Water Quality Assessment Report for the Confederated Tribes of the Colville Reservation

September 2017

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The Colville Confederated Tribes have a primary interest in the protection, control, conservation, and utilization of the water resources of the Colville Indian Reservation. It is the purpose of this Chapter to establish Tribal Water Quality Standards for the surface waters and groundwater located within the exterior boundaries of the Colville Reservation. The quality of all surface and groundwater on the Reservation shall be protected to insure the health, economic, aesthetic and cultural well-being of all people residing upon the Colville Indian Reservation. The human activities and factors which may adversely affect the quality of surface and ground waters on the Colville Indian Reservation and the natural resources which they support shall be regulated to protect and maintain the high quality of such waters and preserve their continued domestic, agricultural, industrial, recreational, cultural and other beneficial uses.

-Confederated Tribes of the Colville Reservation, Water Quality Standards Code, first paragraph [1]

Introduction

In 2006 Environmental Trust completed a trend analysis for surface water quality on the Colville Indian Reservation and covering all data collected between 1992 and 2005. This 2016 report is a comprehensive trend analysis for 1993-2016 (1992 was omitted because of limited data availability). This report also identifies surface waters of concern based on their condition in relation to Tribal water quality standards.

The report follows guidance for reporting provided by the Environmental Protection Agency in the document, *Final Guidance on Awards of Grants to Indian Tribes under Section 106 of the Clean Water Act for Fiscal Years 2007 and Beyond* (2006) [2]. In the past, the Confederated Tribes of the Colville Reservation (CTCR) reported on water quality during five year intervals, publishing 305(b) reports (2001 [3], 2006 [4]). Current EPA grant guidance requires biennial reporting. Recent reports were prepared in 2016 [5], 2013 [6], and 2015 [18].

CTCR has a well-developed water quality management system for the reservation. This system includes water quality standards, which are published in both Tribal code and in the Code of Federal Regulations (40CFR131.35). A set of Tribal codes support achievement of the water quality standards (WQS), including onsite wastewater treatment, mining practices, forest practices, hydraulic (in-stream) projects, and water resource use. CTCR conducts a water quality monitoring program and carries out restoration projects, some of which are based on the results of water quality monitoring or other resource inventory results.

The purpose of the water quality monitoring and assessment program is to determine whether water bodies across the reservation are achieving water quality criteria and supporting beneficial water uses. Monitoring supports understanding of baseline water quality conditions for all waters and enables periodic evaluation of changes. Monitoring also helps identify waters needing restoration.

Besides monitoring and assessment conducted by Environmental Trust, the CTCR Fish & Wildlife Department performs substantial monitoring of aquatic habitat across the Reservation and throughout the Okanogan River watershed. Federal and state agencies also conduct monitoring of the boundary waters (Columbia, San Poil, and Okanogan Rivers). Some coordination and data sharing occurs between agencies.

Important environmental issues within the Reservation include surface and ground water quality, water quantities, non-point source pollution related to silvicultural, agricultural, and transportation network management, and water protection surrounding several industrial facilities. The boundary waters are affected by the Columbia River hydropower system, Columbia Basin water development and withdrawals, land development (mining, agriculture, etc.), industrial chemical use, and Non-Point Source (NPS) pollution throughout the lands draining to the Reservation's boundary waters.

Glossary

"Beneficial use" States and authorized Indian Tribes are required by the federal Clean Water Act to specify appropriate water uses to be achieved and protected. Appropriate uses are identified by taking into consideration the use and value of the water body for public water supply, for protection of fish, shellfish, and wildlife, and for recreational, agricultural, industrial, and navigational purposes. In designating uses for a water body, States and Tribes examine the suitability of water bodies for the uses based on the physical, chemical, and biological characteristics of the water body, its geographical setting and scenic qualities, and economic considerations. Each water body does not necessarily require a unique set of uses. Instead, the characteristics necessary to support a use can be identified so that water bodies having those characteristics can be grouped together as supporting particular uses. States are required to adopt water quality criteria that will protect the designated use(s) of a water body.

"Water quality criteria" Elements of Tribally adopted enforceable water quality standards. They are typically based on scientific information regarding concentrations of specific chemicals or levels of parameters in water that protect aquatic life and human health. Criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents protecting waters' designated uses.

Tribal Surface Water Resources

Water is vital to CTCR communities, culture, and environment. The 1.4 million acre Reservation is located in north central Washington state, and has semi-arid climate with annual precipitation ranging from less than 10" in the lower Okanogan Valley to just over 30 inches on a few mountain tops (Figure 1).

Figure 1: Colville Indian Reservation location within Washington State

Given its size and position, the Reservation possesses a diverse landscape occupying portions of the Columbia Plateau and Columbia Mountains/Northern Rockies ecoregions (Figure 2).

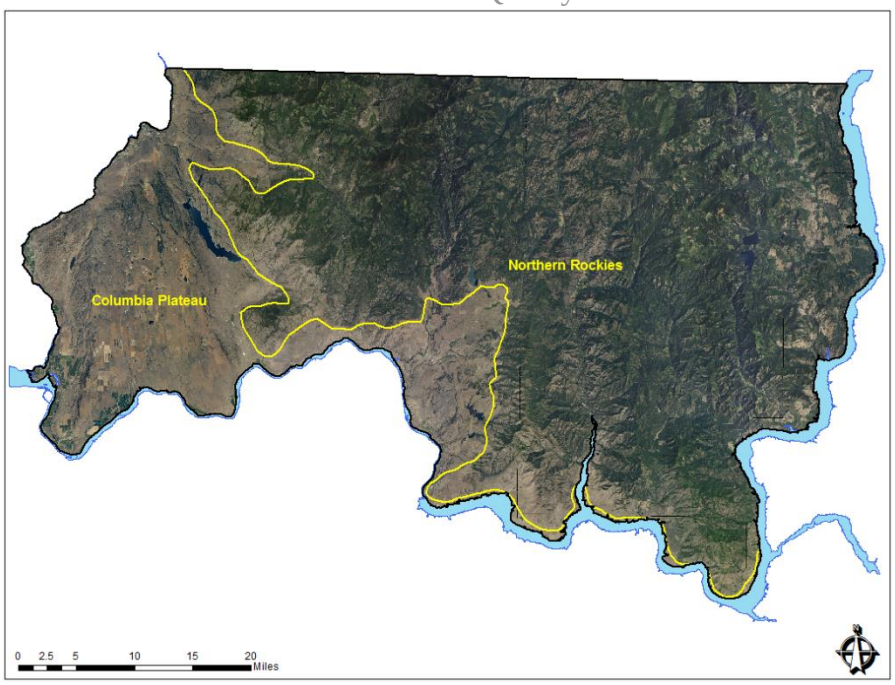

Figure 2: Reservation ecoregions

On its east, south, and west borders, the Reservation extends to the midpoint of the Columbia and Okanogan Rivers. About 36,100 acres of Columbia River reservoirs (portions of Lake Roosevelt, Rufus Woods, and Pateros) and Okanogan River channel exist within the external boundaries of the Reservation. Including 202 miles of river length, nearly 3,000 miles of river and stream lie within the Reservation boundaries. Also, about 9,500 acres of lakes and approximately 22,000 acres of wetlands are contained within the Reservation. These are shown on Figure 3. Appendix A provides a more detailed atlas of water resource information.

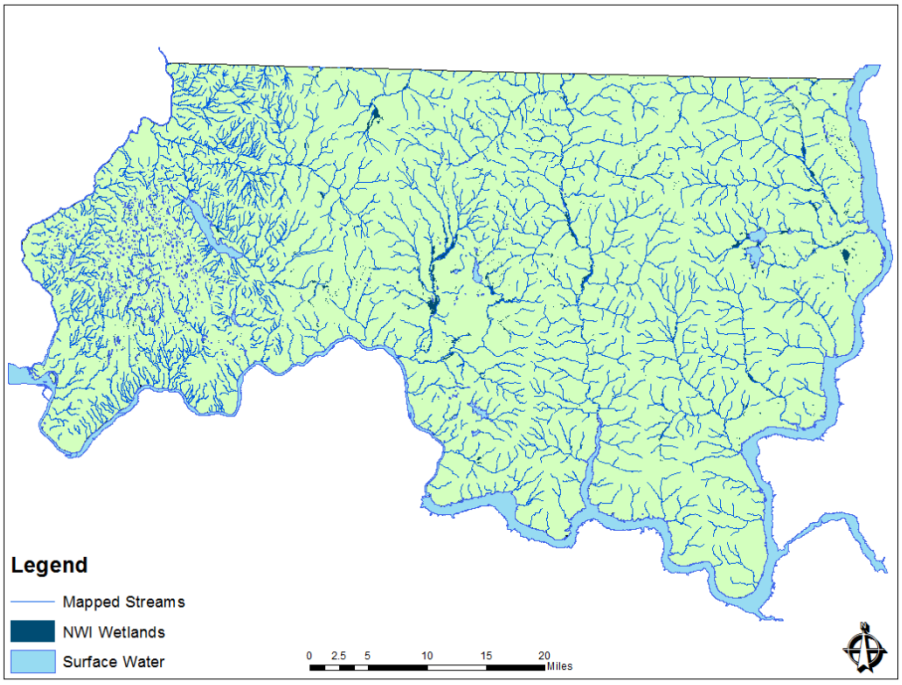

Figure 3: Colville Indian Reservation surface water resources

Water Quality Monitoring Program & Assessment Methods

This section of the report summarizes information from the Colville Indian Reservation Water Monitoring Strategy [7]. The entire Strategy is provided in Appendix B. Quality assurance is guided by a quality assurance project plan approved by EPA [8].

Goals

The primary purpose of the CTCR water monitoring program is to determine the physical, chemical, and biological conditions of water bodies across the Reservation and associated trust lands, using water quality indicators.

Generally the CTCR assessment goals are to establish the condition of water quality for Reservation waters, understand and measure pollution discharges, compare water quality conditions against standards established to assure beneficial uses of the waters, and measure water quality trends. Assessment goals for each type of water are as follows:

Rivers and boundary waters: To assess water quality of river/boundary waters entering and exiting the Reservation, and assess pollution inputs from both Reservation and off-Reservation sources affecting Reservation water quality.

Streams: To assess water quality of streams within the Reservation and pollution inputs from Reservation or remote sources, evaluate effectiveness of regulatory protections and Best Management Practices, and prioritize watershed implementation and restoration work.

Lakes: To assess water quality of lakes to improve understanding of watershed stressors and needs for lake basin protection. At this time lake water quality monitoring includes only sampling for bacteria and toxins from blue green algae blooms, relying otherwise on Fish & Wildlife or university research for more information.

Wetlands: To track wetland resource and functional conditions and evaluate the effectiveness of wetland regulatory protections. Assessments will also prioritize and guide protection and restoration project development and measure restoration success.

Springs: To sample water quality and assess condition of springs (by 2018).

Extent

Monitoring sites capture water quality data for 1780 miles of Reservation streams tributary to the sites. About 65% of the total Reservation stream miles are being monitored. Lake monitoring is conducted at eight sites on five of the Reservation's large lakes. A program of wetland assessment and water quality monitoring was developed by the Environmental Trust in 2013-2014 [9]. Environmental Trust primarily relies on other agencies in monitoring water quality in the Columbia and Okanogan Rivers. These include the US Bureau of Reclamation, US Army Corps, WA Department of Ecology, and CTCR Fish & Wildlife Department.

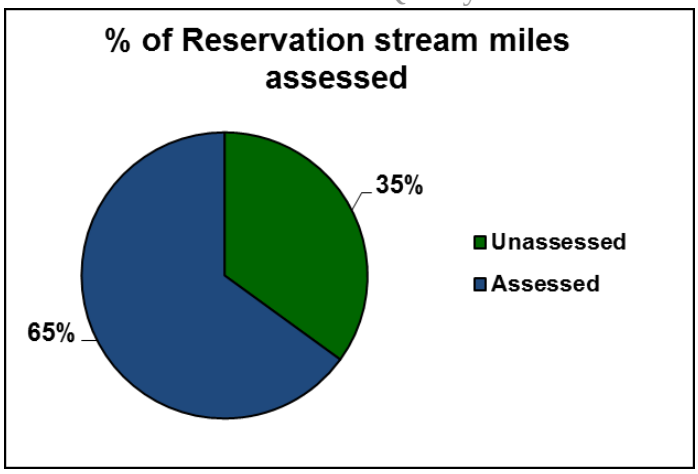

Figure 4: Percent (%) of Reservation stream miles assessed

Parameters

Environmental Trust is monitoring the nine parameters recommended by EPA in *Final Guidance on Awards of Grants to Indian Tribes under Section 106 of the Clean Water Act* (2007). The nine parameters are:

1. Dissolved oxygen
2. pH
3. Temperature
4. Turbidity
5. Phosphorus
6. Total Nitrogen
7. Macroinvertebrates (beginning in 2013)
8. E. coli
9. Habitat information (procedure revised in 2013)

Table 1 lists the physical, chemical and biological parameters monitored for each type of Reservation water resource. Environmental Trust also receives monthly monitoring reports for on-Reservation point sources (wastewater facilities, aquaculture, fish hatchery) but this report does not discuss those results.

Table 1: Water quality parameters by water resource type monitored by Environmental Trust & cooperative agencies

Water Resource Type	Physical Parameters	Chemical Parameters	Biological Parameters
Streams	Discharge (flow), Temperature, Turbidity, and Conductivity (specific conductance), Total Dissolved Gas (TDG)	pH, Dissolved Oxygen (DO), Nutrients (ammonia, nitrate/nitrite, orthophosphate)	Bacteria (fecal coliforms, *E. coli*), Macroinvertebrates, and Habitat (riparian/channel condition)
Lakes		Algal toxicity	Bacteria
Wetlands	Disturbance type and severity, Turbidity	Nutrients	Vegetation Diversity, Sensitivity to disturbance and cultural value, fish/wildlife habitat and presence, Bacteria
Groundwater	Conductivity, Total Dissolved Solids (TDS)	pH, Arsenic, Fluoride, Nitrate-N, Iron, Manganese, Sulfate, Zinc, Sodium, Hardness, Lead, Alkalinity, Calcium, Magnesium, Corrosivity	Bacteria

Monitoring Frequency

Frequencies for the various types of monitoring are listed in Table 2.

Table 2: Monitoring frequency for the different water resource types

Water Resource Type	Physical Parameters
Rivers	Continuous flow monitoring
Streams	Flows measured monthly at 70 sites Samples collected monthly from a panel of 20 sites (3 panels on a 5-year rotation) BMI from 10 streams at 5-year intervals Riparian condition at 3-year intervals
Lakes	8 samples collected monthly (July-August)
Wetlands	With intensive assessments, Situation specific
Groundwater	Annually, 20 wells

Monitoring Network Design

Rivers/Boundary Waters:

A census design is used to monitor the three high resource value rivers on the Reservation (Columbia River, Okanogan River, and San Poil River). Water quality monitoring of the Columbia and Okanogan Rivers is conducted by CTCR Fish & Wildlife, WA Department of Ecology, agencies operating dams on the Columbia, and discharging facilities. The San Poil River is monitored by Environmental Trust with a stream monitoring site where it enters the Reservation.

Streams:

For streams and lakes and groundwater, a judgmental design is employed. 70 stream monitoring sites have been designated for ambient water quality monitoring conducted once monthly between March to November. Sites were selected using a targeted method. The population of streams monitored includes named perennial streams within the Reservation boundary. This network of locations allows monitoring for many—though certainly not all—of the Reservation's named streams and lakes receiving recreational use. Monitoring locations, and which bodies of water are monitored, may change from time to time. This can occur for several reasons, such as to monitor additional streams, adjust for budget and staffing constraints, or respond to new point sources or land use changes.

Some large streams have more than one monitoring site. The selection process includes consideration of tribal interests, accessibility, flows and ecological setting. Sites are typically located just up from the mouth of streams. Several sites monitor water quality as streams flow on or off the Reservation.

Environmental Trust incorporated bio-assessment into this surface water monitoring strategy in 2013. Benthic Macroinvertebrate Indicator monitoring began in 2013 using a judgmental design; site selection is targeted. Environmental Trust currently uses regional reference site data from the appropriate ecoregions (Columbia Plateau and Columbia Mountains/Northern Rockies) for reference sites, such as provided by the WA Department of Ecology (WADOE Reference Sites). Environmental Trust may switch to using on-reservation reference sites once enough sampling has been completed. The index period extends from August 15th to October 15th. Environmental Trust uses direct sampling of natural substrates and composite sampling to characterize reaches rather than individual small replicates. Compositing incorporates several samples or efforts throughout the stream reach, incorporating riffles, runs, and pools, as are typical of the stream in question. Environmental Trust strives to collect two (2) composite samples per year.

Environmental Trust revised its riparian/channel condition monitoring in 2013. Rapid riparian condition surveys are employed by a judgmental design approach to examine riparian, streambank/channel

condition, and any road crossings encountered in a selected reach. Initial target number of surveys is 25 annually. The surveys are performed upstream of water quality stations, allowing all regularly monitored sites to be assessed in three years. Sites will then be re-assessed on a similar schedule, establishing a three year survey rotation for current established water quality stations. Other sites will be chosen to support assessment of Best Management Practices effectiveness and activity compliance. The rapid riparian condition survey form is in Appendix C.

Lakes:

Major lakes with significant swimming and other recreational use on the Reservation include Omak Lake, Owhi Lake, Buffalo Lake, Lake Roosevelt, and Twin Lakes. The focus of Environmental Trust lake water quality monitoring is to confirm the lake waters are safe for primary contact activities such as swimming. Monitoring consists of collecting fecal coliform and E. coli samples monthly during the summer, typically July and August, at 8 beach sites. The beach sites are Carson and Rainbow beaches on North Twin Lake, Keller Park on Lake Roosevelt, Buffalo Lake Beach, Gua Point on Owhi Lake, and Nicholson, North End, and Baines beaches on Omak Lake. Algae toxicity is evaluated as concerns arise.

Wetlands:

For wetlands, rapid wetland assessments occur at 24 randomly selected, fixed sites each year for five years, after which, sites are reassessed (124 sites total). Rapid assessments target sites with special interests that emerge during project planning. Intensive assessments target wetlands that require more detailed monitoring, such as those in high impact project areas, supporting special resources, or chosen for restoration or protection.

Springs:

Currently spring water is sampled and tested for suspected contaminants as questions arise. A monitoring design for Reservation springs has not been developed yet, but is expected to use a probability-based approach to develop a statistically valid random sample from the population of springs, performed every 10 years. Monitoring will examine spring water quality, and soil and vegetation conditions surrounding springs.

Point Sources:

A census approach is used for point dischargers, including several aquaculture facilities and wastewater treatment facilities. Two aquaculture businesses operate on the Lake Rufus Woods reservoir of the Columbia River, and CCT Fish & Wildlife operates two fish hatcheries along the Columbia River and two fish acclimation ponds along the Okanogan River. Wastewater treatment facilities exist for Omak, Nespelem and Colville Agency, Coulee Dam, and Inchelium. Managers of the various facilities perform monitoring of discharge effluent, providing wastewater quality data to Environmental Trust as well as EPA. Environmental Trust receives and reviews the results from their monitoring.

NPS Sources:

There are several non-point source (NPS) activities occurring on the Reservation, including silviculture, agriculture, and grazing as well as road construction, maintenance, and use. Environmental Trust revised the CTCR NPS assessment in 2016 and the management plan in 2017 [10]. The management plan calls for monitoring of NPS activities, assessment of watershed impacts from roads, and evaluation of the performance of NPS Best Management Practices practiced on the Reservation and of NPS pollution control projects.

Tribal Water Quality Standards

CTCR Water Quality Standards classify surface waters into four stream water classes, a lake class and a special resource water class. Each water class is intended to support certain "beneficial uses." These can include providing fish, shellfish, and wildlife habitat, natural food chain maintenance, recreation, water supply, commerce and navigation, ceremonial and religious water use, and stock watering (See Table 3).

Table 3: Beneficial uses by water class designated by the Colville Water Quality Standards

Designated Use	Class I	Class II	Class III	Class IV	Lake	Special Resource
Water Supply (domestic, industrial, agricultural)	X	X	X	X	X	
Commerce & navigation	X	X	X	X	X	
Ceremonial & religious use	X	X			X	
Fish & Shellfish	X	X	X		X	
Recreation	X	X	X	X	X	
Stock watering	X	X	X	X	X	
Wildlife habitat		X	X		X	X
Fish migration	X	X	X	X	X	
Natural food chain maintenance						X

CTC 4-8 Water Quality Standards specifies criteria for the following standards (See Table 4):

- Fecal coliform organisms
- Total dissolved gas
- Dissolved oxygen
- pH
- Temperature
- Turbidity
- Aesthetic values
- Toxic, radioactive, or deleterious material concentrations

CTCR has no additional criteria but uses recommendations of the EPA for guidance. CTC 4-8 specifies, "Deleterious concentrations of toxic, or other non-radio-active materials, shall be determined by the Department in consideration of the "Quality Criteria for Water," published by EPA in 1976 [11], and as revised, as an authoritative source for criteria and/or other relevant information." This reference information has been updated and compiled as a set of tables and associated documents called the National Recommended Water Quality Criteria [12]. The National Recommended Water Quality Criteria Table serves as EPA's current recommended ambient water quality criteria for the protection of aquatic life and human health. EPA also provides recommended recreational water quality criteria [13].

As required by the Federal Clean Water Act, the CTCR Water Quality Standards include anti-degradation standards prohibiting reductions in water quality.

Table 4: Criteria from CTCR Water Quality Standards

Parameter	Water Class	Criteria	Citation
Fecal coliform organisms	I-Extraordinary	≤ geometric mean of 50 organisms/100mL, and No more than 10% of samples exceeding 100 organisms/100mL	[1]
	II-Excellent	≤ geometric mean of 100 organisms/100mL, and No more than 10% of samples exceeding 200 organisms/100mL	
	III-Good	≤ geometric mean of 200 organisms/100mL, and No more than 10% of samples exceeding 400 organisms/100mL	
	IV-Fair	≤ geometric mean of 200 organisms/100mL, and No more than 10% of samples exceeding 400 organisms/100mL	
Dissolved Oxygen	I	> 9.5 mg/l	[1]
	II	> 8.0 mg/l	
	III	> 6.5 mg/l	
	IV	> 4.0 mg/l	
Total Dissolved Gas	I	≤ 110% of saturation	[1]
	II	≤ 110% of saturation	
	III	≤ 110% of saturation	
Temperature	I	≤ 16.0ºC (freshwater)	[1]
	II	≤ 18.0ºC (freshwater)	
	III	≤ 21.0ºC (freshwater)	
	IV	≤ 22.0ºC (freshwater)	
pH	I	6.5 to 8.5	[1]
	II	6.5 to 8.5	
	III	6.5 to 8.5	
	IV	6.5 to 9.0	
Turbidity	I	≤ 5 NTU over background (BG) if BG ≤ 50 NTU, or ≤ 10% increase when BG ≥ 50 NTU	[1]
	II	≤ 5 NTU over background (BG) if BG ≤ 50 NTU, or ≤ 10% increase when BG > 50 NTU	
	III	≤ 10 NTU over background (BG) if BG ≤ 50 NTU, or ≤ 20% increase when BG > 50 NTU	
	IV		
Toxic, radioactive, or deleterious material concentrations	All classes	< public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect any water use	[1]
Aesthetic values	I	Not impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste	[1]
	II		
	III		
	IV		

Collaboration with Other Agencies

Environmental Trust's monitoring strategy relies to some extent on coordinated and cooperative efforts between CTCR Environmental Trust and other agencies involved with water monitoring. Monitoring carried out by the various agencies is driven by different goals and objectives, but with appropriate quality assurance and data management the data and assessment results may be shared. Agencies include the Colville Fish & Wildlife Department, Washington Department of Ecology, US Bureau of Reclamation, Army Corps of Engineers, Natural Resources Conservation Service, Geological Survey and others. Fish & Wildlife conducts the Okanogan Basin Monitoring & Evaluation and Lake Roosevelt Tributary Monitoring programs. The agencies generally support the efforts of each other, communicate regularly, and attempt to avoid duplication of effort.

Laboratory Support

In 2015, Anatek Labs, Inc. began providing analytical services in support of the water quality monitoring program of Environmental Trust by testing water samples from locations identified in the Colville Indian Reservation Surface and Ground Water Monitoring Plans. Previous analytical services were provided by AAA Laboratory.

The lab tests samples from monitoring network 1) streams, lakes and wetlands for nutrients (ammonia, nitrate/nitrite, TKN, orthophosphate), and fecal coliform and *E.coli* bacteria; and 2) public supply and domestic well samples for inorganic contaminants and total coliform bacteria. Analysis for these parameters is beyond the capability of Environmental Trust.

Additionally, the lab performs the following as needed: 1) test network surface water samples for total suspended solids; 2) test network well samples for volatile/semi-volatile organic contaminants and corrosivity; 3) test water samples from non-network locations for selected contaminants; 4) assist with the review and evaluation of all water test results; and 5) advise changes to the monitoring network, monitoring schedule and parameter test list.

Beginning in 2013 EcoAnalysts, Inc. has been providing analytical services regarding BMI assessments.

Data Management & Interpretation

An Access relational database is used for storing and organizing water quality monitoring information and data. The database is located on the Environmental Trust server in the Environmental Trust offices at the Colville Indian Agency campus. The database and information is managed by the Watershed Program Manager. The server is connected to the group of PC computers used by Environmental Trust staff, though only the Watershed Program Manager, Water Resource Analyst, and Water Resource Operations Supervisor open the database. Outside requests for water quality information are handled by the Watershed Program Manager.

Environmental Trust watershed technicians enter data using a database form on their PC. The data entry is supervised by the Water Resource Operations Supervisor, who also checks field and lab forms for accuracy and completeness.

Data is submitted annually to the EPA national STORET water quality database by the Water Resource Operations Supervisor, using WQX Excel to format and organize the submittal.

Sample results are scanned by the Watershed Program Manager as they are received from the lab, and entered into the database. Should spikes in parameter values occur, technicians may be sent back to sites to investigate and document potential pollution sources.

Monitoring results are imported from the database into Excel and assessed by stream or by ecoregion. Excel is used to calculate statistics on the data including annual means, 25th percentiles (P25), percent (%) readings reaching levels of concern, and other analyses as appropriate. Some analyses use all available data (1993-most recent complete year) and some use the most recent five (5) years. Results are compared with water quality criteria for the water body. Any water quality concerns are flagged and potential/probable causes identified.

Data Analysis & Discussion

Different water quality parameters and criteria are used to assess whether existing water quality supports the designated water uses. Table 5 shows which parameters support each use.

Table 5: Water quality parameters supporting assessment decisions

Designated Use or Tribal Goal	Tribal Code Parameter(s) to be Measured to Determine Support of Use or Goal
Water supply (domestic, industrial, agricultural)	Pathogens (*fecal coliform*) Turbidity
Commerce & navigation	Pathogens (*fecal coliform*) Turbidity
Ceremonial & religious use	Pathogens (*fecal coliform*) Turbidity
Fish & shellfish	Dissolved oxygen Temperature pH Turbidity
Recreation	Pathogens (*fecal coliform*) Turbidity
Stock watering	Pathogens (*fecal coliform*) Turbidity
Wildlife habitat	Dissolved oxygen Temperature pH Turbidity
Fish migration	Dissolved oxygen Temperature pH Turbidity
Natural food chain maintenance	Dissolved oxygen Temperature pH Turbidity

The following analyses use data collected from March through November, 1993 – 2016. Freezing conditions and lack of access to sites in December – February have severely limited data collection.

Temperature:

When analyzed by ecoregion or as a whole reservation, collected water and air temperature data for 1993 – 2016 are parametric and have a normal distribution.

Environmental Trust looked for any change in water temperature on the Reservation by generating a regression between mean annual water temperature (March – November) and collection year. The Colville Indian Reservation (CIR) contains two (2) second level ecoregions: Columbia Plateau and Northern Rockies. As such, Environmental Trust also completed similar regressions by ecoregion (see Figures 5, 6, and 7). Based on the line of best fit equations, between 1993 and 2016 CIR water temperature has increased by 1.1 °C, the Columbia Plateau ecoregion has seen an increase of 1.9 °C, and the Northern Rockies ecoregion has increased by 1.1 °C. The R^2 values show that these increases are not really a function of time.

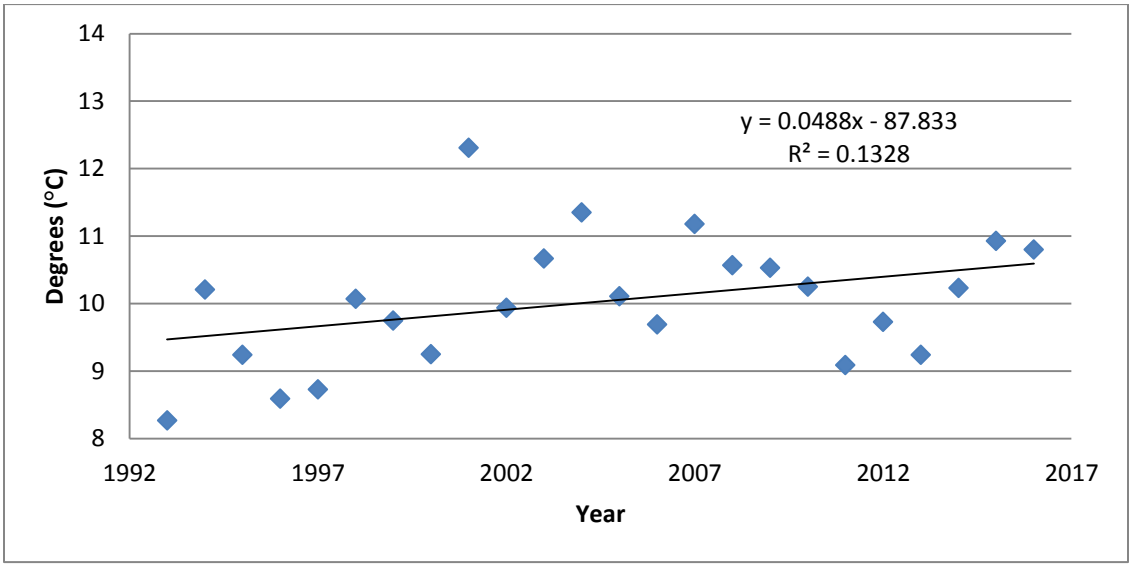

Figure 5: Colville Indian Reservation mean water temperature (°C): March - November

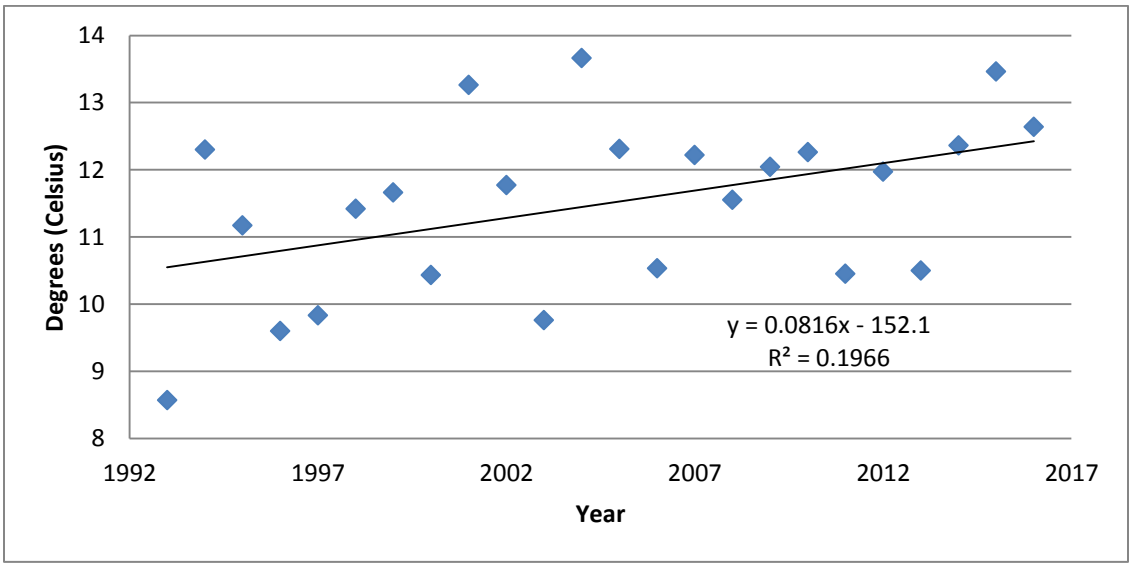

Figure 6: Columbia Plateau ecoregion mean water temperature (°C): March - November

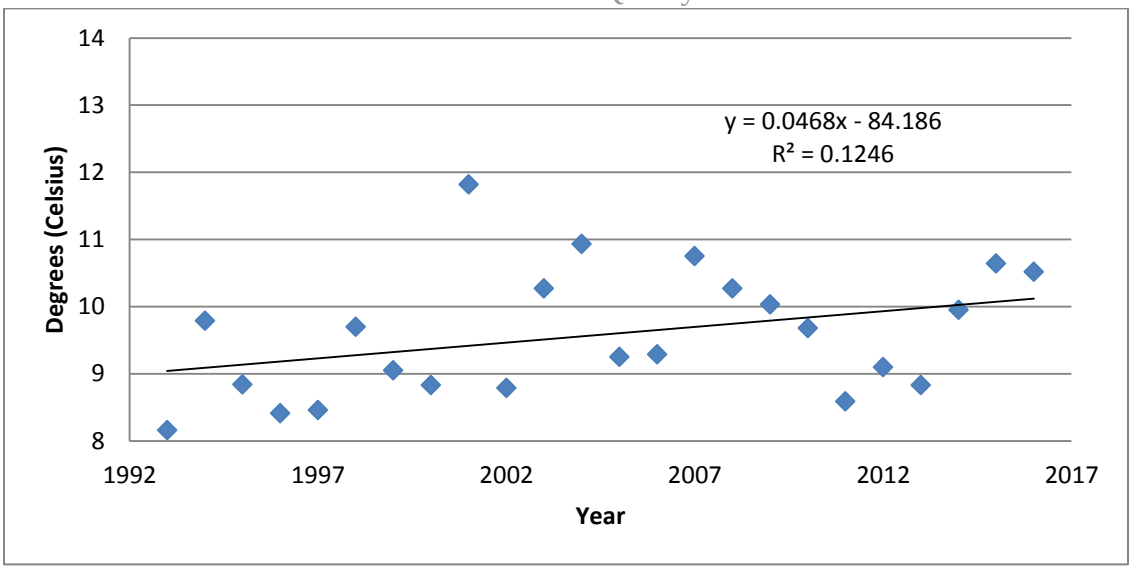

Figure 7: Northern Rockies ecoregion mean water temperature (°C): March - November

NOTE: In all analyses, CIR tended to mirror the results of the Northern Rockies ecoregion because the majority of sample points are located there. Generally, the R^2 for ecoregion-based analyses have been stronger than for CIR-based analyses; water temperature vs. time is an exception. All subsequent results and discussion will look at surface water quality in terms of the Columbia Plateau and Northern Rockies only.

Environmental Trust completed regressions correlating water temperature to air temperature (Figures 8 and 9). The line of best fit and R^2 values show that water temperature in both ecoregions with highly correlated to air temperature. Similar mean annual temperature vs. time (March – November, 1992-2016) regressions for air temperature show that air temperatures have increased 4.7 °F in the Columbia Plateau and 2.5 °F in the Northern Rockies. The data indicate that over the past 24 years the growing season is getting hotter on the Reservation, a likely localized impact of global climate change.

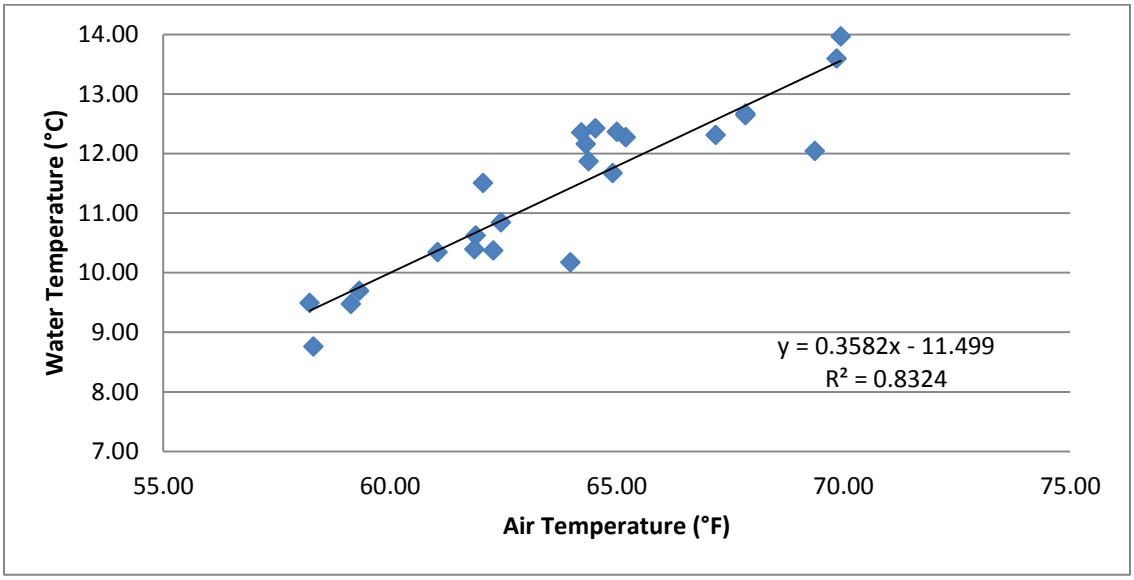

Figure 8: Columbia Plateau ecoregion mean water temperature (°C) vs. mean air temperature (°F): March – November, 1993-2016

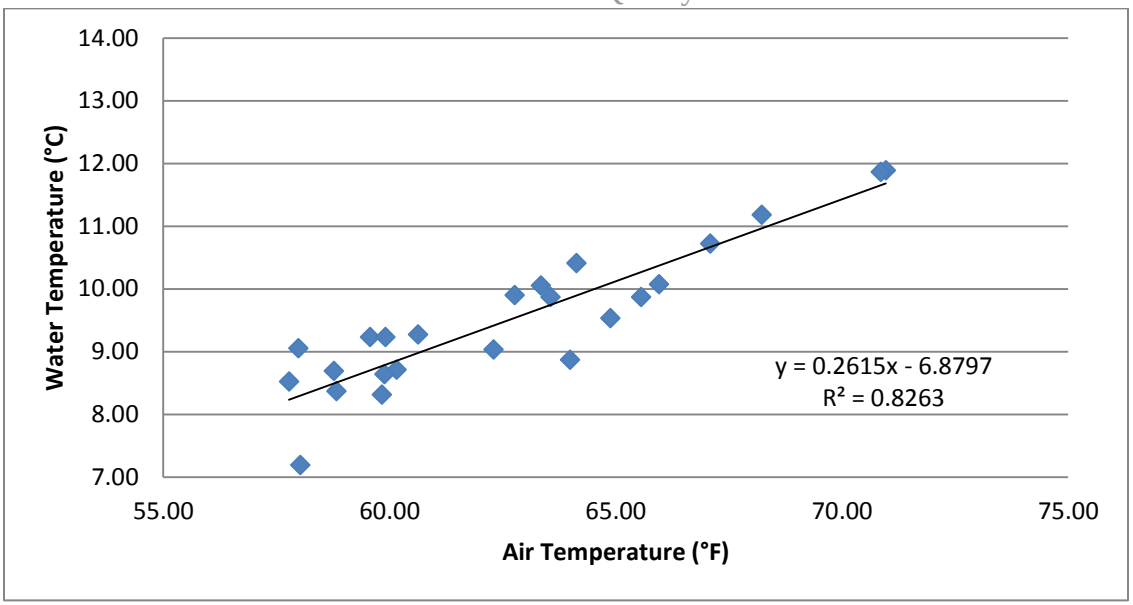

Figure 9: Northern Rockies ecoregion mean water temperature (°C) vs. mean air temperature (°F): March – November, 1993-2016

Although the regressions show that water temperature is strongly connected to air temperature, there is still variation in the data that may be resulting from other factors such as riparian habitat degradation, erosion, channel alteration, and flow alteration.

High temperature water fails to completely support fish and shellfish, wildlife habitat, fish migration, and natural food chain maintenance goals. Environmental Trust identified streams where water temperature is a concern by determining which streams had 10% or more of their water samples reading water temperatures greater than the limits set in the Tribal water quality standards. Environmental Trust assessed the Tribal Standard against the 2012-2016 time period because the downward trend in DO on the Reservation meant that the earlier data could have hidden the current condition. The 1993-2016 sample revealed that five (5) streams were not meeting Tribal criteria. For all water quality metrics, Table 6 on pages 24-25 show streams of concern, the sample size, water quality concern, qualifying concern level, sample time period, and concern measure.

Dissolved Oxygen (DO):

When analyzed by ecoregion or as a whole reservation, collected DO data for 1993 – 2016 are parametric and have a normal distribution.

Environmental Trust looked for any change in DO within Reservation Ecoregion by generating a regression between mean annual DO (March – November) and collection year (see Figures 10 and 11). Based on the line of best fit equations, between 1993 and 2016 Columbia Plateau DO has decreased by 0.78 mg/l and the Northern Rockies ecoregion has decreased by 0.49 mg/l. The R^2 values show that these increases are not really a function of time; only roughly 20% of the variation in DO is explained by the function of time regressions.

Environmental Trust performed multiple regressions to identify if DO were strongly correlated with water temperature, air temperature, and turbidity. The strongest R^2 values (Columbia Plateau = 0.3597, Northern Rockies = 0.3621) occurred when correlating the raw DO and raw water temperature values.

These results show that even though water temperature does impact DO on the Reservation, it is not the driving force like air temperature is to water temperature. Degraded riparian areas and stream channels can provide sediment and nutrients that lead to lowered DO. Contributing human activity like

grazing/livestock management, road runoff, culverts and stream-adjacent road locations, forest management, development, and wildfire persist on the Reservation to some extent.

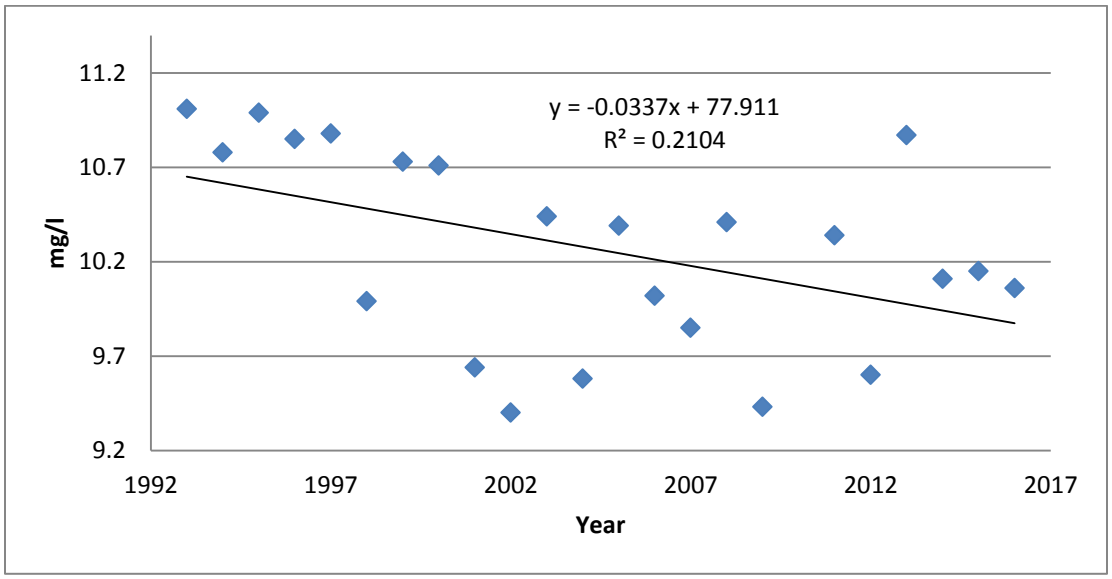

Figure 10: Columbia Plateau ecoregion mean DO (mg/l): March – November

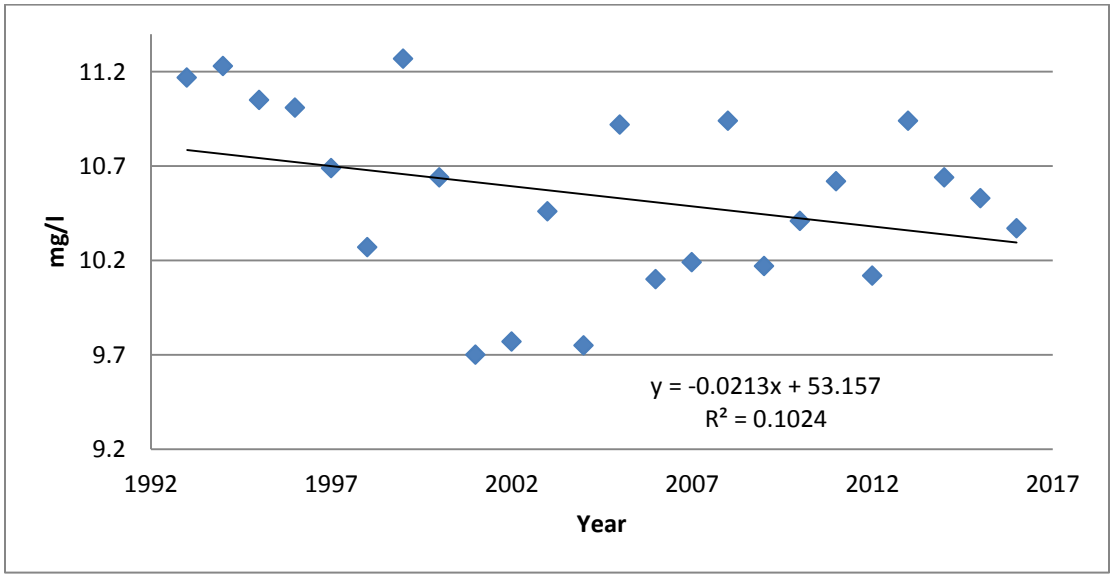

Figure 11: Northern Rockies ecoregion mean DO (mg/l): March – November

Waters with low levels of dissolved oxygen fail to completely support fish and shellfish, wildlife habitat, fish migration, and natural food chain maintenance goals. Environmental Trust identified streams where DO is a concern by determining which streams had 10% or more of their water samples reading DO levels less than the limits set in the Tribal water quality standards. Environmental Trust assessed the Tribal Standard against the 2012-2016 time period because the downward trend in DO on the Reservation meant that the earlier data could have hidden the current condition. The 2012-2016 sample revealed that 13 streams were not meeting Tribal standards. Table 6 on pages 24-25 show streams of concern, the sample size, water quality concern, qualifying concern level, sample time period, and concern measure.

Turbidity:

Turbidity data are non-parametric and follow a logarithmic curve. For a portion of the work completed below, Environmental Trust completed a log transformation of the data that helped the data approach normality but still only had an correlation of 0.9312 for Columbia Plateau and 0.8548 for the Northern Rockies. Roughly 15% of the turbidity readings in the Northern Rockies in 1993 have been 0 NTU.

This section uses the EPA's Ambient Water Quality Criteria Recommendations for the Columbia Plateau and Northern Rockies ecoregions found in EPA 822-B-00-016 and EPA 822-B-00-015 (2000). Because turbidity levels are non-parametric, the EPA recommends using a standard based on the 25th percentile (P25) or lower quartile. In these references, Columbia Plateau is known as level III ecoregion 10 and the reference expected P25 is 1.45; on the Reservation Columbia Plateau's P25 is 2. Northern Rockies is known as level III ecoregion 15 and has an expected P25 of 0.78; on the Reservation Northern Rockies' P25 is 0.7.

NOTE: The reference P25 levels for the Columbia Plateau and Northern Rockies include turbidity reading for the entire year. Due to accessibility, freezing conditions, and spring runoff hazards Environmental Trust is unable to obtain readings from the majority of the Reservation for the better part of five (5) months. March and April readings are geographically limited, their total sum are disproportionately small compared to all readings taken. Additionally, until 2010 Environmental Trust sensors were only accurate to the integer level.

Primary sources of turbidity include road and logging related sediment delivery, livestock and feral horse grazing, and altered hydrology resulting from roads, grazing, and fire. Waters with high levels of turbidity fail to completely support fish & shellfish, wildlife habitat, fish migration, and natural food chain maintenance goals. Three (3) streams within the Columbia Plateau have stream-specific P25 quartiles greater than the reference and forty (40) streams within the Northern Rockies have stream-specific P25 quartiles greater than the reference.

Environmental Trust also reviewed streams by assessing values that make up only the top 2.5% of the area under the normal curve when using a log-transformation (two standard deviations from the mean). Approximately 32% of named streams (30 of 94) account for 77.4% of all turbidity readings in the top 2.5% of the normal curve. 16.7% of top 2.5% readings took place June – November, well after the spring runoff. High turbidity levels outside the traditional spring freshet raise questions regarding the application and effectiveness of best management practices utilized for grazing, forest, and road management.

Omak Creek and San Poil River together account for 22.2% of the top 2.5% readings and 28.1% of all outliers (three standard deviations from the mean). The following streams all have more than five (5) values in the top 2.5% of samples:

- Barnaby Creek (7, including 3 outliers)
- Cache Creek (15, including 3 outliers)
- Coyote Creek (8)
- Haden Creek (9, including 1 outlier)
- Hall Creek (13, including 1 outlier)
- Jack Creek (9, including 2 outliers)
- Kartar Creek (8, including 1 outlier)
- Little Nespelem River (8, including 2 outliers)
- Lost Creek (15, including 5 outliers)
- Lynx Creek (6, including 1 outliers)

- Manila Creek (12, including 6 outliers)
- Meadow Creek (8, including 3 outliers)
- Omak Creek (45, including 14 outliers)
- San Poil River (35, including 9 outliers)
- Trail Creek (8, including 3 outliers)
- West Fork San Poil River (8, including 1 outlier)

Table 6 on pages 24-25 show streams of concern, the sample size, water quality concern, qualifying concern level, sample time period, and concern measure.

pH:

When analyzed by ecoregion or as a whole reservation, collected pH data for 1993 – 2016 are parametric and have a normal distribution.

Environmental Trust looked for any change in pH within Reservation ecoregion by generating a regression between mean annual pH (March – November) and collection year (see Figures 12 and 13). There is no real change or pattern regarding pH in either ecoregion over time. pH is a function of the natural geology on the Reservation and it is unsurprising that there are no discernable trends.

Waters with low or high levels of pH fail to completely support fish & shellfish, wildlife habitat, fish migration, and natural food chain maintenance goals. Environmental Trust identified streams where pH is a concern by determining which streams had 10% or more of their water samples reading water temperatures greater than the limits set in the Tribal water quality standards. Table 6 on pages 24-25 show streams of concern, the sample size, water quality concern, qualifying concern level, sample time period, and concern measure.

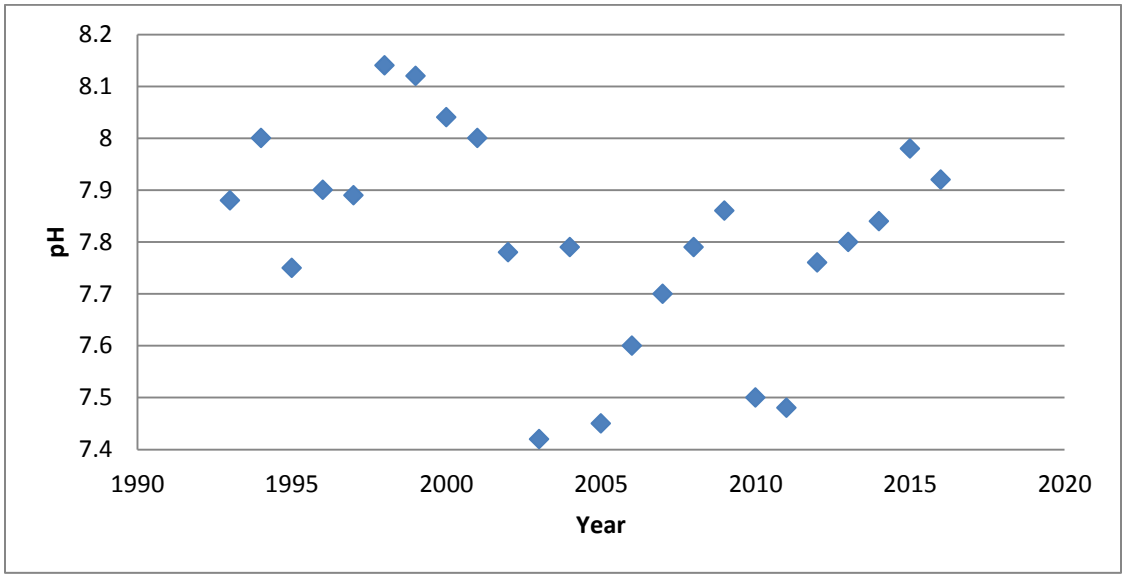

Figure 12: Columbia Plateau ecoregion mean pH (March – November)

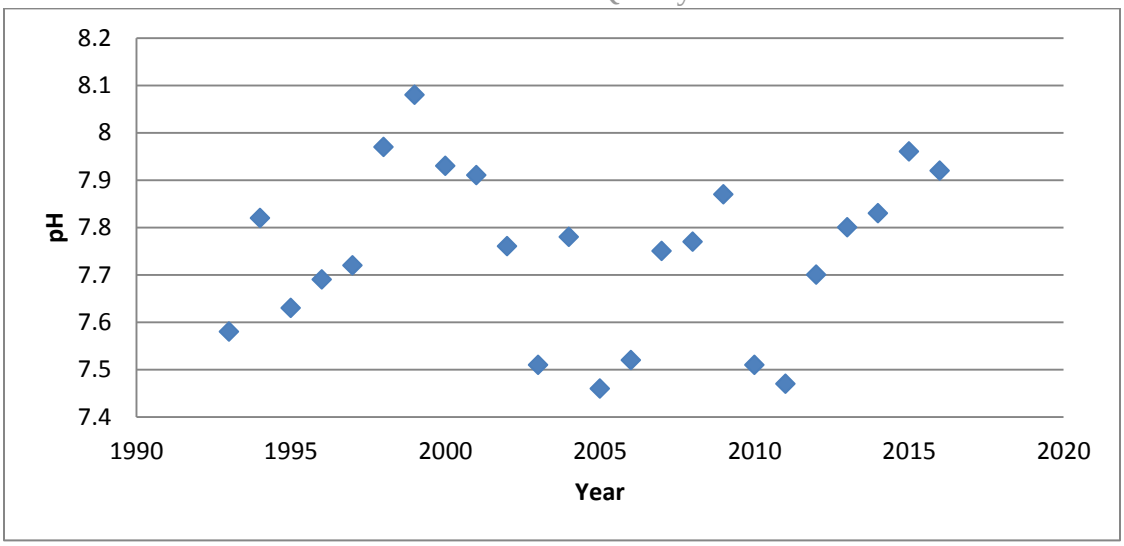

Figure 13: Northern Rockies ecoregion mean pH (March – November)

E. coli:

E. coli levels are measured in lab samples, and are presented in the stream summary tables in Appendix D. The CTCR code does not yet have a criterion for *E. coli* nor does the Tribal ambient monitoring readily support application of the EPA 2012 recommended criterion for E. coli which is based on repeated sampling at one site within a 30-day period [13]. CTCR ambient monitoring samples are typically drawn just once a month from sampling sites.

Still, it is beneficial to compare the Tribal data with the EPA criterion, which calls for a geometric mean of 100 or less colony-forming units (cfu) of *E. coli* in any 30-day period, with no more than ten percent of the values exceeding 320 CFU in the same 30-day period. Sampling sites can be situation-specific or among the sites designated for monthly readings. Typically, no more than one sample is drawn per month at a site and some sites have fewer than ten (10) total sample readings. Environmental Trust compared the geometric mean at each site for 1993-2016 with the EPA criterion; there are no streams with a geometric mean greater than 70 cfu. Only streams with less than 20 samples over a 24 year period did not meet the 10% criterion and Environmental Trust does consider this a viable reason for concern.

E. coli level readings have exceeded 320 cfu 38 times from 1993 to 2016; 33 of those readings were collected 2011 or later. Seven (7) streams have had readings above 320 cfu two to four (2-4) times within a two-year time frame (2011-2016) and these streams are the most likely to have real bacterial concerns. Table 6 on pages 24-25 show streams of concern, the sample size, water quality concern, qualifying concern level, sample time period, and concern measure.

Fecal Coliform:

The Tribal water quality standard for fecal coliform is similar to EPA's standard for *E. coli* with the important distinction that the Tribal standards do not have a 30-day sampling period requirement. This means that 24 streams have readings that technically do not meet Tribal standards. Of those 24, twelve (12) streams had ten (10) or fewer samples. However, only four (4) have total readings above 35 samples in 1993-2016, a minimum generally required for parametric analysis. The same four (4) streams are also the only streams showing repeated high readings since 2011.

Potential causes of fecal coliform exceedances include 1) grazing and feral horses with numbers of animals concentrated along streams, 2) failing septic systems near streams, and 3) wildlife. Waters with high levels of fecal coliform fail to completely support water supply, ceremonial and religious use,

recreation, commerce and navigation, and stock watering goals. Table 6 on pages 24-25 show streams of concern, the sample size, water quality concern, qualifying concern level, sample time period, and concern measure.

Nutrients:

Excessive nutrients can cause nuisance levels of algae, aquatic plant growth, nitrogen-fixing bacteria and associated toxins, with resulting effects to dissolved oxygen and pH. Nutrient-rich bodies of water may support rapid growth of blue green algae, or cyanobacteria. They are larger than typical bacteria and photosynthesize like algae. With the right conditions, a "clear" body of water can become very turbid with green, blue-green or reddish-brown colored algae within just a few days. Many species can regulate their buoyancy and float to the surface to form a thin "oily" looking film or a blue-green scum several inches thick. Cyanobacteria will rapidly die and disappear after one to two weeks. If conditions remain favorable, another bloom can quickly replace the previous one.

Blue-green blooms can pose a human health concern. Although most blue-green blooms are not toxic, some blue-green algae produce nerve or liver toxins. Toxicity is hard to predict in part because a single species of algae can have toxic and non-toxic strains. Also a bloom that tests non-toxic one day can turn toxic the next day. Rarely, humans may experience stomach pains, vomiting, diarrhea, and skin rashes. Nerve and liver damage have been observed following long-term exposure such as drinking water with toxic blooms. Pets and wildlife have died after exposure to toxic blue-green algae in Washington lakes, but worldwide there are no confirmed deaths of humans from algal toxins [17].

Organic phosphate and total nitrogen results from tribal sampling are summarized here, and compared with nutrient criteria recommended by EPA as appropriate for the Reservation ecoregions. EPA's recommendations were determined by calculating the 25th percentile of the median of nutrient results from streams within the ecoregion [14, 15].

Environmental Trust has sampled organic phosphorus and total nitrogen 95 times on the Reservation between 1993 and 2016. Rather than looking at individual streams (very small sample size per stream) this report compares readings to EPA recommendations at the ecoregion level.

Organic phosphorus levels measured range between 'No Detection' to 2.83 mg/l. The Reservation results compare favorably with EPA's 25th percentile for total phosphorus in the Xeric West nutrient ecoregion, 30 mg/l, and with EPA's 25th percentile for total phosphorus in the Western Forested Mountains nutrient ecoregion, 7.75 mg/l. The Columbia Plateau's median reading is 0.24 mg/l and maximum reading (Nespelem River) is 1.6 mg/l. The Northern Rockies' median reading is 0.15 mg/l and maximum reading (Mill Creek #1) is 2.83 mg/l. Interestingly, the two highest samples occurred on the same day with one site directly downstream of the other but on different sides of the ecoregion boundary.

Total nitrogen levels measured range between <0.5 mg/l to 6.2 mg/l. The Reservation results are high compared to EPA's 25th percentile for total nitrogen in the Xeric West nutrient ecoregion, 0.221 mg/l, and for the Western forested Mountains nutrient ecoregion, 0.2 mg/l. The Columbia Plateau's median reading is 1.120 mg/l and maximum reading (Little Nespelem River and Wanacut Creek) is 2.200 mg/l. The Northern Rockies' median reading is 1.100 mg/l and maximum reading (Nez Perce Creek) is 6.200 mg/l. Reviewing the temporal and geographic proximity of the highest readings in both ecoregions suggest a precipitation (or other) event may have led to the highest readings.

Blue green algae blooms have occurred periodically on Owhi Lake and in Columbia River reservoirs. Between 2011 and 2016 Lake Rufus Woods has been sampled for Anatoxin-a and Microcystin 195 times and have registered levels exceeding standards 54 times (28%). Owhi Lake algal blooms samples have never produced Anatoxin-A or Microsystin levels that exceeded standards. Waters are posted with

warning signs and exceedances are registered. Future monitoring will need to track blooms and test for toxicity.

Total Dissolved Gas:

Water with high levels of total dissolved gas fail to completely support fish and shellfish, wildlife habitat, fish migration, and natural food chain maintenance goals. Gas supersaturation levels of 110% or more harm salmon and resident fish, fish embryos and larvae, and other aquatic organisms. Besides fisheries managed by CTCR Fish & Wildlife in the Columbia River, several commercial and Tribal fish production facilities are located on Lake Rufus Woods, and high TDG causes mortality of their stock.

The CTCR water quality criterion for TDG saturation is 110% or less **except** when flows exceed the seven (7) day, ten (10) year frequency flood which has been calculated to be 227 kcfs for the Columbia River. TDG saturation levels are only monitored in the river at five (5) sites in proximity to the Reservation: the international boundary, the forebay at Grand Coulee Dam, six (6) miles below Grand Coulee Dam, the forebay at Chief Joseph Dam, and the tail water at Chief Joseph Dam. Figure 14 shows TDG saturation and flow vs. the Tribal standards at the international boundary; Figure 15 does the same at the Grand Coulee Dam forebay. Flow and TDG saturation low at six (6) miles below is so similar to the forebay that analysis of this site is duplicative and unnecessary. Environmental Trust wasn't able to convert (raw data to daily means for 1997-2016) and assess the data from Chief Joseph Dam in time for this report. The closest flow reporting station to the international boundary is the incoming flow reporting for Lake Roosevelt. Environmental Trust used the total discharge reporting for Grand Coulee Dam as the flow for the forebay.

Between 1997 and 2016, TDG saturation has surpassed 110% 24 times at the international boundary; only seven (7) of those times met the 7-day, 10-year flow exception. In the same time period, TDG saturation has surpassed 110% 17 times at the Grand Coulee Dam forebay; only four (4) of those times met the 7-day, 10-year flow exception. TDG saturation in the Columbia River continues to peak above 110% at regular intervals. However, both above and below Grand Coulee Dam, mean annual TDG saturation levels are decreasing (-6.27% at international boundary, -3.99% at forebay, 1997-2016) and the total number of days that TDG saturation surpasses 110% each year is also decreasing (-70 days per year at international boundary, -35 days per year at forebay, 1997-2016). This indicates that efforts to reduce TDG saturation, first begun in 1997, are having measurable positive impacts.

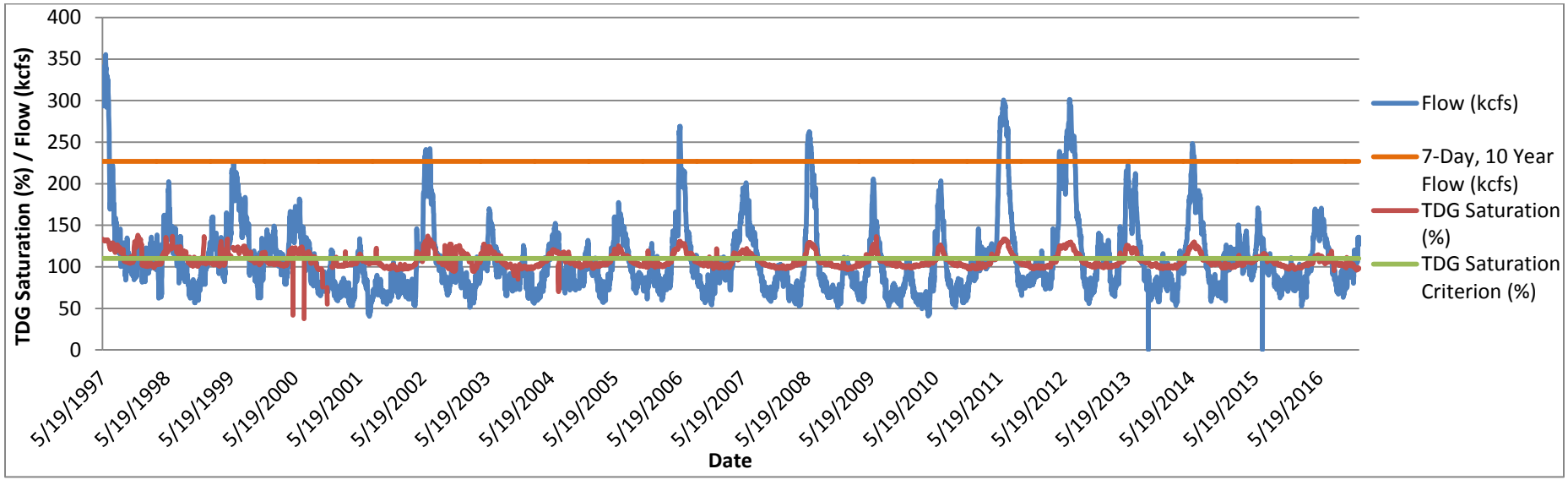

Figure 14: Tribal Total Dissolved Gas (TDG) saturation standards, recorded daily mean TDG saturation levels, and recorded daily mean flows at the international boundary, 1997-2016 (US Bureau of Reclamation Hydromet database- http://www.usbr.gov/pn/hydromet/arcread.html)

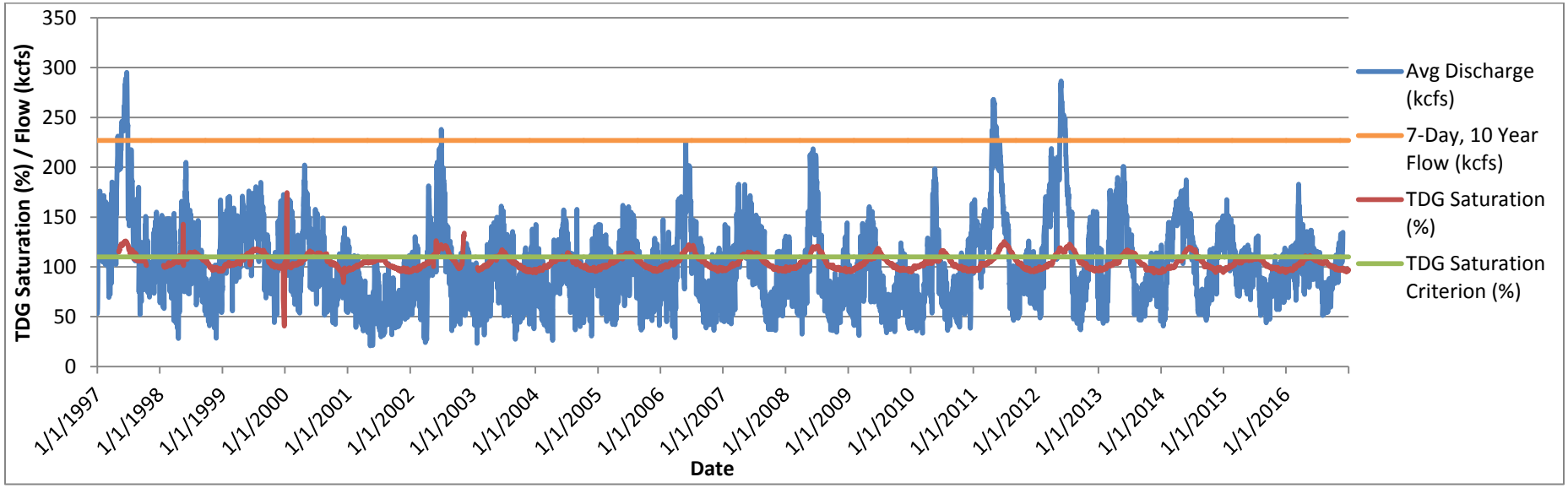

Figure 15: Tribal Total Dissolved Gas (TDG) saturation standards, recorded daily mean TDG saturation levels, and recorded daily mean flows at the Grand Coulee Dam forebay, 1997-2016 (US Bureau of Reclamation Hydromet database- http://www.usbr.gov/pn/hydromet/arcread.html)

Water Quality Concerns Summary

Trend analyses of mean annual (March – November) air and water temperatures as well as DO levels by ecoregion show that temperatures are rising and DO levels are decreasing across the Reservation. Climate variation and climate change is a driving force of air temperature and accounts for a majority of the variation in water temperature across the Reservation. However, water temperature is also impacted by local conditions such as the presence and functional condition of riparian areas.

Analysis shows that DO is connected to water temperature on the Reservation but the primary driver of DO reduction is not measurable at this point. DO also responds to riparian function loss, nutrient delivery, sediment delivery and channel alteration—all of which continue to happen at elevated human-induced levels on the Reservation.

Turbidity is the most common and pervasive water quality concern on the Reservation. Turbidity P25 levels in 43 streams exceed the EPA reference levels. In addition, 16 streams account for 59.6% of the highest recorded readings (top 2.5%); two (2) streams (Omak Creek and San Poil River) account for 22.2% of the highest recorded readings.

pH is largely a function of natural geology and over 24 years has only shown to register readings outside tribal standards on four (4) streams.

P25 Total Nitrogen levels in both Columbia Plateau and Northern Rockies ecoregions are more than twice the EPA reference expected P25 levels.

TDG saturation in the Columbia River regularly peaks above Tribal standards when flows do not reach the 7-day, 10-day expected flow.

Toxic algal blooms occur regularly in Lake Rufus Woods but has yet to be a concerns in lakes within the Reservation.

In addition to overall trend analysis and ecoregion-level analysis, this Report identified streams where the available data indicates a water quality concern. Table 6 summarizes identifed water quality concern by individual stream. Figure 16 is a map of the 59 streams with identified water quality concerns.

Table 6: CTCR Water quality concerns by stream

Stream	Sampled Time Period	Sample Size	Water Quality Concern	Concern Qualifier	Measure of Concern
Anderson Creek	1993-2016	11	Turbidity	P25 > 0.78 NTU	2
Barnaby Creek	2012-2016	28	Water Temperature	>10% of readings ≥ 18.0ºC	10.7%
Bridge Creek	1993-2016		*E. coli*, see pages 20-21		
Brush Creek	1993-2016	29	Turbidity	P25 > 0.78 NTU	1
Buffalo Creek	2012-2016	21	Dissolved Oxygen	>10% of readings > 8.0 mg/l	23.8%
	1993-2016	122	Turbidity	P25 > 1.45 NTU	2
Carson/Boss Creek	2012-2016	20	Dissolved Oxygen	>10% of readings > 8.0 mg/l	15.0%
Clark Creek	1993-2016	40	Turbidity	P25 > 0.78 NTU	4
Copper Creek	1993-2016	79	Turbidity	P25 > 0.78 NTU	1
Cornstalk Creek	1993-2016	57	Turbidity	P25 > 0.78 NTU	2
Coyote Creek	1993-2016	129	Turbidity	P25 > 0.78 NTU	3
Deerhorn Creek	1993-2016	33	Turbidity	P25 > 0.78 NTU	1
Empire Creek	1993-2016	22	Turbidity	P25 > 0.78 NTU	1
Falls Creek	1993-2016	78	pH	> 10% of readings < 6.5 or > 8.5	10.2%
Granite Creek	2012-2016	14	Dissolved Oxygen	>10% of readings > 8.0 mg/l	14.8%
Haden Creek	1993-2016	148	Turbidity	P25 > 0.78 NTU	1

Table 6: Continued

Stream	Sampled Time Period	Sample Size	Water Quality Concern	Concern Qualifier	Measure of Concern
Haley Creek	1993-2016	3	Turbidity	P25 > 0.78 NTU	9
Hall Creek	1993-2016	153	Dissolved Oxygen	>10% of readings > 8.0 mg/l	13.1%
Jack Creek	1993-2016	149	Turbidity	P25 > 0.78 NTU	0.9
Jim Creek	1993-2016	11	Turbidity	P25 > 0.78 NTU	2
John Tom Creek	1993-2016		*E. coli*, see pages 20-21		
Jones Creek	2012-2016	4	Dissolved Oxygen	>10% of readings > 6.5 mg/l	75.0%
	1993-2016	7	pH	> 10% of readings < 6.5 or > 8.5	14.3%
Kartar Creek	1993-2016	120	Turbidity	P25 > 0.78 NTU	1.8
King Creek	1993-2016	25	Turbidity	P25 > 0.78 NTU	1
Kinkaid Creek	1993-2016	115	Turbidity	P25 > 0.78 NTU	1
Lime Creek	1993-2016	47	Turbidity	P25 > 0.78 NTU	1
Little Nespelem River	1993-2016		*E. coli*, see pages 20-21		
	1993-2016	168	Turbidity	P25 > 0.78 NTU	2
	2012-2016	45	Water Temperature	>10% of readings ≥ 18.0ºC	20.0%
Loony Creek	1993-2016	39	Turbidity	P25 > 0.78 NTU	1
Lost Creek	1993-2016	257	Turbidity	P25 > 0.78 NTU	1
Lynx Creek	1993-2016	64	Turbidity	P25 > 0.78 NTU	1
Meadow Creek	1993-2016	83	Turbidity	P25 > 0.78 NTU	1
Mill Creek #1	2012-2016	5	Dissolved Oxygen	>10% of readings > 8.0 mg/l	1
	1993-2016	96	Turbidity	P25 > 0.78 NTU	
Mission Creek	1993-2016	33	Turbidity	P25 > 0.78 NTU	3
Nason Creek	1993-2016	55	pH	> 10% of readings < 6.5 or > 8.5	12.7%
Nespelem River	1993-2016		*E. coli*, see pages 20-21		62
	1993-2016	62	Fecal coliform	>10% of readings ≥ 200 cfu	
Nine Mile Creek	2012-2016	50	Dissolved Oxygen	>10% of readings > 8.0 mg/l	10.0%
	1993-2016		*E. coli*, see pages 20-21		
	1993-2016	39	Fecal coliform	>10% of readings ≥ 200 cfu	17.9%
No Name Creek	2012-2016	18	Dissolved Oxygen	>10% of readings > 8.0 mg/l	
	2012-2016	18	Water Temperature	>10% of readings ≥ 18.0ºC	
North Fork Hall Creek	1993-2016	9	Turbidity	P25 > 0.78 NTU	2
Omak Creek	1993-2016		*E. coli*, see pages 20-21		
	1993-2016	76	Fecal coliform	>10% of readings ≥ 200 cfu	11.8%
	1993-2016	478	Turbidity	P25 > 0.78 NTU	2
	2012-2016	103	Water Temperature	>10% of readings ≥ 18.0ºC	10.7%
Onion Creek	1993-2016	7	Turbidity	P25 > 0.78 NTU	1
Owhi Creek	2012-2016	8	Dissolved Oxygen	>10% of readings > 8.0 mg/l	12.5%
	1993-2016	56	Turbidity	P25 > 0.78 NTU	1
Parmenter Creek	1993-2016	14	Turbidity	P25 > 0.78 NTU	1
Poker Joe Creek	2012-2016	4	Dissolved Oxygen	>10% of readings > 8.0 mg/l	25.0%
	1993-2016	121	Turbidity	P25 > 1.45 NTU	2
Rebecca Lake Creek	2012-2016	18	Dissolved Oxygen	>10% of readings > 8.0 mg/l	16.7%
San Poil River	2012-2016	116	Dissolved Oxygen	>10% of readings > 9.5 mg/l	15.5%
	1993-2016	446	Turbidity	P25 > 0.78 NTU	1
	2012-2016	118	Water Temperature	>10% of readings ≥ 16.0ºC	22.0%
Smith Condon Creek	1993-2016	59	Turbidity	P25 > 0.78 NTU	1
Smith Creek	1993-2016	8	Turbidity	P25 > 0.78 NTU	1
Stapaloop Creek	1993-2016	95	Turbidity	P25 > 0.78 NTU	1
Strawberry Creek	1993-2016	23	Turbidity	P25 > 0.78 NTU	1

Table 6: Continued

Stream	Sampled Time Period	Sample Size	Water Quality Concern	Concern Qualifier	Measure of Concern
Swimptkin Creek	1993-2016	33	Turbidity	P25 > 0.78 NTU	1
Thirteen Mile Creek	1993-2016	47	Turbidity	P25 > 0.78 NTU	1
Tolman Creek	1993-2016	48	Turbidity	P25 > 0.78 NTU	0.9
Trail Creek	1993-2016	154	Turbidity	P25 > 0.78 NTU	1
Tumwater Creek	1993-2016	2	pH	> 10% of readings < 6.5 or > 8.5	100.0%
Tunk Creek	1993-2016	31	Turbidity	P25 > 0.78 NTU	1
Wanacut Creek	2012-2016	27	Water Temperature	>10% of readings ≥ 18.0ºC	18.5%
Wells Creek	2012-2016	2	Dissolved Oxygen	>10% of readings > 8.0 mg/l	2
West Fork San Poil River	1993-2016		*E. coli*, see pages 20-21		
	1993-2016	64	Fecal coliform	>10% of readings ≥ 200 cfu	10.9%
	1993-2016	217	Turbidity	P25 > 0.78 NTU	1
Whitestone Creek	1993-2016	33	Turbidity	P25 > 0.78 NTU	1
Wilmont Creek	1993-2016	81	Turbidity	P25 > 0.78 NTU	1

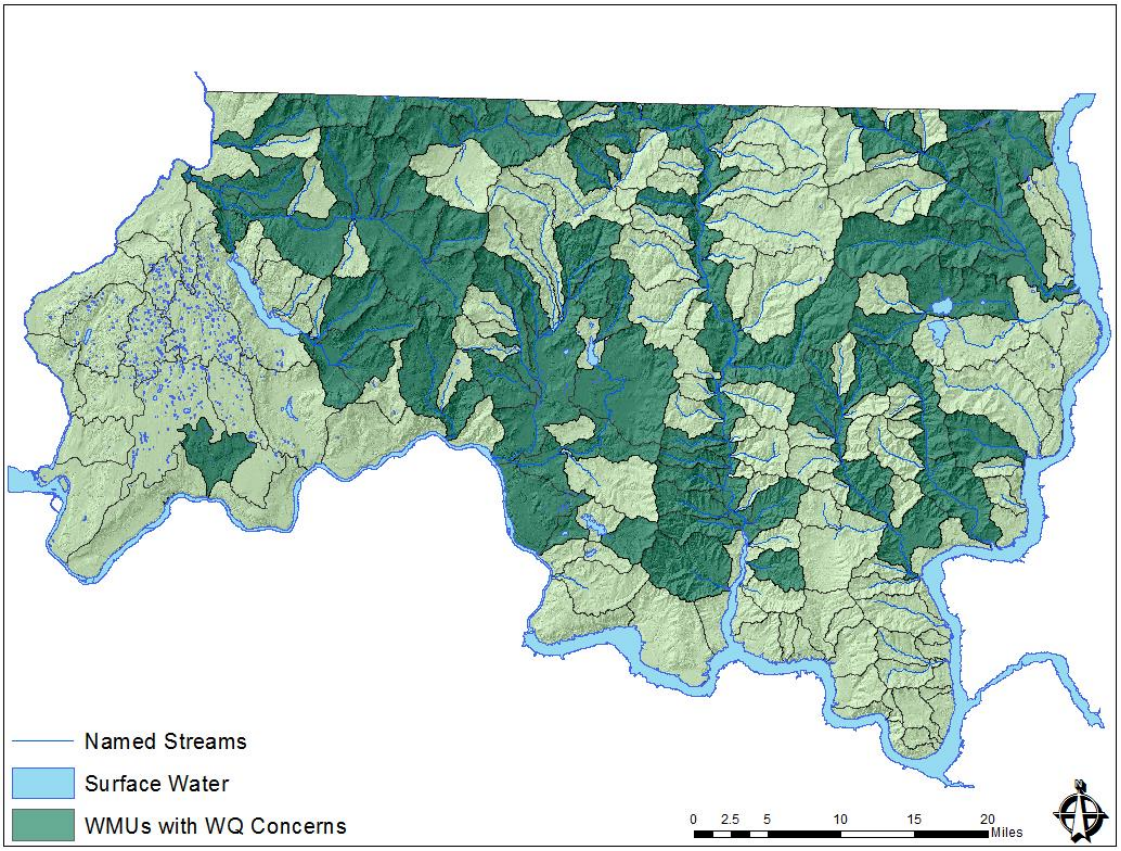

Figure 16: Watershed Management Units with identified water quality concerns (1993-2016)

Designated Uses Achievement

Environmental Trust determines support of beneficial uses by comparing of monitoring results with CTCR water quality criteria. Table 7 shows the water quality concerns that can prevent a stream from fully supporting a designated use. Table 8 depicts how designated uses are being supported or not across the reservation.

Nitrogren and Phosphorus analysis occurred at a scale too big to identify stream mileage. TDG concern applies just to the Columbia River given its hydropower facilities. Environmental Trust hasn't gathered enough habitat and macroinvertebrate data to provide analysis with powerful results.

Table 7: Water quality concerns that do not fully support designated uses

Designated Use	Water Quality Concerns
Water Supply (domestic, industrial, agricultural)	*E. coli*, Fecal coliform, Turbidity, Nitrogen, Phosphorus
Commerce & Navigation	*E. coli*, Fecal coliform
Ceremonial & Religious Use	*E. coli*, Fecal coliform, Turbidity, Nitrogen, Phosphorus
Fish & Shellfish	*E. coli*, Fecal coliform
Recreation	*E. coli*, Fecal coliform, Turbidity, Nitrogen, Phosphorus
Stock Watering	*E. coli*, Fecal coliform, Turbidity
Wildlife Habitat	Water Temperature, DO, pH, Turbidity, Habitat, Macroinvertebrates, Nitrogen, Phosphorus
Fish Migration	Water Temperature, DO, pH, Turbidity, Habitat, Macroinvertebrates, TDG, Nitrogen, Phosphorus
Natural Food Chain Maintenance	Water Temperature, DO, pH, Turbidity, Habitat, Macroinvertebrates, *E. coli*, Fecal coliform, Nitrogen, Phosphorus

Table 8: Supported and unsupported designated use by stream miles

Designated Use	Stream Assessed (mi)	Streams Supporting Use (mi)	Streams Not Fully Supporting Use (mi)
Water Supply (domestic, industrial, agricultural)	1,878	947	931
Commerce & Navigation	1,878	1,532	346
Ceremonial & Religious Use	1,878	947	931
Fish & Shellfish	1,878	1,532	346
Recreation	1,878	947	931
Stock Watering	1,878	947	931
Wildlife Habitat	1,878	845	1,033
Fish Migration	1,878	845	1,033
Natural Food Chain Maintenance	1,878	696	1,182

Causes and Sources of Impairment

Causes of water quality have been discussed throughout this report. Table 9 provides a clear depiction of causes present on the Reservation.

Table 9: Water quality concerns and potential causes

Water Quality Concern	Water Quality Concerns
Low DO	Air Temperature – Climate Change, Riparian vegetation clearing, Channel alteration, Stream-adjacent roads, Stream-adjacent agriculture, Stream-adjacent timber harvest activity, Grazing, Wildlife
E. coli	Septic systems, recreational waste
Fecal coliform	Septic systems, Grazing, Wildlife
Habitat Degradation	Climate Change, Riparian vegetation clearing, Channel alteration, Stream-adjacent roads, Stream-adjacent agriculture, Stream-adjacent timber harvest activity, Grazing, Septic systems, recreational waste
Macroinverte degradation	Climate Change, Riparian vegetation clearing, Channel alteration, Stream-adjacent roads, Stream-adjacent agriculture, Stream-adjacent timber harvest activity, Grazing, Septic systems, recreational waste
Nutrients	Riparian vegetation clearing, Channel alteration, Stream-adjacent roads, Stream-adjacent agriculture, Stream-adjacent timber harvest activity, Grazing, Septic systems, recreational waste
pH	Natural geology
Turbidity	Roads & Stream crossings, Stream-adjacent agriculture, Stream-adjacent timber harvest activity, Channel alteration, Grazing, Beaver Dam Failure
Water Temperature	Air Temperature – Climate Change, Riparian vegetation clearing, Channel alteration, Stream-adjacent roads, Stream-adjacent agriculture, Stream-adjacent timber harvest activity, Grazing, Wildlife

*Underlined causes are the known primary factor

Issues of Tribal Concern

Treatment in a manner similar to a state

CTCR is the only tribe in the United States with water quality standards federally promulgated by EPA. That has long been a distinction but EPA now holds back the updating of standards which are now 25 years old. Federal recognition for new CTCR water quality standards will be achieved by obtaining EPA approval for "Treatment in a manner similar to a state," or TAS, for Sections 106 and 401 of the Clean Water Act. CTCR applied for TAS approval at end of 2012 and continues working with EPA to complete the approval process.

Section 106 authorizes development and approval of tribal water quality standards, and Section 401 provides eligible tribes with a powerful mechanism to control discharges to waters on Indian reservations. Under Section 401 of the CWA, tribes with approved WQS can review any application for federal permits or licenses that may result in a discharge to reservation waters for which the tribe has developed approved WQS.

The requirements to obtain TAS come from CWA Section 518, and are summarized as follows:

- The tribe must be recognized by the Secretary of the Interior and exercise governmental authority over a federal Indian reservation;
- The tribe must have a governing body carrying out substantial governmental duties and powers;
- The functions to be exercised by the tribe must pertain to the management and protection of water resources that are held by an Indian tribe, held by the United States in trust for Indians, held by a member of an Indian tribe if such property interest is subject to a trust restriction on alienation, or otherwise within the borders of an Indian reservation; and,
- The tribe is reasonably expected to be capable, in EPA's judgment, of carrying out the functions to be exercised in a manner consistent with the terms and purposes of the CWA and all applicable regulations [16].

Appropriate water quality standards and monitoring

Existing CTCR water quality standards are being reviewed and an updated code has been drafted. In some instances such as with pH, natural variability may cause exceedances of water quality criteria. Also, water science has advanced in the period since CTCR criteria were chosen, and EPA recommendations for criteria have evolved. Revised water quality standards (CTC Chapter 4-8 Water Quality Standards) have been drafted. Revised standards will contain refinements in definitions of aquatic life, and standards for dissolved oxygen, pH, temperature, total dissolved gas, bacteria, nutrients, toxics, turbidity, and anti-degradation requirements. Final approval of new standards will be required by both the Colville Business Council, and EPA in accordance with the Federal Clean Water Act.

Meeting EPA Report Requirements

This report satisfies the requirements of EPA guidance for a Tribal Assessment Report for surface waters. A similar assessment and report for Reservation groundwater quality will be prepared in 2017. The next surface water report will be prepared in 2018.

References

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17. Washington State Department of Ecology. 10/14/2011. *Algae Control Program.* http://www.ecy.wa.gov/programs/wq/plants/algae/publichealth/GeneralCyanobacteria.html

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Appendices

A. Atlas of Water Resources for the Colville Indian Reservation
B. River Monitoring Sources
C. Colville Water Quality Standards
D. Water Quality Parameter Additional Information

Appendix A

Atlas of Water Resources for the Colville Indian Reservation

Approximately 2,671 miles of river and stream, 9,535 acres of lakes, 28,496 acres of wetland, and 36,100 acres of Columbia River reservoirs (portions of Lake Roosevelt, Rufus Woods and Pateros) and Okanogan River channel exist within the external boundaries of the Reservation, more or less. The Columbia River and Okanogan River adjoin the Reservation, forming a 202 mile long water boundary. Wetland acreage is based on the National Wetland Inventory and mapping of hydric soils by the Natural Resources Conservation Service Soil Inventory.

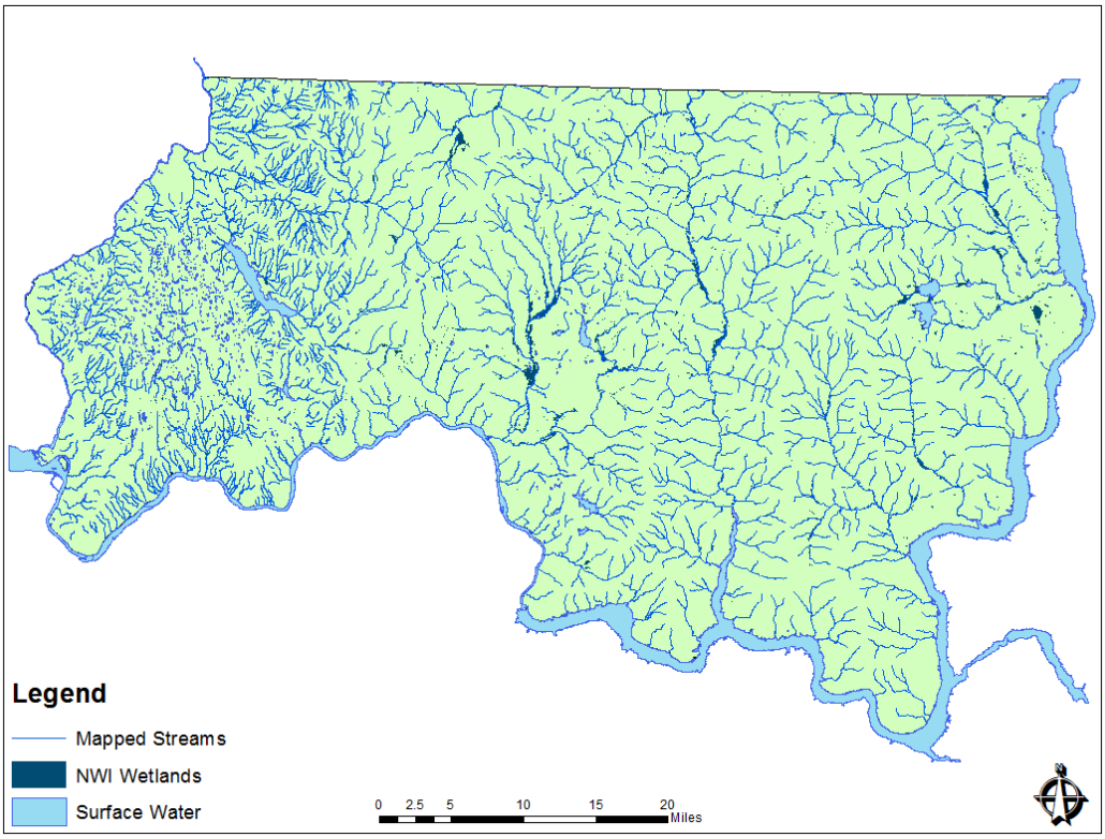

Figure I: Surface water resources of the Colville Indian Reservation

The Reservation encompasses portions of the following 8-digit hydrologic cataloging units (and corresponding HUC numbers) classified by the National Hydrography Dataset:

Hydrologic Cataloging Unit (HUC)	HUC No.
Okanogan. Washington.	17020006
Franklin D. Roosevelt Lake. Washington.	17020001
Sanpoil. Washington	17020004
Chief Joseph. Washington	17020005

A report by the United States Geological Survey, "Water Resources of the Colville Indian Reservation, Washington" by Harkness, Myers, and Bortleson (1974) describes the water budget for the Reservation. Most water enters the Reservation either as rain or snow, and several streams flow onto the Reservation from the north. Precipitation drains to streams, lakes or wetlands, infiltrates into the groundwater, evaporates or is taken up by vegetation. Streams on the Reservation generally flow to the Okanogan, San Poil and Columbia Rivers, though a few feed lakes or wetlands with no surface outlet. Streams flowing

past or across Public Domain trust lands often originate from fee or government land before reaching the Public Domain parcels.

Groundwater primarily develops from precipitation, seepage from streams, and in irrigated areas from irrigation water. Reservation groundwater provides domestic and public water supply, with some groundwater outflow to the Okanogan and Columbia Rivers.

Waters of the Reservation are divided into 15 watershed areas by CTCR natural resource programs. The following table provides details on stream length in each watershed area, length of streams that originate off Reservation and % of stream length on fee land.

Table I: Stream miles by drainage and ownership

Reservation Watershed Areas	Total Stream Length (miles)	Length Off Res (miles)	Length On Res Fee Land (miles)	% Stream on Fee or non-tribal Ownership
Hall Creek	144	41	27.5	48%
Twin Lakes	84	0	12	14%
Wilmont Creek	140	0	14	10%
Ninemile Creek	174.5	0	23.6	14%
Hellgate	76.6	0	5.7	7%
W. Fork San Poil R.	189.8	108.3	4.1	59%
Upper San Poil R.	484.7	214	21.2	49%
Lwr San Poil R.	173	0	13.7	8%
Nespelem R.	162.5	0	89.1	55%
Little Nespelem R.	100.8	0	24.5	24%
Buffalo/Swawilla	103.0	0	56.3	55%
Lost Creek	68.6	0	24.1	35%
Kartar Valley	315.5	0	88.0	28%
Omak Creek	395.8	0	60.6	15%
Southwest Plateau	251.5	0	152.0	60%

Appendix B

River Monitoring Data Sources

1. Statewide Water Quality Monitoring Sites, operated by WA Department of Ecology
   Columbia River
   53A070 Columbia River @ Grand Coulee
   61A070 Columbia River @ Northport
   Kettle River
   60A070 Kettle River near Barstow
   Okanogan River
   49A070 Okanogan River @ Malott
   49A190 Okanogan River @ Oroville
   Similkameen River
   49B070 Similkameen River @ Oroville
   http://www.ecy.wa.gov/programs/eap/fw_riv/rv_main.html#4

2. US Bureau of Reclamation Hydromet Data Collection System Dissolved Gas Monitoring Sites
   Columbia River at Barry, below Grand Coulee Dam, WA
   FDR Lake At Grand Coulee Dam, WA
   Columbia River at International Boundary, WA
   http://www.usbr.gov/pn/hydromet/wqual.html

3. US Army Corps Water Control Data
   Chief Joseph Dam and Rufus Woods Lake
   http://www.nwd-wc.usace.army.mil/report/chj.htm

Appendix C

Colville Water Quality Standards

CHAPTER 4-8 WATER QUALITY STANDARDS

4-8-1 Findings

(a) The Confederated Tribes of the Colville Reservation have a primary interest in the protection, control, conservation, and utilization of the water resources of the Colville Indian Reservation. It is the purpose of this Chapter to establish Tribal Water Quality Standards for the surface waters and ground waters located within the exterior boundaries of the Colville Indian Reservation. The quality of all surface and groundwater on the Reservation shall be protected to insure the health, economic, aesthetic and cultural well being of all people residing upon the Colville Indian Reservation.

(Amended 9/2/10, Certified 9/9/10, Resolution 2010-622)

(b) The human activities and factors which may adversely affect the quality of surface and ground waters on the Colville Indian Reservation and the natural resources which they support shall be regulated to protect and maintain the high quality of such waters and preserve their continued domestic, agricultural, industrial, recreational, cultural and other beneficial uses. The economy, health, safety and welfare of the people residing and doing business on the Colville Indian Reservation may be adversely affected by human activities carried out by both Indian and non-Indian people on trust and fee land within the Colville Indian Reservation. Inadequate control of such activities can contaminate and degrade surface and groundwater resources on which many people depend for domestic, agricultural, industrial, business, recreational, cultural and other uses.

(c) The Confederated Tribes of the Colville Reservation have jurisdiction to enforce Tribal Water Quality Standards in order to protect the economy, health, safety and welfare of the Reservation community.

(Amended 9/2/10, Certified 9/9/10, Resolution 2010-622)

4-8-2 Territory Covered

The provisions of this Chapter, known as the Water Quality Standards Chapter of the Colville Law and Order Code, shall apply to all surface and groundwaters of the Colville Indian Reservation. Every human activity taking place on the Colville Indian Reservation which may affect the quality of the surface and groundwater resources of the Reservation shall be subject to the provisions of this Chapter.

4-8-3 Administration

The Environmental Trust Department of the Confederated Tribes of the Colville Reservation shall administer this Chapter. From time to time, and as it deems appropriate, the Department may recommend that the Business Council amend this Chapter. The Environmental Trust Department may propose that the Business Council adopt a Fee Schedule for the purpose of establishing fees which may be charged for permits and other administrative services provided by the Department under this Chapter.

(Amended 9/2/10, Certified 9/9/10, Resolution 2010-622)

4-8-4 Definitions

(a) "Background conditions" means the biological, chemical, and physical conditions of a water body,

upstream from the point or non-point source of any discharge under consideration. Background sampling location in an enforcement action would be upstream from the point of discharge, but not upstream from other inflows. If several discharges to any water body exist, and enforcement action is being taken for possible violations to the standards, background sampling would be undertaken immediately upstream from each discharge.

(b) "Best Management Practices" or "BMP's" means a generic term describing minimum acceptable land
use practice required to meet applicable Water Quality Standards.

(c) The "Colville Environmental Quality Commission" or "CEQC" means the environmental administrative appellate body of the Confederated Tribes of the Colville Reservation as provided for under Chapter 4-23 of the Colville Tribal Code.
(Amended 9/2/10, Certified 9/9/10, Resolution 2010-622)

(d) "Ceremonial and Religious water use" means activities involving traditional Native American spiritual
practices which involve, among other things, direct contact with water.

(e) "Council" or "Tribal Council" means the Colville Business Council of the Confederated Tribes of the Colville Reservation.
(Amended 9/2/10, Certified 9/9/10, Resolution 2010-622)

(f) "Department" means the Environmental Trust Department of the Confederated Tribes of the Colville Reservation.
(Amended 9/2/10, Certified 9/9/10, Resolution 2010-622)

(g)"Director" means the Director of the Environmental Trust Department.
(Amended 9/2/10, Certified 9/9/10, Resolution 2010-622)

(h) "EPA" means the US Environmental Protection Agency.

(j) "Fecal coliform" means that portion of the coliform group which is present in the intestinal tracts and
feces of warm-blooded animals as detected by the product of acid or gas from lactose in a suitable culture medium within twenty-four (24) hours at 44.5 plus or minus 0.2 degrees Celsius.

(k) "Geometric mean" means the nth root of a product of n factors.

(l) "Ground water" means all water occurring below the ground surface within the exterior boundaries of

the Colville Indian Reservation including but not limited to unconfined, semi-confined, and confined aquifers and all other water occurring within subsurface geologic formations, rock, and soil.

(m)"Mean detention time" means the time obtained by dividing a reservoir's mean annual minimum total
storage by the thirty (30) day, ten (10) year low-flow from the reservoir.

(n) "Non-point source" means any source contributing to water quality degradation where that degradation
cannot be accounted for by any point source, including but not limited to, runoff from agriculture, silviculture, construction, and mining.

(o) "Permit" means a document issued by a public body which specifies waste treatment and control
requirements and waste discharge conditions.

(p) "pH" means the negative logarithm of the hydrogen ion concentration.

(q) "Person" means any individual; association of individuals; partnership; private, public, tribal, or

municipal corporation; tribal enterprise; company; business enterprise; any county, tribal, federal, state, or local government; or any governmental entity.

(r) "Point source" means any discernible, confined and discrete conveyance, including but not limited to
any pipe, ditch, channel, tunnel, conduit, well, discreet fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.

(s) "Pollutant" includes but is not limited to dredged spoil, soil, slurry, solid waste, incinerator residue,
sewage, sewage and industrial sludge, garbage and trash, chemical waste, biological nutrient, biological material, radioactive material, heat, discarded equipment, material and plant matter, rock, sand, gravel, mine tailings, discarded containers, and all other industrial, municipal or agricultural waste.

(t) "Pollution" means artificially made or induced change in the chemical, physical or radiological characteristics of water.

(u) "Primary contact recreation" means activities where a person would have direct contact with water to
the point of complete submergence, including but not limited to skin diving, swimming, and water skiing.

(v) "Reservation" means the Colville Indian Reservation established on July 2, 1872 by Executive Order
containing 1,389,000 acres more or less.

(w) "Reservation population" means all persons who reside on or otherwise conduct business or other
activities on any lands, whether trust or fee, within the exterior boundaries of the Colville Indian Reservation.

(x) "Reservation resources" or "Reservation environment" means land, surface and ground water, fish,
biota, plants, animals, air, wildlife and capital improvements on the Colville Indian Reservation.

(y) "Secondary contact recreation" means activities where a person's water contact would be limited to the
extent that bacterial infections of eyes, ears, respiratory or digestive systems or urogenital areas would normally be avoided (such as wading or fishing).

(z) "Surface water" means all water above the surface of the ground within the exterior boundaries of the
Colville Indian Reservation including but not limited to lakes, ponds, reservoirs, artificial impoundments, streams, rivers, springs and seeps.

(aa) "Temperature" means water temperature expressed in degrees Celsius (ºC).

(bb) "Tribe" means the Confederated Tribes of the Colville Reservation.

(Amended 9/2/10, Certified 9/9/10, Resolution 2010-622)

(bb) "Tribal Water Quality Standards," "Water Quality Criteria," or "Water Quality Standards" means the numerical quantification of specific regulatory parameters to protect ambient surface and ground water quality provided for by this Chapter.

(cc) "Turbidity" means the clarity of water expressed as nephelometric turbidity units (NTU) and measured with a calibrated turbidimeter.

(dd) "Wildlife habitat" means the waters and surrounding land areas of the Reservation used by fish, other
aquatic life and wildlife at any stage of their life history or activity.

4-8-5 <u>General Considerations</u>

The following general guidelines shall apply to the Water Quality Standards and classifications set forth in sections 4-8-6 through 4-8-8.

(a) At the boundary between waters of different classifications, the Water Quality Standards for the higher
classification shall prevail.

(b) The Water Quality Standards herein established shall not apply within an authorized dilution zone
adjacent to or surrounding a wastewater discharge.

(c) Waste discharge permits will not be issued which would allow violations of Tribal Water Quality
Standards.

(1) However, persons discharging wastes in compliance with the terms and conditions of permits shall not be subject to civil penalties on the basis that the discharge violated Tribal Water Quality Standards.

(2) Permits shall be subject to modification by the Department whenever it appears to the Department that the discharge may violate Tribal Water Quality Standards. Modifications

of permits, as provided herein, shall be subject to the same administrative review procedures as originally issued permits.

(d) Non-Point Sources and Tribal Water Quality Standards:

(1) It is recognized that many activities not subject to a waste discharge permit system are now taking place within the Reservation and it is further recognized that such activities may be in conflict with applicable Tribal Water Quality Standards until such time as a regulatory program is in place to control such non-permitted activities. Any such regulatory program shall provide methods or means whereby such activities shall comply with Tribal Water Quality Standards. Person conducting non-point source activities for which a regulatory program may be developed may however, not be subject to civil sanctions for violation of Tribal Water Quality Standards if such activities are either:

(A) Conducted in accordance with applicable best management practices set forth by the Tribe; or

(B) Subject to and in compliance with any regulatory order(s) issued by the Department.

(2) Best management practices or regulatory orders described in subsection 4-8-5(d)(1) shall be subject to modification by either the Council or the Department whenever it appears that the discharge may violate Tribal Water Quality Standards. Modification of best management practices or regulatory orders, as provided herein, shall be subject to the same administrative review procedures as the originally issued best management practices or regulatory orders.

(e) The Water Quality Standards herein established for the total dissolved gas shall not apply when the
stream flow exceeds the seven (7) day, ten (10) year frequency flood.

(f) The total area and/or volume of a receiving water assigned to a dilution zone shall be as described in a
valid discharge permit as needed and shall be limited to that which will:

(1) Not cause acute moralities or sport, food, or commercial fish and shellfish species of established biological communities within populations or important species to a degree which damages the ecosystem; and

(2) Not diminish aesthetic values or other beneficial uses disproportionately.

(g) The antidegradation policy of the Tribe, which is a regulatory requirement of this Chapter shall be
applicable to all surface and ground waters of the Reservation. The antidegradation policy provides that:

(1) Existing beneficial uses shall be maintained and protected and no further degradation which would interfere with or become injurious to existing beneficial uses shall be allowed.

(2) No further degradation of any surface or ground waters lying within areas designated as unique water quality management areas shall be allowed.

(3) Whenever surface or ground waters are in fact of a higher quality than provided for by applicable Water Quality Standards, the existing higher water quality shall be protected. Wastes, other materials, and substances which may reduce the existing quality of such surface or ground waters shall not be allowed to enter such waters. Except that the Department may allow such wastes, other materials, and substances to be placed in such waters in those instances where:

(A) It is clear that overriding considerations of the public interest will be served thereby, and

(B) All wastes and other materials and substances proposed for discharge into the said waters shall have first been subject to all known, available, and reasonable methods of treatment prior to such discharge.

(4) Whenever the natural conditions of surface or ground waters in their unaltered state and not affected by human activity are of a lower quality than the Water Quality Standards assigned thereto by this Chapter, the natural conditions shall constitute the applicable Water Quality Standards.

(5) The criteria and special conditions established in sections 4-8-6 through 4-8-8 may be modified for a specific water body, on a temporary basis not to exceed sixty (60) days, when necessary to accommodate essential activities, respond to emergencies, or to otherwise protect the public interest. Such modification may for good cause be extended for an additional sixty (60) days. All such modifications shall be issued in writing by the Director or his designee subject to such terms and conditions as he or she may prescribe. The aquatic application of herbicides which may result in water use restrictions shall be considered an activity for which a temporary modification may generally be issued subject to conditions specified by the Department.

(6) No degradation of water quality shall be allowed if such degradation may interfere with or become injurious to existing water uses or may cause long-term or irreparable harm to the Reservation environment.

(7) No waste discharge permit shall be issued for any proposed discharge which may violated established Water Quality Standards, except as provided for under section 4-8-9(c).

(h) In applying Water Quality Standards the Department shall give due consideration to the precision and
accuracy of the sampling and analytical methods used as well as existing conditions at the time.

(i) The analytical testing methods used to measure or otherwise evaluate Water Quality Standards shall to
the extent practicable, be in accordance with the most recent editions of "Standard Methods for the Examination of Water and Wastewater," published by the American Public Health Association, American Water Works Association, and the Water Pollution Control Federation, and "Methods for Chemical Analysis of Water and Wastes," published by the EPA, and other or superseding

methods published and/or approved by the Department following consultation with and concurrence of the EPA.

(j) Deleterious concentrations of radioactive materials for all classes shall be as determined by the lowest
practicable concentration attainable and in no case shall exceed EPA Drinking Water Regulations for radionuclides, as published in the Federal Register of July 9, 1976, or subsequent revisions thereof.

(k) Deleterious concentrations of toxic, or other non-radio-active materials, shall be determined by the
Department in consideration of the "Quality Criteria for Water," published by EPA in 1976, and as revised, as an authoritative source for criteria and/or other relevant information.

(l) Nothing in this Chapter shall be interpreted to prohibit the establishment of effluent limitations for the
control of the thermal component of any discharge in accordance with Section 316 of the Federal Clean Water Act (P.L. 95-217 as amended).

4-8-6 General Water Use and Criteria Classes

The following criteria shall apply to the various classes of surface waters on the Colville Indian Reservation:

(a) Class I (Extraordinary):

(1) General characteristics: Water quality of this class shall markedly and uniformly exceed the requirements for all or substantially all uses.

(2) Characteristic uses: Characteristic uses may included, but not be limited to, the following:

(A) Water supply (domestic, industrial, and agricultural).

(B) Stock watering.

(C) Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing, spawning, and harvesting.

(D) Ceremonial and religious water use.

(E) Recreation (primary contact recreation, sport fishing, boating and aesthetic enjoyment).

(F) Commerce and navigation.

(3) Water quality criteria:

(A) Fecal coliform organisms - freshwater: Fecal coliform organisms shall not exceed a geometric mean value of 50 organisms/100 mL, with not more than ten (10%) percent of samples exceeding 100 organisms/100 mL.

(B) Fecal coliform organisms - saline water: Fecal coliform organisms shall not exceed a geometric mean value of 14 organisms/100mL, with not more than ten (10%) percent of samples exceeding 43 organisms/100mL.

(C) Dissolved oxygen - freshwater: Dissolved oxygen shall exceed 9.5 mg/L.

(D) Dissolved oxygen - saline water: Dissolved oxygen shall exceed 7.0 mg/L. When natural conditions, such as upwelling, occur, causing the dissolved oxygen to be depressed near or below 7.0 mg/L, natural dissolved oxygen levels can be degraded by up to 0.2 mg/L by man-caused activities.

(E) Total dissolved gas shall not exceed one hundred-ten (110%) percent of saturation at any point of sample collection.

(F) Temperature shall not exceed 16.0ºC (freshwater) and 13.0ºC (saline water) due to human activities. Temperature increases shall not, at any time, exceed t=23/(T+5) (freshwater) or t=8/(T-4) (saline water).

(i) When natural conditions exceed 16.0ºC (freshwater) and 13.0ºC (saline water), no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3ºC.

(ii) For purposes hereof, "t" represents the permissive temperature change across the dilution zone; and "T" represents the highest existing temperature in this water classification outside of any dilution zone.

(iii) Provided that temperature increase resulting from non-point source activities shall not exceed 2.8ºC, and the maximum water temperature shall not exceed 16.3ºC (freshwater).

(G) pH shall be within the range of 6.5 to 8.5 (freshwater) or 7.0 to 8.5 (saline water) with a man-caused variation within a range of less than 0.5 units.

(H) Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

(I) Toxic, radioactive, or deleterious material concentrations - shall be below those of public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect any water use.

(J) Aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste.

(b) Class II (Excellent):

(1) General characteristics: Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

(2) Characteristic uses: Characteristic uses may include but not be limited to the following:

(A) Water supply (domestic, industrial, and agricultural).

(B) Stock watering.

(C) Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing, spawning, and harvesting; crayfish rearing, spawning, and harvesting.

(D) Wildlife habitat.

(E) Ceremonial and religious water use.

(F) Recreation (primary contact recreation, sport fishing, boating and aesthetic enjoyment).

(G) Commerce and navigation

(3) Water quality criteria:

(A) Fecal coliform organisms - freshwater: Fecal coliform organisms shall not exceed a geometric mean value of 100 organisms/100 mL, with not more than ten (10%) percent of samples exceeding 200 organisms/100 mL.

(B) Fecal coliform organisms - saline water: Fecal coliform organism shall not exceed a geometric mean value of 14 organisms/100 mL, with not more than ten (10%) percent of samples exceeding 43 organisms/100 mL.

(C) Dissolved oxygen - freshwater: Dissolved oxygen shall exceed 8.0 mg/L.

(D) Dissolved oxygen - saline water: Dissolved oxygen shall exceed 6.0 mg/L. When natural conditions, such as upwelling occur causing the dissolved oxygen to be depressed near or below 6.0 mg/L, natural dissolved oxygen levels can be degraded by up to 0.2 mg/L by man-caused activities.

(E) Total dissolved gas shall not exceed one hundred-ten (110%) percent of saturation at any point of sample collection.

(F) Temperature shall not exceed 18.0ºC (freshwater) or 16.0ºC (saline water) due to human activities. Temperature increases shall not, at any time, exceed t=28 / (T+7) (freshwater) or t-12 / (T-2) (saline water).

(i) When natural conditions exceed 18.0ºC (freshwater) and 16.0ºC (saline water), no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3ºC.

(ii) For purposes hereof, “t” represents the permissive temperature change across the dilution zone; and “T” represents the highest existing temperature

in this water classification outside of any dilution zone.

(iii) Provided that temperature increase resulting from non-point source activities shall not exceed 2.8ºC and the maximum water temperature shall not exceed 18.3ºC (freshwater).

(G) pH shall be within the range of 6.5 to 8.5 (freshwater) or 7.0 to 8.5 (saline water) with a man-caused variation within a range of less than 0.5 units.

(H) Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

(I) Toxic, radioactive, or deleterious material concentrations - shall be below those of public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect any water use.

(J) Aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste.

(c) Class III (Good):

(1) General characteristics: Water quality of this class shall meet or exceed the requirements for most uses.

(2) Characteristic uses: Characteristic uses may include but not be limited to, the following:

(A) Water supply (industrial, agricultural).

(B) Stock watering.

(C) Fish and shellfish: salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing, spawning, and harvesting; crayfish rearing, spawning, and harvesting.

(D) Wildlife habitat.

(E) Recreation (secondary contact recreation, sport fishing, boating and aesthetic enjoyment).

(F) Commerce and navigation.

(3) Water quality criteria:

(A) Fecal coliform organisms - freshwater: Fecal coliform organisms shall not exceed a geometric mean value of 200 organisms/100mL, with not more than 10 percent of samples exceeding 400 organisms/100 mL.

(B) Fecal coliform organisms - saline water: Fecal coliform organisms shall not exceed a geometric mean value of 100 organisms/100 mL, with not more than 10 percent of samples exceeding 200 organisms/100 mL.

(C) Dissolved oxygen - freshwater: Dissolved oxygen shall exceed 6.5 mg/L.

(D) Dissolved oxygen - saline water: Dissolved oxygen shall exceed 5.0 mg/L. When natural conditions, such as upwelling, occur, causing, the dissolved oxygen to be depressed near or below 5.0 mg/L, natural dissolved oxygen levels can be degraded by up to 0.2 mg/L by man-caused activities.

(E) Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection.

(F) Temperature shall not exceed 21.0ºC (freshwater) or 19.0ºC (saline water) due to human activities. Temperature increases shall not, at any time, exceed t=34/(T+9) (freshwater) or t=16/T (saline water).

(i) When natural conditions exceed 21.0ºC (freshwater) and 19.0ºC (saline water), no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3ºC.

(ii) For purposes hereof, "t" represents the permissive temperature change across the dilution zone; and "T" represents the highest existing temperature in this water classification outside of any dilution zone.

(iii) Provided that temperature increase resulting from non-point source activities shall not exceed 2.8ºC, and the maximum water temperature shall not exceed 21.3ºC (freshwater).

(4) pH shall be within the range of 6.5 to 8.5 (freshwater) or 7.0 to 8.5 (saline water) with a man-caused variation with a range of less than 0.5 units.

(A) Turbidity shall not exceed 10 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 20 percent increase in turbidity when the background turbidity is more than 50 NTU.

(B) Toxic, radioactive, or deleterious material concentrations shall be below those which adversely affect public health during characteristic uses, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect characteristic water uses.

(C) Aesthetic values shall not be reduced by dissolved, suspended, floating, or submerged matter not attributed to natural causes, so as to affect water use or taint the flesh of edible species.

(d) Class IV (Fair):

(1) General characteristics: Water quality of this class shall meet or exceed the requirements of selected and essential uses.

(2) Characteristic uses: Characteristic uses may include but not be limited to, the following:

(A) Water supply (industrial).

(B) Stock watering.

(C) Fish (salmonid and other fish migration).

(D) Recreation (secondary contact recreation, sport fishing, boating and aesthetic enjoyment).

(E) Commerce and navigation.

(3) Water quality criteria:

(A) Fecal coliform organisms shall not exceed a geometric mean value of 200 organism/100 mL, with not more than 10 percent of samples exceeding 400 organisms/100 mL.

(B) Dissolved oxygen shall exceed 4.0 mg/L, natural dissolved oxygen levels can be degraded by up to 0.2 mg/L by man-caused activities.

(C) Temperature shall not exceed 22.0ºC due to human activities. Temperature increases shall not, at any time, exceed t=20/(T+2).

(i) When natural conditions exceed 22.0ºC, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3ºC.

(ii) For purposes hereof, "t" represents the permissive temperature change across the dilution zone; and "T" represents the highest existing temperature in this water classification outside of any dilution zone.

(D) pH shall be within the range of 6.5 to 9.0 with a man-caused variation within a range of less than 0.5 units.

(E) Turbidity shall not exceed 10 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 20 percent increase in turbidity when the background turbidity is more than 50 NTU.

(F) Toxic, radioactive, or deleterious material concentrations shall be below those which adversely affect public health during characteristic uses, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect characteristic water uses.

(G) Aesthetic values shall not be interfered with by the presence of obnoxious wastes, slimes, aquatic growths, or materials which will taint the flesh of edible species.

(e) Lake Class:

(1) General characteristics: Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

(2) Characteristic uses: Characteristic use may include but not be limited to, the following:

(A) Water supply (domestic, industrial, and agricultural);

(B) Stock watering;

(C) Fish and shellfish: Salmonid migration, rearing, spawning, and harvesting; other fish migration, rearing spawning, and harvesting; crayfish rearing, spawning and harvesting;

(D) Wildlife habitat;

(E) Ceremonial and religious water use.

(F) Recreation (primary contact recreation, sport fishing, boating and aesthetic enjoyment).

(G) Commerce and navigation.

(3) Water quality criteria:

(A) Fecal coliform organisms shall not exceed a geometric mean value of 50 organisms/100 mL, with not more than 10 percent of samples exceeding 100 organisms/100 mL.

(B) Dissolved oxygen - no measurable decrease from natural conditions.

(C) Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection.

(D) Temperature - no measurable change from natural conditions.

(E) pH - no measurable change from natural conditions.

(F) Turbidity shall not exceed 5 NTU over background conditions.

(G) Toxic, radioactive, or deleterious material concentrations shall be less than those which may affect public health, the natural aquatic environment, or the desirability of the water for any use.

(H) Aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste.

(f) Special Resource Water Class (SRW):

(1) General characteristics: Water quality of this class will be varied and unique as determined by the Department. These are fresh or saline waters which comprise a special and unique resource to the Reservation.

(2) Characteristic uses: Characteristic uses may include but not be limited to, the following:

(A) Wildlife habitat.

(B) Natural food chain maintenance.

(3) Water quality criteria:

(A) Fecal coliform organisms shall not exceed natural conditions.

(B) Dissolved oxygen - no measurable decrease from natural conditions.

(C) Total dissolved gas shall not vary from natural conditions.

(D) Temperature - no measurable change from natural conditions.

(E) pH - no measurable change from natural conditions.

(F) Turbidity shall not exceed 5 NTU over background conditions.

(G) Toxic, radioactive, or deleterious material concentrations shall not exceed those found in the state of nature.

(H) Aesthetic values shall not be impaired by the presence of materials of their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste.

4-8-7 General Classifications

General classifications applying to various surface water bodies not specifically classified under section 4-8-8 are as follows:

(a) All unclassified surface waters that are tributaries to Class I waters are classified Class I.

(b) Except for those specifically classified otherwise, all lakes of less than 2000 mg/L TADS and their
feeder streams on the Colville Indian Reservation are classified as Lake Class and Class I, respectively.

(c) All lakes on the Colville Indian Reservation with average TADS levels equal or exceeding 2000 mg/L
and their feeder streams are classified as Class I Saline and Class I respectively unless specifically classified otherwise.

(d) All reservoirs with a mean detention time of greater than fifteen (15) days are classified Lake

Class.

(e) All reservoirs with a mean detention time of fifteen (15) days or less are classified the same as the river
section in which they are located.

(f) All reservoirs established on preexisting lakes are classified as Lake Class.

(g) All other unclassified waters of the Reservation are classified as Class II.

4-8-8 Specific Classifications

Specific classifications for surface waters of the Colville Indian Reservation are as follows:

(a) Streams

Alice Creek..... Class III
Anderson Creek..... Class III
Armstrong Creek..... Class III
Barnaby Creek.....Class II
Bear Creek.....Class III
Beaver Dam Creek .....Class II
Bridge Creek .....Class II
Brush Creek.....Class II
Buckhorn Creek .....Class III
Cache Creek .....Class III
Canteen Creek ..... Class I
Capoose Creek .....Class III
Cobbs Creek.....Class III
Columbia River from Chief Joseph Dam to Wells Dam.....Class II
Columbia River from northern Reservation
boundary to Chief Joseph Dam..... Class I
Cook Creek ..... Class I
Copper Creek .....Class III
Cornstalk Creek.....Class III
Cougar Creek ..... Class I
Coyote Creek.....Class II
Deerhorn Creek ..... Class IV
Dick Creek .....Class III
Dry Creek..... Class I
Empire Creek .....Class III
Faye Creek ..... Class I
Forty Mile Creek.....Class III
Gibson Creek..... Class I
Gold Creek .....Class II
Granite Creek .....Class II
Grizzly Creek .....Class III
Haley Creek..... Class IV
Hall Creek .....Class II
Hall Creek, West Fork..... Class I
Iron Creek.....Class III
Jack Creek .....Class III

Jerred Creek ..... Class I
Joe Moses Creek ..... Class IV
John Tom Creek ..... Class III
Jones Creek ..... Class I
Kartar Creek ..... Class III
Kincaid Creek ..... Class IV
King Creek ..... Class IV
Klondyke Creek ..... Class I
Lime Creek ..... Class III
Little Jim Creek ..... Class III
Little Nespelem ..... Class II
Louie Creek ..... Class III
Lynx Creek ..... Class II
Manila Creek ..... Class III
McAllister Creek ..... Class III
Meadow Creek ..... Class III
Mill Creek ..... Class II
Mission Creek ..... Class IV
Nespelem River ..... Class II
Nez Perce Creek ..... Class III
Nine Mile Creek ..... Class II
Nineteen Mile Creek ..... Class III
No Name Creek ..... Class II
North Nanamkin Creek ..... Class III
North Star Creek ..... Class III
Okanogan River from Reservation
north boundary to Columbia River ..... Class II
Olds Creek ..... Class I
Omak Creek ..... Class II
Onion Creek ..... Class II
Parmenter Creek ..... Class IV
Peel Creek ..... Class IV
Peter Dan Creek ..... Class IV
Rock Creek ..... Class I
San Poil River ..... Class I
Sanpoil, West Fork ..... Class II
Seventeen Mile Creek ..... Class III
Silver Creek ..... Class III
Sitdown Creek ..... Class II
Six Mile Creek ..... Class IV
South Nanamkin Creek ..... Class III
Spring Creek ..... Class III
Stapaloop Creek ..... Class III
Stepstone Creek ..... Class III
Stranger Creek ..... Class II
Strawberry Creek ..... Class III
Swimptkin Creek ..... Class III
Three Forks Creek ..... Class I
Three Mile Creek ..... Class IV
Thirteen Mile Creek ..... Class II

Thirty Mile Creek..... Class II
Trail Creek .....Class III
Twenty-five Mile Creek.....Class III
Twenty-one Mile Creek .....Class III
Twenty-three Mile Creek .....Class III
Wannacot Creek.....Class III
Wells Creek..... Class I
Whitelaw Creek..... Class IV
Wilmont Creek..... Class II

(b) Lakes
Apex Lake LC
Big Goose Lake..... LC
Bourgeau Lake LC
Buffalo Lake..... LC
Camille Lake LC
Cody Lake LC
Crawfish Lake LC
Elbow Lake LC
Fish Lake..... LC
Gold Lake..... LC
Great Western Lake..... LC
Johnson Lake..... LC
LaFleur Lake LC
Little Goose Lake..... LC
Little Owhi Lake LC
McGinnis Lake..... LC
Nicholas Lake..... LC
Omak Lake .....SRW
Owhi Lake.....SRW
Penley Lake.....SRW
Rebecca Lake LC
Round Lake LC
Simpson Lake..... LC
Soap Lake.....SRW
Sugar Lake LC
Summit Lake LC
Twin Lakes.....SRW

4-8-9 <u>Permits</u>

(a) No person shall discharge any waste from a point source into Reservation waters without having first
obtained a permit from either the BPA or the Department, as applicable.

(b) The Department may, through the issuance of regulatory permits, directives, and orders, control
miscellaneous waste discharge not covered by section 4-8-9(a).

(c) From time to time the Department may authorize certain temporary activities which may temporarily

reduce water quality below those set by this Chapter (4-8-5 and 4-8-6) when such activities found to be overriding public benefit, provided that all such temporary authorizations shall be for a thirty (30) day period or less.

(d) The Department may in furtherance of section 4-8-9(b) require any prospective or current discharge to,
among other things, perform such water quality monitoring tasks as might be necessary to determine the pre and post discharge conditions, mixing zone requirements, and permit parameters.

(e) To ascertain whether the regulations, waste disposal permits, orders, and directives promulgated and/or
issued by the Department, the Council, or EPA are being complied with a continuing surveillance program shall be conducted by the Department. This continuing surveillance program shall include, among other things, the following:

(1) Inspecting treatment and control facilities;

(2) Monitoring and reporting waste discharge characteristics; and

(3) Monitoring receiving water quality.

4-8-10 <u>Violations, Enforcement and Civil Penalties</u>

(a) The Department shall be notified of all suspected violations and accidental discharges.

(1) Any person may apply in writing to the Department and the Department will initiate an investigation and take action upon any suspected or alleged violation of any provision of this Chapter or of any order, permit, or regulation issued or promulgated under the authority of this Chapter.

(2) Any person engaged in any operation or activity which results in a spill or discharge which may cause pollution of the water of the Reservation contrary to this Chapter shall immediately notify the Department. Any person who fails to notify the Department as soon as he either knows or should have known about the spill or discharge is deemed in violation of this Chapter and, upon an administrative finding thereof after notice and hearing as provided by the Colville Administrative Procedures Act, shall be levied an administrative civil penalty of not more than ten thousand dollars ($10,000) per day that such violation continues.

(b) Notice of Alleged Violations:

(1) Wherever the Department has reason to believe that there has occurred a violation of an order, permit, or other requirement issued or promulgated under authority of this Chapter, the Director shall cause written notice to be served personally or by certified mail return-receipt requested upon the alleged violator or its agent for service of process. The notice shall state the provision alleged to be violated, the facts alleged to constitute a violation, and may include the nature of any corrective action proposed to be required.

(2) Each cease and desist and clean-up order issued pursuant to sections 4-8-10(d) and 4-8-10(e) shall be accompanied by or have incorporated in it the notice provided for in

subsection 4-8-10(b)(1) of this section unless such notice shall have prior thereto been given.

(c) Hearing Procedures for Alleged Violation:

(1) In any notice given under section 4-8-10(b), the Department may require the alleged violator to appear before it for a hearing and to answer each alleged violation. Such hearing shall be held no sooner than fifteen (15) days after service of this notice, except the Department may set an earlier date for hearing if so requested by the alleged violator or if any emergency exists. This hearing shall be conducted in accordance with the Colville Administrative Procedures Act.

(2) If the Department does not require an alleged violator to appear for a hearing, the alleged violator may request the hearing. Such request shall be in writing and shall be filed with the Department no later than thirty (30) days after service of the notice under section 4-8-10(b). If such a request is filed, a hearing shall be held within a reasonable time.

(3) If a hearing is held pursuant to the provisions of this section, it shall be recorded and this record be made available to the public. All parties may respond to the notice served under section 4-8-10(b) and may present evidence and argument on all issues, call witnesses, and conduct cross-examination required for a full disclosure of the facts as provided for in the Colville Administrative Procedures Act.

(d) Hearing Procedures for Alleged Violation: Upon a finding and determination, after hearing, that a violation of a permit provision, Departmental directive or order has occurred, the Department may suspend, modify, or revoke the pertinent permit, or take such other action with respect to the violation as may be authorized by applicable law.

(e) Cease and Desist Orders: If the Department determines, with or without a hearing, that there exists a violation of any provision of this Chapter or of any order, permit, or other requirement of this Chapter, the Department may issue a cease and desist order. Such order shall set forth the provision alleged to be violated, the facts alleged to constitute the violation, and the time by which acts or practices complained of must be terminated.

(f) Clean-Up Orders: The Department may issue orders to any person to clean up material which he, or his employee, or his agent has accidentally or purposely dumped, spilled, or otherwise deposit in or near Reservation waters which may pollute them. The Department may also request that the Tribal attorney proceed and take appropriate action.

(g) Restraining Orders and Injunctions: In the event any person fails to comply with either a cease and desist order or a clean-up order which order or orders are not subject to stay pending administrative or judicial review, the Department may request the Tribal attorney to investigate, and if appropriate, bring suit for temporary injunction to prevent any further or continued violation of such order or orders. In any such suit the findings of the Department based upon evidence in the record, shall be given due difference by any reviewing administrative body or court.

(1) Emergencies shall be given precedence over all other such matters pending in Tribal Court. The institution of such injunction proceedings by the Tribal attorney on behalf of the Department shall confer upon such court exclusive jurisdiction to determine finally the subject matter of the proceedings.

(h) Civil Penalties:

(1) Any person who violates any provision of any permit issued under this Chapter or any final cease and desist order or clean-up order shall be subject to a civil penalty of not more than ten thousand ($10,000) per day for each day during which such violation occurs.

(2) Penalty amounts shall be determined after hearing and may be collected by the Tribe by action instituted in Tribal Court by the Tribal attorney for collection of such penalty. A stay of any order of the Tribe pending judicial review shall not relieve any person from any liability under subsection 4-8-10(h)(1) of this section, but the reason for the request for judicial review shall be considered in the determination of the amount of the penalty.

(i) Falsification and Tampering: Any person who knowingly makes any false statement, representation, or
certification in any application, record, report, plan, or other document filed or required to be maintained under this Chapter, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Chapter shall be subject to a civil penalty of not more than five hundred dollars ($500) for each individual instance. Each day that invalid monitoring data is generated as a result of such wrongful action shall constitute a separate violation.

(j) Proceeding by Other Parties:

(1) The factual or legal basis for proceedings or other actions that shall result from a violation of this Chapter inure solely to the benefit of the Tribe is not intended by this Chapter, in any way, to create new private rights or to enlarge existing private rights. A determination that water pollution exists or that any standard has been disregarded or violated, whether or not a proceeding or action may be brought by the Department or the Tribe, shall not create by reason thereof any presumption of law or finding of fact which shall inure to or be for the benefit of any person other than the Tribe.

(2) A permit issued pursuant to this Chapter may be introduced in any court of law as evidence that the permittee's activity is not a public or private nuisance. Introduction into any evidence of such permit and evidence of compliance with the permit conditions shall constitute a prima facie case that the activity to which the permit pertains is not public or private nuisance.

4-8-11 Waiver of Regulations

Whenever a strict interpretation of this Chapter would result in extreme hardships the Department may waive or modify such regulation or portion thereof, provided such waiver or modification is consistent with the intent of this Chapter and no public health hazard will result.

4-8-12 Cooperation with Public Agencies—Grants and Gifts

The Department is authorized subject to approval of the Tribal Council, to accept, receive,

disburse, and administer grants or other funds or gifts from any source, for the purposes of carrying out the provisions of this Chapter and to consult and cooperate with federal and state agencies in matters pertaining to this Chapter. The Department is authorized to negotiate, subject to approval by the Tribal Council, inter-governmental agreements and other cooperative agreements which may create, modify, or change duties established by this Chapter, providing that creation of new regulatory requirements or changes in existing regulatory requirements must comply with the procedural requirements of the Colville Administrative Procedure Act applicable to rule-making actions before such regulations become effective.

4-8-13 Statutes and Trust Responsibility Not Modified

Nothing in this Chapter as now or hereafter modified shall modify or waive any requirements to comply with applicable federal laws and regulations. Nothing in this Chapter as now or hereafter amended shall be construed to modify, waive or impair the trust responsibility of the United States.

4-8-14 Severability

Should any part of this Chapter be declared unconstitutional or invalid for any reason such declaration shall not affect the validity of the remainder of this Chapter.

(Chapter 4-8 Adopted 8/6/84, Resolution 1984-526)
(Amended 1/18/85, Resolution 1985-20)

Appendix D

Water Quality Parameter Additional Information

US EPA Water Quality Parameters

pH: pH affects many chemical and biological processes in the water. For example, different organisms flourish within different ranges of pH. A large variety of aquatic animals prefer a range of 6.5-8.0. pH outside this range reduces the diversity in the stream because it stresses the physiological systems of most organisms and can reduce reproduction. Low pH can also allow toxic elements and compounds to become mobile and "available" for uptake by aquatic plants and animals. This can produce conditions that are toxic to aquatic life, particularly to sensitive species like rainbow trout. Changes in acidity can be caused by atmospheric deposition (acid rain), surrounding rock, and certain wastewater discharges. The pH scale measures how acidic or basic a substance is. It ranges from 0 to 14. Pure water is neutral, with a pH of 7.0.

Dissolved Oxygen: Stream systems both produce and consume oxygen. Oxygen is gained from the atmosphere and from plants as a result of photosynthesis. Running water, because of its churning, dissolves more oxygen than still water, such as that in a reservoir behind a dam. Respiration by aquatic animals, decomposition, and various chemical reactions consume oxygen. Oxygen is measured in its dissolved form as dissolved oxygen (DO). If more oxygen is consumed than is produced, dissolved oxygen levels decline and some sensitive animals may move away, weaken, or die. DO levels fluctuate seasonally and over the daily 24-hour cycle; they also vary with water temperature and altitude. Cold water holds more oxygen than warm water and water holds less oxygen at higher altitudes.

Temperature: The rates of biological and chemical processes depend on temperature. Aquatic organisms from microbes to fish are dependent on certain temperature ranges for their optimal health. Optimal temperatures for fish depend on the species: some survive best in colder water, whereas others prefer warmer water. Benthic macroinvertebrates are also sensitive to temperature and will move in the stream to find their optimal temperature. If temperatures are outside this optimal range for a prolonged period of time, organisms are stressed and can die. CTCR monitoring methodology measures temperature in degrees, Celsius (°C).

Bacteria: Total coliforms are a group of bacteria that are widespread in nature. All members of the total coliform group can occur in human feces, but some can also be present in animal manure, soil, and submerged wood and in other places outside the human body. Members of two bacteria groups, coliforms and fecal streptococci, are used as indicators of possible sewage contamination because they are commonly found in human and animal feces. Although they are generally not harmful themselves, they indicate the possible presence of pathogenic (disease-causing) bacteria, viruses, and protozoans that also live in human and animal digestive systems. Therefore, their presence in streams suggests that pathogenic microorganisms might also be present and that swimming and eating shellfish might be a health risk. Sources of fecal contamination to surface waters include wastewater treatment plants, on-site septic systems, domestic and wild animal manure, and storm runoff. In addition to the possible health risk associated with the presence of elevated levels of fecal bacteria, they can also cause cloudy water, unpleasant odors, and an increased oxygen demand.

E. coli is a species of fecal coliform bacteria that is specific to fecal material from humans and other warm-blooded animals. EPA recommends *E. coli* as the best indicator of health risk from water contact in recreational waters [11].

Turbidity: Turbidity is a measure of water clarity how much the material suspended in water decreases the passage of light through the water. Suspended materials include soil particles (clay, silt, and sand), algae, plankton, microbes, and other substances. These materials are typically in the size range of 0.004 mm (clay) to 1.0 mm (sand). Turbidity can affect the color of the water.

Higher turbidity increases water temperatures because suspended particles absorb more heat. This, in turn, reduces the concentration of dissolved oxygen (DO) because warm water holds less DO than cold. Higher turbidity also reduces the amount of light penetrating the water, which reduces photosynthesis and the production of DO. Suspended materials can clog fish gills, reducing resistance to disease in fish, lowering growth rates, and affecting egg and larval development. As the particles settle, they can blanket the stream bottom, especially in slower waters, and smother fish eggs and benthic macroinvertebrates. Turbidity sources may include:

- Soil erosion
- Waste discharge
- Urban runoff
- Eroding stream banks
- Large numbers of bottom feeders (such as carp), which stir up bottom sediments
- Excessive algal growth.

Measured turbidity values exceeded a chosen criterion reference value or benchmark in a number of instances. Because the tribal water quality standard is not based on a set reference value, but rather variance relative to background levels, these are not technically exceedances. But it is instructive to review the numbers nonetheless. The benchmark was selected, choosing the 25th percentile averages for monitored streams across the Columbia Plateau ecoregion (1.45 NTU), and adding 5 NTU, a value from the Tribes' turbidity standard.