

## Antidegradation Evaluation for the Leavenworth National Fish Hatchery NPDES Permit in Washington (WA0001902)

June 15, 2017

The Environmental Protection Agency (EPA) is required under Section 301(b)(1)(C) of the Clean Water Act (CWA) and implementing regulations (40 CFR 122.4(d) and 122.44(d)) to establish conditions in NPDES permits that ensure compliance with state and tribal water quality standards, including antidegradation requirements. Since the Leavenworth National Fish Hatchery (Hatchery) discharges to Icicle Creek, which is located within the State of Washington, Washington's antidegradation implementation procedures were used to conduct the antidegradation analysis for this permit. Documents and files to develop the Fact Sheet and draft permit for the Hatchery Permit were used. Other documents that were used include:

- Washington Department of Ecology's (Ecology) Supplemental Guidance on Implementing Tier II Antidegradation;
- EPA's Fact Sheet for the Washington Hatchery General Permit; and
- Ecology's Wenatchee River Basin Dissolved Oxygen, pH, and Phosphorus Total Maximum Daily Load Study, April 2006.

Determining the Applicable Level of Protection. The State of Washington's antidegradation policy follows the federal regulations in establishing three tiers of protection:

- Tier I ensures existing and designated uses are maintained and protected and applies to all waters and all sources of pollution.
- Tier II ensures that waters of a higher quality than the criteria assigned are not degraded unless such lowering of water quality is necessary to accommodate important economic or social development and is in the overriding public interest.
- Tier III prevents the degradation of waters identified as constituting an outstanding national or reservation resource and applies to all sources of pollution.

The Hatchery discharges to Icicle Creek, which qualifies for both Tier I and Tier II protection, as explained in more detail below.

### Tier I Protection

A facility must meet Tier I requirements to ensure that all existing and designated uses are maintained and protected. No degradation may be allowed that would interfere with, or become injurious to, existing or designated uses, except as provided for in Chapter 173-201A WAC.

In order to maintain and protect designated and existing beneficial uses, a permitted discharge must comply with the narrative and numeric criteria of the State/Tribe's water quality standards. Water bodies not supporting existing or designated beneficial uses must be identified as water quality limited and a Total Maximum Daily Load (TMDL) must be prepared for those pollutants causing the impairment. Discharge permits must contain limitations that are consistent with the wasteload allocations (WLAs) in an EPA-approved TMDL. A permit with effluent limitations consistent with the WLA from an applicable TMDL will provide the level of water quality

necessary to support existing and designated uses and therefore satisfies Tier I antidegradation requirements.

The applicable designated uses for Icicle Creek from the mouth to the National Forest Boundary are core summer habitat, primary contact recreation, domestic water, industrial water, agricultural water, stock water, wildlife habitat, harvesting, commerce/navigation, boating, and aesthetics. (Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A WAC, Revised March 2017). In addition, there are supplemental spawning uses during certain times of the year for the segment of Icicle Creek to which the Hatchery discharges.

The draft permit includes effluent limitations and monitoring requirements that would ensure that the facility maintains a level of water quality necessary to protect the existing and designated uses, as required by 40 CFR 131.12(a)(1) and 131.35(e)(2)(i). The draft permit also ensures compliance with the applicable water quality criteria as discussed in the Fact Sheet for the Hatchery permit. See Fact Sheet at pages 20-22.

Where technology-based limits are not protective enough to meet water quality standards, the EPA develops water quality-based effluent limits (WQBELs). The segment of Icicle Creek that the Hatchery discharges to is impaired for dissolved oxygen, pH, and temperature. In August 2007, the EPA approved Ecology's *Wenatchee River Watershed Temperature TMDL*, which included a wasteload allocation (WLA) for temperature for the Hatchery. In 2009, the EPA approved Ecology's *Wenatchee River Watershed Dissolved Oxygen and pH TMDL Water Quality Improvement Report*, which included a WLA for total phosphorus for the Leavenworth National Fish Hatchery. In 2011, the Washington Department of Ecology (Ecology) revised their water quality standards and included a segment of Icicle Creek that requires special protection for spawning and incubation. The numeric temperature criteria were more stringent than the temperature WLA in Ecology's 2007 temperature TMDL. As a result, in developing the effluent limits in the draft permit, the EPA used the more stringent temperature criteria that are applicable to the segment of Icicle Creek where the Hatchery's outfalls are located. In addition, the draft permit includes effluent limits that are consistent with the total phosphorus WLA in the 2009 TMDL, which also ensures that the discharge meets Washington's water quality standards for dissolved oxygen and pH.

The effluent limits in the proposed draft permit contain limits for settleable solids and net total suspended solids, temperature, phosphorus, and dissolved oxygen. The draft permit also prohibits discharges of toxic substances, including drugs, pesticides, or other chemicals, in toxic amounts that may cause or contribute to an impairment of designated uses in violation of the State of Washington water quality standards. The draft permit requires additional monitoring for total residual chlorine, total ammonia as N, pH, turbidity, and flow in the effluent. The draft permit further requires monitoring in Icicle Creek for temperature, total phosphorus, pH, ammonia nitrogen as N, turbidity, and dissolved oxygen.

The effluent limitations and monitoring requirements contained in the draft permit ensure compliance with the narrative and numeric criteria in the water quality standards. Therefore, it was determined that the permit will protect and maintain existing and designated beneficial

uses in compliance with the Tier I provisions for all pollutants including DO, pH, and temperature.

### Tier II Protection

A Tier II analysis consists of an evaluation of whether the proposed degradation of water quality from a new or expanded action would be both necessary and in the overriding public interest. A Tier II analysis focuses on evaluating feasible alternatives that would eliminate or significantly reduce the level of degradation. The analysis also includes a review of the benefits and costs associated with the lowering of water quality. New discharges and facility expansions are prohibited from lowering water quality without providing overriding public benefits.

Under Ecology's antidegradation policy, the Tier II evaluation involves determining whether a Tier II analysis is needed. Ecology's *Water Quality Program Guidance Manual* from September 2011 outlines the process to evaluate whether a Tier II analysis is necessary and includes the following steps:

1. Does the action require an authorization that could trigger a Tier II analysis? *See 173-201A-320(2).*
2. Is the action considered to be a "new or expanded" action?
3. Would the new or expanded action cause a measurable change in water quality in the edge of the chronic mixing zone? *See 173-201A-320(3).*

Washington water quality standards define a measurable change to include:

- (a) *Temperature increase of 0.3°C or greater;*
- (b) *Dissolved oxygen decrease of 0.2 mg/L or greater;*
- (c) *Bacteria level increase of 2 cfu/100 mL or greater;*
- (d) *pH change of 0.1 units or greater;*
- (e) *Turbidity increase of 0.5 NTU or greater; or*
- (f) *Any detectable increase in the concentration of a toxic or radioactive substance.*

This process was used to determine whether a Tier II analysis was needed.

1. *Does the action require an authorization that could trigger a Tier II analysis?*

WAC 173-201A-320(2) describes Tier II waters as "Protection of waters of higher quality than the standards." Since the draft permit authorizes discharges for pollutants that are of higher quality than the standards in Icicle Creek, the action could trigger a need for a Tier II analysis. Therefore, whether the action is considered to be "new or expanded" was evaluated.

2. *Is the action considered to be a "new or expanded" action?*

It was determined that the Hatchery has a new or expanded discharge compared to the last NPDES permit that was issued. As such, the discharge from the Hatchery was evaluated to

determine whether it would cause a measurable change in water quality that would trigger the need for a Tier II analysis.

3. *Would the new or expanded action cause a measurable change in water quality in the edge of the chronic mixing zone? See 173-201A-320(3).*

Washington water quality standards define a measurable change to include:

- (a) Temperature increase of 0.3°C or greater;*
- (b) Dissolved oxygen decrease of 0.2 mg/L or greater;*
- (c) Bacteria level increase of 2 cfu/100 mL or greater;*
- (d) pH change of 0.1 units or greater;*
- (e) Turbidity increase of 0.5 NTU or greater; or*
- (f) Any detectable increase in the concentration of a toxic or radioactive substance.*

As described earlier, Tier I protections apply to all waters. Ecology's guidelines state that "Tier II is used to ensure that waters of a higher quality than the criteria assigned in the standards are not degraded unless such lowering of water quality is necessary." Ecology uses a pollutant-by-pollutant analysis for antidegradation analyses. After discussions between Ecology and the EPA, each pollutant listed above was evaluated to determine whether Tier I or Tier II protections were appropriate.

Icicle Creek is impaired for temperature, dissolved oxygen, and pH. Therefore, the waters are not of a higher quality than the criteria for these parameters, and Tier I protections are appropriate for the parameters below:

- (a) Temperature increase of 0.3°C or greater;*
- (b) Dissolved oxygen decrease of 0.2 mg/L or greater*
- (d) pH change of 0.1 units or greater;*

The draft permit includes temperature limits written to the revised 2011 water quality standards and phosphorus limits consistent with the total phosphorus WLA in the 2009 TMDL. These limits and monitoring requirements ensure that the discharge meets Washington's water quality standards for temperature, dissolved oxygen, and pH. Therefore, the draft permit complies with Tier I protection for temperature, dissolved oxygen, and pH.

Icicle Creek is not impaired for bacteria, turbidity, not toxic or radioactive substances. Tier II protections apply for the following pollutants.

- (c) Bacteria level increase of 2 cfu/100 mL or greater;*
- (e) Turbidity increase of 0.5 NTU or greater; or*
- (f) Any detectable increase in the concentration of a toxic or radioactive substance.*

The following sections provide a more detailed evaluation of each parameter..

- (c) Bacteria level increase of 2 cfu/100 mL or greater;*

Icicle Creek is not impaired for bacteria and, therefore, Tier II protection is appropriate for this parameter.

The draft permit does not authorize the Hatchery to discharge bacteria. Additionally, aquaculture facilities are not considered to be significant sources of pathogens. In 2002-2003, Ecology collected fecal coliform bacteria samples at the Hatchery from Outfalls 001 and 002. Both outfalls had low concentrations of bacteria (i.e. 1-2 cfu/100mL). Therefore, the discharges from the Hatchery will not cause a measurable change to existing water quality and this parameter does not trigger a Tier II antidegradation analysis.

*(e) Turbidity increase of 0.5 NTU or greater;*

Icicle Creek is not impaired for turbidity and, therefore, Tier II protection is appropriate for this parameter.

The draft permit includes numeric limits and monitoring requirements for total suspended solids (TSS) and settleable solids (SS). The proposed limits for TSS and SS are equal to or more stringent than limits from the 1974 NPDES permit. The draft permit also includes monitoring requirements for turbidity during cleaning events throughout the year. In addition, various Best Management Practices (BMP) Plan Operational Requirements are included in the permit to ensure that minimal solids will be discharged by the Hatchery. For example, the raceways and ponds must be cleaned at a frequency and in a manner that minimizes accumulated solids discharged to waters of the U.S. Similarly, fish feeding must be conducted so as to minimize the discharge of unconsumed food. Therefore, the discharges will not cause a measurable change to existing water quality and this parameter does not trigger the need for a Tier II antidegradation analysis.

*(f) Any detectable increase in the concentration of a toxic or radioactive substance.*

Icicle Creek is not impaired for toxic or radioactive substances and, therefore, Tier II protection is appropriate for these parameters.

The Hatchery uses or generates the following chemicals: ammonia, formalin, and iodine. Effluent characteristics from the aquaculture industry have been well documented, and no information exists from the Hatchery to indicate that there are additional pollutants of concern other than those that have already been identified. The draft permit includes the following narrative limitation for all of the authorized outfalls: *“Toxic, radioactive, or deleterious material concentrations must be below those which have the potential, either singularly or cumulatively, to adversely affect characteristics water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health.”*

Fish excrete small amounts of ammonia nitrogen, which in high doses can be toxic to fish, depending on pH and temperature that controls the ionic species of the ammonia-ammonium complex. The Hatchery closely monitors the health of their fish so ammonia toxicity would be unlikely to occur within the Hatchery, and therefore would not be a source of ammonia in toxic amounts. In addition, the draft permit includes monthly ammonia monitoring requirements for all outfalls that discharge directly to waters of the U.S.

The Hatchery applies therapeutic chemicals, including formalin and iodine to promote fish health. The discharge concentration of these chemicals should not cause receiving water toxicity if the use is consistent with product labels, FDA regulations, and the permit requirement mandating BMPs. As per a BMP requirement in this permit, all drugs and pesticides must be used in accordance with applicable label instructions (FIFRA or FDA), except when part of an Investigational New Animal Drug Study or as an extra-label drug use as prescribed by a veterinarian. In addition, the draft permit also requires reporting of dosage, method of application, amount used, flow, water temperature, estimated maximum concentration used, method of disposal and location of discharge. These requirements are consistent with Ecology's Upland Fin-Fish General Permit and the EPA's Washington Hatchery General Permit.

The EPA and Ecology conducted a study in 2016 to quantify the concentrations of formaldehyde in effluent from aquaculture facilities in Washington, which included the Hatchery. Formalin, the therapeutic chemical used at aquaculture facilities, is an aqueous solution of formaldehyde, which is a known toxic pollutant. Grab samples were collected upstream of the Hatchery, from the Hatchery effluent, and downstream of the Hatchery at a time period when it was believed that the plume with the highest likely concentration of formaldehyde was being discharged from the Hatchery. No detectable concentrations of formaldehyde were observed in the grab samples associated with the Hatchery.

Therefore, it was determined that ammonia, iodine, and formalin discharges will not cause a measurable change to existing water quality, and this parameter does not trigger the need for a Tier II antidegradation analysis.

The NPDES Fact Sheet for the Hatchery describes the PCB studies done in anadromous fish and sediment in the Wenatchee River and Icicle Creek since 1997. Based on water sampling results from 2014-2015, Ecology concluded there is no obvious source of PCBs in Icicle Creek. In addition, after two years of sampling sediment and periphyton near the Hatchery, there is no evidence the Hatchery is contributing significant amounts of PCBs to the creek. Out of an abundance of caution, the draft permit includes BMP provisions to minimize PCBs discharged from the Hatchery. See pages 25-26 of the NPDES Fact Sheet.

The Hatchery does not use chlorine or Chloramine-T. However, if the Hatchery uses chlorine or Chloramine-T in the future, the draft permit requires daily monitoring when the chemical is being used and compliance with the narrative limitations for toxics.

Therefore, issuance of the permit does **not** trigger the need for a Tier II antidegradation analysis because the discharges authorized under the permit will not cause a measurable change to existing water quality where Tier II protections apply.

The draft permit does not provide a mixing zone for the Hatchery because the receiving water is impaired for pollutants present in the discharge (temperature, dissolved oxygen, and pH). Therefore, effects from dilution in a mixing zone were not explicitly evaluated, and modeling was not conducted in the Tier II evaluation. Although dilution was not used to support the

determination that the permit does **not** trigger the need for a Tier II antidegradation, dilution naturally occurs throughout the year. This would result in lower pollutant levels downstream of the hatchery. Dilution ranges from a small amount during low flow periods to a larger amount during high flow periods. The dilution factor is the ratio of the effluent volume plus volume of ambient dilution water to the effluent. Under critical 7Q10 low flows with 95<sup>th</sup> percentile effluent discharges in Icicle Creek, the dilution factor is 2.4<sup>1</sup>. Under average flow conditions in Icicle Creek, the dilution factor is 8.0<sup>2</sup>. That is, under low flow conditions, concentrations would be expected to be 2.4 times lower, and under average flow conditions, concentrations would be expected to be 8.0 times lower. This dilution occurs throughout the 2.8-mile segment of Icicle Creek prior to its confluence with the Wenatchee River, at which point additional dilution and mixing will occur<sup>3</sup>.

### Summary

Tier I protections are appropriate for temperature, pH, and dissolved oxygen, since Icicle Creek is impaired for those parameters. The draft permit incorporates phosphorus WLAs from the TMDL and the revised 2011 temperature criteria to ensure that existing and designated uses are protected for these and other parameters in Icicle Creek.

For the Tier II evaluation, the Hatchery's discharges allowed under the draft permit will not cause a measurable change in water quality for bacteria, turbidity, and toxics. Therefore, a Tier II analysis is not necessary.

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<sup>1</sup> To calculate dilution factors under low flow conditions, the upstream 7Q10 flow (73 cfs) from 1926-2016 at USGS Gaging station 12458000 upstream of LNFH was compared with the combined 95<sup>th</sup> percentile effluent flows (53 cfs) from Outfall 001(46 cfs) and Outfall 002 (7.1 cfs). Therefore, the dilution factor is  $(53 \text{ cfs} + 73 \text{ cfs})/53 \text{ cfs} = 2.4$ .

<sup>2</sup> To calculate dilution factors under average flow conditions, the upstream harmonic mean flow (369 cfs) from 1926-2016 at USGS Gaging station 12458000 upstream of LNFH was compared with the combined 95<sup>th</sup> percentile effluent flows (53 cfs) from Outfall 001(46 cfs) and Outfall 002 (7.1 cfs). Therefore, the dilution factor is  $(53 \text{ cfs} + 369 \text{ cfs})/53 \text{ cfs} = 8.0$ .

<sup>3</sup> USGS gaging station 12459000 at Peshastin is the closest gage on the Wenatchee River downstream of Icicle Creek. Using flows from the USGS website from 1928-2017, the minimum flow was 1880 cfs, and the mean flow was 7920 cfs. This would result in dilution factors of 36  $((53 \text{ cfs} + 1880 \text{ cfs})/53 \text{ cfs} = 36)$  and 150  $((53 \text{ cfs} + 7920 \text{ cfs})/53 \text{ cfs} = 150)$  under minimum and mean flows, respectively.