



DEPARTMENT OF
ECOLOGY
State of Washington

Final Regulatory Analyses

Including the:

Final Cost-Benefit Analysis

Least-Burdensome Alternative Analysis

Administrative Procedure Act Determinations

Regulatory Fairness Act Compliance

*Chapter 173-201A WAC
Water Quality Standards for Surface Waters
of the State of Washington*

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-

Chapter 173-201A WAC Water Quality Standards for Surface Waters of the State of Washington

by

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Acronyms

| | |
|-------|---|
| APA | Administrative Procedure Act |
| CBA | Cost-Benefit Analysis |
| CFR | Code of Federal Regulations |
| DOH | WA Department of Health |
| EPA | US Environmental Protection Agency |
| FDA | Federal Food and Drug Administration |
| GBT | Gas Bubble Trauma |
| GHG | Greenhouse gas |
| LBA | Least-Burdensome Alternative Analysis |
| NOAA | National Oceanic and Atmospheric Administration |
| NSSP | National Shellfish Sanitation program |
| NRKW | Northern Resident Killer Whale |
| NWEA | Northwest Environmental Advocates |
| PUD | Public Utility District |
| RCW | Revised Code of Washington |
| RFA | Regulatory Fairness Act |
| RUC | Recreational use criteria |
| SRKW | Southern Resident Killer Whale |
| TDG | Total dissolved gas |
| USACE | US Army Corps of Engineers |
| WAC | Washington Administrative Code |
| WDFW | WA Department of Fish and Wildlife |

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Executive Summary

This report presents the determinations made by the Washington State Department of Ecology (Ecology) as required under chapters 34.05 RCW and 19.85 RCW, for the adopted amendments to the Water Quality Standards for Surface Waters of the State of Washington rule (chapter 173-201A WAC; the “rule”). This includes the:

- Final Cost-Benefit Analysis (CBA)
- Least-Burdensome Alternative Analysis (LBA)
- Administrative Procedure Act Determinations
- Regulatory Fairness Act Compliance

The Washington Administrative Procedure Act (APA; RCW 34.05.328(1)(d)) requires Ecology to evaluate significant legislative rules to “determine 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 law being implemented.” Chapters 1 – 5 of this document describe that determination.

The APA also requires Ecology to “determine, after considering alternative versions of the rule...that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives” of the governing and authorizing statutes (RCW 34.05.328(1)(d)). Chapter 6 of this document describes that determination.

The APA also requires Ecology to make several other determinations (RCW 34.05.328(1)(a) – (c) and (f) – (h)) about the rule, including authorization, need, context, and coordination. Appendix A provides the documentation for these determinations.

All determinations are based on the best available information at the time of publication. Ecology encourages feedback (including specific data) that may improve the accuracy of this analysis.

The Washington Regulatory Fairness Act (RFA; chapter 19.85 RCW) requires Ecology to evaluate the relative impact of rules that impose costs on businesses in an industry. It compares the relative compliance costs to small businesses to the largest businesses affected. Chapter 7 documents that analysis, when applicable.

Rule history

Total dissolved gas (TDG) levels in water increase when water is spilled from dams. When water falls long distances from spillways and plunges deep into the water column, atmospheric gases (primarily oxygen and nitrogen) become trapped. As depths in the water column increase, hydrostatic pressure increases resulting in increased solubility of gases. The increased solubility of gases leads to higher levels of total dissolved gas in water. Gases that do not dissolve form bubbles in water and move towards the water’s surface to return to the atmosphere.

High levels of TDG have been identified as a cause of sublethal and lethal effects in fish associated with gas bubble trauma (GBT) where gas bubbles form in the blood and tissues. Some of the TDG related impacts described in field and laboratory studies include:

- Early development:
 - Embryo mortality (e.g., steelhead failing to hatch).
 - Burst swim bladders and opercular deformities in salmon fry.
 - Gas bubbles in eyes, fins, nares, and yolk sacs.
- Juveniles:
 - Mortality.
 - Behavioral changes and loss of swimming ability.
 - Ceasing to feed.
 - Reduced growth.
 - Blindness.
- Adults:
 - Gas bubbles in tissues.
 - Blindness.

TDG levels in the Snake and Columbia rivers are regulated by the water quality standards (WAC 173-201A), which dictates the maximum amount of TDG levels allowed in the rivers, and can affect the amount of spill allowed to aid fish passage at dams owned by public utility districts (PUDs) and the US Army Corps of Engineers (USACE) on those rivers.¹ The rule covers the following dams that spill water to aid fish passage:

- Wells Dam (Douglas County PUD)
- Rocky Reach Dam (Chelan County PUD)
- Rock Island Dam (Chelan County PUD)
- Wanapum Dam (Grant County PUD)
- Priest Rapids Dam (Grant County PUD)
- Lower Granite Dam (USACE)
- Little Goose Dam (USACE)
- Lower Monumental Dam (USACE)
- Ice Harbor Dam (USACE)
- McNary Dam (USACE)
- John Day Dam (USACE)
- The Dalles Dam (USACE)
- Bonneville Dam (USACE)

Summary of the amendments

The amendments make the following changes:

¹ Note that USACE-owned dams are operated by the Bonneville Power Administration (BPA).

- Total dissolved gas (TDG):
 - Revising requirements related to applying adjusted TDG levels in the Snake and Columbia rivers.
 - Revising the adjusted TDG criteria during the spring spill season in the Snake and Columbia rivers.
- Deleting temperature requirements, and clarifying footnote ‘dd’ in Table 240, per a 2018 Agreed Order.
- Clarifying and correcting marine water aquatic life use designations.

Summary of the costs and benefits of the amendments

The amendments are unlikely to result in costs compared to the baseline. They are, however, likely to result in benefits of:

- Increased salmonid passage, contributing to:
 - Up to 146 thousand more adult spring Chinook salmon returning each year.
 - Up to 117 thousand more returning steelhead each year.
 - Commercial catch values.
 - Recreational catch values.
 - Tribal catch values.
 - Ecosystem contribution value for orcas and other animals.
 - Reduced likelihood of extinction.
 - Cultural and existence value in stream.
- Increased lamprey passage downstream, supporting tribal use and cultural values.

Conclusion

Ecology concludes, based on reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the amendments, that the benefits of the adopted amendments are greater than the costs.

Least-Burdensome Alternative

After considering alternatives to the amended rule’s contents, as well as the goals and objectives of the authorizing statute, Ecology determined that the amended rule represents the least-burdensome alternative of possible rule contents meeting these goals and objectives.

Regulatory Fairness Act compliance

Ecology has analyzed the compliance costs of this rulemaking in previous chapters of this document. Based on this analysis Ecology has determined the amendments do not impose compliance costs on private businesses. Parties regulated by the amendments are all government and publicly owned entities.

Therefore, Ecology is not required to prepare a small business economic impact statement (RCW 19.85.030(1)(a)).

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Chapter 1: Background and Introduction

1.1 Introduction

This report presents the determinations made by the Washington State Department of Ecology (Ecology) as required under chapters 34.05 RCW and 19.85 RCW, for the adopted amendments to the Water Quality Standards for Surface Waters of the State of Washington rule (chapter 173-201A WAC; the “rule”). This includes the:

- Final Cost-Benefit Analysis (CBA)
- Least-Burdensome Alternative Analysis (LBA)
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- Regulatory Fairness Act Compliance

The Washington Administrative Procedure Act (APA; RCW 34.05.328(1)(d)) requires Ecology to evaluate significant legislative rules to “determine 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 law being implemented.” Chapters 1 – 5 of this document describe that determination.

The APA also requires Ecology to “determine, after considering alternative versions of the rule...that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives” of the governing and authorizing statutes (RCW 34.05.328(1)(d)). Chapter 6 of this document describes that determination.

The APA also requires Ecology to make several other determinations (RCW 34.05.328(1)(a) – (c) and (f) – (h)) about the rule, including authorization, need, context, and coordination. Appendix A provides the documentation for these determinations.

All determinations are based on the best available information at the time of publication. Ecology encourages feedback (including specific data) that may improve the accuracy of this analysis.

The Washington Regulatory Fairness Act (RFA; chapter 19.85 RCW) requires Ecology to evaluate the relative impact of rules that impose costs on businesses in an industry. It compares the relative compliance costs to small businesses to the largest businesses affected. Chapter 7 documents that analysis, when applicable.

1.1.1 Rule history

Total dissolved gas (TDG) levels in water increase when water is spilled from dams. When water falls long distances from spillways and plunges deep into the water column, atmospheric gases (primarily oxygen and nitrogen) become trapped. As depths in the water column increase, hydrostatic pressure increases resulting in increased solubility of gases. The increased solubility of gases leads to high levels of total dissolved gas in water. Gases that do not dissolve form bubbles in water and move towards the water’s surface to return to the atmosphere. High levels

of TDG have been identified as a cause of sublethal and lethal effects in fish associated with gas bubble trauma (GBT) where gas bubbles form in the blood and tissues. Some of the TDG related impacts described in field and laboratory studies include:

- Early development:
 - Embryo mortality (e.g., steelhead failing to hatch).
 - Burst swim bladders and opercular deformities in salmon fry.
 - Gas bubbles in eyes, fins, nares, and yolk sacs.
- Juveniles:
 - Mortality.
 - Behavioral changes and loss of swimming ability.
 - Ceasing to feed.
 - Reduced growth.
 - Blindness.
- Adults:
 - Gas bubbles in tissues.
 - Blindness.

TDG levels in the Snake and Columbia rivers are regulated by the water quality standards (WAC 173-201A), which dictates the maximum amount of TDG levels allowed in the rivers, and can affect the amount of spill allowed to aid fish passage at dams owned by public utility districts (PUDs) and the US Army Corps of Engineers (USACE) on those rivers.² The rule covers the following dams that spill water to aid fish passage:

- Wells Dam (Douglas County PUD)
- Rocky Reach Dam (Chelan County PUD)
- Rock Island Dam (Chelan County PUD)
- Wanapum Dam (Grant County PUD)
- Priest Rapids Dam (Grant County PUD)
- Lower Granite Dam (USACE)
- Little Goose Dam (USACE)
- Lower Monumental Dam (USACE)
- Ice Harbor Dam (USACE)
- McNary Dam (USACE)
- John Day Dam (USACE)
- The Dalles Dam (USACE)

² Note that USACE-owned dams are operated by the Bonneville Power Administration (BPA).

- Bonneville Dam (USACE)

Temporary modification and the Flexible Spill Agreement

In March 2019, we issued a short-term modification of WAC 173-201A-200(1)(f) TDG criteria for areas on the lower Snake and Columbia rivers. This modification applied to the spring spill season (generally April through June) at the following eight federal dams, allowing them to increase spill consistent with the 2018 Flexible Spill Agreement that is aimed at improving fish survival rates.

- Lower Granite Dam
- Little Goose Dam
- Lower Monumental Dam
- Ice Harbor Dam
- McNary Dam
- John Day Dam
- The Dalles Dam
- Bonneville Dam

The Flexible Spill Agreement was signed by the states of Washington and Oregon, the Nez Perce Tribe, the Bonneville Power Administration, U.S. Army Corps of Engineers, and the Bureau of Reclamation. It is supported by the states of Idaho and Montana and the Columbia River Inter-Tribal Fish Commission.

Contingent on Oregon and Washington allowing higher TDG levels (in Washington, through the short-term modification now in place, then more permanently through this rulemaking), the Flexible Spill Agreement intends to further improve juvenile salmon and steelhead survival rates as they travel downriver through the eight federal dams on the lower Snake and Columbia rivers. The Flexible Spill Agreement seeks benefits to salmonid survival in concert with managing the Columbia River system for multiple congressionally authorized purposes, including power generation to ensure the Pacific Northwest has an adequate, efficient, economical, and reliable power supply.

The Flexible Spill Agreement is contingent on the implementation of flexible spill operations that increases spill beyond the levels ordered by a federal court for the 2018 salmon migration season at the times of day when regional energy demand is lower, and reduces spill during times of peak energy demand (generally early morning and late afternoon/evening) and highest energy market values. Recent trends suggest that such flexibility may become more valuable to energy marketers as solar energy continues to be deployed in California and elsewhere in the western United States.

1.2 Summary of the amendments

The amendments make the following changes:

- Total dissolved gas (TDG):
 - Revising requirements related to applying adjusted TDG levels in the Snake and Columbia rivers.
 - Revising the adjusted TDG criteria during the spring spill season in the Snake and Columbia rivers.
- Deleting temperature requirements, and clarifying footnote ‘dd’ in Table 240, per a 2018 Agreed Order.
- Clarifying and correcting marine water aquatic life use designations.

1.3 Reasons for the amendments

1.3.1 TDG in the Snake and Columbia Rivers

The primary goal of this rulemaking is to improve fish passage for salmon and steelhead migrating downstream in the Snake and Columbia rivers. Dams release water through spillways over the dam and fish using the spillways have a better chance for survival compared to those that pass through the dams’ turbines. However, spilling water also increases TDG that can negatively affect aquatic life. This rulemaking amends the TDG limit to allow for greater water flow through spillways for improved salmon migration, while ensuring that TDG limits minimize negative impacts to aquatic life through sufficient biological monitoring.

In 2018, Governor Inslee’s Southern Resident Orca Task Force recommended that Ecology adjust TDG allowances to allow for additional spill for the purpose of benefiting Columbia Basin Chinook salmon populations.³ By reducing out-migration barriers and travel times to the ocean for Columbia Basin salmon modeling predicts an increasing salmon returns.⁴ Greater salmon populations are anticipated to increase prey availability for Southern Resident Killer Whales (SRKWs).⁵

1.3.2 Agreed Order

An additional goal of this rulemaking is to revise the rule per a 2018 U.S. District Court Stipulated Order of Dismissal (Order) between Northwest Environmental Advocates (NWEA), the U.S. Environmental Protection Agency (EPA), and the Department of Ecology (Ecology). In the Order, Ecology agreed to take action on several sections of the surface water quality standards by October 2021:

- Remove two sub-sections in the fresh and marine water temperature criteria related to an incremental temperature allowance from nonpoint source activities. Although these provisions for nonpoint temperature increases have been in the standards for decades, they have not been applied in Ecology’s nonpoint protection program. The provisions

³ Southern Resident Orca Task Force, 2018.

⁴ Fish Passage Center, 2017. Comparative survival study model.

⁵ Southern Resident Orca Task Force, 2018.

may also conflict with our current antidegradation requirements that already prescribe a different temperature allowance when water is cooler than the assigned numeric criterion.

- Amend footnote ‘dd’ in Table 240 to clarify that an adjustment of metals criteria (Water Effects Ratio) pursuant to this footnote requires EPA approval pursuant to 33 U.S.C. § 1313(c). Ecology agreed to amend the footnote to clarify that adjustments to metals criteria requires EPA approval. The EPA previously indicated to Ecology that any efforts to revise metals criteria by developing water effects ratios would need to go through a separate rulemaking, which Ecology agreed to. This amendment will codify the agreed-upon intent of this footnote and will not change how the footnote is implemented.

1.3.3 Aquatic life use designation

This rulemaking also revises descriptions of the aquatic life use designations for marine waters. In a 2003 rulemaking to update Washington’s Water Quality Standards, the restructuring of aquatic life use designations descriptions resulted in an unintentional change that applied these use designations to cold-water fisheries. This error was recently identified when the City of Everett petitioned us to revise dissolved oxygen criteria for marine waters. The city pointed out the discrepancies in the marine use designation descriptions, and upon review, we agreed that this was an unintended error and that the agency would correct in a future rulemaking. For example, marine use designations included waters used for salmon spawning, which does not occur in marine waters. This clarification will return the descriptions to their original intent and improve the ability for stakeholders to apply the water quality standards appropriately and without confusion.

1.4 Document organization

The remainder of this document is organized in the following chapters:

- Baseline and the amendments (chapter 2): Description and comparison of the baseline (what would occur in the absence of the amendments) and the changes to requirements.
- Likely costs of the amendments (chapter 3): Analysis of the types and sizes of costs we expect impacted entities to incur as a result of the amendments.
- Likely benefits of the amendments (chapter 4): Analysis of the types and size of benefits we expect to result from the amendments.
- Cost-benefit comparison and conclusions (chapter 5): Discussion of the complete implications of the CBA.
- Least-Burdensome Alternative Analysis (chapter 6): Analysis of considered alternatives to the contents of the amendments.
- Regulatory Fairness Act Compliance (chapter 7, when applicable): Comparison of compliance costs to small and large businesses; mitigation; impact on jobs.
- RCW 34.05.328 determinations not discussed in chapter 5 or 6 (Appendix A).

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Chapter 2: Baseline and the Amendments

2.1 Introduction

We analyzed the impacts of the amendments relative to the baseline of the existing rule, within the context of all existing requirements (federal and state laws and rules, binding court rulings). This context for comparison is called the baseline, and reflects the most likely regulatory circumstances that entities would face if the amendments were not adopted. It is discussed in Section 2.2, below.

2.2 Baseline

The baseline for our analyses generally consists of existing rules and laws, and their requirements. This is what allows us to make a consistent comparison between the state of the world with and without the amendments.

For this rulemaking, the baseline includes:

- The existing rule, chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington.
- The authorizing statute, chapter 90.48 RCW, Water Pollution Control.
- 2018 U.S. District Court Stipulated Order of Dismissal (Order) between Northwest Environmental Advocates (NWEA), the U.S. Environmental Protection Agency (EPA), and the Department of Ecology (Ecology).⁶
- 2018 Flexible Spill Agreement signed by the states of Washington and Oregon, the Nez Perce Tribe, the Bonneville Power Administration, U.S. Army Corps of Engineers, and the Bureau of Reclamation.⁷ This agreement applies to the 2019 – 2021 migration seasons.

2.3 Amendments

The amendments make the following changes:

- Total dissolved gas (TDG):
 - Revising requirements related to applying adjusted TDG levels in the Snake and Columbia rivers.
 - Revising the adjusted TDG criteria during the spring spill season in the Snake and Columbia rivers.

⁶ U.S. District Court, Western District of Washington at Seattle. Northwest Environmental Advocates v. United States Environmental Protection Agency, No. 2:14-cv-0196-RSM. Document 95. Filed 10/17/18.

⁷ U.S. District Court, District of Oregon, Portland Division. National Wildlife Federation v. National Marine Fisheries Service, et al. No.: 3:01-CV-00640-SI. Document 2298. Filed 12/18/18.

https://www.bpa.gov/efw/FishWildlife/SpillOperationAgreement/doc/ECF-2298_Spill-Notice-and-Agreement.pdf

- Deleting temperature requirements, and clarifying footnote ‘dd’ in Table 240, per a 2018 Agreed Order.
- Clarifying and correcting marine water aquatic life use designations.

2.3.1 TDG in the Snake and Columbia Rivers

Baseline

The baseline rule allows TDG criteria to be adjusted to aid fish passage by increasing spill, when consistent with an approved gas abatement plan, accompanied by fisheries management and physical and biological monitoring plans. TDG levels are limited to 115 percent in the forebay of the next downstream dams, or 120 percent in tailraces of each dam (measured as the average of the 12 highest consecutive hourly readings in any one day), and a maximum one hour average of 125 percent.

Adopted

The amendments will allow further adjustment of TDG criteria to aid fish passage, and change the implementation requirements depending on the level of TDG.

Adjusted TDG allowance automatically applied during spill season:

- TDG adjusted up to 115 percent (forebays) and 120 percent (tailraces) (without an approved gas abatement plan).
- Measurement of TDG at the 115 percent (forebays) and 120 percent (tailraces) level is the average of the 12 highest hourly readings (removing the word “consecutive”).
- A maximum saturation level of 125 percent calculated as an average of the two highest hourly TDG measures in a calendar day (changing averaging period from 1 hour to 2 hours).

Optional Adjusted TDG allowance that can be applied during spring spill season:

- The secondary criterion limits TDG up to 125 percent in the tailraces, and is calculated as an average of the 12 highest hourly TDG measures (replacing the 1-hour average) in a calendar day.
- The secondary criterion limits TDG to a maximum saturation level of 126 percent that is calculated as an average of the two highest consecutive hourly TDG measures.
- A further adjustment may be allowed that would remove the 115 percent (forebays) and 120 percent (tailraces) criteria, and require only the current secondary criterion of the tailrace 125 percent TDG criteria, if:
 - Spill activities align with Endangered Species Act requirements.
 - Accompanied by an approved biological monitoring plan including non-salmonid fish species.
 - Biological monitoring continues for at least five years.

- Incidence of GBT does not exceed 15 percent in non-paired fins.⁸
- Incidence of GBT does not exceed five percent, and gas bubbles occlude up to 25 percent of the surface area of the fin.

The amendments also remove the requirement for an approved gas abatement plan accompanied by fisheries management and physical and biological monitoring plans unless required by a Federal Energy Regulatory Commission (FERC) license.

Expected impact

Five PUD dams continuing to implement spills resulting in the baseline levels of allowable TDG could avoid the costs of future revisions to existing gas abatement plans.⁹ We do not expect this amendment to result in required changes to spill levels at PUD dams, though it does offer the option of PUDs choosing to change to spill levels resulting in higher levels of TDG. PUDs covered by the amendments are not parties to the Flexible Spill Agreement, and therefore will have no agreed-upon requirement to change spill operations from current levels. They operate in compliance with the existing rule, and will not be required to do anything different if higher levels of TDG (via larger spills) are allowed through this rulemaking. However, in the amended TDG rule, PUDs will have the opportunity to request a higher TDG standard if they meet the minimum requirements.

Removing the requirement to measure TDG based on highest consecutive hourly readings will reduce confusion in compliance, and reduce the potential need for hydropower projects to report differently to Oregon (which does not require consecutive hours) and Washington. We do not expect this amendment to result in environmental impacts. While it allows dam operators more flexibility in better reflecting actual TDG levels (since the highest levels may not all be within the same 12-hour time period) it has the potential to result in less spill if the average under the amendments is higher than it would be under the baseline. Restricted spills in such a scenario are covered under the limits in the Flexible Spill Agreement.

Allowing spills that result in up to 125 percent TDG will:

- Allow USACE dams to operate spills based on the Flexible Spill Agreement and any future operating agreements that may require spill up to 125 percent.¹⁰
- Facilitate increased fish passage downstream past dams, resulting in increased survival as predicted by the modeling.¹¹

⁸ The dorsal, caudal, and anal fins.

⁹ Note that PUDs may be required to submit a gas abatement plan in future, depending on the language in the license in their FERC license.

¹⁰ Note that the amended rule allows up to 126 percent TDG, as this allows for the inherent imprecision of spill measurement. The intent of this additional 1 percent is to allow dams to reach the 125 percent TDG in practical terms.

¹¹ Fish Passage Center, 2017.

Removing the gas abatement plan requirements for dams managing TDG up to 115 percent in forebays and 120 percent in tailraces will theoretically reduce compliance costs for the USACE dams. We anticipate the five PUD dams to continue to implement the 115 percent forebay criterion and 120 percent tailrace criterion covered by the baseline rule. However, the PUD operated dams have a 401 Water Quality certification, and are required under their Federal Energy Regulatory Commission licenses (currently 40 to 50 years) to have gas abatement plans. Additionally, the PUDs already rely on monitoring at Rock Island Dam, conducted by the Fish Passage Center. Therefore, we do not expect this amendment to affect the PUD dams' behavior, or result in any costs or benefits.

2.3.2 Agreed Order

Baseline

The baseline rule includes limits to incremental temperature increases from combined nonpoint sources. They must not exceed 2.8 degrees Celsius. The 2018 Agreed Order requires Ecology to remove these limits.

The baseline rule also includes footnote 'dd' in Table 240 that allows an adjustment of metals criteria (water effects ratio) pursuant to EPA procedures. The 2018 Agreed Order requires Ecology to add a clarifying statement that any adjusted site specific criteria for metals based on this footnote are not in effect until they have been incorporated into this chapter and approved by EPA.

Adopted

Two subsections limiting incremental temperature increases from combined nonpoint sources are deleted under the amendments.¹²

The amendments also add a statement to the footnote to indicate that adjusted site specific criteria are not in effect until they have been incorporated into this chapter and approved by EPA.

Expected impact

We do not expect these amendments to result in costs or benefits relative to the baseline, as the requirement to remove these sections is part of the baseline. Moreover, this requirement has never been implemented, and will not result in a change in requirements, even if the Agreed Order was not part of the baseline.

We do not expect this amendment to result in costs or benefits relative to the baseline, as the requirement to go through a rulemaking to establish a water effects ratio for metals is part of the baseline. This amendment codifies the agreed-upon intent of this footnote and will not change how the footnote is currently implemented.

¹² WAC 173-201A-200(1)(c)(ii)(B) and WAC 173-201A-210(1)(c)(ii)(B)

2.3.3 Aquatic life use designation

Baseline

When the marine aquatic life use designations were modified in 2003, they erroneously included components such as salmonid spawning in marine waters, and were difficult to differentiate across based on their general descriptions.

Adopted

The amendments clarify language for extraordinary, excellent, good, and fair quality marine aquatic life uses. They more clearly differentiate between the uses, and specify that salmon use marine waters for migration and rearing.

Expected impact

We do not expect the amendments to result in costs or benefits beyond improved clarity for understanding the aquatic life uses.

2.4 Duration of impacts

The amendments with likely impacts are intended to facilitate compliance with the Flexible Spill Agreement. The amendments themselves (absent the Flexible Spill Agreement) allow an additional option for compliance with a higher TDG level, but do not require any dams to comply with this new language. Without the Flexible Spill Agreement, TDG-related choices will be made based on business and environmental decisions (spills required by court order; what maximum level of TDG to allow; what additional planning or monitoring is necessary to comply; electricity market attributes; etc.).

The Flexible Spill Agreement, however, is for 2019 – 2021. The impacts discussed in this document (primarily benefits surrounding increased fish survival and contribution to fish populations that have various use and non-use values), are technically only likely for that time period. Benefits beyond 2021 rely on renewal of the agreement or other operating agreements. If a future agreement is not initiated, PUD dams will remain without impact, and USACE dams will likely revert to baseline behavior. In this case, the impacts of the amendments (positive or negative) will revert to zero, as compared to the baseline, except for when conditions prompt dams to perform more spill and aim for a higher level of TDG. We note that while the adopted amendments allow for 125 percent TDG to allow for potential future flexibility without additional rulemaking, Ecology does not expect spill plans resulting in 24-hour, 125 percent TDG. This is because future spill levels or agreements resulting in these levels and durations of TDG would need to be the result of agreement between ESA consultation and NOAA Fisheries Biological Opinion.

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Chapter 3: Likely Costs of the Amendments

3.1 Introduction

We estimated the likely costs associated with the amendments, as compared to the baseline. The amendments and the baseline are discussed in detail in chapter 2 of this document.

3.2 Cost analysis

The amendments make the following changes:

- Total dissolved gas (TDG):
 - Revising requirements related to applying adjusted TDG levels in the Snake and Columbia rivers.
 - Revising the adjusted TDG criteria during the spring spill season in the Snake and Columbia rivers.
- Deleting temperature requirements, and clarifying footnote ‘dd’ in Table 240, per a 2018 Agreed Order.
- Clarifying and correcting marine water aquatic life use designations.

3.2.1 TDG in the Snake and Columbia Rivers

Washington is the nation’s largest hydropower producer, with over two-thirds of electricity generated in the state coming from hydropower.¹³ Hydroelectricity generation at Columbia Basin dams has an average annual economic impact of around \$3.3 billion.¹⁴ The state’s hydropower abundance significantly influences Washington’s low electricity costs and electricity sector greenhouse gas (GHG) emissions, which make up a much smaller share (less than 20 percent) of the state GHG inventory than most other states.¹⁵ Washington’s 2017 average retail electricity price was the second lowest in the nation at 7.94 cents/kWh.¹⁶

Previous publications have suggested that increased spill at Columbia Basin dams would result in both increased energy costs and electricity sector GHG emissions, as natural gas electricity generating facilities would likely offset the reduction in available hydropower.¹⁷ Given this, the Flexible Spill Agreement was designed to be both revenue and emissions neutral or positive.¹⁸ Although increasing spill at the dams during the mid-day hours will affect increased natural gas generation, the Flexible Spill Agreement will allow for additional hydroelectricity generation (and less spill) during peak demand hours for electricity (morning and evening), offsetting added costs and emissions from increased natural gas electricity generation during the day.^{19, 20} The

¹³ Washington State Department of Commerce, 2018 – Fuel mix disclosures

¹⁴ Flores et al, 2017, p. 54

¹⁵ <https://fortress.wa.gov/ecy/publications/documents/1802043.pdf>

¹⁶ <https://www.eia.gov/electricity/state/>

¹⁷ NWPCC CO₂ Footprint of the Northwest Power System 2007

¹⁸ Relative to the baseline 2018 court-ordered spill operations that preceded the Flexible Spill Agreement

¹⁹ Ecology EIS – March 2019

²⁰ Conversations with staff at Northwest Power and Conservation Council, May 2019

amendments, in allowing the USACE dams to operate in accordance with the Flexible Spill Agreement, will therefore not affect a change in the price of electricity in the state or the amount of greenhouse gasses (GHGs) emitted by the electricity sector.

Allowing water spill over dams that results in up to 125 percent TDG will allow USACE dams to operate spill as directed in the Flexible Spill Agreement. Since the Flexible Spill Agreement is revenue neutral compared to the baseline, we do not expect the amendments to result in net costs at the USACE dams (for the Bonneville Power Administration that operates them).

3.2.2 Agreed Order

We do not expect this amendment to result in costs or benefits as compared to the baseline.

3.2.3 Aquatic life use designation

We do not expect this amendment to result in costs or benefits as compared to the baseline, beyond improved clarity.

Chapter 4: Likely Benefits of the Amendments

4.1 Introduction

We estimated the likely benefits associated with the amendments, as compared to the baseline (both described in chapter 2 of this document).

4.2 Benefit analysis

The amendments make the following changes:

- Total dissolved gas (TDG):
 - Revising requirements related to applying adjusted TDG levels in the Snake and Columbia rivers.
 - Revising the adjusted TDG criteria during the spring spill season in the Snake and Columbia rivers.
- Deleting temperature requirements and clarifying footnote ‘dd’ in Table 240, per a 2018 Agreed Order.
- Clarifying and correcting marine water aquatic life use designations.

4.2.1 TDG in the Snake and Columbia Rivers

Allowing spills that result in up to 125 percent TDG will facilitate increased fish passage downstream past dams, resulting in increased survival. Under the baseline, an approved biological monitoring plan is required. While the amendments will remove the plan requirement for lower levels of TDG (see Section 4.2.2), this requirement for dams generating up to 125 percent TDG will not be a change from the baseline. By improving survival rates, the amendments are likely to create benefits stemming from use and non-use values for salmon. A co-benefit of increased spills intended to improve salmon survival is potential increased survival of juvenile Pacific lamprey, migrating downstream and to the Pacific Ocean.

Use values include the value of fisheries and consumption:

- Commercial
- Recreational
- Tribal

Non-use values include:

- Ecosystem contribution value (e.g., food source for other species)
- Reduced likelihood of extinction
- Cultural and existence value in stream

4.2.1.1 Improved salmonid survival

The Washington Department of Fish and Wildlife (WDFW) anticipates the return of 99,300 Upriver Spring Chinook salmon to the Columbia River in 2019, down over 50 percent from the average of around 200,000 during the 2000s.²¹ At the Bonneville Dam, 2017 adult fish counts were significantly reduced for all major salmonid species.²² Upper Columbia spring run Chinook salmon are endangered, and three units of Chinook are listed as threatened under the Endangered Species Act: Lower Columbia River, Snake River fall run, and Snake River spring/summer run.²³

Increased springtime spill at Columbia Basins under the Flexible Spill Agreement has potential to result in a positive impact on salmonid fish species, including Chinook salmon and steelhead. Increased spill reduces mortality in turbines and reduces migration delay from reduced flow.²⁴ Research has identified measurable effects on all stages of salmon and steelhead life cycles from increased spill at Columbia Basin dams.²⁵ Using estimates from a 2017 Fish Passage Center Report, the Oregon Department of Fish and Wildlife estimated an average annual increase of up to 146,000 adult spring Chinook salmon returning to the mouth of the Columbia River, depending on the level of spill. Similarly, the average annual number of returning steelhead are anticipated to increase by up to 116,929, depending on the level of spill.²⁶ These average estimates are associated with 125 percent TDG. Alternative estimates were not available specific to 120 percent TDG, or other potential TDG levels under future spill agreements. Nonetheless, the amendments are likely to improve downstream fish passage, and result in significant increases in returning fish, up to these levels.

Although the Flexible Spill Agreement centers on spill during spring months, spring spill is anticipated to benefit out-migrating juvenile salmonids from all periods of spawning throughout the year, given that most salmonids and steelhead out-migrate during spring months.

Increased Steelhead out-migration

Unlike most salmonid species in Washington, Steelhead are able to reproduce multiple times during their lifetime. While dams are most often blamed for the disruption of *upriver* salmonid migration, dams also pose a serious barrier to steelhead (and other species) out-migrating *downriver* after spawning. Less than two percent of Columbia River steelhead successfully return to spawn twice, due in part to limitations on downstream migration from dams.^{27, 28}

²¹ Washington State Department of Fish and Wildlife, 2018 – Joint agency report

²² <https://www.wildsalmoncenter.org/wp-content/uploads/2018/08/Columbia-Spill-Handout-2-26-18.pdf>

²³ <https://www.fisheries.noaa.gov/species/chinook-salmon-protected>

²⁴ Conversations with staff from the Washington Department of Fish and Wildlife, June 2019

²⁵ Haesecker, McCann, Tuomikoski, and Chockley, 2012

²⁶ Both the Chinook and steelhead return estimates were created by the Oregon Department of Fish and Wildlife, using the Smolt-to-Adult Return (SAR) ratios from the Fish Passage Center and annual fish return estimates provided by the Washington Department of Fish and Wildlife.

²⁷ Hatch et al, 2019

²⁸ Keefer and Caudill, 2014

Coastal steelhead populations, on the other hand, successfully respawn at a rate closer to 10 percent.²⁹

A recent study of Columbia Basin Steelhead kelts³⁰ reported a positive correlation between wild steelhead iteroparity³¹ and river discharge during outmigration.³² The study also noted that increased operation of surface flow outlets, which include spillways, might have contributed to the kelts' out-migration success. Increased flow will also benefit kelts by reducing migration delay.³³

Steelhead in the lower, middle, and upper Columbia reaches are listed as threatened under the federal endangered species act and as a candidate species under the state Endangered Species Act (chapter 220-610 WAC). The Columbia River Inter-Tribal Fish Commission is working in coordination with the federal government and local utility districts to increase steelhead survival and respawning through a fish-reconditioning program. An increase in successfully out-migrating steelhead will not only increase the number of surviving fish, but will also contribute to the genetic diversity of the populations.³⁴ Both of these results will affect increased ecosystem services.

Like some salmon, steelhead have seasonally distinct migration populations. The majority of winter Columbia River Steelhead spawn in the lower and middle Columbia tributaries, while Summer Columbia River Steelhead tend to spawn in other middle and upper Columbia tributaries and beyond into the Snake River and Clearwater and Salmon River basins.³⁵ In most cases, the juveniles of both populations out-migrate during the spring months.

4.2.1.2 Improved Pacific lamprey survival

Pacific lamprey populations in the Columbia may also benefit from an increase in water spill over dams. Like salmonids, Pacific lamprey are anadromous, spawning in fresh water during spring months. One of the primary challenges for the Pacific lamprey population are barriers to passage, both upstream and downstream.³⁶ While the dams impacted by the amendments have systems designed to aid fish passage for salmonids (such as grates guiding juvenile salmon away from turbines), these systems are not designed to aid softer-bodied lamprey that have weaker swimming ability than salmon.³⁷ Increased spill over dams could aid lamprey in downstream passage and survival. These ancient, eel-like jawless fish have significant cultural value to Columbia Basin tribes. According to the Columbia River Inter-Tribal Fish Commission, current

²⁹ Conversations with staff from the Washington Department of Fish and Wildlife, June 2019.

³⁰ A salmon that has recently spawned and is usually in poor condition.

³¹ The incidence of repeat spawning migration.

³² Keefer and Caudill, 2014.

³³ Conversations with staff from the Washington Department of Fish and Wildlife, June 2019.

³⁴ Crespi and Teo, 2002.

³⁵ Fish Passage Center, 2018 – 2017 Annual Report.

³⁶ <https://www.fws.gov/oregonfwo/articles.cfm?id=149489457>

³⁷ <https://www.critfc.org/fish-and-watersheds/columbia-river-fish-species/lamprey/>

counts of lamprey at the Bonneville Dam are down over 90 percent from the mid-twentieth century.³⁸

4.2.1.3 Value of commercial catch

Although the majority of Columbia Basin-spawning salmon landed by commercial fisheries are caught outside of Washington’s waters, commercial fisheries are likely to see benefits from increased spill. Columbia Chinook and Coho have a total landed commercial value of over \$5.3 million annually.³⁹ Salmon and steelhead fishery management in the Columbia River is dictated by *United States vs. Oregon* (302 F. Supp. 899) and management by short-term agreements between the parties of the suit.⁴⁰ The current agreement, which lasts from 2018 to 2027, dictates the allowable harvest of non-tribal commercial and recreational salmonids on a dynamic scale based on estimated fish return.⁴¹

4.2.1.4 Value of recreational catch

The amendments will also likely benefit recreational harvest of salmonids. Recreational salmon and steelhead fishing have significant economic impacts in the Columbia Basin and beyond.⁴² According to a recent Earth Economics report, the total economic value of Chinook, Coho, and Steelhead recreational fishing approached \$135 million annually (See Table 1).⁴³ Recreational expenditures include fishing equipment trip-related costs, which include food and lodging, transportation, boating costs, and other trip costs. A 2008 study estimated that total trip expenditures of all recreational fishing expenditures in Washington State was over \$900 million annually.⁴⁴

Table 1: Value of recreational catch in Washington

| Species | Recreation Catch | Economic Value | Value Per Fish |
|--------------|------------------|----------------------|----------------|
| Chinook | 116,590 | \$51,948,853 | \$445.57 |
| Coho | 57,541 | \$21,979,192 | \$381.97 |
| Steelhead | 133,497 | \$60,572,823 | \$453.74 |
| Total | 307,628 | \$134,500,868 | ----- |

4.2.1.5 Value of tribal catch

Tribes hold long-standing cultural values for the environment and as part of that, for fish catch. Salmon are among local tribes’ “first foods” which include water, salmon, deer, cous root,

³⁸ Ibid.

³⁹ Flores et al, 2017, Table 9

⁴⁰ Parties to *U.S. vs. Oregon* include Washington State, Oregon, Idaho, the United States, the Shosone-Bannock Tribes, the Confederated Tribes of the Warm Springs of Oregon, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, and the Confederated Tribes and Bands of the Yakama Nation

⁴¹ https://www.westcoast.fisheries.noaa.gov/publications/fishery_management/salmon_steelhead/s7-usvoregon_2018-2027_mgmamnt_final_signed.pdf

⁴² Most available economic data focuses geographically on the Columbia Basin, which includes parts of both Washington and Oregon.

⁴³ Flores et al, 2017, page 68.

⁴⁴ WDFW Economic Analysis of the Non-Treaty Commercial and Recreational Fisheries.

huckleberry, and lamprey.⁴⁵ The culture and lifeways of tribal communities are tied to fisheries resources and a number of tribes hold treaty rights to the harvest of fisheries.⁴⁶

In terms of use value, tribes, holding the right to half of the additional salmon likely to result from the amendments, will be able to sell or consume additional fish, and have increased resources for traditional cultural uses. Also, some individuals are subsistence fishers, harvesting fish for cultural, spiritual, and economic reasons. Additional fish survival and availability in stream will improve the ability of subsistence fishers to receive nutrition, reduce food costs, and participate in cultural harvest their own food.

Increased spills past dams will also potentially benefit downstream passage of lamprey. Pacific lamprey are an ancient fish species (450 million years) and, like salmon, are anadromous (spawning in fresh water then migrating to marine water). They must travel past dams to reach the Pacific Ocean. Lamprey use holds centuries-old historical significance for tribes in the Columbia Basin, as a food source, as well as a source of medicine and oil. While historically an abundant species, lamprey populations have declined significantly in recent decades due to the following circumstances.⁴⁷

- Impaired migratory passage.
- Dewatering and flows.
- Poisoning and poor water quality.
- Dredging.
- Stream and floodplain degradation.
- Ocean conditions.
- Predation by non-native species such as bass and walleye.
- Overharvest for bait.

Currently, lamprey populations in the Snake and Columbia rivers, and their tributaries, have disappeared in upper reaches, or are too low for tribes to harvest.⁴⁸ The single remaining small fishery is in Oregon, at Willamette Falls. Increased lamprey survival downstream, and return to spawn, will potentially contribute to future ability to harvest in more locations, and increase consumption as well as the historical cultural activities of lamprey fishing and use.

4.2.1.6 Ecosystem contribution value

The SRKWs are a geographically distinct population of killer whales that travels in and around the Salish Sea during the summer and fall months and along the Pacific West Coast during the

⁴⁵ Columbia River Inter-Tribal Fish Commission, 2011.

⁴⁶ There are 21 treaty tribes in Washington State. Including tribes located in Idaho and Oregon, there are 24 tribes with treaty fishing rights in usual and accustomed areas in Washington State.

⁴⁷ US Fish and Wildlife Service, 2010.

⁴⁸ Columbia River Inter-Tribal Fish Commission, 2011.

winter and spring months. These apex predators⁴⁹ have significant economic and cultural values for Washingtonians. The population of SRKWs has historically reached a high of 200 individuals. In recent years, the number has fallen to 74 due in large part to a reduction in Chinook salmon populations, which is the Southern Resident's primary prey.⁵⁰ Recovering and enhancing the population of SRKWs provides numerous benefits to the ecosystems they frequent, to the state's economy, and to the cultural identity of the state.

We anticipate that an increase in the returning Columbia River Basin Chinook salmon resulting from the Flexible Spill Agreement will benefit the SRKWs. A recent study on the amount of Chinook available for SRKWs suggests that about seven of the top 15 priority Chinook stocks are Snake or Columbia River populations.⁵¹ Because we know the availability of Chinook is one of the primary hurdles for the recovery of SRKW populations, we assume the additional returning adult salmon resulting from increased spill will have a positive impact on SRKWs. A 2011 NOAA Fisheries and Canadian Department of Fisheries and Oceans study found that an increase in the availability of salmon may be related to improved killer whale birth and survival rates, although their results did not take into account other factors like increased salmon predation by other species.

While there is confidence among the scientific community that increased spill will benefit the SRKWs, a quantitative relationship is unavailable. Because of this, we are not able to quantify the economic benefits of the policy change as they related to SRKWs at this time.

The Southern Resident Killer Whale Chinook Salmon Initiative reports that:⁵²

- Wildlife watchers spend nearly \$1 billion per year in Washington, primarily in rural areas.
- In 2001, 47 percent of Washington's residents participated in wildlife watching, compared to 16 percent in fishing and five percent in hunting.
- Wildlife watching activities support more than 21,000 jobs in Washington State, yield \$426.9 million in job income, and generate \$56.9 million in state and \$67.4 million in federal tax revenues each year, based on 2001 data.
- The value of the overall whale watching industry in Washington State is worth at least \$65-\$70 million per year, with an average annual growth rate of three percent.
- An estimated 42 whale watch companies operate in Washington State, 22 of which are listed in Dun & Bradstreet's Million Dollar Database. The 22 listed companies generated \$64 million in sales, by themselves.

⁴⁹ A predator at the top of a food chain that is not preyed upon by any other animal.

⁵⁰ For more information, see the website for the Governor's Orca Task Force <https://www.governor.wa.gov/issues/issues/energy-environment/southern-resident-orca-recovery>

⁵¹ NOAA and DFW, 2018 - https://www.westcoast.fisheries.noaa.gov/publications/protected_species/marine_mammals/killer_whales/recovery/srkw_priority_chinook_stocks_conceptual_model_report_list_22june2018.pdf

⁵² Southern Resident Killer Whale Chinook Salmon Initiative (2015). Economic Value. <https://srkwcsi.org/the-economic-value-of-southern-resident-killer-whales/>

- On San Juan Island, there are 17 whale-watching and kayak-touring businesses. Countywide, tourism is a \$127 million industry. “This is an orca-based economy,” says Jason Gunter, manager of Discovery Sea Kayak. He estimates that 75 percent of his clients sign up to see killer whales.

We note that there are animals other than the SRKW that will benefit from increased food supply if higher fish survival rates result in more plentiful food sources for them. These include Northern Resident Killer Whale (NRKW) pods, about 264 individuals. These orcas, also a geographically distinct population, live off the coast of British Columbia, from Vancouver Island up to Alaska. NRKWs specialize in eating Chinook and Chum salmon. Other animals consuming salmon (various species) will also benefit, such as other fish and marine mammals.

Increased survival of Pacific lamprey downstream past the dams will also benefit the ecosystem. Lamprey are a food source for fish, birds, and mammals in the basin.

4.2.1.7 Reduced likelihood of extinction

While the public places value on fish for use or non-use, they may hold additional values associated with avoiding extinction of a species (or passing a point from which there is not likely population recovery). Values may be for full recovery of a specific population, or for downlisting from endangered to threatened. These extinction values (or threatened status values) may be based on potential future use or non-use values (such as bequest values for future generations, or contribution to the food chain), and like general values, may be species-specific. There is therefore limited quantified literature available specifically to Snake and Columbia River species.

An available value for recovery of a similar population is for Puget Sound Chinook salmon. To invest in a ten-year program of chinook recovery, households were estimated to be willing to pay an average of \$40.49 (2011- dollars) per household.⁵³ This survey was based on a nationwide sample of U.S. households, taken from 2006 through 2009. As an illustrative example, if this average value were held by all 2.8 million households in Washington, this would be a total value of over \$112 million. Population proximity to the location of a species, and related knowledge about the species and its environmental context, can affect these valuations, so a state-specific population may have a higher value per household.⁵⁴

4.2.1.8 Cultural and existence value in stream

The public can hold values for fish in stream even if they never consume fish, fish recreationally, or spend money on whale watching. These values may intersect with cultural, ecosystem contribution, and avoided extinction values, but they extend to a difficult-to-capture conceptual value for abundant native species functioning in a high-quality environment. Cultural and

⁵³ Wallmo and Lew, 2010.

⁵⁴ Note that this may not be true for populations limited to a close geographic area, however. As demonstrated in a survey related to water allocation to aid fish in the Klamath River basin, local populations may have competing demands for resources that may be displaced to aid fish (such as irrigation). This could result in lower local willingness to pay for species aid or recovery. Mansfield, et al., 2012.

existence values can incorporate egalitarian values for others to use or encounter fish species, currently or intergenerationally.

4.2.2 Agreed Order

We do not expect this amendment to result in costs or benefits as compared to the baseline.

4.2.3 Aquatic life use designation

We do not expect this amendment to result in costs or benefits as compared to the baseline, beyond improved clarity.

Chapter 5: Cost-Benefit Comparison and Conclusions

5.1 Summary of the costs and benefits of the amendments

The amendments are unlikely to result in costs. They are, however, likely to result in benefits of:

- Increased salmonid passage, contributing to:
 - Up to 146 thousand more adult spring Chinook salmon returning each year.
 - Up to 117 thousand more returning steelhead each year.
 - Commercial catch values.
 - Recreational catch values.
 - Tribal catch values.
 - Ecosystem contribution value for orcas and other animals.
 - Reduced likelihood of extinction.
 - Cultural and existence value in stream.
- Increased lamprey passage downstream, supporting tribal use and cultural values.

5.2 Conclusion

Ecology concludes, based on reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the adopted amendments, that the benefits of the amendments are greater than the costs.

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Chapter 6: Least-Burdensome Alternative Analysis

6.1 Introduction

RCW 34.05.328(1)(e) requires Ecology to "...[d]etermine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection." The referenced subsections are:

- (a) Clearly state in detail the general goals and specific objectives of the statute that the rule implements;
- (b) Determine that the rule is needed to achieve the general goals and specific objectives stated under (a) of this subsection, and analyze alternatives to rule making and the consequences of not adopting the rule;
- (c) Provide notification in the notice of proposed rulemaking under RCW 34.05.320 that a preliminary cost-benefit analysis is available. The preliminary cost-benefit analysis must fulfill the requirements of the cost-benefit analysis under (d) of this subsection. If the agency files a supplemental notice under RCW 34.05.340, the supplemental notice must include notification that a revised preliminary cost-benefit analysis is available. A final cost-benefit analysis must be available when the rule is adopted under RCW 34.05.360;
- (d) Determine 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;

In other words, to be able to adopt the amendments, Ecology is required to determine that the contents of the amendments are the least burdensome set of requirements that achieve the goals and objectives of the authorizing statute(s).

Ecology assessed alternative amended rule content, and determined whether they met the goals and objectives of the authorizing statutes. Of those that would meet these goals and objectives, Ecology determined whether those chosen for the amended rule were the least burdensome to those required to comply with them.

6.2 Goals and objectives of the authorizing statute: Chapter 90.48 RCW

The goals and objectives of the authorizing statute are:

- Maintain the highest possible standards to insure the purity of all waters of the state consistent with public health and public enjoyment thereof, the propagation and protection of wild life, birds, game, fish and other aquatic life, and the industrial development of the state, and to that end require the use of all known available and

reasonable methods by industries and others to prevent and control the pollution of the waters of the state of Washington.

- Exercise the state's powers, as fully and as effectively as possible, to retain and secure high quality for all waters of the state.
- Work cooperatively with the federal government in a joint effort to extinguish the sources of water quality degradation, while at the same time preserving and vigorously exercising state powers to insure that present and future standards of water quality within the state shall be determined by the citizenry, through and by the efforts of state government, of the state of Washington.

6.3 Alternatives considered and why they were not included

This section discusses alternative rule contents that was considered during this rulemaking. An inherent option would have been not doing a rulemaking at all, which is discussed in Appendix A.

6.3.1 Alternative TDG modifications

We considered several alternative TDG criteria modifications for spring season spill on the Snake and Columbia Rivers, including not modifying existing TDG criteria. These alternatives would not have met goals and objectives of the authorizing statute in terms of protecting fish in a cooperative manner with federal agencies, as increased spills are likely to improve fish survival. Additionally, we believe that these alternatives may have an impact on revenue from electricity generation, where the chosen alternative allows for revenue neutral operations as laid out in the Flexible Spill Agreement. See Section 3.2.1 for discussion.

6.3.2 Align shellfish harvesting criteria with Department of Health

We considered amending the shellfish harvesting criteria to align them with criteria set by the WA Department of Health (DOH). While not the primary (TDG-related) goal of this rulemaking, this alternative was considered as a rulemaking component to revise multiple sections of the rule at once. During development of the rule language, in consultation with DOH, we determined that the scope and timeline of this rulemaking were not appropriate for a revision of this nature. See Appendix A for discussion.

6.3.3 Requiring monitoring for involuntary spills

The proposed rule language requires dams to compare gas bubble trauma incidence to biological thresholds at all times. This alternative would have been more burdensome to covered parties without necessarily achieving the goals and objectives of the statute better, because the spills are not always voluntary. The adopted rule, explicitly excludes comparisons of gas bubble trauma incidence to the biological thresholds during an involuntary spill or within one calendar following involuntary spill.

6.4 Conclusion

After considering alternatives to the amended rule's contents, as well as the goals and objectives of the authorizing statute, Ecology determined that the amended rule represents the least-burdensome alternative of possible rule contents meeting these goals and objectives.

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Chapter 7: Regulatory Fairness Act Compliance

Ecology has analyzed the compliance costs of this rulemaking in previous chapters of this document. Based on this analysis Ecology has determined the adopted amendments do not impose compliance costs on private businesses. Parties regulated by the amendments are all government and publicly owned entities.

Therefore, Ecology is not required to prepare a small business economic impact statement (RCW 19.85.030(1)(a)).

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Appendix A: Administrative Procedure Act (RCW 34.05.328)

A. RCW 34.05.328(1)(a) – Clearly state in detail the general goals and specific objectives of the statute that this rule implements.

See chapter 6.

B. RCW 34.05.328(1)(b) –

1. Determine that the rule is needed to achieve the general goals and specific objectives of the statute.

See chapters 1 and 2.

2. Analyze alternatives to rulemaking and the consequences of not adopting this rule.

We considered four revision topics for this rulemaking, as follows:

(Revision A) Amending the numeric criteria for total dissolved gas (TDG) in the Snake and Columbia rivers

The only alternative we considered was to not move forward with rulemaking. The consequences of not revising the TDG criteria for the Snake and Columbia rivers include:

- Fish passage in the Snake and Columbia rivers for salmon and steelhead will maintain current levels.
- The Flexible Spill Agreement will not be met and the agreement could dissolve.
- The Orca Task Force recommendation for increased water spill over dams for the benefit of Orca prey will not be attained.

(Revision B) Meeting legal obligations made in a 2018 U.S. District Court Stipulated Order of Dismissal between NWEA, EPA, and Ecology to do the following:

- i. Remove two sub-sections in the fresh and marine water temperature criteria relating to an incremental temperature allowance from nonpoint source activities when the water is cooler than the assigned numeric criterion.
- ii. Amend footnote ‘dd’ in Table 240 to clarify that an adjustment of metals criteria (Water Effects Ratio) pursuant to this footnote requires EPA approval pursuant to 33 U.S.C. § 1313(c).

The only alternative we considered for these two revisions was not move forward with rulemaking. The consequence of not revising sections of the rule that we agreed to in the Stipulated Order of Dismissal between NWEA, EPA, and Ecology is that we would be in contempt of a legally binding agreement. Not meeting this agreement may also negatively affect our working relationship with the EPA, and the NWEA.

(Revision C – NOT ADOPTED) Aligning the rule with the Washington State Department of Health (WA DOH) shellfish harvesting program

The only alternative we considered was not move forward with rulemaking to align portions of the shellfish harvesting use criteria with the WA DOH Shellfish Harvesting

Program and the associated Federal Food & Drug Administration's (FDA) National Shellfish Sanitation program (NSSP).

The WA DOH requested Ecology to align this section of the surface water quality standards with state and federal shellfish harvesting program requirements. Due to changes that occurred as a result of Ecology's January 2019 rule adoption for recreational use criteria (RUC), recreation and shellfish harvesting are now protected using different bacterial indicators. The WA DOH formal request was submitted during the comment period of the RUC rulemaking. Now that shellfish harvesting use criteria is 'decoupled' from recreational use criteria, Ecology is able to consider the WA DOH request.

We initially considered this request to be easily resolved by adopting the same bacteria data averaging and duration periods as the WA DOH and FDA programs. This would be a straightforward approach that would align the programs and simplify compliance goals by making federal FDA and Clean Water Act requirements the same. The intent would be to minimize confusion between the two state agency programs that implement these federal programs to ensure that consumers and the public are protected.

We met with WA DOH Shellfish Program managers and staff to determine if our straightforward approach to revise the averaging and duration periods for bacteria monitoring would resolve the differences between the two state programs and bring them into alignment. After discussion, and upon consideration of the many factors that are built into the FDA NSSP that must be met by WA DOH, it became clear that there is not a straightforward "fix" in the shellfish harvesting criteria section of the standards to align these two programs. It will require more research into how other coastal states deal with these overlapping programs and more work with WA DOH Shellfish Program staff to consider what revisions would be necessary to satisfy the intent to align the two state programs.

Aligning shellfish harvesting use criteria will also require more discussions and research with EPA to determine what they can approve as a water quality standard. WA DOH suggested that we simply adopt the "NSSP Guide for the Control of Molluscan Shellfish" (Section II Model Ordinance – Chapter IV. Shellstock Growing Areas). However, this guidance document is revised periodically and EPA does not allow rules by reference in state water quality standards.

We decided not to move forward with Revision C and therefore, it will not be included in the CR-102. We based this decision on discussions with WA DOH, initial research on draft rule language, and concerns about what EPA can approve.

(Revision D) Clarifying the descriptions of marine water aquatic life use designations.

The only alternative we considered was not move forward with rulemaking to clarify the definitions for marine use designations. The consequences of not revising these sections of the rule would be to continue to have unclear language that describes uses in marine waters. Further, a letter from Ecology's Director Maia Bellon to the City of Everett committed to clarifying these sections, so not making these clarifications could result in the City arguing that Ecology did not move forward with its commitments.

Please see the Least Burdensome Alternative Analysis, chapter 6 of this document, for discussion of alternative rule content considered.

C. RCW 34.05.328(1)(c) - A preliminary cost-benefit analysis was made available.

When filing a rule proposal (CR-102) under RCW 34.05.320, Ecology provides notice that a preliminary cost-benefit analysis is available. At adoption (CR-103 filing) under RCW 34.05.360, Ecology provides notice of the availability of the final cost-benefit analysis.

D. RCW 34.05.328(1)(d) – Determine that probable benefits of this 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.

See chapters 1 – 5.

E. RCW 34.05.328 (1)(e) - Determine, after considering alternative versions of the analysis required under RCW 34.05.328 (b), (c) and (d) that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated in chapter 6.

Please see chapter 6.

F. RCW 34.05.328(1)(f) - Determine that the rule does not require those to whom it applies to take an action that violates requirements of another federal or state law.

40 CFR 131.20 requires states and tribes (with primacy for clean water actions) to periodically review and update the Water Quality Standards. The adopted updates are reviewed and approved by the EPA before becoming effective for Clean Water Act actions.

G. RCW 34.05.328 (1)(g) - Determine that the rule does not impose more stringent performance requirements on private entities than on public entities unless required to do so by federal or state law.

The rule revisions B, C, and D do not impose more stringent performance requirements on private entities than on public entities as the rule applies to surface waters of the state. Any entity, whether public or private, must adhere to the rules protecting water quality in the state of Washington.

Rule revision A (TDG in the Snake and Columbia rivers) do not impose more stringent performance requirements on private entities than on public entities because the adjusted criteria will be available, but not required, for use by any dam operator on these rivers that spill water to pass juvenile salmon migrating to the ocean. In addition, these changes are consistent with negotiations that occurred under the Flexible Spill Agreement which was signed by affected federal dam operators and the Bonneville Power Administration.

H. RCW 34.05.328 (1)(h) Determine if the rule differs from any federal regulation or statute applicable to the same activity or subject matter.

No.

If yes, the difference is justified because of the following:

- (i) A state statute explicitly allows Ecology to differ from federal standards. [If checked, provide the citation included quote of the language.]
- (ii) Substantial evidence that the difference is necessary to achieve the general goals and specific objectives stated in chapter 6.

I. RCW 34.05.328 (1)(i) – Coordinate the rule, to the maximum extent practicable, with other federal, state, and local laws applicable to the same subject matter.

We coordinated with other federal, state, and local laws as follows:

(Revision A) Amending the numeric criteria for total dissolved gas (TDG) in the Snake and Columbia rivers.

We worked closely with parties of a Flexible Spill Agreement that was reached for the 2019-2021 spill operations at the eight federal dams on the lower Snake and Columbia rivers. This Agreement was formally announced on December 18, 2018, and signed by the states of Washington and Oregon, the Nez Perce Tribe, the Bonneville Power Administration, U.S. Army Corps of Engineers, and the Bureau of Reclamation. The Flexible Spill Agreement is supported by the states of Idaho and Montana and the Columbia River Inter-Tribal Fish Commission. These amendments are also supported by the Final Report from the Southern Resident Orca Task Force, convened by Governor Jay Inslee.

We are working with federal agencies (EPA, NOAA) to help them be ready for federal approval actions.

(Revision B) Meeting legal obligations made in a 2018 U.S. District Court Stipulated Order of Dismissal between NWEA, EPA, and Ecology.

We worked with EPA during the litigation discussions and they are supportive of these changes. The revisions will help EPA with their obligations in this lawsuit.

(Revision C – NOT ADOPTED) Aligning the rule with the Washington State Department of Health (WA DOH) shellfish harvesting program

We worked with WA DOH to consider how the revisions to the shellfish harvesting use section impacts the WA DOH rules that overlap with the Ecology's rules.

(Revision D) Clarifying the descriptions of marine water aquatic life use designations.

We worked with EPA to ensure the revisions are approvable.