Final Regulatory Analyses:

Including the:

- 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

By

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For the

Water Quality Program

Washington State Department of Ecology

Olympia, Washington

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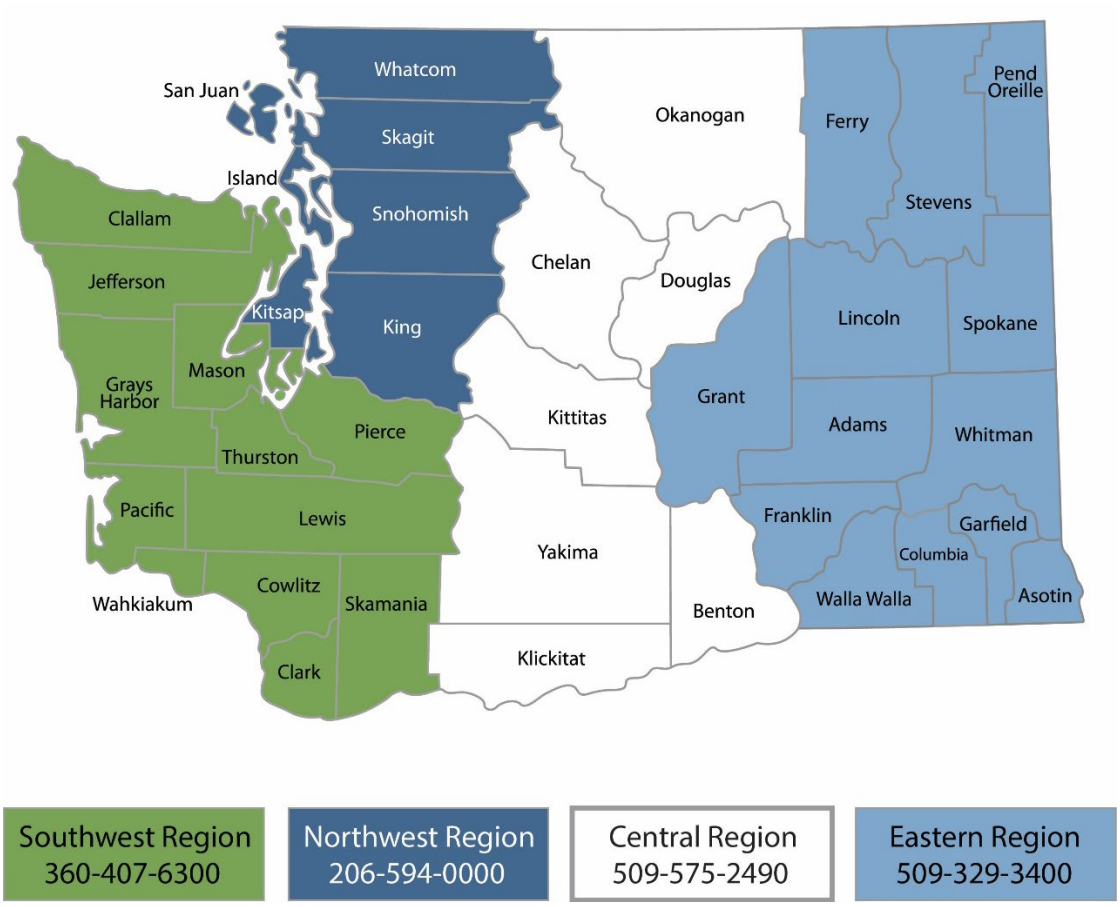

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Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington

Water Quality Program
Washington State Department of Ecology

Olympia, WA

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DEPARTMENT OF
ECOLOGY
State of Washington

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Abbreviations and Acronyms

APA	Administrative Procedure Act
CBA	Cost Benefit Analysis
CFR	Code of Federal Regulations
CWA	Clean Water Act
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
ESA	Endangered Species Act
GP	General Permit
IP	Individual Permit
LBA	Least Burdensome Alternative
MGD	Million Gallons per Day
O&M	Operations and Maintenance
PPM	Parts Per Million
pH	potential of Hydrogen
RCW	Revised Code of Washington
RFA	Regulatory Fairness Act
SU	Standard Units
TMDL	Total Maximum Daily Load
UAA	Use Attainability Analysis
ug/L	Micrograms Per Liter
USFWS	United States Fish and Wildlife Service
WAC	Washington Administrative Code
WLA	Wasteload Allocations
WQ	Water Quality
WQS	Water Quality Standards

Executive Summary

This report presents the determinations made by the Washington State Department of Ecology as required under Chapters 34.05 RCW and 19.85 RCW, for the adopted amendments to the Water Quality Standards for the 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

Washington's administrative code contains numeric, biologically based, aquatic life criteria ("biologically based criteria" from here on where appropriate) for temperature, dissolved oxygen (DO), and pH limits. Biologically based criteria are broadly protective for all surface waters across the state and determined by designated use categories. Along with aquatic life toxics criteria like copper, lead, and zinc, these form the basis for water quality actions including permit limits.

Biologically based criteria however do not always capture the unique chemical, physical, or genetic characteristics that exist in any one system. Inconsistencies may be due to natural processes or seasonal conditions that vary across geography like a water's source, natural shading, and flow rate, among others. For example, a naturally low-flowing stream in a natural prairie without trees or human alteration may have seasonally higher temperatures than the biologically based criteria. Here, waters may fail to meet water quality standards because of a naturally occurring condition, yet current regulations still require associated permittees to make improvements.

To prevent this, we are adopting rule amendments that address EPA's 2021 disapproval of previously-approved tools and processes used to determine natural conditions in our standards. Nearly all states have some process of this kind. Likewise, Washington needs natural conditions provisions that recognizes some surface waters naturally do not always meet biologically based criteria throughout the year to more effectively implement our Clean Water Act programs.

The rule amendments consist of:

Revisions to existing criteria:

- Updates to the natural conditions provision to limit use to aquatic life criteria and site-specific processes.
- Updated allowances for human impacts to fresh and marine waters for dissolved oxygen and temperature when natural conditions are used to determine water quality criteria.

- Updates that allow natural conditions to be used as a basis for developing site-specific criteria under WAC 173-201A-430.

Other changes:

- Add definitions for the performance-based approach and local and regional sources of human-caused pollution.
- Added a new section detailing the use of the performance-based approach and applicable aquatic life criteria.
- Added a reference to a document in the water quality standards that details the methodology of the performance-based approach.

Minor non-substantive edits:

- One update to reflect the latest and current revision for a referenced EPA document

These adopted regulations taken together are expected to restore Ecology's ability to establish site-specific numeric criteria based on natural conditions ("natural conditions criteria" from here on where appropriate) that are protective of existing and designated aquatic life uses. In particular, the amendments will allow future TMDL studies and those currently under development to consider the natural conditions of a water body in the context of aquatic life through two **optional** processes:

1. Natural conditions as the scientific basis for proposing criteria under WAC173-201A-430 applicable for any aquatic life criteria,
2. The performance-based approach applicable to developing temperate, DO and pH criteria only.[2]

Meeting statewide biologically based criteria, and site-specific criteria based on natural conditions, will often require some level of mitigating technology and behavior by permittees. However, waters under consideration for determining natural conditions criteria will likely have already failed to meet their assigned biologically based criteria because of natural factors. Therefore, criteria established based on the natural conditions process adopted by this rule are likely easier for permittees to meet and represent a benefit for the purposes of this FRA.

The most likely action to occur because of the rule from a permittee perspective is meeting wasteload allocations based on natural conditions criteria developed through the total maximum daily load (TMDL) process using the performance-based approach referenced in the

[2] Option 1 requires additional rulemaking by Ecology. For this reason we include section 2.4.3 and other mentions of the amendment throughout this document to be complete but emphasize that an analysis of the impacts of option 1, if pursued by Ecology to establish site-specific natural conditions criteria, is relegated to subsequent rulemakings.
Except where noted, impacts hereafter are referring to Ecology's use of the performance-based approach.

adopted rule—compared to meeting wasteload allocations based on statewide biologically based criteria without the rule.[3]

Historical TMDLs reviewed by the study team and the general logic of natural conditions provisions help confirm that criteria developed using site-specific factors and seasonal variation would be more easily met through fewer actions or investments—and avoid contradictory situations in which permittees need to improve the quality of the water they discharged to beyond what is achievable without any human influence.[4]

We cannot fully quantify the extent of potential benefits of the adopted rule because future TMDL studies have not been performed yet. Instead, we filter future planned TMDL studies for temperature, pH and DO criteria with potential for violation due to natural conditions, and prioritized in the next 20 years, to identify 3,918 associated permits. We then provide a pair of illustrative examples in which we apply small temperature and DO changes at the permit level comparable to just one scenario when meeting natural conditions criteria determined using tools and processes adopted by the rule. We estimate a total 20-year present value benefit of $741 million through this exercise, but stress that it represents partial benefits and should be considered conservative.

Additional, qualitative, benefits of the rule include the avoided costs of meeting numeric criteria for freshwater pH compared to a natural condition criteria, and any avoided cost of independent science by permittees in support of Ecology performing site-specific study.

As this rule makes no requirements that natural conditions be used by Ecology to develop site-specific water quality criteria (in other words, Ecology would only use natural conditions to develop site-specific criteria when deemed relevant and appropriate), not determining natural conditions would also, by definition, carry no costs or benefits compared to the baseline (existing laws and rules without this rulemaking).

The baseline conditions and adopted rule are protective of aquatic life and designated uses. Therefore, we do not expect new costs or benefits from a material change in related ecosystem services.

We conclude that the benefits of the rule amendments are greater than the costs. This is based on a reasonable understanding of the quantifiable and qualitative costs and benefits likely to arise from the adopted rule amendments, as compared to the baseline.

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[3] See other potential actions and baseline comparisons detailed in Section 3.

[4] We note that if it were determined that for one part of the year natural conditions criteria are more stringent than the biologically based criteria (e.g. lower temperatures in winter months), permittees might face new cost during this period compared to baseline under the adopted rule. However, other aspects of the rule like the human allowance and limiting allowances to local and regional sources could mitigate these to an unknown degree. The net impact on costs would depend on the relative size of new costs and cost-savings. Ultimately, data limitations prevent us from quantifying a forecast of how often this might occur and the net cost of such a scenario.

After considering alternatives, within the context of the goals and objectives of the authorizing statute, we determined that the adopted rule represents the least-burdensome alternative of possible rule requirements meeting the goals and objectives.

We conclude that the rule amendments are not likely to result in compliance costs for any businesses. The rule is likely to result only in cost-savings for dischargers, as compared to the baseline. Based on this analysis, Ecology is exempt from performing additional analyses under the Regulatory Fairness Act (RFA), under RCW 19.85.025(4) which states that, "This chapter does not apply to the adoption of a rule if an agency is able to demonstrate that the adopted rule does not affect small businesses." Moreover, by not imposing compliance costs, the adopted rule amendments do not meet the RFA applicability standard under RCW 19.85.030(1)(a).

A note on Finalization of the Performance-Based Approach Document

During the public comment period for this rulemaking, Ecology received numerous comments regarding the draft performance-based approach document. These comments allowed us to recognize that additional work on this document is needed.

Ecology plans to make edits to this publication based on feedback received and provide another opportunity for public comment on the revised draft of the performance-based approach document. Following the public comment period, we will edit the document based on comments received.

Because the performance-based approach document is only referenced, and not adopted, as part of the Water Quality Standards regulations at WAC 173-201A-470, we are not required nor will be conducting a separate formal rulemaking to revise this document. However, we feel it is important to provide another opportunity for public and Tribal input on a revised draft. Further, this document, which governs how Ecology will use the performance-based approach for site-specific criteria development, must meet federal CWA requirements, which includes a public review process and EPA review and approval. Therefore, until we publish a final version of the performance-based approach document and receive EPA approval following their review, we will not be able to use the performance-based approach document for any federal CWA actions.

Because the performance-based approach is at the core of Ecology's ability to determine site-specific natural conditions criteria without additional rulemakings, note that the bulk of the impacts described in this FRA will not be realized until EPA approval.

Chapter 1: Background and Introduction

1.1 Introduction

This report presents the determinations made by the Washington State Department of Ecology, as required under Chapters 34.05 RCW and 19.85 RCW, for the adopted Water Quality Standards for the 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. 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 of this document provides the documentation for these determinations.

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

All determinations are based on the best available information at the time of publication.

1.1.1 Background

The distribution, health, and survival of many aquatic species in Washington directly or indirectly depend on the quality of the water in which they live. Changes in water temperature, for example, can materially impact the life of a salmonid given that cooler river water temperatures in the fall signal upstream migration. Human activities can directly contribute to thermal input to rivers, reduce groundwater that moderates stream temperatures, or reduce the capacity of a river to absorb heat. Importantly, seasonal swings in temperature and

variations in climatic conditions can also push temperatures outside the optimal range (USEPA, 2003).

DO, another important criterion, is the amount of oxygen that is present in water, which all aquatic animals need to breathe. Low levels of oxygen (hypoxia) or no oxygen levels (anoxia) can occur when excess organic materials, such as large algal blooms, are decomposed by microorganisms. As DO levels drop, some sensitive animals may move away, decline in health, or die (EPA, 2023). DO can be affected directly by local human actions such as contributing organic and inorganic materials that are metabolized by organisms (consuming available oxygen), and by actions that raise the temperature of waterbodies (thus reducing the solubility of oxygen). Like temperature, DO levels also fluctuate periodically, seasonally, and as part of the daily ecology of the aquatic resource (Ecology, 2018).[5]

Variation in pH above (basic) or below (acidic) safe ranges may also physiologically stress species and can result in decreased reproduction, decreased growth, disease, or death. While human activity can contribute to fluctuations in pH, pH levels vary naturally with the draining of wetlands or floodplains, substrate composition, and dissolved vegetative material or photosynthetic activity (EPA, 2024). Other toxic pollutants known to threaten aquatic life in a water body such as copper, lead, and zinc, may also come from human and natural contributors.

This rulemaking seeks to establish provisions that allow the use of natural conditions as a basis when determining aquatic life criteria through site-specific rulemaking. For temperature, DO and the potential of hydrogen ion concentration in freshwater (pH) specifically, this rulemaking provides an optional pathway for Ecology to determine these criteria based on natural conditions without subsequent rulemaking through a performance-based approach. In waters where temperature, DO, and pH natural conditions apply, this rulemaking sets human actions, or allowances. The rulemaking also includes definitions and reference to methodological documentation supporting these changes.

Biologically Based Numeric Criteria

Washington's administrative code contains biologically based numeric water quality criteria ("biologically based criteria" hereafter) determined by designated use categories (see for example temperature in 173-201A-200(1)(c) WAC and 173-201A-210(1)(c) WAC, and DO in 173-201A-200(1)(d) WAC and 173-201A-210(1)(d) WAC), as well as a complete list of aquatic life toxics criteria in 173-201A-240 WAC.[6] Designated uses, sometimes called "beneficial uses," describe uses specified in Washington's water quality standards, and use designations are made for each surface water body or water body segment (see 173-201A-600 WAC and 173-201A-610 WAC).

[5] Other toxic pollutants known to threaten aquatic life in a water body such as copper, lead, and zinc, may also come from human and natural contributors. In this document, we predominantly focus our attention on temperature, DO, and pH given that using natural conditions to establish other criteria will require additional rulemaking and regulatory analysis (see Section 2.4).

[6] Note that 173-201A-610 WAC contain all site-specific criteria where applicable.

Biologically based criteria are designed to protect designated uses and form the basis for water quality actions including permit limits. There are six designated uses related to aquatic life for freshwater bodies including:

- Char spawning and rearing,
- Core summer salmonid habitat,
- Salmonoid spawning, rearing, and migration,
- Salmonid rearing and migration only,
- Nonanadromous interior redband trout, and
- Indigenous warm water species

There are four marine water designated uses related to aquatic life:

- Extraordinary quality,
- Excellent quality,
- Good quality, and
- Fair quality.

Each designated use is associated with a biologically based criteria to be protective of aquatic life. For example, the biologically based criteria for freshwater segments designated char spawning and rearing is 12 °C (53.6 °F). The biologically based criteria for marine water designated Excellent quality is 16°C (60.8 °F), and so on.[7]

Natural Condition Provisions at Ecology

Biologically based criteria do not always capture the unique chemical, physical, or genetic characteristics that exist in any one system. Inconsistencies may be due to natural processes or seasonal conditions that vary across geography like water source, natural shading, and flow rate among others. For example, a naturally low-flowing stream in a natural prairie without any human alteration may have seasonally higher temperatures than the biologically based criteria set to protect aquatic life statewide.

In the example above, a difficult situation may arise in which water bodies fail to meet water quality standards because of natural conditions, yet regulations require their improvement. Permitting and enforcement would be costly if not impossible in this regulatory environment. Not only would dischargers need to limit their impacts, but they would be required to bring water quality to a level that is potentially unachievable, even if no discharge existed.

To overcome these and similar challenges, the US Environmental Protection Agency (EPA) recommends that generalized aquatic life criteria be further refined through adoption of local criteria to protect unique characteristics inherent to a specific water (USEPA, 2015).[8] In this

[7] See tables 200(1)(c), 200(1)(d), 210(1)(c), and 210(1)(d) in 173-201A WAC for additional details.
[8] https://www.epa.gov/sites/default/files/2015-02/documents/natural-conditions-framework-2015.pdf.

way, Ecology's regulatory work has relied on "natural condition provisions" to reconcile numeric criteria and local conditions before human alteration.[9]

Natural conditions provisions were adopted into the first water quality standards for the state in 1967 which placed limits on non-natural increases for temperature and allowed limited modifications when natural water quality conditions dropped due to "unusual and not reasonably foreseeable" natural causes.

The 1973 updates to the Water Quality Standards (WQS) introduced a general natural conditions provision, stating that "[w]henever the natural conditions are of a lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria." This was further refined in 2003 and migrated to WAC 173-201A-260:

> "It is recognized that portions of many water bodies cannot meet the assigned criteria due to the natural conditions of the water body. When a water body does not meet its assigned criteria due to natural climatic or landscape attributes, the natural conditions constitute the water quality criteria."

Human action values were subsequently adopted to limit temperature (WAC 173-201A-200(1)(c)(i), -210(1)(c)(i))) and DO (WAC 173-201A-200(1)(d)(i), -210(1)(d)(i))) increases caused by human activity. For example, with respect to freshwater temperature (WAC 173-201A-200(1)(c)(i)):

> "When a water body's temperature is warmer than the criteria in Table 200 (1)(c) (or within 0.3°C (0.54°F) of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F)"

EPA Disapproval

On Nov. 19, 2021, the EPA reconsidered and disapproved some of Ecology's previously approved natural conditions provisions and criteria in Surface Water Quality Standards (USEPA, 2021)[10]. EPA disapproved the following WQS:

- A general provision that allows a water body's natural conditions to serve as the water quality standard. [WAC 173-201A-260(1)(a)]
- A specific provision that sets the temperature requirement to how cool a water body would be without human alterations. This provision also limits temperature increases caused by human activity cumulatively to less than 0.3 degrees Celsius. [WAC 173-201A-200(1)(c)(i), -210(1)(c)(i))]

[9] See WAC 173-201A-260(1); 173-201A-200(1)(c)(i); -210(1)(c)(i)); 173-201A-200(1)(d)(i); -210(1)(d)(i)).

[10] In February 2014, the Northwest Environmental Advocates (NWEA) filed a complaint with the United States District Court for the Western District of Washington (Case No. 2:14-cv-0196-RSM) over EPA's 2008 CWA Section 303(c) approval. In October 2018, the Court issued an Order Granting a Stay (Dkt. 95) pending EPA's reconsideration of its prior determinations and subsequently granted an extension (Dkt. 118) for EPA to complete its reconsideration of these natural condition provisions by November 19, 2021. See https://fortress.wa.gov/ecy/ezshare/wq/standards/EPA_ActionsNCC_Nov192021.pdf for EPA's decisions.

- A specific provision that sets the dissolved oxygen requirement to the highest concentration a water body can achieve without human alterations. This provision also states that human activity cannot cumulatively cause dissolved oxygen in a water body to decrease more than 0.2 mg/L. [WAC 173-201A-200(1)(d)(i), -210(1)(d)(i)]

EPA stated in its justification of disapproving WAC 173-201A-260(1)(a) that the provision is broadly drafted and does not specify the types of criteria or pollutants to which it applies. Therefore, such a provision could apply to a wide range of naturally occurring pollutants, including toxic pollutants, and even allow an exception from otherwise applicable numeric human health criteria. This is not consistent with EPA's interpretation of the relationship between natural conditions and protection of designated human health uses. Washington's adopted provision did not limit in scope the natural conditions provision to aquatic life uses or specific pollutants.

EPA noted that there are no changes necessary to address the disapproval. Washington's WQS currently include applicable numeric criteria that EPA has determined to be protective of designated uses. EPA did, however, provide discretionary recommendations. EPA noted that it continues to believe an "appropriately drafted natural condition provision can serve an important role in state WQS by reflecting a naturally occurring spatial and temporal variability in water quality that is protective of uses" (Opalski, 2021). EPA notes that a new provision for natural conditions narrowly tailored to aquatic life uses could be adopted. Alternatively, the adoption of a performance-based approach could be used to establish aquatic life criteria reflecting the natural condition for specific pollutants.

In their justification for disapproving human allowance provisions in WAC 173-201A-200 and -210, EPA noted that it had disapproved the general provision in WAC 173-201A-260(1)(a) (as discussed above). Without an approved WQS that allows for natural conditions to constitute the applicable water quality criteria, then the applicable criteria for temperature and DO are the numeric criteria. The natural condition provisions for allowable human contribution are not based on these biologically based numeric criteria, but on the natural condition of the water body. Further, these provisions do not allow for insignificant exceedances to the applicable biologically based criteria as a result of human actions. Thus, EPA disapproved these provisions because such impacts are not tied to approved criteria that are in effect for Clean Water Act (CWA) purposes.

EPA noted again that no changes were necessary to address the disapproval, but that Washington could adopt new tools and processes for determining natural conditions criteria specific to temperature or DO. For instance, a performance-based approach for establishing these criteria representative of the natural condition of a water body could be adopted into the WQS. Another option would be for Washington to adopt numeric temperature and dissolved oxygen criteria that account for natural conditions using the best available relevant data. This could include site-specific criteria. EPA notes that Washington could also choose to adopt a new WQS provision that allows for human actions to cause insignificant decreases in DO or increases to temperature.

1.2 Reasons for rule amendments

We are adopting rule amendments to address EPA's 2021 disapproval of previously-approved natural condition provisions in our standards.

It is important that we have a provision in the WQS recognizing that conditions in some surface waters naturally do not meet water quality criteria at all times throughout the year. Nearly all states have some provision of this kind. Washington needs tools and processes for determining natural conditions to effectively implement our Clean Water Act programs.

1.3 Summary of rule amendments

In this rulemaking, we are using information from previous ESA consultations, prior EPA biological evaluations, EPA memorandums, EPA guidance documents, exploration of how other states address natural conditions, and the latest scientific information to adopt natural conditions criteria that will protect designated and existing uses in Washington, while recognizing that some waters in Washington do not meet applicable biologically based numeric criteria due to natural or seasonal factors (see *inter alia* USEPA 2003, 2005, 2007, 2009, 2015b, 2021, 2023; USFWS, 2008).

The rule amendments consist of:

Revisions to existing criteria:

- Updates to the natural conditions provision to limit use to aquatic life criteria and site-specific processes.
- Updated allowances for human impacts to fresh and marine waters for dissolved oxygen and temperature when natural conditions are used to determine water quality criteria.
- Updates that allow natural conditions to be used as a basis for developing site-specific criteria under WAC 173-201A-430.

Other changes:

- Add definitions for the performance-based approach and local and regional sources of human-caused pollution.
- Added a new section detailing the use of the performance-based approach and applicable aquatic life criteria.
- Added a reference to a document in the water quality standards that details the methodology of the performance-based approach.

Minor non-substantive edits:

- One update to reflect the latest and current revision for a referenced EPA document

1.4 Document organization

The chapters of this document are organized as follows:

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

Chapter 2: Baseline and Rule Amendments

2.1 Introduction

We analyzed the impacts of the adopted rule amendments relative to the existing rule, within the context of all existing requirements (federal and state laws and rules). This context for comparison is called the baseline and reflects the most likely regulatory circumstances that entities would face if Ecology does not adopt the rule.

2.2 Baseline

The baseline is what allows us to make a consistent comparison between the state of the world with and without the adopted rule amendments. Should Ecology not adopt the rulemaking, administering water quality actions is determined by existing laws and rules discussed in further detail in the remainder of this chapter.[11] Specifically, the baseline for this rulemaking includes:

- Clean Water Act (33 U.S.C §§ 1251 et seq.)
- Water Pollution Control Act (90.48 RCW)
- Impaired Water body Listing and Cleanup Plan (40 CFR 130.2, Ecology 2023b)
- State Surface Water Quality Standards (WAC 173-201A)
- Permitting Guidelines and Compliance (Ecology, 2018)

The reminder of this section discusses the baseline in greater detail.

2.2.1 Clean Water Act

Section 303(c)(2)(A) states, about surface water quality standards:

> "…Such standards shall be such as to protect the public health or welfare, enhance the quality of the water and serve the purposes of this Chapter. Such standards shall be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes and agricultural, industrial and other purposes and also taking into consideration their use and value for navigation."

On standards, Section 304(a) cites that states should:

[11] Note again that we focus our attention predominantly on water quality actions related to temperature, DO and pH. That is because the adopted rule provides an pathway for these criteria to consider natural conditions through a performance-based approach without additional rulemaking. For all others, a site-specific study is needed, which will require a separate rulemaking and regulatory analysis.

(1) Establish numeric criteria values based on: 304(a) Guidance; 304(a) Guidance modified to reflect site-specific conditions; or other scientifically defensible methods.[12]

(2) Establish narrative criteria or criteria based upon biomonitoring methods where numerical criteria cannot be established or to supplement numerical criteria.

2.2.2 Water Pollution Control Act

RCW 90.48.010 states, about water quality standards:

> It is declared to be the public policy of the state of Washington **to 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. Consistent with this policy, the state of Washington will exercise its powers, as fully and as effectively as possible, to retain and secure high quality for all waters of the state. The state of Washington in recognition of the federal government's interest in the quality of the navigable waters of the United States, of which certain portions thereof are within the jurisdictional limits of this state, proclaims a public policy of working 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.

RCW 90.48.035 states, about rule-making authority:

> The department shall have the authority to, and shall promulgate, amend, or rescind such rules and regulations as it shall deem necessary to carry out the provisions of this Chapter, including but not limited to rules and regulations relating to standards of quality for waters of the state and for substances discharged therein in order to maintain the highest possible standards of all waters of the state in accordance with the public policy as declared in RCW 90.48.010.

2.2.3 Impaired Water body Listing and Cleanup Plan

The CWA section 303(d) establishes a process to identify and clean up polluted waters. Every two years, all states are required to perform a water quality assessment of surface waters in

[12] Where other scientifically defensible methods include setting site-specific criteria equal to natural conditions (See https://www.epa.gov/sites/default/files/2015-02/documents/natural-conditions-framework-2015.pdf.)

the state, including all the rivers, lakes, and marine waters where data are available. Ecology compiles its own water quality data and federal data and invites other groups to submit water quality data they have collected. All data submitted must be collected using appropriate scientific methods and follow an approved Quality Assurance Project Plan.[13] The assessed waters are placed in categories that describe the status of water quality. Once the assessment is complete, the public is given a chance to review and provide comments. The final assessment is formally submitted to the EPA for approval.

Waters with beneficial uses – such as aquatic habitat– that are impaired by pollutants are placed in the polluted water category in the water quality assessment 303(d) list. These water bodies fall short of state surface water quality standards and are not expected to improve within the next two years**.** Waters placed on the 303(d) list require the preparation of a water cleanup plan (TMDL) or other approved water quality improvement project.[14] The improvement plan identifies how much pollution needs to be reduced or eliminated to achieve clean water and allocates that amount of required pollution reduction among the existing sources.

Ecology's assessment of which waters to place on the 303(d) list is guided by federal laws, state water quality standards, and the Policy on the Washington State Water Quality Assessment (Ecology 2023b). This policy describes how the standards are applied, requirements for the data used, and how to prioritize TMDLs, among other issues.[15] In addition, even before a TMDL is completed, the inclusion of a water body on the 303(d) list can reduce the amount of pollutants allowed to be released under permits issued by Ecology.

2.2.4 State Surface Water Quality Standards

State surface water quality standards form the initial basis for federal 303(d) listings and TMDLs described in section 2.2.2. Relevant rules that determine standards without this rulemaking include the following.[16]

Biologically based criteria

Fresh water aquatic life designated uses and criteria WAC 173-201A-200, and marine water designated uses and criteria WAC 173-201A-210, establish Washington's biologically based numeric criteria for freshwater temperature, marine temperature, freshwater DO, saltwater

[13] See https://apps.ecology.wa.gov/publications/documents/2110032.pdf.
[14] The term "TMDL" is often also applied to the process to determine a TMDL ("Ecology is doing a TMDL") and to the final documentation of the TMDL ("Ecology has submitted a TMDL").
[15] A TMDL is the sum of the Load Allocations and Wasteload Allocations, plus reserves for future growth and a margin of safety, which are equal to the Loading Capacity of the water body. This is a requirement of Section 303(d) of the federal Clean Water Act and is defined in 40 CFR 130.2(i). See https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Total-Maximum-Daily-Load-process for additional details on the TMDL process.
[16] Note that 90.48 RCW discussed above is the authorizing statute for opening WAC 173-201A discussed below.

DO, and freshwater pH —except for criteria applicable to specific water body segments found in Table 602 (173-201A-602).[17]

As discussed in Section 1.1.2, WAC 173-201A-260(1)(a), WAC 173-201A-200(1)(c)(i), -210(1)(c)(i)) and WAC 173-201A-200(1)(d)(i) -210(1)(d)(i) are not in effect for federal actions. This means that **without the rule, Ecology cannot determine site-specific criteria based on unique natural conditions of a water body** for the purposes of federal actions, such as 303(d) listings and TMDLs**. In the baseline, entities associated with water bodies that exceed biologically based criteria in WAC 173-201A-200 & -210 for temperature, DO, and pH remain subject to numeric criteria and associated penalties.**

Site-Specific Criteria

Ecology can develop new site-specific criteria. **Without the rule, natural conditions cannot form the basis for site-specific criteria; only biologically based numeric criteria determined from aquatic life species studies.[18]**

Currently under the baseline, a private entity wishing to establish a site-specific criterion may evaluate, develop, and present the scientific support to Ecology for such an action. However, Ecology would carry out the full process of considering, proposing, and adoption through rulemaking.[19]

WAC 173-201A-430 states, about establishing site-specific criteria:

> (1) Where the attainable condition of existing and designated uses for the water body would be fully protected using an alternative criterion, site-specific criteria may be adopted. (a) The site-specific criterion must be consistent with the federal regulations on designating and protecting uses (currently 40 C.F.R. 131.10 and 131.11); and (b) The decision to approve a site-specific criterion must be subject to a public involvement and intergovernmental coordination process.
>
> (2) The site-specific analyses for the development of a new water quality criterion must be conducted in a manner that is scientifically justifiable and consistent with the assumptions and rationale in "Guidelines for Deriving National Water Quality Criteria for the Protection of Aquatic Organisms and their Uses," EPA 1985; and conducted in accordance with the procedures established in the "Water Quality Standards Handbook," EPA 1994, as revised.
>
> (3) The decision to approve the site-specific criterion must be based on a demonstration that it will protect the existing and attainable uses of the water body.

[17] Note that in addition to tables in 173-201A-200 and -210, 1 DADMax values and supplemental numeric spawning criteria described in subsequent subsections may also apply.

[18] Based on the scientific approach detailed in EPA (1985) guidelines.

[19] Developing site-specific criteria under 173-201A-430 is a resource intensive process (Ecology, 2004). The need to balance resources with other water quality activities—such as permit management and TMDL work— means that site-specific criteria are taken on sparingly.

(4) Site-specific criteria are not in effect until they have been incorporated into this chapter and approved by the USEPA."

2.2.5 Permitting Guidelines and Compliance

Permitting guidelines help determine how permit writers approach different permit scenarios. They assist permit writers in how to think through meeting water quality criteria for protection of aquatic life to permittee-specific requirements. While not a legal requirement, guidance informs how aquatic life criteria might impact permittees who discharge effluent to water bodies. Therefore, in describing the baseline for this analysis of the rule amendments, it is necessary to consider the permitting guidelines in the baseline and amended scenarios, as they will contribute to the cost and benefit estimates and the discussed impacts.

Ecology uses the Water Quality Program Permit Writer's Manual (Ecology, 2018) for technical guidance when developing wastewater discharge permits.[20] With respect to temperature, DO, and pH limits, permit writers would first determine if an applicable TMDL has been approved, or is in development before determining whether effluent will cause, or have reasonable potential to cause or contribute to, violation of water quality standards. If an approved TMDL exists, wasteload allocations (WLA) described in the TMDL are used to determine appropriate water quality-based effluent limits.

If no TMDL exists, permit writers determine whether effluent will cause, or have reasonable potential to cause or contribute to, a violation of water quality standards. If so, then effluent limits are established using methods described in the permit writer's manual to meet biologically based numeric criteria.

Occasionally, the permit writer will have information that the receiving water concentration at the point of discharge during critical condition does not meet the aquatic life criteria and that the receiving water body is not listed on the 303(d) list.[21] In these cases, where the excursion is documented with data that meets the criteria for 303(d) listing, the permit writer should develop interim effluent limits based on existing performance (no increase in loading) to be placed in the permit.[22] The periodic Water Quality Assessment will evaluate the data and subsequently categorize the water body. If the water body is impaired, it will be put in Category 5 on the 303(d) list and prioritized for a TMDL.

Past or existing compliance

The baseline includes past or existing compliance behavior in response to federal and state laws, rules, permits, guidance, and policies. These include currently implemented TMDLs that set WLAs and other necessary actions to protect the natural conditions of the water, and site-

[20] https://apps.ecology.wa.gov/publications/documents/92109.pdf.
[21] Critical condition refers to the time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.
[22] Where loading refers to the mass of a substance that passes particular point in a specified amount of time.

specific criteria. This behavior might include, but is not limited to, existing treatment technologies, production processes, and effluent volumes.

Future compliance

The baseline includes future compliance behavior without the rule. This includes response to in-development and future TMDL activity and permit actions related to temperature, DO, and pH. **In the absence of this rule, meeting freshwater temperature and marine DO on an impaired water body would eventually subject permits to a TMDL based on statewide biologically based criteria (WAC 173-201A) or criteria established under a biologically based site-specific study.**

2.3 Rule amendments

Rule amendments consist of:

Revisions to existing criteria:

- Updates to the natural conditions provision to limit use to aquatic life criteria and site-specific processes.
- Updated allowances for human impacts to fresh and marine waters for dissolved oxygen and temperature when natural conditions are used to determine water quality criteria.
- Updates that allow natural conditions to be used as a basis for developing site-specific criteria under WAC 173-201A-430.

Other changes:

- Add definitions for the performance-based approach and local and regional sources of human-caused pollution.
- Added a new section detailing the use of the performance-based approach and applicable aquatic life criteria.
- Added a reference to a document in the water quality standards that details the methodology of the performance-based approach.

Minor non-substantive edits:

- One update to reflect the latest and current revision for a referenced EPA document

2.4 Regulatory Impacts by Component

2.4.1 Updates to the natural conditions provision to limit use to aquatic life criteria and site-specific processes.

Baseline

State

On account of EPA's disapproval, there is no state baseline associated with natural conditions currently approved for federal actions (USEPA, 2021). Previous EPA-approved state regulations at WAC 173-201A-260(1)(a) states that:

"…portions of many water bodies cannot meet the assigned criteria due to the natural conditions of the water body. When a water body does not meet its assigned criteria due to natural climatic or landscape attributes, the natural conditions constitute the water quality criteria."

Federal

The EPA's interpretation of the Clean Water Act allows for site-specific criteria to be set to natural conditions (see 2015 guidance on site-specific conditions and EPA's Action on Revisions to the Washington State Department of Ecology's Surface Water Quality Standards for Natural Conditions Provisions).[23, 24]

Adopted Rule:

- Changes "assigned criteria" to "assigned aquatic life criteria" in WAC 173-201A-260(1)(a) to clarify that natural conditions apply only to aquatic life.
- Expands WAC 173-201A-260(1)(a) to provide information to determine natural conditions criteria values, which reflect EPA's recommendations that there is a binding procedure in a state's WQS to determine site-specific natural background (Davies, 1997).[25] These include the addition of:
    - WAC 173-201A-260(1)(a)(i) Aquatic life criteria based on natural conditions for temperature or dissolved oxygen for fresh or marine waters, or pH for fresh waters, will be derived by following either the site-specific criteria approach pursuant to WAC 173-201A-430 or the performance-based approach pursuant to WAC 173-201A-470.

    And

    - WAC 173-201A-260(1)(a)(ii) For all aquatic life parameters other than those listed in WAC 173-201A-260(1)(a)(i), aquatic life criteria based on natural conditions will be derived by following the site-specific criteria approach pursuant to WAC 173-201A-430.

Expected Impact

This amendment, in combination with others in this rulemaking, is expected to restore the tools and processes used by Ecology to determine natural conditions criteria that are fully protective of existing and designated aquatic life uses. In particular, the amendments will allow future

[23] https://www.epa.gov/sites/default/files/2015-02/documents/natural-conditions-framework-2015.pdf.
[24] https://fortress.wa.gov/ecy/ezshare/wq/standards/EPA_ActionsNCC_Nov192021.pdf.
[25] Where natural background is defined as "background concentration due only to non-anthropogenic sources, i.e., non-manmade sources."

TMDL studies and those currently under development to consider the natural conditions of a water body in the context of aquatic life through two optional processes:

1. Natural conditions as the scientific basis for proposing criteria under WAC 173-201A-430 applicable for any aquatic life criteria (see section 2.4.3),
2. The performance-based approach applicable to developing temperate, DO and pH criteria only (see section 2.4.4, 2.4.5, 2.4.6)

Natural conditions criteria are generally pursued when a water body does not meet statewide numeric criteria and the natural conditions of the water body are suspected of contributing to the failure to meet the water quality standard. In this rulemaking, applying the tools and processes for determining natural conditions criteria and insignificant human allowances will provide protection for aquatic life while recognizing the characteristics and seasonal attributes unique to a specific water body. This likely constitutes a **benefit** because criteria set through natural conditions provisions will typically be more achievable by permittees than those based on numeric criteria.

Note that the costs of TMDL studies and associated data collection, labor, and other resources are borne by Ecology. Therefore, amending the TMDL process through this rulemaking to include natural conditions does not represent new costs to private entities.

Also note that biologically based criteria, and natural conditions criteria determined using tools and processes adopted by this rulemaking are both protective of aquatic life. Thus, the amendments are not expected to materially impact ecosystem services or cultural values otherwise associated with changes to aquatic life.

Using option 1 above requires additional rulemaking by Ecology. For this reason we include section 2.4.3 and other mentions of the amendment throughout this document to be complete but emphasize that an analysis of the impacts of option 1, if pursued by Ecology to determine site-specific natural conditions criteria, is relegated to subsequent rulemakings.

Except where noted, impacts hereafter are referring to Ecology's use of the performance-based approach.

2.4.2 Updated allowances for human impacts to fresh and marine waters for dissolved oxygen and temperature when natural conditions are used to determine water quality criteria

Baseline

State

On account of EPA's disapproval, there is no state baseline associated with natural conditions currently approved for federal actions (EPA, 2021). The previously EPA-approved state laws regulating human impacts when natural conditions are used to determine site-specific numeric aquatic life criteria are: WAC 173-201A-200(1)(c)(i), 173-201A-200(1)(d)(i), WAC 173-201A-210(1)(c)(i), WAC 173-201A-210(1)(d)(i) and for specific water body segments listed under 173-201A-602.

In the disapproved sections above, "human actions" considered cumulatively may not cause the DO of that water body to decrease [from natural conditions] more than 0.2 mg/L, or the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F) for both fresh waters and marine waters.

Federal

The EPA's interpretation of the Clean Water Act allows for site-specific criteria to be set equal to the natural conditions of a water body. EPA guidance further suggest adopting a provision that allows for human actions to cause insignificant decreases in DO or increases to temperature (see 2015 guidance on site-specific conditions, EPA's Action on Revisions to the Washington State Department of Ecology's Surface Water Quality Standards for Natural Conditions Provisions).[26, 27]

Adopted Rule

(1) Change "human actions" to "local and regional sources of human-caused pollution".[28]

(2) Add that DO allowances may not cause the DO concentration of that water body to decrease more than 10% or 0.2 mg/L below natural conditions, whichever decrease is smaller.

(3) Insert "below natural condition" referring to DO allowances and "above natural condition" for temperature allowance, to clarify they are given from the natural conditions criteria.

Expected Impact

This amendment, in combination with others in this rulemaking, is expected to restore the tools and processes used by Ecology to determine natural conditions criteria that are protective of existing and designated aquatic life uses.

In particular, the change (1) to the human action allowances will provide Ecology with the tools to regulate insignificant allowances when natural conditions criteria apply to a water body, without the cumulative human action allowance being partially or fully allocated to impacts that are outside of Ecology's regulatory authority (e.g., point source discharges in upstream Canadian waters, global climate change impacts). Amending DO allowance (2) provides additional protections in hypoxic waters, as otherwise a 0.2 mg/L decrease when waters are <2 mg/L DO may cause harm to aquatic life. Adopted language in (3) is purely for clarification.

If compared to EPA-disapproved state language, amendments in (1) would allow for more achievable water quality by permittees while remaining protective of aquatic life, thus representing a benefit. Amendment (2) would be more stringent in some instances representing a cost to permittees and benefit to society by improving aquatic life. Amendment 3 has no impact.

[26] https://www.epa.gov/sites/default/files/2015-02/documents/natural-conditions-framework-2015.pdf.
[27] https://fortress.wa.gov/ecy/ezshare/wq/standards/EPA_ActionsNCC_Nov192021.pdf.
[28] See definition of "local and regional sources of human-caused pollution" below

However, note that these amendments are only impactful in the context of Ecology re-establishing the use of tools and processes for determining natural conditions criteria in water quality standards (i.e. WAC 173-201A-260(1)(a)). From the current baseline, amendments in this section will provide **benefits** as part of the broader collection of amendments allowing for the use of natural conditions described in section 2.4.1.

2.4.3 Updates that allow natural conditions to be used as a basis for developing site-specific criteria under WAC 173-201A-430

Baseline

State

WAC 173-201A-430(2) says, of developing a new site-specific criteria, that it must be consistent with assumptions and rationale in "Guidelines for Deriving National Water Quality Criteria for the Protection of Aquatic Organisms and their Uses" (USEPA, 1985).

The 1985 guidelines from the EPA were incorporated by reference and provide a mechanism for developing protective biologically based criteria, but these guidelines rule out the possibility of developing protective natural conditions criteria.

Federal

The EPA's interpretation of the CWA allows for site-specific criteria to be set equal to the natural conditions of a water body. Communication with the EPA guided Ecology to adopt 40 CFR 131.11 for simplicity and to cite federal regulations rather than guidance documents. This allowed Ecology to incorporate the ability to use the natural conditions of a water body as the basis for developing site-specific aquatic life criteria.

Adopted Rule

- Replace the 1985 EPA guidance references in WAC 173-201A-430(2) with 40 CFR 131.11,
- Clarifying edits to 173-201A-430 based on EPA comments.

Expected Impact

This amendment, in combination with others in this rulemaking, is expected to restore the tools and processes used by Ecology to determine natural conditions criteria that are protective of existing and designated aquatic life uses. This amendment in particular allows the use of natural conditions for the site-specific criteria development process under WAC 173-201A-430.

Adopting 40 CFR 131.11 broadens what approaches can be used to scientifically support site-specific criteria development. Under the rulemaking, site-specific criteria development would become particularly useful when data, parameter, or site constraints prevent use of the performance-based approaches described elsewhere in this rulemaking.

Because additional rulemaking is required for site-specific criteria development under WAC 173-201A-430, a cost benefit analysis would be developed at that time, if pursued by Ecology.

On the margin where other approaches are not pursued (e.g. performance-based), and private entities wish to develop scientific support for Ecology to perform site-specific criteria, the additional options and flexibility afforded by the amendment could translate to a **benefit.**

As with other means of establishing WQ criteria, note that site-specific criteria pursued by this amendment are also expected to be protective of aquatic life and the designated uses of the water body. Thus, the amendment is not expected to impact ecosystem services or cultural values associated with changes to aquatic life compared to the baseline.

2.4.4 Add definitions for the performance-based approach and local and regional sources of human-caused pollution

Baseline

State

Multiple definitions, but not all those necessary to facilitate establishing natural conditions criteria.

Federal

A 1997 EPA Memo, which reflects EPA recommendation to have a definition for natural conditions, where “natural background” is defined as “background concentration due only to non-anthropogenic sources, i.e., non-manmade sources.” (Davies, 1997).

Adopted Rule

Add the following definitions to WAC 173-201A-020:

"Performance-based Approach” means a water quality standard that is a transparent process (i.e., methodology) which is sufficiently detailed and has suitable safeguards that ensures predictable and repeatable outcomes, rather than a specific outcome. The outcomes from the performance-based approach are site-specific criteria.

“Local and regional sources of human-caused pollution” means sources of pollution caused by human actions, and the pollution originates from: (1) within the boundaries of the State; or (2) within the boundaries of a U.S. jurisdiction abutting to the State that impacts surface waters of the State.

Expected Impact

Definition. No direct impact outside of where the defined terms are used in the rule, discussed above and below in this Section.

2.4.5 Added a new section detailing the use of the performance-based approach and applicable aquatic life criteria

Baseline

Federal

The EPA's interpretation of the Clean Water Act allows for site-specific criteria to be set equal to the natural conditions of a water body. The EPA guidance has identified two general approaches states and authorized tribes can use when adopting site-specific water quality criteria: determining a specific outcome (i.e., concentration limit for a pollutant) through the development of an individual numeric criteria, and adopting a criteria derivation process through the performance-based approach (see USEPA, 2021, 2023).[29,30]

Adopted Rule

Add a new section to the WAC (173-201A-470) detailing performance-based approach as a tool that Ecology can choose to use to establish site-specific numeric criteria based on natural conditions that are protective of existing and designated aquatic life uses. In the adopted rule, the performance-based approach can only be applied to dissolved oxygen (fresh water and marine water), pH (fresh water), and temperature (fresh water and marine water) only. Ecology does not propose a requirement that the tool must be used.

Expected Impact

This amendment, in combination with others in this rulemaking, is expected to restore the tools and processes used by Ecology to determine natural conditions criteria that are protective of existing and designated aquatic life uses. In particular, the amendments will allow future TMDL studies and those currently under development to consider protecting aquatic life by requiring actions that would allow the water to meet site-specific natural conditions criteria for temperature, DO, and pH, without additional rulemakings. From the current baseline, the amendment in this section is part of a broader set of tools and processes used to determine natural conditions criteria that **provide benefits** described above in section 2.4.1.

Without this rule, permittees discharging to water bodies that exceed numeric criteria, but suspect this is in part due to natural conditions, will be subject to the applicable numeric criteria unless a biologically based site-specific criteria is adopted through additional rule making. Site-specific biologically based criteria are rarely pursued by Ecology, but private entities may evaluate, develop, and present the science support to Ecology for such an action (see section 2.2.4). Independently conducted science must be evaluated by Ecology and the EPA and does not guarantee agreement or adoption. In this way, this amendment constitutes an additional **benefit** to the degree that performance-based options are taken by Ecology, and privately conducted scientific support of site-specific criteria and associated cost can be avoided.

While the cost of rulemaking for future site-specific biological based criteria in the baseline are Ecology's and out of the scope of this analysis, the fact remains that site-specific rulemakings are time intensive compared to the performance-based approach referenced in this rulemaking. During the period in which waters are not meeting statewide standards, but do not have site-specific criteria assigned, permittees may be accruing penalties. This means that the

[29] https://www.epa.gov/sites/default/files/2015-02/documents/natural-conditions-framework-2015.pdf.
[30] https://fortress.wa.gov/ecy/ezshare/wq/standards/EPA_ActionsNCC_Nov192021.pdf.

performance-based approach may create an additional **benefit** by expediting site-specific criteria, even where Ecology may have pursued site-specific biologically based study in the baseline.

2.4.6 Added a reference to a document in the water quality standards that details the methodology of the performance-based approach

Baseline

Federal

The EPA's interpretation of the Clean Water Act allows for site-specific criteria to be set equal to the natural conditions of a water body The EPA guidance has identified two general approaches states and authorized tribes can use when adopting site-specific water quality criteria: determining a specific outcome (i.e., concentration limit for a pollutant) through the development of an individual numeric criteria, and adopting a criteria derivation process through the performance-based approach (see 2015 guidance on site-specific conditions and EPA's Action on Revisions to the Washington State Department of Ecology's Surface Water Quality Standards for Natural Conditions Provisions).[31,32]

Adopted Rule

Due to the information required for the performance-based approach, we adopted, by reference, a separate rule document, Ecology publication 25-10-0101 "A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington", that provides details and requirements of the performance-based approach as noted in section WAC 173-201A-470(1).

Expected Impact

This amendment, in combination with others in this rulemaking, is expected to restore the tools and processes used by Ecology to determine natural conditions criteria that are protective of existing and designated aquatic life uses. In particular, the amendments will allow future TMDL studies and those currently under development to consider protecting aquatic life by requiring actions that would allow the water to meet site-specific natural conditions criteria for temperature, DO, and pH, without additional rulemakings. From the current baseline, the amendment in this section is part of a broader set of tools and processes used to determine natural conditions criteria that **provide benefits** described above in section 2.4.1.

2.4.7 Update to reflect the latest and current revision for a referenced EPA document

Baseline

[31] https://www.epa.gov/sites/default/files/2015-02/documents/natural-conditions-framework-2015.pdf.
[32] https://fortress.wa.gov/ecy/ezshare/wq/standards/EPA_ActionsNCC_Nov192021.pdf.

State

WAC 173-201A-430(2) cites "*Water Quality Standards Handbook*," EPA 1994, as revised.

Adopted Rule

Update WAC 173-201A-430(2) to "*Water Quality Standards Handbook*," EPA 2023, as revised.

Expected Impact

Revision of this document is required by current state law. No impact.

2.4 Regulatory Impacts by Potential Permit Action

This rule will primarily impact current and future permits associated with surface waters on the 303(d) list as currently impaired (Category 5) for temperature, pH, and/or DO. To illustrate the scope of potentially impacted permits, we queried proposed TMDL projects listed from Ecology's latest water quality assessment at the time of this writing (Ecology, 2023a) that have the potential for natural conditions based on temperature, DO, and/or pH.[33, 34]

Ecology ranks projects based on the severity of the pollution problem, risks to public health, risk to threatened and endangered species, and vulnerability of water bodies to degradation among other factors (2023a, 2023b). Projects fall under one of four priorities:

- High: projects that have already been vetted and are actively being worked on,
- Medium: projects that should begin in the next 1 to 5 years,
- Medium-Low: projects that should begin in the next 5 to 15 years, and,
- Low: Projects that do not warrant starting before the higher prioritized projects.

We narrowed our initial list to only high, medium, and medium-high priority TMDL projects to describe those that will likely be complete or nearly complete within the 20-year timeframe of this analysis. Through the filtering process, 43 TMDLs were identified across all four of Ecology's regions (Eastern, Central, Northwestern, and Southwestern) and the Puget Sound.[35, 36]

Table 1 provides a description of the top 5 out of 18 permit categories associated with potentially affected TMDLs by listing criteria (see Table 3in Appendix B for full permit list). Note that among 3,918 unique permits identified, any single permit can fall within one or multiple

[33] https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d.

[34] Based on conversations with Ecology staff, 3-5 years is an average time period for completing most TMDL studies assuming current staff capacity and omitting extreme and unpredictable cases.

[35] TMDLs in this analysis typically represent a full or partial watershed with one or multiple rivers and its tributaries. Impacts of a TMDL also potentially include upstream reaches of listed segments.

[36] Because of the size and complexity of the Puget Sound Nutrient Reduction TMDL, the project will take place across multiple phases and several decades and therefore not assigned a typical priority ranking. For the purposes of this analysis we included Ecology's best professional judgement of permits that will be impacted by phase 1 only, which is to be the main body of water that makes up the Puget Sound. To these, we assign a Medium-Low rank to ensure they are included in this analysis but reflect our uncertainty over timing and completion.

TMDLs listed for one or multiple criteria. Therefore, potential permit impacts described across and within columns in Table 1 are not mutually exclusive. Note that individual permit (IP) is for a specific discharger, while general permits (GP) cover multiple dischargers performing similar activities.[37]

Table 1. Top 5 Potentially Impacted Permit Categories, by Criteria

Permit Type	Temp	DO	pH
Construction SW GP	2,256	2,852	1,155
Sand and Gravel GP	217	270	199
Industrial SW GP	179	401	175
Fruit Packer GP	70	54	54
Municipal NPDES IP	46	118	49
Total (Top 5)	**2,768**	**3,695**	**1,632**
Total Including bottom 13 (not shown)	**2,918**	**3,940**	**1,783**

Note: GP is "General Permit" and IP "Individual Permit", SW is "Storm Water". PSNGPs are a secondary permit for existing Municipal NPDES IPs and nested within Municipal NPDES IPs to avoid double counting.

2.4.1 Potential Actions

From the prospective of a permittee, amendments taken collectively in this rulemaking would result in one of the following actions (behaviors):

1. Meet wasteload allocations based on natural conditions criteria developed through the TMDL process using the performance-based approach,
2. Meet site-specific criteria based on natural conditions under WAC 173-201A-430 (supported by a separate Ecology rulemaking),
3. Meet site-specific criteria based on natural conditions under WAC 173-201A-430 (supported by permittee science, followed by a separate Ecology rulemaking).

Compared to an action that would take place without the rule (baseline):

a. Meet wasteload allocations based on biologically based criteria through the TMDL process,
b. Meet site-specific criteria based on biological study under WAC 173-201A-430 (supported by a separate Ecology rulemaking)
c. Meet site-specific criteria based on biological study under WAC 173-201A-430 (supported by permittee science, followed by a separate Ecology rulemaking)

[37] Other small changes to permit impacts in Table 1 in the FRA compared to the PRA reflect additional data cleaning efforts to remove non-active permits.

Impacts (benefits or costs) from the rule could originate from any action taken by permittees to comply with procedures or conditions that change capital expenses (e.g. technology, engineering solutions or land acquisition), labor (e.g. source control and monitoring), or other miscellaneous activities (studies) compared to baseline. In the face of multiple potential outcomes from the rule and multiple baseline scenarios, this amounts to any "action pair", made up of a numbered (1, 2, or 3) potential action taken under the rule, compared to a series of potential baseline states (a, b, c) above. There are 3 × 3 = 9 such pairs.

Based on guidance and conversations with Ecology staff (Ecology, 2004), the most likely action pair because of the adopted rule is meeting wasteload allocations based on natural conditions criteria developed through the TMDL process using the performance-based approach compared to a biologically based statewide criteria, or pair 1a.[38]

Practically this is because establishing site-specific natural conditions criteria under WAC 173-201A-430 (with or without permittee science) is a very resource intensive process. The need to balance these resources with other water quality activities—such as permit management and TMDL work—means that site-specific criteria development under WAC 173-201A-430 are taken on sparingly, and if so, on significantly extended timelines.

From a regulatory perspective, establishing site-specific natural conditions criteria under WAC 173-201A-430 would require additional rulemaking, which is outside of the scope of this FRA.

For these reasons, the proceeding cost and benefit sections only consider action pair 1a, and briefly discuss 1b and 1c for completeness.

A note on Finalization of the Performance-Based Approach Document

During the public comment period for this rulemaking, Ecology received numerous comments regarding our draft performance-based approach document (required for action 1a). These comments allowed us to recognize that additional work is needed to the document.

Ecology plans to make edits to this publication based on feedback received and provide another opportunity for public comment on the revised draft of the performance-based approach document. Following the public comment period, we will edit the document based on comments received.

Because the performance-based approach document is only referenced, and not adopted, as part of the Water Quality Standards regulations at WAC 173-201A-470, we are not required nor will be conducting a separate formal rulemaking to revise this document. However, we feel it is important to provide another opportunity for public and Tribal input on a revised draft. Further, this document, which governs how Ecology will use the performance-based approach for site-specific criteria development, must meet federal CWA requirements, which includes a public review process and EPA review and approval. Therefore, until we publish a final version of the performance-based approach document and receive EPA approval following their review, we

[38] Keeping in mind that there are no requirements that the performance-based approach, or site-specific study determining natural conditions must be used.

will not be able to use the performance-based approach document for any federal CWA actions.

Because the performance-based approach is at the core of Ecology's ability to determine site-specific natural conditions criteria without additional rulemakings (e.g. action 1a), note that the bulk of the impacts described in the remainder of the FRA will not be realized until EPA approval.

Chapter 3: Likely Costs of Rule Amendments

3.1 Introduction

We analyzed the likely costs associated with the adopted rule amendments, as compared to the baseline. Rule amendments and the baseline are discussed in detail in Chapter 2 of this document.

3.2 Cost analysis

As discussed in Chapter 2, the collective rule amendments interact and work together to generate impacts. Given that the baseline has no federally-approved tools and processes for determining natural conditions criteria, it is not practical to analyze every component of the rulemaking individually. We proceed instead by describing the impacts of the following amendments on the behavior of affected parties **as implemented together** (e.g. restoring natural conditions provisions, as amended, for the purposed of federal actions):

Revisions to existing criteria:

- Updates to the natural conditions provision to limit use to aquatic life criteria and site-specific processes.
- Updated allowances for human impacts to fresh and marine waters for dissolved oxygen and temperature when natural conditions are used to determine water quality criteria.
- Updates that allow natural conditions to be used as a basis for developing site-specific criteria under WAC 173-201A-430.

Other changes:

- Add definitions for the performance-based approach and local and regional sources of human-caused pollution.
- Added a new section detailing the use of the performance-based approach and applicable aquatic life criteria.
- Added a reference to a document in the water quality standards that details the methodology of the performance-based approach.

Minor non-substantive edits:

- One update to reflect the latest and current revision for a referenced EPA document

3.2.3 Costs by Action Pair

Action Pair 1a

Action pair 1a (discussed in Section 2.4.1) will lead to meeting natural conditions criteria through the TMDL study process using a performance-based approach compared to the same process using statewide biologically based criteria.

From a practical perspective, Ecology would typically only determine natural conditions of a water body using tools and processes adopted by this rulemaking when waters already cannot meet statewide biologically based criteria due to a suspected natural condition. Therefore, it is reasonable to assume that alternative criteria considering local natural conditions and seasonal variation within these waters should be more easily met through fewer actions or investments.

In effect this means there would be **no new costs associated with meeting water quality requirements that allow for equal or higher temperature criteria, and/or equal or lower DO criteria (less dissolved oxygen required in the system) compared to the baseline. Since correcting pH up *or* down in effluent may require action, values set higher or lower (or both) than baseline to consider local natural conditions and seasonal variation should also, by the same logic, result in no new costs.** It is instead most likely that the rulemaking represents a **cost savings (benefit),** as described further in Chapter 4.

TMDL studies associated with permits in Table 1 have not yet been performed using natural conditions described in this rulemaking. As a proxy for future TMDL development, Ecology reviewed 8 historical TMDLs developed to protect natural conditions of the water.[39] We summarize their general differences between natural and biologically based statewide criteria, the drivers of those differences, and how refining site-specific standards to include natural conditions may potentially avoid costs.

- From **temperature** modeling scenarios in the reviewed TMDLs, a few degrees Celsius typically made up the difference between natural conditions targets and statewide biologically based criteria when applicable. Natural temperatures, higher than statewide biological criteria, were commonly attributed to natural limits in vegetative growth, high air temperature, and naturally low flow periods. In most instances, temperature TMDLs considered all anthropogenic sources and determined what the natural conditions criteria would be after that exercise. They were written in such a way that allowed for natural conditions of the system to constitute water quality criteria during parts of the year when biologically based criteria were exceeded, so long as they were determined to remain protective.[40]
- Among **DO** modeling scenarios, the difference between biological based statewide criteria and natural DO conditions ranged from a fraction of a mg/L to over 3 mg/L. Natural levels of DO lower than biologically based statewide standards were commonly attributed to local rates of natural stream bank erosion, groundwater with low DO

[39] Historical TMDLs natural conditions models vary widely by geographic scale (e.g. by stream segment within a watershed), time interval, and seasonal granularity. Modeling techniques also vary over time and space with technology, site access, and available historical data. This makes a systematic review impractical.

[40] In historical TMDL reviewed in this section, the natural condition of temperature was approximated by the system potential through an evaluation of the combined effect of hypothetical natural conditions of site potential riparian vegetation, microclimate improvements, and improved channel widths. The modeling software QUAL2Kw was frequently used in these settings.[41] Standard units are given on a logarithmic scale. Each number represents a 10-fold change in the acidity/basicness of the water, where 7 is neutral. For example, a pH of five is ten times more acidic than water having a pH of six.

concentrations, naturally occurring aquatic vegetation such as algae and elodea. Also note that natural higher water temperature can have indirect effects on DO through vegetation growth and other natural processes. Like temperature, natural conditions were commonly used to develop the TMDL in such a way that refined DO limits to reflect the naturally lower DO concentrations when and where appropriate.

- From **pH** modeling scenarios in the reviewed TMDLs, natural pH values varied as much as 1.5 standard units (SU) beyond the highest/lowest numeric standards.[41] Natural variances in pH were attributed to factors and processes similar to DO such as algal productivity and groundwater contributions. Also, like temperature and DO, pH criteria in these systems were set and allocated in such a way to meet natural conditions in the system.

In historical cases reviewed by the study team, allowing for natural conditions provided the flexibility necessary to avoid situations in which permittees would need to improve the quality of the water they discharged to beyond what is achievable without any human influence. In other words, criteria based on natural conditions would require fewer actions or technologies to achieve and maintain protective levels of water quality compared to biologically based statewide standards.

We note that because of this rulemaking, future natural conditions values could be calculated differently than the historical TMDLs reviewed above. Differences come primarily from amended human impact allowances (see Section 2.4.2) and the introduction of the performance-based approach (see Sections 2.4.5 and 2.4.6).

Natural conditions determined using tools and processes adopted by this rulemaking will make up the criteria for the entire duration of the year where data allow, rather than only during periods in which the criteria was exceeded (e.g., due to seasonal factors like flow and air temperature). If it were determined that for one part of the year natural conditions criteria are more stringent than the biologically based statewide criteria (e.g. lower temperatures in winter months), permittees could face new cost during this period compared to baseline.

Data limitations prevent quantifying a forecast of how often the above condition might occur and to what degree. Also bear in mind that natural conditions criteria determined using tools and processes adopted by this rulemaking would be technically achievable during these periods, while biologically based statewide criteria in other parts of the year may not have been without this rule.[42] Compared to zero allowances in the baseline, human allowance in the rule would also work to reduce cost, as would limiting allowances to local and regional sources such that they would not be absorbed by global climate change and cross-border polluters.

[41] Standard units are given on a logarithmic scale. Each number represents a 10-fold change in the acidity/basicness of the water, where 7 is neutral. For example, a pH of five is ten times more acidic than water having a pH of six.

[42] Historical TMDLs typically focus on times of year where waters were impaired. On the extreme end, natural conditions criteria could be more stringent than numeric criteria at all times of the year. However, to our knowledge there is no historical evidence that this condition exists, or would exist in future TMDLs.

Impacts to Aquatic Life

A material loss in aquatic life in a water body because of the rule would constitute a loss of ecosystem services and cost to society. This is especially true for impacts to ESA listed species with uniquely high market and cultural value such as salmonoids. It is important to note that the rule is intended to refine water quality criteria, whilst remaining protective of aquatic life and endangered species. So long as this holds true, there is no cost expected from the rule along this dimension compared to the baseline.

To ensure this is the case, Ecology utilized information from previous ESA consultations, prior EPA biological evaluations, EPA memorandums, EPA guidance documents, exploration of how other states and tribes address natural conditions, and the latest scientific information to support the rule (WAC 173-201A-470) (see *inter alia* USEPA 2003, 2005, 2007, 2009, 2015b, 2021, 2023; USFWS, 2008). From similar documentation and consultation with federal agencies, Ecology also ensured that other aspects of the rule, such as human allowances, are *de minimis*. For example:

- The EPA determined the allowable 0.3° C increase in temperature for fresh waters under natural condition scenarios is consistent with recommendations in EPA's Temperature Guidance (EPA, 2003). This provision allows for an insignificant level of heat from human actions when natural conditions are the applicable criteria or where waters are exceeding the biologically based numeric criteria. The EPA has also noted that absent such a provision, no heat would be allowed from humans when the natural conditions criteria are the applicable criteria. The EPA believed that a 0.3° C or less temperature increase about the natural condition temperature is insignificant because monitoring measurement error for recording instruments typically used in field studies are approximately 0.2° C to 0.3°.
- The EPA determined the allowable 0.2 mg/L decrease of DO for fresh waters and lakes under natural condition scenarios are considered insignificant decreases. EPA noted that DO is a characteristic of the water body that can be affected by several parameters (e.g., temperature). Further, 0.2 mg/L is within the monitoring measurement error for recording instruments typically used to monitor dissolved oxygen. Ecology's rule requires that a decrease in DO from natural conditions equal 10% of the water body's DO or 0.2 mg/L, whichever is lower. This amendment provides additional safeguards in naturally hypoxic waters (<2 mg/L of DO).

Action Pair 1b-c

Action pair 1b-c amounts to meeting natural conditions criteria through the TMDL study process using the performance-based approach, compared to criteria developed using biological data collected in site-specific studies.

Here, criteria in the baseline scenario, despite being site-specific, is still biologically based. Like 1a, criteria considering natural conditions and seasonal variation within that system are again likely to be more easily met by permittees through fewer actions or investments and present no new costs.

Beyond this general logic, to our knowledge there are no examples to draw from in which a site-specific study established biologically based criteria without natural conditions (a proxy for baseline b and c); then later for the same water body, established natural conditions criteria through the TMDL process (proxy for action 1 in the adopted rule).

Because Ecology would carry out the full process of considering, proposing, and adopting site-specific criteria through rulemaking under WAC 173-201A-430, there would be no administrative costs differences to permittees under 1b. If a permittee were to elect to privately fund science in support of the site-specific criteria (1c), the performance-based approach referenced by this rulemaking represents an avoided cost of such a study (i.e. **a benefit**, see Chapter 4).

3.2.4 Cost Summary

Historical TMDLs reviewed by the study team and the general logic of natural conditions provisions suggest that criteria considering local factors and seasonal variation would be more easily met through fewer actions or investments up to avoiding situations in which permittees need to improve the quality of the water they discharged to beyond what is achievable without any human influence. In other words, the most likely actions, taken because of the rule, are **not likely to impose new costs.**[43] Rather, the rule likely represents a **cost savings (benefit),** as described further below in Chapter 4.

Meeting wasteload allocations based on natural conditions criteria developed through the TMDL process compared to other, but unlikely, baseline scenarios such as developing site-specific criteria, also likely carry no new costs.

The baseline conditions and the adopted rule would be considered protective of aquatic life and designated uses. Therefore, we do not expect new costs or benefits from a material change in related ecosystem services.

As this rule makes no requirements that natural conditions be used by Ecology to develop site-specific water quality criteria (in other words, Ecology would only use natural conditions to develop site-specific criteria when deemed relevant and appropriate), not determining natural conditions would also, by definition, carry no costs compared to the baseline.

[43] We note that if it were determined that for one part of the year natural conditions criteria are more stringent than the biologically based criteria (e.g. lower temperatures in winter months), permittees might face new cost during this period compared to baseline under the adopted rule. However, other aspects of the rule like the human allowance and limiting allowances to local and regional sources, could mitigate these to an unknown degree. The net impact on costs would depend on the relative size of new costs and cost-savings. Ultimately, data limitations prevent us from quantifying a forecast of how often this might occur and the net cost if such a scenario.

Chapter 4: Likely Benefits of Rule Amendments

4.1 Introduction

We analyzed the likely benefits associated with the adopted rule amendments, as compared to the baseline. Rule amendments and the baseline are discussed in detail in Chapter 2 of this document.

4.2 Benefits analysis

As discussed in Chapter 2, and reprinted from Chapter 3, the collective rule amendments interact and work together to generate impacts. Given that the baseline has no federally-approved tools and processes for determining natural conditions criteria, it is not practical to analyze every component of the rulemaking individually. We proceed instead by describing the impacts of the following amendments on the behavior of affected parties **as implemented together** (e.g. restoring natural conditions provisions , as amended, for the purposed of federal actions):

Revisions to existing criteria:

- Updates to the natural conditions provision to limit use to aquatic life criteria and site-specific processes.
- Updated allowances for human impacts to fresh and marine waters for dissolved oxygen and temperature when natural conditions are used to determine water quality criteria.
- Updates that allow natural conditions to be used as a basis for developing site-specific criteria under WAC 173-201A-430.

Other changes:

- Add definitions for the performance-based approach and local and regional sources of human-caused pollution.
- Added a new section detailing the use of the performance-based approach and applicable aquatic life criteria.
- Added a reference to a document in the water quality standards that details the methodology of the performance-based approach.

Minor non-substantive edits:

- One update to reflect the latest and current revision for a referenced EPA document

4.2.1 Benefits by Action Pair

Benefits from the adopted rulemaking will be predominantly borne by permittees avoiding the cost of compliance with baseline scenarios. This includes capital expenses (e.g. technology, engineering solutions or land acquisition), labor cost (e.g. source control and monitoring), or other miscellaneous activities (e.g. scientific study) required compared to those expected under

the adopted rule. Table 1 in Chapter 2.4 summarizes permits potentially affected by the adopted rule. Various outcomes of the rule and baseline alternatives, or "action pairs", can be reviewed in Section 2.4.1.

Action Pair 1a

As noted in Section 2.4.1, action pair 1a—meeting natural conditions criteria developed through the TMDL study process using the performance-based approach compared to meeting statewide biologically based criteria—is the most likely action to apply to permits in Table 1.

Based on the general logic and intent of natural conditions criteria to refine criteria values, and Ecology's review of historical TMDLs, action pair 1a is likely to generate benefits because:

1. TMDLs under consideration for natural conditions will already be exceeding biologically based statewide criteria. Therefore, it is reasonable to assume that considering local variation in temperature, DO, and pH would result in fewer actions and investments required to comply with refined criteria limits.
2. Almost all historical TMDLs that develop WLA based on natural conditions (see Section 3.2.3) reviewed by the study team allowed flexibility to permittee compliance. This amounted to small allowances for higher temperature (e.g. a couple degrees Celsius) and DO (e.g. a fraction of a mg/L), and pH variation (e.g. fraction of a standard unit) in parts of the year for some segments of a water body, compared to their statewide biologically based equivalents.
3. To the degree that similar or larger differences between biologically based standards and natural conditions exist in future TMDLs, permittees in Table 1 could face a situation under the baseline in which they must improve the quality of the water they discharged to well beyond what is achievable, even without human influence. The adopted rulemaking would help prevent major engineering solutions otherwise needed to remain in compliance, or at the extreme end, prevent the need to cease operations for part of the year or all together.

We are unable to identify the exact magnitude of these benefits (i.e. avoided costs) by potentially affected permittees beyond being likely non-zero. This is because WLAs under the baseline or adopted rule for these permits are currently unknown without specific TMDL study. In addition, behavior would depend on a wide variety of facility types, with potentially multiple discharges, all taking different actions in response to compliance.

Benefits – Temperature

To illustrate just one select benefit pathway, we provide a stylized example of a small adjustment to effluent temperature that might be required in the absence of the adopted rule (i.e. a benefit of this action pair because of the rule).

In this example, we only consider permits in the top 5 permit types likely impacted to be conservative in our assessment of benefits (see Table 1). From the highest to lowest number of impacted permittees, this includes 2,256 Construction Stormwater general permittees, 217 Sand and Gravel general permittees, 179 Industrial Stormwater general permittees, 70 Fruit Packing general permittees, and 46 municipal wastewater treatment plants.

We assume that all affected permits, regardless of type, would be required to cool their discharge by at least 1 degree Fahrenheit (0.56 Celsius) for at least part of the year to meet numeric standards in the absence of the rule. We recognize that several of these permit types, such as construction stormwater and sand and gravel, are not commonly responsible for raising the temperature of water nor are commonly required to cool effluent. But in a hypothetical water body for this analysis, it is the fact that site conditions are naturally higher (hotter) than numeric criteria that would lead all associated permits under the TMDL to be responsible for lowering effluent temperature.

The cost of a thermal reduction to surface water from effluent can vary greatly depending on application and volume. Table 2 contains a non-exhaustive list of methods recommended to decrease the temperature impacts to surface water. Values in Table 2 are presented as industrial or water treatment plant solutions, broken out by component in such a way that allows for generalization to other applications (Jenkins, 2007).

Table 2. Common Surface Water Cooling Techniques and Costs

Effluent Cooling Modifications	Description	Cost
Clarifier Covers	This method provides shade over clarifiers to reduce the amount of solar radiation reaching the wastewater before discharge.	Approximately $180,000 for a 50' diameter clarifier
Seasonal Storage	Holding treated effluent in a reservoir until stream temperature has decreased.	$0.18 to $2.60 per cubic foot of storage volume
Move Discharge Location	Discharging effluent to a different portion of the stream or to a different surface water body altogether.	$180 - $1800 per linear foot of pipeline
Multiple Port Diffusers	Releasing effluent through multi-port diffuser systems in several locations simultaneously into the receiving water.	$370 - $2800 per foot of diffuser
Effluent Blending	Mixing treated effluent with cooler groundwater or surface water prior to discharge.	$140 - $275 per foot for a well or $180 - $275 per lineal foot for a pipeline
Unlined Ponds	Contain treated effluent and allow it to percolate into the subsurface.	$0.45 - $0.90 per gallon of storage

Effluent Cooling Modifications	Description	Cost
Riparian Shading	Establishing streamside forests to provide shade over receiving water.	Example cost: Property purchase = $36,750 per acre, Plant starts = $4.60 per plant, Density = 2,614 plants per acre
Cooling Ponds	A shallow reservoir designed to receive warm water and discharge cool water, relying on evaporative and radiative heat loss.	$0.18 to $0.40 per cubic foot of storage volume
Cooling Towers	An evaporative cooling method used to dissipate heat from process water.	Example cost: $237,150 for a 0.05 MGD plant
Chillers	Devices that employ an evaporator, compressor, condenser, and refrigerant to remove heat from a liquid.	$46,000 - $110,300 per MGD per degree Fahrenheit and an additional $9,200 - $18,400 per MGD per degree Fahrenheit per year in operating costs

Note: Values in table range from 2001 to 2005 dollars depending on technology.

For construction stormwater, sand and gravel, and fruit packer general permits we estimated the price to install a small cooling pond as a low-cost option to comply to the baseline scenario. These shallow reservoirs are designed to receive warm water and discharge cool water through evaporative and radiative heat loss. Note in Table 2 that ponds may double as holding tanks for effluent until stream temperature has decreased. We assume an average engineered cooling pond, with the ability to hold 40,000 cubic feet of water, can be constructed for a fixed cost of $14,946 in 2024 dollars.[44]

Industrial stormwater general permits include air and seaports, large manufacturing facilities, refineries, and commercial food processors, with the potential of treating and discharging millions of gallons of effluent per day. Together with municipal wastewater treatment permits, more sophisticated methods of cooling would likely be required for these facilities to meet future cooling requirements without the rule. To estimate the cost of cooling effluent in these facilities, we assumed the need for more advanced technology such as cooling towers or chillers. Drawing on information from Jenkins (2007) we estimated the cost to a mid-sized 3 million gallons per day (MGD) system using these technologies to lower effluent temperatures

[44] Adjusted upward from initial estimates of $7,200 from 2005 data in Jenkins, 2007. Adjustments were made using Producer Price Index by Commodity: Machinery and Equipment: Domestic Water Systems (https://fred.stlouisfed.org/series/WPU11411311). Does not include the cost of any land acquisition that, if avoided by the rule, would increase this benefit.

1 degree Fahrenheit is $686,923 in capital costs and $114,591 per year in operating and maintenance (O&M) in 2024 dollars.[45,46]

Benefits described above will not accrue all at once upon the adoption of this rulemaking; rather, they would be staggered across time depending on TMDL priority and where the receiving permit is within its 5-year renewal cycle. To calculate the net present value over a 20-year period, we consider again Ecology's TMDL priority rankings (discussed in Section 3.2.1) and add 5 years to the latest date that the TMDL might begin to allow for research time and idiosyncratic lags in permit renewal. That is:

- Permittees under high priority TMDLs for temperature (1,295) receive benefits 5 years after adoption.
- Permittees under medium priority TMDLs for temperature (1,192) would begin receiving benefits 10 years after adoption.
- Permittees under medium-low priority TMDLs for temperature (281) would begin receiving benefits 20 years after adoption.

Conditional on assumptions discussed above in this exercise (e.g. a 1 degree Fahrenheit reduction, required by all permittees in the top 5 permit in the next 20 years) the total net present value of benefits from the rule over a 20 year horizon would be just over $353 million.[47]

Benefit – DO

When high levels of nutrients fuel excessive plant life, such as algae, oxygen is consumed when plants later die and decompose. Nutrient removal is therefore one of the main, and potentially costly, strategies used when mitigating dissolved oxygen depletion in fresh and marine water.

We emphasize that the adopted rule would not absolve impacted permittees from treating nutrients in their effluent. However, any marginal refinements to DO criteria based on natural conditions provisions could provide financial relief to facilities otherwise facing the need to meet, often naturally unobtainable, biologically based statewide standards. In this way, setting DO criteria values based on natural conditions represents a potential benefit of the rule.

Reiterated from above, it is not possible to know exactly how natural conditions criteria determined using tools and processes adopted by this rulemaking will differ from biologically

[45] Note that in many cases these estimates are conservative with respect to facility size. For example, very large water treatment plants (upwards of 90 MGD), could require as much as $10 million in infrastructure alone and $1.6 million per year in O&M for a single plant to cool effluent by 1 degree Fahrenheit.
[46] Adjusted upward from initial capital and O&M estimates of $330,900 and $114,591 from 2005 data in Jenkins, 2007. Adjustments were made using Producer Price Index by Commodity: Machinery and Equipment: Domestic Water Systems (https://fred.stlouisfed.org/series/WPU11411311)
[47] Discounted at 0.9%, the 20-year average of fixed real annual rates. Fixed rate of return to inflation-indexed I-Bonds by US Treasury Department (https://www.treasurydirect.gov/savings-bonds/i-bonds/i-bonds-interest-rates/).

based statewide DO criteria for permits in Table 1, or how those differences would translate to nutrient requirements in TMDL wasteload allocations. Available data on nutrient treatment costs are also not commonly presented in marginal units of removed nutrients (e.g. a dollar amount for every unit of nitrogen or phosphorus), making such an analysis additionally impractical.

Under these caveats, the most conservative assumption we can make is that the lowest known treatment reduction would occur to satisfy a small difference between biologically based DO requirements in the baseline and natural conditions criteria determined using tools and processes adopted by the rule. As another illustrative example, this time focused on nutrient removal, we apply this facility and operational change to permits in the top 5 likely impacted permit types (see Table 1).

Considering impacts to wastewater treatment, we assume again an average municipal treatment facility size of 3 MGD. In 2011, Ecology produced a technical report identifying cost estimates for a suite of wastewater treatment technologies to achieve a range of different effluent quality performance targets with respect to nutrients (Ecology, 2011). This report, as summarized by the EPA (2015a), finds constructed or retrofitted treatment technologies for removing nutrients, such as inorganic nitrogen, come at a capital cost ranging from $0.1/MGD/year to nearly $100/MGD/year, with typical costs cited as averaging $25/MGD/year. Annual O&M for these systems ranged from $0.01/MGD/year to $1.85/MGD/year.[48,49] Applying $0.1/MGD and $0.01/MGD for capital and O&M cost, and adjusting to current price levels, the estimated avoided cost of removing an arbitrarily small amount of nitrogen on account of the adopted rule is $488,790 per facility in avoided capital costs, and $48,879 in avoided annual O&M.[50]

For the treatment of nutrients in industrial and agricultural applications, the USEPA (2015a) points to publications that primarily draw from foodstuffs, beverages, livestock, and agricultural producers. Technologies used in these industries include enhanced aeration, modified Ludzack-Ettinger process, and chemical treatment that would apply to fruit packers and other large-footprint facilities found in Industrial stormwater general permits. While unable to recover a unit costs, the minimum estimated total cost used to achieve a reduction in nutrients at the facility level in the report (and potentially avoided by this rulemaking) was $241,570 in upfront capital and $119,164 annually for O&M in 2024 dollars.

Potential avoided costs borne by construction wastewater and sand and gravel permits are less clear. For the purposes of this exercise, we assume that complying with a small arbitrary reduction in nutrients would include moving materials such as fertilizers and landscaping material out of the path of stormwater, ensuring proper operation and maintenance of any treatments already installed, and updating plans to minimize unnecessary land disturbance.

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[48] Employed technologies range from activated sludge, lagoons, membrane bioreactors, rotating biological contactors, sequencing batch reactors, and trickling filters.
[49] 2012 dollars.
[50] Adjustments made using Producer Price Index by Commodity: Machinery and Equipment: Domestic Water Systems (https://fred.stlouisfed.org/series/WPU11411311).

Assuming 40 hours of labor per year for these activities by existing staff, and the Bureau of Labor Statistics median pay for Environmental Engineering Technicians, ($24.51 per hour), we estimated avoided costs of $980.04 annually (BLS, 2023).

As with temperature, we applied benefits at the permit level over time based on permit type and TMDL priority over a 20-year horizon. We again limit this analysis to the top 5 affected permit categories described in Table 1 to be consistent and additionally conservative.

Conditional on assumptions discussed above (e.g. a small reduction in nutrients, required by all permittees in the top 5 permit categories over 20 years), the net present value of this stream of benefits is estimated to be just under $389 million.

Benefit – pH

As with Temperature and DO requirements, benefits of avoided compliance cost with numeric pH criteria, compared to those based on applicable natural condition criteria, would likely be positive. Due to a lack of publicly available data on the cost of pH neutralization, the study team is currently unable to illustrate these benefits quantitatively.

Action Pair 1b-c

Action pair 1b-c amounts to meeting natural conditions criteria through the TMDL study process using the performance-based approach, compared to criteria developed using biological data collected in site-specific studies.

Both alternatives in the action pair are intended to allow for a departure from statewide numeric criteria based on local conditions. However, criteria in the baseline scenario, despite being site-specific, must still be biologically based. Like in action 1a, criteria considering natural conditions and seasonal variation within that system are likely to be more easily met by permittees through fewer actions or investments, representing an avoided cost (benefit).

If a permittee were to have elected to privately fund science in support of the site-specific criteria developed by Ecology (action 1c), the adopted rule represents an additional benefit in the form of avoided costs of such a study. The benefit of this avoided study component could range from tens to hundreds of thousands of dollars depending on the size, complexity, and detail needed to effectively substantiate site-specific criteria.

4.2.2 Benefits Summary

In this section, we considered the likely benefits associated with the adopted rule amendments as implemented together.

As described in Section 3, we assumed that the most likely action to occur because of this rulemaking—that would not undergo additional rulemaking—is meeting wasteload allocations based on natural conditions criteria developed through the TMDL process using the performance-based approach compared to meeting statewide biologically based temperature, DO, and/or pH criteria.

Based on historical TMDLs reviewed by the study team, and the general logic of natural conditions provisions, we expect a potentially wide range of benefits associated with the rule. For many, criteria considering local factors and seasonal variation by this rule will be more easily met by permittees through fewer actions or investments compared to statewide biologically based criteria. For others, benefits would include avoiding the need to eliminate discharge and associated economic activity for part or all of the year completely to avoid situations in which permittees must improve the quality of the water they discharged to beyond what is achievable without any human influence.

We cannot fully quantify the extent of potential benefits of the rule because future TMDL studies have not been performed yet. However, through a pair of illustrative calculations, we apply a small and arbitrary temperature and DO criteria change to potentially impacted permits—comparable to just one scenario when meeting natural conditions criteria developed using tools and processes adopted by the rule. We estimated a total 20-year present value benefit of $741 million through this exercise, but stress that this represents partial benefits and should be considered conservative.[51]

Additional, qualitative, benefits of the rule include the avoided costs of meeting numeric criteria for freshwater pH compared to a natural condition criteria, and any avoided cost of independent science by permittees in support of Ecology performing site-specific study.

The baseline conditions and the adopted rule would be considered protective of aquatic life and designated uses. Therefore, we do not expect new costs or benefits from a material change in related ecosystem services.

As this rule makes no requirements that natural conditions be used by Ecology to develop site-specific water quality criteria (in other words, Ecology would only use natural conditions to develop site-specific criteria when deemed relevant and appropriate), benefits would be reduced to the degree that potential waste load allocations are not based on natural conditions determined using tools and processes established by this rulemaking.

[51] This figure is reasonably robust to different assumptions. For example, if we did not include permits related to the Puget Sound TMDL in the calculation (for example, if determining natural conditions did not apply or infeasible due to data and technology constraints), the benefits of the rule as described in this section would drop to $670 million. If we further removed construction stormwater general permits from the calculation as well, the benefits of the rule would drop to $638 million.

Chapter 5: Cost-Benefit Comparison and Conclusions

5.1 Summary of costs and benefits of the rule

The most likely actions taken because of the adopted rulemaking are not likely to impose new costs, but rather produce benefits in the form of avoided costs through meeting otherwise applicable biologically based criteria. Historical TMDLs reviewed by the study team and the general logic of natural conditions provisions suggest that criteria considering local factors and seasonal variation would be more easily met through fewer actions or investments—up to avoiding situations in which permittees need to improve the quality of the water they discharged to beyond what is achievable without any human influence. In this way, the adopted rule is not likely to impose new costs, but rater cost savings (benefits).

We cannot fully quantify the extent of potential benefits of the adopted rule because future TMDL studies have not been performed yet. Instead, we filter future planned TMDL studies for temperature, pH and DO criteria with potential for violation due to natural conditions, and prioritized in the next 20 years, to identify 3,918 associated permits. We then provide a pair of illustrative examples in which we apply small temperature and DO changes at the permit level comparable to just one scenario when meeting natural conditions criteria determined using tools and processes adopted by the rule. We estimate a total 20-year present value benefit of $741 million through this exercise, but stress that it represents partial benefits and should be considered conservative.

Additional qualitative benefits include avoided costs of meeting numeric criteria for freshwater pH compared to a natural condition-based criteria, and any avoided costs of independent science by permittees in support of Ecology performing site-specific criteria in the baseline.

As this rule makes no requirements that natural conditions be used by Ecology to develop site-specific water quality criteria (in other words, Ecology would only use natural conditions to develop site-specific criteria when deemed relevant and appropriate), not determining natural conditions would also, by definition, carry no costs or benefits compared to the baseline.

Both baseline conditions and adopted rule would be considered protective of aquatic life and designated uses. Therefore, we do not expect new costs or benefits from a material change in related ecosystem services.

5.2 Conclusion

We conclude, based on a reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the adopted rule, as compared to the baseline, that the benefits of the rule are greater than the costs.

Chapter 6: Least-Burdensome Alternative Analysis

6.1 Introduction

RCW 34.05.328(1)(c) 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 rule, we must determine that the requirements of the rule are the least burdensome set of requirements that achieve the goals and objectives of the authorizing statute(s).

We assessed alternative rule content and determined whether they met the goals and objectives of the authorizing statute(s). Of those that would meet the goals and objectives, we determined whether those chosen for inclusion in the rule amendments were the least burdensome to those required to comply with them.

6.2 Goals and objectives of the authorizing statute

The authorizing statute for this rule is Chapter 90.48 RCW, Water Pollution Control. Its goals and objectives include the state of Washington's policy of maintaining the highest possible standards to ensure the purity of all waters of the state consistent with public health, public enjoyment, the protection of wildlife, and the industrial development of the state. This requires the use of all known available and reasonable methods to prevent and control the pollution of the waters of the state of Washington.

RCW 90.48.035, Rule-making authority, specifically authorizes Ecology to promulgate, amend, or rescind rules and regulations as deemed necessary to maintain the highest possible standards of all waters in the state. Its goals and objectives include but are not limited to rules relating to standards of quality of waters of the state and regulating substances discharged into them.

6.3 Alternatives considered and why they were excluded

We considered the following alternative rule requirements and did not include them in the rule amendments. This list includes alternatives that were suggested by the public during development of the rule, with the intent of mitigating negative impacts, including environmental harms, on vulnerable populations and overburdened communities, and equitably distributing benefits. Each section below explains why we did not include these alternatives.

- Updating human allowance and natural condition provisions only (i.e., no performance-based approach).
- Updating natural condition provision only (i.e., no human allowance or performance-based approach).
- No natural condition updates
- Add additional DO allowance alternatives

6.3.1 Updating human allowance and natural condition provisions only

We considered updating only the human allowance and natural conditions provisions in the rule, but not including a performance-based approach. This alternative would potentially be more burdensome for permittees. If a water is not meeting biologically based numeric criteria, and that is due in part to natural conditions, then determining protective criteria based on natural conditions would only occur through site-specific criteria development. This approach would require separate WQ Standards rulemaking and would need to undergo EPA review (including any ESA consultation with NOAA NMFS and USFWS) and approval prior to being in effect for CWA purposes.

While the cost of rulemaking for future site-specific criteria are Ecology's and out of the scope of this analysis, the fact remains that developing site-specific criteria based on natural conditions, but requiring rulemaking, is likely more time intensive than using the performance-based approach. This difference in time represents a delay in which waters could have a site-specific criterion, but don't. During this time, permittees risk being out of compliance, and may expend additional time and resources including, but not limited to, remediation and penalty payments. Rulemaking would also likely involve affected permittees efforts to provide input and feedback during the rule development and public process.

6.3.2 Updating natural condition provision only

We considered updating only the natural condition provision in the rule, but not including the human allowance or the performance-based approach. This alternative would potentially be more burdensome for permittees. If a water is not meeting biologically based numeric criteria, and that is due in part to natural conditions, then determining protective criteria based on natural conditions would only occur through site-specific criteria development. This approach would require separate WQ Standards rulemaking and would need to undergo EPA review (including any ESA consultation with NOAA NMFS and USFWS) and approval prior to being in effect for CWA purposes.

While the cost of rulemaking for future site-specific criteria are Ecology's and out of the scope of this analysis, the fact remains that developing site-specific criteria based on natural conditions, but requiring rulemaking, is is likely more time intensive than using the performance-based approach. This difference in time represents a delay in which waters could have a site-specific criterion, but don't. During this time, permittees risk being out of compliance, and may expend additional time and resources including, but not limited to, remediation and penalty payments. Rulemaking would also likely involve affected permittees efforts to provide input and feedback during the rule development and public process.

In addition, if no human allowance is provided in rule, then when natural conditions are the applicable criteria, NO degradation for temperature or DO would be allowed. This would be unnecessary for protection of aquatic life and unnecessarily costly. See rulemaking Technical Support Document for further details.

6.3.3 No Rulemaking

We considered not doing this rulemaking. Without natural conditions criteria, the applicable biologically based numeric criteria would apply and must be met to protect existing and designated aquatic life uses. Some waters during some periods of the year may not be able to meet these criteria due to natural and seasonal variations. This could be the case even if all human impact was reversed and removed from this determination. Thus, it would be more burdensome to covered parties as applicable criteria would not be able to be met regardless of any actions taken (See Appendix A(B)(2) for additional details).

6.3.4 Alternative DO allowance 1

We considered an alternative DO allowance that states when natural conditions constitute the water quality criteria for a site, local and regional sources of human-caused pollution considered cumulatively may not decrease DO more than 0.2 mg/L.

We excluded this possibility as we determined it would not be protective of aquatic life when waters were naturally low in DO (i.e., <2 mg/L), and therefore does not meet goals and objectives. For instance, if waters were naturally 1.0 mg/L for DO Concentration, a 0.2 mg/L decrease to 0.8 mg/L would have negative impact on aquatic life; therefore, this would not be protective and would not represent a *de minimis* amount of degradation.

6.3.5 Alternative DO allowance 2

We considered an alternative DO allowance that states when natural conditions constitute the water quality criteria for a site, local and regional sources of human-caused pollution considered cumulatively may not decrease DO more than 0.2 mg/L only if the natural condition criteria of the water is > or = 2.0 mg/L. Otherwise, no further degradation of the waters are allowed.

We excluded this possibility because it would be unnecessarily stringent, and thus overly burdensome for permittees, compared to what is needed for protection of aquatic life (see EPA's 2007 Biological Evaluation regarding 0.2 mg/L for freshwater systems). Additionally, because we may be using water quality models to estimate natural condition values, there will inherently be some error associated with estimation. Trying to meet no degradation (i.e., 0) is difficult when you must account for associated model error. Thus, no allowance in this alternative prevents accounting for natural condition estimation error in our modeling process in TMDLs.

6.4 Conclusion

After considering alternatives, within the context of the goals and objectives of the authorizing statute, we determined that the adopted rule represents the least-burdensome alternative of possible rule requirements meeting the goals and objectives.

Chapter 7: Regulatory Fairness Act Compliance

We analyzed the compliance costs of the adopted rule amendments in Chapter 3 of this document. We conclude that the adopted rule amendments are not likely to result in compliance costs for any businesses. The rule is likely to result only in cost-savings for dischargers, as compared to the baseline. Based on this analysis, Ecology is exempt from performing additional analyses under the Regulatory Fairness Act, under RCW 19.85.025(4) which states that, "This chapter does not apply to the adoption of a rule if an agency is able to demonstrate that the adopted rule does not affect small businesses." Moreover, by not imposing compliance costs, the adopted rule amendments do not meet the RFA applicability standard under RCW 19.85.030(1)(a).

References

RCW 34.05.272 requires Ecology to categorize sources of information used in significant agency actions made in the Water Quality Program.

Independent peer review

Review is overseen by an independent third party.

n/a

Internal peer review

Review by staff internal to Ecology.

Jenkins, Pam. 2007. Methods to Reduce or Avoid Thermal Impacts to Surface Water (Publication 07-10-088). Available at: https://apps.ecology.wa.gov/publications/SummaryPages/0710088.html.

External peer review

Review by persons that are external to and selected by Ecology.

n/a

Open review

Documented open public review process that is not limited to invited organizations or individuals.

n/a

Legal and policy documents

Documents related to the legal framework for the significant agency action, including but not limited to: federal and state statutes, court and hearings board decisions, federal and state administrative rules and regulations, and policy and regulatory documents adopted by local governments.

33 U.S.C §§ 1251 et seq.: Clean Water Act

40 CFR Section 131: Federal Water Quality Standards

40 CFR 130.2: Section 303(d) of the Clean Water Act

Chapter 90.48 RCW: Water Pollution Control.

Chapter 173-201A WAC: Water quality standards for surface waters of the state of Washington.

Davies, Tudor T. 1997. Establishing Site Specific Aquatic Life Criteria Equal to Natural Background. Memorandum to Water Management Division Directors, EPA Regions 1-10, and State and Tribal Water Quality Management Program Directors. Dated 5 November

1997. Office of Water, Office of Science and Technology. Washington, D.C. Available at: http://water.epa.gov/scitech/swguidance/standards/upload/2009_01_29_criteria_naturalback.pdf.

Opalski, Daniel. 2021. EPA's Action on Revisions to the Washington State Department of Ecology's Surface Water Quality Standards for Natural Conditions Provisions. Water Division, USEPA Region 10, Seattle, Washington. Available at: https://fortress.wa.gov/ecy/ezshare/wq/standards/EPA_ActionsNCC_Nov192021.pdf.

United States Environmental Protection Agency (USEPA). 1985. Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses. EPA PB85-227049.

United States Environmental Protection Agency (USEPA). 2003. EPA Region 10 Guidance For Pacific Northwest State and Tribal Temperature Water Quality Standards. Region 10, Office of Water, Seattle, Washington. EPA 910-B-03-002.

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United States Environmental Protection Agency (USEPA). 2007. Biological Evaluation of the Revised Washington Water Quality Standards. USEPA Region 10, Seattle, Washington.

United States Environmental Protection Agency (USEPA). 2009. Guidance on the Development, Evaluation, and Application of Environmental Models. Office of the Science Advisor, Washington, D.C. EPA/100/K-09/003.

United States Environmental Protection Agency (USEPA). 2015b. A Framework for Defining and Documenting Natural Conditions for Development of Site-Specific Natural Background Aquatic Life Criteria for Temperature, Dissolved Oxygen, and pH: Interim Document (EPA 820-R-15-001).

United States Environmental Protection Agency (USEPA). 2021. EPA's Clean Water Act Action on Revisions to the Washington State Department of Ecology's Surface Water Quality Standards for Natural Conditions Provisions.

United States Environmental Protection Agency (USEPA). 2023. EPA Water Quality Standards Program Recommendations for Performance-Based Approach for Natural Conditions (DO, Temperature, Freshwater pH) Required Elements. Washington, D.C. Draft, deliberative document.

United States Environmental Protection Agency (USEPA). 2024. Causal Analysis/Diagnosis Decision Information System (CADDIS).

United States Fish and Wildlife Service (USFWS). 2008. U.S. Fish and Wildlife Service Biological Opinion for Environmental Protection Agency's Proposed Approval of the Revised Washington Water Quality Standards for Designated Uses, Temperature, Dissolved

Washington Department of Ecology (Ecology). 2004. Frequently Asked Questions about Use Attainability Analysis (Publication 04-10-021). Available at: https://apps.ecology.wa.gov/publications/documents/0410021.pdf.

Washington State Department of Ecology (Ecology). 2011. Technical and Economic Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater Treatment Facilities. Available at: https://apps.ecology.wa.gov/publications/documents/1110060.pdf.

Washington Department of Ecology (Ecology). 2018. Water Quality Program Permit Writer's Manual (Publication 92-109). Available at: https://apps.ecology.wa.gov/publications/summarypages/92109.html.

Washington Department of Ecology (Ecology). 2023a. 2021 TMDL Workload Assessment- Analysis of Category 5 Listings from 2018 Water Quality Assessment (*Publication 23-10-026*).

Washington Department of Ecology (Ecology). 2023b. Water Quality Program Policy 1-11. Washington's Water Quality Assessment Listing Methodology to Meet Clean Water Act Requirements (*Publication 18-10-035*). Available at: https://apps.ecology.wa.gov/publications/SummaryPages/1810035.html.

Independent data

Data from primary research, monitoring activities, or other sources, but that has not been incorporated as part of documents reviewed under independent, internal, or external peer review.

Bureau of Labor Statistics (BLS). 2023. "Occupational Outlook Handbook, 2023 – 2024, Environmental Engineering Technicians." Bureau of Labor Statistics, U.S. Department of Labor. Available at: http://www.bls.gov/ooh/architecture-and engineering/environmental-engineering-technicians.htm.

Federal Reserve Economic Data (FRED). 2023. Producer Price Index by Commodity: Machinery and Equipment: Domestic Water Systems. Available at: https://fred.stlouisfed.org/series/WPU11411311.

United States Environmental Protection Agency (USEPA). 2015a. A compilation of cost data associated with the impacts and control of nutrient pollution (*EPA 820-F-15-096)*. Office of Water.

Records of the best professional judgment of Ecology employees or other individuals.

n/a

Other

Sources of information that do not fit into other categories.

United States Environmental Protection Agency (USEPA). 2024. Causal Analysis/Diagnosis Decision Information System (CADDIS).

Appendix A: Administrative Procedure Act (RCW 34.05.328) Determinations

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.

A rulemaking is the only way to adopt natural conditions provisions and criteria. If we do not adopt this rule, then waters would need to meet applicable biologically based numeric aquatic life criteria. As some waters cannot meet these aquatic life numeric criteria due to natural or seasonal variations, then without this rule, these waters would not meet applicable water quality standards and may be considered impaired, even if fully protecting all existing and designated uses. In addition, if natural conditions are the sole cause of a violation of the applicable biologically based aquatic life criteria, then listing these waters as impaired would go against the intent of the legislature (RCW 90.48.570(3)).

If we do not adopt a performance-based approach during this rulemaking, then any site-specific criteria development for determining natural conditions criteria would need to go through rulemaking, including EPA review, prior to being used for state and federal Clean Water Act purposes. A consequence of such approach would be a possibly lengthy delay between developing protective site-specific criteria based on natural conditions of the water body and the ability to use such criteria in a Clean Water Act action (e.g., TMDLs).

If we do not adopt human-use allowances for temperature and dissolved oxygen, then when natural conditions constitute the criteria for a water, there would be no allowance for any degradation by human actions. EPA has previously determined, and Ecology agrees, that such approach would be unnecessary for the protection of existing and designated uses and would be unnecessarily costly for entities with stake in those waters.

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.

Under the Federal Clean Water Act, states are required to adopt water quality standards that consist of designated uses, water quality criteria that protect those uses, and an antidegradation policy. These standards must protect the public health or welfare, enhance the quality of the water, and serve the purposes of the Act. States must adopt water quality criteria that protect designated uses. States adopt EPA recommended CWA Section 304(a) criteria, modified CWA Section 304(a) criteria that reflect site-specific conditions, or other criteria so long as they are based on sound scientific rationale and protect the designated uses of the water (40 CFR 131.11).

EPA's policy on natural conditions states that site-specific numeric aquatic life criteria can be set equal to natural background, where natural background is defined as "background concentration due only to non-anthropogenic sources, i.e., non-manmade sources." States that wish to set criteria equal to natural background should include, at minimum, in their water quality standards: (a) a definition of natural background; (b) a provision that allows setting site-specific criteria equal to natural background; and (c) a binding procedure for determining natural background.

Ecology amended and introduced new natural conditions provisions and criteria in 2003 and 2006 to be consistent with federal requirements for use of natural conditions in effect at the time. Since then, certain natural condition provisions have been reconsidered by EPA and disapproved. Any new or updated natural conditions criteria will be consistent with current federal requirements and policy for use of natural conditions, and these criteria and associated provisions are reviewed and approved by 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.

No. The rule does not impose more stringent performance requirements on private entities than on public entities. Any entity, private or public, must adhere to the rules protecting water quality in the state of Washington.

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.

  ☐ (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 will work with EPA to ensure that the adopted rules are approvable.

Appendix B: Additional Tables and Figures

Table 3. Potentially Impacted Permit Categories, by Criteria

Permit Type	Temp	DO	pH
Construction SW GP	2,256	2,852	1,155
Sand and Gravel GP	217	270	199
Industrial SW GP	179	401	175
Fruit Packer GP	70	54	54
Municipal NPDES IP	46	118	49
Industrial (IU) to POTW/PRIVATE SWDP IP	30	49	36
Bridge Washing GP	26	25	18
Industrial NPDES IP	22	54	24
Upland Fish Hatchery GP	15	18	13
Industrial to ground SWDP IP	14	21	17
Municipal to ground SWDP IP	11	15	17
AP Irrigation System Aquatic Weed Control GP	10	14	14
Water Treatment Plant GP	8	8	6
Boatyard GP	5	25	1
Net Pens NPDES IP	3	7	0
Reclaimed Water IP	3	5	2
Winery GP	3	3	3
Vessel Deconstruction GP	0	1	0
Total	**2,918**	**3,940**	**1,783**

Note: GP is “General Permit” and IP “Individual Permit”. PSNGPs are a secondary permit for existing Municipal NPDES IPs and nested within Municipal NPDES IPs to avoid double counting