

Parameter	Description	Sources	Puget Sound Optimal and Natural Levels	Effects
<b>Ammonia</b>	<b>NH<sub>4</sub></b> - natural part of the nitrogen cycle. <b>NH<sub>3</sub></b> - produced by humans.	Occurs naturally, found in urine. Toxic, colorless gas used in cleaning.	<b>.02 ppm</b> is the EPA recommended limit for marine and freshwater	0.06 ppm damages fish gills 0.2 ppm kills sensitive species 2.0 ppm kills tolerant species
<b>Chlorine</b>	<b>Cl</b> – gaseous, but also common in salts, like table salt. The main component of bleach.	Used in liquid form for cleaning, bleaching, disinfecting. Also in road salts.		0.006ppm kills trout fry 0.01ppm kills Coho and Chinook 0.10ppm kills marine plankton 0.37mg/L kills most fish
<b>Copper</b>	<b>Cu</b> – metal with high conductivity.	Occurs naturally in very small amounts. Used in wiring and electrical uses; and in car brake pads.	<b>.00025 ppm</b> (natural background in seawater) <b>.013 ppm</b> is the EPA standard for aquatic life	.01 ppm has been shown to inhibit salmon olfactory and behavioral responses.
<b>Dissolved Oxygen</b>	<b>DO</b> – oxygen dissolved in water.	There is naturally higher DO with increased flow and colder water temperatures.	<b>9 ppm</b> (optimal for salmon) Acceptable: <b>&gt;7 ppm</b>	< 6 ppm: stressful conditions for fish <3.5 results in death
<b>Fecal Coliform</b>	<b>FC</b> – Coliform bacteria found in feces (or poop)	Animal and pet waste, sewage systems.	<b>0</b> counts for drinking water <b>&lt;50</b> counts optimal for surface waters <b>&lt;200</b> counts acceptable for swimming	Indicates the presence of disease causing pathogens that can be harmful to human health
<b>Nitrates</b>	<b>NO<sub>3</sub></b> – nitrogen is an essential and limiting nutrient for all life.	Occurs naturally in manure, plant matter. Human sources include fertilizers, waste, septic tanks.	<b>&lt; 1 ppm</b> (natural background) <b>&gt; 1.0 ppm</b> suggests human caused pollution (runoff)	Excess levels of nitrates can lead to eutrophication and thus lowered oxygen levels in waters
<b>Phosphates</b>	<b>PO<sub>4</sub></b> – an essential and limiting nutrient for all life.	Occurs naturally at low levels in manure, plant matter. Human sources include fertilizers, detergents, and waste.	<b>&gt; 0.1 ppm</b> suggests human caused pollution (runoff) <b>&lt;0.01</b> ideal <b>&lt; 0.1 ppm</b> (natural background) <b>0.011-0.025</b> average <b>0.025-0.049</b> fair <b>&gt;.05</b> poor	Levels > 0.025 ppm and >0.10 ppm in streams can lead to eutrophication

<b>pH</b>	Measures the hydrogen ion concentration, or the acidity, on a logarithmic scale from 0 – 14.	Puget Sound is becoming more acidic. Residence time is a factor, and ocean acidification is likely driving it.	<b>6.5-8.0</b> is ideal for freshwater systems with 7-8 being ideal for supporting a diverse aquatic ecosystem.	Low pH results in oyster larvae mortality, inhibition of shell formation
<b>Phenols</b>	A synthetic compound used in resins, plastics, pharmaceuticals.	Used in lots of plastics and household products – creams, medicine; and in glues, construction materials, etc.	Should not exceed <b>50ppm</b>	Can cause cancer, lower immunity to disease, affect blood organs, reduce weight and fertility in fish species
<b>Sulfides</b>	Hydrogen sulfide is a gas with a 'rotten egg' smell.	Naturally occurs - anaerobic breakdown of organic matter by bacteria. Human sources include tanneries, coal plants and gasoline.	Presence of sulfides often indicates poor oxygen conditions.	Levels at 0.008ppm can be lethal to some juvenile fish and at 0.01ppm they can be lethal to adults.
<b>Surfactants</b>	Compounds that lower the surface tension of water.	Used in cleaning products to break up stains and dirt.	<b>0.5 ppm</b> human health hazard in drinking water	1.6 ppm kill 50% of juvenile fish >15ppm enough to kill adult fish
<b>Temperature</b>	Measured in °C	Effluent (or point-source runoff) especially from a factory or plant.	Optimal for hatching salmon ~ <b>9°C</b> Optimal for adult salmon ~ <b>12°C</b>	Should not exceed 18°C >21°C is unacceptable
<b>Turbidity</b>	The cloudiness or haziness of a fluid.	Runoff, especially from eroding banks or slopes.	≤ <b>5 NTU</b> Excellent ≥ <b>10 NTU</b> Fair-Poor	High levels of can reduce visibility for fish, lead to lower DO, increase temp, increase presence of pathogens, decrease light penetration for plants
<b>Silica</b>	Silicon dioxide is found as a sand or dust. Aqueous silica is less common in freshwater and a limiting trace nutrient in the ocean.	SiO <sub>2</sub> is common in glass, food preservatives, etc. Occurs naturally in rocks and minerals.	Ranges from a few ppb to much higher (in terrestrial waters)	SiO <sub>2</sub> is a known carcinogen, in particular when in dust form in the atmosphere and inhaled.