

**Analyses and Methods Used to Derive the
Draft Water Quality Standards for Surface
Waters of the Lummi Indian Reservation**



Lummi Indian Business Council
Natural Resources Department
Water Resources Division

October 4, 2006

Introduction

The purpose of this document is to describe the analyses and methods used to derive the draft water quality standards for surface waters on the Lummi Indian Reservation (Reservation). The draft Lummi Nation Water Quality Standards (WQS) are intended to represent the most current best available science and are based on criteria recommended by the United States Environmental Protection Agency (EPA) and the adopted Washington State WQS (WAC 173-201A).

The general approach taken to developing the 2006 draft Lummi Nation WQS was to update the 1997 draft Lummi WQS using the EPA-approved portions of Washington's 1997 and 2003 WQS (as of June 28, 2006). The 1997 draft Lummi WQS were based on the 1992 Washington WQS. The syntax of the Washington WQS and other sources were modified for compatibility with the government and culture of the Lummi Nation.

The Lummi Nation did not independently develop any of the criteria. The draft Lummi Nation WQS are numerically equivalent to the water quality standards adopted by the State of Washington except for a provision in the Class AA temperature criteria for freshwaters to protect summertime spawning; dissolved oxygen criteria for Class AA freshwaters; enterococci criteria; toxics criteria; and radioactive criteria. The Washington State water quality standards for these variables are currently not updated to the criteria recommended and/or approved by the EPA.

Briefly, to be consistent with the most current best available science, the temperature criteria for freshwater follow the recommendations reported in the April 2003 *EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards* (EPA 2003); the dissolved oxygen criteria for Class AA fresh waters follow the Oregon State Water Quality Standards approved by the EPA (Oregon State 2003); the enterococci criteria follow the recommendations reported in the EPA's *Water Quality Standards for Coastal and Great Lakes Recreation Waters* (EPA 2004); most of the toxics criteria follow the recommendations reported in the EPA's 2006 *National Recommended Water Quality Criteria* (EPA 2006a) and the EPA's 2002 report *Fish Consumption and Environmental Justice, A Report of the National Environmental Justice Advisory Council Meeting of December 3-6, 2001, Seattle, WA* (EPA 2002b); and the radioactive criteria follow the recommendations reported in the EPA's *Radionuclides Rule 66* (EPA 2000a).

Additionally, although the Washington WQS are being transitioned into a "use-based" approach, the draft Lummi Nation WQS retain the "class-based" approach utilized in Washington's 1997 WQS and the 1997 draft Lummi WQS. The "class-based" approach is being utilized for the surface waters of the Lummi Reservation due to the relatively small number of water bodies and their similarities. Classifications of waterbodies by uses and criteria on the Lummi Indian Reservation (see Figure 1) align with classifications applied by Washington adjacent to the Reservation, except where the EPA has determined that the waterbody should be classified differently (EPA 2006b). In such cases, EPA determinations were used. In addition, due to the variable salinities of many

brackish waters on the Reservation, waterbodies were specifically designated as either fresh or marine.

The methods and analysis for specific criteria and use deviations from the Washington WQS are described below by section and the sources used are summarized in Table 1.

Definitions

Several terms found in the draft Lummi Nation WQS are defined in Title 17 of the Lummi Code of Laws. Terms not defined in Title 17 of the Lummi Code of Laws are defined in the Definitions Section of the draft Lummi Nation WQS, but terms are not repeated in both documents.

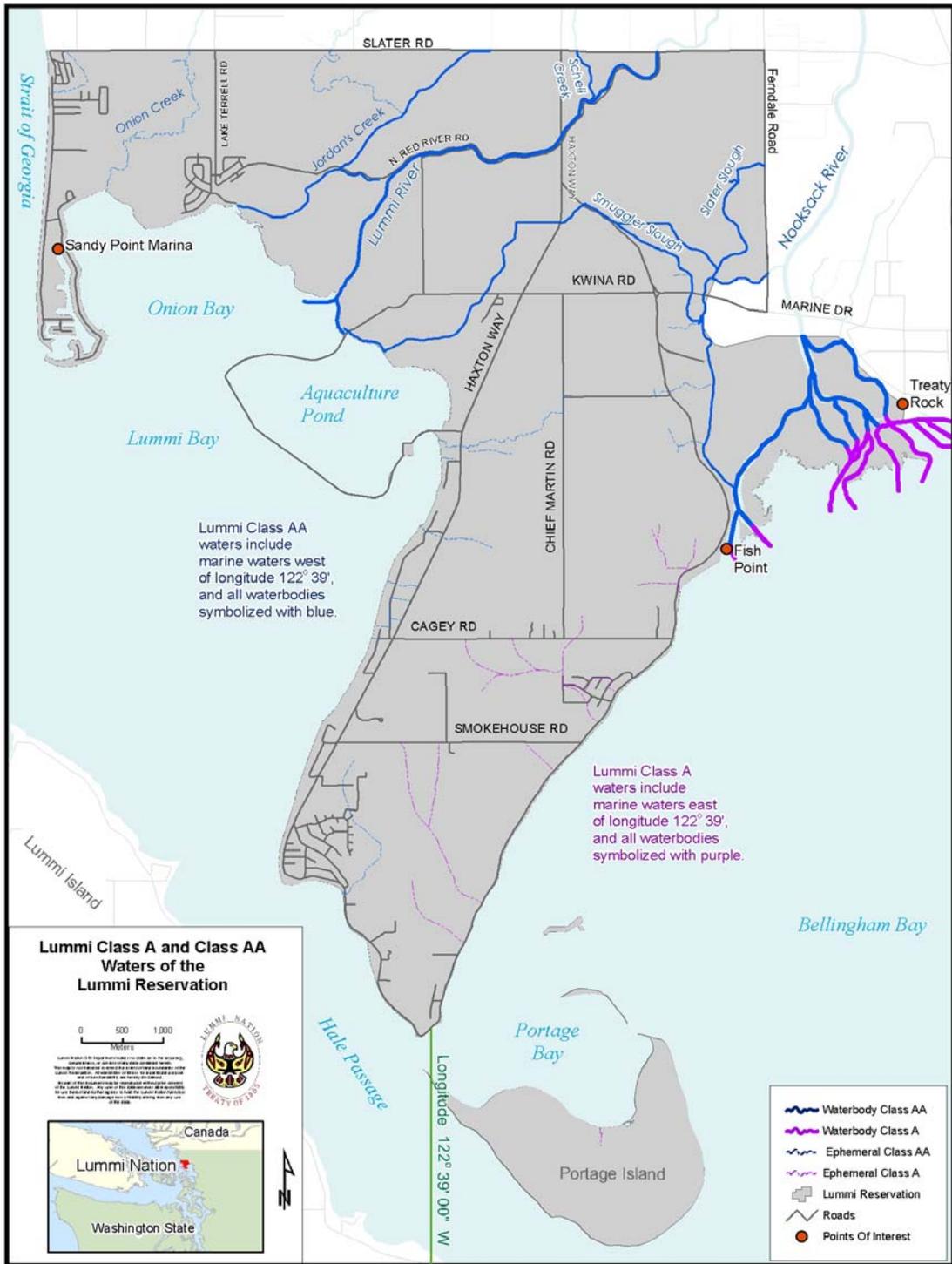


Figure 1. Water body classifications for the draft Lummi Nation WQS

General Water Use and Criteria Classes

The *general water use and criteria class* section deviates from the Washington WQS in the following four subsections: characteristic uses, enterococci densities for water contact, dissolved oxygen, and temperature.

- The subsection “characteristic uses” includes Tribal Cultural and Canoeing uses. Members of the Lummi Nation immerse themselves in water bodies frequently and completely (e.g., canoe racing and associated practice). The associated bacteria criteria align with Washington for fecal coliform and follow EPA recommendations for enterococci, as explained below.
- “Commercial” and “municipal” were added to “water supply” uses.
- The subsection “enterococci densities for water contact” establishes water quality criteria for enterococci that correspond with the level of contact recreation for each class due to and based upon EPA recommendations (EPA 2004). The EPA recommends the use of enterococci for marine waters and either *E. coli* or enterococci for fresh waters through the 2004 document in the Federal Register “Water quality standards for Coastal and Great Lakes Recreation Waters,” v. 69, no. 220 and the EPA’s 2002 Draft Implementation Guidance for Ambient Water Quality Criteria for Bacteria. Washington only used enterococci for marine secondary contact. As a note, although bacteria can be regulated by these Enterococci criteria alone, the draft Lummi Nation WQS also include criteria for fecal coliform organisms that are numerically equivalent to Washington’s 1997 WQS. Fecal coliform criteria are included because the National Shellfish Sanitation Program uses fecal coliform to classify shellfish beds for commercial harvest, and considerable portions of the tidelands on the Reservation support commercial shellfish harvest.
- The fresh water criteria in the subsection “dissolved oxygen” is numerically equivalent to Washington’s, except for Class AA, where the State of Oregon’s 2003 dissolved oxygen criteria for spawning is used. Oregon’s dissolved oxygen criteria was used because the EPA has approved Oregon’s criteria and the fresh water dissolved oxygen criteria that Washington State will use in its next revision are not known.
- For fresh water, the subsection “temperature” is aligned with Washington’s proposed 2003 criteria, except that the format is different. The 2003 Washington fresh water criteria follows the recommendations reported in the April 2003 *EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards* (EPA 910-B-03-002), except that they are 0.5°C lower for non-core rearing uses. The draft Lummi Nation WQS explicitly include a provision for summertime spawning and list that the use does not currently occur on the Reservation. The 2003 Washington WQS do not explicitly address where summertime spawning occurs, or does not occur.
 - Although summertime spawning has not been observed in recent times on the Lummi Indian Reservation, it may have occurred historically, and it may be possible in the future. In order to protect this possibility, the temperature criterion for Class AA fresh waters may be reduced to 13.0°C if evidence is found of spawning or the potential for spawning. The

conditions for “potential spawning” are described in the WQS as the occurrence of perennial flow for more than one year with depth suitable for adult salmon and/or trout use, and the presence of suitable spawning substrate.

Toxic Substances

In the draft Lummi Nation WQS, the toxics substances section follows the EPA’s 2006 *National Recommended Water Quality Criteria* because it is more reflective of the most current best available science than the toxics criteria in Washington State’s WQS. Furthermore, the draft Lummi Nation WQS includes toxics criteria to protect human health, which are not contained in Washington’s WQS, but are included in the EPA’s 2006 *National Recommended Water Quality Criteria*. The EPA calculated values for the toxics criteria to protect human health in the draft Lummi Nation WQS using a fish consumption rate of 142.4 g/day pursuant to the EPA recommendation for subsistence fishers (Sally Brough, Pers. Comm. 2006a; EPA 2000b; and EPA 2002b). A fish consumption rate representative of subsistence fishers was chosen because many tribal members of the Lummi Nation are subsistence fishers.

The draft Lummi Nation WQS include toxics criteria for all of the priority pollutants whose criteria are listed in units of $\mu\text{g/L}$ (and not those with units of mg/kg), plus various non-priority pollutants. The EPA (Sally Brough, Pers. Comm. 2006b) recommended the exclusion of criteria listed with units of mg/kg , which is explained below for Mercury and PCBs. The draft Lummi Nation WQS include all the non priority pollutants included in Washington State’s WQS:

- Ammonia
- Chloride
- Chlorine
- Parathion
- Chloropyrifos

Additionally, because agriculture is practiced on and upstream of the Reservation, the draft Lummi Nation WQS include the legacy pesticides and biocides:

- Chlorophenoxy herbicides (2,4-D and 2,4,5-T)
- Parathion
- Chloropyrifos
- Demeton
- Guthion
- Malathion
- Methoxychlor
- Mirex
- Tributyltin

For a couple pollutants, the draft Lummi Nation WQS deviate from those in the National Recommended Criteria. For example:

- For mercury, the EPA does not recommend matching the chronic water quality criteria from the National Recommended WQ Criteria because the values are not based on best-available science and are not stringent enough to comply with the Endangered Species Act (Sally Brough, Pers. Comm. 2006b). As a result, the Lummi Nation's draft criteria for mercury match those of Washington State for chronic criteria and match those of the National Recommended WQ Criteria for acute criteria. Additionally, the National Recommended Criteria contain no mercury criteria for the protection of human health, but instead have a fish tissue criterion for methylmercury of 0.3 mg/kg, for which no equivalent water concentration has been developed yet (Sally Brough, Pers. Comm. EPA 2006b). The human health water quality criteria for mercury from the California Toxics Rule is 0.050 µg/l for the consumption of water and organisms, and 0.051 µg/l for the consumption of organisms only. The EPA recalculated these values using the subsistence fish consumption rate of 142.4 g/day for the draft Lummi Nation WQS.
- For Polychlorinated biphenyls (PCBs), the freshwater criteria matches those of Washington State because EPA's National Recommended Water Quality Criteria contains no PCB criteria for freshwater.

Radioactive Substances

The radioactive substances criteria of the draft Lummi Nation WQS are the same as those of the Clean Water Act as reported in the EPA's *Radionuclides Rule* 66 FR 76708 (Federal Register: December 7, 2000 Volume 65, Number 236).

General Considerations

Washington's WQS assign fresh or marine water classifications to brackish waters on a case-by-case basis utilizing ninety-percent of the vertically averaged daily maximum salinity values. The draft Lummi Nation WQS designate brackish waters as fresh or marine. The specific designations were made because there are many brackish waterbodies on the reservation with variable salinities.

Outstanding Resource Waters

Since there are no national or state parks, monuments, preserves, refuges, wilderness areas, rivers, seashores, sanctuaries, or other similar areas on the Lummi Indian Reservation, there are no "outstanding resource waters" protected in the Lummi Nation WQS.

Mixing Zones

Design flows were not adopted for mixing zones because most waterbodies on the Reservation are either tidally influenced or ephemeral. Tidal influences include the presence of salt-water wedges moving upstream under downstream-flowing fresh water, reversal of flow direction of the waterbody, and/or a change in the water level. These factors, combined with upland waterbodies becoming dewatered during the dry season, preclude the adoption of generic design flows on Reservation. Site- and case-specific flows will have to be used for discharges requiring mixing zones.

Short-Term Exceedences

The short-term exceedences section in the draft Lummi Nation WQS combines the short-term modifications language from the 1992 draft Lummi Nation WQS and 1997 Washington State WQS, with additional changes recommended by the EPA. Short-term modifications language was substantially altered in the 1997 Washington WQS compared to the 1992 Washington WQS. Some of the changes were not incorporated into the current draft Lummi Nation WQS because they were not necessary. EPA recommendations addressed the duration of individual short-term exceedences, and longer-term plans that authorize repeated, individual short-term exceedences.

Specific Classifications

The longitudinal line (122°39'W) divides Washington State's marine water Class AA from Class A in the region near the Reservation, with Class AA to the West and Class A to the East (Washington State Department of Ecology 1997). Although not a deviation from Washington's WQS, it is worth mentioning that the draft Lummi Nation WQS extended this longitudinal line through the Reservation, classifying Lummi Bay, Hale Passage, Georgia Strait, and the Sandy Point Marina as Class AA, and classifying Bellingham Bay and Portage Bay as Class A. Fresh water uses were assigned based upon classifications aligned with Washington's, except where the EPA determined that the waterbody should be classified differently (EPA 2006b). Following the EPA determination, the Nooksack River is Class AA. Figure 1 shows the waterbody classifications on the Reservation.

Table 1. Sources used for the draft Lummi Nation WQS

Lummi Nation WQS Section	Component	Sources
17 LAR 07.020 Definitions	All definitions in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 1997.
		Washington State Department of Ecology, 2003.
	"CCC" and "CMC" spell out	U.S. Environmental Protection Agency, 2006a.
	Definitions not listed	Title 17 of the Lummi Code of Laws
17 LAR 07.030 General Water Use and Criteria Classes	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 1997.
		Washington State Department of Ecology, 2003.
	Tribal Cultural (Characteristic use)	Title 17 of the Lummi Code of Laws
	Commercial and Municipal Water Supply Uses	Title 17 of the Lummi Code of Laws
	Enterococci	U.S. Environmental Protection Agency, 2004.
	Dissolved Oxygen (all but Class AA fresh water)	Washington State Department of Ecology, 1997.

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	Dissolved Oxygen (Class AA fresh water)	Oregon Department of Environmental Quality, 2003.
	Temperature	U.S. Environmental Protection Agency, 2003.
		Washington State Department of Ecology, 1997
17 LAR 07.040 Toxic Substances	All components in the section, except for those listed below and/or addressed in the text	U.S. Environmental Protection Agency, 2006a.
	The consumption rate of 142.4 g/day used to calculate the Human Health criteria	U.S. Environmental Protection Agency, 2002b.
	Final calculated criteria using the consumption rate of 142.4 g/day.	Sally Brough, Unpublished Data. EPA 2006
	Ammonia, Chloride, Chlorine, Parathion Chloropyrifos, PCBs, ammonia, and chronic mercury criteria	Washington State Department of Ecology, 1997.
	Human Health mercury criteria	U.S. Environmental Protection Agency, 2000c
		U.S. Environmental Protection Agency, 2002b
Sally Brough, Pers. Comm. 2006a		
17 LAR 07.050 Radioactive Substances	All components in the section, except for those listed below and/or addressed in the text	U.S. Environmental Protection Agency, 2000a.
17 LAR 07.060 General Considerations	All components in the section, except the case-by-case fresh or marine determinations for brackish waters. Instead, fresh and marine designations are explicitly made in the two Specific Classifications sections.	Washington State Department of Ecology, 1997.
17 LAR 07.070 Antidegradation	All components in the section, except for those listed below and/or addressed in the text	40 CFR Part 131.12

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17 LAR 07.080 Outstanding Resource Waters	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 1997.
17 LAR 07.090 Mixing Zones	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 1997.
17 LAR 07.100 Short-Term Exceedences	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 1992.
		Washington State Department of Ecology, 1997.
17 LAR 07.110 Variances	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 2003.
17 LAR 07.120 Site Specific Criteria	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 2003.
17 LAR 07.130 Use Attainability Analysis	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 2003.
17 LAR 07.140 Water Quality Offsets	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 2003.
17 LAR 07.150 General Classifications	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 1997.
17 LAR 07.160 Specific Classifications – Freshwater	All components in the section, except for those listed below and/or addressed in the text	U.S. Environmental Protection Agency, 2006b.
		Washington State Department of Ecology, 1997
17 LAR 07.170 Specific Classifications – Marine Water	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 1997.
17 LAR 07.180 Achievement Considerations	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 1997.

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Lummi Nation WQS Section	Component	Sources
17 LAR 07.190 Implementation	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 1997.
	Compliance Schedule for dams	Washington State Department of Ecology, 2003.
17 LAR 07.200 Surveillance	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 1997.
17 LAR 07.210 Enforcement	All components in the section, except for those listed below and/or addressed in the text	Washington State Department of Ecology, 1997.

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U.S. Environmental Protection Agency. 2000c. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule: Federal Register, v. 65, no. 97, Part III, May 18, 2000.

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