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MEMORANDUM

July 5, 2023

TO: TFW Policy

FROM: Lori Clark, Adaptive Management Program Administrator (AMPA)
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SUBJECT: Anadromous Fish Floor Validation Study Proposal Initiation

The Anadromous Fish Floor (AFF) Validation Study Proposal Initiation (PI) was received on May 30, 2023, from Washington Department of Natural Resources (DNR) requesting the Adaptive Management Program Administrator (AMPA) assess the proposal's applicability in the Adaptive Management Program (AMP). This memo serves as my overall recommendation and transmits to the Policy Committee the AMPA's assessment of the PI request (Forest Practices Board Manual Section M22-8 and WAC 222-12-045(2)(d)). The PI requests that TFW Policy makes a recommendation to the Forest Practices Board (FPB) to add a new AFF Validation Study in the AMP Master Project Schedule (MPS). Based on the information provided in the PI, I recommend assigning this proposal a science track and for CMER to prepare technical summary for TFW Policy consideration that clarifies how the AFF validation study would best fit as a companion or add-on study to the existing Potential Habitat Breaks (PHB) study, including the recommended timeline for scoping and implementation to inform effective and efficient sequencing. Careful consideration must be given to integrating this validation study into the Water Typing Strategy suite of projects given the status, cost, and timing of the current PHB study. Additionally, AMP staff and CMER participant capacity limitations will limit the pace of the AFF Validation Study.

Attachments:

Appendix 1: AMPA Assessment
Appendix 2: DNR Proposal Initiation

Appendix 1: AMP Administrator Assessment

1. Proposal Initiation

Washington Department of Natural Resources (DNR) Proposal Initiation (PI) request was delivered to the Adaptive Management Program Administrator (AMPA) by email on May 30, 2021. DNR is the proponent and an AMP participant. The submission follows the instructions of WAC 222-12-045(2)(d)(i) and the guidance of the Forest Practices Board (FPB) Manual Section 22.

The proposal was submitted in accordance with the annual deadline suggested by the FPB Manual (Section 22-7) which states that proposals for “the Adaptive Management Program process should be submitted prior to the first day of July to be considered for inclusion the following year’s fiscal work plan. This date is used to provide a systematic and consistent annual process, regardless of whether proposals require funding. Proposals submitted to the Administrator after the first day of July are at risk of not being considered in the subsequent fiscal year.”

The PI process begins with the AMPA’s assessment who is directed by FPB Manual to identify:

- a) The affected forest practices rule, guidance, or DNR product;
- b) The urgency based on scientific uncertainty and resource risk;
- c) Any outstanding TFW, FFR, or Policy Committee agreements supporting the proposal;
- d) How the results of the proposal could address AMP key questions and resource objectives or other rule, guidance, or DNR product; and
- e) Available literature, data and other information supporting the proposal.

The proponents have answered these questions in the PI request. The AMPA additionally addresses these questions as part of the Administrator’s assessment of management and resource implications below.

2. Summary of the Proposal

DNR requests the support from TFW Policy Committee to make a recommendation to the Forest Practice Board (FPB) to add the Anadromous Fish Floor (AFF) Validation Study to the AMP Master Project Schedule (MPS) for the 23-25 biennium to meet the FPB’s intent to establish an AFF based on the measurable stream features where there is presumed anadromy and their directive for an AFF Validation Study within the AMP. The PI intends for CMER to complete a scoping document leading to an independently reviewed study design for AFF validation using best available science, methods, and data to determine the physical stream features of an anadromous stream floor and compare to the criteria used in the Board accepted AFF alternatives for consideration from a scientific perspective only (i.e. without any consideration of the policy implications of the results or the eventual use of the results in policy decisions by the FPB). The PI outlines the initial research objectives for the scoping stage to determine the physical stream features of an anadromous fish habitat floor:

- I. Incorporate existing data from habitat surveys to improve understanding of anadromous fish presence and association with habitat characteristics;
- II. Collect anadromous fish data in waters including tributaries of main channels;
- III. Employ field methods to validate:
 - existing and newly collected anadromous fish data,
 - the GIS analysis in the findings report of the Anadromous Fish Floor Spatial Analysis prepared for the Board Water Typing System Committee; and
 - the criteria used to define the AFF in FPB accepted AFF alternatives for consideration.
- IV. Determine what combination of measurable physical stream or channel characteristics, metrics in association with anadromous fish presence data can best predict an anadromous fish floor based on the FPB accepted definition of an AFF; and
- V. Determine what rule-tools and/or methods should be used to implement an AFF in streams without anadromous fish distribution data.

The PI further intends that CMER add the AFF as a new validation study to the existing suite of Water Typing Strategy projects. Projects currently included in the Water Typing Strategy are: Potential Habitat Breaks (PHB),

Default Physical Criteria Assessment (DPC), LiDAR Based Water Typing Model (LiDAR), and Fish/Habitat Detection Using eDNA (eDNA). The PI requests consideration of the AFF as a companion or add-on to the existing Potential Habitat Breaks (PHB) study to establish:

- physical stream features downstream from which will always be presumed to contain anadromous fish habitat, and will be added to known fish habitat data upstream from which the process to determine where to apply a protocol fish survey using FHAM is permitted; and
- data from which to establish methodologies to locate the AFF on a map and in the field.

3. Adaptive Management Program Applicability

The AMPA is to assess a proposal for its applicability and relevance to the AMP, i.e., whether it would affect how forest practices are conducted with respect to aquatic resources, or whether it is a directive from the Board to include within the AMP. In this step the AMPA is also to consider outstanding agreements including any formal agreements from TFW (1987), FFR (1999), or current Policy agreements related to the issue, and determine if they are interpreted correctly in the proposal. The Board Manual further provides that proposals “are initiated as requests for investigation of potential changes to forest practices rules, guidance, or DNR products.” In general, the types of proposals considered for the AMP are requests for:

- research and monitoring of scientific uncertainty and resource risks;
- policy interpretations and modifications to improve forest practices management and aquatic resource protection; and
- review of completed technical studies or issue analyses for consideration in the adaptive management program.

The AFF validation study is a proposal to address scientific uncertainty and resource risk. The proposal identifies the uncertainty with anadromy and F/N breaks and uncertainty with modeled channel gradients and stream lengths and proposes the validation study to provide anadromous fish data that represents the upper extent of anadromous fish or their habitat to decrease use of electro-fishing.

4. Assessment of Management and Resources Implications

To inform Policy and the FPB of the applicability and relevance of a PI to the AMP, the AMPA is to provide a coarse level assessment of management implications using the Framework for Successful Policy Committee/CMER Interaction. The questions that comprise the Framework establish the standard process for assessing a proposal's applicability:

a) Is the proposal intended to inform a key question, resource objective, or performance target from Schedule L-1?

Yes, the proposal informs a functional objective on stream typing in Schedule L-1. The schedule does not, however, include specific performance targets related to AFF. Viewed alongside the permanent water typing rule, the AFF PI does intent to inform a key functional objective in Schedule L-1. An existing performance target on developing a predictive model to serve as the basis for stream typing may not be relevant anymore given the inaccuracies of such models and the lack of reference to such model in the Board's objectives for the water typing system rule. A LiDAR based model, importantly, is an objective of the water typing system rule. Schedule L-1, on water typing at least, may need to be updated.

b) Is the proposal intended to implement projects listed in Schedule L-2?

No, I could not identify any project in Schedule L-2 that this PI intends to implement.

c) Is the proposal intended to inform the forest practices rules, guidance, or DNR product? Is the specific rule, board manual section, DNR product, or effectiveness of compliance monitoring

cited and key language provided correctly? If the proposal is for a new forest practices rule, does it fill a gap? If so, would it fit within the current forest practices structure?

Yes, the PI affects and relates to the FPB efforts to adopt a permanent water typing system rule. In 2016, the FPB initiated the process to review, amend, and add to the water typing system rules, WAC 222-16-030 and WAC 222-16-031, to develop a single water typing system rule. The FPB intent was to establish a consistent, stable system to determine the water type classification for all typed waters. In 2018, based on caucus recommendations directly to the Board, the FPB approved inclusion of an AFF to rule language, and in 2019 requested the Board Water Typing Committee to provide oversight to further analyze two AFF alternatives accepted by the FPB with the intent to develop a single consensus based AFF. The alternatives included a joint Eastern and Western Washington Tribal; and, an Industrial Landowner AFF alternative.

As a result of the Board Water Typing Committee's analysis¹, in August 2022, the FPB accepted AFF alternatives A4(7%) and D for analysis and inclusion in the draft statewide permanent water typing system rule. In the second decision, in November of 2022, the FPB established the overall key elements for the water typing system rule containing a purpose for and definition of an AFF. The FPB approved elements of the water typing system include:

- A methodology which will balance the error when locating the break between Type F and N Waters
- A field fish habitat protocol which minimizes electrofishing
- Include methods to address stream segments not shown on the DNR hydro layer
- Improve water typing map over time
- Include methods to locate the Type F/N break on the ground; and ensure the methods provide the ability to be applied by small forest landowners; and
- Make methods as accurate as possible using existing information.

Many of the rule elements are addressed through the FPB approved the Fish Habitat Assessment Method (FHAM) as the field protocol to establish the end of fish habitat and the Type F/N Water break. The FPB also approved the anadromous fish floor (AFF) to establish the area which will always be considered anadromous fish habitat and to assure the application of FHAM is upstream of the AFF. For the AFF the FPB approved the following definition: Measurable physical stream characteristics downstream from which anadromous fish habitat is presumed and agreement that AFF would establish the location upstream of which fish protocol surveys may be conducted under fish habitat assessment methodology. The FPB intended the AFF to be included in the DNR Water Typing map, and a field protocol to locate the AFF to be included in the water typing system rule.

d) If the proposal includes a completed study, was the study carried out using protocols and standards similar to CMER (i.e., study design, peer review)?

The PI does not include a completed CMER study. Instead, the PI requests the inclusion of an additional CMER validation study in the Master Project Schedule. Additionally, the PI suggests including AFF validation, at CMER's discretion, a companion or add-on to the existing Water Typing Strategy project, Potential Habitat Breaks (PHB) study. This Study Design was approved by the Independent Scientific Review Panel (ISPR) in April 2023 and CMER on May 23, 2023. The Charter is currently in the approval process for CMER/ Policy and the Project Management Plan is currently under development.

e) What would/does the study tell us?

The proposal aims to validate the AFF metrics to include in Board Manual guidance and the DNR Water Typing map to improve our understanding on: a) establishing AFF locations in the field, b) implementation of AFF in locations without LiDAR coverage, and c) field methods to implement AFF in locations without anadromous fish distribution data.

f) What would/does the study not tell us?

The AFF Validation Study will offer data on the threshold/gradient below which anadromous fish are presumed, however given the state of anadromy AFF could be ephemeral. The PHB study will reveal the threshold below which any fish would be present and could be paired with the data from AFF report¹ to validate the gradient and meet the goal of decreasing the amount of electrofishing.

g) What is the relationship between this proposal and any other studies that may be planned, underway, or recently completed?

This proposal is for AFF inclusion as a component of the Water Typing Strategy project, Potential Habitat Breaks (PHB), for water typing system rule. Other studies in the Strategy are the Default Physical Criteria Assessment (DPC), LiDAR Based Water Typing Model (LiDAR), and Fish/Habitat Detection Using eDNA (eDNA). The DPC project is expected to have an approved Study Design in late 2023, and the LiDAR project will follow the implementation of PHB and DPC. The Fish/Habitat Detection Using eDNA (eDNA) has not yet been added onto the Water Typing Strategy projects.

h) How much of an incremental gain in understanding would/do the proposal results represent? Explain how the proposal's results might affect the current rules, numeric targets, performance targets, or resource objectives.

This proposal is for AFF inclusion as a component of the Water Typing Strategy projects for water typing system rule. Reducing the use of electro-fishing is among the FPB's stated objective for a permanent water typing system. Extensive use of electrofishing to determine the regulatory fish/non-fish (F/N) break can, at times, miss fish presence resulting in mistyped waters. Harm to fish and fertilized eggs is an unintentional consequence of using electrofishing as a method to determine the regulatory F/N break. The AFF is proposed to be included in the DNR water typing map, and a field protocol to locate the AFF to be included in the water typing system rule. AFF will establish the area which will always be considered anadromous fish habitat and to assure the application of Fish Habitat Assessment Method (FHAM) is upstream anadromous fish habitat.

5. Assessment of the Proposal's Development Track

For each proposal, the AMPA recommends a proposal development track to the Policy Committee based on the nature of the proposal and amount of information provided.

Science track: The science track evaluates currently available science, collects new information through research and monitoring, and synthesizes the best available information into a technical summary for Policy's consideration. In all cases CMER is responsible for conducting synthesis of research and monitoring information and for producing reports to Policy. Proposals requiring scientific assessment or analysis are to be directed toward the science track.

Policy track: Proposals recommended for Adaptive Management Program development following the policy track are those related to interpretation and implementation of the TFW Agreement or the FFR. Proposals seeking to change or clarify policies or change the way existing science is implemented in the rules are to be directed toward the policy track.

Based on the information provided in the PI, I recommend assigning this proposal a science track and for CMER to prepare technical summary for Policy Committee consideration that clarifies how the AFF validation study would best fit as a companion or add-on study to the existing Potential Habitat Breaks (PHB) study, including the recommended timeline for scoping and implementation to inform effective and efficient sequencing.

6. Next Steps

The AMPA recommends the DNR proposal be accepted as a scient track project in the AMP.

Proposal Initiation:

ANADROMOUS FISH FLOOR VALIDATION STUDY

The Department of Natural Resources (DNR) is initiating an Adaptive Management Proposal (PI) for an Anadromous Fish Floor (AFF) validation study. DNR is requesting the Adaptive Management Program Administrator (AMPA) to assess the proposal's applicability in the Adaptive Management Program (AMP) and to forward it for TFW Policy review and decision alongside the AMPA assessment.

This proposal is meant to establish:

- Physical stream features downstream from which will always be presumed to contain anadromous fish habitat;
- Additional data to be added to the known fish habitat data upstream from which protocol fish surveys are allowed; and
- Data from which to establish methodologies to locate the AFF on a map and in the field.

The proposal initiation document is intended to provide the TFW Policy Committee with the manner and means by which to bring an AFF validation study recommendation to the Forest Practices Board (FPB) for approval to add to the AMP Master Project Schedule (MPS) such that:

- a) The Cooperative Monitoring Evaluation and Research Committee (CMER) – in the 23-25 biennium - completes a scoping document leading to an independently reviewed study design for AFF validation which incorporates the FPB accepted definition of AFF: *“measurable physical stream characteristics downstream from which anadromous fish habitat is presumed¹ and an agreement that the AFF would establish the location upstream of which fish protocol surveys may begin under fish habitat assessment methodology”*
- b) CMER uses best available science, methods, and data to determine the physical stream features of an AFF and compares to the criteria used in the Board accepted AFF alternatives for consideration; and to do so from a scientific perspective only, without any consideration of the policy implications of the results or the eventual use of the results in policy decisions by the FPB;

¹ The FPB Water Typing Committee objective for the term presumed: *“Committee member Swedeen agreed the term “presumed” more accurately reflects what we are looking for and comes from the present situation so the term “presumed” should apply where there is anadromy all the time. Committee member Davis added that AFF areas should be those streams where there is no need to electrofish”*

- c) CMER adds a new validation study to the existing Water Typing Rule Group of studies; and considers – at the committee’s choice and discretion – AFF validation as a companion or add-on study to the existing Potential Habitat Breaks (PHB) study; and
- d) CMER begins the scoping stage to determine the physical stream features of an anadromous fish habitat floor with the following initial research objectives and questions while not precluding further refinement or expansion through CMER and TFW Policy interactions in the scoping stage to:
 - I. Incorporate existing data from habitat surveys to improve understanding of anadromous fish presence and association with habitat characteristics;
 - II. Collect anadromous fish data in waters including tributaries of main channels;
 - III. Employ field methods to validate:
 - Existing and newly collected anadromous fish data
 - The GIS analysis in the findings report of the Anadromous Fish Floor Spatial Analysis prepared for the Board Water Typing System Committee; and,
 - The criteria used to define the AFF in FPB accepted AFF alternatives for consideration;
 - IV. Determine what combination of measurable physical stream or channel characteristics, metrics in association with anadromous fish presence data can best predict an anadromous fish floor based on the FPB accepted definition of an AFF and,
 - V. Determine what rule-tools and/or methods should be used to implement an AFF in streams without anadromous fish distribution data

DNR is confident that this proposal, if recommended by TFW Policy to the FPB, will allow CMER to begin scoping a new study and fully meet the FPB’s intent to establish an AFF based on the measureable stream features where there is presumed anadromy all the time, and their directive for an AFF validation study within the AMP.

Part 3.1 of Board Manual Section 22 (BM22) provides guidance on submitting PIs. Key aspects of the proposal are identified below as provided BM 22.

AFFECTED FOREST PRACTICES RULE, GUIDANCE, OR DNR PRODUCT

The PI affects and relates to the FPB efforts to adopt a permanent water typing system rule. In 2016, the FPB initiated the process to review, amend, and add to the water typing system rules, WAC 222-16-030 and WAC 222-16-031, to develop a single water typing system rule. The FPB intent was to establish a consistent, stable system to determine the water type classification for all typed waters. In 2018, based on caucus recommendations directly to the Board, the FPB approved inclusion of an AFF to rule language, and in 2019 requested the Board Water Typing

Committee (Committee) to provide oversight to further analyze two AFF alternatives accepted by the FPB with the intent to develop a single consensus based AFF. The alternatives included a joint Eastern and Western Washington Tribal; and, an Industrial Landowner AFF alternative.

The FPB subsequently made two key decisions: In the first decision, in August 2022, the FPB accepted the Committee recommended AFF alternatives A4(7%) and D for analysis and inclusion in the draft statewide permanent water typing system rule. In the second decision, in November of 2022, the FPB established the overall key elements for the water typing system rule containing a purpose for and definition of an AFF. The FPB approved elements of the water typing system include:

- A methodology which will balance the error when locating the break between Type F and N Waters
- A field fish habitat protocol which minimizes electrofishing
- Include methods to address stream segments not shown on the DNR hydro layer
- Improve water typing map over time
- Include methods to locate the Type F/N break on the ground; and ensure the methods provide the ability to be applied by small forest landowners; and
- Make methods as accurate as possible using existing information.

Many of the rule elements are addressed through the FPB approved Fish Habitat Assessment Method (FHAM) as the field protocol to establish the end of fish habitat and the Type F/N Water break. The FPB also approved the anadromous fish floor (AFF) to establish the area which will always be considered anadromous fish habitat and to assure the application of FHAM is upstream of the AFF. For the AFF the FPB approved the following definition: Measurable physical stream characteristics downstream from which anadromous fish habitat is presumed and agreement that AFF would establish the location upstream of which fish protocol surveys may be conducted under fish habitat assessment methodology. The FPB intended the AFF to be included in the DNR Water Typing map, and a field protocol to locate the AFF to be included in the water typing system rule.

THE URGENCY BASED ON SCIENTIFIC UNCERTAINTY AND RESOURCE RISK

Reducing the use of electro-fishing is among the FPB's stated objectives for a permanent water typing system. Extensive use of electrofishing to determine the regulatory fish/non-fish (F/N) break can, at times, miss fish presence resulting in mistyped waters. Harm to fish and fertilized eggs is an unintentional consequence of using electrofishing as a method to determine the regulatory F/N break.

Two key sources of uncertainty – as reported in an AFF spatial analysis to the FPB² - require the validation of AFF through a CMER study:

1- Uncertainty with anadromy and F/N breaks:

The anadromous fish data used in the spatial analysis of potential AFF alternatives – of which two AFF alternatives were accepted by the FPB for further analysis - is largely based on data in the Integrated Fish Distribution (SWIFD) database and concurred F/N breaks. Multiple methods have been used to populate this dataset. Additionally, the dataset includes points that are either documented (confirmed/observed fish presence) – 85% of points - or are presumed fish presence (15% of points). Together, the dataset does not represent the extent of anadromous fish presence within streams. The area within anadromous fish habitat in which presumed anadromous presence will always exist is a key source of uncertainty that may over or underestimate the true distribution of anadromous fish.

2- Uncertainty with modeled channel gradients and stream lengths

A CMER validation study employing field methods could reduce the second source or uncertainty in the analysis of AFF alternatives: uncertainties (appropriate stream gradient and the resulting stream length, and instream features such as falls) arising from modeling a synthetic stream network (using LiDAR) as compared to implementation on the ground. The modeled results may extend each alternative higher in the stream network as compared to field implementation.

ANY OUTSTANDING TFW, FFR, OR POLICY COMMITTEE AGREEMENTS SUPPORTING THE PROPOSAL

Directly relating to this PI are the AFF Workgroup reports in which TFW Policy members participated. While a consensus was not reached on one AFF alternative, their reports to the Board Water Typing Committee and the FPB lists an agreement or common understanding that supports a proposal for AFF validation. Implementation topics recommended by TFW Policy members and accepted by the FPB include, among others, validating the AFF metrics through AMP, and needed elements for Board Manual Guidance. Both of these aspects would need a CMER validation study to not only validate AFF metrics but to also improve our understanding on: a) establishing AFF locations in the field, b) implementation of AFF in locations without LiDAR coverage, and c) field methods to implement AFF in locations without anadromous fish distribution data.

² Anadromous Fish Floor [Spatial Analysis](#): Findings report and [addendum](#) to the findings report. Prepared for the Water Typing Rule Committee of the Forest Practices Board.

On the broader water typing system, TFW Policy has a history of making consensus recommendations to the FPB. In August 2016, the FPB accepted the following consensus TFW Policy recommendations:

- Maintain consensus elements of the current rules by blending Washington Administrative Code (WAC) 222-16-030 and 222-16-031;
- Retain the current definition for wetlands, fish habitat, and bankfull width; and
- Develop a fish habitat assessment methodology (FHAM) to reduce electrofishing, establish known breaks limiting fish movement upstream, and achieve consistency in application

TFW Policy also recommended the following aspects of the water typing system rule to the FPB in August 2019:

- An AFF should be considered for inclusion as a component of the water typing system rule; and
Additional water-crossing structure language not be included in the water typing system rule

HOW THE RESULTS OF THE PROPOSAL COULD ADDRESS ADAPTIVE MANAGEMENT PROGRAM KEY QUESTIONS AND RESOURCE OBJECTIVES OR OTHER RULE, GUIDANCE, OR DNR PRODUCT

Schedule L-1 outlines the key questions, resource objectives and performance targets for the AMP. This proposal directly addresses a functional objective which are broad statements of objectives for major watershed functions potentially affected by forest practices. The results of the AFF validation study could address the functional objective on stream typing. This Schedule L-1 objective states that Type F streams are to “include habitat which is used by fish at any life stage at any time of the year...”

The AFF validation study addresses the permanent water typing system rule. One of FPB’s primary areas of focus has been the development of a permanent water typing system rule (and associated Board Manual technical guidance) that establishes the dividing point between segments of streams that provide fish habitat and those that do not. This rulemaking effort is directed at addressing the Forests and Fish

Report foundational goal for protecting fish habitat. The goal is to reduce reliance on electrofishing to identify the presence of fish, and establish an objective dividing point between fish- and non-fish habitats. Doing this supports the statutory objectives endorsed in the Forests and Fish Report, the Forest Practices Act, and the FP HCP. The FPB approved elements for inclusion in this rule:

- In 2017, the FPB accepted Policy consensus recommendations for key elements including in the rule additional water delineation methods and a new field protocol– FHAM – for delineating the upper extent of fish habitat while reducing electrofishing.
- In 2018, the FPB approved three PHB alternatives for analysis and the concept for an Anadromous Fish Floor (AFF) alternative.
- Between 2018 and November 2022, the FPB approved two AFF alternatives for analysis and resolved all outstanding rule element issues.

New Water Typing System Rule

The FPB has initiated rulemaking to implement a new permanent water typing system rule. The intent of the new rule is to:

- Continue use of the default physical characteristics to establish the Type F/N regulatory water break.
- Replace the voluntary landowner fish field protocol, conducted under WAC 222-16-031.
- Establish the Type F/N break with a new field protocol survey incorporating the Board approved Fish Habitat Assessment Methodology (FHAM) to establish the extent of fish habitat waters and the Type F/N Water break.
- To add an anadromous fish floor (AFF) as part of the Type F Water data layer. The AFF will be established so all waters downstream of the AFF will be presumed to be anadromous fish habitat and in the waters upstream of the AFF fish protocol surveys may be conducted under FHAM.

AVAILABLE LITERATURE, DATA AND OTHER INFORMATION SUPPORTING THE PROPOSAL

Literature reviewed for this proposal indicates approaches that could potentially validate AFF. These include: 1) genetic techniques, 2) radio telemetry, 3) analysis of environmental variables, and 4) analysis of stream geomorphology/characteristics and barriers such as gradient (Burnett et al., 2009; Fitzpatrick et al., 1998)). Radio telemetry – this method attaches transmitters to individual fish and tracks their movement through stream system – requires vast resources. It may also be impractical for a validation study even if the method could identify the transition point of anadromy. Because the FPB has relied on measurable physical stream characteristics to define an AFF, a validation study should extend this

approach to include a combination of field/direct measurements as well as modelling of physical characteristics (gradient and other barriers) and physical quantities (temperature, flow rate and etc.).

An AMP validation study that significantly reduces current uncertainties surrounding the AFF alternatives (uncertainties with anadromy and with modelled stream gradient and length) would best serve the purpose of validation. It is not the intent of this proposal to request a parsing of the existing spatial analysis of AFF alternatives. Instead, The AMP should consider a study that would not only validate existing AFF alternatives but would also provide and propose combination of physical characteristics, metrics and/or physical quantities that best matches the intent of FPB for an AFF if not the FPB accepted definition for an AFF exactly. In other words, an AMP validation study should also, if warranted, propose to the FPB alternative definitions of AFF.

CMER, as the science arm of the AMP, is best placed to scope and then propose an appropriate study design for AFF validation. Here, we provide a brief overview of existing literature that provides methods and data supporting a validation effort for an AFF.

- 1- Genetic techniques: tools, such as DNA analysis, offer a non-invasive approach to determining the presence of anadromous fish. Studies have demonstrated the use of genetic markers to identify specific anadromous species' DNA in water samples (e.g., environmental DNA or eDNA) taken from various points along a stream. This technique could be used to detect even low abundance fish presence (Barnes, M.A., et al. 2016). By analyzing these samples, researchers can assess the genetic signatures of anadromous and identify a downstream point where their presence becomes evident. The AMP is familiar with eDNA as a technique. The program presented a study that aimed to identify distribution boundaries at the upper extent of fish using eDNA techniques in 2021 (Penaluna, 2021).
- 2- Analysis of environmental variables: analyzing environmental variables that influence anadromous fish distribution can provide valuable insights for validating or even defining an AFF. Studies have shown correlations between specific environmental factors (e.g., temperature, flow rates, substrate type) and the presence of anadromous fish (Warren et al. 2015; Isaak et al., 2012). Statistical models could be developed to predict the transition point where these environmental variables favor or disfavor fish presence (Ruiz and Peterson 2011).
- 3- Analysis of stream geomorphology/characteristics and permanent barriers: field verification of the methods used in the spatial analysis of AFF alternatives would be the central focus on this approach. CMER should review and field verify measurable stream characteristics that are associated with upper extent of verified fish presence. The objective, as mentioned above, would be reduce uncertainties with anadromy (verified vs presumed presence) and uncertainties with modeling gradient and stream networks. CMER will soon start collecting data for the Potential Habitat Breaks (PHB) validation study. This data can be used for the validation of AFF alternatives and definition.

Available Data:

A non-exhaustive list of databases in support of this proposal is provided below:

- 1- Statewide Integrated Fish Distribution: jointly managed by Department of Fish and Wildlife (WDFW) and the Northwest Indian Fisheries Commission (NWFIC), this database maps known and presumed fish distribution based on observations and assumptions of habitat suitability.
- 2- USDA Forest Service: data originate from a study in the Olympic Peninsula region and include information on fish (anadromous and resident) presence
- 3- StreamNet (<https://www.streamnet.org>) anadromous fish habitat
- 4- DNR Water Type Modification Forms: this data represent regulatory F/N break points and includes both concurred/verified points and presumed habitat extensions upstream
- 5- Water Quality Monitoring Databases: the Department of Ecology (DOE) water quality monitoring database while focused on water quality, may include fish presence and/or their response to water quality parameters
- 6- USGS Surface-Water Database provide access to a wide range of hydrological data, including stream flow, and water temperature. While not exclusively focused on fish presence data, it offers information on stream conditions that may influence the distribution of fish.
- 7- CMER Data: CMER plans to collect valuable information and data for the PHB validation study. This dataset is directly related to the AFF validation study. The program should consider AFF validation data needs when field surveys being for the PHB study.

Reference cited:

Fitzpatrick, Faith A., Waite, Ian R., Patricia J. D'Arconte, Michael R. Meador, Molly A. Maupin, and Martin E. Gurtz. Revised Methods for Characterizing Stream Habitat in the National Water-Quality Assessment Program, United States Geological Survey, Water Resources Investigations Report 98-4052 (1998)

Burnett, Kelly M., Christian E Torgersen, E Ashley Steel, David P Larsen, JOSEPH L EBERSOLE, ROBERT E GRESSWELL, PETER W LAWSON, DANIEL J MILLER, JEFFERY D RODGERS, DONL STEVENS JR. Data and Modeling Tools for Assessing Landscape Influences on Salmonid Populations: Examples from Western Oregon, American Fisheries Society Symposium 70, 873-900 (2009)

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