DEPARTMENT OF ECOLOGY
State of Washington

Draft Environmental Impact Statement

Washington State's Proposed Changes to Water Quality Standards for Surface Waters of the State of Washington – WAC 173-201A

July 2018

Publication 18-10-028

Publication and Contact Information

This document is available on the Department of Ecology's website at:
https://fortress.wa.gov/ecy/publications/summarypages/1810028.html

For more information contact:

Water Quality Program
P.O. Box 47600
Olympia, WA 98504-7600
Phone: 360-407-6600

Washington State Department of Ecology — www.ecology.wa.gov

- Headquarters, Olympia 360-407-6000
- Northwest Regional Office, Bellevue 425-649-7000
- Southwest Regional Office, Olympia 360-407-6300
- Central Regional Office, Union Gap 509-575-2490
- Eastern Regional Office, Spokane 509-329-3400

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Draft Environmental Impact Statement

Washington State's Proposed Changes to Water Quality Standards for Surface Waters of the State of Washington – WAC 173-201A

Water Quality Program
Washington State Department of Ecology
Olympia, Washington

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

July 13, 2018

Dear Interested Party:

The Washington State Department of Ecology (Ecology) is issuing this draft Environmental Impact Statement (EIS) on the changes to the Water Quality Standards for Surface Waters of the State of Washington - WAC 173-201A (Water Quality Standards). This draft EIS was prepared to satisfy the requirements of the State Environmental Policy Act (SEPA).

Ecology determined that, in order to provide as much information as possible to aid in decision making, an EIS will be prepared.

The state's water quality standards set limits on pollution in our lakes, rivers, and marine waters in order to protect beneficial uses, such as swimming and fishing. The water quality standards are implemented through discharge permits under the federal Clean Water Act. They are also used to identify polluted waters and set levels for water cleanup.

This rulemaking proposes:

1. New bacterial indicators and numeric criteria to protect water contact recreation uses in sections 200(2) and 210(3).
2. Modified water contact recreation use categories.
3. Improved location information in use designation tables listed in this chapter – Table 602, Use designations for fresh waters and Table 612, Use designations for marine waters.

This draft EIS addresses only the key parts of the water quality standards that Ecology is proposing to change. They include:

1. Adoption of new bacterial indicators.
2. The adoption of modified water contact recreation uses.

For a comprehensive discussion of the proposed changes, please visit the water quality standards website at https://ecology.wa.gov/Regulations-Permits/Laws-rules-rulemaking/Rulemaking/WAC-173-201A-Aug17.

For assistance or questions, please contact Bryson Finch, rulemaking lead, at swqs@ecy.wa.gov or (360) 407-6440.

Sincerely,

Heather R. Bartlett
Water Quality Program Manager

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Fact Sheet

Title: Washington State's Proposed Changes to Water Quality Standards for Surface Waters of the State of Washington – WAC 173-201A

Description: The proposed rule is to update Chapter 173-201A WAC to include new bacterial indicators and numeric criteria for water contact recreation use, modify the water contact recreation use classes, and improve location information in use designation tables 602 (use designations for fresh waters) and 612 (use designations for marine waters).

Location: Statewide

Lead Agency: Washington State Department of Ecology

Responsible Official: Heather R. Bartlett, Program Manager
Water Quality Program
Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Lead Agency Contact: Becca Conklin

Date draft EIS was issued: July 17, 2018

Date draft EIS Public Comments Due: September 14, 2018

Public Hearings:

Ecology is holding five public hearings on this rule proposal:

- one in-person hearing in Western Washington
- one in-person hearing in Eastern Washington, and
- three statewide webinars

The hearings will begin with a short presentation followed by a question and answer (Q&A) session. Testimony will start after the Q&A session. The hearings will conclude once all interested persons provide formal testimony.

Comments may be provided verbally or in writing. Staff will accept written comments submitted at the in-person hearings, but not via the webinar.

For more information about the hearings, and instructions on how to join and participate through the webinar, or to submit written comments, visit https://ecology.wa.gov/Regulations-Permits/Laws-rules-rulemaking/Rulemaking/WAC-173-201A-Aug17.

Webinar Hearings		
Daytime Webinar **Date:** August 28, 2018 **Time:** 1:30 p.m. **Join online and see instructions:** https://watech.webex.com/watech/onstage/g.php?MTID=e89508b32b3fbe29e50539ccfb6febb48 For audio call US Toll number 1-204-454-0887 and enter access code 804 961 541. Or to receive a free call back, provide your phone number when you join the event.	**Evening Webinar** **Date:** August 28, 2018 **Time:** 6:30 p.m. **Join online and see instructions:** https://watech.webex.com/watech/onstage/g.php?MTID=e66c438b9a9ab2be29230dd42cae3c933 For audio call US Toll number 1-204-454-0887 and enter access code 801 319 021. Or to receive a free call back, provide your phone number when you join the event.	**Evening Webinar Date:** September 5, 2018 **Time:** 6:30 p.m. **Join online and see instructions:** https://watech.webex.com/watech/onstage/g.php?MTID=eb07c7e9fb398786a44b57486a41abab7 For audio call US Toll number 1-204-454-0887 and enter access code 802 977 451. Or to receive a free call back, provide your phone number when you join the event.

In-person Hearings	
Western Washington **Date:** August 29, 2018 **Time:** 1:30 p.m. **Facility:** Tukwila Community Center **Room:** Social Hall **Address:** 12424 42nd Ave S Tukwila, WA 98168	***Eastern Washington*** **Date:** August 30, 2018 **Time:** 10:30 a.m. **Facility:** CenterPlace **Room:** Auditorium **Address:** 2426 N Discovery Place Spokane Valley, WA 99216

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Chapter 1: Purpose and Background

In accordance with the Administrative Procedures Act, the Washington State Department of Ecology (Ecology) filed a pre-proposal statement of inquiry, Code Reviser (CR) 101, in July 2017, to notify the public of its intent to begin rulemaking for the Water Quality Standards for Surface Waters of the State of Washington – Chapter 173-201A WAC.

The CR-101 statement addresses updating fresh and marine water quality standards for the protection of water contact recreation use in state waters. The objective of the rulemaking is to update Washington's recreational use water quality standards to include new bacterial indicators and numeric criteria that protect the public from waterborne disease while boating, swimming, and enjoying other water contact recreation activities in the state waters regulated by Ecology.

The agency decided that it will, in order to provide as much information as possible to aid in decision making, prepare an Environmental Impact Statement for this rulemaking process.

Purpose of the Environmental Impact Statement

The purpose of this draft Environmental Impact Statement (EIS) is to identify the potential impacts caused by proposed changes to Chapter 173-201A WAC, the Water Quality Standards for Surface Waters of the State of Washington, and to identify and analyze reasonable alternatives. An Environmental Impact Statement provides an impartial discussion of significant environmental impacts. It is used to inform decision makers and the public of reasonable alternatives which would avoid or minimize adverse impacts or enhance environmental quality. This draft EIS is focused on the specific policy decisions and the subsequent revised fresh and marine water quality standards for the protection of water contact recreation use in state waters.

It is not the purpose of the draft EIS to address every possible alternative. Additionally, the draft EIS is not designed to meet the requirement of "least burdensome," which is evaluated in the Preliminary Regulatory Analyses required as part of the Administrative Procedures Act. The rule proposal materials, which include the Preliminary Regulatory Analyses and other supporting materials, are available on the water quality standards website.

This draft environmental impact statement is for a nonproject activity. Nonproject actions are governmental actions involving decisions on policies, plans or programs that contain standards controlling use or modification of the environment. This includes the adoption or amendment of comprehensive plans, ordinances, rules and regulations at WAC 197-11-704(b).

The purpose of this draft EIS is to discuss the options for water contact recreation use criteria for Washington State, implementation of the new criteria, and policy outcomes of the rulemaking. Other topics include acceptable levels of risk using bacterial indicators, background risks, and site-specific variability.

Background

Overview of the surface water quality standards

Washington State's surface water quality standards set limits on pollution in lakes, rivers, and marine waters in order to protect beneficial uses, such as swimming and fishing.

Water contact recreation use criteria are intended to protect human health while participating in water-related activities. Water contact recreation use criteria are based on bacterial indicators rather than direct measurements of pathogens. The current water contact recreation uses in sections 600 and 610 of the state water quality standards include three levels of protection: extraordinary primary contact, primary contact, and secondary contact. Washington's current bacterial indicator for fresh waters is fecal coliform.

In marine waters, Washington's current standards use the same fecal coliform based criteria to protect for both shellfish harvesting and primary contact recreation uses. The secondary contact recreation use in marine waters has enterococci based criteria. Shellfish harvesting is regulated by the Washington State Department of Health, in accordance with the Federal Drug Administration (FDA) National Shellfish Sanitation Program (NSSP) Guide for the Control of Molluscan Shellfish. The FDA requires a more stringent fecal coliform standard to protect consumers of shellfish grown in marine water than the criteria to protect water contact recreators. To protect for both water contact and shellfish harvesting consumption uses in state marine waters, Washington adopted the FDA's more stringent fecal coliform criteria.

Basis for the proposed rulemaking for water contact recreation uses

Ecology is updating Washington's contact recreation use water quality standards to include new bacteria indicators and numeric criteria that protect the public from waterborne disease while boating, swimming, and participating in other water contact recreation activities in state waters.

This rulemaking proposes to adopt new fresh and marine water quality standards for the protection of water contact recreation uses of state waters in Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington.

Washington's current bacterial indicator for water contact recreation, fecal coliform, was removed from the Environmental Protection Agency's recommendations in 1986. This method of determining compliance with water quality standards is outdated. The Environmental Protection Agency (EPA) has instructed states that still rely on fecal coliform as an indicator to revise their recreation use criteria and align them with the current national recommendations.

Ecology is proposing updated water contact recreation use classes to ensure that they align with the new federal water quality recommendations issued by the EPA in 2012.

Ecology also proposes to decouple the shellfish harvesting and the primary contact recreation use criteria as is currently in the water quality standards. Under the proposed rule, shellfish harvesting will continue to apply the FDA's fecal coliform-based standard, while water contact recreation for marine waters will be based on enterococci.

We intend to improve the water quality standards by:

- Incorporating new science to protect recreation uses of state waters.
- Establishing bacterial indicators that are better correlated with illness and can more accurately determine the presence of human-caused fecal pollution.
- Aligning Washington's recreation use categories with recommendations from the EPA.
- Providing improved location information to allow the public help clarify which water quality criteria apply in their local waters.

Federal recommendations for water contact recreation uses

Federal recommendations to protect for water contact recreation uses were first released by the Department of Interior (DOI) in 1965 under the Federal Water Pollution Control Act (as amended). Within the recommendations for water contact recreation use criteria, the DOI recommended that "water quality criteria be set for potential and future water uses as well as the present intended use and uses (USDOI, 1968)." Furthermore, the DOI recommended that to meet goals of the established Federal Water Pollution Control Act, "water quality standards must be adequate to protect and upgrade water quality in the face of population and industrial growth, urbanization, and technological change. In accordance with the provisions of the Act, it is anticipated that after the initial setting of standards, periodic review and revision will be required to take into account changing technology of waste production and waste removal and advances in knowledge of water quality requirements developed through research (USDOI, 1968)." The DOI recommended fecal coliform at 200 CFU per 100 mL for water contact recreation use criteria in the 1968 water quality standards guidance document for interstate waters.

Using the 1968 DOI guidance, the 1976 EPA recommendations suggested that fecal coliform be used to protect for water contact recreation uses. Fecal coliform was removed from the 1986 EPA recommendations for recreation use criteria and was replaced by *Escherichia coli* and enterococci. The EPA epidemiological studies demonstrated that fecal coliform does not correlate well with gastrointestinal illnesses and is not a suitable indicator for recreation contact in waters. Conversely, *E. coli* and enterococci have a strong correlation with swimming-related gastrointestinal illnesses.

In 2012, the EPA completed revisions to the national recommended water contact recreation water quality criteria. The recommendations include the latest science, which quantifies the link between illness and fecal contamination in water contact recreation use waters. The EPA National Epidemiological and Environmental Assessment of Recreational Water (NEEAR) studies affirmed previous results suggesting that *E. coli* and enterococci are better bacterial indicators of fecal contamination. The current recommended criteria continue to be based on *E. coli* and enterococci.

Washington's current bacterial indicator for water contact recreation for fresh waters, fecal coliform, was not included in the EPA 2012 recommendations. The EPA has instructed states that still rely on fecal coliform as an indicator to revise their water contact recreation use criteria and align the criteria with the current national recommendations. Washington is one of 12 states

that have not yet revised fresh water criteria and one of 9 coastal states that have not revised marine water criteria to meet the EPA recommendations.

EPA Recommendations

The 2012 EPA recommendations for recreation use criteria are detailed in Table 1. Enterococci and *E. coli* are recommended bacterial indicators for freshwater, while only enterococci is recommended for marine waters. Two sets of numeric criteria are available for each indicator with an associated geometric mean (GM) and statistical threshold value (STV). EPA recommends both a GM and STV be used together to protect recreation uses. EPA includes the STV in conjunction with the GM to help ensure that fecal indicator bacteria densities in recreational waters correspond to a water quality level protective of primary contact recreation by limiting the number of significant pollution events (USEPA, 2012).

Table 1 - The 2012 EPA recommendations for water contact recreation use criteria (USEPA, 2012)

CRITERIA ELEMENTS	**EPA Recommendation Option 1** **Illness Rate: 36/1,000 recreators**		**EPA Recommendation Option 2** **Illness Rate 32/1,000 recreators**	
Indicator	**Geometric Mean** (CFU/100 mL)	**Statistical Threshold Value** (CFU/100 mL)	**Geometric Mean** (CFU/100 mL)	**Statistical Threshold Value** (CFU/100 mL)
Enterococci (freshwater & marine)	35	130	30	110
E. coli (freshwater)	126	410	100	320

EPA notes on magnitude and duration: The waterbody GM should not be greater than the selected GM magnitude in any 30-day interval. There should not be greater than a ten percent excursion frequency of the selected STV magnitude in the same 30-day interval.

Chapter 2: SEPA Scoping and Comments

The SEPA Scoping process began on May 1, 2018, when Ecology issued a threshold determination of significance on the rulemaking actions. SEPA scoping is the process of soliciting input on a proposal to define the scope of the Environmental Impact Statement. Public notice of SEPA scoping was provided via the SEPA Register, Ecology's Water Quality Info ListServ notice, and on our website.

The comments received during the scoping process were considered as the agency identified significant issues, noted elements of the environment that could be affected, developed alternatives, and prepared the draft environmental documents.

Public comments were received through May 21, 2018. Three public comment letters were received through our online comment system during the comment period. Comment detail and input varied and ranged from general notes of support, general notes of disapproval, suggestions for alternatives to be considered, and concerns about implementation issues and impacts.

All comments are provided, in full, in Appendix A.

Chapter 3: Affected Environment, Potential Impacts, and Mitigation Measures

The purpose of the water quality standards is to set criteria to be used to fully protect beneficial uses of all of Washington's rivers, streams, lakes, marine waters, and other waters of the state. The beneficial uses that are specifically protected are listed below:

- **Aquatic Life**. The aquatic life beneficial use includes salmonids (salmon, trout, and char), other fish, macroinvertebrates, other animals, and plants. All life-stages of aquatic life, including spawning, rearing, and migrating, are protected. Salmonids, especially those that are threatened or endangered, usually receive the most attention. In many cases, they are also the most sensitive species.
- **Water Contact**. The water contact beneficial use is designed to protect those who work or play in Washington's waters. This includes swimming, wading, boating, fishing, and other activities.
- **Agricultural, Domestic, and Industrial Water Supply**. Water quality must be of high enough quality so water can be used for these activities.
- **Commerce and Navigation**. Water quality must be of high enough quality so water can be used for these activities.
- **Wildlife**. The wildlife use protects terrestrial plants and animals that rely on rivers, streams, lakes, and marine water for survival.
- **Fishing and Harvesting**. The fishing and harvesting use protects water quality at levels that allow for fishing, harvesting, and consumption of aquatic plants and animals (such as fish and shellfish).

Pollution that affects these uses comes from point sources (such as industrial facilities and waste water treatment plants) and non-point sources (such as stormwater runoff from urban and rural lands), as well as other sources such as direct atmospheric deposition.

Affected Environment

Ecology's proposed new bacterial indicators and numeric criteria impact the water contact recreation uses. The beneficial use of water contact protects the public from waterborne disease while boating, swimming, and participating in other water contact recreation activities in state waters.

This draft EIS considers the affected environment to be Washington's rivers, streams, lakes, marine waters, and other surface waters of the state.

Potential Impacts

The proposed changes to the water quality standards set specific criteria that, if met, will fully protect the water contact recreation uses associated with water contact, such as swimming, fishing, boating, and other recreational water activities. However, the level of protection that will actually be gained by the criteria change is unclear. The proposed criteria will change, but how those criteria actually impact environmental outcomes is more challenging to determine.

Mitigation Measures

Mitigation measures should be identified that will reduce or eliminate the adverse environmental impacts of a proposal. Mitigation measure should be reasonable and capable of being accomplished. According to the SEPA rules (WAC 197-11-768), "mitigation" means:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing, enhancing, or providing substitute resources or environments.
- Monitoring the impact and taking appropriate corrective measures.

The state does not expect there to be adverse impacts associated with this rule change. However, the following mitigation measures are identified for the state to move forward with:

- Continue to monitor bacteria in our waters,
- Move forward with developing water cleanup plans for waters that are identified as polluted, and
- Work to encourage all permitted facilities to implement pollution prevention technologies.

Chapter 4: Alternatives

The alternatives analyzed in this document are the result of ongoing studies and discussions with state and federal regulators on how to best identify appropriate bacterial indicators for fresh and marine waters in the State. Additionally, discussions during technical advisory meetings, outreach activities, and SEPA scoping helped shape these alternatives. This section explains how alternatives were developed and selected for inclusion in this draft EIS.

Transitioning from a fecal coliform-based water contact recreation use criteria to one based on *E. coli* and/or enterococci requires several key changes to Washington State's current water contact recreation use criteria. Each issue is identified below, with options available for each decision-making action, discussion of each action, and the final decision on each topic.

Selecting a Bacterial Indicator for Freshwater

Alternatives

Alternative 1: Select *E. coli* as the freshwater bacterial indicator.

Alternative 2: Select enterococci as the freshwater bacterial indicator.

Alternative 3: No action.

Decision

Ecology is proposing the selection of *E. coli* as the freshwater indicator for water contact recreation use criteria (**Alternative 1**).

Discussion

Correlation with Illness

Environmental Protection Agency epidemiological studies found a mean correlation coefficient for swimming-associated gastroenteritis (GI) illnesses of 0.80 for *E. coli* in freshwater (Dufour and Ballentine, 1986). *E. coli* had the strongest correlation with illnesses in freshwater compared with other bacterial indicators (enterococci: 0.74; fecal coliforms: -0.08) examined in EPA epidemiological studies (Dufour and Ballentine, 1986). Enterococci is also being recommended as both a fresh water and marine water bacterial indicator option for water contact recreation use criteria (USEPA, 2012).

Analytical Methods and Costs

Similar analytical methods are available for fecal coliform and the proposed bacterial indicators in this rulemaking, *E. coli* and enterococci. The methods available for enumerating these three bacterial indicators include membrane filtration, multi-tube fermentation, and quanti-tray. Membrane filtration is the most common method used by dischargers who collect and conduct their own laboratory tests. Membrane filtration is the most cost effective method, short in duration, and requires limited expertise.

Compared with fecal coliform, membrane filtration testing for *E. coli* requires one additional step that takes 4 additional hours at a different incubation temperature. The methods and

expertise necessary for fecal coliform and *E. coli* membrane filtration tests are very similar. The similarities in the membrane filtration method for *E. coli* and fecal coliform results in comparable laboratory costs. Contrarily, membrane filtration methods for enterococci requires two different agar media, different membrane filters, separate incubators for initial analysis and confirmation testing, several more steps, greater expertise to confirm results, and has a test duration of up to 4 days. Overall, membrane filtration for enterococci is very involved and requires additional time, equipment, and consumables. Enterococci testing presents higher laboratory costs and complexities that may pose problems for those with limited budgets and expertise. Furthermore, the test duration requirements for enterococci using membrane filtration methods are problematic for timely sample results.

According to the laboratory accreditation unit, few laboratories in Washington State are accredited for the multi-tube fermentation test method (also known as the most probable number or MPN method). The multi-tube fermentation method has higher expenses than membrane filtration and takes on the order of 3-4 days to complete sample analyses. The multi-tube method is not feasible for dischargers that require rapid sample results. Laboratory costs are expected to be similar between fecal coliform, *E. coli*, and enterococci for the multi-tube fermentation method.

The quanti-tray method (reported as most probable number or MPN), requires limited expertise and is a rapid test (24 hours). The quanti-tray method is similar with regard to time, equipment, and daily costs for fecal coliform, *E. coli*, and enterococci. However, the start-up costs for equipment and consumables can be high for all three bacterial indicators and potentially burdensome for laboratories with limited budgets. For *E. coli*, membrane filtration and quanti-tray are viable options for rapid analyses, while with enterococci, the quanti-tray method is the only method available for rapid results. Commercial laboratories that offer quanti-tray methods may be the more cost effective route for enterococci testing compared with in-house laboratory testing.

Association with Fecal Coliform

WAC 173-201A-260 (3)(b) requires that upstream actions must be protective of downstream uses. Many of Washington State coastal waters include shellfish that are subject to shellfish harvesting criteria. The FDA's National Shellfish Sanitation Program has set a shellfish harvesting use standard for fecal coliform at a geometric mean of 14 CFU per 100 mL and a 10% not-to-exceed value of 43 CFU per 100 mL. To comply with downstream uses, upstream dischargers must also meet the fecal coliform based shellfish harvesting criteria downstream. Given that the shellfish harvesting criteria is based on a federal standard and not related to water contact recreation uses, fecal coliform will remain the bacterial indicator to protect the harvesting and consumption of shellfish.

The association of *E. coli* and enterococci with fecal coliform is an important consideration for source tracking of fecal contamination when exceedances of the shellfish harvesting criteria occur. If marine shellfish harvesting criteria were to be exceeded, upstream dischargers may be required to adopt more stringent effluent limits. Establishing relationships in specific water bodies between the presence of water contact recreation-based bacterial indicators and downstream uses may assist permit writers in developing more stringent effluent limits and identifying upstream sources of fecal contamination.

E. coli is a subset of fecal coliform. In Washington waters, a large proportion of fecal coliform levels are comprised of *E. coli* bacteria. Given this information, site-specific equivalencies could be developed to translate between *E. coli* and fecal coliform. Contrarily, enterococci is not associated with fecal coliform. Enterococci and fecal coliform originate from two different bacterial families and thus, a relationship is not likely to be established. Associations between the proposed indicators and fecal coliform should be considered important to implement this rule for permit effluent limits, and water cleanup wasteload and load allocations developed in total maximum daily load (TMDL) studies.

Neighboring Criteria

While not vital to the protection of water contact recreation uses, continuity between states in bacterial indicators used for water contact recreation use criteria may save time and costs associated with the protection of shared water bodies across interstate boundaries, especially for those waters with TMDL limits. States surrounding Washington State, and the majority of Western States, have adopted *E. coli* as the bacterial indicator for fresh water. Hawaii adopted enterococci for freshwater, while a few states continue to use fecal coliform as their bacterial indicator for water contact recreation use criteria.

Links to Vegetative Sources

One criticism of using fecal coliform as an indicator of fecal contamination is that counts can be confounded by Klebsiella bacteria. Although, some Klebsiella species are associated with warm-blooded animal excrement, the presence of Klebsiella does not indicate there is fecal matter or pathogens present. Klebsiella species are ubiquitous in nature and can be found in high densities in wood products and plants and can dominate fecal coliform counts. Klebsiella species are enumerated in fecal coliform tests and may inflate bacterial counts, even though fecal contamination is absent. Dischargers that release wood products such as recycling plants and pulp and paper mills, can have elevated fecal coliform counts due to the contribution of Klebsiella bacteria and not necessarily due to the presence of fecal matter. Furthermore, headwaters of streams containing large amounts of detritus may have elevated fecal coliform counts due to the presence of Klebsiella species.

In order of specificity to fecal matter of warm blooded animals, *E. coli* is the most specific, followed closely by enterococci, while fecal coliform is a distant third. *E. coli* testing enumerates a specific species of Escherichia and is linked directly to fecal contamination. Klebsiella species are not counted in tests measuring for *E. coli* or enterococci. However, enterococci has been linked to vegetative sources (Byappanahalli et al. 2012).

Environmental Survival

The water contact recreation use criteria does not employ methods that directly measure pathogens in water that cause illnesses. Rather, bacterial indicators of fecal contamination are used to determine the risk of contracting illnesses from pathogens while recreating in waters. Pathogens are not directly measured for several reasons, including:

- abundance and diversity of different pathogens that cause illness
- lack of information on infection rates and dose-response data for all pathogens
- insufficient method development for all pathogens, and
- routine monitoring for every potential pathogen is not practical

For these reasons, setting water column standards based on direct measurements of pathogens may be ineffectual. Alternatively, bacterial indicators are ubiquitous and present in all fecal contamination. Bacterial indicators can be utilized to provide indirect measurements regarding the presence of pathogens in a given water body. This enables regulators to make informed decision to protect human health associated with water contact recreation uses based on a more easily measurable environmental indicator.

When selecting bacterial indicators, it is desirable that the indicator have survival characteristics similar to pathogens that cause disease. Enterococci is known to better mimic viral pathogens and have survival characteristics more similar to viral pathogens in chlorinated wastewater and natural waters. While particular strains of *E. coli* can be pathogenic, the rapid die-off in chlorinated effluent and marine waters limits its resemblance and behavior to pathogenic viruses.

Treatment Technologies

Ultraviolet (UV) light and chlorination are the two most common methods of disinfection employed by wastewater treatment plants to limit pathogens in surface waters. Current disinfection methods are geared towards minimizing fecal coliform in effluent to meet water contact recreation use criteria. However, with the advent of newly proposed bacterial indicators in this rulemaking, the efficacy of current treatment technologies to remove *E. coli* and/or enterococci needs to be evaluated.

According to several studies, enterococci species have a tendency to be more resistant to chlorination compared with *E. coli* (Miescier and Cabelli, 1982; Rice et al. 1993; Tree et al. 2003; Blatchley et al. 2007). However, enterococci better represents the survival of pathogens in chlorinated wastewater than *E. coli* or fecal coliform (USEPA, 2012). Due to the increased resistance of enterococci compared with fecal coliform, minor adjustments to operations or treatments may be needed to effectively remove enterococci from effluent.

The efficacy of UV light to remove *E. coli* and enterococci has been found to be similar in some studies (Blatchley et al. 2007; Noble et al. 2004; Kadir, 2010), while others studies suggest that enterococci species have greater resistance to UV light compared with *E. coli* (Deller et al. 2006; Kuhn et al. 2003). The efficacy of UV light in relation to bacterial indicators appears to be dependent on the characteristics of the effluent. Given that enterococci is considered to better emulate pathogens in the environment, increased resistance to wastewater treatment technologies is not unexpected. The discrepancy between the efficacies of removing *E. coli* versus enterococci for UV light is less than that for chlorination.

Modifying Water Contact Recreation Use Classes

Alternatives

Alternative 1:

Table 2: Recreation Use Class Alternative 1

Alternatives for Use Classes	Freshwater Criteria (geometric mean)	Marine Criteria (geometric mean)
Retain extraordinary and primary use classes; use existing secondary use class criteria	Extraordinary: • *E.coli (100)* ***OR*** • *Enterococci (30)* Primary: • *E. coli (126)* ***OR*** • *Enterococci (35)* Secondary: • *Fecal Coliform (200)*	Primary: • *Enterococci (30 or 35)* Secondary: • *Enterococci (70)*

Alternative 2:

Table 3: Recreation Use Class Alternative 2

Alternatives for Use Classes	Freshwater Criteria (geometric mean)	Marine Criteria (geometric mean)
Remove extraordinary and secondary uses; choose between risk levels	Primary: • *E. coli (100 or 126)* ***OR*** • *Enterococci (30 or 35)*	Primary: • *Enterococci (30 or 35)*

Alternative 3:

Table 4: Recreation Use Class Alternative 3

Alternatives for Use Classes	Freshwater Criteria (geometric mean)	Marine Criteria (geometric mean)
Keep extraordinary use for freshwater; remove secondary uses; apply lower risk level to extraordinary and higher risk level to primary for freshwater;	Extraordinary: • *E. coli (100)* ***OR*** • *Enterococci (30)* Primary: • *E. coli (126)* ***OR*** • *Enterococci (35)*	Primary: • *Enterococci (35)* Secondary • *Enterococci (70)*

Alternative 4:

Table 5: Recreation Use Class Alternative 4

Alternatives for Use Classes	Freshwater Criteria (geometric mean)	Marine Criteria (geometric mean)
Keep extraordinary use for freshwater; remove secondary uses; apply lower risk level to extraordinary and higher risk level to primary for freshwater;	Extraordinary: • *E. coli (100)* ***OR*** • *Enterococci (30)* Primary: • *E. coli (126)* ***OR*** • *Enterococci (35)*	Primary: • *enterococci (35)*

Alternative 5: No action.

Decision

Ecology is proposing to set water contact recreation use criteria for only the primary contact use class, and remove the extraordinary and secondary use classes associated with fresh and marine waters (**Alternative 2**).

Discussion

Ecology is proposing to set recreation use criteria for only the primary contact use, while removing extraordinary and secondary contact uses. Relying only on the primary contact recreation use aligns with EPA's recommendations and is consistent with what other states have adopted. The basis for these decisions are further described below:

Primary contact recreation

The primary contact recreation use is the level of protection that the EPA recommends states adopt, and Ecology is proposing as the protected use for all contact recreation.

Secondary contact recreation

The secondary contact recreation use was assigned to lower quality waters with the assumption there was a proportionate lower probability of human contact with those waters (for example, waters near high industrial activity). The EPA no longer approves numeric criteria less stringent than protection of primary contact uses (that is, swimming / full immersion). Therefore, the EPA will not approve less stringent criteria set for secondary contact uses or partial immersion during water contact recreation activities. For these reasons, Ecology is proposing to remove the secondary contact recreation use in this rulemaking.

Extraordinary primary contact recreation

The Department of Interior (DOI) water quality standards recommendations under the Federal Water Pollution Control Act (as amended in 1965) suggested that "water quality criteria be set for potential and future water uses as well as the present intended use and uses" and "water quality standards must be adequate to protect **and upgrade** [emphasis added] water quality in the face of population and industrial growth, urbanization, and technological change" (USDOI, 1968). In accordance with the recommendations, Washington created extraordinary primary contact uses in 1968.

The extraordinary primary contact use class is a unique feature of Washington's water quality standards and was developed to protect high quality waters and to add an aspirational level of protection to other waters that were not yet achieving these low bacteria levels. At the time, the DOI recommended 200 CFU per 100 mL fecal coliform to protect primary contact uses. This level was selected to apply to secondary contact use waters. To determine a numeric criteria to protect and "upgrade" water quality in the state, Washington set standards for primary contact at half of the DOI recommendation (or 100 CFU per 100 mL) for primary contact and further halved primary contact use criteria to set 50 CFU per 100 mL criteria for extraordinary primary contact.

Although these more stringent fecal coliform criteria were assumed to provide greater protection, they were not scientifically derived, and therefore are not associated with a measureable increase in protection for public health. Furthermore, in 1983 federal rules (40 CFR §131.12) were adopted that required states to adopt antidegradation policies to protect high quality waters. This requirement to put antidegradation rules into the water quality standards was issued after Washington had created the extraordinary use class to meet the same purpose. The extraordinary use class is no longer necessary because all high quality waters are now protected by antidegradation requirements in Washington's water quality standards.

Because the extraordinary primary contact use class and associated criteria are not required by EPA, nor are they based on a calculated reduction in risk from contact recreation, Ecology is proposing to remove this use class. In a similar action, Ecology removed the extraordinary primary contact use class from marine waters in a 2003 rulemaking.

Discussing the options

Alternative 1 would potentially result in three different bacterial indicators on the books for water contact recreation criteria (*E. coli* for freshwater primary contact and fecal coliform for secondary contact and enterococci for marine waters). This option has the potential to complicate permitting, TMDLs, and the protection of downstream uses. Determining associations between three different bacterial indicators would be essential for the protection of water contact recreation use activities, thus requiring robust side-by-side sampling at site-specific locations. However, equivalent concentrations cannot be determined between enterococci and fecal coliform due to their differing variability in the environment.

Alternative 2 would eliminate both secondary and extraordinary use classes and simplify designations of waters. There is no scientific basis for numeric values associated with the extraordinary primary use class and the EPA only recommends water contact recreation use criteria for primary contact uses. The removal of the extraordinary use class in freshwater would create continuity between the water contact recreation use classes of fresh and marine waters. Listing all waters as primary contact would closely align with neighboring states use classes and the EPA's recommendations. This option would assume equal protection of all waters.

Alternative 3 would keep extraordinary and primary uses for freshwater and primary and secondary for marine waters. This option would remove fecal coliform as an indicator for water contact recreation criteria, while retaining two different use designations for fresh and marine waters. Option three was favored for those who prefer to delineate between extraordinary and primary contact for freshwaters and primary and secondary for marine waters. However, this option would result in discontinuity between the use classes, given that the extraordinary primary use class was removed from marine waters in a previous rulemaking. Secondary contact geometric mean criterion for marine waters is already set for enterococci at 70 CFU/100 mL and therefore no changes would be proposed. Fecal coliform is currently used for secondary contact uses for freshwater, and therefore a rule change to the secondary contact use class would not be permissible (i.e. the EPA doesn't recognize secondary uses and would deny a rule that included numeric values associated with partial immersion in water). Consequently, the secondary use class for freshwater would be removed in this option.

Alternative 4 is similar to alternative three, except secondary contact use for marine waters would be eliminated. The extraordinary primary use class would be retained for freshwater and the primary contact use class for both fresh and marine waters. Similar to option three, this arrangement would result in discontinuity between the use classes.

Selecting an Illness Rate for Bacterial Indicators

Alternatives

Alternative 1: Select an illness rate of 32 per 1,000 primary contact recreators.

Table 6: Illness Rate Alternative 1

Indicator	Geometric mean (CFU/100 mL)	STV value (CFU/100 mL)
E. coli	**100**	**320**
OR		
enterococci	**30**	**110**

Alternative 2: Select an illness rate of 36 per 1,000 primary contact recreators.

Table 7: Illness Rate Alternative 2

Indicator	Geometric mean (CFU/100 mL)	STV value (CFU/100 mL)
E. coli	**126**	**410**
OR		
enterococci	**35**	**130**

Alternative 3: More stringent numeric values than the EPA's recommendations.

Alternative 4: No action.

Decision

Ecology is recommending the selection of the 32 per 1,000 illness rate for primary contact uses for *E. coli* and enterococci in fresh and marine waters (**Alternative 1**).

Discussion

The EPA recommends two options for setting criteria with different risk of illness rates (32 or 36 illnesses per 1,000 recreators). Both of these illness rates are considered protective of primary contact recreation (i.e. full immersion in water). The illness rates are based on a series of Environmental Protection Agency epidemiological studies that found a range of 30 or 35 CFU/100 mL of enterococci resulted in statistically significant differences in swimming-associated illness rates, depending on site location (USEPA, 2012). The EPA calculated illness rates associated with 30 and 35 CFU/100 mL of enterococci in waters, resulting an associated

illness rates of 32 and 36 illnesses per 1,000 recreators. Subsequently, *E. coli* numeric criteria were back-calculated from these illness rates.

The current illness rates of 32 / 36 illnesses per 1,000 primary contact recreators are equivalent to previous 1986 EPA recommendations when accounting for the change in the definition of illness. The numeric criteria are threshold values or levels in which statistically significant increases in illnesses were observed in swimmers compared with non-swimmers. Waters with bacterial counts below the numeric threshold values are considered safe for water contact recreation.

The 1986 EPA recommendations had illness rates set at 8 highly credible gastrointestinal illnesses (HCGI) per 1,000 primary contact recreators. However, when the EPA conducted additional epidemiological studies (known as NEEAR studies) in the early 2000s, the definition of illness was changed from one that required fever to be qualified as an illness to a new definition that did not require fever. The change in the definition of illnesses qualified more illnesses to be counted in the NEEAR epidemiological studies and therefore increased the perceived illness rate. Furthermore, the number of days that participants in the studies were observed changed from 8-10 days in the 1970s epidemiological studies to 10-12 days after swimming in the 2000s epidemiological studies. This change in methodology captured more illnesses in epidemiological studies, while concurrently leading to higher background illness rates. Using the ratio of background illness rates from epidemiological studies performed in the 1970s and 2000s (which had different definitions of illness), the EPA developed a translation factor of 4.5 to convert 1986 EPA recommendations to 2012 EPA recommendations. Therefore, the previous illness rate of 8 HCGI associated with the 1986 EPA recommendations was translated to 36 NEEAR illnesses in the 2012 EPA recommendations. The two illness rates (8 HCGI and 36 NEEAR illnesses) are equivalent when accounting for the definition of an illness.

The option of adopting numeric criteria more stringent than the EPA recommendations has been proposed (option 3). However, numeric criteria more stringent than the EPA recommendations would require scientific justification or it would be deemed arbitrary and capricious. Ecology is not aware of data that indicates more stringent numeric values than EPA recommendations are needed to adequately protect water contact recreation health in Washington State.

Washington has decided to select the more stringent or more protective illness rate for recreation use criteria (i.e. 32 per 1,000 primary contact recreators). Data from the EPA study locations resulted in threshold values at illness rates of 32 or 36 per 1,000 primary contact recreators, depending on the site location and conditions. Washington has a diverse range of water types and conditions, and thus, the illness rate of 32 per 1,000 primary contact recreators was selected to protect all sites and conditions throughout Washington.

Averaging Period Duration

Alternative

Alternative 1: The geometric mean would be calculated over a 30-day rolling averaging period for all sampling.

Alternative 2: The geometric mean would be calculated over a 30-day rolling averaging period for permit compliance, while all other monitoring data would be averaged over a 90-day rolling averaging period.

Alternative 3: No action.

Decision

Ecology is proposing the 90-day rolling averaging period for ambient monitoring and 30-day rolling averaging period for permit compliance (**Alternative 2**).

Discussion

The current standards at WAC 173-200(2)(b)(i) and 210(3)(b)(i) describe averaging period and sampling as follows: "when averaging bacteria sample data for comparison to the geometric mean criteria, it is preferable to average by season and include five or more data collection events within each period. Averaging of data collected beyond a thirty-day period, or beyond a specific discharge event under investigation, is not permitted when such averaging would skew the data set so as to mask noncompliance periods. The period of averaging should not exceed twelve months, and should have sample collection dates well distributed throughout the reporting period."

In the 2012 recommendations, the EPA states that the geometric mean averaging period should be less than 30 days regardless of sample size. However, other states have adopted a 90-day averaging period for ambient monitoring programs and a 30-day averaging period for permit compliance. The 90-day averaging period has been approved by the EPA on the basis that the EPA epidemiological studies exposure periods were up to 90-day periods. Consequently, a maximum of a 90-day averaging period is justifiable for ambient monitoring, while a maximum of a 30-day averaging period is allowable for permit compliance.

Permittees are required to sample regularly (at least weekly) and thus, have a robust number of samples to compare to the water contact recreation use criteria. However, several ambient monitoring programs would benefit from a longer averaging period. Some programs may only collect 1-2 samples per month and therefore not have adequate number of samples to calculate a geometric mean. Adding flexibility to the averaging period for non-permitting purposes will enable programs to collect sufficient samples to be compared to the water contact recreation use criteria, thereby increasing the certainty of public health protection.

Minimum Sample Number for Averaging

Alternatives:

Alternative 1: The criteria will have no recommended sample size for averaging.

Alternative 2: Require a minimum of 3 samples to calculate the geometric mean within the averaging period.

Alternative 3: No action.

Decision

Ecology is proposing a minimum of 3 sample collection events to calculate a geometric mean for comparison to the water contact recreation use criteria (**Alternative 2**).

Discussion

To calculate a valid geometric mean, a minimum of 3 samples should be required in order to calculate variability around any statistic. The EPA does not provide any recommendation for samples sizes for comparison to the geometric mean or statistical threshold value. Using this guidance, 1 sample may be used for comparison to the water contact recreation use criteria.

When calculating statistics within the averaging period, Ecology considered:

- The EPA recommendation of no sample size
- A minimum of 3 sample collection events
- A "no action" option (which would keep the current language that 5 or more data collection events are preferable when calculating a geometric mean)

Units of Measure for Bacteria

Alternatives

Alternative 1: Change units of measure to "MPN or CFU per 100 mL."

Alternative 2: Change units of measure to "Bacterial counts per 100 mL."

Alternative 3: No action.

Decision

Ecology is proposing to maintain the current unit of measure for bacteria, CFU (colony forming units) per 100 mL and add MPN (most probable number) or CFUper 100 mL as another acceptable unit of measure. This change will encompass all units resulting from current EPA-approved methods for reporting bacterial indicator sample concentrations (**Alternative 1**).

Discussion

The water contact recreation use criteria units in the current rule only include CFU per 100 mL. Other analytical testing methods are available with units of MPN and have in fact been used in compliance monitoring for decades. The EPA recognizes CFU per 100 mL and MPN to be acceptable units based on the EPA approved methods. The EPA states that samples analyzed via

methods that result in CFU or MPN can be compared. The units of measure for water contact recreation use criteria in the current rule do not explicitly include the MPN unit of measure.

The first option would be to modify the units of water contact recreation use criteria to include MPN or CFU per 100 mL. This method more specifically defines the units resulting from the EPA methods being used to measure bacterial indicator concentration.

Changing units to "bacterial counts per 100 mL" would broadly encompass current and any future methods that are associated with different units. However, broad language in regards to units invites the interpretation that any bacterial species qualify for comparison to the water contact recreation use criteria and incorrectly implies that methods that are not EPA approved may be acceptable.

The no action option would continue with only allowing units of CFU per 100 mL, while recognizing MPN units and methods are acceptable.

Adoption of Cyanotoxin Criteria

Alternatives

Alternative 1: Adopt EPA draft cyanotoxin criteria (USEPA, 2016) or Washington Department of Health provisional guidance values for cyanotoxins (WDOH, 2011).

Alternative 2: No action.

Decision

Ecology has decided to take no action on adopting cyanotoxin criteria (**Alternative 2**). Ecology will not adopt the EPA draft cyanotoxin criteria at this time. Ecology will continue to use the WDOH guidance values and procedures and work collaboratively with local health departments and WDOH to identify lakes with harmful algal blooms (HABs) through the Washington State Toxic Algae program. To minimize the occurrence of HABs, Ecology will continue to rely on lake nutrient thresholds and dissolved oxygen criteria to limit algal production in lakes.

Discussion

The EPA currently has draft cyanotoxin criteria for microcystin and cylindrospermopsin available to States. Washington State does not have specific numeric water quality standards for cyanotoxin species but has measures that protect against the formation of harmful algal blooms and the release of cyanotoxins.

Washington currently employs phosphorus action values in the surface water quality standards for listing impaired lakes for excessive nutrients. Furthermore, Washington provides protection against excessive nutrients in waters indirectly using the dissolved oxygen (DO) criteria. DO is not a pollutant itself but an environmental response to excessive nutrient inputs. Excessive nutrient inputs lead to increases in algal growth. Algal die-offs provide large amounts of organic matter for respiring (i.e. oxygen-consuming) microorganisms resulting in the consumption of DO in the water column. Given the interrelationship between DO and nutrients, DO concentrations can be used as an indicator of nutrient pollution for initiating actions to protect aquatic life.

The WDOH biotoxin program provides human health protection by closing water bodies that contain cyanotoxins that pose risks to human and animal health. WDOH has contact recreation guidance values for microcystin, anatoxin, cylindrospermopsin, and saxitoxin. The WDOH program has a progressive set of steps aimed at reducing human and pet exposures to cyanotoxins released from algal blooms, including advisories and water body closures.

Several uncertainties exist including the implementation of cyanotoxin criteria, methods to measure or anticipate cyanotoxin formation, funding for monitoring programs, interference with the WDOH biotoxin program, and how it may affect established rules for nutrient control. The degree of additional protections that cyanotoxin criteria would provide is uncertain at this time. Currently, there are several data gaps in the science regarding the presence of harmful algal blooms. The EPA recommendations have yet to be finalized for microcystin and cylindrospermopsin and may be subject to further review.

Transition Period for Criteria Changes and Accreditation

Alternatives

Alternative 1: The water contact recreation use criteria proposal includes both the fecal coliform-based criteria and the newly adopted criteria for a 2 year period. This transition period will allow dischargers and environmental monitoring staff to collect side-by-side data on the new bacterial indicators and if necessary, adjust treatment technologies. A proposed sunset date is included in the proposed rule, after which time all compliance monitoring for the protection of water contact recreation use will need to meet the new bacteria indicator criteria of *E. coli* or enterococci (Note: all fecal coliform monitoring requirements to protect shellfish beds will remain in place until pollution control objectives have been met and shellfish harvesting uses are fully attained).

Alternative 2: The fecal coliform based criteria will be immediately removed from the standards and compliance will be based on the newly adopted water contact recreation use criteria.

Decision

Ecology is proposing to implement a transition period of 2 years following the date of adoption of the revised water contact recreation use criteria (**Alternative 1**).

Discussion

The water contact recreation use criteria rulemaking will require changing bacterial indicators for protecting water contact recreation activities. Given that the bacteria parameter that is measured to protect water contact recreation is changing, several implementation steps will need to be followed for an efficient transition from the current fecal coliform-based criteria to the new criteria.

If Ecology adopts a new bacterial indicator to measure permit compliance with water contact recreation use criteria, dischargers whose permit cycles end near adoption of new criteria may not be able to immediately demonstrate compliance. To facilitate the transition between bacterial indicators and collect adequate data to develop accurate effluent limits that are protective of water contact recreation, a transition period is necessary. Effluent limits in permits based on recreation will need to be changed from one based on fecal coliform to one based on *E. coli*

and/or enterococci. The allowable mixing zone, as well as downstream shellfish harvesting uses, will need to be considered when developing revised effluent limits. To meet the future water contact recreation use criteria based on *E. coli* and enterococci, additional monitoring data may be needed along with modifications to operations and treatment technologies for pathogens.

After consulting with the Ecology's Laboratory Accreditation Unit (LAU), a transition period will also be necessary to accredit laboratories for permitted dischargers that conduct in-house laboratory testing for bacteria. There are approximately 188 wastewater treatment plants accredited for fecal coliform. If the fecal coliform based criteria were immediately removed in this rulemaking, those treatment plants accredited for fecal coliform would need to be concurrently accredited for a new indicator (*E. coli* or enterococci). Ecology's accreditation unit has limited staff resources for this large increase in accreditation applications. Currently, only one microbiologist accredits laboratories for bacteria, and drinking water audits take priority over environmental monitoring. The laboratory accreditation unit anticipates accreditation to be a multi-year effort. Thus, the two year transition period seems reasonable.

Chapter 5: Conclusions

Ecology's recommendations for Washington State water contact recreation use criteria are based on national recommendations. The move from fecal coliform to *E. coli* and enterococci aims to provide greater certainty in human health protection during water contact recreation use activities. Ecology intends to simplify the water contact recreation use criteria and create continuity between fresh and marine waters, as well as continuity with neighboring states.

Ecology's proposed rule eliminates the need to delineate between water boundaries of recreation areas and therefore simplifies the application of the water contact recreation use criteria. The water contact recreation use criteria uses a risk-based approach that will not completely eliminate risks of people becoming ill from coming in contact with the state's waters, given that no indicator-based standard is completely risk free. However, Ecology does support the recommendations herein to effectively protect public health from illnesses during water contact activities in state waters.

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Appendix A

Appendix A contains copies of the comments received during the SEPA scoping process.

We received public comments from:

- IDEXX Water
- Snoqualmie Tribe
- Washington Environmental Council

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IDEXX Water

Hello,

Thank you for the opportunity to submit comments on SEPA# 201802244, Ecology's proposed update to fresh and marine water quality standards (Chapter 173-201A WAC), attached is a written comment letter for your consideration.

Best regards,

Jody Frymire
Regulatory Affairs Associate II
IDEXX Water

Ms. Becca Conklin
Washington State Department of Ecology
PO Box 47600
Olympia, WA 98504-7600

Document: 201802244 -Washington Department of Ecology

May 7, 2018

Dear Ms. Becca Conklin,

IDEXX commends the State of Washington Department of Ecology (Ecology) on proposing to update the water quality standards for surface waters by including new bacterial indicators of fecal contamination and associated numerical criteria for water contact recreational use. At this time, IDEXX would like to request Ecology to consider the following supportive and editorial comments.

1. Recommend and support changes to the bacteria criteria for fresh and marine, extraordinary primary, primary, and secondary contact waters, changing from fecal coliforms to either *E. coli* or enterococci as listed within WAC 173-201A-200 Table 200(2)(b) and WAC 173-201A-210 Table 210(3)(b).

Rational: *E. coli* and enterococci are more protective indicators of fecal contamination versus fecal coliforms.

Fecal coliform bacteria are commonly identified as being thermotolerant bacteria (able to grow at 44.5°C) [1]. Thermotolerant bacteria consists of *E. coli,* Klebsiella, Enterobacter, and Citrobacter species [1,2]. When testing for fecal coliforms, the population of the bacteria present can affect the fecal coliform results, for example: Klebsiella, Enterobacter, & Citrobacter species are false-positive indicators of fecal contamination as they are from nonfecal origin [2]. It has been found, up to 15% of Klebsiella (nonfecal origin) are thermotolerant and up to 10% of *E. coli* are not thermotolerant, thus potentially causing an error rate of 25% when testing for fecal coliforms [3]. *E. coli* is the only bacteria of the coliform bacteria group that comes from the intestinal tract and found to be more specific to the detection of fecal contamination, so much so, that *E. coli* is the definitive indicator of fecal contamination in US drinking water regulations [3,4] and is the recommended bacterial indicator for fecal contamination in recreational fresh water, as part of the 2012 US EPA Recreational Water Quality Criteria recommendations [5].

Within marine waters, studies show enterococci as compared to other fecal contamination indicators, have a higher survival rate and enterococci show a direct association with risk of swimmer's illness [6,7]. The European Union (EU), uses enterococci as an indicator of fecal contamination for recreational waters, as well as in drinking water, and additionally enterococci are part of the US EPA 2012 Recreational Water Quality Criteria and included by the World Health Organization as recommended bacteria indicator for fecal contamination for recreational water [5,7].

2. Suggest to edit units associated with bacteria indicators currently "colonies/100mL" included within WAC 173-201A-200 Table 200(2)(b) and WAC 173-201A-210 Table 210(3)(b) to instead read "counts/100 mL;" which would be relevant to both CFU and MPN units.

Rational: The unit describes the method the lab uses for bacterial detection, for example the test result would be assigned either as most probable number (MPN) per 100mL or colony forming units (CFU) per 100mL, depending on what approved test method was used [8]. The term "colonies," is typically associated with the term CFU. The US EPA approves the use of different analytical methods, with results expressed in either MPN or CFU units [9]. To enter an MPN value in a column called "CFU" or "colonies" would be using the incorrect unit. CFU and MPN are both estimates for the concentration of viable target bacteria within a water sample.

3. Suggest to edit the definition for "*E. coli*" as written within WAC 173-201A-020.

Current language:

> **"*E. coli*"** or **"*Escherichia coli*"** is an aerobic and facultative gram negative nonspore forming rod shaped bacterium that can grow at 44.5 degrees Celsius that is ortho-nitrophenyl-B-D-galactopyranoside (ONPG) positive and Methylumbelliferyl glucuronide (MUG) positive.

Suggested language:

> **"*E. coli*"** or **"*Escherichia coli*"** is an aerobic and facultative gram negative nonspore forming rod shaped bacterium that that is ortho-nitrophenyl-B-D-galactopyranoside (ONPG) positive and Methylumbelliferyl glucuronide (MUG) positive and is a species specific to fecal material from humans and other warm-blooded animals.

Rational: While thermotolerant *E. coli* can grow at 44.5 degrees Celsius, typical *E. coli* grow at 35 degrees Celsius. By listing a temperature in the definition, it suggests the only analytical methods that use the defined temperature would be valid. Listed within the EPA 40 CFR Part 136.3, under the approved biological methods for *E. coli,* scientifically valid methods, like EPA Method 1604, detect *E. coli* at 35 degrees Celsius [9,10]. To only reference *E. coli* that can grow in 44.5 degrees Celsius, does not seem to be inclusive to the other EPA approved methods. Also, adding the additional information clarifies the bacteria is used as an indicator of fecal contamination within water.

4. Suggest to edit the definition for "*Enterococci*" as written within WAC 173-201A-020.

Current language:

> **"Enterococci"** refers to a subgroup of fecal streptococci that includes *S. faecalis, S. faecium, S. gallinarum,* and *S. avium*. The enterococci are differentiated from other streptococci by their ability to grow in 6.5% sodium chloride, at pH 9.6, and at 10°C and 45°C.

Suggested language:

> **"Enterococci"** refers to a subgroup of fecal streptococci that includes *S. faecalis, S. faecium, S. gallinarum,* and *S. avium*. An indicator of fecal pollution in water, commonly found in fecal material from humans and other warm-blooded animals.

Rational: This sentence "The enterococci are differentiated from other streptococci by their ability to grow in 6.5% sodium chloride, at pH 9.6, and at 10°C and 45°C," leaves out important details that provide information on the analytical methods used, for example: the reference to 6.5% sodium chloride is on bile esculin agar and the reference to temperature is on brain-heart infusion. To avoid confusion, recommendation is to either add the

additional information or take the sentence entirely. [11]. Additionally, for further definition clarification, recommendation is to add the bacteria is used as an indicator of fecal contamination within water.

IDEXX appreciates the opportunity to provide this supportive comment as well as the editorial comments and hopes Ecology will consider these suggested edits as an additional way to strengthen the water quality standards for surface waters. We look forward to the next steps in the Triennial Review process.

Respectfully submitted,

Jody Frymire
Regulatory Affairs Associate, Water

One IDEXX Drive
Westbrook, Maine 04092 USA
idexx.com/water
jody-frymire@idexx.com
Tel/Fax: +1 207 556 4840
Mobile +1 207 239 1563

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May 21st, 2018

Washington State Department of Ecology
PO Box 47600
Olympia, WA 98504-7600

Re: Rulemaking to amend Chapter 173-201A WAC, Water Quality Standards for Surface Waters

Dear Ecology,

The Snoqualmie Indian Tribe is a federally recognized tribe in the Puget Sound region of Washington State. Known as the People of the Moon, Snoqualmie tribal members were signatories to the Treaty of Point Elliott in 1855. The Tribe owns and operates the Snoqualmie Casino in Snoqualmie, WA.

The Snoqualmie Indian Tribe believes the state should use the most up to date and effective water quality standards available and applaud Ecology for updating its Marine and freshwater fecal coliform standards. The state should push for the strongest standards reasonable for the protection of humans and marine shellfisheries. FDA requires marine shellfisheries to meet an enterococcus standard, while EPA wants E. coli for recreational waters and beaches, in which case both standards should be met where feasible. The Snoqualmie Tribe implores Ecology to focus of doing what is right for the health and safety of the water users, not what is more administratively convenient.

While a final decision is still forthcoming there are several concerns that the tribe has over this regulatory change. Will the previously issued TMDL permits be grandfathered in under the current standard or will there be a transition period applicable to all permits? How will new protocols rollouts be initiated? How will the TMDL permits will be handled during the transition? Additionally, we implore the state to have some flexibility for monitoring programs to switch to measuring the new standards in the transition period and that is time left for analysis during the transition.

Please keep us informed about any ongoing proposed changes.

Thank you for the opportunity to comment.

Sincerely,

Matt Baerwalde
Water Quality Manager
Snoqualmie Tribe

WASHINGTON ENVIRONMENTAL COUNCIL

wecprotects.org
1402 Third Ave, Suite 1400
Seattle WA, 98101
206.631.2600

May 21, 2018

Washington State Department of Ecology
Attn. Becca Conklin
PO Box 47600
Olympia, WA 98504-7600

By email to: swqs@ecy.wa.gov or **online comment form**

Dear Ms. Conklin,

Thank you for the opportunity to comment on the scoping of the Environmental Impact Statement for recreational use criteria. Washington Environmental Council (WEC) supports the Department of Ecology's process to enhance the protection of people who contact water during recreational use in our state fresh and marine waters.

WEC is a 501(c)(3) organization founded in 1967. Our mission is to protect, restore, and sustain Washington's environment for all, and we are committed to clean water protections for Puget Sound and for all Washington State waters.

As a member of the Recreational Use Criteria Technical group, WEC would like to take this opportunity to submit the following scoping comments:

- The EIS should consider the freshwater indicator for recreation use criteria and illness rate that is most protective and best interest of human health and is in the best interest of public health.
- The EIS should not hide bacteria spikes that could have impacts to public health and should evaluate the alternative averaging period for samples that provides robust and accurate data.
- The EIS should evaluate the impacts and benefits of different minimum sample number sizes for averaging. The current recreational use criteria recommends five or more data collection events per season for averaging.
- The EIS should evaluate the impacts of adopting or not adopting EPA's cyanotoxin criteria for recreation and the benefits and impacts of Department of Health's recreational guidance values that is being currently used.
- The EIS should consider environmental impacts of the various transition times and plans being considered to implement the new recreational use criteria once adopted and evaluate lessons learned when Department of Ecology changed the standard method for total phosphorus over ten years ago.

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- The EIS should address public health impacts and water quality impacts while transitioning and adopting new bacteria TMDL's or addressing existing bacterial TMDL's.

Thank you for considering our scoping comments as you evaluate the benefits of updating the state's fresh and marine water quality standards.

Sincerely,

Rein Attemann

Puget Sound Campaign Manager

rein@wecprotects.org