



AMP Water Typing Update

PRESENTED BY JASON WALTER (ISAG CHAIR) ON BEHALF OF ISAG/CMER

AMP CMER SCIENCE CONFERENCE, THURSDAY, MAY 11, 2023



Overview

- ❖ **Water Typing in Washington**
- ❖ **AMP Water Typing Strategy**
 - **PHB Study**
 - **DPC Study**
 - **LiDAR Model**
 - **eDNA**



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Water Typing in Washington

❖ What is it?

- System to delineate waters as 'fish' (F) or 'non-fish' (N) based on presence/absence of fish and/or the upstream extent of fish habitat.

❖ Importance?

- Timber harvest
- Roads




LAST FISH

Site _____

Date _____

By _____



SEPARATE HABITAT
POINT UPSTREAM?

C-0004 COLE SCREENPRINT 877-994-4800

PROPOSED F/N BREAK

Site _____

Date _____

By _____



C-13001 COLE SCREENPRINT 877-994-4800

Protocol Survey

- ❖ Uniform survey protocol to refute the ‘presumption’ of fish use based solely on physical characteristics (DPC)
- ❖ Electrofishing based
- ❖ March 1 – July 15
- ❖ Establish upstream extent of fish use and regulatory Type-F/N break (potential fish use).



Potential Fish Use

- ❖ Extension of Type-F water upstream from the ‘nose of the last fish’ in some cases
- ❖ Temporal variability in the upstream extent of fish use
- ❖ No specific/definitive rule or guidance in place RE this process.





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WA FPB, November 2019

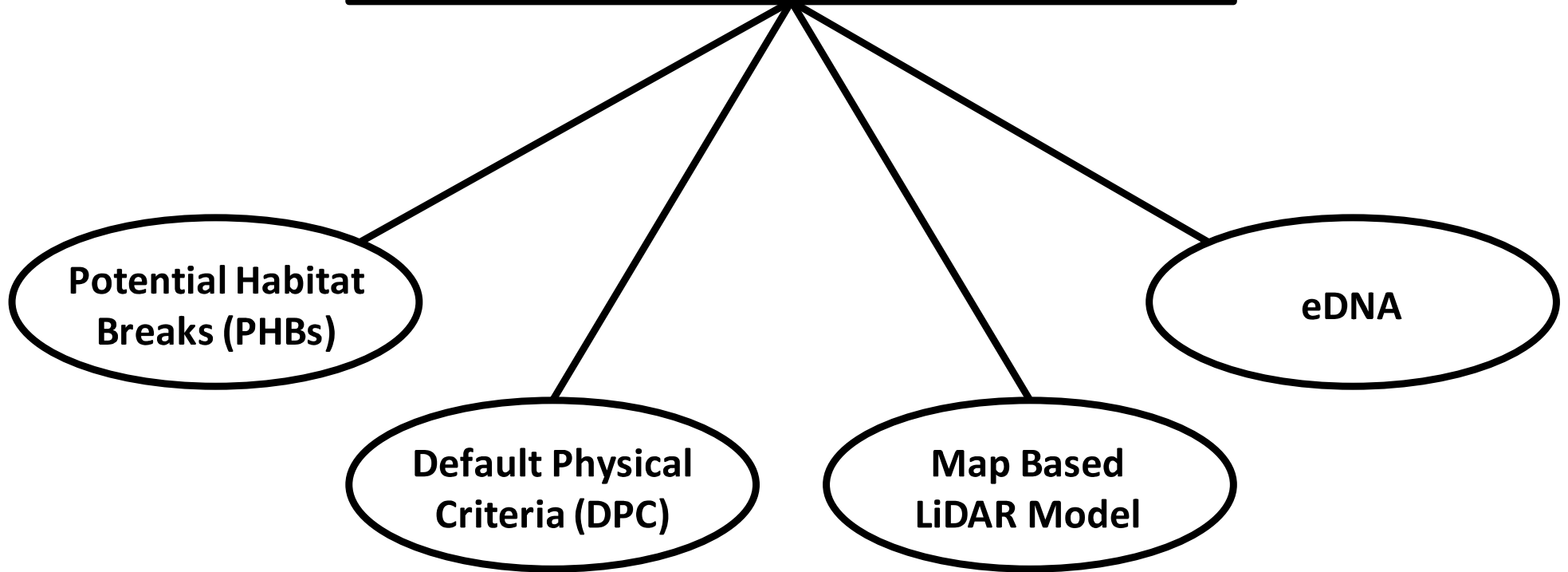
“Recommend the Cooperative Monitoring, Evaluation and Research Committee (CMER) to develop study designs for the PHB validation, physical characteristics, and map-based Lidar model studies. Design the studies for cost savings, including the phasing of the studies with eastern Washington to be initiated first, and the possibility and advisability of combining the PHB validation, physical characteristics and map-based Lidar model studies ...”

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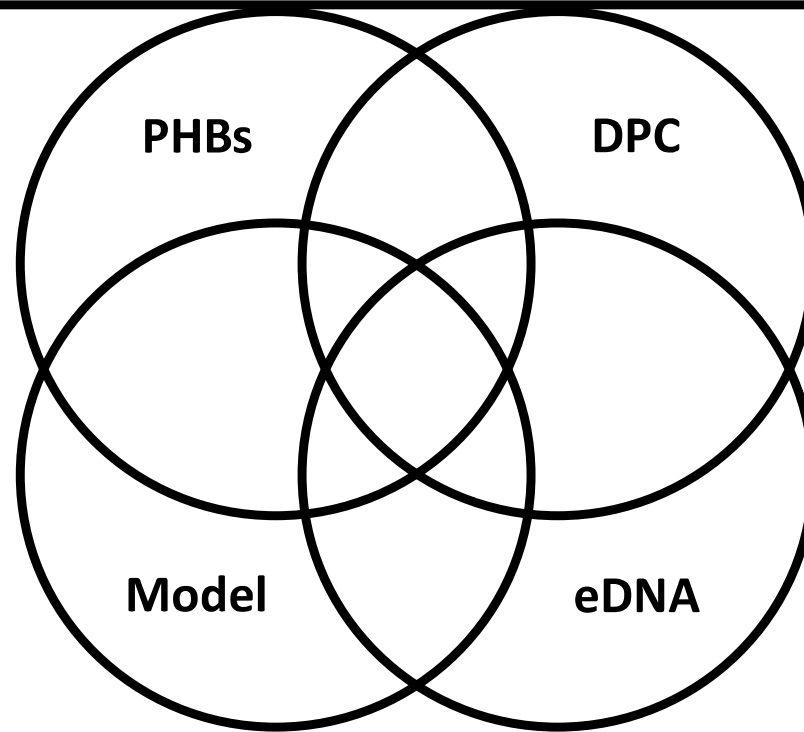
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In December 2019, CMER voted that ISAG would be the lead in responding to the Board motion and develop an overall CMER based Water Typing Strategy.

AMP Water Typing Strategy



AMP Water Typing Strategy





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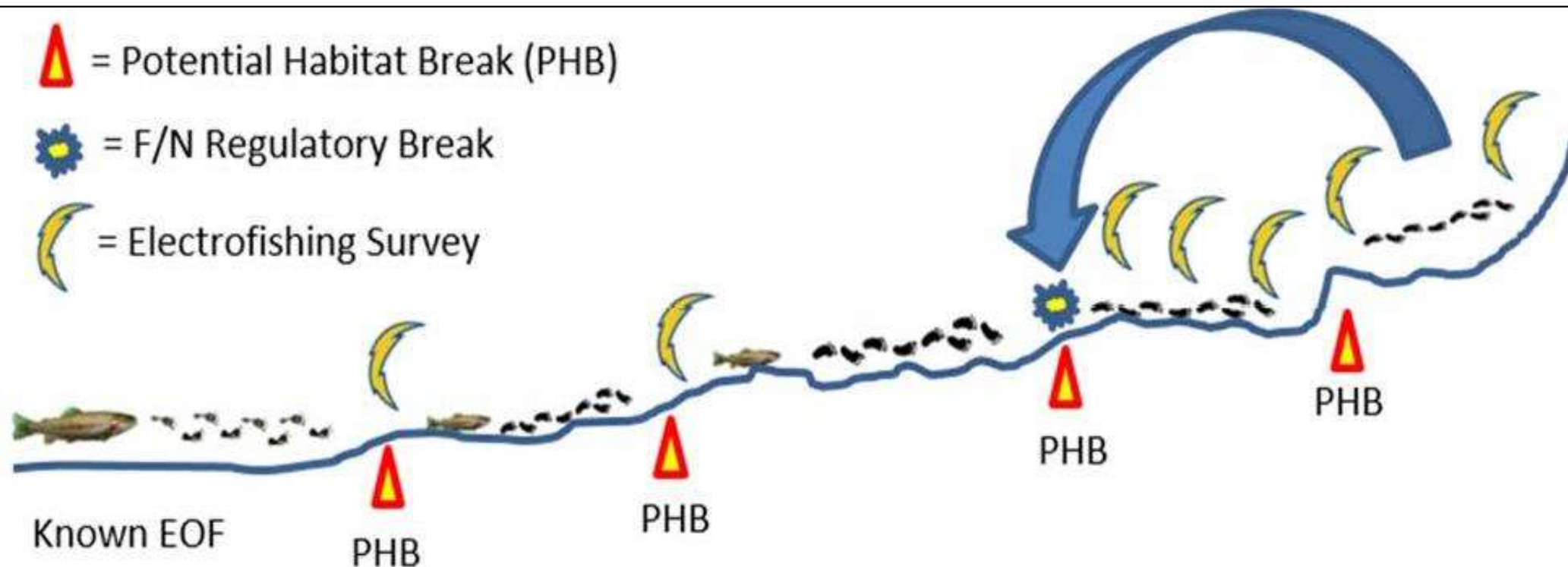
But... what are PHBs?

- ❖ **Potential habitat breaks (PHBs) are defined as permanent, distinct, and measurable in-channel physical characteristics that limit the upstream extent of fish distributions.**
- ❖ **Based upon data that can be collected during a single protocol electrofishing survey and include channel gradient, bankfull width, and both vertical and non-vertical non-deformable natural obstacles to upstream migration**
- ❖ **Function within FHAM**



So... then what is FHAM?

- ❖ Fish Habitat Assessment Method... a process used to assess the stream channel to determine the upstream extent of fish habitat for a given stream segment.
- ❖ Where to “hang the flag”



PHB Study Purpose

- ❖ **Develop criteria for accurately identifying PHBs**

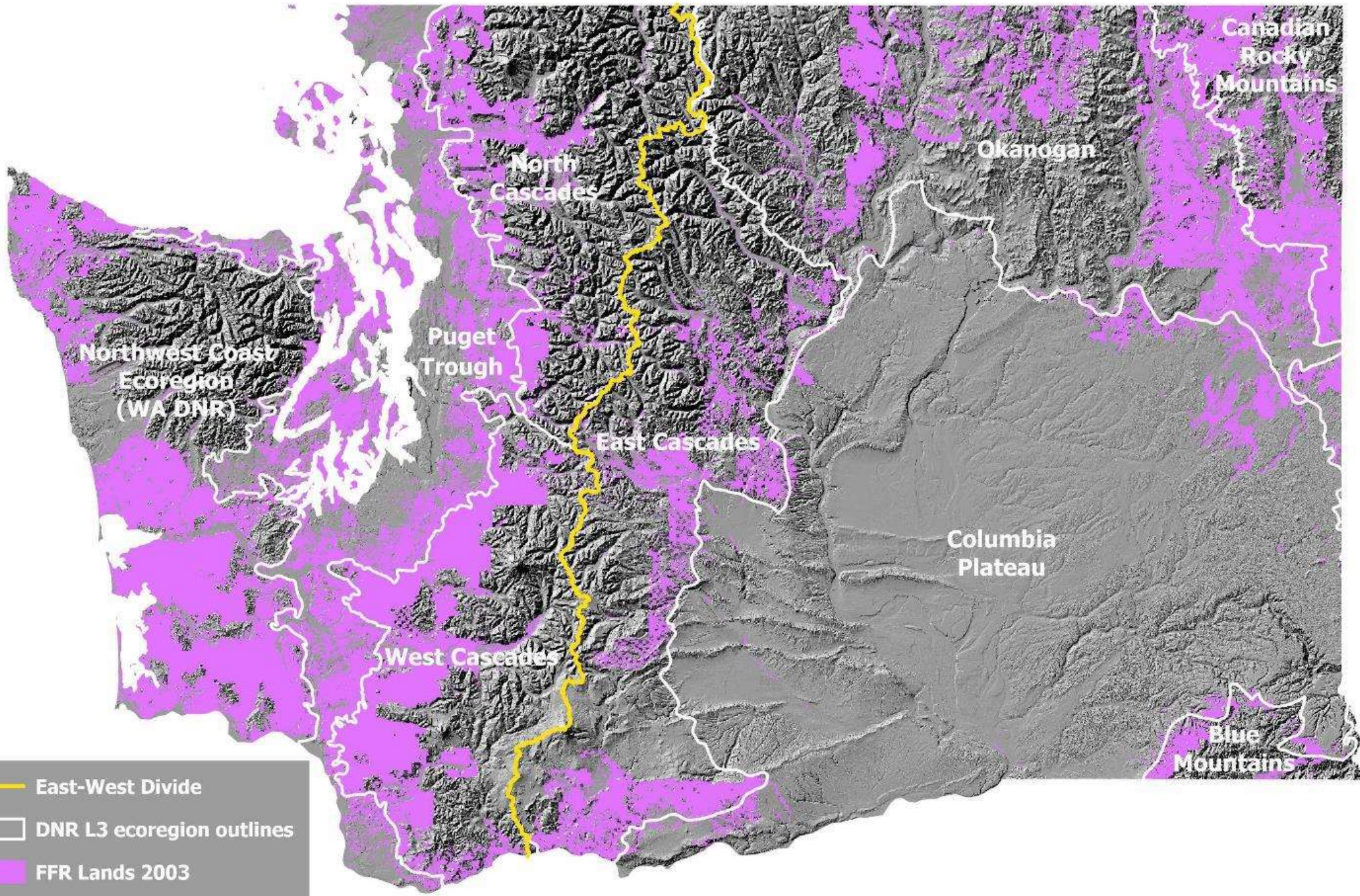
- ❖ **Designed to assess combinations of gradient, channel width, barriers to migration, and other physical habitat and geomorphic conditions associated with uppermost detected fish locations. Study findings will:**
 - 1) Inform which Board-identified PHB criteria most accurately identify the upstream extent of fish habitat in an objective and repeatable manner as applied in the FHAM;**

 - 2) Evaluate whether an alternative set or combination of empirically derived criteria more accurately achieves this goal;**

 - 3) Provide insight into how uppermost detected fish points and associated stream characteristics may vary across geography, seasons, and years.**

Site Selection & Schedule

Sampling Event	Pilot year (2018)	Year 1 (2024)	Year 2 (2025)	Year 3 (2026)
Spring to early summer		160 eastern Washington 190 western Washington	160 eastern Washington 190 western Washington	160 eastern Washington 190 western Washington
Late Fall/Winter Fixed Panel Sampled All Years (same sites)	27 to test methods	40 E WA 48 W WA	40 E WA 48 W WA	40 E WA 48 W WA
Late Fall/Winter Rotating panel, Sampled Only in Single Season		40 E WA 48 W WA	40 E WA 47 W WA	40 E WA 47 W WA
Reporting	Pilot study report	Annual report	Annual Report	Final Report



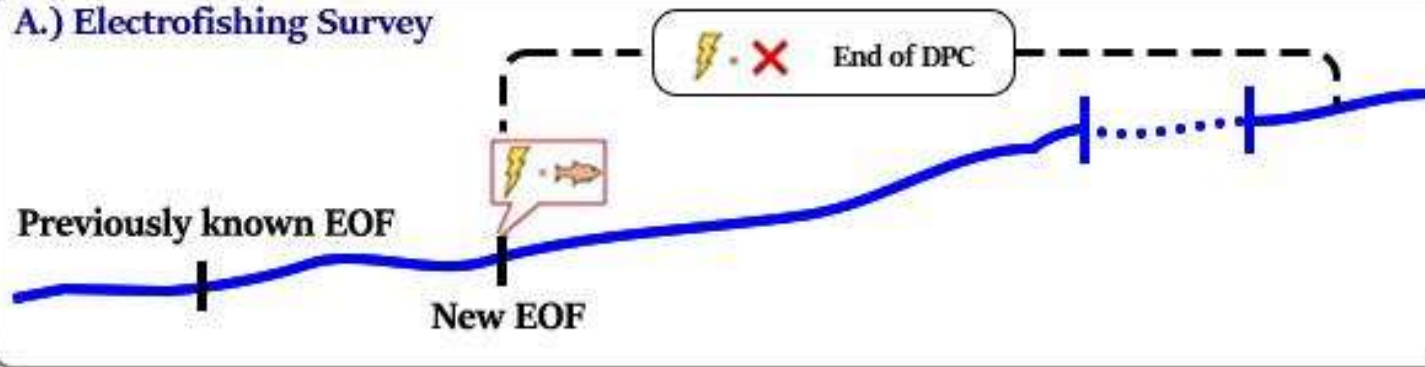


Site Exclusion

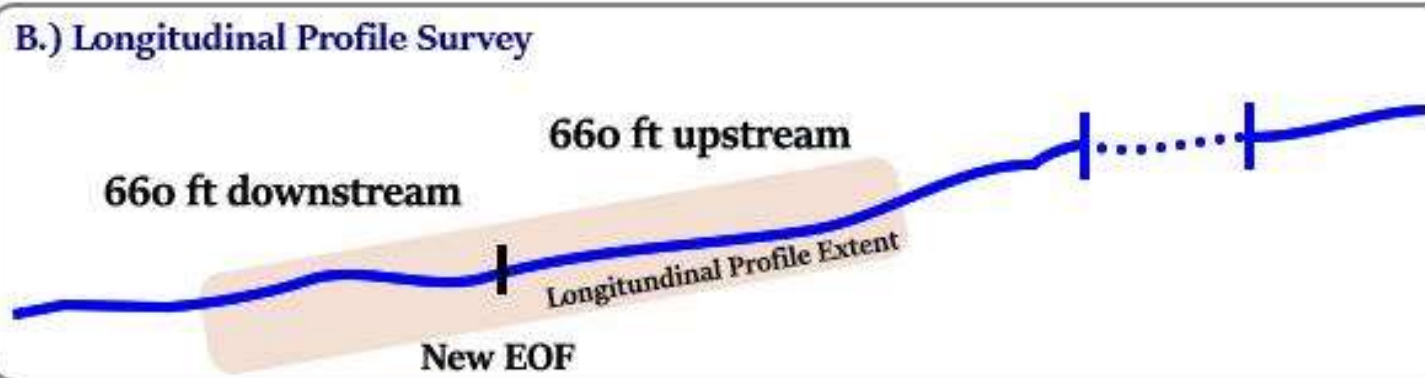
- ❖ Anthropogenic blockage
- ❖ Recent debris flow (~5 yr)
- ❖ No landowner permission
- ❖ Lack of safe access
- ❖ Other? (documented and approved)

Field Survey Methods

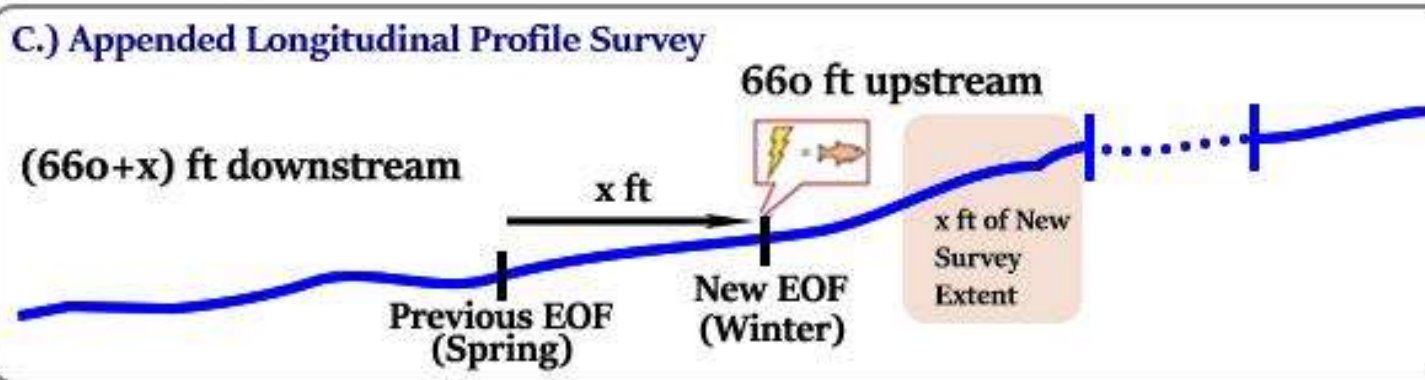
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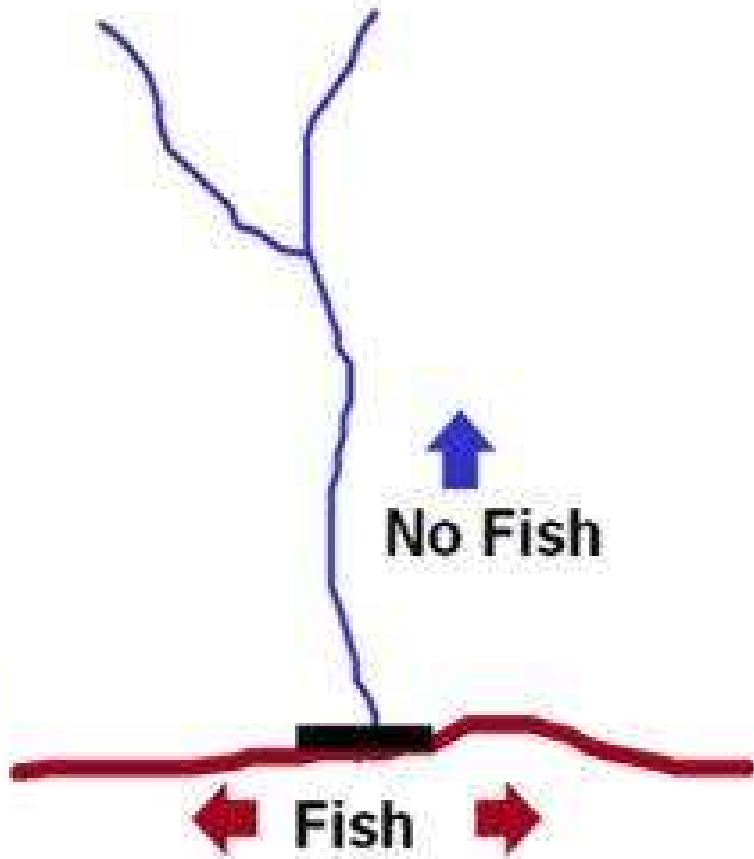


B.) Longitudinal Profile Survey

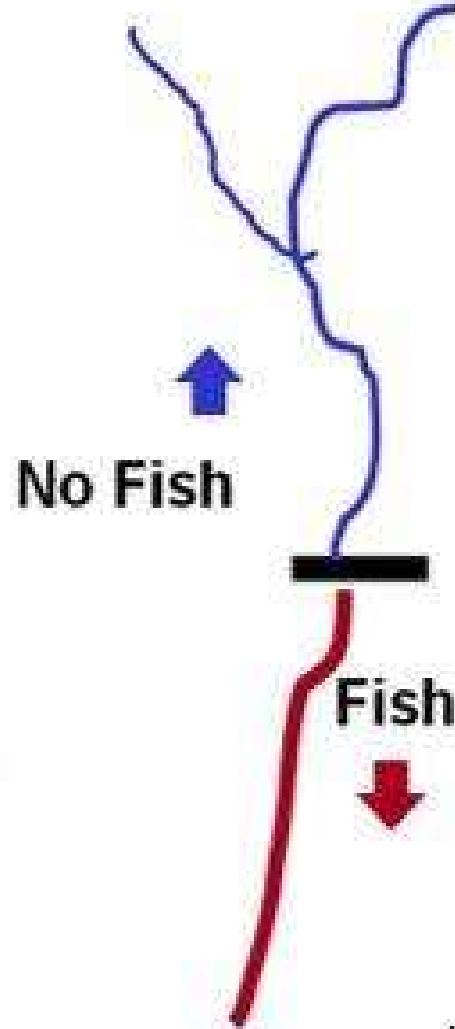


C.) Appended Longitudinal Profile Survey

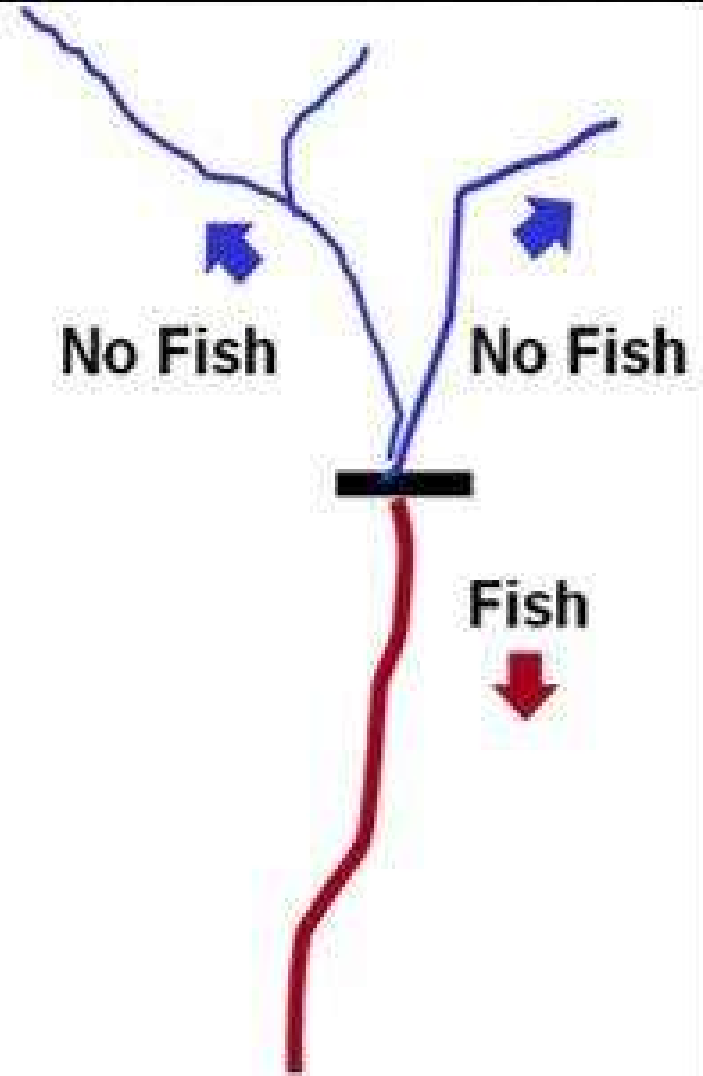




“Lateral”



“Terminal”

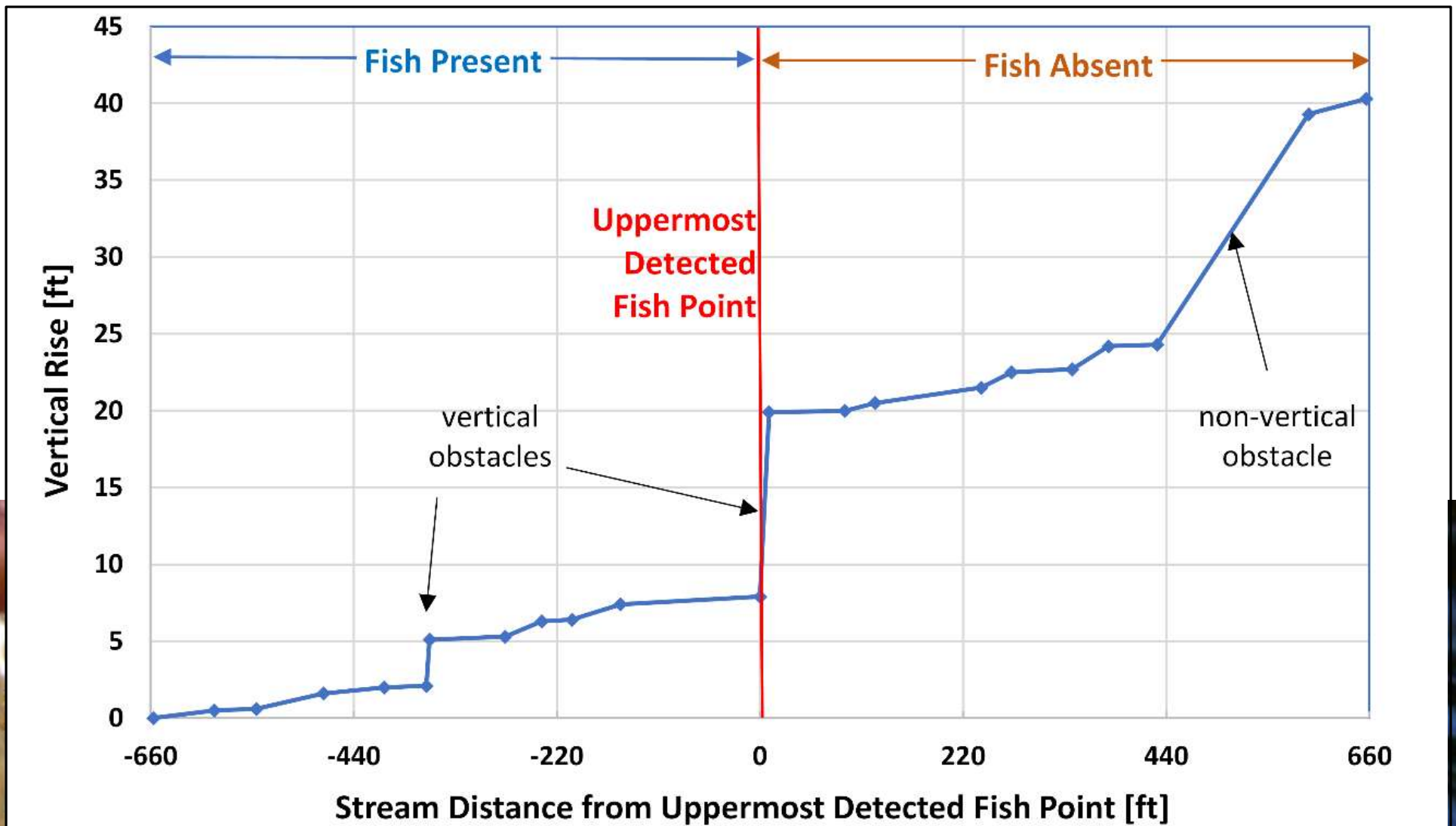


Data Analyses

- ❖ **Data exploration, summary statistics, and initial tests**
- ❖ **Examining uppermost detected fish locations and associated habitat**



Data Analyses



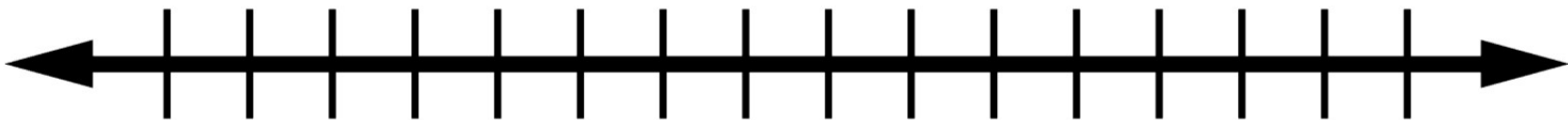
Data Analyses

- ❖ **Data exploration, summary statistics, and initial tests**
- ❖ **Examining uppermost detected fish locations and associated habitat**
- ❖ **PHB performance analyses:**
 - **Board proposed**
 - **Empirically derived**
 - **Probability of fish movement**



Status, Timeline, & Next Steps

- ❖ ISPR review and approval of PHB Study Design complete (as of May 4, 2023) ✓
- ❖ (Hopeful) final CMER approval, May 2023
- ❖ Site selection (desktop) and access coordination starting June 2023
- ❖ Field implementation starting March 2024
- ❖ The Board is expected to use the study findings to inform which PHB criteria to use in FHAM.





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What are DPCs?

❖ **Default Physical Characteristics (DPCs) reflect combinations of physical stream channel metrics where fish use is 'presumed' in the absence of actual fish use survey information.**

- **Channel gradient**
- **Bankfull width**
- **Basin area**
- **Regionally based (east vs west)**



DPC Study Purpose

- ❖ **Develop criteria for accurately defining (refining) DPCs as part of a water typing rule.**

- ❖ **The DPC study is being designed to:**
 - 1) Assess the accuracy of current DPCs;**

 - 2) Evaluate whether alternative combinations of gradient, channel width, and basin area (and/or other physical characteristics) are associated with the upstream extent of potentially suitable fish habitat;**

 - 3) Provide insight into how last detected fish points, upstream extent of fish habitat based on FHAM, and PHBs relate to DPCs;**

 - 4) Examine if/how DPCs vary across geography and time.**



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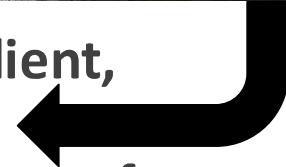
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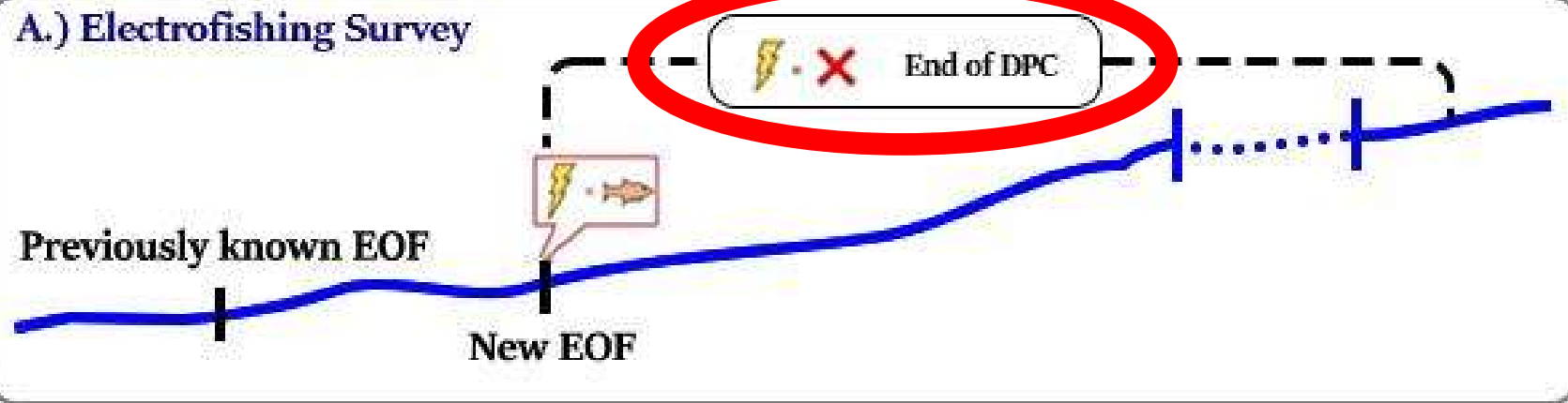
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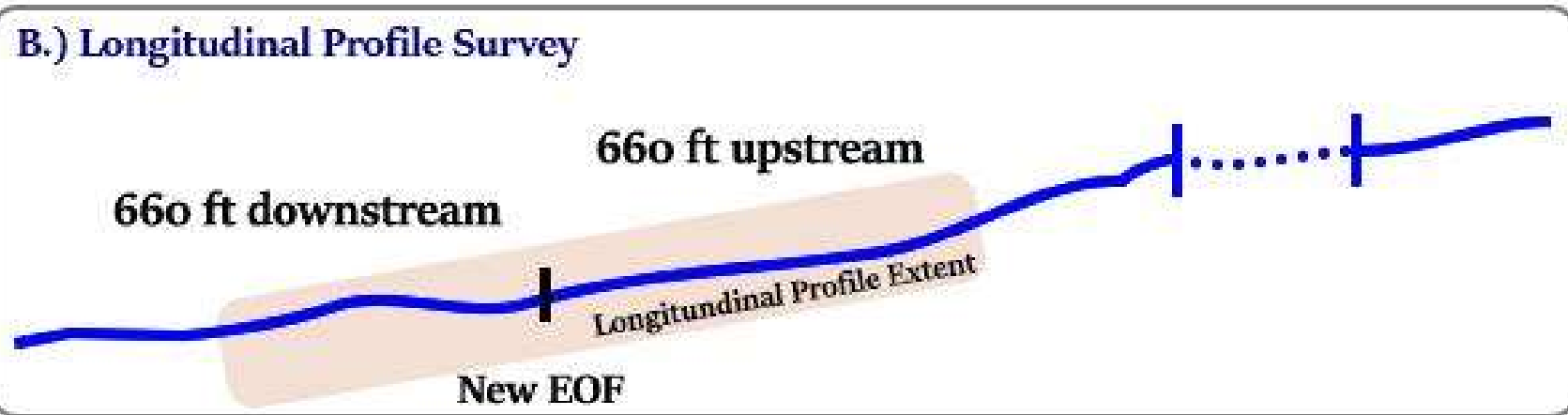
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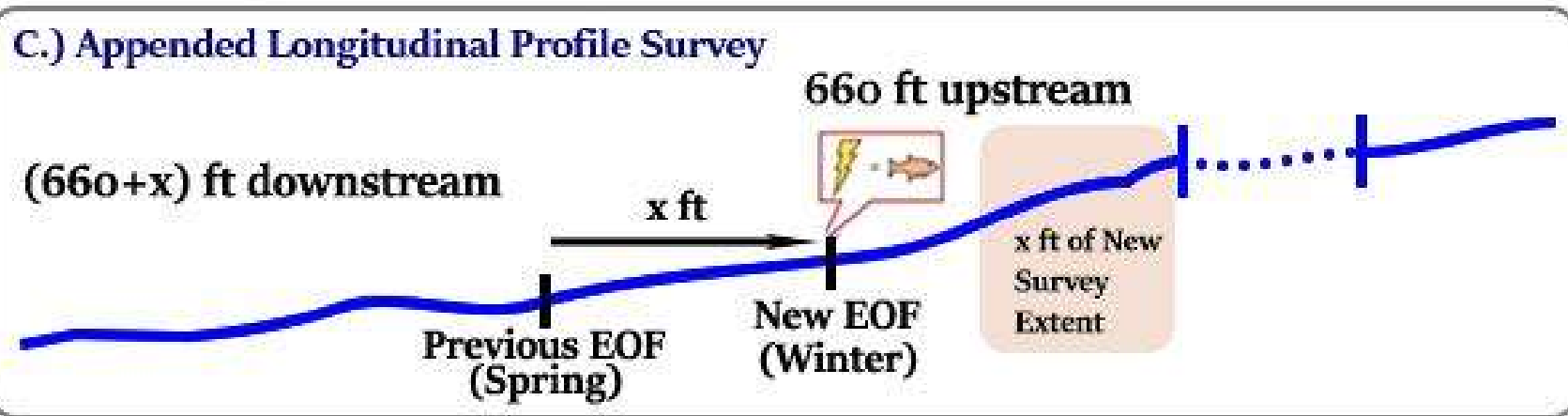
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B.) Longitudinal Profile Survey

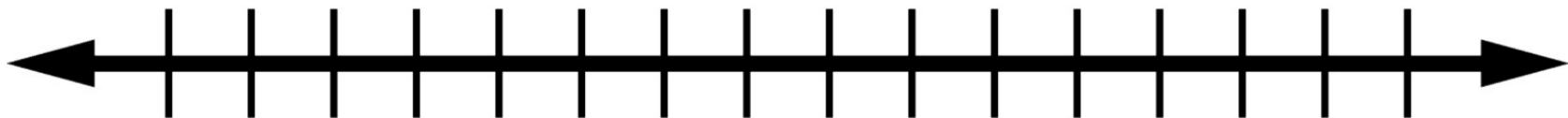


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Status, Timeline, & Next Steps

- ❖ **Study design currently in development within ISAG with a primary focus on additional (to PHB) analyses needed to address DPC questions.**
- ❖ **CMER/ISPR review of study design in fall/winter 2023/4**
- ❖ **Field implementation starting March 2024 (as part of PHB Study (remember... same field sites/surveys))**
- ❖ **The Board is expected to use the study findings to inform which DPC to use as part of a permanent water typing rule.**



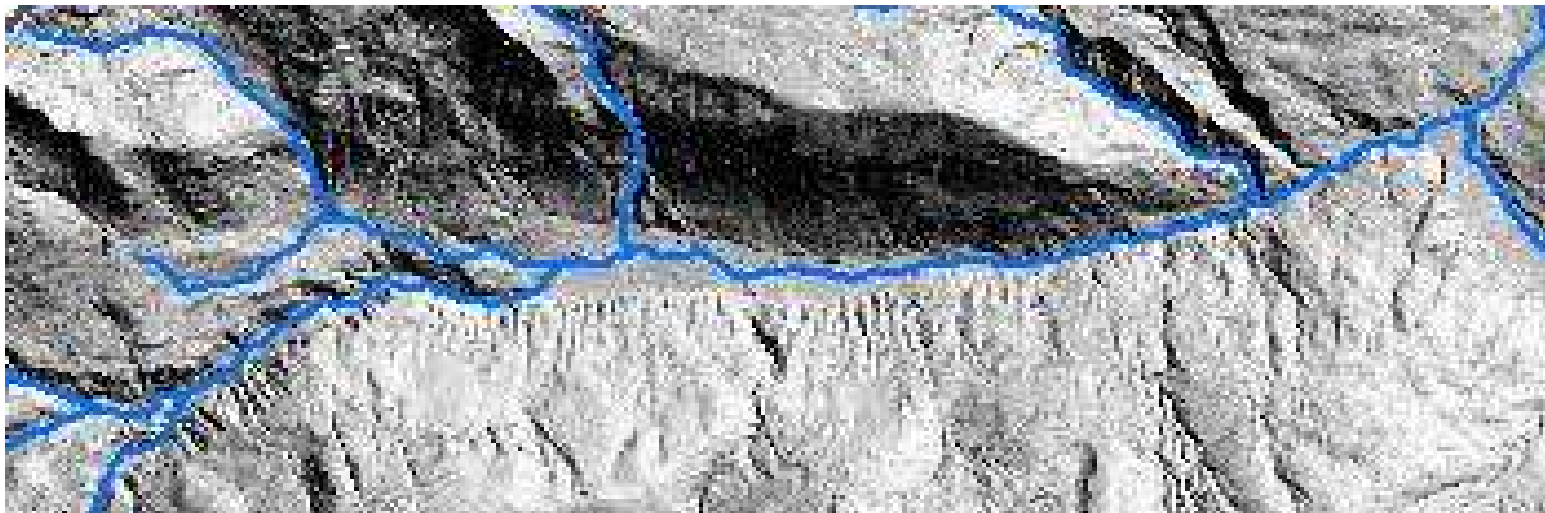


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LiDAR Model Study Purpose

- ❖ **Develop a statewide water typing map identifying F/N break points and thereby classifying stream segments as 'F' or 'N' using LiDAR based model where fish habitat has not been determined using accepted protocol electrofishing survey methodology.**
 - **Apply current model (or updated version) to LiDAR DEM.**
 - **Create new LiDAR based model reflecting PHB and DPC work.**

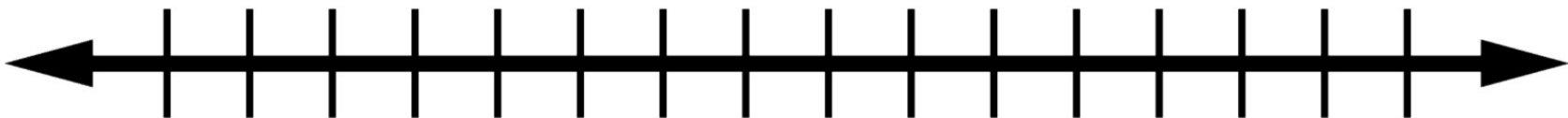


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 - **Apply current model (or updated version) to LiDAR DEM.**
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Status, Timeline, & Next Steps

- ❖ **On hold pending completion results of PHB and DPC studies, and/or further direction from Board/Policy.**



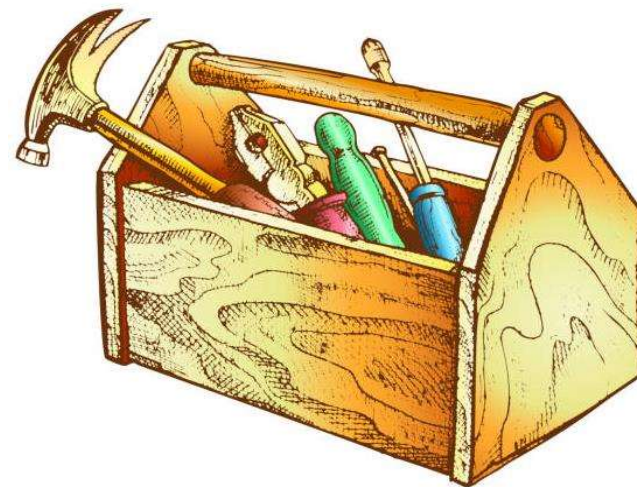
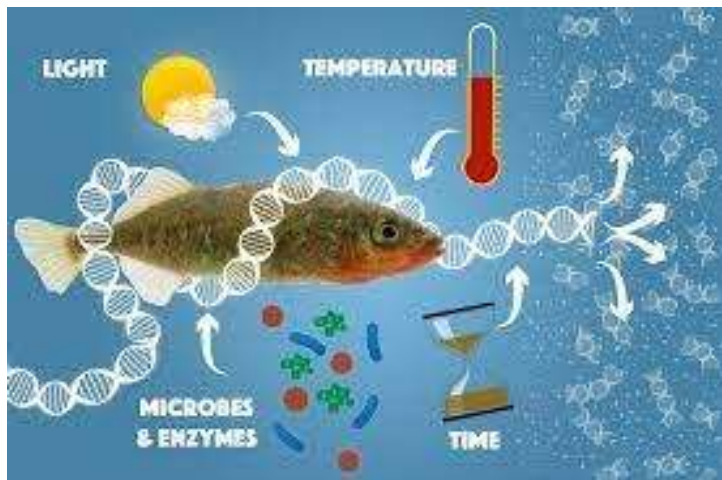


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eDNA Study Purpose

- ❖ Assess how eDNA sampling compares with electrofishing in overall effectiveness, cost, and accuracy for identifying fish presence.
- ❖ Investigate what sampling conditions are conducive to accurately and consistently identifying fish presence using eDNA.
- ❖ Evaluate if eDNA sampling could be used to better characterize fish presence as it relates to fish habitat.



eDNA Pilot Study

- ❖ **2018-19 - Brooke Penaluna (USDA PNW Research Station) collaborated with CMER/ISAG to conduct eDNA pilot study with WA forest landowners volunteering previously fish-surveyed sites.**
- ❖ **May 2021 - CMER approved eDNA Pilot report after extensive revisions at ISAG and informal dispute resolution at CMER, and submits final eDNA report and Findings Report to Policy.**
- ❖ **July 2021 - Policy determines that “no action” is needed given the exploratory nature of the Pilot study.**
- ❖ **August 2021 - Board accepts “no action” recommendation and motions for CMER/ISAG to consider the potential use of eDNA in future studies on Water Typing.**



eDNA Pilot Study

- ❖ **The Pilot study was not intended to and does not inform a rule, numeric target, performance target, or resource objective. The intent of this work was to assess a process/method, and to help inform if/how eDNA may be; 1) further investigated in a stand-alone study and/or 2) included as part of other proposed CMER research (PHB, DPC, etc.).**
- ❖ **What else did the Pilot study tell us?**
 - **Variability exists in where/when positive trout eDNA detections align with confirmed trout presence through e-fishing, but reasons for that variability are not clear.**
 - **The occurrence of trout eDNA is increased in field samples with greater electrofishing trout density.**



eDNA Pilot Study

- ❖ The report also provides a direct comparison of eDNA versus electrofishing approaches in delimiting the upper extent of fish.

Metric	eDNA	Electrofishing
Assesses potential presence and absence of fish	Yes	Yes
Estimates relative abundance of fish	Yes	Yes
Archives fish as museum voucher	No	YES
Obtains data on length, weight, or fish characteristics	No	YES
Obtains genetic data	Yes	Yes
Allows for sampling year-round	with safe access	in wadeable waters
Can directly harm fish	NO	Yes
Need state/federal scientific take permit	NO	Yes
Offers data instantaneously	No	YES
Identifies exact time and place of fish	No	YES
Potential for false positives	YES	No
Potential for false negatives	Yes	Yes

Bold/caps text in the comparison table above denotes positive characteristics of a given method where a difference exists.



eDNA Pilot Study

- ❖ Four of the metrics compared in the table are critical to the logistical practicality and ability to implement the methods for water typing purposes.

Metric	eDNA	Electrofishing
Assesses potential presence and absence of fish	Yes	Yes
Estimates relative abundance of fish	Yes	Yes
Archives fish as museum voucher	No	YES
Obtains data on length, weight, or fish characteristics	No	YES
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Allows for sampling year-round	with safe access	in wadeable waters
Can directly harm fish	NO	Yes
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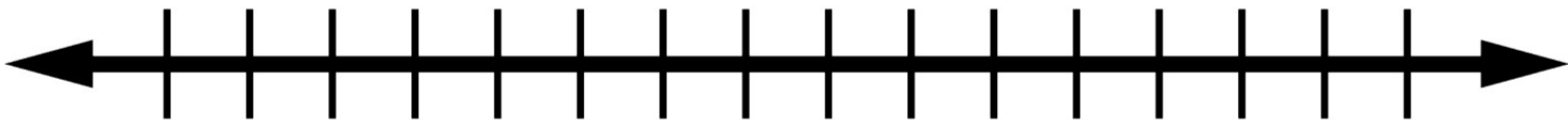
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Status, Timeline, & Next Steps

- ❖ Pilot study complete ✓
- ❖ Additional research on hold pending completion results of PHB and DPC studies, and/or further direction from Board/Policy.

“... 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 (PHB) study. This companion study can further compare electrofishing and eDNA as methods for determining the location of the upper extent of fish use, as well as different methods for eDNA collection and analysis, and can take advantage of the lessons learned from the pilot study.” (PHB Study Design – 2023)



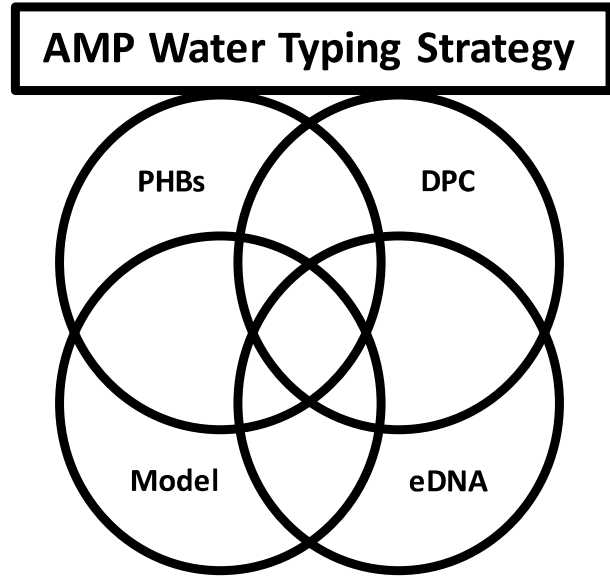
In Summary

- ❖ **The Board is currently in the process of establishing a permanent water typing rule.**
- ❖ **The rule must be implementable, repeatable, and enforceable by practitioners and regulators involved in the water typing system.**
- ❖ **The individual elements of the AMP Water Typing Strategy should inform this rule making process and help achieve these objectives.**



In Summary

- ❖ While related... completion of individual strategy elements is not dependent on completion of the entire strategy. Individual milestones will continue to be completed and reviewed without the necessity to wait until completion of the entire strategy



Questions???

