

IEC

Preliminary Results of the Updated Economic Analysis of the Proposed Water Typing Rule

BY: INDUSTRIAL ECONOMICS, INC. AND HALEY & ALDRICH

FOR: WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES, FOREST PRACTICES BOARD

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Presentation Overview

1. Background and Analysis Framework
2. Effects Considered in Analysis
3. Extrapolating from GIS Sample Point Analysis
4. Summary Findings
5. Analysis Determinations

1. Background and Analysis Framework

Background and Objectives

Objectives of the Rule:

- Establish a water-typing system that can be consistently applied, including a method for determining Type F waters based on fish habitat.
- Reduce the use of electrofishing in stream typing.

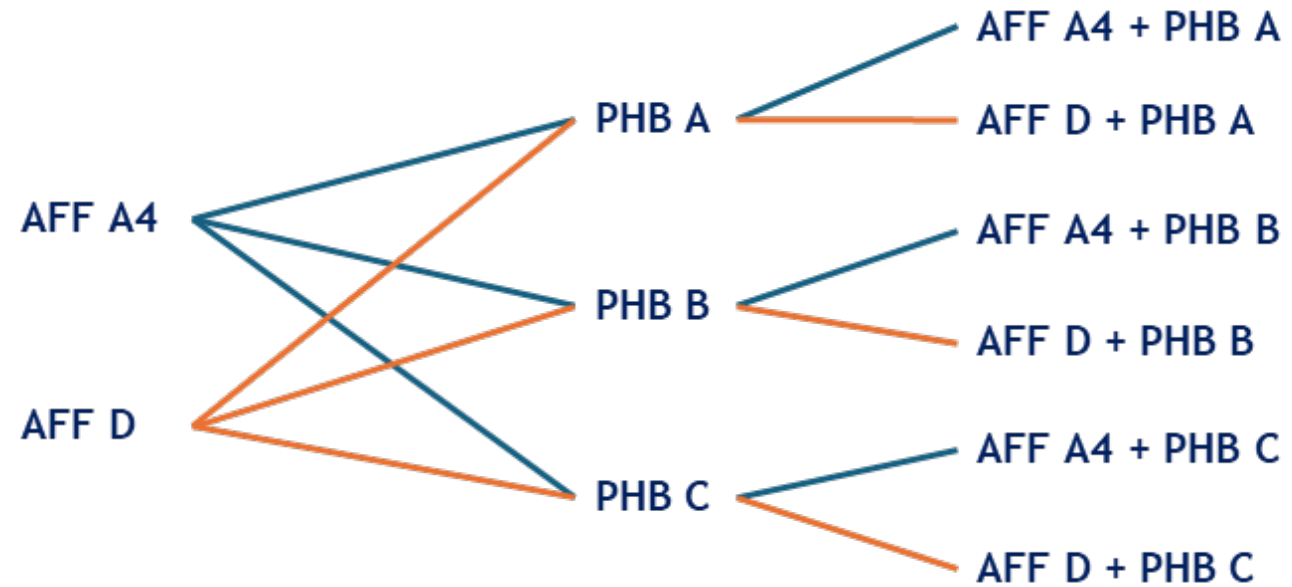
Objectives of Cost-Benefit Analysis (CBA) under RCW 34.05.328 and Rulemaking Process:

- Do probable benefits outweigh probable costs?
- Which alternative is least burdensome but still meets objectives?

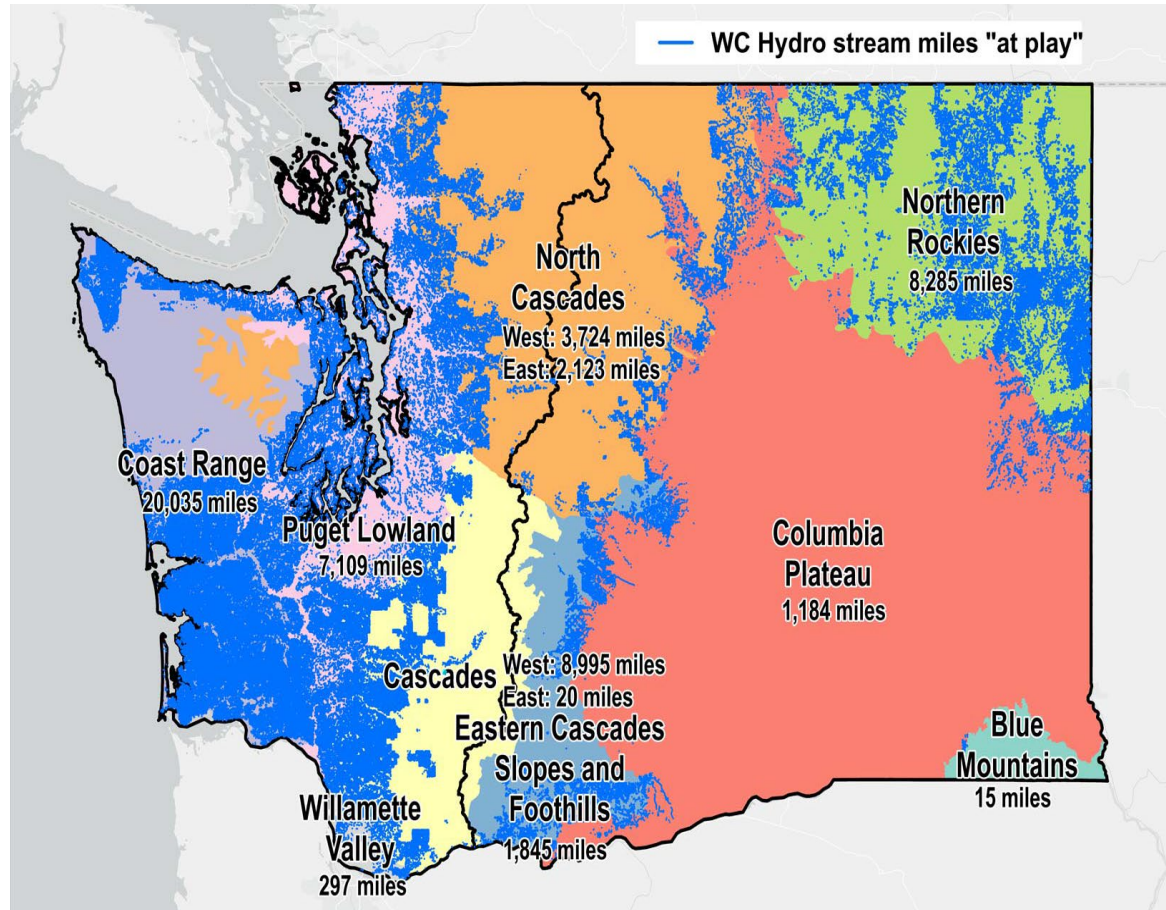
Objectives of Small Business Economic Impact Analysis (SBEIS) under RCW 19.85.040:

- More than minor costs?
- Are costs disproportionately incurred by small businesses?
- What are steps taken to reduce the costs of the rule to small businesses?

Analysis Framework



Analysis Framework



Geographic scope and scale:

- State-level analysis
- Analysis performed at the ecoregion and east/west level
- Results presented separately for western Washington and eastern Washington

Analysis Framework

Meets the legal standard of identify and comparing “probable” costs and benefits:

- *Is the effect probable?*
- *If probable, is the magnitude of the effect major, minor, or negligible? Includes qualitative and quantitative effects.*

Focus on incremental effects:

- *Incremental impacts are triggered by the rule. We quantify incremental effects by comparing two scenarios: the world with the rule and the world without the rule (i.e., the “baseline”).*
- *The Baseline reflects stream typing absent the rule (reflecting current practices under the interim final rule).*

Timeframe: 55-years (aligns with harvest rotations in eastern Washington)

Discount rate: 2% social discount rate

Uncertainty: Quantitative and qualitative considerations

2. Effects Considered in Analysis

Potential Changes Resulting from Implementation of the Regulatory Alternatives



Effects associated with conducting stream typing according to the AFF and FHAM

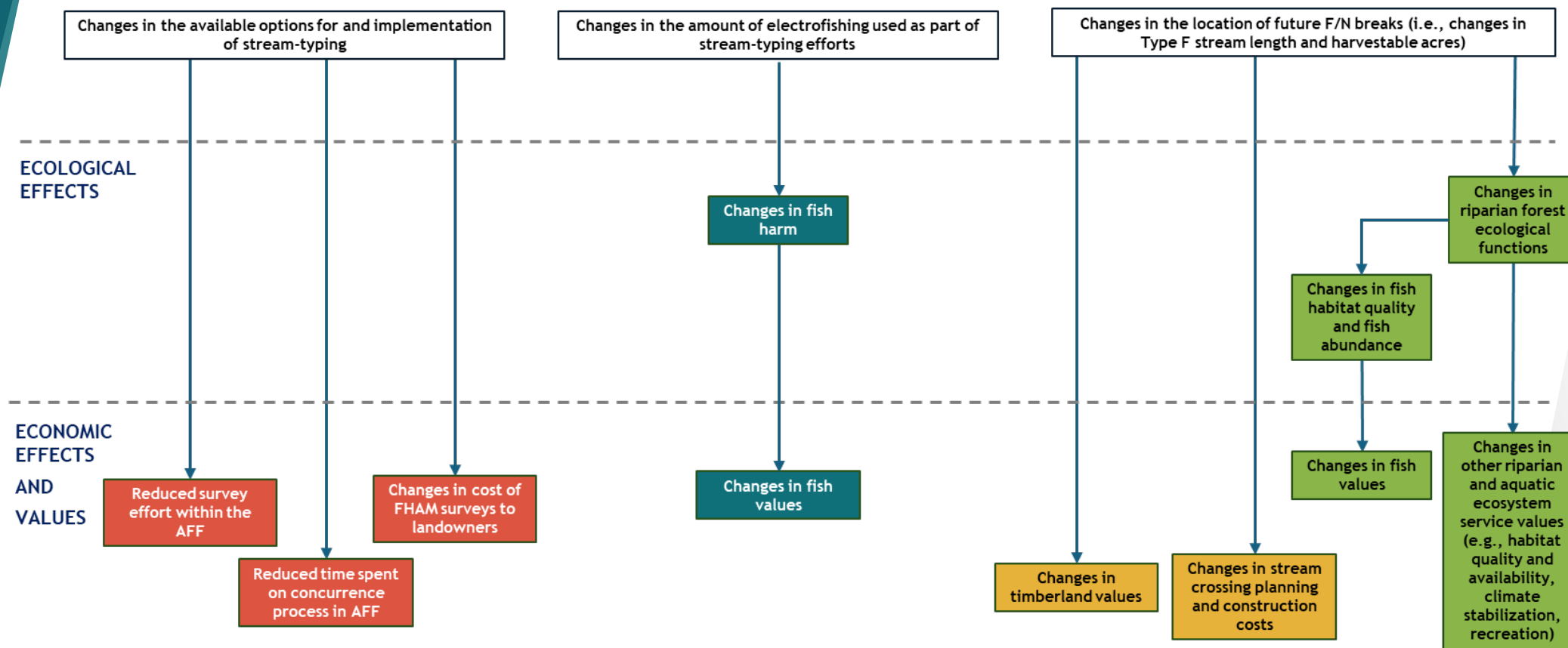


Effects of reduced electrofishing



Effects associated with potential changes in the extent of Type F streams

Potential Effects of the Regulatory Alternatives



The rule does not affect...

- The status of existing, permanently typed streams.
- The option of landowners to use Default Physical Characteristics for stream typing (outside of the AFF).
- The concurrence process for establishing a concurred F/N break to permanently type streams.

3. Extrapolating from the GIS Analysis of Sample Points

How IEc's Analysis Builds on the GIS Sample Point Analysis

1. Applies statistical methods to evaluate the predictive power for Four Peaks' sample data at the ecoregion level.
 - T-tests to identify which ecoregion averages are statistically significantly different from zero (95th and 90th percent confident interval)
 - Also T-tests to explore if averages across PHB options differ
2. Consider how the AFF will interact with upstream areas that will be typed using FHAM or other existing typing options.
3. Extrapolates findings from the PHB options to only those streams likely to be typed via protocol surveys in the future.

Outcome of Statistical Analysis of Sample Site Data

Extent of AFF:

- AFF A4 analysis identifies AFF above the F/N breaks in four ecoregions.
- AFF D analysis identifies AFF below existing F/N breaks.

Analysis of PHBs:

- Results vary by PHB option and ecoregion but generally identify the F/N break farther downstream than the baseline.
- Found statistically significant effects of the PHB on the location of the F/N break in 3 Western WA ecoregions and 2 Eastern WA ecoregions.
- PHB options do not vary significantly from one another with respect to location of the F/N break.

4. Summary Findings

What are the Probable Outcomes?

Probable outcomes of rule implementation:

- **Changes in extent of Type F stream, resulting in...**
 - Changes in timber harvest restrictions
 - Fish and other ecological effects of riparian habitat protection
 - Effects on costs of stream crossing upgrades
- **Reduced risk of fish harm from electrofishing**

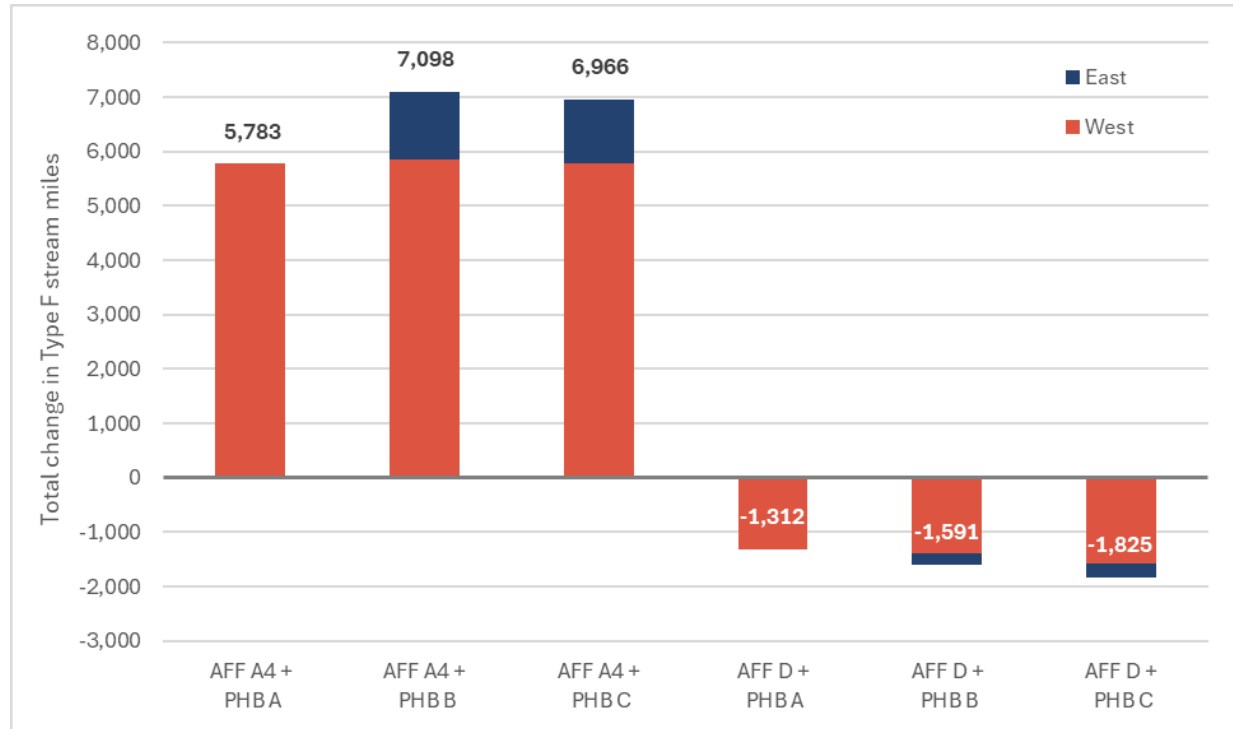
Not probable outcomes of rule implementation:

- **Changes in the effort devoted to stream typing and concurrence**
- **Changes in the cost of protocol surveys**
- **Changes in fish harvest allocations (e.g., commercial fishing)**
- **Regional economic impacts (jobs and revenues in the timber industry)**

Drivers of Costs and Benefits

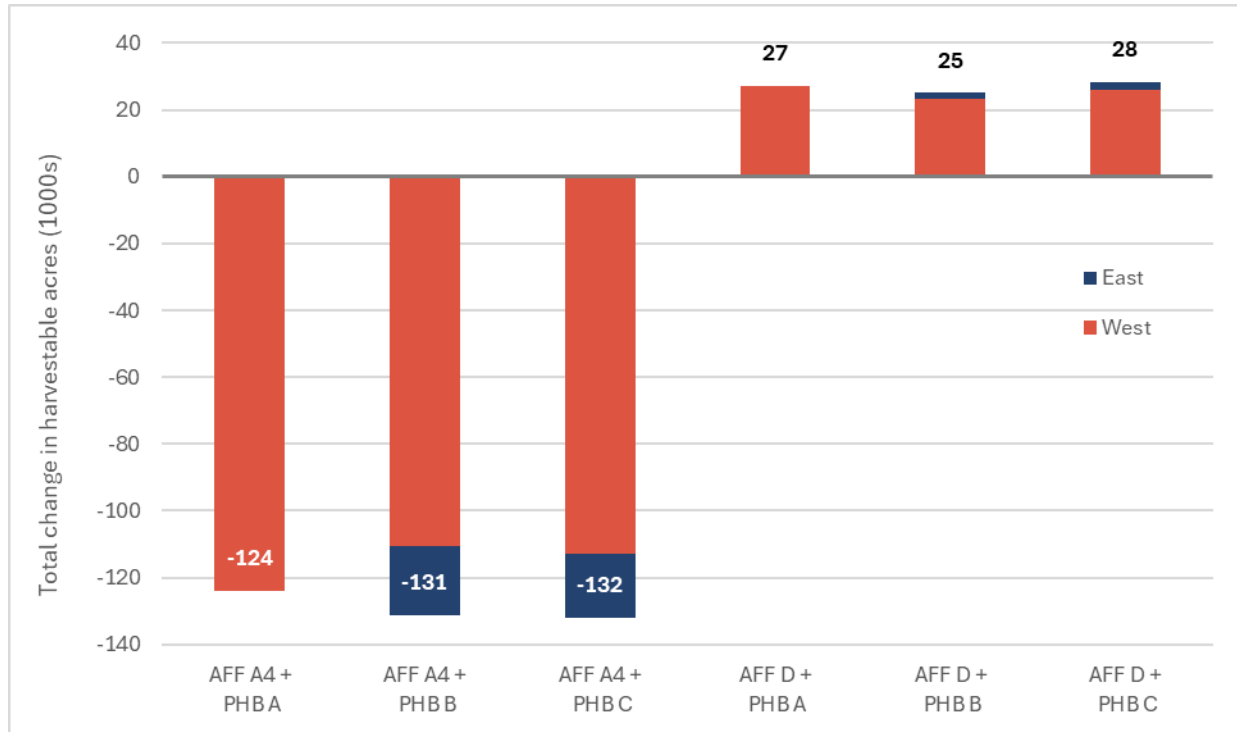
- Differences in effects across alternatives are driven by the AFF options:
 - Significant differences in size of AFF under A4 and D
 - 3 PHB options for FHAM not statistically different from one another
- Key effects:
 - AFF A4 alternatives result in major increase in Type F stream, driven by extent of the AFF
 - AFF D alternatives result in relatively minor reduction in Type F stream, driven by implementation of FHAM survey protocol

Total Change in Type F Stream



- AFF options vary significantly while differences between PHB options are negligible
- The 3 AFF A4 rule options result in net increase in Type F stream while the 3 AFF D rule options results in net decrease in Type F stream

Total Change in Harvestable Acres



- AFF A4 rule options result in net decrease in harvestable acres
- AFF D rule options result in net increase in harvestable acres

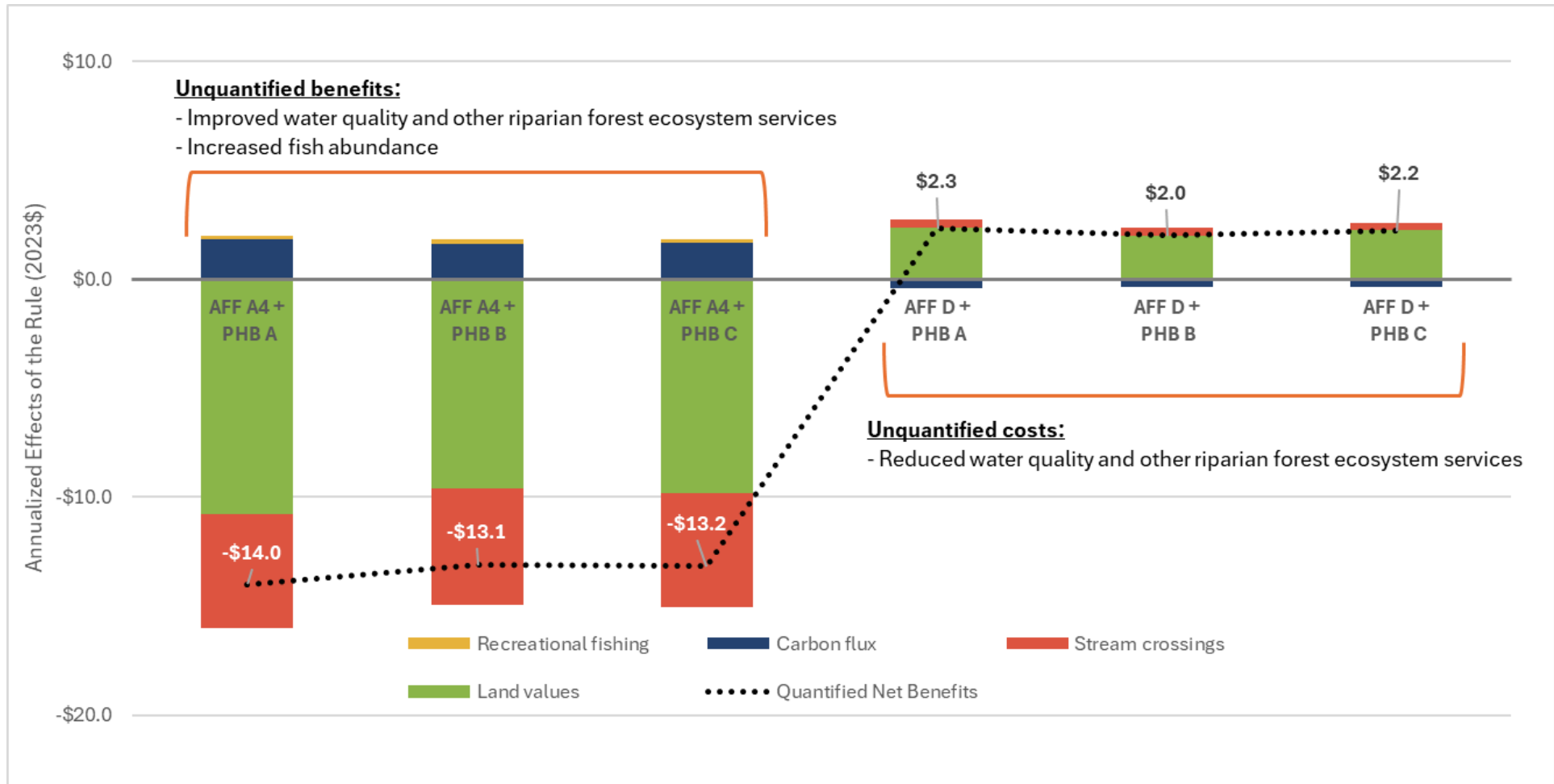
AFF A4 Rule Options: Probable Costs and Benefits

Incremental Costs (or Foregone Benefits)	Incremental Benefits (or Avoided Costs)
<p><u>Major costs</u></p> <ul style="list-style-type: none"> • Reduced timberland values (\$11 million) • Increased costs of stream crossing upgrades (\$6.3 million) 	<p><u>Major benefits</u></p> <ul style="list-style-type: none"> • Improved water quality and other riparian forest ecosystem services (58% increase in Type F protected riparian buffers resulting in biodiversity and ecosystem service values adjacent to 3% of streams statewide), including: <ul style="list-style-type: none"> • Increased landscape carbon storage and sequestration (\$1.8 million) • Increased fish abundance (13,000 fish per year), resulting in: <ul style="list-style-type: none"> • Ceremonial and subsistence fishing and tribal cultural values (not quantified) • Improved recreational fishing (\$220,000 for 2,500 new fishing trips per year, primarily for coho salmon and steelhead) • Non-use values (not quantified) <p><u>Minor benefits</u></p> <ul style="list-style-type: none"> • Reduced risk of fish harm from electrofishing (due to codifying FHAM protocol survey process; minor due to limited electrofishing in baseline) <p><u>Negligible benefits</u></p> <ul style="list-style-type: none"> • Improved forest- and other water-based recreation (areas with improved habitat are often on inaccessible private property, improvements may be less perceptible to recreationalists)

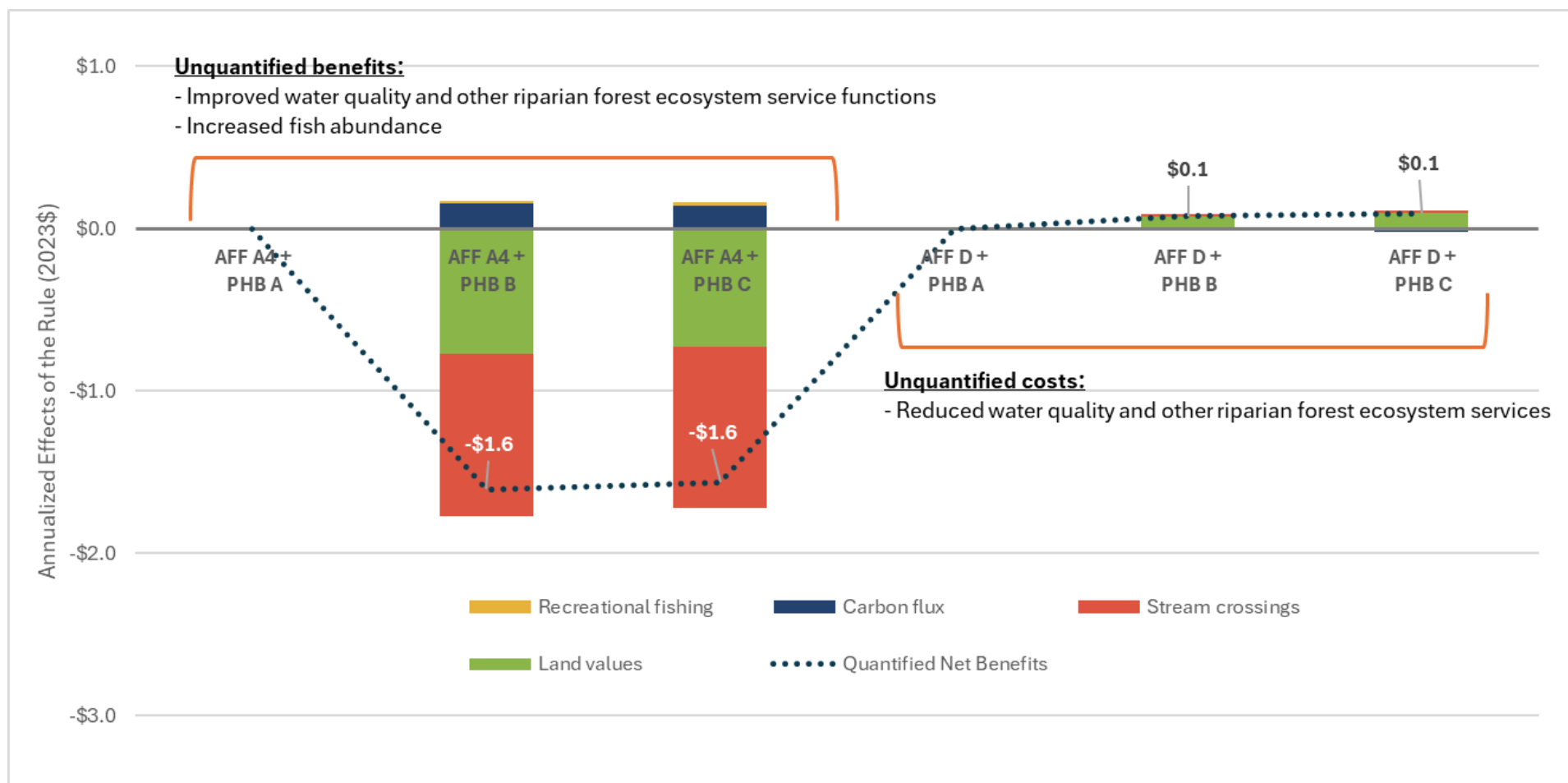
AFF D Rule Options: Probable Costs and Benefits

Incremental Costs (or Foregone Benefits)	Incremental Benefits (or Avoided Costs)
<p>Minor costs</p> <ul style="list-style-type: none"> • Reduced water quality and other riparian forest ecosystem services (limited change in Type F stream effects to downstream fish and other organisms at the individual, not population, level), including: <ul style="list-style-type: none"> • Reduced landscape carbon sequestration and storage (\$400,000) <p>Negligible costs</p> <ul style="list-style-type: none"> • Decreased forest- and water-based recreation (areas with degraded habitat are often on inaccessible private property, habitat changes may be less perceptible to recreationalists) 	<p>Major benefits</p> <ul style="list-style-type: none"> • Increased timberland values (\$2.4 million) <p>Minor benefits</p> <ul style="list-style-type: none"> • Stream crossing upgrades (\$380,000) • Reduced risk of fish harm from electrofishing (due to codifying FHAM protocol survey process; minor due to limited electrofishing in baseline)

Western Washington: Quantified Costs and Benefits



Eastern Washington: Quantified Costs and Benefits



Qualitative Assessment of Ecological Effects

Remaining questions:

- Is the magnitude of unquantified ecological benefits for AFF A4 large enough for probable benefits to outweigh probable costs?
- Is the magnitude of unquantified ecological costs for AFF D large enough that the probable benefits continue to outweigh probable costs?

We provide perspective on the potential magnitude of economic benefits and costs associated with the ecological changes based on the available literature.

Perspective on Non-Monetized Ecological Effects

Service	Value per Acre per Year of Temperate Forest from Costanza et al. 2014 (2023 dollars)
Climate Regulation	\$521
Water Supply	\$655
Soil Formation	\$47
Nutrient Cycling	\$318
Waste Treatment	\$411
Biological Control	\$806
Habitat/Refuge	\$2,953
Food Production	\$1,025
Raw Materials	
Recreation	
Cultural	
Total	\$6,736

■ Unquantified values of fish abundance

- Layton et al. (1999) estimates value per fish for Eastern and Western Washington freshwater and migratory species.
- Applying these estimates suggests benefits on the order of \$900,000 annualized for the increased abundance from the rule. This does not reflect tribal cultural values.

■ Unquantified values of riparian forest services

- Costanza et al. (2014) estimates benefits per acre per year for relevant ecosystem services of temperate forest of \$6,700.
- This value does not reflect an incremental change in ecosystem service values

Accounting for Uncertainty

Example source of uncertainty	Approach
Location of breakpoint under alternatives	<ul style="list-style-type: none"> Apply statistical tests to determine predictive power of Four Peaks data
Effects on fish	<ul style="list-style-type: none"> Refined 2019 methods based on comments, interviews, etc. Conducted sensitivity analysis of key parameters
Land values	<ul style="list-style-type: none"> Compared with WFPA market values Conducted sensitivity analysis with discount rate
Carbon storage and sequestration	<ul style="list-style-type: none"> Incorporated new tool from USDA/FS Conducted sensitivity analysis using different SC-CO₂

- We take a conservative approach to determine which effects are probable based on evidence-based analysis, then only quantify outcomes that are probable.
- While uncertainty about the future exists, we are confident in the order of magnitude of the estimates.
- The key remaining source of uncertainty is related to ecological effects, and we provide perspective on potential magnitude.

Impacts on Small Businesses

- SBEIS not required for AFF D rule options as these options do not result in “more than minor” costs to businesses.
- For AFF A4 rule options, landowner costs are likely to exceed minor cost threshold. For instance, if:
 - 1.6 acres of forestland per business taken out of harvest in western Washington
 - 1 stream crossing requires per business upgrade to meet Type F requirements
 - 1 future stream crossing per business will be built to Type F specs as opposed to Type N specs
- Yes, impacts are disproportionately born by small businesses given effectively all businesses affected are small.

Industry	Total Number of Businesses in Washington (2022)	Percent Small Businesses	Minor Cost Threshold (based on 2022 revenue)
113110 – Timber tract operations	19	100%	\$5,537
113210 – Forest nurseries	25	100%	\$6,740
113310 – Logging	767	99%	\$6,970
Total	811	99%	-

5. Analysis Determinations

Findings Related to Objectives

Objectives of the Rule:

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- Reduce the use of electrofishing in stream typing.

Objectives of Cost-Benefit Analysis (CBA) under RCW 34.05.328 and Rulemaking Process:

- Do probable benefits outweigh probable costs?
- Which alternative is least burdensome but still meets objectives?

Objectives of Small Business Economic Impact Analysis (SBEIS) under RCW 19.85.040:

- More than minor costs?
- Are costs disproportionately incurred by small businesses?
- What are steps taken to reduce the costs of the rule to small businesses?

Findings Related to Objectives: Rule

Objectives of the Rule:

- Establish a water-typing system that can be consistently applied, including a method for determining Type F waters based on fish habitat.
- Reduce the use of electrofishing in stream typing.

- Do the rule options establish a consistent water typing system?
 - ✓ 3 AFF A4 rule options - YES
 - ✓ 3 AFF D rule options - YES
- Do the rule options reduce the use of electrofishing in stream typing?
 - ✓ 3 AFF A4 rule options - YES
 - ✓ 3 AFF D rule options - YES

Findings Related to Objectives: CBA and Rulemaking Process

Objectives of Cost-Benefit Analysis (CBA) under RCW 34.05.328 and Rulemaking Process:

- Do probable benefits outweigh probable costs?
- Which alternative is least burdensome but still meets objectives?

- Do the probable benefits outweigh probable costs?
 - ✓ 3 AFF A4 rule options - YES
 - 3 AFF D rule options - Uncertain
- Which alternative is the least burdensome but still meets objectives?
 - 3 AFF D rule options are the least burdensome (net benefits to landowners of increasing area available for harvest)

Findings related to Objectives: SBEIS

Objectives of Small Business Economic Impact Analysis (SBEIS) under RCW 19.85.040:

- More than minor costs?
- Are costs disproportionately incurred by small businesses?
- What are steps taken to reduce the costs of the rule to small businesses?

- More than minor costs to businesses?
 - ✓ 3 AFF A4 rule options - YES
 - x 3 AFF D rule options - NO
- Are costs disproportionately borne by small businesses?
 - ✓ 3 AFF A4 rule options - YES
- Steps to reduce the costs of the rule to small businesses...
 - To be evaluated in SBEIS if AFF A4 rule options are selected (potentially including conservation easements, etc.)



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Industrial Economics, Inc
www.indecon.com

Haley & Aldrich
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