol stream survey crews to visit a survey site more than once and / or require more ID teams to occur, at an increased cost for all ID team participants.
- RCW 34.05.328 (1) (e) under the Administrative Procedure Act, that “Before adopting a rule ..., an agency must: ... (e) Determine, after considering alternative versions of the rule and analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection.
- Although the occurrence of the AFF terminating downstream of uppermost Other Anadromy reference data was higher under Alternative D than any of the A4 alternatives, if Alternative D is selected by the FPB, under FHAM, surveyors will evaluate all available fish data and information (including Other Anadromy and resident fish distribution) and / or consult with WDFW and tribal biologists, in order to appropriately identify the initiation point for FHAM fish survey protocols, to minimize survey time and costs.
- Alternative D directly addresses concerns expressed by several caucuses that small, low gradient streams and laterals, particularly in the lower reaches of watersheds, may be missed and / or misclassified as non-fish habitat. Alternative D directly addresses small, low gradient streams and current draft guidance under consideration in Board Manual 23 will allow protocol survey timing outside the standard survey window (March 1 to July 15), when alternate timing may be more appropriate, determined in consultation with WDFW and affected tribes.
- Alternative D also extends classification of Type F waters beyond SWIFD streams into small lateral tributaries adjacent to known anadromous streams even if no fish are found during survey.
- In their July 27, 2017 Report for the Forest Practices Board (FPB), the PHB Science Panel found that abrupt changes in channel gradient (as used in Alternative D) were more consistent with how habitat breaks are defined in literature and based on how fish view and react to the environment they encounter than fixed thresholds for gradient (as used in Alternatives A4 7% and A4 10%). Alternative D also includes definitions consistent with the Science Panel’s recommendations for change in gradient (Science Panel Test 15) found in the Science Panel’s January 16, 2018 Report to the FPB.
- Alternative D included barrier and obstacle definitions consistent with the PHB Science Panel’s recommendations in their January 16, 2018 Report to the FPB (“... we recommend the same criteria for eastern and western Washington, which defines a potential fish passage barrier as a 3-ft vertical drop or an abrupt step in the stream channel with at least 20% slope and minimum elevation change greater than or equal to

1 upstream bankfull channel width ...”. The barrier definitions in Alternative A4 7% and 10% are not consistent with the Science Panel’s barrier recommendations.

- The AFF and barrier criteria used in all AFF A4 Alternatives are overly precautionary and are in conflict with the FPB-sponsored work performed by the PHB Science Panel, as well as published research, including research conducted and approved within the Adaptive Management Program.
- FPB approval of any of the AFF A4 Alternatives would also be inconsistent with prior FPB approved objectives that the permanent forest practices water typing rule balance error and make methods to locate the stream break points on the ground as accurate as possible.
- All AFF alternatives which include sustained gradient criteria (such as the A4 variants) will invariably require more field time (and cost) to identify the first occurrence of specified sustained gradients beyond the SWIFD point, before the practitioner is allowed to initiate FHAM fish survey protocols.
- Although the FPB supports (and the Small Forest Landowner and most other caucuses that we are aware of, generally accept) the concept for use of an AFF across the state of Washington, the spatial analysis work of the Anadromous Fish Floor Project Team was entirely confined to western Washington, with no eastern Washington sample watersheds analyzed. The Small Forest Landowner Caucus recommends that further spatial analysis be performed in sample eastern Washington watersheds (and review by the Anadromous Fish Floor Project Team including AFF Policy members) before a final AFF rule decision for eastern Washington is made by the FPB.
- The Small Forest Landowner Caucus also strongly insists that, as requested in the December 8, 2021 Anadromous Fish Floor (AFF Policy Memo, that pdf maps of all sample watersheds (not merely “selected basins”) be produced showing all components of all alternatives for the purpose of informing a workshop with the Board Committee and the full FPB.
- The Small Forest Landowner Caucus also strongly supports the need for AFF, PHB and Default Physical Criteria validation work. However, the most critically important work pertaining to water typing for small forest landowners is fulfillment of the earlier commitment made by the FPB for development of a LiDAR-based logistic regression map model that accurately predicts fish habitat across non-federal forestlands in Washington and avoids systematic bias.

Appendix A

1. Total number of Concurred F/N Break Points in the AFF dataset^{1/}: 435 100%

2. Number of 'overshoots'^{2/} and calculated percentage of times AFF exceeds Concurred F/N Break Points^{3/}:

• AFF Alternative A4 5%	40	9.2%
• AFF Alternative A4 7%	80	18.4%
• AFF Alternative A4 10%	148	34.0%
• AFF Alternative D	9	2.1%

3. Frequency AFF exceeds Concurred F/N Break Points, compared to Alternative D:

• AFF Alternative A4 5%	4.4 times
• AFF Alternative A4 7%	8.9 times
• AFF Alternative a4 10%	16.4 times

4. Total length in meters^{2/} (and magnitude) AFF exceeds Concurred F/N Break Points, compared to Alternative D:

• AFF Alternative A4 5%	11,225	2 times
• AFF Alternative A4 7%	24,346	4.4 times
• AFF Alternative A4 10%	46,223	8.3 times
• AFF Alternative D	5,539	-----

5. Estimated number of Concurred F/N Break Points per AFF length with Fish

Data:	AFF Length w/ Fish Data (km) ^{4/}	Total F/N Breaks ^{1/}	Est. F/N Breaks Per Kilometer
• AFF Alternative A4 5%	1,145	435	2.6
• AFF Alternative A4 7%	1,194	435	2.7
• AFF Alternative A4 10%	1,236	435	2.8
• AFF Alternative D	1,067	435	2.5

6. Estimated average length (in meters) of overshoot^{5/}:

• AFF Alternative A4 5%	280 meters
• AFF Alternative A4 7%	304 meters
• AFF Alternative A4 10%	312 meters
• AFF Alternative D	615 meters

7. Total AFF Length within Unsurveyed Streams^{6/}, and estimated number of ‘overshoot’ F/N Break Points^{7/} and estimated lengths of ‘overshoot’ (in Kilometers) within the Unsurveyed Streams in the AFF Spatial Analysis^{8/}, based on data above:

	AFF Unsurveyed Stream (km)	Est. # of overshoots	Est. ‘Overshoot’ Kilometers
• AFF Alternative A4 5%	4,125	987	276
• AFF Alternative A4 7%	4,665	2,318	705
• AFF Alternative A4 10%	5,319	5,064	1,580
• AFF Alternative D	2,482	130	80

1/ From Addendum Figures 16 and 17.

2/ From Addendum Figure 18.

3/ Calculated by dividing the number of F/N Break Points (shown for each alternative in Addendum Figure 18) by 435.

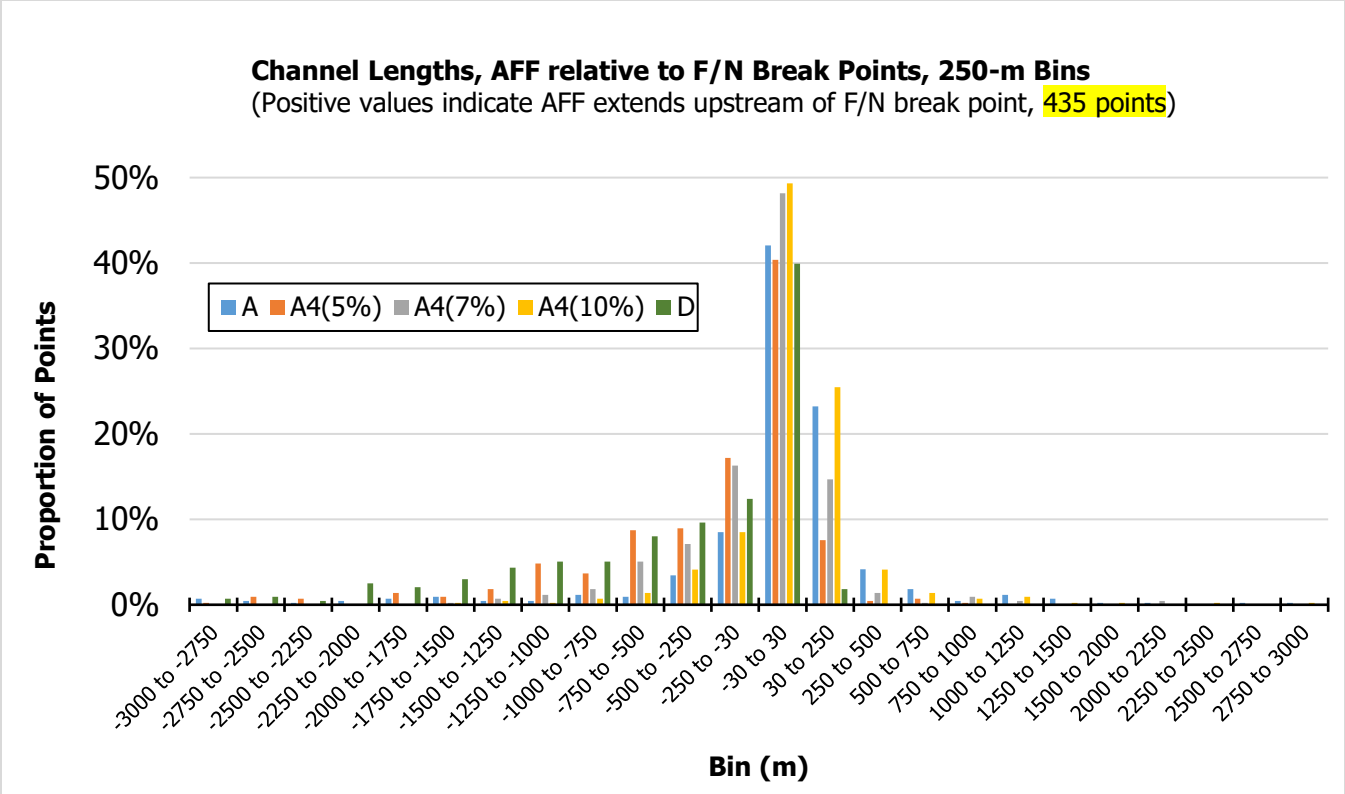
4/ Derived by subtracting the second row values of Addendum Table 2 from the first row values, while acknowledging that this violates cautionary footnote 1/ of Addendum Table 2.

5/ Estimated by dividing the number of the total AFF length from Addendum Figure 18 for each alternative by the number of F/N break points.

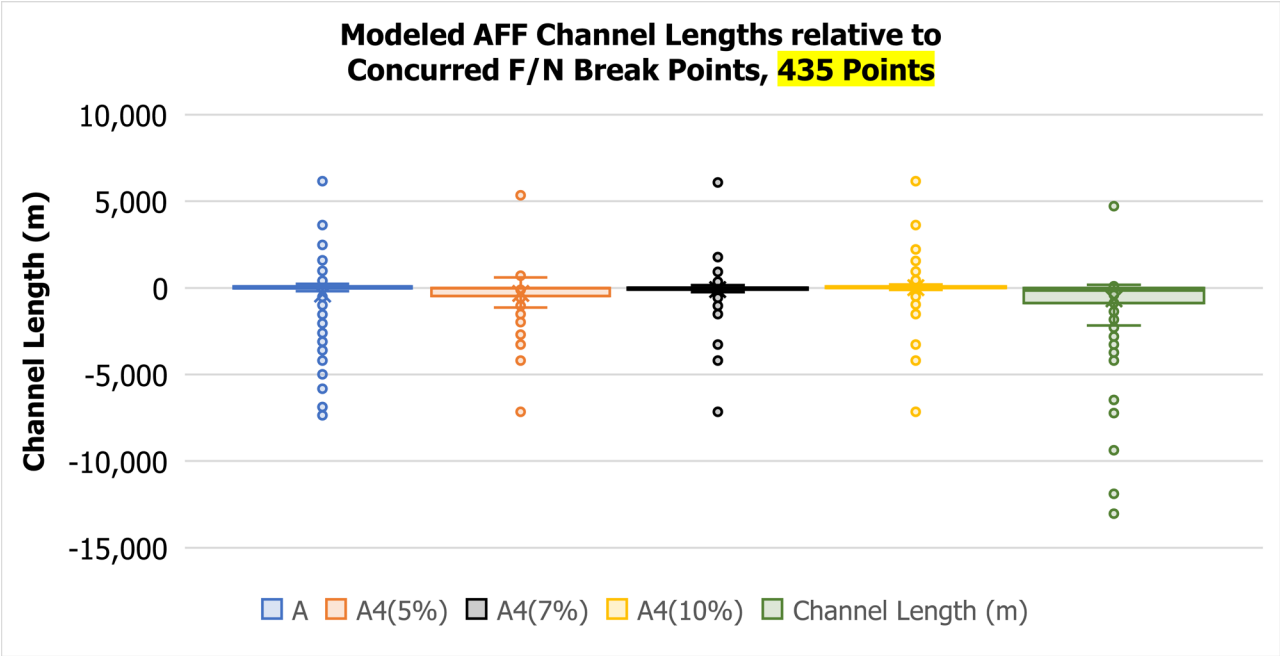
6/ From the second row of data in Addendum Table 2.

7/ Estimated by multiplying the AFF Unsurveyed Stream kilometers for each alternative by the ‘Est. F/N Breaks per Kilometer’ from 5. above and multiplying the result by the calculated percentage of ‘overshoots’ from 2. above.

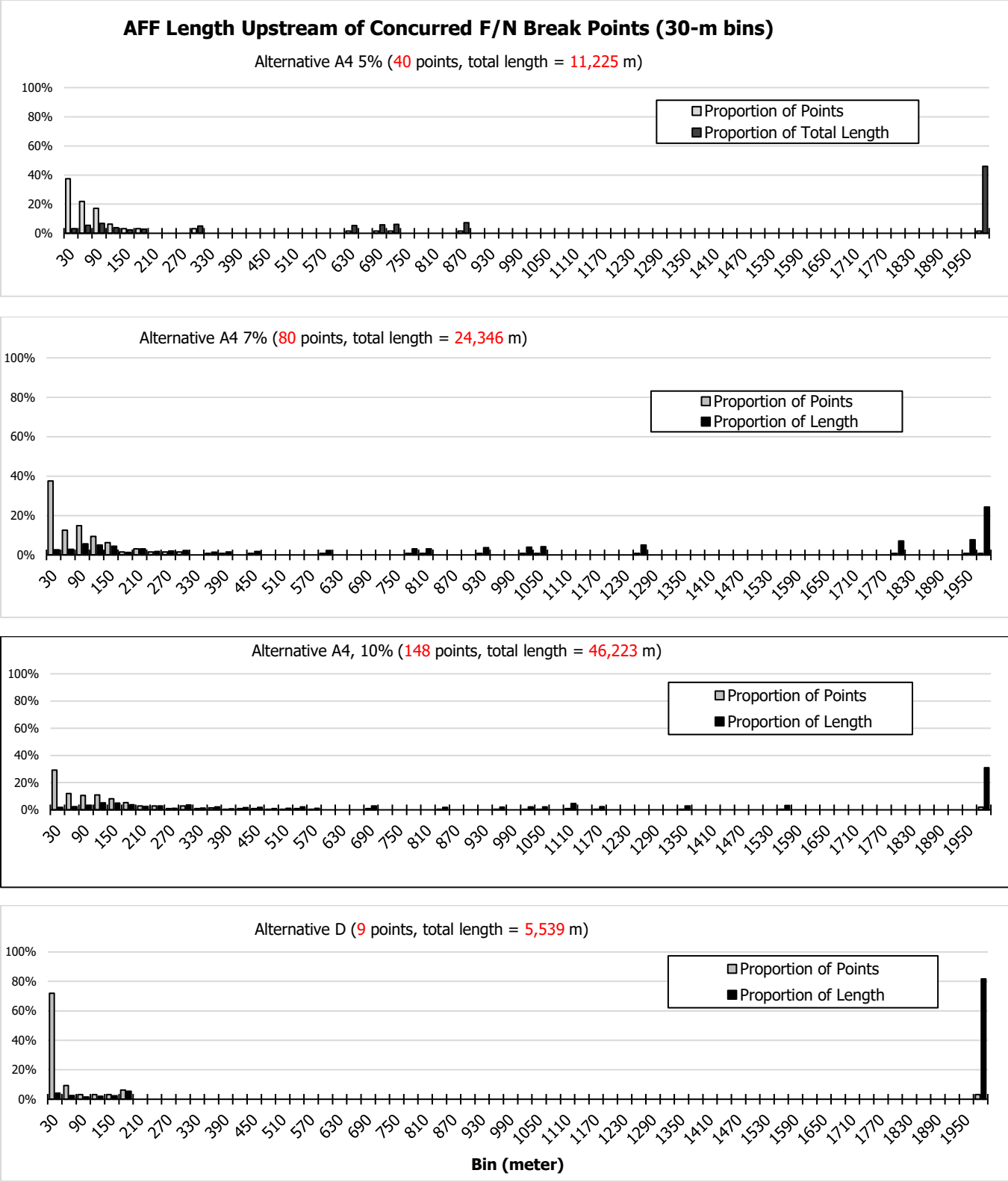
8/ Estimated by multiplying the ‘Est. # of overshoots’ for each alternative in 7. above by the estimated average length of overshoot per incidence of overshoot from 6. above. This is “order of magnitude” estimate of overshoots for the unsurveyed stream reaches in the sample watersheds within the AFF Spatial Analysis. It is, at best, an extrapolation of the data provided by TerrainWorks and admittedly not precise, but are logical.



Addendum Figure 1. Frequency histogram of the proportion of the streams that fall within the AFF by alternative. Given the imprecision of the mapping translation and lidar interpretation, the AFF streams that fall within the -30 to 30 meter bin are considered coincident with the F/N break points.



Addendum Figure 2. Box and whisker plots of the AFF alternatives relative to the F/N break points.



Addendum Figure 3. Frequency histograms of the AFF lengths that ‘overshoot’ the F/N break points, sorted into 30 meter bins. The light grey bars show the proportion of stream reaches observed within each bin; the dark bars show what proportion of the total ‘overshoot’ stream length each bin represents. Sample sizes and total overshoot distances for each alternative are provided in the title for each graph.

Addendum Table 1. Total channel lengths (kilometers) for each AFF alternative and stream categories.¹

Stream category	AFF Alternative				
	A	A4 (5%)	A4 (7%)	A4 (10%)	D
Total AFF length	6,647	5,270	5,859	6,555	3,549
AFF in streams with no fish data	5,210	4,125	4,665	5,319	2,482
AFF overlap with fish data					
Overlap of AFF and all anadromy	2,155	NA	NA	NA	NA
Overlap of AFF and SWIFD	2,083	NA	NA	NA	NA
Overlap of AFF and other anadromy	1,060	1,056	1,058	1,059	1,034
AFF ends downstream of highest fish points					
AFF ends downstream of all anadromy	60	NA	NA	NA	NA
AFF ends downstream of SWIFD	60	NA	NA	NA	NA
AFF ends downstream of other anadromy	0.7	5	3	1	27
AFF ends downstream of other fish	80	49	35	31	134
AFF ends upstream of highest fish points					
AFF ends upstream of all anadromy	4,258	3,061	3,647	4,343	1,362
AFF ends upstream of SWIFD	4,296	3,110	3,697	4,392	1,402
AFF ends upstream of other anadromy	4,402	3,485	3,949	4,515	2,015
AFF ends upstream of other fish	3,966	2,844	3,371	4,021	1,287
Relation of AFF with F/N Break points					
AFF ends below F/N break	53	82	47	27	155
AFF ends above F/N break	53	12	26	48	6

¹ Results should be compared between alternatives (within rows), not between stream categories (within columns) because the stream categories use reference fish occurrence data with different sample sizes.

Western Washington Tribe Anadromous Fish Floor Policy Recommendation

February 28, 2022

We think anadromous fish floor alternative A4 7% best reduces electro-shocking as part of the water typing system while balancing the risk of (1) inadequately protecting fish habitat and (2) unnecessarily limiting harvest of marketable timber. We think the 7% gradient threshold is reasonable as a floor as this gradient is typically recognized as fish habitat by stakeholder reviewers in streams above artificial barriers, absent compelling natural explanations for the absence of fish. The AFF GIS analysis estimated that approximately 25% of the highest observed salmon points in the analysis occurred at or above a 7% gradient threshold (Figure 16 in the AFF Technical Report). This figure likely underestimates the percent of observed anadromy above the 7% threshold as most of the salmon observations in the analysis were based on spawning surveys, which typically occur below the upper extent of anadromy.¹

Shared Risk – balancing uncertainty

Adopting a gradient threshold based AFF balances the risk of incorrectly typing water in the proposed FHAM water typing system.

Currently, fish habitat in rule (WAC 222-16-010) 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.” Under the current water typing system landowners can downgrade streams from fish habitat to non-fish habitat below the default physicals if fish are not observed in the stream, based on a single visit to the stream during a survey window. In this system, fish presence largely defines fish habitat. Doesn’t matter the current or potential condition of the stream or channel, or how far downstream from the default physicals the stream reach is located; unless a fish is observed in that stream, or there is documented use of that stream by fish, that stream can be downgraded to a non-fish designation. Under the proposed Fish Habitat Assessment Methodology system (FHAM) this basic approach changes only slightly; fish presence still largely determines the extent of fish habitat – physical stream and channel characteristics are only referenced upstream of the last observed fish and are used to identify the *end* of fish habitat (e.g. Potential Habitat Breaks – PHBs), not the habitat itself.

In mountain foothill headwater systems where fish are already present, this method doesn’t necessarily pose a serious risk to incorrectly typing streams. However, in low gradient streams that are accessible to salmon below the 7% gradient threshold (e.g. streams within the tribal AFF recommendation), relying so heavily on fish presence to identify fish habitat can lead to

¹ Many of these fish points are on channels with modeled gradients less than 2%, often located on small, floodplain tributary streams that drain into large mainstem streams. These fish points don’t reflect the true capacity of salmonids to navigate channel gradients.

mis-typing streams, resulting in a water typing system where risk and uncertainty are not equally shared.

(1) Streams currently with no documented salmon or other fish use. There are still many low gradient streams that have yet to be physically surveyed and so lack documentation of salmon or other fish use. The analysis done by Terrain Works found that under Alternative A4 (7%), 4,665 km of the 5,859 km of streams in the study basins that were modeled to fall within the 7% gradient threshold don't have any known fish or fish survey data. This represents about 80% of the stream lengths in the study watersheds.

Under the proposed FHAM system, without an Anadromous Fish Floor, currently un-surveyed stream reaches that are under forest practices jurisdiction are potential candidates for protocol surveys and electro-shocking. The reliability of protocol surveys depends on the assumption that fish are present in fish streams at the time of the survey and absent in streams that are not fish streams. While the second condition (fish absent from non-fish streams) will always be true, the same cannot be said of the first condition (fish present in fish streams), particularly salmon. Salmon use of streams varies between and within seasons, and also by year, given their currently depressed populations. In an accessible, low gradient stream, if salmon or other fish are observed during a survey, great - no one is going to argue whether the stream is fish habitat or not. If salmon or other fish are not observed, absent a clear natural barrier blocking fish access, there is still uncertainty whether the stream is actually non-fish. Over time, the expectation of the HCP is that both salmon and habitats will recover. Recovering salmon populations will put pressure on salmon to move further upstream to utilize new habitats. To the extent there is error in a water typing system that relies on single pass protocol surveys, it will only result in streams that are fish habitat or potential fish habitat being misclassified as non-fish habitat. In other words, the risk and uncertainty is weighted heavily against appropriately protecting fish habitat.

(2) Barriers vs obstacles in low gradient streams. The proposed FHAM stream typing system and its associated PHBs were designed for headwater streams, not lower down in watersheds within the AFF where anadromous fish are most likely to be found. The FHAM system works to identify 'obstacles' (PHBs) to fish passage, not barriers. These features were developed from data collected at the end of fish habitat – the F/N Break points, which tend to be in headwater areas. The specific PHBs that will be part of FHAM have yet to be determined and there is a lot of uncertainty over (1) how well these features will perform in general as indicators of the end of fish habitat as part of the water typing system, and in particular, from our point of view (2) how these features will perform with salmon downstream of headwater areas within the AFF. In these low gradient streams that don't currently have fish data, stream typing will rely heavily on these relatively small features to help limit electro-shocking and correctly identify end of fish habitat. Examples of the types of low gradient streams at risk include low elevation tributaries that drain into large mainstem streams, small streams that drain directly into salt water, extensions of stream reaches above the last observed anadromous fish, and headwater systems

with floodplains and wetland systems. Again, in low gradient situations where channels have yet to exceed a 7% gradient threshold, if for whatever reason fish aren't observed on the day the protocol survey was conducted there can still be uncertainty if that stream is actually non-fish, unless there is a clear barrier or other explanation of why that stream does not currently support fish.

From a risk and uncertainty sharing perspective, we think it is reasonable to presume that low-gradient streams accessible to salmon are fish habitat unless there are clear explanation as to why they are not. In these streams, it shouldn't require observation of a fish to confirm fish habitat. Instead, the onus in water typing should be on identifying why they are *not* fish habitat. Additionally, if we can end or at least limit electro-shocking of these low-gradient streams, so much the better for the resource and for meeting the intent of the HCP. Upstream, above the gradient threshold and below the default physicals, landowners should have the opportunity to determine whether streams are fish habitat or not by using protocol surveys and FHAM. Above the default physicals, there remains a presumption of non-fish habitat, absent observation of fish.

In this way a gradient threshold based AFF reasonably and fairly allocates uncertainty and risk between fish and timber resources. Where fish habitat is most likely to occur, in a low gradient stream within the AFF, habitat is presumed unless there is a clear explanation as to why not, such as the presence of a natural permanent barrier. Upstream of the default physicals where habitat is marginal, streams are presumed non-habitat (unless fish are observed). In between where stream channels transition from low gradient to high gradient and there is currently no documented fish use, FHAM can be used to determine which streams and stream reaches are fish habitat. This is a fair and balanced approach to water typing in stream systems where fish stocks are depressed and habitats are still in the process of recovery.

Conservation Caucus Preferred Alternative A4(10%)

March 7, 2022

1. **Minimizing electrofishing:** One of the Forest Practices Board’s priorities in finalizing a permanent water-typing rule is to “minimize electro-fishing” (as captured in their motion from the Board meeting on 8/11/2015). The FPHCP (as expressed in the Biological Opinion) does not provide “coverage” for the extended use of electrofishing as a method of determining the Type F/N break.

As demonstrated in the CMER e-DNA Pilot study (Petaluma 2021), the use of electrofishing as a method of fish detection can miss fish presence (false-negative) a substantial amount of the time. Washington’s native fishes, including juvenile anadromous fish, are small, cryptic, and currently persisting in relatively low densities. When fish densities increase, individuals disperse to move away from high-density sites. Movements of juvenile coho salmon are strongly seasonal as fish seek refuge in off-channel habitats or tributaries of larger rivers as river discharge increases (Anderson et al. 2013).

Electrofishing effectiveness is affected by numerous variables including water temperature, conductivity, surveyor experience, and turbidity / visibility. Electrofishing can also harm fish and fertilized eggs unintentionally as documented by the stakeholder-driven, technical workgroup’s report to TFW Policy and the FP Board on “Recommendations of Best Practices Regarding Protocol Survey Electrofishing” (Haemmerle et al. 2016). Point-in-time / place electrofishing surveys fail to identify unoccupied fish habitats used by fish at other times of the year critical to their survival (e.g. small tributary habitat refugia during mainstem high fall/winter flows) or in other years.

Thousands of barrier culverts, many of which are located low in watersheds at state and county road crossings, prevent anadromous fish from fully accessing miles of upstream habitats located on federal, state, and private forest lands (FPHCP EIS 2006). The RMAP (Road Maintenance and Abandonment Plans) program under DNR’s two federally approved HCPs covering WA state and private forestlands does not cover replacing these culverts, nor those located on small forest landowners’ property located within the AFF unless submitting a Forest Practice Application. Because of downstream culverts, fish do not have full access to watersheds on state and private forestlands, and watersheds are not fully seeded due to significant recent declines in abundance. The use of electrofishing also does not address the FPHCP’s commitment to protect recoverable and restorable, but as yet unoccupied habitat.

2. **Covering the majority of anadromous fish reference points:** Of the AFF alternatives recently tested, A4(10%) is the second-most risk averse. It captured the majority of the model’s anadromous reference data points while Alternative D fell most short (false negatives) of the anadromous reference data. As such, we feel A4(10%) is the most effective and responsible alternative to ensure that electrofishing does not occur in places very likely to contain anadromous fish habitat. A4(10%) is also the most consistent with meeting the Board’s motion

described above (minimizes electrofishing) by directly decreasing the amount of stream miles subjected to unnecessary electrofishing. Adopting A4(10%) combined with the use of the FHAM and the other PHBs proposed in the Westside Tribal PHB Alternative before the Board, will minimize electrofishing but not to the maximum extent possible.

It is important to note that the AFF modeled anadromous fish reference data do not reliably represent the upper extent of anadromy in the study watersheds. A4(10%) ends downstream from more anadromous habitat than modeling suggests. As a result of the limitations of the SWIFD data used to represent presence of anadromous species (e.g. visual observation of spawners, not their upstream extent of distribution) the A4(10%) modeled results are underestimating (i.e. undershooting) anadromy more than implied by the model.

3. **F/N Overshoots:** All of the AFF alternatives tested overshoot some of the F/N reference data, though relatively few locations accounted for the vast majority of the overshoot lengths (AFF technical report addendum). It is puzzling that stream channels less than 10% (or 7%, or 5%) gradient would be identified as Type N reaches, especially considering the anadromous fish and F/N break gradient data presented in Figure 16 of the AFF Technical Report. However, there are several possible explanations for this, many of which are related to the fact that the F/N data were collected using an interim water typing methodology that the FP Board has found to be inadequate:
 - a. The stream was e-fished during a point / place in time survey, and fish present were missed: visibility, conductivity, temperature, surveyor experience, all effect electrofishing efficiency.
 - b. The stream was electrofished during a point / place in time survey and no fish were found, but downstream barrier culvert(s) or deformable natural barriers impact fish access to the reach.
 - c. The stream was electrofished during a point / place in time survey and no fish were found, because current fish abundance is a fraction of historical abundance, and headwater fish populations are low-density.
 - d. The stream was electrofished during a point / place in time survey and no fish were found, because the reach is recovering from mass wasting from 'legacy' forest practices impacts.
 - e. The F/N call was erroneous but was not reviewed because it wasn't submitted for concurrence.
 - f. The stream was surveyed during lower-flow conditions that limited fish distribution.
 - g. The stream was surveyed during a time of the year when the reach was unoccupied, but it is occupied by fish at other times of the year.
 - h. Snapping errors could account for some of the F/N overshoots. DNR digitizes the locations of F/N breaks from paper Water Type Mod Forms received from industry, and staff transfer points from paper maps to GIS (DNR's hydro layer). Again, in the process of constructing the AFF model, F/N points (e.g. from DNR's hydro layer) were 'snapped' to Terrainwork's synthetic stream network. At each of these 'migrations,' small changes in point locations can affect model results.

4. **10% gradient is well below default physical criteria in rule:** Default physical criteria in rule (WAC 222-16-031) define Type F fish habitat in stream reaches that extend up to 16% or 20% channel gradient depending on basin area (<50 acres>). A4(10%) stops at the first encountered

vertical or non-vertical barrier (scaled to stream size), or the first sustained 10% gradient, well downstream from default physical criteria for Type F waters. Therefore, in those places where A4(10%) may overshoot modeled anadromous reference data, it is most often still well within default physical criteria defining Type F waters. In on the ground application, it should be evident where these types of situations are occurring and they should not be very frequent. We are supportive of a site-specific process for landowners to apply if they believe the AFF extends into non-fish habitat, i.e. ID teams or some systematic pre-FPA screening process.

5. **Re-calibrating risk balancing:** Risk balancing may involve the use of ID teams on occasion to ensure fish habitat is not missed while trying to determine if fish are present in streams during one day of the year. The application of the emergency rule approach for over 20 years has meant that fish habitats unoccupied on the day of an electrofishing survey have unjustifiably been downgraded to Type N waters; this may explain some of the AFF overshoots of F/N points identified in the AFF modeling process. Since the beginning of forest practices in Washington, the aquatic resource risk has been squarely placed on fish and fish habitat. The targeted, occasional use of ID Teams is in our view a small part of re-balancing the risk that has for decades been borne by the listed fish species and their habitats that are supposed to be protected by the HCP.

The Conservation Caucus has already made numerous concessions in the interest of balancing risk. Alt A4(10%) differs from the original Caucus-supported Westside Tribes' Alt A in that A4(10%):

- It incorporates SWIFD, though not all of SWIFD. A4(10%) excludes SWIFD classifications identified by Tribal biologists and WDFW biologists as 'presumed gradient-accessible.'
- It significantly reduces the original WDFW-provided criteria for vertical and non-vertical barriers, scaling those criteria to channel width.

Consequently, Alt A4(10%) has a smaller footprint on the landscape compared to the original Alternative A.

Because the AFF determines the reach in which the first PHB is sought, it is inexorably linked to FHAM. The Westside Tribes' FHAM PHBs, which the Conservation Caucus supported, were developed with the understanding that they would be applied above a sustained 10% channel gradient; those PHBs may be inadequate if the Board selects an AFF alternative with a lower gradient threshold that ends downstream of A4(10%).

6. **Repeatable, Enforceable and Implementable:** Under the current interim water typing rule in place since 1996, forest landowners have surveyed thousands of miles of streams using DNR's policies and practices (rule and board manual guidance) through the use of ID teams, updating DNR's hydro-layer, working with SFLO's on adjacent landowner access issues, updating DNR's FPARs system, etc. The proposed Permanent Water Typing rule using an AFF continues to allow DNR and landowners to utilize similar implementation tools. Landowners are already required to

verify water types on their property when submitting FPAs, which entails measuring similar metrics like channel width, channel gradient, permanent natural barriers, and basin area. With DNR's recent acquisition of LiDAR, combined with large landowners' LiDAR, many of these channel metrics can be more efficiently targeted reducing the amount of field work and therefore making implementation more feasible. Moreover, the Cost Benefit Analysis conducted by DNR indicates that compared to existing DNR rules and guidance for determining Type F waters, there will be "negligible costs" associated with AFF and FHAM rule implementation including administrative costs (Preliminary Cost Benefit Analysis of the Proposed Water Typing rule System. IEC - Industrial Economics, Incorporated 2019).

7. **Application of the AFF statewide, including in eastern Washington.** The Conservation Caucus supports the application of the AFF to eastern WA for the following reasons:
- The development and analysis of PHBs in eastern WA assumed the use of an AFF – a channel gradient threshold above which to start the application of the FHAM process.
 - Board documents, the draft Cost Benefit Analysis, work conducted by the Board's Expert Panel on PHBs, and DNR staff and technical committees engaged in QA/QC of eastern WA fish and fish habitat data were based on the assumption that the AFF would apply to the entire state— including the eastside.
 - Eastside Tribe representation has unequivocally stated a strong policy preference for the application of the AFF in eastern Washington.
 - The same issues that necessitate the AFF in westside watersheds are present in eastside watersheds. The same species of salmon and steelhead exist throughout the state, with similar habitat needs and physical limitations. Likewise, the same potential exists for fish habitat to be misidentified as Type N waters when point in time and point in place single pass electrofishing occurs too far downstream in recoverable or temporarily unoccupied fish habitats. This threat is arguably even more pressing in eastern Washington given the extensive network of hydroelectric dams that contribute to reduced salmon abundance and distribution.

The lack of analysis of eastside watersheds in the AFF workgroup should not hinder a chosen AFF from applying to the eastside. Refinement can be accomplished while rule-making process continues or during early implementation phases of the new water-typing rule if necessary.

8. **Urgency to support salmon recovery with a strong and implementable AFF:** Washington's wild salmon populations have significantly declined from historic levels and are in crisis (FPHCP Biological Opinion 2006), and climate change is exacerbating their decline. In Washington, 14 species of salmon and steelhead are listed as 'at risk of extinction' under the ESA. Preventable habitat loss and the declining health of our watersheds are chief among the causes of this crisis. Since 1999 the WA Salmon Recovery Funding Board has invested \$1.2B in over 3,000 habitat projects statewide in an effort to bring salmon back from the brink of extinction. Governor Inslee recently announced a \$187M investment in salmon recovery for the 2022 legislative session. These investments will not be realized in full if anadromous fish habitats are underrepresented, causing the FHAM to start too far downstream. Salmon recovery in a changing climate demands effective implementation of appropriately protective forest practices regulations that safeguard forest and stream resiliency and ensure that the ecological integrity of all Washington watersheds. The FPHCP provided riparian protection measures assuming implementation of an effective permanent water typing system. The FPHCP also committed

that those regulations would protect listed species, meet Clean Water Act water quality criteria, and provide a harvestable supply of fish. It is time that the commitments made in the FPHCP are honored. We believe that using A4(10%) with the ability to field verify specific cases of potential overshoot best matches the intent of the Forest Practices Board motion, and commitments of the FPHCP.

Industrial Landowner Caucus' rationale for preferring AFF Alternative D

The industrial landowners support the Small Forest Landowner preferred AFF alternative D. The rationale for alternative D is fairly simple and been stated many times.

- Alternative D meets what industrial landowners understand the western Washington tribal concerns are about seasonal anadromous fish use of small, low gradient streams.
- Alternative D aligns well with the Board Water Typing Committee's description of the AFF objective from their September 2019 meeting ([bc fpb wtypingcom mtgsummary 20190924.pdf \(wa.gov\)](https://www.fpb.wa.gov/wp-content/uploads/2019/09/24-fpb-wt-com-mtg-summary-20190924.pdf)).
- The AFF technical analysis suggests alternative D performs the best regarding accuracy and error balance in comparison to fish reference data, which are Forest Practices Board expectations for the water typing system rule (Aug 2015).
- Alternative D eliminates use of FHAM in streams known to be used by anadromous fish and provides opportunity for FHAM to be used in streams where the upper extent of fish habitat has not been determined, it does not become the default water typing system to determine the F/N break in those streams.

If the AFF is to be implemented consistently with how landowners interpret the Forest Practices Act and Rules, components of SWIFD would be incorporated into rule, and the metrics would be determined through AMP science process, same for the development of the metrics for the PHBs and Default Physical Criteria. The high bias/error of the current Default Physical Criteria incentivizes electrofishing, decreasing bias/error of Default Physical Criteria should be a priority which will reduce electrofishing.

Anadromous Fish Floor (AFF) Implementation Topics for further consideration by Board Committee / Forest Practices Board

The AFF Policy members did not reach consensus on an anadromous fish floor alternative and have prepared, per the AFF Workgroup Charter deliverables, their preferred or recommended AFF alternatives and the supporting rationale for Committee consideration. The Charter deliverables also directed the AFF Policy members to include implementation considerations for an AFF in their memo to the Board Committee and Board.

The AFF Policy members have discussed potential implementation elements which need to be addressed without reaching consensus. The Committee may consider the following list of topics associated with inclusion of an Anadromous Fish Floor within the Water Typing System rule. The following are the topics discussed by the AFF Policy members and are separated between rule element and Board Manual guidance topics:

Rule elements:

- Affirm the scope of application for Anadromous Fish Floor (AFF) is the entire State of Washington.
- How the new permanent water typing system will address concurred Type F/N breaks.
- Which final Statewide Washington Integrated Fish Distribution (SWIFD) distribution data types should be used to define an AFF, as part of a permanent water typing system rule?
- What AFF data will be added to the DNR GIS hydro layer: SWIFD points, modelled AFF-specific sustained gradient points (if an A4 AFF alternative is approved), modelled location of the first Potential Habitat Break (PHB) on tributaries downstream of a SWIFD point with an absence of a 5% gradient increase or permanent natural barrier at the junction with the main stem (if AFF Alternative D is approved), modelled permanent natural barriers (for any AFF alternative approved) or any other AFF information?
- Affirm DNR GIS hydro layer mapped AFF point locations that identify the regulatory extent of the AFF will need to have a field protocol to physically locate the actual regulatory AFF point in the field, via a procedure eventually described in a board manual.

Board Manual Guidance to:

- Establish the AFF location in the field where protocol fish surveys to determine water typing may begin under the Fish Habitat Assessment Methodology (FHAM). This is needed under any FPB-approved sustained gradient AFF alternative where FHAM will be allowed to commence. For example will FHAM begin at the modelled (or field-located) end of a specified sustained gradient or at the next PHB above the end of the specified sustained gradient.

- Address how AFF will be implemented in those areas where high resolution (sub-meter or better) LiDAR does not exist for proposed AFF alternatives which rely on high resolution LiDAR.
- Provide field methods for implementation of AFF in areas without SWIFD or any other anadromous fish distribution data.
- Address situations where landowners choose to water type streams on their property and do not have access to adjacent property ownerships.
- To develop a field procedure for landowners and/or protocol fish surveyors to initiate an FHAM survey downstream of a sustained gradient AFF without going through a field ID team process. This will address site-specific situations in streams where there is currently no fish data or have yet to be water typed when a sustained gradient AFF may not be the appropriate starting point for an FHAM survey.