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MEMORANDUM

10/28/2024

To: Forest Practices Board

FROM: Saboor Jawad, Forest Regulation Division Manager 
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SUBJECT: Rule Language and Preliminary Cost-Benefit Analysis of the Water Typing System Rule

At the August 28th, 2024 special meeting, the Board decided to remove the specific metrics of the Anadromous Fish Floor (AFF) and of the Potential Habitat Breaks (PHB) from the Water Typing System (WTS) rule language and decided to include them as guidance in Board Manual Section 23.

Staff have now concluded the remaining work of the WTS rule. I am pleased to inform the Board that the draft rule language, and the Preliminary Cost-Benefit Analysis (CBA) is now ready for your consideration of approval. If you approve the filing of CR102, staff will file both documents with the Office of the Code Reviser beginning the public review process for the proposed rule and the Preliminary CBA.

1- Rule Language

The draft rule language (attached) now reflects your August 28th decision, amending only parts of the rule language directly relating to AFF and PHB. The rest of the rule language is not changed reflecting your prior approvals for the WTS rule. Staff received feedback from the Timber, Fish and Wildlife (TFW) stakeholders on this version of the draft rule.

2- Preliminary Cost-Benefit Analysis (CBA)

A CBA is required for the proposed WTS rule pursuant to RCW 34.05.328. The Preliminary CBA is now complete and attached. *The CBA remains preliminary until the public review process is complete. The Board will receive a final Cost Benefit Analysis when the Board considers adoption of the rule (May 2024).* As mentioned in the Preliminary CBA, after your August 2024 decisions, the proposed rule no longer has more than minor costs to small businesses. A Small Business Economic Impact Statement (SBEIS) is, therefore, not required.

Industrial Economics, Incorporated (IEC) has drafted the Preliminary CBA and will present the findings at your November 2024 regular meeting.

3- Board Manual 23 Update

Soon after your August Board meetings, staff convened a TFW stakeholder group to amend Board Manual Section 23. The group held four meetings and continues to meet twice every month. In addition to reviewing the entire Board Manual, the main focus of the group remains on incorporating a description of the AFF and PHB that aligns with your decisions. The Board Manual is not required to be complete at this stage of the rule making process. The Board should note, however, that providing guidance on AFF is challenging. Efforts are underway to draft an unambiguous description of the AFF that is implementable. Staff may come back to the Board for guidance to provide this description, if needed. The Board can expect a complete draft of the Board Manual for Board approval by May 2024.

You are receiving all the materials needed to consider a decision on whether to file the CR102 Proposed Rule Making to initiate rule making on the WTS rule. If you approve the WTS rule making will follow your approved timeline and the public review process will begin.

Please feel free to reach out to me for any questions or clarifications. I look forward to discussing the WTS rule with you at your November 2024 meeting.

SJ/

Attachments:

Proposed Rule Language
Preliminary Cost Benefit Analysis

- c:** Katie R Allen, Acting Deputy Supervisor, Forest Resilience, Regulation and Aquatics
Terry Pruitt, Assistant Attorney General and Board Attorney
Karen Zirkle, Assistant Division Manager, Policy and Landowner Services
Maggie Franquemont, Policy Program manager

**Rule Proposal for a Water Typing System
Forest Practices Board
November 13, 2024**

WAC 222-12-090 *Forest practices board manual.

...
(13) Reserved.
...

REPEAL

WAC 222-16-031 Interim water typing system.

WAC 222-24-040 *Water crossing structures for all typed waters.

- (1) When a department approved water type change causes the location of the break between Type F and Type N Water to be upstream beyond an existing water crossing structure, it must be replaced with a fish passable structure. Replacement is not required if: the existing structure is fish passable per WAC 222-24-041; or the structure is functioning with little risk to public resources and has been installed under a forest practices hydraulic **project in** an approved forest practices application or a hydraulic project approval by the department of fish and wildlife.
- (2) Bridges are required for new crossings and reconstructed crossings of any typed waters regularly used for recreational boating.
- (3) Structures containing concrete must be sufficiently cured prior to contact with water.
- (4) One end of each new or reconstructed permanent log or wood bridge shall be tied or firmly anchored if any of the bridge structure is within ten vertical feet of the 100-year flood level.
- (5) Alterations or disturbance of the stream bed, bank or bank vegetation must be limited to that necessary to construct the project. All disturbed areas must be stabilized and restored according to the recommended schedule and procedures found in board manual section 5. This requirement may be modified or waived by the department, in consultation with the department of fish and wildlife, if precluded by engineering or safety factors.
- (6) When earthen materials are used for bridge surfacing, only clean sorted gravel may be used, a geotextile lining must be installed and curbs of sufficient size shall be installed to a height above the surface material to prevent surface material from falling into the stream bed.
- (7) Wood removed from the upstream end of culverts and bridges will be placed at the downstream end of such culverts and bridges in such a way as to minimize obstruction of fish passage and to the extent practical, while avoiding significant disturbance of sediment in connection with maintenance activities.
- (8) Fords.
...

222-30-021 *Western Washington riparian management zones

...
*** (1)(b)(i)(B)** In addition to the conditions set forth above, permitted conversion activities in the **inner zone** of any harvest unit are limited by the following:

- Each continuous conversion area is not more than five hundred feet in length; two conversion areas will be considered "continuous" unless the no-harvest area separating the two conversion areas is at least half the length of the larger of the two conversion areas.

- 1 • Type S and F Water: Up to fifty percent of the inner zone area of the harvest unit on one side of
2 the stream may be converted provided that:
 - 3 ♦ The landowner owns the opposite side of the stream and the landowner's riparian area on the
4 opposite bank meets the shade requirements of WAC 222-30-040 or has a seventy-five foot
5 buffer of trees at least forty feet tall or:

6 . . .

7 (2)(b)(v) No timber harvest is permitted within a fifty-six-foot radius buffer patch centered on a
8 headwater spring or, in the absence of a headwater spring, on a point at the upper most extent of a
9 Type Np Water as defined in WAC 222-16-030(3).

12 **WAC 222-16-030 Water typing system.**

13 The objective of the water typing system is to correctly classify waters to inform the appropriate appli-
14 cation of riparian protections and to accurately determine the extent of fish habitat at the landscape
15 scale. This section identifies the criteria to classify waters. The requirements for determining fish use
16 are described in WAC 222-16-0301(1).

17
18 The department classifies streams, lakes and ponds on state and private forest lands of Washington
19 State in cooperation with the departments of fish and wildlife, and ecology, and in consultation with
20 affected Indian tribes.

21
22 To assist applicants in determining water type classifications, the department shall prepare and update
23 water type maps showing the location of Type S, F, and N (Np and Ns) Waters within the forested
24 areas of the state. All Type S Waters, and department concurred Type F and N Water breaks and
25 Type Np and Ns Water breaks shown on the water type map are official and may be relied upon by
26 landowners.

27
28 The water type maps and instructions for use are available for public review from the department. All
29 water breaks concurred by the department are regulatory water type classifications; all other mapped,
30 and unknown Type F and N Water breaks or Type Np and Ns Water breaks must be determined, in the
31 field, by forest landowners or their representative. The water type break can be determined per this sec-
32 tion or, for fish use, WAC 222-16-0301. Small forest landowners can contact the department for tech-
33 nical assistance and/or ID teams to determine water typing breaks.

34
35 The department may convene an interdisciplinary team, as defined in WAC 222-16-010, to consider
36 proposed modifications to the department's water type map; to address observed in-field conditions,
37 including observations of fish; to address naturally occurring stream conditions or blockages making
38 habitat inaccessible to fish; or, if a dispute arises concerning a water type classification in accordance
39 with WAC 222-46-020.

40
41 Waters are classified using the following criteria:

- 42 *(1) **"Type S Water"** means all waters, within their bankfull width, as inventoried as "shorelines of
43 the state" under chapter 90.58 RCW and the rules promulgated pursuant to chapter 90.58 RCW
44 including periodically inundated areas of associated wetlands.
- 45 *(2) **"Type F Water"** means segments of natural waters including periodically inundated areas of
46 their associated wetlands, not classified as Type S Waters, which have a fish, wildlife, or
47 human use; and which in any case contain fish habitat or are described by one of the following
48 four categories:

- 1 (a) Waters within lakes, ponds or impoundments having a surface of 0.5 acre or greater at
2 seasonal low water.
- 3 (b) Stream segments having a defined channel 20 feet or greater within the bankfull width
4 and having a gradient of less than 4 percent.
- 5 (c) **Waters which are off-channel habitat. These are areas important for rearing and survival
6 of fish and include riverine ponds, wall-based channels, and stream associated wetlands.
7 The area must be connected to Type F or Type S water and accessible to fish during
8 some portion of the year.**
- 9 (i) For channelized streams, the edge of off-channel habitat is determined based on the
10 outer edge of inundation of the stream at the bankfull elevation flow.
- 11 (ii) For non-channelized streams, including stream associated wetlands, off-channel
12 habitat is the outer edge of the area periodically inundated at the ordinary high water
13 line.
- 14 (d) Waters used by fish. The department has prepared water type maps showing the
15 location of Type F Waters. All department concurred Type F and N Water breaks
16 shown on the water type map are official. Where fish use has not been determined:
- 17 (i) Waters having any of the following characteristics are presumed to have fish
18 use:
- 19 (A) Stream segments having a defined channel of two feet or greater within the
20 bankfull width in Western Washington; or three feet or greater in width in
21 Eastern Washington; and having a gradient of sixteen percent or less;
- 22 (B) Stream segments having a defined channel of two feet or greater within the
23 bankfull width in Western Washington; or three feet or greater within the
24 bankfull width in Eastern Washington, and having a gradient greater than
25 sixteen percent and less than or equal to twenty percent, and having greater
26 than fifty acres in contributing basin size in Western Washington or greater
27 than one hundred seventy five acres contributing basin size in Eastern
28 Washington, based on hydrographic boundaries;
- 29 (C) Ponds or impoundments having a surface area of less than one acre at
30 seasonal low water and having an outlet to a fish stream;
- 31 (D) Ponds or impoundments having a surface area of 0.5 acre or greater at
32 seasonal low water.
- 33 (E) Waters within the anadromous fish floor, see WAC 222-16-0301.
- 34 (ii) The department shall waive or modify the characteristics in (i) of this subsection
35 where:
- 36 (A) Waters have confirmed, long term, naturally occurring water quality
37 parameters incapable of supporting fish;
- 38 (B) Snowmelt streams with short flow cycles that do not support successful
39 life history phases of fish. These streams typically have no flow in the
40 winter months and discontinue flow by June 1; or
- 41 (C) Sufficient information about a geomorphic region is available to support
42 a departure from the characteristics in (i) of this subsection, as
43 determined in consultation with the department of fish and wildlife,
44 department of ecology, affected tribes and interested parties.

- 1 (e) Waters diverted for domestic use by more than ten residential or camping units or by a
2 public accommodation facility licensed to serve more than ten persons, where the
3 department determines the diversion is a valid appropriation of water. These waters
4 shall be considered Type F Water upstream from the point of diversion for fifteen
5 hundred feet or until the drainage area is reduced by fifty percent, whichever is less;
- 6 (f) Waters diverted for use by a federal, state, tribal or private fish hatchery. These waters
7 shall be considered Type F Water for fifteen hundred feet upstream from the point of
8 diversion, including tributaries if highly significant for protection of downstream water
9 quality. The department may allow additional harvest beyond the requirements of Type
10 F Water classificatoin if the department determines after a landowner-requested
11 interdisciplinary team assessment that:
- 12 (i) The management practices proposed by the landowner will adequately protect
13 water quality for the fish hatchery; and
- 14 (ii) The additional harvest within the riparian management zone meets the
15 requirements of the water type classification that would apply in the absence of
16 the hatchery;
- 17 (g) Waters within a federal, state, local governmental entity, or private campground having
18 more than ten camping units. These are waters that enter a campground at the boundary
19 of the park lands available for public use and come within one hundred feet of a
20 camping unit, trail or other park improvement;
- 21 (3) **“Type Np Water”** means all segments of natural waters within the bankfull width of perennial
22 non-fish habitat streams. Perennial streams are flowing waters that do not go dry any time of a
23 year of normal rainfall and include the intermittent dry portions of the perennial channel below
24 the uppermost point of perennial flow.
- 25 (4) **“Type Ns Water”** means all segments of natural waters within the bankfull width of the defined
26 channels that are not Type S, F, or Np Waters. These are seasonal, non-fish habitat streams in
27 which surface flow is not present for at least some portion of a year of normal rainfall and are not
28 located downstream from a Type Np Water. Type Ns Waters must be physically connected by an
29 above-ground channel system to Type S, F, or Np Waters.
- 30 *(5) For purposes of this section:
- 31 (a) “Residential unit” means a home, apartment, condominium unit or mobile home,
32 serving as the principal place of residence.
- 33 (b) “Camping unit” means an area intended and used for:
- 34 (i) Overnight camping or picnicking by the public containing at least a fireplace,
35 picnic table and access to water and sanitary facilities; or
- 36 (ii) A permanent home or condominium unit or mobile home not qualifying as a
37 “residential unit” because of part time occupancy.
- 38 (c) “Public accommodation facility” means a business establishment licensed to serve the
39 public, such as a restaurant, tavern, motel or hotel.
- 40 (d) “Natural waters” only excludes water conveyance systems which are artificially
41 constructed and actively maintained for irrigation.
- 42 (e) “Seasonal low water” means the conditions of the seven day, two year low water
43 situation, as measured or estimated by accepted hydrologic techniques recognized by
44 the department.

- 1 (f) “Bankfull width” for defined channels means a measurement over a representative
2 section of at least five hundred linear feet with at least ten evenly spaced measurement
3 points along the normal stream channel but excluding unusually wide areas of negligible
4 gradient such as marshy or swampy areas, beaver ponds and impoundments. See board
5 manual section 23).
- 6 (g) “Intermittent” means those segments of streams that normally go dry.

7
8 NEW SECTION

9 **WAC 222-16-0301 Verification of fish habitat and the break between Type F and Type N Water.**

10 To assist applicants in determining the water type classification, the department prepares water type
11 maps showing the location of Type S, F, and N (Np and Ns) Waters within the forested areas of the
12 state. The mapping tool and instructions for viewing water type maps is available on the department’s
13 website.

14
15 For the purposes of forest practices, landowners are required to verify the water type break between
16 Type F and N Waters where fish use has not previously been determined. Department concurred
17 breaks between Type F and N Waters are shown on the water type map. These breaks are official and
18 can be used by the landowner. All other mapped stream breaks, and the establishment of the Type F
19 and N Water break on streams not shown on the map, need to have the Type F and N Water break
20 established through the application of the default physical characteristics, per WAC 222-16-
21 030(2)(d)(i); or, through the application of the fish habitat assessment method (FHAM) described in
22 (1) of this section.

23
24 The application of FHAM is intended to establish the line of demarcation between fish and non-fish
25 habitat waters. No application of default physical characteristics or FHAM to determine the Type F
26 and N Water break is allowed within the anadromous fish floor (AFF), unless a landowner requests an
27 interdisciplinary team, as defined in WAC 222-16-010.

28
29 The AFF is delineated on waters connected to saltwater by measurable physical stream characteristics,
30 within which anadromous fish habitat is presumed, and upstream of which the default physical
31 characteristics or a protocol fish survey under FHAM may be applied to establish the Type F and N
32 Water type break. Board manual section 23 provides guidance on how to delineate the AFF.

33
34 ***(1) Fish Habitat Assessment Methodology (FHAM).** The FHAM is a series of steps used to
35 delineate the upper extent of fish habitat coincident with the regulatory water type break between
36 Type F and Type N Waters. Proposals to change the department water type map must include
37 documentation of the use of the FHAM on a form designated by the department. FHAM shall be
38 applied in waters situated upstream from the anadromous fish floor or known fish use. Board
39 manual section 23 provides additional technical guidance for conducting the FHAM.

40
41 The FHAM requires the identification of geomorphic features meeting the definition of a
42 potential habitat break (PHB) as described in (a) of this section.

- 43
44 (a) **“Potential Habitat Break”** means a permanent, distinct, and measurable change to in-stream
45 physical characteristics. PHBs are typically associated with underlying geomorphic
46 conditions and may consist of natural obstacles that physically limit fish access to upstream
47 reaches or a distinct measurable change in channel gradient, bankfull width or a combination
48 of the two. Natural, non-deformable obstacle PHB includes vertical drops, steep cascades,

1 bedrock sheets and bedrock chutes. Guidance on how to identify PHB is contained in Board
2 Manual Section 23.

3
4 (b) The steps to conduct FHAM are:
5

Step 1	Locate the upstream extent of the AFF or other upstream most point of known fish use, whichever is furthest upstream. The process and sources used to determine known presence or fish habitat must be documented. Proponents are encouraged to contact the department of fish and wildlife and/or affected Indian tribes to assist in determining areas of known fish use.
Step 2	Locate the first PHB situated upstream of the stream segment with known fish use point, determined in Step 1. See the PHB criteria in (1)(a) of this section and associated guidance in board manual section 23.
Step 3	Begin the fish habitat assessment directly upstream of the PHB identified in Step 2. If a fish is observed in the stream segment upstream from the first PHB, stop the electrofishing survey and proceed upstream to the next PHB. Repeat this process until no fish are observed upstream of a PHB;
Step 4	When fish are not observed in the stream segment directly above a PHB, continue protocol surveying of all available habitats for ¼ mile upstream of the PHB. If no fish are observed, this point becomes the end of fish habitat for the stream segment and the proposed water type break between Type F and Type N Waters. Document this location as the proposed habitat break.

6



Washington State Proposed Water Typing System Rule

Final Preliminary Cost Benefit Analysis

Draft | October 29, 2024

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Several staff members of the Washington Department of Natural Resources (DNR) provided significant technical direction and support, participating in interviews with experts and key informants; overseeing outreach for purposes of data collection; obtaining key data and information from internal DNR sources; and providing thoughtful insight and comments on our approach and assumptions. We thank Karen Zirkle, Marc Engel, Maggie Franquemont, Dave Wischer, Colleen Granberg, Kristoffer Larson, Saboor Jawad, and Katie Rose Allen for their contributions.

Several additional individuals within DNR provided valuable knowledge, insight, and data as we developed the draft report. We are particularly grateful for the input and data provided by KelliAnne Ricks (Conservation Easement Program), Brent Haverkamp (Small Forest Landowners Office), Allen Estep (Forest Resources Division, Habitat Conservation Program and Scientific Consultation Section), Jon Byerly (Forest Practice Forester, Pacific Cascade Region), and Bob Green (Land Appraisals).

We are also appreciative of information and insight provided by other Washington State agencies, in particular Valerie Torres (Research and Fiscal Analysis, Washington Department of Revenue), Kenneth Behen (Scientific Collection Permits, Washington Department of Fish and Wildlife (WDFW)), and John Heimborg (Habitat Program, WDFW). Our analysis also benefited from input provided by representatives of the Northwest Indian Fisheries Commission and Columbia River Inter-Tribal Fish Commission as well as water typing survey industry representatives (including individuals at West Fork Environmental and Terrapin Environmental).

We also thank Four Peaks Environmental Science and Data Solutions for guidance on the application of their spatial analysis and results. Finally, this analysis incorporates the useful input, suggestions, and resources provided by the Economics Working Group and other individuals and organizations that provided feedback on previous iterations of this analysis. We additionally benefitted from data and guidance provided by timberland appraisers at Atterbury Consultants.

The IEc project managers and lead analysts are Maura Flight, Megan Sheahan, Jen Kassakian, and Isabel Holland. The IEc team also included Jim Shannon, a fish biologist from Hayley & Aldrich.

Acronyms

AFF	Anadromous Fish Floor
C&S	Ceremonial and Subsistence
CBA	Cost-Benefit Analysis
CRITFC	Columbia River Inter-Tribal Fish Commission
DNR	Washington Department of Natural Resources
DPC	Default Physical Characteristic
Ecology	Washington State Department of Ecology
ETG	Electrofishing Technical Group
FFR	Forests and Fish Report
FHAM	Fish Habitat Assessment Methodology
FPA	Forest Practices Application
GIS	Geographic Information System
LSI	Landslide Susceptibility Index
NAICS	North American Industry Classification System
NMFS	National Marine Fisheries Service
PHB	Potential Habitat Break
RCW	Revised Code of Washington
REIT	Real Estate Investment Trust
RFA	Washington Regulatory Fairness Act
SBEIS	Small Business Economic Impact Statement
SFL	Small Forest Landowner
TIMO	Timber Investment Management Organization
UBI	Uniform Business Identification
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WC Hydro	DNR's Hydrography – Watercourses GIS Open Layer
WDFW	Washington Department of Fish and Wildlife

WTMF Water Type Modification Form

WTP Willingness to Pay

Executive Summary

This report provides the results of a Preliminary Cost-Benefit Analysis (CBA) of the Proposed Water Typing System Rule (“Proposed Rule”) defined by the Washington Forest Practices Board. The Proposed Rule would amend the existing interim water typing system rule, in place since 2001, by 1) defining that the role of the anadromous fish floor (AFF) in the water typing system process; and 2) prescribing a Fish Habitat Assessment Methodology (FHAM) for establishing the demarcation between fish and non-fish habitat waters outside of the AFF.

The Forest Practices Board determined that a Cost-Benefit Analysis (CBA) is required for the proposed water typing rule pursuant to Revised Code of Washington (RCW) 34.05.328. The objective of the CBA is to provide information to allow the Board to, “[d]etermine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented” (RCW 34.05.328(1)(d)). This report provides the basis for that determination.

Pursuant to RCW 19.85, a Small Business Economic Impact Statement (SBEIS) is required if the agency determines that the proposed rule will impose “more than minor costs” on businesses in an industry. The objective of the SBEIS is to determine whether the rule will have a disproportionate cost impact on small businesses, and if so, where legal and feasible, to reduce the costs imposed by the rule on small businesses (RCW 19.85.30). The report also addresses these questions.

ES.1 Summary of the Proposed Rule

The primary objectives of the Board’s water typing system rulemaking are to reduce the use of electrofishing and to reduce the potential for subjectivity when classifying stream water type. To meet these objectives, the proposed rule introduces a new section (WAC 222-16-0301) into the Water Typing System rules that defines a consistent process for identifying the break between Type F and Type N water. The new section describes two elements of the rule to be used in concert to establish the break between Type F and N streams across the state:

1. *Prescribing FHAM as the protocol for all future water typing surveys.* FHAM provides a consistent means of establishing the demarcation between fish and non-fish habitat, removing ambiguity and subjectivity associated with the protocol survey approach for identifying the break between Type F and N water.
2. *Describing the application of an AFF.* The AFF delineates the stream extents that support anadromous fish. Stream length specified as the AFF would be managed as Type F and would not require typing by landowners to determine appropriate management requirements.

The proposed rule defines the AFF as “waters connected to saltwater by measurable physical stream characteristics, within which anadromous fish habitat is presumed, and upstream of which the default physical characteristics (DPCs) or a protocol fish survey under FHAM may be applied to establish the Type F and N Water type break.” The proposed rule also enumerates four steps for implementing FHAM as well as a broad definition of physical habitat breaks (PHBs). For guidance on how to identify the extent of the AFF as well as PHBs, the rule directs landowners to Board Manual Section 23.

The rule would apply to private, state, and other local forest landowners in Washington State that require information about whether streams intersecting their forestland are Type F or N. The rule does not apply to federal and tribal forestland owners and does not influence streams that have been permanently typed. The rule maintains the current option for landowners to type their streams by referring to a set of DPCs. The proposed

rule also would not affect any of the requirements associated with the outcome of a water typing effort (i.e., the size and composition of riparian buffers, accommodating fish passage on stream crossings, etc.).

ES.2 Probable Benefits and Costs

We evaluate the probable costs and benefits for the proposed rule by comparing water typing in Washington under two scenarios: the world with the proposed rule and the world without the proposed rule. The world without the proposed rule reflects the regulatory baseline for the analysis. An important aspect of the baseline is the current practice for determining water types under the interim rule. It also includes current and expected future industry practices with respect to water typing approach and implementation.

Relative to this baseline, we assess whether and to what extent the proposed rule is likely to result in 1) changes in the water typing process as well as 2) changes in the outcomes of survey efforts. Table ES-1 summarizes the findings of our evaluation. Overall, we find that the proposed rule, with its broad definitions of the AFF and PHBs used in the FHAM, largely codifies existing practices around survey implementation during water typing efforts. Therefore, the proposed rule is unlikely to result in significant changes in process or outcomes of surveys relative to current conditions. As such, the proposed rule does not result in changes to land use management, fish abundance, or other ecological conditions in riparian areas.

However, by codifying these practices in rule, the proposed rule generates regulatory certainty and reduces the risk of potential fish harm by creating bounds on the use of electrofishing. We describe these two benefits of the rule in more detail below. **Because the rule is anticipated to generate benefits but not costs, we find that the probable benefits of the rule are likely to outweigh the probable costs.**

Table ES-1. Summary of Findings Related to the Effects of the Rule and Resulting Categories of Probable Costs and Benefits

Potential Effect of the Rule Evaluated	Finding of the Analysis	Incremental Costs	Incremental Benefits
Potential changes in water typing process			
Landowner choice of water typing method (i.e., use of DPCs versus protocol survey)	No effect of the rule	None	None
Effort devoted to water typing and concurrence	Proposed rule unlikely to result in changes in effort devoted to water typing and concurrence relative to current conditions but reduces the potential for subjectivity when classifying stream water type	None	Regulatory certainty regarding appropriate process for water typing
Extent of electrofishing during FHAM implementation	Proposed rule unlikely to change extent of electrofishing relative to current survey implementation but reduces the risk for the potential increase in electrofishing in the future	None	Reduced risk of potential fish harm by codifying limits in electrofishing during protocol surveys
Potential changes in water typing outcomes			
Change in the expected location of F/N breakpoints (i.e., change in extent of Type F and Type N streams)	No effect of the rule	None	None

Reduced Risk of Potential Fish Harm

The proposed rule reduces the risk of future increases in electrofishing, therefore a key benefit is the reduced risk of potential fish harm. The best available evidence suggests that the proposed rule is unlikely to result in population-level effects on fish, although may prevent harm to individual fish. Under current conditions, electrofishing for water typing purposes effects hundreds to thousands of fish each year. Given the limited use of electrofishing during survey efforts in the baseline, the proposed rule is unlikely to result in less fish harm relative to these current conditions, although is likely to prevent these numbers from increasing in the future. We are unable to quantify the risk reduction associated with the proposed rule given significant uncertainty about how electrofishing may change in the future absent the rule.

The relevant economic benefits associated with this reduced risk are the public's willingness to pay (WTP) to reduce fish harm. To our knowledge, there is no literature evaluating the value that the public holds to avoid harm to fish through reduced electrofishing. However, there is abundant literature demonstrating that people value fish, in particular the species found in streams in Washington that experience electrofishing in the baseline. The appendix summarizes available literature demonstrating that people value fish presence.

Regulatory Certainty

The proposed rule also reduces the potential for subjectivity when classifying water types by providing more scaffolding for surveyors, including a definition of where surveys should start and step-by-step instructions for implementing FHAM. Therefore, a key benefit of the rule is certainty in how streams will be typed in the future, reducing ambiguity in future implementation. Increasing certainty may translate into more confidence among landowners and other stakeholders that the outcome of a survey is unlikely to differ across surveyors.

The proposed rule is the result of a long process that started with the publication of the interim water typing rule in 2001 and the Forest Practice's Board announcement in 2013 that it would commence work developing a permanent water typing rule. Since then, there has been significant uncertainty among landowners about what the new water typing system would mean for the process and outcomes of future survey efforts. The proposed rule, if finalized, would codify existing practices and create flexibility for future improvement by relegating specific definitions of the AFF and the PHBs to guidance contained in the Board Manual. Relative to the uncertainty experienced over more than a decade, the proposed rule provides landowners and other stakeholders with assurance about the processes that can be utilized to type their streams in the future.

ES.3 Impacts on Small Businesses

The proposed rule directly regulates owners of forestland immediately adjacent to water. In some cases, these forestland owners are businesses; in other cases, these landowners are private individuals and public entities, including state and local government. We identify three North American Industry Classification System (NAICS) codes with businesses that will be most likely to be regulated by the proposed rule because they are most likely to want to harvest timberland in riparian areas: 113110 – Timber tract operations, 113210 – Forest nurseries, and 113310 – Logging. We find that approximately 99 percent of businesses in these industries meet Washington's definition of small business, i.e., a business with 50 or fewer employees.

However, the proposed rule is not anticipated to result in probable costs to these industries. This is because the rule is unlikely to change how landowners conduct water typing relative to current conditions and is unlikely to change the outcomes of surveys. Therefore, we do not anticipate an increase in costs associated with surveys or compliance costs associated with more Type F stream requirements (i.e., unharvestable buffer area, fish passage through stream crossings). **Because the rule does not result in more than minor costs to businesses in the regulated industries, a complete SBEIS is not required for this proposed rule.** For transparency purposes, the report also provides the information that is typically required of a SBEIS.

CHAPTER 1 | Introduction

In 1999, a collaboration of federal, state, tribal, and county governments, and private forest landowners, presented the Forests and Fish Report (FFR) to the Washington Forest Practices Board and Governor's Salmon Recovery Office to recommend, "...biologically sound and economically practical solutions that will improve and protect riparian habitat on non-federal forest lands in the State of Washington." The FFR, which provides the foundation for addressing forest management as part of Washington's Statewide Salmon Recovery Strategy, includes riparian forest management provisions that prescribe restrictions and conservation measures based on "water type." Water types are divided into shorelines (Type S), fish habitat (Type F), and seasonal and perennial streams that are neither shorelines nor fish habitat (Type Ns and Np streams, respectively).

In 1999, the Legislature passed HB 2091 which adopted the FFR and directed the Forest Practices Board to adopt rules consistent with the FFR. In 2001, the Washington Forest Practices Board adopted two rules to work toward a systematic approach for identifying water types. The first rule (WAC 222-16-030), which specified a GIS modeling approach to establish Type F waters, was never implemented as the model did not meet its targeted accuracy requirements. The second rule (WAC 222-16-031) is currently implemented across the state and specifies an "interim water typing system" based on fish presence and not fish habitat. In August 2024, the Forest Practices Board defined a proposed rule to codify a consistent, permanent system for determining water types in accordance with the FFR. The proposed rule amends the existing interim water typing system rule by 1) defining that the role of the anadromous fish floor (AFF) in the water typing system process; and 2) prescribing a Fish Habitat Assessment Methodology (FHAM) for establishing the demarcation between fish and non-fish habitat waters outside of the AFF.

The Forest Practices Board determined that a Cost-Benefit Analysis (CBA) is required for the proposed water typing rule pursuant to Revised Code of Washington (RCW) 34.05.328. The objective of the CBA is to provide information to allow the Board to, "[d]etermine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented" (RCW 34.05.328(1)(d)). This report provides the basis for that determination.

Pursuant to RCW 19.85, a Small Business Economic Impact Statement (SBEIS) is required if the agency determines that the proposed rule will impose "more than minor costs" on businesses in an industry. The objective of the SBEIS is to determine whether the rule will have a disproportionate cost impact on small businesses, and if so, where legal and feasible, to reduce the costs imposed by the rule on small businesses (RCW 19.85.30). This report also addresses these questions.

1.1 Objective and Description of the Proposed Rule

The primary objectives of the Board's water typing system rulemaking are to reduce the use of electrofishing and to reduce the potential for subjectivity when classifying stream water type. To accomplish this, the Board established further objectives directing the Timber, Fish, and Wildlife (TFW) Policy Committee to:

1. Better address the FFR's foundational goal to protect accessible fish habitat through a field applied methodology to reliably identify accessible fish habitat in an objective and repeatable manner.
2. Maintain all essential elements of the methodology in rule by adding long-standing Board guidance, found in the Board Manual, into rules where appropriate.
3. To have a sound water typing system which ensures riparian buffers are properly placed at each stream, protecting aquatic resources and their respective habitats.

4. The AFF is the measurable physical stream characteristics downstream from which anadromous fish habitat is presumed, and would establish the location upstream of which fish protocol surveys may begin under FHAM.

To meet these objectives, the proposed rule introduces a new section (WAC 222-16-0301) into the Water Typing System rules that defines a consistent process for identifying the break between Type F and Type N water. The new section describes two elements of the rule to be used in concert to establish the break between Type F and N streams across the state:

1. *Prescribing FHAM as the protocol for all future water typing surveys.* FHAM provides a consistent means of establishing the demarcation between fish and non-fish habitat, removing ambiguity and subjectivity associated with the protocol survey approach for identifying the break between Type F and N water.
2. *Describing the application of an AFF.* The AFF delineates the stream extents that support anadromous fish. Stream length specified as the AFF would be managed as Type F and would not require typing by landowners to determine appropriate management requirements.

The proposed rule defines the AFF as “waters connected to saltwater by measurable physical stream characteristics, within which anadromous fish habitat is presumed, and upstream of which the default physical characteristics (DPCs) or a protocol fish survey under FHAM may be applied to establish the Type F and N Water type break.” For guidance on how to identify the extent of the AFF, the rule directs landowners to Board Manual Section 23.

The FHAM prescribes the specific steps for delineating the upper extent of fish habitat coincident with the break between Type F and N waters, as follows:

- **Step One:** Locate the upstream extent of the AFF or other upstream most point of known fish use, whichever is further upstream. The proposed rule encourages landowners to contact the Washington Department of Fish and Wildlife (WDFW) and/or affected Indian tribes to assist in determining areas of known fish use.
- **Step Two:** Locate the first potential habitat break (PHB) above the point identified in Step One. PHBs are defined as “permanent, distinct, and measurable changes to in-stream physical characteristics.” The proposed rule refers landowners to Board Manual Section 23 for guidance on how to identify PHBs.¹
- **Step Three:** Begin the fish habitat assessment directly upstream of the PHB identified in Step 2. If a fish is observed in the stream segment upstream from the first PHB, stop the electrofishing survey and proceed upstream to the next PHB. Repeat this process until no fish are observed upstream of a PHB.
- **Step Four:** When fish are not observed in the stream segment directly above a PHB, continue protocol surveying of all available habitats for ¼ mile upstream of the PHB. If no fish are observed, this point becomes the end of fish habitat for the stream segment and the proposed water type break between Type F and Type N Waters. Document this location as the proposed habitat break.

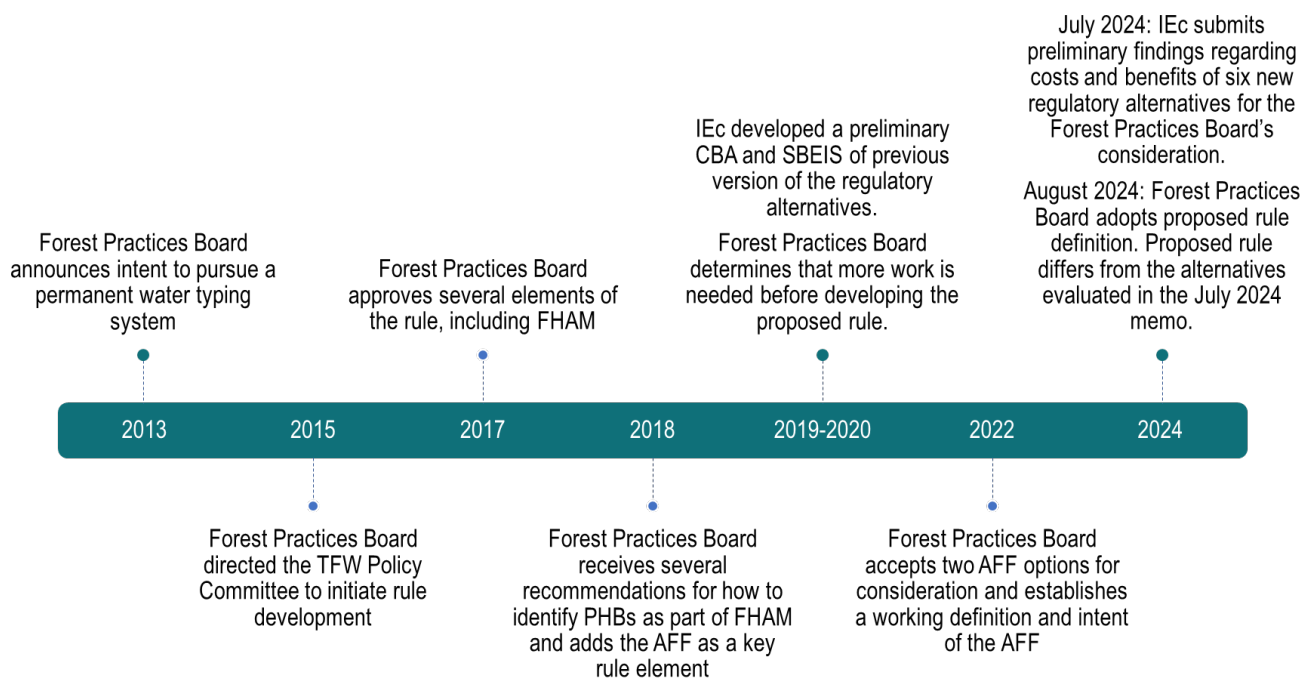
¹ While not providing a specific PHB definition in the proposed rule, the rule next describes that PHBs “are typically associated with underlying geomorphic conditions and may consist of natural obstacles that physically limit fish access to upstream reaches or a distinct measurable change in channel, bankfull width or a combination of the two. Natural, non-deformable obstacle PHB includes vertical drops, steep cascades, bedrock sheets and bedrock chutes.”

The rule would apply to private, state, and other local forest landowners in Washington State that require information about whether streams intersecting their forestland are Type F or N. The rule does not apply to federal and tribal forestland owners and does not influence streams that have been permanently typed. The rule maintains the current option for landowners to type their streams by referring to a set of DPCs, described in more detail in Chapter 2. The proposed rule also would not affect any of the requirements associated with the outcome of a water typing effort (i.e., the size and composition of riparian buffers, accommodating fish passage on stream crossings, etc.).

1.2 Background on the Rulemaking Process

This section summarizes the history of the water typing rulemaking process that led to the proposed rule that is the subject of this report, drawing heavily on a memorandum by Engel (2024). By providing a historical account, we aim to describe how this preliminary CBA relates to other economic analyses of rule options conducted to date. Figure 1 further summarizes key events in the process for this rulemaking.

Figure 1. Timeline of Rulemaking Process and Economic Analysis Development



In February 2013, the Forest Practices Board established the intent for a permanent water typing system that would replace that interim water typing system in place since WAC 222-16-031 was promulgated in 2001. In August 2015, the Forest Practices Board directed the TFW Policy Committee to initiate the development of a rule that would meet its various objectives. In May 2017, the board approved several key elements for inclusion in the rule, including the framework for FHAM. The following year, in 2018, the board received recommendations for specific criteria for identifying PHBs when implementing FHAM, as provided by the western and eastern Washington tribes as well as industrial landowners, and also accepted a recommendation from the western Washington tribes to add the AFF to the rule. It was at this stage that the Board directed Washington Department of Natural Resources (DNR) staff to proceed with other requirements for the rulemaking process.

In 2019 and 2020, DNR engaged IEC to develop drafts of a preliminary CBA and SBEIS of the initial version of the regulatory alternatives, which included various criteria for identifying PHBs and the AFF. Through that

process, IEc received feedback on its methods, assumptions, data sources, and findings from various groups and individuals, including timber industry representatives, conservation interests, tribes, and other state agencies, including the Washington Department of Fish and Wildlife (WDFW) and the Washington Department of Ecology (Ecology).

Since then, the Forest Practices Board revisited the regulatory alternatives. In August 2022, the Board approved two new specifications of the AFF for consideration and, in November 2022, provided a working definition and purpose of the AFF. Following acceptance of three potential PHB options and two AFF alternatives, DNR engaged in detailed spatial analysis to identify the effects of the PHB and AFF options on the expected locations of the Type F/N breakpoints relative to the current water typing methods under the interim rule.

In spring 2024, the Forest Practices Board engaged IEc to develop economic analyses of six new regulatory alternatives, two alternatives for the criteria used to establish the AFF each paired with three options for PHBs that would be part of the FHAM survey protocol. IEc shared with stakeholders a memorandum detailing how it intends to perform the CBA and requested and received comments on its proposed methods, data sources, and assumptions (dated March 27, 2024). Subsequently, IEc prepared a memorandum for the Forest Practices Board with preliminary findings regarding the costs and benefits of each alternative for consideration during the Board's August 14, 2024 meeting (hereafter "July 2024 Preliminary Analysis Memorandum" or IEc 2024). At a follow up meeting on August 28, 2024, the Forest Practices Board voted to include a broad definition of the AFF and PHBs in the rule and to exclude from rulemaking specific criteria for defining both the AFF and PHBs. The Board elected to provide landowners with guidance on how to identify whether a proposed forest practices activity is within the AFF and how to identify PHBs when applying FHAM protocol surveys into Board Manual Section 23 (see Section 1.1 for details). As such, the proposed rule differs from the six alternatives evaluated in the July 2024 Preliminary Analysis Memorandum.

This Preliminary CBA evaluates the probable costs and benefits of the proposed rule as defined by the Board in August 2024. It does not include analysis of the six regulatory alternatives that were the subject of the July 2024 Preliminary Analysis Memorandum given the ultimate scope of the proposed rule.

1.3 Framework for the Economic Analysis

This section summarizes our approach to evaluating the probable incremental costs and benefits of the proposed rule as well as the geographic scale and timeframe for analysis. For framework and methods topics for which Washington State guidance and requirements are not prescribed, we generally follow best practices in regulatory cost benefit analysis documented in the White House Office of Management and Budget (OMB)'s Circular A-4 (OMB 2023).

1.3.1 Focus on Identifying Probable Effects of the Rule

This analysis assesses costs and benefits that are "probable" effects of the proposed rule, consistent with RCW 34.05.328. To determine whether an effect is "probable," we employ logic to ensure consideration of those costs and benefits that can be considered likely outcomes of the rule. Where we determine the effect is likely, we determine if information is available to provide perspective on the magnitude of the effect. According to RCW 34.05.328, the objective of the CBA for a proposed rule is to determine whether the probable benefits of the rule outweigh the probable costs, *taking into account both quantitative and qualitative impacts*. This framing underscores the importance of a comprehensive weighing of all probable cost and benefit categories regardless of whether they are quantified or monetized. In this analysis, the weighing of probable benefits and costs is qualitative. This is justified by the limited changes in process relative to current (i.e., baseline) conditions as well as no change in the outcomes of water typing efforts.

1.3.2 Focus on Incremental Effects

We evaluate the incremental costs and benefits for the proposed rule by comparing water typing in Washington under two scenarios: the world with the proposed rule and the world without the proposed rule. The world without the proposed rule reflects the regulatory baseline for the analysis. An important aspect of the baseline is the current practice for determining water types under the interim rule. It also includes current and expected future industry practices with respect to water typing approach and implementation.

1.3.3 Geographic Scope and Scale

The main objective of this analysis is to determine statewide effects of the proposed rule. Accordingly, we do not offer site-specific information. In some cases, we present data separately for western Washington and eastern Washington, where the divide line between the two is the summit of the Cascade Mountains. Where feasible, this analysis also quantifies and summarizes conditions by ecoregion as a means of describing where the effects of the rule may be concentrated.

1.3.4 Analysis Timeframe

The incremental costs and benefits begin to accrue as soon as the rule is implemented, which we define as when the AFF is established and landowners begin implementing FHAM, and will persist as long as the rule is in effect. Where feasible, the analysis evaluates economic costs and benefits over a 55-year time period between the year the rule would take effect (estimated to be 2025) through 2079. This timeframe is tied to average harvest rotations in eastern Washington and balances the need to capture the important benefits of the rule that grow over time (i.e., ecological benefits), with increasing uncertainty regarding the socioeconomic and biophysical state of the world over longer timeframes.

1.4 Organization of the Report

The analysis in the chapters that follow addresses the requirements of RCW 34.05.328 and RCW 19.85. In Chapter 2, we characterize the baseline that serves as a point of comparison to the proposed rule, including how water typing is conducted absent the rule and the extent of streams that may be typed in the future. We assess the probable effects of the proposed rule in Chapter 3, evaluating and weighing the resulting incremental costs and benefits. Finally, in Chapter 4 we consider impacts of the proposed rule on small businesses and provide information that is typically required in an SBEIS. The report also includes an appendix that summarizes information about the values people place on fish presence.

Although this analysis attempts to mirror the terms and wording of the proposed rule, no attempt is made to precisely replicate the regulatory language and readers are cautioned that the actual finalized regulatory text, not the text of this analysis, is binding.

CHAPTER 2 | Regulatory Baseline

This chapter defines and characterizes water typing in forestland across Washington State in the baseline (i.e., the “world without the proposed rule”). Section 2.1 describes the water typing options available to regulated landowners and provides context on how these options are currently implemented across landowner groups. Section 2.2 relies on the best available information to estimate the number of stream miles that may be subject to water typing in the future and the portion that may be typed using a survey method. The baseline scenario described in this chapter represents the reference against which incremental effects of the proposed rule are assessed in Chapter 3.

2.1 Water Typing Under the Interim Rule

This section describes how water typing is currently implemented under the interim rule, including the options available to landowners, the number and distribution of water typing efforts conducted each year, and the extent of electrofishing in the baseline.

2.1.1 Baseline Processes for Water Typing

Water Typing Options Available to Landowners

To submit a Forest Practices Application (FPA) to DNR for harvest and other forest-based activities, the landowner must note if and what type of water exists on their property using one of the two methods described in the interim rule (WAC 222-16-031):

- (1) Use of DPCs of the stream for the assumption of fish habitat (i.e., particular levels of gradient or bankfull width); or
- (2) Implementation of a protocol survey that involves electrofishing to determine if fish are present.

The first method, use of DPCs, requires visual inspection of the stream segments and can be implemented by the landowner. The second method, use of a protocol survey, is expected to be more reliable than the first method and is generally undertaken by a hired survey firm. On average, surveyors charge landowners approximately \$2,000 per survey effort. The primary driver of costs is how far surveyors need to travel to the field site.² Survey companies describe that the amount of electrofishing employed during a survey is not a significant contributor to surveying costs.

Board Manual Section 13 provides overarching guidance for implementing protocol surveys, which allows for significant discretion and professional judgement during implementation (Washington Forest Practices Board 2002). Over time, surveyors’ approach to conducting surveys has evolved to limit the use of electrofishing. According to industry experts interviewed, surveyors currently use the best available data on known fish presence to identify where they are likely to find the upper extent of fish habitat.³ This includes the use of topographical maps identifying fish habitat and other maintained data sources on observed fish presence. From this point, surveyors visually identify features in the stream that may function as “breaks” in fish habitat, then implement electrofishing to determine if fish are present above these points. Before implementing a survey in

² IEc calculation based on personal communication with representatives from West Fork Environmental on May 1, 2024; personal communication with representatives from Terrapin Environmental on May 22, 2024.

³ IEc interviews with representatives from West Fork Environmental on May 1, 2024, Terrapin Environmental on May 22, 2024, and staff from the DNR SFL Office on June 18, 2024.

the field, surveyors are also required to notify all interested parties (including the state, tribes, and landowners) about their planned survey approach. As part of this process, interested parties can provide additional data regarding fish use to inform where the survey effort should begin.

A document published by DNR's superintendent suggested that surveyors should use visual cues for identifying the likely end of fish habitat, as opposed to only fish presence, to determine where the F/N breakpoint occurs (Young 2002). While the memo represents neither a regulatory requirement nor official Board-approved guidance, industry practices adapted based on these recommendations.⁴ This represents another important aspect of industry practices absent the proposed rule.

Permanent Water Typing

Only Type F/N breakpoints identified based on protocol surveys result in a permanent update to the water type map maintained by the DNR, which provides landowners with greater certainty in terms of forest management restrictions, for example on road crossing construction and timber harvests.⁵ To initiate the process of permanently typing a stream, referred to as concurrence, landowners submit Water Type Modification Forms (WTMFs) to DNR, for review by a four-person TFW Review Committee (including a representative each from DNR, Ecology, WDFW, and tribes) in the relevant region.

The main role of the TFW Review Committee is to ensure the landowner correctly applied the protocol survey by reviewing details about the survey administration and findings. Each region has a unique process for verifying surveys. In the Pacific Cascades region, approximately 95 percent of WTMFs are concurred via a brief monthly meeting among the TFW Review Committee which does not involve a significant time investment.⁶ For the remaining 5 percent of WTMFs, some or all of the TFW Review Committee participate in 1-2 field verification visits (of 1-2 days per visit) at the survey site.

2.1.2 Baseline Number and Distribution of Water Typing Efforts

There is no readily available data describing how many water typing efforts are implemented each year under each method available through the interim rule. To provide context, we reviewed data maintained by DNR on FPAs and WTMFs submitted over the last five years (2019 to 2023).⁷ DNR's data show an average of approximately 3,700 FPAs submitted each year for timber harvest, road construction, and/or aerial chemical spraying (see Table 1).⁸ Only a sub-set of all submitted FPAs required new water typing efforts, because some of the streams on lands with planned forest practices were surveyed previously and/or are permanently typed. The data are not maintained in a format that readily enables determination of which portion of FPAs required new water typing.

DNR's data also identifies an average of approximately 660 WTMFs submitted annually (see Table 1). WTMFs typically rely on new protocol survey efforts although often include the results of multiple surveys per form. While these data do not provide precise information on the total number of survey efforts conducted each year,

⁴ Personal communication with DNR on October 22, 2024.

⁵ There are exceptions. For instance, in eastern Washington implementing a protocol survey may not be possible for streams that are underground. In these cases, water typing via DPCs can serve as the basis for permanently typing a stream. (Personal communication with DNR on April 23, 2024)

⁶ Personal communication with DNR (Pacific Cascades Region) on June 4, 2024.

⁷ Data provided by DNR via email on various dates in May and June 2024.

⁸ An FPA can include multiple forest-based activities in a single application (e.g., road construction may be necessary to access timber for harvest). IEC's analysis of data provided by DNR finds that approximately 85 percent of all submitted FPAs include timber harvest.

they suggest there are *at least* 660 protocol surveys completed each year and *no more than* 3,700 total surveys across both methods.

Table 1. Number of Forest Practices Applications (FPAs) and Water Type Modification Forms (WTMFs) Submitted to DNR (2019-2023)

Species	Number of FPAs Submitted for Timber Harvest, Road Construction, Aerial Spraying	Number of WTMFs Submitted	Number of Permanently Typed Stream Miles Associated with Submitted WTMFs
2019	3,905	855	658
2020	3,896	592	408
2021	4,116	743	664
2022	3,490	501	527
2023	3,263	592	378
Average	3,734	657	527
Median	3,896	592	527

Sources: Summary of data provided by DNR via email on various dates in May and June 2024.

The WTMF data also finds that an average of approximately 530 stream miles are permanently typed each year (see Table 1). Representatives of the water typing industry describe that nearly all protocol surveys they implement result in submission of a WTMF.⁹ Therefore, we expect that approximately 530 stream miles are surveyed using protocol survey methods each year. Given the use of DPCs does not result in permanent water typing, data are not currently available in a format that would enable providing analogous information for the extent of streams typed using DPCs.

The choice of water typing method varies by landowner type. Based on interviews with water typing industry representatives, we found that large private landowners typically rely on protocol surveys.¹⁰ Individuals that support small forest landowners (SFLs) with their water typing assert that these entities are more likely to rely on DPCs due to costs, potentially using a survey approximately 20 percent of the time.¹¹ Others familiar with SFL water-typing practices believe the percent is likely less.¹² Interviews also reveal that state agencies tend to rely on DPCs as well and may only use protocol surveys with electrofishing during at most 10 percent of water typing efforts.¹³ While we did not interview land managers among local municipalities, we anticipate they apply survey methods with the same relative frequency as state land managers. Figure 2 summarizes findings from these conversations and conveys the approximate distribution of surveys across each available method by regulated landowner type.

⁹ Personal communication with representatives from West Fork Environmental on May 1, 2024; personal communication with representatives from Terrapin Environmental on May 22, 2024.

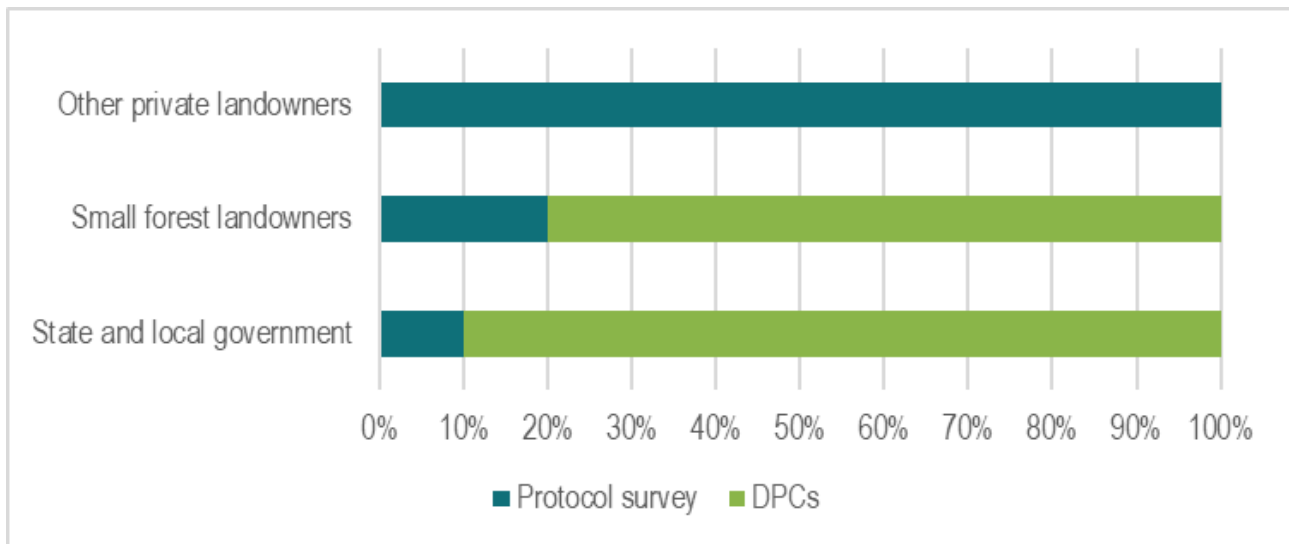
¹⁰ *Ibid.*

¹¹ Personal communication with representatives of DNR's Small Forest Landowner Office on June 12, 2024.

¹² Personal communication with representatives of the Economics Working Group on October 3, 2024.

¹³ Personal communication with a representative of DNR State Lands on May 30, 2024. While there are limited other state agencies that engage in water typing, we do not expect the relative ratio of water typing conducted via DPCs and surveys to differ significantly.

Figure 2. Distribution of Water Typing Method Employed by Landowner Type Under Interim Rule



Source: IEC estimates based on communication with members of the stream survey industry, state land managers that participate in water typing, and DNR representatives that provide water typing support to SFLs. See footnotes in the main text for more details.

2.1.3 Baseline Extent of Electrofishing During Protocol Surveys

As described above, current practice among surveyors limits the use of electrofishing during protocol survey implementation. Per Board Manual Section 13, above documented fish habitat, visual surveys and professional judgement can be used to identify areas further upstream of known occupancy where fish are likely to be present (Washington Forest Practices Board 2002). Past that point, survey effort should include shocking in at least 12 high quality pools within a given reach to demonstrate the absence of fish. However, according to two industry leaders, stream typing surveys often take a different approach.¹⁴

Specifically, industry experts interviewed describe an approach that similarly begins at the point of last known fish. From that point, the surveyor may assume fish presence in areas upstream until he or she identifies a likely physical barrier or characteristics of the stream that suggest fish are unlikely to be present and then move upstream of the identified barrier or habitat break, identify areas (e.g., deep pools) where fish are likely to be, and then electrofish. If fish are found, then the process is repeated. Alternatively, rather than moving above an identified barrier, surveyors may conduct electrofishing along the reach to confirm presence of fish up to the barrier.¹⁵

To understand the current use of electrofishing during protocol surveys, we analyzed the last five years of available WDFW Scientific Collection Permit data (2019-2023).¹⁶ Any individual wishing to conduct electrofishing in the state must obtain a Scientific Collection Permit from WDFW, with a single annual permit covering all activities for the year, then annually report on activities undertaken under the permit. These data

¹⁴ This approach is commonly referred to as “Fish-Plus” and aligns with the process described in Weyerhaeuser’s technical guidance for conducting protocol surveys.

¹⁵ Personal communication with representatives from West Fork Environmental on May 1, 2024; personal communication with representatives from Terrapin Environmental on May 22, 2024.

¹⁶ Scientific Collection Permit reporting data provided by WDFW on May 30, 2024.

identify that at least 190 permits are issued on average each year for electrofishing in Washington State, although not all permits are used for water typing purposes.¹⁷

Scientific Collection Permit reporting data provided by WDFW identify the number and species of fish electrofished during each survey event. With input from WDFW, we reviewed the data to determine which reported electrofishing events were associated with water typing for forest practices purposes based on the permittee and project title. For one high-activity permit holder, Weyerhaeuser, it was not possible to conclusively distinguish between survey events that were for forest practices versus other activities. Therefore, we provide both a “low-end” and “high-end” estimate of the number of fish counted during electrofishing conducted as part of survey efforts by including and excluding this permit holder. For both the low- and high-end estimates, we calculate the annual average number of fish per species surveyed between 2019 and 2023. Using these data, we calculate between approximately 820 and 3,700 fish electrofished annually during water typing surveys (see Table 1Table 2).

The species most likely to be identified in electrofishing surveys is cutthroat trout (74 percent within the low-end estimate and 35 percent within the high-end estimate). Other trout species, including rainbow trout, are also identified with relatively high frequency. Coho salmon and other species are found during electrofishing, although in much lower numbers. Pairing these data with the number of stream miles associated with protocol surveys presented in Section 2.1.2 (i.e., about 530 stream miles per year on average), we estimate between 1.6 and 7.0 fish experience electrofishing per stream mile surveyed each year.

Table 2. Baseline Average Number of Fish Electrofished Per Year During Protocol Surveys

Species	Low-End	High-End
Coho Salmon	31	489
Cutthroat Trout	608	1,303
Rainbow Trout/Steelhead	145	1,042
Unidentified Salmonid Species	13	13
Unidentified Trout Species	13	816
All other species	14	20
Total	824	3,682

Sources: IEc analysis of WDFW Scientific Collection Permit data provided by email on May 30, 2024.

Notes: This analysis considers both a “high-end” estimate that includes all survey conducted by Weyerhaeuser, which overestimates the number of fish electrofished in the course of water typing surveys, and a “low-end” estimate that excludes them, which underestimates the affected fish. See text for details.

¹⁷ Other use cases for electrofishing permits include research as well as catch and relocation of fish in preparation for restoration.

2.2 Extent of Waters Subject to Future Water Typing

To assess the extent of waters that may be surveyed in the future under the baseline absent the proposed rule, we assembled various data sources. The best available information regarding the distribution of Type F and Np streams that would occur under the interim rule survey options is DNR's Hydrography – Watercourses (WC Hydro) GIS Open Data.¹⁸ From this layer, we removed various streams not subject to the future implementation of the interim rule, including:

- 1) permanently typed streams,¹⁹
- 2) stream segments marked as “shorelines of the state,”²⁰ and
- 3) stream segments overlapping federal and tribal land.²¹

To identify the subset of remaining streams where water typing surveys may be implemented in the future, we remove streams where forest practices are *less likely* (although not necessarily unallowed). These areas include:

- 1) streams abutting unstable slopes,²²
- 2) forest within portions of northern spotted owl habitat,²³ and
- 3) conservation land.²⁴

The rationale for removing these areas is that landowners are unlikely to pursue water-typing for harvest purposes within these areas specifically.²⁵ There may be other reasons that a landowner would not type their streams in the future, for instance because they are part of a conservation easement that precludes harvest or because they have no intention of harvesting their timber. This analysis makes use of available spatial data that provides some information about the extent of forestland where harvest is unlikely but is unable to account for all possible reasons future water typing may not occur on a given stream segment.

This analysis identifies nearly 54,000 stream miles with potential future water typing effort, including 40,000 in western Washington and 13,000 in eastern Washington (see Table 3). Within western Washington, nearly half of all identified stream miles are in the Coast Range ecoregion. While DNR's WC Hydro represents the best available information about the extent of streams in Washington, it remains incomplete, particularly for smaller

¹⁸ The WC Hydro layer is available at <https://data-wadnr.opendata.arcgis.com/> and was downloaded on May 17, 2024 for use in this analysis.

¹⁹ Permanently typed streams are identified in WC Hydro. See footnote 18 for details.

²⁰ Shorelines of the state are identified in WC Hydro. See footnote 18 for details.

²¹ Federal and tribal land is identified using spatially explicit landownership data from Atterbury Consultants sent to IEC by DNR for analysis on February 26, 2024.

²² We identify unstable slopes using DNR's Landslide Susceptibility Index (LSI) spatial layer available at <https://data-wadnr.opendata.arcgis.com/>. Downloaded on May 17, 2024. We note that the LSI layer may under-estimate the extent of unstable slopes where harvest may be unlikely because the database is a work in progress. The layer also has the potential to over-estimate the distribution of unstable slopes because it relies on an interpolation model that has not been fully field-verified. On net, it is uncertain whether this layer identifies too many or too few stream segments abutting slopes where harvest is not likely.

²³ The Northern Spotted Owl habitat layer was provided by DNR on June 4, 2024. As advised by DNR, we only excluded areas within old forest, sub-mature forest, and young forest marginal northern spotted owl habitat. Harvest is more likely in other parts of northern spotted owl habitat.

²⁴ We identify conservation land using the U.S. Geological Survey (USGS) Gap Analysis Project, 2024, Protected Areas Database of the United States 4.0: USGS data release, <https://doi.org/10.5066/P96WBCHS>. Downloaded June 5, 2024.

²⁵ While a landowner is unlikely to harvest in these areas and therefore unlikely to survey for the purposes of submitting a FPA, it is still possible that survey efforts along other stream segments will identify F/N breakpoints upstream or downstream that will result in permanent water-typing within areas where harvest is unlikely. In other words, forest practices activities outside of these areas may still influence whether these stream miles are typed in the future.

Type Np streams. Accordingly, the total extent of stream remaining to be typed in the state is most likely greater than this estimate.

WC Hydro also models F/N breakpoints using a computer modeling approach. Assuming those breakpoints represent where the F/N breakpoint would occur absent the rule (i.e., in the baseline), we identify approximately 72,000 breakpoints across these stream miles (see Table 3). Again, the majority of these breakpoints are found in the Coast Range ecoregion. When combined with the number of stream miles that could be typed in the future, there are approximately 1.1 breakpoints on average per stream mile.

Table 3. Total Number of Stream Miles and F/N Breakpoints With Potential Future Water Typing Efforts

Ecoregion	Stateside	Total Number of Stream Miles	Total Number of F/N Breakpoints
Blue Mountains	East	15	21
Cascades	West	8,995	8,355
	East	20	13
Coast Range	West	20,035	39,888
Columbia Plateau	East	1,184	1,252
Eastern Cascades Slopes and Foothills	East	1,845	1,545
	West	3,724	3,026
North Cascades	East	2,123	1,695
	West	8,285	6,619
Northern Rockies	East	8,285	6,619
Puget Lowland	West	7,109	9,393
Willamette Valley	West	297	29
West		40,158	60,691
East		13,472	11,145
Statewide		53,630	71,836

Source: IEc analysis using WC Hydro and various data sources described in the main text.

As described in Section 2.1.1, only some of these stream miles are likely to be surveyed using protocol surveys in the future. To estimate the portion of the total stream miles from Table 3 where protocol surveys, and therefore electrofishing, may occur in the future, we rely on information about the distribution of landowner types across these stream miles because the likelihood of applying a protocol survey over the DPCs varies by landowner type. To accomplish this, we calculated the landowner composition of streams using Atterbury Consultants' land ownership data and determined the percent of private land owned by SFLs using the Washington State Forestland Database.^{26,27} Table 4 presents the percent of stream miles by landowner type. As shown, the distribution varies significantly across ecoregions, and most of the total stream miles potentially subject to future typing occur on private land.

²⁶ For information on the Atterbury landownership data, see footnote 21. We made the following groupings using the Atterbury data: state, local (city and county), private (private, real estate investment trusts (REIT), and timber investment management organizations (TIMO)) and other (conserve, IFPC, lake, lender, port, river, and utility).

²⁷ The Washington State Forestland Database comes from the Natural Resources Spatial Informatics Group at the University of Washington School of Environmental and Forest Sciences. More about these data is available here: <https://nrsig.org/projects/small-forest-landowner-regulatory-impacts>. DNR provided these data on February 27, 2024.

The distribution of stream miles by landowner type (Table 4) is combined with the information about the probability of employing a protocol survey by landowner type (see Figure 2) to estimate the portion of total stream miles where protocol surveys may be employed in the future. When combining this information, we find that approximately 64 percent of the total stream miles available for future water typing are likely to be typed using a protocol survey (rightmost columns in Table 4). The ecoregions with the highest proportion of stream miles with protocol surveys include Coast Range and Cascades, where over 70 percent of stream miles may be subject to protocol surveys in the future. Across the entire state, this method identifies approximately 34,000 stream miles may be typed using a protocol survey in the future.

Table 4. Distribution of Stream Miles with Potential Future Water Typing Effort by Landowner Type, and Estimated Portion of Stream Miles Where Protocol Surveys May Be Employed in the Baseline

Ecoregion	Stateside	Landownership Distribution					Streams That May Be Subject to Protocol Surveys in the Baseline	
		State	Local	Private, SLF	Private, other	Other	% of Total Steams	Miles of Streams
Blue Mountains	East	0%	0%	67%	29%	4%	46%	7
Cascades	West	18%	2%	11%	56%	14%	74%	6,642
	East	11%	0%	11%	48%	30%	81%	16
Coast Range	West	14%	2%	12%	61%	11%	76%	15,225
Columbia Plateau	East	44%	0%	26%	28%	2%	40%	470
Eastern Cascades Slopes and Foothills	East	53%	2%	30%	11%	3%	26%	484
	West	43%	5%	4%	17%	30%	53%	1,976
North Cascades	East	39%	4%	31%	19%	7%	36%	767
	West	11%	1%	45%	24%	19%	53%	4,404
Puget Lowland	West	12%	4%	37%	35%	11%	55%	3,918
Willamette Valley	West	2%	1%	52%	42%	3%	56%	166
West		17%	3%	16%	51%	13%	70%	27,926
East		24%	1%	39%	22%	13%	46%	6,147
Statewide		19%	2%	22%	44%	13%	64%	34,074

Source: IEc analysis using WC Hydro and various data sources described in the main text.

Notes: To estimate the portion of stream miles subject to future water typing, we assume state and local municipalities rely on protocol surveys 10 percent of the time, SFLs 20 percent of the time, and other private landowners and all other landowners 100 percent of the time. See Figure 2.

CHAPTER 3 | Incremental Costs and Benefits of the Proposed Rule

This chapter describes the incremental effects of the proposed rule, which are evaluated relative to the baseline conditions presented in Chapter 2. Section 3.1 provides an assessment of whether and to what extent the proposed rule is likely to result in changes in the water typing process as well as the outcomes of survey efforts. Sections 3.2 and 3.3 translate any changes into incremental costs and benefits of the proposed rule, respectively. The chapter concludes with a weighing of the probable benefits and costs attributable to the proposed rule (Section 3.4) and a discussion of uncertainty (Section 3.5). Table 5 provides a high-level summary of the findings of this chapter discussed in greater detail in the sections that follow.

Table 5. Summary of Findings Related to the Effects of the Rule and Resulting Categories of Probable Costs and Benefits

Potential Effect of the Rule Evaluated	Finding of the Analysis	Incremental Costs	Incremental Benefits
Potential changes in water typing process			
Landowner choice of water typing method (i.e., use of DPCs versus protocol survey)	No effect of the rule	None	None
Effort devoted to water typing and concurrence	Proposed rule unlikely to result in changes in effort devoted to water typing and concurrence relative to current conditions but reduces the potential for subjectivity when classifying stream water type	None	Regulatory certainty regarding appropriate process for water typing
Extent of electrofishing during FHAM implementation	Proposed rule unlikely to change extent of electrofishing relative to current survey implementation but reduces the risk for the potential increase in electrofishing in the future	None	Reduced risk of potential fish harm by codifying limits in electrofishing during protocol surveys
Potential changes in water typing outcomes			
Change in the expected location of F/N breakpoints (i.e., change in extent of Type F and Type N streams)	No effect of the rule	None	None

3.1 Effects Generated by the Proposed Rule

This section describes each potential effect of the proposed rule as well as our determination as to which effects are probable outcomes, leading to costs and benefits. First, in Section 3.1.1, we describe whether the proposed rule results in changes in the process of water typing. Then, in Section 3.1.2, we evaluate whether the proposed rule may change the outcomes of water typing efforts.

3.1.1 Potential for Changes in the Water Typing Process

The proposed rule clarifies and expands the water typing system to be applied by forestland owners. This analysis therefore evaluates whether the changes are likely to affect how landowners implement water typing in the future relative to water typing implemented under the interim rule. We consider the potential for changes in

landowner choice of water typing method, the effort devoted to water typing or concurrence, as well as the extent of electrofishing employed during surveys.

Landowner Choice of Water Typing Method

The proposed rule replaces the protocol survey method described in the interim rule (WAC 222-16-031) with the more specific FHAM survey protocol. It also leaves open the option to continue typing streams using the DPCs. The proposed rule does not, however, compel landowners to use one water typing option over the other. Given that cost is the primary reason some landowner types apply DPCs, and it is unlikely there is a cost difference between the interim protocol survey and the FHAM protocol survey (see below), we conclude that the proposed rule is unlikely to change a landowner's choice of water typing method. In other words, landowners that would select a survey method absent the rule are likely to employ FHAM while landowners likely to use the DPCs are likely to continue doing so. Therefore, the distribution of water typing method employed by landowner type in the baseline described in Figure 2 is likely to remain constant under the proposed rule.

Effort Devoted to Water Typing and Concurrence

One of the objectives of the rule is to reduce the potential for subjectivity when identifying the Type F/N break through the addition of the AFF and prescribing steps as part of FHAM. As described in more details below, our analysis identifies that water typing implementation is unlikely to change relative to current industry practices. However, by codifying these practices in the WAC, the proposed rule reduces the potential for industry to diverge from its current methods in the future. We evaluated three mechanisms through which water typing implementation and the concurrence process may change relative to current conditions and found that the proposed rule is unlikely to result in incremental effort to either process. These three potential mechanisms and the outcomes of our assessment are described below.

- **Potential for change in effort during to implement the FHAM protocol surveys relative to surveys implemented in the baseline.** Discussions with DNR reveal that the steps associated with FHAM in the proposed rule are intended to codify current industry practices.²⁸ Interviews with entities that represent approximately 95 percent of the survey efforts that resulted in electrofishing over the last five years confirmed their approach closely mirrors what is described for FHAM, including using the best available information to demark the end of known fish use, as well as the use of PHBs to determine where electrofishing should begin. It is possible the Board Manual Section 23 will provide more specific information about how to identify PHBs; the manual has not yet been developed for comparison with what surveyors use now. However, any text included in the manual is intended to provide guidance and is not regulation. By including a generic definition of PHBs, the proposed rule does not require a change in effort among surveyors to learn about and employ PHB criteria that differ from the PHBs they employ in the baseline. Additionally, as described in Section 2.1.1, stream surveyors identified that the primary driver of water typing survey costs is how far the surveyors need to travel to reach the site; the amount of electrofishing and nature of PHBs were not identified as primary drivers of the survey costs. Therefore, the proposed rule is unlikely to result in additional effort or cost to implement FHAM relative to the baseline protocol surveys.
- **The potential for decreased survey effort given the addition of the AFF.** The proposed rule states that only streams above the AFF should be surveyed, meaning any stream that falls within the AFF would no longer require typing through a survey or the DPCs. The definition of the AFF included in the proposed rule refers to “the measurable physical stream characteristics downstream of which

²⁸ Personal communication with DNR on April 30, 2024.

anadromous fish habitat is presumed” and refers surveyors to the Board Manual Section 23 for guidance on how to identify the AFF. As described in Section 2.1.1, surveyors currently rely on all available information to determine known fish use within streams before establishing the starting point for their survey, including information from the state and tribes. Because the proposed rule does not offer a specific definition of what constitutes the “measurable physical stream characteristics,” surveyors are likely to continue using the same information as the basis for identifying the point at which the survey effort should begin, at least at the outset of rule implementation. While the addition of the AFF represents a significant procedural change relative to the language included in the interim rule, by providing a broad definition of the AFF, the proposed rule is generally unlikely to change where surveyors commence their surveying and therefore the number of stream miles subject to surveying in the future.

- **The potential for changes in concurrence effort given both the AFF and FHAM.** Because we find that the proposed rule is unlikely to change the number of stream miles subject to water typing in the future, there is no reason to expect any a change in the number of stream miles for which landowners are likely to pursue permanent water typing. Further, the concurrence process itself is unaffected by the proposed rule, and the addition of the AFF and FHAM are unlikely to measurably change the effort that the TFW Review Committee devotes to the concurrence process.

Extent of Electrofishing During Survey Implementation

The second objective of the proposed rule is to reduce the use of electrofishing during survey implementation. To accomplish this, the proposed rule does two things 1) precludes surveying within known fish habitat by establishing the AFF and 2) prescribes specific steps for implementing FHAM including the reliance on the location of PHBs for determining where electrofishing can occur. Relative to the text of the interim rule, the proposed rule is significantly more prescriptive about where electrofishing should occur and therefore reduces the risk of potential future increases in electrofishing. However, the proposed rule does not diverge from current industry practices.²⁹ These two ways in which the proposed rule could reduce electrofishing are described below.

- **The potential for reduced electrofishing within the AFF.** The proposed rule defines the AFF as “the measurable physical stream characteristics [...] upstream of which the DPCs or a protocol fish survey under FHAM may be applied.” Therefore, a landowner or surveyor may not conduct electrofishing within the AFF because FHAM, which includes the use of electrofishing, should not be implemented. Under current practices, surveyors already use available information about known fish use when determining where a survey should commence. This means that surveyors do not electrofish within known fish habitat in the baseline. The proposed rule does not provide new information about what constitutes an AFF and therefore is unlikely to change where a surveyor starts a survey that relies on electrofishing. The proposed rule, however, does reduce the need for electrofishing across the extent of the AFF and has the potential to reduce future electrofishing as a result.
- **The potential for reduced electrofishing during FHAM implementation.** The proposed rule offers four steps for implementing fish protocol surveys via FHAM. As part of the process, electrofishing should only occur directly above PHBs, not along an entire stream length. When implementing surveys above areas of known fish use, surveyors already rely on physical attributes of the stream to determine where to conduct electrofishing. The proposed rule does not provide new information that a surveyor

²⁹ Based on interviews with multiple industry and agency experts in water typing surveys conducted in May and June 2024 and analysis of Scientific Collection Permit reporting data provided by WDFW on May 30, 2024.

would use to determine the location of a PHB and therefore change where electrofishing occurs. Although we find that surveyors already limit electrofishing effort under baseline protocol survey methods, codifying the need to limit electrofishing as described in the FHAM protocol reduces the risk that surveyors may increase the use of electrofishing in the future. Under the baseline interim water typing rule, increased electrofishing would not be precluded as it will be under the FHAM protocol.

3.1.2 Potential for Changes in the Outcomes of Water Typing

The proposed rule was not developed with the intent to change outcomes of water typing surveys (i.e., the location of the identified Type F/N break). Accordingly, adding or reducing the extent of Type F stream is not an intended outcome of the proposed rule. However, we consider the potential for unintended changes in the extent of Type F streams relative to the baseline resulting from both the AFF and the implementation of FHAM protocol survey methods. Differences in the extent of Type F stream under the proposed rule in turn would influence the size of the riparian buffer and the requirements and constraints on activities within the riparian buffer for Type F versus Type N streams in accordance with existing Forest Practices Act regulations.

Water Type Within the AFF

All streams included in the AFF will be Type F under the proposed rule. To assess whether this represents a change relative to the baseline, we consider how these streams would be typed using baseline water typing methods. As described in Section 2.1, surveyors do not survey within known fish habitat because these are presumed to be Type F streams. Because the AFF is defined no differently in the proposed rule than how a surveyor would determine the upper extent of fish habitat now (i.e., “the measurable physical stream characteristics downstream of which anadromous fish habitat is presumed”), there is no reason to expect that the definition of the AFF included in the rule is likely to result in changes in the extent of Type F stream.

Water Type Outside of the AFF

Beyond the AFF, we also assess whether implementing FHAM may identify a different location of the F/N break relative to where it would be identified under the baseline. If the F/N break identified is upstream under the rule as compared with baseline water typing practices, the length of Type F streams is increased and the length of Type Np streams is reduced; where the F/N break identified is downstream under the proposed rule as compared with baseline practices, the length of Type F streams is reduced and the length of Type Np streams is increased.

The mechanism through which FHAM has the potential to change the location of the F/N breakpoint is through differences in how PHBs are determined via the proposed rule relative to current conditions. For instance, analysis by Four Peaks (2024) demonstrates that specific definitions of PHBs have the potential to occur at different points along a stream. However, the proposed rule specifies a broad definition of PHBs (i.e., “permanent, distinct, and measurable changes to in-stream physical characteristics”) that likely captures all of the ways in which surveyors are currently identifying, or may identify in the future, the location of habitat breaks during surveys. Therefore, the PHB definition is unlikely to result in differences in how the survey is conducted as well as the outcomes of the survey with respect to the location of the F/N breakpoint.

3.2 Probable Benefits

This section describes the two main categories of benefits stemming from the effects of the rule outlined above, including reduced risk of potential harm to fish (Section 3.2.1) and regulatory certainty (Section 3.2.2).

3.2.1 Reduced Risk of Potential Fish Harm

Section 3.1.1 describes that the proposed rule reduces the risk for the potential future increase in electrofishing, therefore a key benefit of the rule is reduced risk of potential fish harm. Research indicates that electrofishing may cause behavioral changes, reduced growth, and spinal injury to fish. However, studies have shown that despite electrofishing impacts to individual fish, abundance of salmonid species in small streams remained stable or increased after intensive backpack electrofishing over multiple years (Kocovsky et al. 1997).

The Electrofishing Technical Group (ETG) for the TFW Policy Committee authored a report regarding the use and effectiveness of protocol electrofishing surveys in detecting fish (ETG 2016). The ETG was asked to consider questions related to the efficacy of backpack protocol survey electrofishing and discuss the evidence supporting conclusions. This evidence included published scientific papers as well as the collective experience of members of the ETG who have strong backgrounds in sampling small streams. Results of the ETG report concluded that:

In most situations, protocol electrofishing surveys are unlikely to result in harmful demographic effects on headwater fish populations as long as appropriate precautions are taken to avoid damage to active redds, damage to instream and riparian habitats, or to cause extensive downstream movement of population members[...]. The electrofishing technique itself does have the potential to harm individuals and eggs exposed to electrical fields. Spinal injuries are most common. The risk of injury can be minimized by employing modern equipment and using settings that are least harmful to fish. (ETG 2016)

Therefore, the best available evidence suggests that the proposed rule is unlikely to result in population-level effects on fish. However, the proposed rule may prevent harm to individual fish. Under the current conditions described in Section 2.1.3, electrofishing for water typing purposes effects hundreds to thousands of fish each year. Given the limited use of electrofishing during survey efforts in the baseline, the proposed rule is unlikely to result in less fish harm relative to these current conditions, although is likely to prevent these numbers from increasing in the future. We are unable to quantify the risk reduction associated with the proposed rule given significant uncertainty about how electrofishing may change in the future absent the rule.

Values for Fish

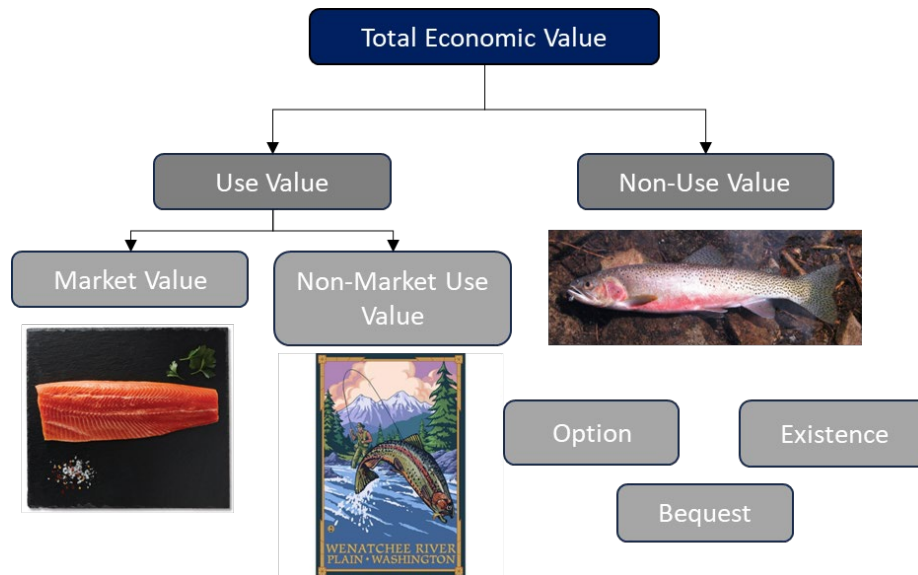
The relevant economic benefits of this reduced risk are the public's willingness to pay (WTP) to reduce fish harm. To our knowledge, there is no literature evaluating the value that the public holds to avoid harm to fish through reduced electrofishing. However, there is abundant literature demonstrating that people value fish, in particular the species found in streams in Washington that experience electrofishing in the baseline. While much of the literature is focused on population-scale changes in fish abundance, some studies evaluate the WTP for fish population increases *per fish*, which can be more readily applied to this context where the number of affected fish is likely limited.³⁰

From an economic perspective, the “total economic value” of a species or ecosystem reflects the full range of contributions the species makes to people's well-being. Value is frequently measured in terms of the public's WTP for the species, inclusive of all use and non-use services. This type of valuation is generally focused on endangered and threatened species. For example, salmon and steelhead provide value to society through multiple pathways that are difficult to disentangle. That is, their “total economic value” has multiple

³⁰ For instance, Layton et al. (1999) reports these numbers for five categories of fish: eastern Washington freshwater species (approximately \$15 per fish in \$2023), eastern Washington migratory species (\$600/fish), western Washington freshwater species (\$27/fish), western Washington migratory species (\$500/fish), and saltwater species.

components, and individual members of society may value salmon and steelhead for multiple reasons (see Figure 3).

Figure 3. Components of Total Economic Value (TEV) of a Species



First are the direct use values for which markets exist, namely commercial harvest. Next are the direct use values for which no markets exist, such as recreational fishing. Tribal harvest is unique in that it provides direct use value as both a marketed (commercial fishery) and nonmarketed (subsistence fishery) good. In contrast to the direct uses, which involve extraction, some non-consumptive use values may exist as well, including viewing spring salmon runs by nature enthusiasts. Additionally, the economics literature demonstrates that the public holds significant non-use values for Pacific salmon and steelhead. These types of values (existence, option, and bequest) are common for threatened and endangered species. Studies of the total economic value of salmon attempt to capture all of these components of value collectively, though not individually.

Importantly, Pacific salmon and steelhead are part of the spiritual and cultural identity of regional tribes. *As these cultural values cannot be measured in monetary terms, they are not captured in estimates of total economic value for the species.* However, it is important to consider the cultural significance of the species in any comparison of costs and benefits of policies affecting the species.

The appendix to this report provides evidence regarding the values people place on fish species of importance in Washington State. It documents studies that evaluate the TEV of the species, information from tribes regarding the cultural significance of the species, economics literature that isolates the non-use value component, and values associated with recreational and commercial fishing.

3.2.2 Regulatory Certainty

Section 3.1.1 also describes that the proposed rule reduces the potential for subjectivity when classifying water types by providing more scaffolding for surveyors, including a definition of where surveys should start and step-by-step instructions for implementing surveys. Therefore, a key benefit of the rule is certainty in how streams will be typed in the future, reducing ambiguity in future implementation. Increasing certainty may translate into more confidence among landowners that the outcome of a survey is unlikely to differ across surveyors. It theoretically has the potential to streamline the concurrence process, although DNR staff that participate in

permanent water typing believe the “peer review” element remains essential for buy in among various stakeholders.³¹

The proposed rule is the result of a long process that started with the publication of the interim water typing rule in 2001 and the Forest Practice’s Board announcement in 2013 that it would commence work developing a permanent water typing rule (see Section 1.2). Since then, there has been significant uncertainty among landowners about what the new water typing system would mean for the process and outcomes of future survey efforts. The proposed rule, if finalized, would codify existing practices and create flexibility for future improvement by relegating specific definitions of the AFF and the PHBs to guidance contained in the Board Manual. Relative to the uncertainty experienced over more than a decade, the proposed rule provides landowners with assurance about the processes that can be utilized to type their streams in the future.

3.3 Probable Costs

The effects generated by the proposed rule described in Section 3.1 are unlikely to result in incremental costs. This is because we anticipate no change relative to the current process through which streams are typed as well as no change in outcomes of future survey efforts. As previously mentioned, the rule is unlikely to generate an increase in survey costs to landowners or to result in new compliance costs associated with more Type F stream. We also considered the possibility that limiting increases in electrofishing could result in costs to landowners. However, surveyors confirm that the amount of electrofishing that accompanies a survey effort is not a driver of cost.³²

The proposed rule does prompt the need to add guidance to the Board Manual 23 regarding the identification of the AFF and detection of PHBs. While this process will result in more effort among DNR staff and other stakeholders, we do not attribute those administrative costs to the proposed rule given the recurring effort to update the board manual, as appropriate, even absent the rule.

3.4 Weighing of Probable Benefits and Costs

This analysis finds that the probable benefits of the proposed rule exceed its probable costs. As described above, the proposed rule generates incremental benefits in the form of reducing the potential for future fish harm and providing regulatory certainty to forestland owners. Neither of these outcomes can be quantified given significant uncertainty about the future and/or data limitations. However, we find that the benefits exceed costs because the proposed rule does not result in incremental costs.

3.5 Key Assumptions and Sources of Uncertainty

The results of this analysis are subject to several key assumptions which introduce uncertainty. In Table 6, we describe the key assumptions associated with our finding as well as the potential magnitude of the effect on our overall estimates.

³¹ Personal communication with DNR (Pacific Cascades Region) on June 4, 2024.

³² Personal communication with representatives from West Fork Environmental on May 1, 2024; personal communication with representatives from Terrapin Environmental on May 22, 2024.

Table 6. Sources of Uncertainty in Assessment of Incremental Effects

Key Assumption or Source of Uncertainty	Direction of Potential Bias	Likely Effect of the Uncertainty on Results
The introduction of the AFF will not change the way that landowners or surveyors determine where to start survey efforts relative to how they conduct surveys now.	Underestimate costs.	Likely minor effect on results. Based on discussions with DNR and surveyors, we assume that the broad definition of the AFF included in the proposed rule will not change where surveyors start surveys and therefore will have no effect on the process for typing streams. By extension, we assume that surveys will continue to identify the F/N breakpoint at the same location they could absent the rule. However, even if future surveys were implemented in these areas (absent delineation of an AFF), the presence of anadromous fish habitat in these stream reaches would mean the surveys would identify the stream as Type F. Thus, this assumption is unlikely to affect future outcomes of water types in Washington.
The addition of the AFF does not result in fewer survey efforts in the future.	Underestimate benefits.	Likely minor effect on results. We assume that establishing the AFF does not result in fewer survey efforts in the future because the definition of the AFF resembles how surveyors identify where to start surveys in the baseline. If the AFF does result in fewer surveys, then the proposed rule would result in a decrease in survey costs for landowners.
The broad definition of PHBs is inclusive of the criteria surveyors use now and therefore is unlikely to result in changes to survey implementation or outcomes relative to how surveys are conducted now.	Unknown. May overestimate or underestimate effects.	Likely minor effect on results. We assume that the broad definition of a PHB in the proposed rule captures the way surveyors are identifying PHBs during survey implementation, and therefore is unlikely to result in incremental effects. However, uncertainty exists in what PHBs surveyors will use without prescriptive guidance. As demonstrated in IEc 2024 and Four Peaks 2024, the location of specific definitions of PHB can occur in different points along a stream, including both upstream and downstream of the where F/N break would occur when implementing a survey absent the rule.

CHAPTER 4 | Impacts on Small Businesses

The Washington Regulatory Fairness Act (RFA), RCW 19.85, requires that DNR prepare an SBEIS if the proposed rule “will impose more than minor costs on businesses in an industry.” Per the SBEIS *Frequently Asked Questions* guidance, agencies are required to consider “costs imposed on businesses and costs associated with compliance with the proposed rules” (Washington Attorney General Office 2021). Agencies are not required under 19.85 RCW to consider indirect costs not associated with compliance with the rule. The SBEIS also requires consideration of whether small businesses are disproportionately affected by the costs of the rule.

A complete SBEIS is required if 1) the rule is likely to impose more than minor costs and 2) small businesses are likely to be disproportionately affected. The sections that follow provide justification for why an SBEIS is not required for the proposed rule as defined by the Board. However, for context and transparency purposes, this chapter provides the information that is typically required of a SBEIS, as outlined in the text box.

Required Components of an SBEIS

1. What are the industries and universe of businesses that may incur costs as a result of this rule?
2. What are the likely costs of the rule to those businesses?
3. Are those costs resulting from the rule anticipated to be more than minor?
4. Will the rule disproportionately affect small businesses?
5. What steps has the agency taken to reduce the costs of the rule on small businesses?
6. How has the agency involved small businesses in the development of the rule?
7. How many jobs may be created or lost as a result of compliance with the rule?

4.1 Small Businesses in Relevant Industries

The proposed rule directly regulates owners of forestland immediately adjacent to water. In some cases, these forestland owners are businesses; in other cases, these landowners are private individuals and public entities, including state and local government. Analysis by the U.S. Endowment for Forestry and Communities reports that about 43 percent of all forestland in Washington is privately owned, and approximately half of that is owned by private corporations (Alvarez, n.d.). Even among the forestland owners that are incorporated as private businesses, they likely span a wide variety of industry classifications given the diversity of ways that forestland is used for business purposes. For example, due to recent interest in holding forestland as a financial asset, financial institutions (including TIMOs and REITs) are among the industry types that could be subject to the proposed rule (Alvarez, n.d.).

As the proposed rule is relevant to all forest landowners (except federal and tribal entities) across the state, the scale of the analysis constrains our ability to accurately characterize the nature of all businesses that own forestland in riparian areas across Washington State.³³ To our knowledge, no publicly available data source exists that identifies the locations and Uniform Business Identification (UBI) information of small businesses that are landowners. Instead, we identify three North American Industry Classification System (NAICS) codes with businesses most likely to want to harvest timberland in riparian areas that is subject to the proposed rule:

³³ Land ownership data from Atterbury Consultants (provided by DNR with permissions) shows that there are approximately 3,500 unique landowners outside of federal and tribal land. There are 2,116 unique landowners of among the streams determined to be potentially typed in the future under the requirements of the proposed rule (see Section 2.2).

113110 – Timber tract operations

113210 – Forest nurseries

113310 – Logging

Data provided by the Washington Department of Revenue reveals that there was a total of 811 businesses identified using these NAICS codes in 2022 (and virtually the same number in 2021).³⁴ Of these, approximately 99 percent meet Washington’s definition of small business, i.e., a business with 50 or fewer employees. Of note, all businesses in the “113110 – Timber tract operations” and “113210 – Forest nurseries” industries qualify as small businesses. Table 7 presents these findings.

Table 7. Number of Small Businesses and Minor Cost Threshold in Relevant Industries

NAICS code – Industry name	Total Number of Businesses in WA	Percent that are Small Businesses	Minor Cost Threshold for SBEIS Consideration (Based on Annual Revenue)
113110 – Timber tract operations	19	100%	\$5,537
113210 – Forest nurseries	25	100%	\$5,740
113310 – Logging	767	99%	\$6,970
Total	811	99%	-

Source: IEc analysis of data provided by the Washington Department of Revenue on May 2, 2024. The data characterize fiscal year 2022; very similar numbers were reported in 2021.

4.2 Costs of the Proposed Rule Relative to Minor Cost Thresholds

For these industries, we calculate the “minor cost” threshold associated with each. 19.85 RCW requires that the relevant agency prepare an SBEIS if the proposed rule “will impose more than minor costs on businesses in an industry” (RCW 19.85.030). “Minor cost” is defined in RCW 19.85.020 as a cost per business that is less than 0.3 percent of annual revenue or income, or \$100, whichever is greater, or one percent of annual payroll (RCW 19.85.020). Table 7 also presents the minor cost threshold established for each of the three industries. For all three, we determine that the minor cost measure derived from revenue data is the greatest of the three options (i.e., based on revenue, payroll, or \$100).

However, as described in Chapter 2, the proposed rule is not anticipated to result in probable costs to these industries. This is because the rule is unlikely to change how landowners and surveyors conduct water typing relative to current conditions and also is unlikely to change the outcomes of any surveys. Therefore, we do not anticipate an increase in costs associated with surveys or compliance costs associated with more Type F stream requirements (i.e., unharvestable buffer area, fish passage through stream crossings). Because the rule does not result in more than minor costs to businesses in the regulated industries, a complete SBEIS is not required for this proposed rule.

³⁴ Data provided by the Washington Department of Revenue on May 2, 2024. Analysis was prepared by the Research and Fiscal Analysis department by combining Department of Revenue and Employment Security Department data. While a longer time series of data was requested, the Department of Revenue cautioned against using data from 2020 given the influence of the COVID-19 pandemic.

4.3 Steps Taken to Reduce Costs of the Rule

Before selecting a proposed rule, the Forest Practices Board undertook extensive research into different definitions and criteria for the AFF and PHB. Ultimately, the selected rule language minimizes impacts (including both costs and benefits) and codifies current practices while meeting the stated objectives of the rule.

While this proposed rule does not result in new costs to landowners, DNR provides significant technical and financial assistance to reduce the burden of compliance with existing Forest Practices rules. In 1999, the Washington State Legislature determined that the regulatory requirements for forestland were “diminish[ing] the economic viability of small forest landowners” and established the Small Forest Landowner Office to serve as a resource and focal point for SFL concerns and policies (RCW 76.13.100). This office provides assistance to eligible SFL to help them meet the requirements of legislation with significant cost implications. To date, the Small Forest Landowner Office has implemented several programs that reduce the compliance costs for businesses:

- ***Family Forest Fish Passage Program:*** A cost-share program that subsidizes the cost to upgrade existing stream crossings to meet fish passage requirements by 75-100 percent.
- ***Forestry Riparian Easement Program:*** Compensates SFL for the loss of revenue associated with lost timber harvest in riparian buffer areas.

Given the expected overlap between SFL and small businesses in Washington State, these programs are expected to continue to mitigate the cost Forest Practices rules for small businesses by transferring some portion of the compliance costs back to the state government.

4.4 Involvement of Small Businesses in the Rulemaking Process

Throughout the rule-development process, the DNR engaged with SFL (who are likely to be small businesses). Small businesses were involved in the proposed rule development through the inclusion of the industrial forest landowner (e.g., some industrial landowners are small business) and SFL caucuses in:

- the development of TFW Policy Committee recommendations to the Forest Practices Board of elements for inclusion in the water typing system;
- stakeholder meetings for the draft rule and associated board manual guidance; and as
- board members representing SFLs.

4.5 Impact on Jobs

Because the analysis does not identify changes in the process or outcomes of future water typing efforts, the proposed rule is unlikely to result in the creation or loss of jobs.

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Appendix: Fish Values Information

This appendix offers information regarding the values people derive from the presence of fish, in particular anadromous species found in the Northwest, building on the discussion started in Section 3.2.1 of the main text. First, we highlight available economics literature that quantifies TEVs for fish species relevant to this rulemaking. Next, we describe information regarding ceremonial and subsistence (C&S) fishing and tribal cultural values. Finally, we highlight literature that quantifies non-use values and recreational fishing values while concluding with information about how commercial fishing values are not relevant to the proposed rule although are typically a component of the TEV of a species.

Total Economic Value

Table 8 summarizes relevant primary studies that estimate the TEV of anadromous species in the Northwest in terms of the valuation context (e.g., species, magnitude of change), the geographic location, the survey population, and WTP (per household and aggregated across the survey population). Studies included are those appearing in either peer-reviewed journals or the grey literature that estimate the total economic value of Pacific salmon and/or steelhead recovery to residents of Washington State. Literature on total economic value is more limited for other fish species (i.e., cutthroat trout) affected by the proposed rule.

The literature consistently finds that the public places a high value on recovery of Pacific salmon and steelhead. However, the specific WTP estimates are difficult to compare across studies due to differences in the resources being valued (specific subpopulations of salmon), the study scope (i.e., both the number of species and the magnitude of increases), geographic scale of restoration (e.g., whether the change occurs in a single river system or region-wide), and elicitation methodology. Additionally, studies completed at different points in time may reflect variation in the ecological baseline (i.e., current abundance) or shifting preferences for restoration over time. Each study has advantages and disadvantages, and none perfectly match the context of valuing the changes induced by the proposed rule (i.e., marginal increases to coho, Chinook salmon, and steelhead populations attributable to improvements in riparian habitats).

As mentioned, none of the studies identified match the context of this analysis of this rulemaking, which identifies relatively limited changes in the number of fish affected by electrofishing, including but not limited to salmon, in Washington. Accordingly, the remainder of this section provides insight into specific categories of value related to changes in fish abundance, beginning with tribal cultural values and then assessing components of total economic value.

Table 8. Select Literature Describing the Total Economic Value (TEV) of Anadromous Fish in the Northwest

Study	Valuation Context	Site	Sampled Population	Annual WTP per Household (2023 USD) ^{1,2}	Aggregate Annual WTP ³ (2023 USD)
Lewis et al. (2022)	Increase Coho salmon returns by 1,000	All Oregon Coast Coho salmon runs	Pacific Northwest residents (including WA)	\$0.09-\$0.23	NA
Lewis et al. (2019)	Increase Coho salmon returns by 100,000 (least aggressive) to 375,000 (most aggressive, includes delisting)	All Oregon Coast Coho salmon runs	Pacific Northwest residents (including WA)	\$62 (least aggressive); \$179 (most aggressive)	NA
ECONorthwest (2019)	Restore wild salmon and improve water quality by removing four dams	Lower Snake River, WA	Active voters in WA	\$49-\$67	\$142-\$195M (WA state)
Stratus Consulting (2015)	Restoration of salmon at limited (25-50%) or extensive (60%) increase	Elwha River, WA	WA residents	\$310 (limited); \$369 (extensive)	\$1.040B (WA state, limited); \$1.220B (WA state, extensive)
Bell et al. (2003)	Doubling of local coho runs and harvest	Two estuaries in WA	Residents within 30 miles of estuary	\$126-\$196	NA
Layton et al. (1999)	Increase migratory fish populations by 50%	Eastern WA and Columbia River	WA residents	\$212-\$406	\$621M-\$1.189B (WA state)
Layton et al. (1999)	Increase migratory fish populations by 50%	Western WA and Puget Sound	WA residents	\$446-\$612	\$1.306B-\$1.795B (WA state)
Loomis (1996)	Increase salmon and steelhead (4 species) from 50,000 to 300,000	Elwha River, WA	Three samples: Clallam County, WA state, national	\$111 (Clallam); \$138 (WA); \$129 (national)	\$406M (WA state); \$15.987B (national)

Notes:

- Dollar values reported in studies are adjusted to 2023 dollars in this table.
- Total economic value includes both use and non-use values. However, it does not quantify significance to tribes, which is a potentially large source of additional (nonquantifiable) value.
- Aggregate values are estimated at the Washington State level and national level where appropriate based on the sampling frame of the original study. Number of households obtained from United States Census Bureau "Quick Facts": 2,931,841 (WA); 124,010,992 (United States).

Ceremonial and Subsistence Fishing and Tribal Cultural Values

Washington State tribes and indigenous communities more broadly value the natural environment as an interconnected and inseparable system where all components play a critical role.

It's all interconnected. Almost all cultures seem to have a word or phrase for this. For Nuu-chah-nulth, the words are hishuk'ish tsawalk, meaning everything is connected, everything is one. It is definitely a principal that is first and foremost in dialogue, discussion, and documents. Not giving lip service to it, but real meaning, that this is so fundamental to our existence. That protecting and caring for all—air, water, animals—that are in First Nations' territories, all interconnected.

Dr. Don Hall, Pacific Salmon Commission Canadian First Nations Caucus

As such, tribes place a high value on protection of fish and fish populations. While tribes recognize the critical role played by all fish species within the natural system, salmon are recognized as ecological and cultural keystone species to Indigenous communities (Garibaldi and Turner 2004). In the words of Wilbur Slockish, Kilkitat Chief, “All of the animals have a role in this world, in our belief. Rocks and water was the first one, the last one, but [salmon] is the first one that said he would take care of the people, providing them with drink to quench the thirst” (Earth Economics 2021). As a result, efforts to document the importance of fish to Pacific northwest tribes have focused almost exclusively on salmon, and no information is readily available to support evaluation of the value of other species to tribes, including cutthroat trout.³⁵

Tribal cultural and social values typically reflect a higher intensity and range of use of natural resources by tribal communities than the general population. In addition to the market value derived by tribes from their involvement in commercial and recreational fishing activities, tribal communities hold other values for the affected fish species that are unique and distinct from those held by the general public. These values derive primarily from the harvest and use of the salmon through C&S fisheries. C&S fish refers to non-commercial fish caught by tribal members for purposes related to ceremonies or subsistence. Tribal members fishing commercially may designate a portion of their catch as “take home fish” (i.e., C&S fish), or a tribe may open a fishery expressly to harvest C&S fish for an intended purposes when there is no ongoing commercial fishing activity (National Marine Fisheries Service [NMFS] et al. 2004). To the extent that the proposed rule may impact tribal C&S fishing, tribal cultural values may be affected.

Importantly, tribes do not support the concept of monetizing the value of natural resources:

We don't want to put a dollar value on fish. It means more to us than that. One of the sayings that First Nations have—both in Canada and in the United States—is that when the last tree is gone, when the last fish is gone, only then will people find out that you can't eat money. That's something that we have in common with the folks that we work with in the United States is that we have the same kind of belief system because we are family. Because before Canada and the United States existed, we existed, and we had those feelings about fish.

Grand Chief Ken Malloway, Stó:lō Nation

For this reason, this analysis focuses on a qualitative description of the potential benefits of the proposed rule to tribes. Washington is home to 29 federally recognized Indian tribes, as well as numerous additional tribes and bands without federal recognition. Despite diversity across these tribes in terms of values and practices, one

³⁵ Personal communication with Columbia River Inter-Tribal Fish Commission (CRITFC) on May 28, 2024.

commonality is that all indigenous communities within the region identify as “Salmon Nations and People” (Conarro 2020). Washington tribes are culturally connected to all five species of Pacific salmon (genus *Oncorhynchus*). For these tribes, salmon are considered to be more than simply a resource to be utilized but is seen as “family and relations gifted by the Creator” (Earth Economics 2021). Of these tribes, 20 nations in Western Washington and five nations in Eastern Washington hold treaty-reserved rights to fishing at usual and accustomed areas (Earth Economics 2021).

As described by Lane et al. (2004) and summarized in NMFS (2014), tribes in the region rely on salmon for numerous purposes including: personal and family consumption, informal inter-personal distribution and sharing, formal community distribution and sharing, and ceremonial uses. In addition to these uses, salmon also facilitates the intergenerational transfer of knowledge and culture. Young people are taught by elders the use of fishing gears, preparation and preservation of salmon (e.g., smoking), and an appreciation for and awareness of their environment and the place of salmon within it. To tribal communities, their obligation to salmon revolves around the concepts of renewal, reciprocity, and balance (Lane et al. 2004).

Earth Economics (2021) identifies a sociocultural framework for describing the significance and value of Pacific salmon for tribes and First Nations around five cultural themes. Within each, based on engagement with Northwest Tribes and First Nations and available research, they identify concepts or “codes” that emerge as particularly important values associated with salmon within those themes. These themes, as well as the concepts most frequently identified during interviews, include: social, health, livelihood, indigenous management, and knowledge and practices.³⁶

Non-Use Values

Changes in the quality or quantity of fish resources may affect the non-use values that people hold for those resources. As described previously, non-use values reflect the positive preference that people may have for a resource beyond any current or planned future use. Non-use values are thought to reflect an environmental ethic and may be motivated by a desire to preserve the resource for future generations or based on the resource’s intrinsic importance. Theoretically, people may have non-use values for any fish affected by the rule. Research on total economic values for fish species are theoretically inclusive of use and non-use values. While existing research demonstrates that total economic values do include non-use components, the total economic value studies are generally not able to parse the fraction of the value associated with non-use. Information on the magnitude of non-use values for fish species is very limited, although some research attempts to specifically quantify non-use values of fish and wildlife.

Table 9 highlights studies that have quantified the public’s WTP for actions that increase salmon and steelhead populations in Washington and have specifically attempted to isolate and quantify the non-use value respondents hold for fish. Overall, the findings of these studies suggest that people hold a positive value for increasing salmon populations and recovering ESA-listed populations to a level sufficient to justify delisting. The absence of research on total economic values or non-use values for other fish species does not indicate that people do not hold value for these species.³⁷ As noted above, the valuation context in these studies differs from the objective and likely outcome of the proposed rule: to limit harm to individual fish through the use of electrofishing.

³⁶ The frequency with which interviewees mentioned each concept does not necessarily indicate its importance relative to other concepts but can serve as a proxy for understanding the associations and weight Tribal members place on it.

³⁷ The focus of the current literature on salmon is due to the fact that it is actively managed and information on the economic benefits of improving conservation of these fish allows managers to compare costs of the conservation actions with the economic benefits to society.

However, these studies provide support that the general public values protection of fish species and, by extension, likely hold non-use values associated with preventing harm to these same species.

Table 9. Select Literature Describing Non-Use Values for Anadromous Fish in the Northwest

Study	Valuation Context	Site	Sampled Population	Annual WTP per Household (2023 USD) ¹
Bell et al. (2003)	Doubling or quadrupling of coho salmon	Two Washington estuaries	Coastal residents of WA	\$130.89 and \$209.82 per year for five years
Johnston et al. (2015)	Delisting of Puget Sound Chinook salmon within 50 years	Puget Sound	U.S. residents	\$32.24 per year for 10 years
Olsen et al. (1991)	Doubling of salmon and steelhead runs from 2.5 million to 5 million	Columbia River Basin	Pacific Northwest residents	\$58.12 per year in perpetuity
Layton et al. (1999)	Scenario 1: Eastern Washington and Columbia River migratory fish populations (CM) increase from 0.5 million to 2 million and Western Washington and Puget Sound migratory fish populations (PM) increase from 2.5 million to 5 million Scenario 2: CM increases from 2 million to 4 million and PM increases from 5 million to 10 million	Washington	2 million WA households	Scenario 1: \$81.85 per month Scenario 2: \$52.87 per month

Notes:

1. Dollar values reported in studies are adjusted to 2023 dollars in this table.

Recreational Fishing

Recreational fishing in Washington occurs in marine and fresh water throughout the state. The species most frequently targeted recreationally in Washington of relevance to this analysis include salmon, steelhead, and trout. Some anadromous fish species are supply limited, suggesting that an increase in the ability/likelihood of harvesting one, or the quality of an experience fishing for one, may result in generation of new trips. For other (e.g., cutthroat trout), it is less likely that additional fish or improved fishing experience would result in additional trips. The reduction in fish harm resulting from the proposed rule may affect the quality of a limited number of recreational fishing experiences in given areas.

In particular, more fish in the water resulting from reduced electrofishing mortality may increase the catch rate (number of fish caught per trip, which may be harvested or caught and released) or increase the catch per unit effort (i.e., more fish caught per unit of time spent fishing). However, given the low mortality rate due to electrofishing and limited number of fish that experience electrofishing in the course of water typing surveys, a more likely outcome is that the fish caught during fishing trips are less likely to have visible signs of harm. These improvements in recreational fishing experiences may increase the value that anglers derive from participation in the activity. Improved quality or quantity of recreational fishing trips may therefore be measured in terms of the effect on people's value for (i.e., WTP) for fishing in an area.

For context, the available economics literature on WTP for fishing trips suggests that people value recreational fishing trips that target anadromous fish species in Washington State on the order of \$87 per trip (2023 USD) (NMFS 2014). While the benefits to fish stemming from the proposed rule are unlikely to support new fishing trips, they may increase the value people derive from existing trips. Available literature does not offer

information on the marginal increase in value of individual fishing trips that may be attributed to the proposed rule.

Commercial Fishing

The commercial fishing industry in Washington targets a variety of species including shellfish (e.g., geoduck clams and Dungeness crabs), groundfish (e.g., sablefish and Pacific whiting), highly migratory species (e.g., albacore tuna), and salmon. Of the species identified as potentially affected by the proposed rule, coho salmon, Chinook salmon, and steelhead are targeted in commercial fisheries. This analysis predicts no change in the population-level abundance of these species, therefore benefits to the commercial fishing industry are unlikely. However, in instances where commercial fishing benefits are the result of a rule change, the market value of those fish is typically a useful proxy.