Defining default physical criteria (DPC) for fish-bearing streams in forested landscapes in Washington State

Answers to Prospective Six Questions from the CMER / Policy Interaction Framework Document

5/29/2025

Approved by CMER on: June 24, 2025
Presented by the: Instream Science Advisory Group (ISAG)
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Brief Project Description: The purpose of this study is to develop criteria for accurately defining DPC as part of a water typing rule. The study is designed to assess the accuracy (in terms of encompassment and alignment, described below) and utility of current DPC and to evaluate whether alternative combinations of gradient, channel width, and basin area (and/or other physical characteristics) would better identify the upstream extent of potentially suitable fish habitat. Additionally, this study is intended to provide insight into how last-detected-fish points, upstream extent of fish habitat based on FHAM, and PHBs relate to DPC and whether or how the DPC in this study vary across geography and time. We anticipate that the Board will use the study findings to inform which DPC criteria to use as part of a permanent water typing rule (CMER 2020).

1. **Will the study inform a rule, numeric target, Performance Target, or Resource Objective?**
   Yes.

2. **Will the study inform the Forest Practices Rules, the Forest Practices Board Manual guidelines, or Schedules L-1 or L-2?**

   Yes. The study will examine the portion of the water typing rules dealing with the Default Physical Criteria, currently described in WAC 222-16-031(3), and assess the performance of those criteria and possible alternative criteria in fulfilling the multiple roles played by DPC in the overall water typing system. This will also inform relevant sections of Board Manual Section 23. It will not directly inform Schedules L-1 or L-2 (Appendix N, FP HCP 2006). The study will address at least in part the first four CMER Work Plan Water Typing Rule Group CQs:

   - How can the line demarcating fish- and non-fish-habitat waters be accurately identified?
   - To what extent do current default physical criteria for Type-F waters, considering potential geographic differences, accurately identify the upstream extent of (detected) fish use (all species) and/or fish habitat?
   - 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 use (all species) and/or fish habitat?

- Are there sustained gradient or stream size thresholds alone that serve as default physical criteria?

3. Will the study be carried out pursuant to CMER scientific protocols (i.e., study design, peer review)?

Yes. The development of the study design followed the AMP process. It was written by a Project Team within ISAG, then reviewed and approved by ISAG, CMER, and ISPR. The findings will also be routed through ISAG, CMER, and ISPR for review and approval.

4a. What will the study tell us?

As a stand-alone project, and in conjunction with the companion PHB study, the DPC study will provide answers to several CMER Workplan critical questions (listed above in response to Question 2) and to more detailed research questions:

- How frequently does the upstream extent of fish[1] use and/or fish habitat[2] end at a point downstream, upstream, or coincident with current DPC thresholds for bankfull width, gradient, or both?
- What is the distribution of distances between the upstream extent of fish[1] use and/or fish habitat[2] points downstream, upstream, or coincident with current DPC thresholds for bankfull width, gradient, or both?
- How do physical and ecogeohydrologic covariates influence the frequency and distribution of distances addressed in RQs 1 and 2?
- How frequently and by how much do the physical channel conditions (e.g., bankfull width and gradient) at the locations initially identified as the end of current DPC change over the course of the study?
- Can protocols used to identify DPC be consistently applied among survey crews and be expected to provide similar results in practice?
- Are there singular or combinations of physical channel metrics (e.g., stream gradient and bankfull width) and basin characteristics (e.g., basin area) alternative to current DPC that would serve as more accurate[3] DPC criteria relative to the location of the last detected fish? If so, what are they?

This will include an assessment of the performance of current and possible alternative DPC in terms of encompassment and alignment as described below, taken from the study design.

- Encompassment is a binary variable for each stream that is true when the DPC point is

[1] The definition of "fish" (WAC 222-16-010) encompasses all fishes, including sculpins, lamprey, etc.
[2] For the purposes of this study, "fish habitat" is as defined by each PHB option derived from the PHB study field data as it would be applied within FHAM (see **Error! Reference source not found.** for PHB options).
[3] "Accuracy" herein refers to alignment with and encompassment (capture) of EOF/EOFH points. See questions 1 and 2 in **Error! Reference source not found.**, **Error! Reference source not found.**, and **Error! Reference source not found.** in DPC Study Design.

upstream of EOF/EOFH points. It is summarized across the sample population as the proportion of streams for which the DPC point falls upstream of EOF/EOFH point and reflects the degree to which DPC thresholds encompass EOF/EOFH points across the sample population (Research Question #1).

- Alignment describes the direction and distances between the end of DPC thresholds for each stream and two metrics of interest: EOF and EOFH, as defined by potential habitat breaks (PHBs). Positive distance values represent EOF/EOFH upstream of DPC thresholds and negative distance values would represent EOF/EOFH downstream of DPC thresholds (Research Question #2).

4b. What will the study not tell us?

This study is not intended to evaluate protocol electrofishing surveys as used in the current water typing system or the FHAM; nor is it intended to describe how the regulatory Type F/N break should be determined as a result of these survey methods.

This study does not address the relationship of DPC to the expansion and contraction of fish habitat over long time intervals, because the sample time is limited to three years and the methods cannot predict with certainty where and in what form large disturbances capable of transforming a stream segment's ability to support fish will occur.

5. What is the relationship between this study and any others that may be planned, underway, or recently completed?

The DPC Study is part of the AMP Water Typing Strategy (CMER 2020), which also includes PHB, LiDAR-based modeling and mapping, and eDNA (see first four bullets below). As of August 2023, AFF was also assigned to CMER/ISAG (final bullet below).

- Implementation of the DPC study will occur simultaneously with that of the PHB study in order to take advantage of their shared elements (e.g., sample sites, upstream extent of fish distribution information). The PHB and DPC studies will maintain separate and focused analyses designed to accomplish discrete study objectives and answer project-related critical questions in the CMER work plan.
- Implementation of the LiDAR model study has been postponed until after completion of the DPC and PHB studies and the development of a statewide LiDAR derived stream network.
- The data from the PHB and DPC studies would likely be used in the development of the map-based LiDAR model.
- The PHB project team explored ways to include further eDNA components into this study design. The team determined that the best option would be to recommend that an additional complementary study is developed by the AMP that utilizes the sample sites and the fish location data that are collected in this study.
- While not included in the current AMP Water Typing Strategy, the AFF is a potentially complementary study for which CMER approved the Policy recommendation to the

Board to delegate the study to ISAG on the science track, consistent with the AMP process. CMER approved Policy's recommendation to forward to the Board to add this project to the AMP Water Typing Strategy and the Master Project Schedule.

6. What is the scientific basis that underlies the rule, numeric target, performance target, or resource objective that the study will inform? How much of an incremental gain in understanding will the study results represent?

The current water typing rule was based on a general understanding in the mid-1990s founded on strong empirical evidence that the water type definitions and rules in effect at that time were not resulting in accurate identification or adequate protection of a satisfactory fraction of known fish use areas. Concerns were further substantiated by a large assemblage of field data gathered, contributed, and analyzed by TFW stakeholders including WA DNR, WDFW, tribes from both sides of the Cascades, industrial forest landowners, and Washington Trout, with some of this work conducted under state and/or federal grants (see for example, Light 1997). In response to those concerns illuminated by that new information, the Forest Practices Board adopted emergency rules in 1996 that included revisions to the default definition of Type 3 (now Type F, i.e., fish bearing) waters. Provisions were made in rule allowing protocol electrofishing surveys as an alternative to use of the default physical criteria.

While the dataset used in development of the emergency rules was extensive, not all the data were gathered consistently using the same methods or standards. This DPC study, in conjunction with the companion PHB study, will use standardized methods to generate a data set that is significantly more robust and statistically powerful by using a spatially balanced random sample of adequate size and superior geographic coverage to that afforded by the earlier efforts. Careful and rigorous analysis of the data and the resulting reports will offer substantial insights on relationships of fish with the geophysical template of their habitats, including factors limiting their upstream movements and upstream limits of their distribution. Those factors include the constituent metrics used to construct both the potential habitat breaks (PHBs) and the default physical criteria (DPC).

The findings of this study will result in a substantial gain in understanding and the reduction in uncertainty about our knowledge of fish-habitat relationships. The sample frame and sampling scheme to be used (all FFR lands statewide) will improve the scope of inference for the results of this study relative to earlier data collection and analysis efforts that led to the current rule.

REFERENCES

CMER. 2020. CMER Strategy for completing Water Typing Study Designs. Memo to the Forest Practices Board, May 1, 2020. Delivered to and approved by the Washington Forest Practices Board May 13, 2020. File "bc_fpb_wtstrategy_20200513.pdf" in Board meeting materials for May 13, 2020 meeting.

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