

# INTERMEDIATE WATER QUALITY ASSESSMENT REPORT FOR THE CONFEDERATED TRIBES OF COOS, LOWER UMPQUA AND SIUSLAW INDIANS



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Tribal Contact: Margaret Corvi, Director, Department of Culture and Natural Resources  
Phone: 541-997-6685  
Email: mcorvi@ctclusi.org

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## **I. Introduction**

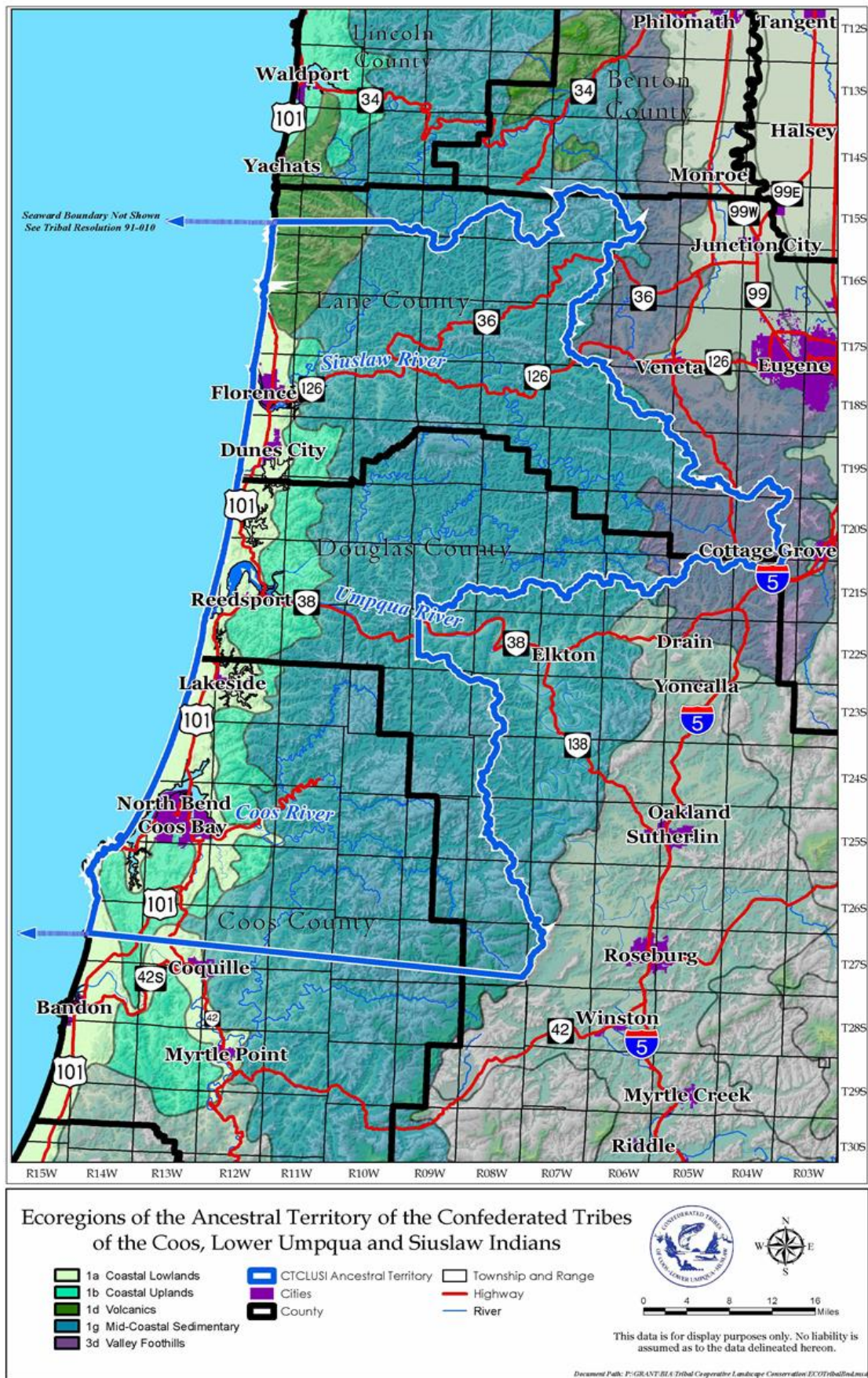
This assessment report focuses on data collected by the Tribes' Integrated Water Quality Monitoring Program (IWQMP) in waters of or pertaining to the Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians' (CTCLUSI) Reservation or other Tribal lands.

Environmental issues within our ancestral watersheds can take many years to develop or may have an immediate impact on our cultural and natural resources as well as the environment. The Tribes' Culture and Natural Resources Department's overarching goal is to continually strengthen and modify the Tribes' capacity to develop and sustain environmental programs that address cultural and natural resource issues and concerns on and off Tribal lands. Below is a broad list of cultural and natural resource issues and concerns within our ancestral watersheds in no particular order of importance.

- Downward trend of salmonid, lamprey, herring, eulachon, flounder, and green sturgeon returns
- Degradation of salmonid, lamprey, herring, eulachon, flounder, and green sturgeon habitat
- Downward trend of other aquatic/marine traditional foods, such as abalone
- Cultural and natural resource impacts linked to natural resource extraction and recreation
- Water quality degradation due to point and non-point source pollution, including agricultural, timber harvesting, road construction, outfalls, and storm sewer runoff.
- Urban, industrial, and energy production discharges
- Environmental changes attributed to climate change, such as the reoccurrence of harmful algal blooms
- Shellfish closures due to harmful algal blooms
- Spreading of existing and new non-native invasive species
- Toxins within water, sediments, cultural resources, natural resources, and traditional foods
- Maritime spill impacts to cultural resources, natural resources, and traditional foods



**Figure 1. Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians' Ancestral Territory**



Overview of the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians' (CTCLUSI) Reservation and Tribal lands:

- CTCLUSI Reservation and Tribal lands total approximately 547 acres.
- This land base includes approximately 18 acres of tidelands and 3.18 miles of shoreline.
- Tribal lands are dispersed among 4<sup>th</sup> and 5<sup>th</sup> field HUCs.<sup>[1](#)</sup>
  - Sixes: 85,760 acres<sup>2</sup>
  - Coos: 467, 200 acres<sup>2</sup>
  - Tenmile 62,720 acres<sup>2</sup>
  - Siuslaw: 497, 720 acres<sup>2</sup>
- Waters located on Tribal property consist of:
  - 0.94 miles of rivers and streams.
  - 143 acres of wetlands, excluding tidelands.
- There are three drinking active water wells that depend on a potable aquifer system located on Tribal lands.

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<sup>1</sup> [https://cfpub.epa.gov/surf/locate/hucperstate\\_search.cfm?statepostal=OR](https://cfpub.epa.gov/surf/locate/hucperstate_search.cfm?statepostal=OR)

## II. Integrated water quality monitoring program and assessment methods

### 1) Introduction

The purpose of the Tribes' Integrated Water Quality Monitoring Program (IWQMP) is to determine whether water quality criteria/benchmarks are being met and beneficial uses are being supported for waterbodies of or pertaining to the reservation and other Tribal lands. Establishing a baseline of water quality conditions for all Tribal waters and periodically reassessing baseline water quality to evaluate short-term variability and long term trends is an important component of this program objective.

Monitoring Objectives	
Program Area	Objectives
Overall Integrated Water Quality Program	<ol style="list-style-type: none"><li>1. Establish baseline water quality conditions for all pertinent uses.</li><li>2. Document short term and long-term water quality trends.</li><li>3. Assess whether water quality standards are being met and beneficial uses are being supported.</li><li>3. Develop and test ecological indicators and monitoring designs.</li><li>4. Assess local water quality issues such as: low dissolved oxygen, eutrophication, chemical &amp; biological (e.g. bacteria) contamination, HAB's, habitat modification, and cumulative impacts.</li></ol>
Non-point Source Pollution Program	<ol style="list-style-type: none"><li>1. Identify and employ monitoring techniques to determine and quantify the effectiveness of watershed improvement projects.</li><li>2. Build partnerships with local agencies and water quality stakeholders to reduce non-point source water pollution.</li></ol>
Water Quality Standards	<ol style="list-style-type: none"><li>1. Identify reference conditions for the development of numerical and biological criteria.</li><li>2. Develop and refine Tribal water quality standards.</li><li>3. Determine if water resources are meeting Tribal water quality standards.</li></ol>
Wetlands Program	<ol style="list-style-type: none"><li>1. Develop Wetlands Monitoring Program.</li><li>2. Develop indicators and assess beneficial use attainment.</li></ol>
HAB Program	<ol style="list-style-type: none"><li>1. Develop HAB's Monitoring Program.</li><li>2. Develop indicators and assess beneficial use attainment.</li></ol>

## 2) **Monitoring Program Overview**

Water quality monitoring is conducted by the CTCLUSI Department of Culture and Natural Resources staff and is implemented according to the Tribes' Quality Assurance Project Plan (QAPP) for the IWQMP. This QAPP is approved by the Environmental Protection Agency.

During the 2018 water year, the integrated water quality monitoring program continued to collect baseline estuarine water quality monitoring data at four continuous monitoring stations. These data were collected at 15 minute sample intervals year round. The station locations and parameters measured are listed in the table below. The Tribes' continuous estuarine water monitoring was developed by integrating a combination of the National Estuarine Research Reserve (NERR) System Wide Monitoring Program (SWMP) and USGS recommended equipment and protocols for the collection and management of these data (see [CDMO NERR SWMP Data Management Manual](#) and the USGS manual '[Guidelines and Standard Procedures for Continuous Water-Quality Monitors: Station Operation, Record Computation, and Data Reporting](#)').

The Tribes' Integrated Water Quality Monitoring Program also collects discrete water quality data on a quarterly to annual basis (as staff and resources allow) at two freshwater sites, Sixes River and North Tenmile Lake (station location and parameters measured are listed in the table below). Protocols implemented for the collection of these data are primarily those outlined in the Oregon Department of Environmental Quality (ODEQ) [Water Monitoring and Assessment Mode of Operations Manual \(MOMs\)](#).

## Monitoring Locations:

Waterbody Name	Lat./Long	Parameters monitored	Monitoring frequency	303d List Parameter(s)
Siuslaw River, Cox Island – Siuslaw Watershed	43° 58' 27" N 124° 04' 16" W	Field Measurements: Water Temperature, Dissolved Oxygen, Salinity/Specific Conductivity, pH, Turbidity, and Depth	Year Round: 15 minute intervals	<p><b>Parameter:</b> Alkalinity <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Aquatic Life <b>Status:</b> Insufficient data, potential concern</p> <p><b>Parameter:</b> Ammonia <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Aquatic Life <b>Status:</b> Attaining some criteria/uses</p> <p><b>Parameter:</b> Biological Criteria <b>Season:</b> Year Round <b>Listed:</b> 2010 <b>Beneficial Use(s):</b> Aquatic Life <b>Status:</b> Water quality limited, 303(d) list, TMDL needed</p> <p><b>Parameter:</b> Chloride <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Aquatic Life <b>Status:</b> Insufficient data</p> <p><b>Parameter:</b> Chlorophyll a <b>Season:</b> Fall, Winter, Spring; Summer <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Water supply; Water contact recreation; Fishing; Aesthetics; Livestock watering <b>Status:</b> Insufficient data; Attaining some criteria/uses</p>
		Laboratory: Bacteria ( <i>e.coli</i> and <i>enterococcus</i> )	Monthly/After storm events	<p><b>Parameter:</b> Dissolved Oxygen <b>Season:</b> Year Round (Non-spawning); Year Round <b>Listed:</b> 2004; 2002 <b>Beneficial Use(s):</b> Estuarine water, Cold-water aquatic life; Anadromous fish passage; Salmonid fish rearing; Salmonid fish spawning <b>Status:</b> Attaining some criteria/uses; Water quality limited, 303(d) list, TMDL needed</p> <p><b>Parameter:</b> Fecal Coliform <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Water contact recreation, Shellfish growing <b>Status:</b> Water quality limited, 303(d) list, TMDL needed.</p> <p><b>Parameter:</b> Nutrients <b>Season:</b> Undefined <b>Listed:</b> 1998 <b>Beneficial Use(s):</b> Aesthetics <b>Status:</b> Insufficient data</p>
		Laboratory: Nutrients (TN and TP), and Chlorophyll	Seasonally to Quarterly (as staff and resources allow)	<p><b>Parameter:</b> pH <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Water contact recreation; Salmonid fish spawning; Resident fish and aquatic life; Anadromous fish passage; Salmonid fish rearing <b>Status:</b> Attaining some criteria/uses</p> <p><b>Parameter:</b> Phosphate Phosphorus <b>Season:</b> Summer <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Aquatic life <b>Status:</b> Insufficient data</p> <p><b>Parameter:</b> Sedimentation <b>Season:</b> Undefined <b>Listed:</b> 1998 <b>Beneficial Use(s):</b> Salmonid fish rearing; Resident fish and aquatic life; Salmonid fish spawning <b>Status:</b> Insufficient data</p> <p><b>Parameter:</b> Temperature <b>Season:</b> Year Round (Non-spawning) <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Salmon and trout rearing and migration <b>Status:</b> Water quality limited, 303(d) list, TMDL needed.</p>



North Fork Siuslaw River – Siuslaw Watershed	43° 58' 40" N 124° 04' 48" W	Field Measurements: Water Temperature, Dissolved Oxygen, Salinity/Specific Conductivity, pH, Turbidity, and Depth	Year Round: 15 minute intervals	<b>Parameter:</b> Sedimentation <b>Season:</b> Undefined <b>Listed:</b> 1998 <b>Beneficial Use(s):</b> Resident fish and aquatic life , Salmonid fish rearing, Salmonid fish spawning <b>Status:</b> Water quality limited, 303(d) list, TMDL needed  <b>Parameter:</b> Temperature <b>Season:</b> Year Round (Non-spawning) <b>Listed</b> :2004 <b>Beneficial Use(s):</b> Salmon and trout rearing and migration <b>Status:</b> Water quality limited, 303(d) list, TMDL needed.
		Laboratory: Bacteria ( <i>e.col</i> and <i>enterococcus</i> )	Monthly/After storm events	
		Laboratory: Nutrients (TN and TP), and Chlorophyll	Seasonally to Quarterly (as staff and resources allow)	
North Tenmile Lakes—Tenmile Lakes Watershed	43° 35' 59" N 124° 7' 34" W	Field Measurements: Water Temperature, Dissolved Oxygen, Salinity/Specific Conductivity, pH, Turbidity, and Depth	Seasonally to Quarterly (as staff and resources allow)	<b>Parameter:</b> Alkalinity <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Uses:</b> Aquatic Life <b>Status:</b> Insufficient data  <b>Parameter:</b> Ammonia <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Uses:</b> Aquatic Life <b>Status:</b> Insufficient data  <b>Parameter:</b> pH <b>Season:</b> Summer <b>Listed:</b> 2004 <b>Beneficial Uses:</b> Resident fish and aquatic life; Water contact recreation <b>Status:</b> Insufficient data  <b>Parameter:</b> Phosphate Phosphorus <b>Season:</b> Summer <b>Listed:</b> 2004 <b>Beneficial Uses:</b> Aquatic life <b>Status:</b> Insufficient data  <b>Parameter:</b> Dissolved Oxygen <b>Season:</b> Year Round (Non-spawning) <b>Listed:</b> 2004 <b>Beneficial Uses:</b> Cold-water aquatic life <b>Status:</b> Insufficient data  <b>Parameter:</b> Iron <b>Season:</b> Year Round <b>Listed:</b> 2012 <b>Beneficial Uses:</b> Aquatic life <b>Status:</b> Insufficient data  <b>Parameter:</b> Nutrients <b>Season:</b> Undefined <b>Listed:</b> 1998 <b>Beneficial Uses:</b> Aesthetics <b>Status:</b> Insufficient data  <b>Parameter:</b> Sedimentation <b>Season:</b> Undefined <b>Listed:</b> 2010 <b>Beneficial Uses:</b> <b>Status:</b> Water quality limited, TMDL approved
		Laboratory: Bacteria ( <i>e.coli</i> )	Seasonally to Quarterly (as staff and resources allow)	
		Laboratory: Nutrients (TN and TP), and Chlorophyll	Seasonally	
		Laboratory: Toxic Algae	Seasonally	

Coos River, Lower Bay, North Spit, BLM boat ramp – Coos Watershed	43° 24' 54.83" N 124° 16' 42.60" W	Field Measurements: Water Temperature, Dissolved Oxygen, Salinity/Specific Conductivity, pH, Turbidity, and Depth	Year Round: 15 minute intervals	<p><b>Parameter:</b> Ammonia <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Aquatic life <b>Status:</b> Insufficient data</p> <p><b>Parameter:</b> Chlorophyll a <b>Season:</b> Summer <b>Listed:</b> 2004 <b>Beneficial Uses:</b> Water contact recreation; Aesthetics; Livestock watering; Water supply; Fishing <b>Status:</b> Insufficient data</p> <p><b>Parameter:</b> Fecal Coliform <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Shellfish growing; Water contact recreation <b>Status:</b> Water quality limited, 303(d) list, TMDL needed</p> <p><b>Parameter:</b> pH <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Resident fish and aquatic life; Water contact recreation <b>Status:</b> Insufficient data</p> <p><b>Parameter:</b> Sedimentation <b>Season:</b> Undefined <b>Listed:</b> 1998 <b>Beneficial Use(s):</b> Salmonid fish rearing; Salmonid fish spawning; Resident fish and aquatic life <b>Status:</b> Insufficient data</p>
		Laboratory: Bacteria ( <i>e.coli</i> and <i>enterococcus</i> )	Monthly/After storm events	
		Laboratory: Nutrients (TN and TP), and Chlorophyll	Seasonally to Quarterly (as staff and resources allow)	
Coos River, Lower Bay, Empire Docks – Coos Watershed	43° 23' 39.37" N 124° 16' 49.80" W	Field Measurements: Water Temperature, Dissolved Oxygen, Salinity/Specific Conductivity, pH, Turbidity, and Depth	Year Round: 15 minute intervals	<p><b>Parameter:</b> Ammonia <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Aquatic life <b>Status:</b> Insufficient data</p> <p><b>Parameter:</b> Chlorophyll a <b>Season:</b> Summer <b>Listed:</b> 2004 <b>Beneficial Uses:</b> Water contact recreation; Aesthetics; Livestock watering; Water supply; Fishing <b>Status:</b> Insufficient data</p> <p><b>Parameter:</b> Fecal Coliform <b>Season:</b> Year Around <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Shellfish growing; Water contact recreation <b>Status:</b> Water quality limited, 303(d) list, TMDL needed</p> <p><b>Parameter:</b> pH <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Resident fish and aquatic life; Water contact recreation <b>Status:</b> Insufficient data</p> <p><b>Parameter:</b> Sedimentation <b>Season:</b> Undefined <b>Listed:</b> 1998 <b>Beneficial Use(s):</b> Salmonid fish rearing; Salmonid fish spawning; Resident fish and aquatic life <b>Status:</b> Insufficient data</p>
		Laboratory: Bacteria ( <i>e.coli</i> and <i>enterococcus</i> )	Monthly/After storm events	
		Laboratory: Nutrients (TN and TP), and Chlorophyll,	Seasonally to Quarterly (as staff and resources allow)	
Pacific Ocean, Gregory Point – Coos Watershed	TBD	Field Measurements: Water Temperature, Dissolved Oxygen, Salinity/Specific Conductivity, pH, Turbidity, and Depth	Seasonally	<p><b>Adjacent Location Listings (Sunset Bay and Bastendorf Beach)</b></p> <p><b>Parameter:</b> Enterococcus <b>Season:</b> Fall, Winter, Spring; Summer <b>Listed:</b> 2010 <b>Beneficial Use(s):</b> Water contact recreation <b>Status:</b> Water quality limited, 303(d) list, TMDL needed</p>
		Laboratory: Bacteria ( <i>enterococcus</i> )		

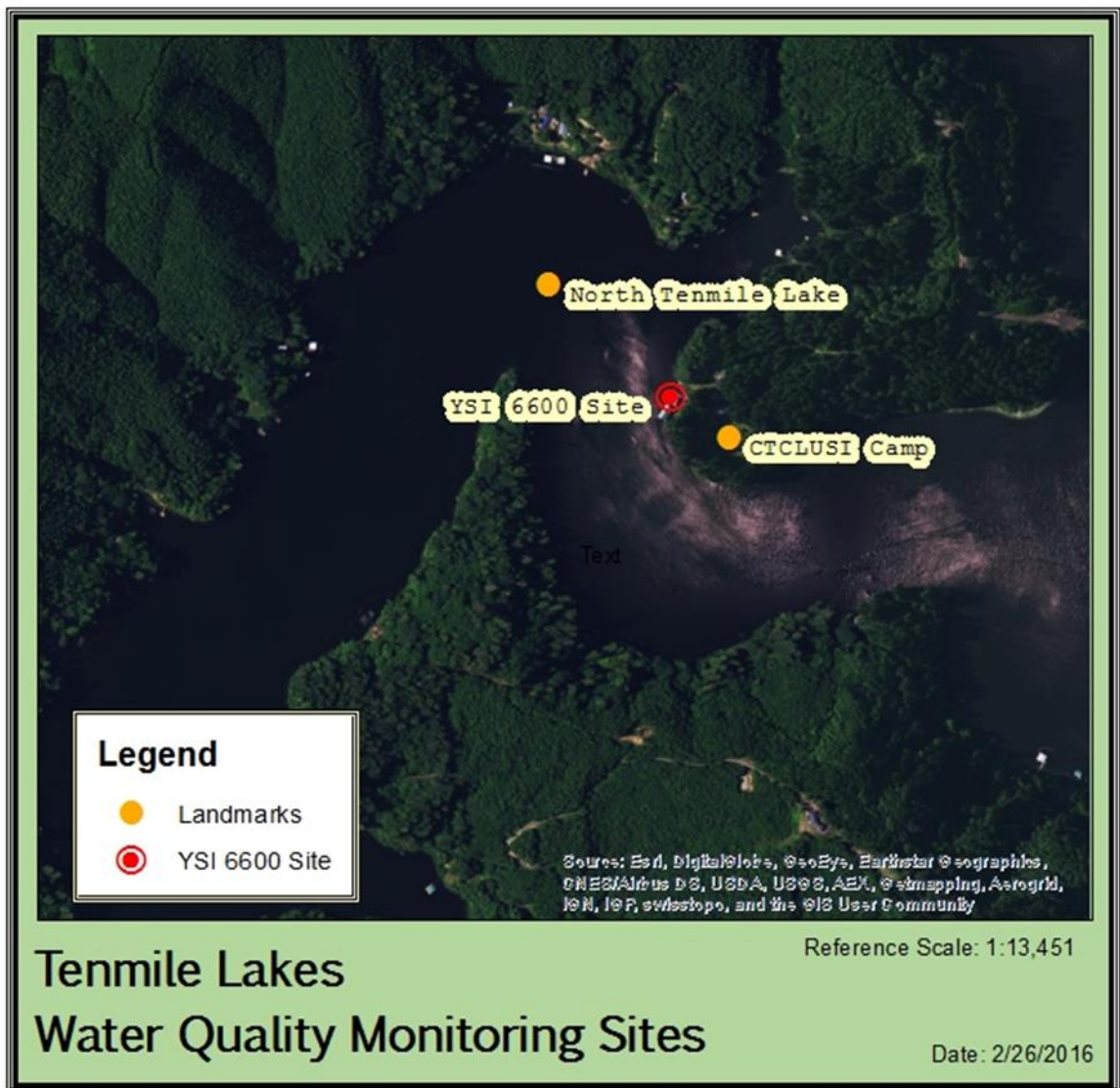
Sixes River – Sixes Watershed	42° 48' 39.5" N 124° 26' 43.3" W	Field Measurements: Water Temperature, Dissolved Oxygen, Salinity/Specific Conductivity, pH, Turbidity, and Depth	Seasonally to Quarterly (as staff and resources allow)	<p><b>Parameter:</b> Alkalinity <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Aquatic life <b>Status:</b> Insufficient data, potential concern</p> <p><b>Parameter:</b> Ammonia <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Aquatic life <b>Status:</b> Attaining some criteria/uses</p> <p><b>Parameter:</b> Biological Criteria <b>Season:</b> Year Round <b>Listed:</b> :2010 <b>Beneficial Use(s):</b> Aquatic Life <b>Status:</b> Water quality limited, 303(d) list, TMDL needed</p> <p><b>Parameter:</b> Chloride <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Aquatic Life <b>Status:</b> Insufficient data</p> <p><b>Parameter:</b> Chlorophyll a <b>Season:</b> Fall, Winter, Spring; Summer <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Fishing; Aesthetics; Livestock watering; Water supply; Water contact recreation <b>Status:</b> Insufficient data; Attaining some criteria/uses (Summer)</p> <p><b>Parameter:</b> Dissolved Oxygen <b>Season:</b> Year Round (Non-spawning); Oct. 15 to May15 <b>Listed:</b> 2010; 2004 <b>Beneficial Use(s):</b> Cold-water aquatic life; Salmon and steelhead spawning <b>Status:</b> Water quality limited, 303(d) listed, TMDL needed.</p> <p><b>Parameter:</b> E.Coli <b>Season:</b> Year Around <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Water contact recreation <b>Status:</b> Attaining some criteria/uses</p> <p><b>Parameter:</b> Fecal Coliform <b>Season:</b> Year Around <b>Listed:</b> 1998 <b>Beneficial Use(s):</b> Water contact recreation <b>Status:</b> Attaining some criteria/uses</p> <p><b>Parameter:</b> pH <b>Season:</b> Year Round <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Water contact recreation; Salmonid fish spawning; Resident fish and aquatic life; Anadromous fish passage; Salmonid fish rearing <b>Status:</b> Attaining some criteria/uses</p> <p><b>Parameter:</b> Sedimentation <b>Season:</b> Undefined <b>Listed:</b> 1998 <b>Beneficial Use(s):</b> Salmonid fish rearing; Salmonid fish spawning; Resident fish and aquatic life <b>Status:</b> Insufficient data</p> <p><b>Parameter:</b> Temperature <b>Season:</b> Year Round (Non-spawning) <b>Listed:</b> 2004 <b>Beneficial Use(s):</b> Salmon and trout rearing and migration <b>Status:</b> Water quality limited, 303(d) list, TMDL needed.</p>
		Laboratory: Bacteria ( <i>e.coli</i> )		
		Laboratory: Nutrients (TN and TP), Chlorophyll, Basic Habitat Information, and Macroinvertebrates		

### 3) Maps of Monitoring Sites

#### North Fork and Cox Island Siuslaw Sonde Stations



## North Tenmile Lake Sample Site





## Coos Bay Sonde Stations



## Sixes River Sample Site



#### 4) Total Extent of Waters Assessed

During the 2018 water year, our program continuously monitored baseline water quality at 4 locations on two rivers pertaining to Tribal lands (the Coos Bay Estuary and North Fork Siuslaw River). Those data collected at the continuous monitoring stations represent approximately 36% of the total stream and 3% of the total tideland miles (approx. 0.94 miles of rivers and streams and 3.18 miles of tideland) of or pertaining to Tribal lands. Additional water quality assessment data such as nutrient, bacteria and benthic macroinvertebrate data were collected less frequently and included sample sites other than the continuous monitoring sites. The reduced sampling frequency and disparity among parameters monitored at different sites is due primarily to funding and staff resource constraints (see table above for parameters measured at each site and monitoring frequency). The program did not do any significant monitoring of wetlands or lakes due to funding and staff resource constraints.

Also, due to funding and staff resource constraints, microcystin testing was not performed for the 2018 year at our North Tenmile Lakes site nor was bacteria monitoring performed at the Tribe's Pacific Ocean site.

#### 5) Data Analysis and Assessment

The goal for all waters of or pertaining to Tribal lands is to support the following Tribal and/or state designated beneficial uses.

##### Tribal Goals/Designated Beneficial Uses for the Waters of or Pertaining to Tribal Lands

BENEFICIAL USES	MISERY CREEK	MAINSTEM SIUSLAW RIVER	NORTH FORK SIUSLAW RIVER	KENTUCK SLOUGH	COOS RIVER	SIXES RIVER	TENMILE LAKE
PRIMARY HUMAN CONTACT/CULTURAL AND CEREMONIAL USES	X	X	X	X	X	X	X
SECONDARY HUMAN CONTACT	X	X	X	X	X	X	X
RESIDENT FISH AND AQUATIC LIFE	X	X	X	X	X	X	X
ANADROMOUS FISH PASSAGE	X	X	X	X	X	X	X
SHELLFISH GROWING/HARVESTING	N/A	X	N/A	N/A	X	N/A	N/A

CTCLUSI is in the process of developing water quality standards for waters of or pertaining to reservation, trust, and fee lands. Therefore, our program primarily refers to ODEQ water quality standards to evaluate water quality data generated by our Integrated Water Quality Monitoring Program. In addition to ODEQ criteria, our program refers to the Commonwealth of the Northern Mariana Islands Water Quality Standards to evaluate total nitrogen and total phosphorus and Oregon Watershed Enhancement Board (OWEB) recommended indicator criteria to evaluate turbidity data generated by the Tribes' integrated water quality monitoring program. In addition to the water quality parameters listed below, the Tribes' water quality monitoring program also collects annual macroinvertebrate samples from the Sixes River sample site. Macroinvertebrate data collected by our program are evaluated per the Benthic Invertebrate Index of Biological Integrity – BIBI (modified Karr 1998).

Designated Uses	Water Quality Parameter			
RESIDENT FISH AND AQUATIC LIFE &	Temp*	Dissolved Oxygen	Turbidity	pH

ANADROMOUS FISH PASSAGE				
Salmon and Trout Rearing and Migration	Not greater than 18° C  7-day max daily average	Ocean Waters: No measurable reduction allowed  Estuarine Waters: <6.5 mg/L  Cold Waters: <8.0 mg/L 30 day mean min; <6.5 mg/L seven-day min mean; <6.0 mg/L absolute min  Cool Waters: <6.5 mg/L 30 day mean min; <5.0 mg/L seven-day min mean; <4.0 mg/L absolute min  Warm Waters: <5.5 mg/L 30 day mean min; <4.0 mg/L absolute min  % Saturation: May not fall outside of 90-110% (>110% Lethal)	>10 FNU	Marine Waters: May not fall outside of 7.0-8.5 range  Estuarine and Fresh Waters: May not fall outside of 6.5-8.5 range
Salmon Habitat (Healthy Adult)	May not fall outside of 7.2-15.6 °C (>25 °C Lethal)			
Salmon Habitat (Healthy Juvenile)	12.2-13.9°C (>25 °C Lethal)			
		Citation		
		OAR 340-041-0028* WATER POLLUTION DIVISION 41 WATER QUALITY STANDARDS: BENEFICIAL USES, POLICIES, AND CRITERIA FOR OREGON	OAR 340-041-0016 WATER POLLUTION DIVISION 41 WATER QUALITY STANDARDS: BENEFICIAL USES, POLICIES, AND CRITERIA FOR OREGON	DEQ WQS Turbidity Technical Review
PRIMARY HUMAN CONTACT/CULTURAL AND CEREMONIAL USES	Enterococci organism levels (fresh and marine)	E.coli organism levels	HABs	
	No more than 70 colony forming units (70 MPN) per 100 ml of marine water	No more than 235 CFU or 235 MPN per 100 ml of fresh water	Anatoxin-A- 8 µg/L Cylindrospermopsin- 8 µg/L Saxitoxin- 4 µg/L Microcystin- 4 µg/L	
			Citation	
			EPA-823-B-14-001	EPA-823-B-14-001
SECONDARY HUMAN CONTACT	Nutrients		Turbidity	
	Total Phosphorus (streams): >100 µg/L  Total Phosphorus (Lakes w/o thermal stratification, reservoirs, rivers, and estuaries): >50 µg/L		No more than a 10% cumulative increase in natural stream turbidities shall be allowed, as measured relative to a control	



	<p>Total Phosphorus (Lakes/reservoirs): &gt;25 µg/L</p> <p>Total Nitrogen (Marine Waters): &gt;200 µg/L /L</p> <p>Total Nitrogen (Fresh Waters): &gt;750 µg/L</p> <p>Chlorophyll a (Lakes with Thermal Stratification) &gt;10 µg/L</p> <p>Chlorophyll a (Lakes without Thermal Stratification, Reservoirs, Rivers, and Estuaries): &gt;15 µg/L</p> <p>Ammonia: May not fall outside 270 µg/L- 33,000 µg/L once every 3 years depending on pH, temperature, and salinity</p>	<p>point immediately upstream of the turbidity causing activity.</p> <p>However, limited duration activities necessary to address an emergency or to accommodate essential dredging, construction or other legitimate activities and which cause the standard to be exceeded may be authorized provided all practicable turbidity control techniques have been applied.</p>
	<b>Citation</b>	
	USEPA/ Commonwealth of the Northern Mariana Islands Water Quality Standards/ OAR 340-041-0019	OAR 340-041-0036

\* OAR 340-041-0028, (7): Oceans and Bays. Except for the Columbia River above river mile 7, ocean and bay waters may not be warmed by more than 0.3 degrees Celsius (0.5 degrees Fahrenheit) above the natural condition unless a greater increase would not reasonably be expected to adversely affect fish or other aquatic life. Absent a discharge or human modification that would reasonably be expected to increase temperature, DEQ will presume that the ambient temperature of the ocean or bay is the same as its natural thermal condition



### III. Data Analysis Results

#### A. Summary of Data Collected

The following data summaries of Tribal discrete (grab) and continuous (sonde) water quality monitoring data are for the 2018 water year (unless otherwise indicated) and are presented in tabular format.

Lower Coos Surface Water Quality Monitoring Data for Water Year 2018  
(Oct 2017 to Sept 2018)

BLM Discrete Data Summary **							
BLM Grabs Wet Season: 10/01/2017 to 05/31/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	10.77	40703.03	25.99	96.64	9.11	7.70	7.84
Median	10.94	42365.00	27.13	94.80	9.23	7.75	1.53
Minimum	8.46	31036.10	19.18	92.40	8.20	7.38	-0.76
Maximum	13.96	47194.50	30.57	101.70	10.28	7.80	29.80
Count	7	7	7	7	7	7	7
BLM Grabs Dry Season: 06/01/2018 to 09/30/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	14.31	49898.38	32.66	92.43	7.74	7.56	0.61
Median	14.53	51011.85	33.44	89.15	7.53	7.53	0.55
Minimum	12.54	46200.20	30.01	87.10	7.21	7.48	-0.63
Maximum	15.63	51369.60	33.74	104.30	8.67	7.69	1.99
Count	4	4	4	4	4	4	4
BLM Continuous Data Summary **							
BLM Sonde Wet Season: 10/01/2017 to 05/31/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	11.04	41142.99	26.33	95.43	8.92	7.70	2.24
Median	10.85	42092.55	26.94	95.20	8.99	7.68	1.89
Minimum	7.22	349.60	0.17	65.60	6.09	7.29	-3.10
Maximum	16.51	51375.90	33.58	114.50	11.26	8.03	444.12
Count	22620	22508	22508	22620	22620	23320	23318
BLM Sonde Dry Season: 06/01/2018 to 09/30/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	14.02	49524.59	32.37	92.51	7.80	7.67	0.72
Median	14.28	50191.00	32.88	92.40	7.71	7.66	0.69
Minimum	8.99	42873.50	27.64	44.80	4.14	7.37	-3.62
Maximum	18.17	52086.10	34.06	135.30	11.51	8.13	116.98
Count	11707	11707	11707	11707	11707	11707	11706

\* Values in **bold** represent exceedances in single values for a particular designated use. However, these exceedances can be possible anomalies attributable to seasonal extremes (temperature) or localized conditions (turbidity). Values highlighted in **green** represent exceedances in temperature for healthy juvenile salmon habitat. Likewise, values highlighted in **green** represent exceedances in temperature for both healthy juvenile and healthy adult salmon habitat and values highlighted in **purple** represent exceedances in temperature for both healthy juvenile and healthy adult salmon habitat as well as salmon and trout rearing and migration. \*\* Estuary habitat tends to have tidal (salinity/ temp) and open water characteristics (high temp/ low DO) that are not comparable to mainstem and side channel water quality parameters.

## Data Summary (cont.)

Lower Coos Surface Water Quality Monitoring Data for Water Year 2018  
(Oct 2017 to Sept 2018)

Empire Discrete Data Summary**							
Empire Grabs Wet Season: 10/01/2017 to 05/31/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	10.91	44286.78	28.50	98.43	9.09	7.77	2.75
Median	10.95	43716.40	28.14	98.20	9.16	7.81	2.01
Minimum	8.91	38973.50	24.65	94.40	8.40	7.54	-0.61
Maximum	13.85	49230.00	32.04	102.70	10.11	7.91	7.73
Count	6	6	6	6	6	6	6
Empire Grabs Dry Season: 06/01/2018 to 09/30/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	13.75	50149.75	32.82	93.73	7.93	7.66	0.32
Median	13.76	51220.50	33.59	92.70	7.89	7.64	-0.21
Minimum	12.08	46824.20	30.46	85.10	7.20	7.56	-0.36
Maximum	15.39	51333.80	33.65	104.40	8.73	7.79	2.03
Count	4	4	4	4	4	4	4
Empire Continuous Data Summary **							
Empire Sonde Wet Season: 10/01/2016 to 05/31/2017	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	10.97	44521.76	28.70	96.58	8.90	7.81	2.12
Median	10.88	46126.80	29.80	96.70	8.95	7.79	2.04
Minimum	7.40	19607.30	11.65	58.50	5.53	7.54	-2.10
Maximum	16.09	55793.40	36.84	117.80	10.61	8.16	141.34
Count	23321	23321	23321	23321	23321	23321	23321
Empire Sonde Dry Season: 06/01/2017 to 09/30/2017	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	13.08	50045.78	32.72	92.10	7.89	7.73	2.96
Median	13.12	50507.00	33.08	91.60	7.76	7.67	2.41
Minimum	9.07	43711.20	28.23	53.40	4.92	7.41	-2.86
Maximum	17.21	52413.50	34.25	141.90	11.90	8.35	16.46
Count	11709	11709	11709	11709	11709	11709	11709

\* Values in **bold** represent exceedances in single values for a particular designated use. However, these exceedances can be possible anomalies attributable to seasonal extremes (temperature) or localized conditions (turbidity). Values highlighted in   represent exceedances in temperature for healthy juvenile salmon habitat. Likewise, values highlighted in   represent exceedances in temperature for both healthy juvenile and healthy adult salmon habitat and values highlighted in   represent exceedances in temperature for both healthy juvenile and healthy adult salmon habitat as well as salmon and trout rearing and migration. \*\* Estuary habitat tends to have tidal (salinity/ temp) and open water characteristics (high temp/ low DO) that are not comparable to mainstem and side channel water quality parameters.

## Data Summary (cont.)

Lower Siuslaw Surface Water Quality Monitoring Data for Water Year 2018  
(Oct 2017 to Sept 2018)

North Fork Discrete Data Summary**							
North Fork Grabs Wet Season: 10/01/2017 to 05/31/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	11.00	11500.37	7.09	92.84	9.93	7.65	0.02
Median	10.83	546.90	0.27	95.10	10.41	7.55	1.93
Minimum	5.71	80.40	0.04	82.10	7.13	7.31	-4.34
Maximum	15.78	35304.90	22.29	97.80	11.74	8.62	2.84
Count	7	7	7	7	7	7	7
North Fork Grabs Dry Season: 06/01/2018 to 09/30/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	18.06	31593.73	19.77	81.50	6.87	7.23	2.88
Median	17.58	32582.10	20.44	83.55	6.93	7.19	2.56
Minimum	17.16	23277.40	14.05	67.20	5.51	7.11	0.76
Maximum	19.92	37933.30	24.14	91.70	8.11	7.41	5.63
Count	4	4	4	4	4	4	4
North Fork Continuous Data Summary **							
North Fork Sonde Wet Season: 10/01/2017 to 05/31/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	10.12	6722.77	3.99	95.28	10.48	6.99	3.49
Median	9.55	929.30	0.46	95.20	10.65	6.94	2.77
Minimum	4.66	42.40	0.02	43.50	4.06	5.88	-0.84
Maximum	19.78	46446.60	30.02	127.40	12.28	8.53	71.15
Count	20106	20106	20106	17648	17648	20106	19973
North Fork Sonde Dry Season: 06/01/2018 to 09/30/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	17.96	29564.67	18.46	81.47	6.93	7.23	2.22
Median	17.86	30880.65	19.25	80.70	6.87	7.21	1.87
Minimum	11.01	1044.50	0.52	26.90	2.24	6.63	-2.75
Maximum	22.88	48669.90	31.67	139.30	12.35	8.10	78.79
Count	11703	11703	11703	11703	11703	11703	8012

\* Values in **bold** represent exceedances in single values for a particular designated use. However, these exceedances can be possible anomalies attributable to seasonal extremes (temperature) or localized conditions (turbidity). Values highlighted in **green** represent exceedances in temperature for healthy juvenile salmon habitat. Likewise, values highlighted in **yellow** represent exceedances in temperature for both healthy juvenile and healthy adult salmon habitat and values highlighted in **purple** represent exceedances in temperature for both healthy juvenile and healthy adult salmon habitat as well as salmon and trout rearing and migration. \*\* Estuary habitat tends to have tidal (salinity/ temp) and open water characteristics (high temp/ low DO) that are not comparable to mainstem and side channel water quality parameters.

## Data Summary (cont.)

Lower Siuslaw Surface Water Quality Monitoring Data for Water Year 2018  
(Oct 2017 to Sept 2018)

Cox Island Discrete Data Summary**							
Cox Island Grabs Wet Season: 10/01/2017 to 05/31/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	10.64	11117.77	6.78	94.19	10.20	7.79	2.14
Median	10.74	3770.30	1.98	97.80	10.82	7.82	2.64
Minimum	5.10	47.70	0.02	81.40	7.07	7.39	-1.86
Maximum	16.05	36247.90	22.94	98.90	12.16	8.17	5.25
Count	7	7	7	7	7	7	7
Cox Island Grabs Dry Season: 06/01/2018 to 09/30/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	18.48	28731.25	17.84	79.18	6.70	7.09	3.34
Median	18.18	27842.80	17.22	82.40	6.87	7.09	3.62
Minimum	16.95	21951.50	13.25	64.30	5.26	6.91	1.92
Maximum	20.63	37287.90	23.68	87.60	7.81	7.25	4.20
Count	4	4	4	4	4	4	4
Cox Island Continuous Data Summary **							
Cox Island Sonde Wet Season: 10/01/2017 to 05/31/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	10.38	9213.27	5.54	95.21	10.38	7.17	3.28
Median	9.78	2871.10	1.49	96.50	10.68	7.09	2.52
Minimum	4.11	32.10	0.01	57.30	5.19	6.45	-2.38
Maximum	19.36	47924.90	31.18	123.50	13.04	8.30	98.12
JCount	23319	23319	23319	23319	23319	23319	23187
Cox Island Sonde Dry Season: 06/01/2018 to 09/30/2018	Temp (°C)	SpCond (µS/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	17.70	31089.56	19.51	83.88	7.13	7.25	3.27
Median	17.81	31642.80	19.77	82.60	7.03	7.22	2.79
Minimum	10.15	1388.40	0.70	20.20	1.66	6.63	0.50
Maximum	22.17	50305.10	32.82	144.40	12.46	8.18	345.90
Count	11703	11703	11703	11703	11703	11703	11700

\* **Bold** values represent exceedances in single values for a particular designated use. However, these exceedances can be possible anomalies attributable to seasonal extremes (temperature) or localized conditions (turbidity). Values highlighted in **green** represent exceedances in temperature for healthy juvenile salmon habitat. Likewise, values highlighted in **red** represent exceedances in temperature for both healthy juvenile and healthy adult salmon habitat and values highlighted in **purple** represent exceedances in temperature for both healthy juvenile and healthy adult salmon habitat as well as salmon and trout rearing and migration. \*\* Estuary habitat tends to have tidal (salinity/ temp) and open water characteristics (high temp/ low DO) that are not comparable to mainstem and side channel water quality parameters.

## **Bacteria Data**

Siuslaw - Cox Island 1 <i>E. coli</i>		Siuslaw - Cox Island 2 <i>E. coli</i>		Siuslaw – North Fork 1 <i>E. coli</i>		Siuslaw – North Fork 2 <i>E. coli</i>	
Sample Date	MPN/100 ml	Sample Date	MPN/100 ml	Sample Date	MPN/100 ml	Sample Date	MPN/100 ml
11/6/2017	2.0	11/6/2017	2.0	11/6/2017	3.1	11/6/2017	4.1
12/12/2017	<1.0	12/12/2017	<1.0	12/12/2017	2.0	12/12/2017	4.1
1/22/2018	1.0	1/22/2018	2.0	1/22/2018	1.0	1/22/2018	4.1
3/6/2018	1.0	3/6/2018	1.0	3/6/2018	<1.0	3/6/2018	1.0
4/11/2018	8.6	4/11/2018	4.1	4/11/2018	9.7	4/11/2018	4.1
5/14/2018	3.1	5/14/2018	3.1	5/14/2018	7.5	5/14/2018	4.1
6/12/2018	2.0	6/12/2018	3.1	6/12/2018	2.0	6/12/2018	1.0
7/16/2018	1.0	7/16/2018	2.0	7/16/2018	<1.0	7/16/2018	1.0
8/15/2018	<1.0	8/15/2018	<1.0	8/15/2018	2.0	8/15/2018	1.0
9/19/18	3.1	9/19/18	2.0	9/19/18	1.0	9/19/18	1.0

Tenmile 1 <i>E. coli</i>		Tenmile 2 <i>E. coli</i>	
Sample Date	MPN/100 ml	Sample Date	MPN/100 ml
6/11/2018	2.0	6/11/2018	2.0
9/24/18	<1.0	9/24/18	<1.0

Coos - BLM 1 <i>E. coli</i>		Coos - BLM 2 <i>E. coli</i>		Coos - Empire Dock <i>E. coli</i>		Coos - Empire Dock <i>E. coli</i>	
Sample Date	MPN/100 ml	Sample Date	MPN/100 ml	Sample Date	MPN/100 ml	Sample Date	MPN/100 ml
11/7/2017	3.1	11/7/2017	2.0	11/7/2017	<1.0	11/7/2017	3.1
12/11/2017	<1	12/11/2017	<1	12/11/2017	2.0	12/11/2017	<1
1/16/2018	<1	1/16/2018	<1	1/16/2018	1.0	1/16/2018	<1
2/27/2018	<1	2/27/2018	2.0	2/27/2018	2.0	2/27/2018	<1
4/9/2018	8.5	4/9/2018	5.2	4/9/2018	7.3	4/9/2018	7.5
5/17/2018	<1	5/17/2018	<1	5/17/2018	<1	5/17/2018	1.0
6/20/2018	<1	6/20/2018	2.0	6/20/2018	<1	6/20/2018	<1
7/19/2018	<1	7/19/2018	1.0	7/19/2018	<1	7/19/2018	<1
8/23/2018	2.0	8/23/2018	<1	8/23/2018	<1	8/23/2018	<1
9/20/18	1.0	9/20/18	<1	9/20/18	<1	9/20/18	1.0

Sixes River 1 <i>E. coli</i>		Sixes River 2 <i>E. coli</i>	
Sample Date	MPN/100 ml	Sample Date	MPN/100 ml
6/4/2018	2.0	6/4/2018	2.0
10/1/18	12.2	10/1/18	13.4

**Bold values** exceeded criteria (Enterococci 70 MPN/100 ml of marine water; *E.coli* 235 MPN/100 ml of water)



## Nutrient Data – Total Nitrogen (TN), Total Phosphorous (TP) and Chlorophyll *a*, Phaeopigment, and Ammonia

Station	Date	Total Phosphorus	Total Nitrogen	Chlorophyll <i>a</i>	Phaeopigment	Ammonia
		[TP] (ug/L)	[TN] (ug/L)	(ug/L)	(ug/L)	[NH <sub>4</sub> ] (ug/L)
North Fork 1	6/12/18	45.1	<b>221.5</b>	2.629	2.012	16.1
	9/19/18	45.3	<b>295.3</b>	1.539	1.017	35.5
North Fork 2	6/12/18	45.5	<b>229.3</b>	3.236	2.505	16.1
	9/19/18	46.6	<b>303.1</b>	1.521	0.999	36.5
North Fork 3	6/12/18	45.6	<b>236.2</b>	2.542	1.675	19.5
	9/19/18	49.0	<b>300.4</b>	1.102	0.754	34.5
Tenmile 1	6/11/18	<b>36.6</b>	287.5	4.69	-	3.9
	9/24/18	<b>78.0</b>	<b>932.4</b>	<b>14.06</b>	-	156.9
Tenmile 2	6/11/18	<b>40.0</b>	287.5	4.87	-	3.9
	9/24/18	<b>83.1</b>	<b>972.3</b>	<b>15.45</b>	-	169.1
Tenmile 3	6/11/18	<b>38.8</b>	302.3	5.31	-	4.0
	9/24/18	<b>82.7</b>	<b>936.7</b>	<b>16.00</b>	-	174.3
Empire 1	6/15/18	66.4	<b>344.9</b>	2.396	3.739	30.3
	9/20/18	68.1	<b>345.2</b>	1.312	1.59	33.1
Empire 2	6/15/18	64.0	<b>314.6</b>	2.728	3.495	24.4
	9/20/18	67.7	<b>320.4</b>	1.863	1.64	32.7
Empire 3	6/15/18	63.9	<b>353.5</b>	2.099	2.770	4.6
	9/20/18	66.9	<b>323.2</b>	1.410	1.62	33.2
Sixes 1	6/4/18	21.6	135.4	1.22	-	4.0
	10/1/18	12.2	43.9	2.42	-	0
Sixes 2	6/4/18	14.5	120.5	1.16	-	23.5
	10/1/18	12.5	50.4	1.11	-	0.3
Sixes 3	6/4/18	14.4	105.3	1.11	-	7.4
	10/1/18	12.3	50.0	3.24	-	0.0

\* Cracked tube

**Bold values** exceeded criteria ([TP] >100 ug/L streams, >50 ug/L streams that enter lakes/reservoirs, and >25 ug/L lakes/reservoirs; [TN] > 200 ug/L marine waters and >750 ug/L fresh waters; [Chlorophyll *a*] >10 ug/L lakes with thermal stratification, >15 ug/L lakes without thermal stratification, reservoirs, rivers, and estuaries; [NH<sub>4</sub>] outside of 270 ug/L- 33,000 ug/L depending on pH, temperature, and salinity.

## Macroinvertebrate Data

### Benthic Invertebrate Index of Biological Integrity-BIBI (modified Karr 1998)

OR: Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians. Analysis by ABA, Inc., Corvallis, OR.

Sampling method: D-frame net, riffle/run habitat, 8 square feet composite, 500 micron mesh.

Subsampling: 500 organism minimum or entire sample. Level 3 PNW standard taxonomic effort.

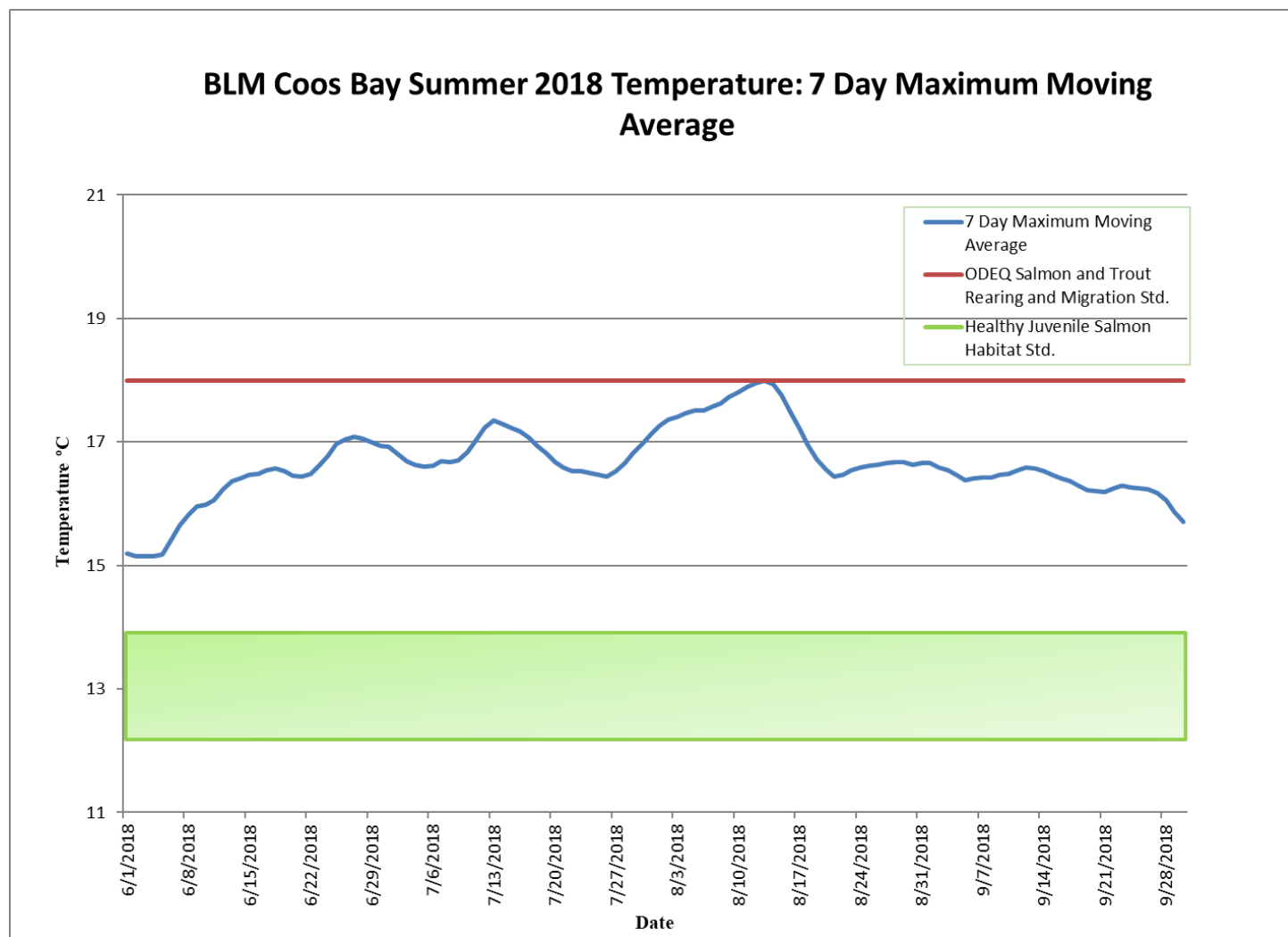
Abundances adjusted to a full sample and square meter basis.

Site Date	Sixes River 8/17/2007		Sixes River 6/24/2008		Sixes River 10/2/2008		Sixes River 7/28/2009		Sixes River 8/13/2010		Sixes River 9/16/2011		Sixes River 9/6/2012		Sixes River 9/29/2014		Sixes River 9/28/2015		Sixes River 10/4/2016		Sixes River 9/26/2017		Sixes River 10/1/2018	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
D Total number of taxa	44	5	34	3	51	5	46	5	45	5	45	5	46	5	50	5	49	5	63	5	72	5	60	5
D Number Ephemeroptera taxa	8	3	9	5	12	5	9	5	9	5	11	5	10	5	9	5	7	3	13	5	12	5	8	3
D Number Plecoptera taxa	4	3	3	1	3	1	3	1	3	1	4	3	3	1	7	3	4	3	5	3	5	3	4	3
D Number Trichoptera taxa	8	3	7	3	6	3	6	3	7	3	6	3	7	3	6	3	10	5	8	3	10	5	10	5
D Number of long-lived taxa	5	5	2	1	4	3	4	3	3	3	3	3	3	3	4	3	5	5	3	3	3	3	3	3
D Number of intolerant taxa	1	1	1	1	1	1	1	1	1	1	2	1	2	1	1	1	0	0	2	1	1	1	3	3
I % Tolerant taxa	31	3	39.17	3	31.9	3	26.38	3	29.86	3	23.3	3	23.79	3	35.7	3	29.34	3	50.19	1	33.1	3	64	1
D % Predator	7.57	1	2.34	1	6.03	1	4.09	1	4.42	1	4.69	1	3.77	1	4	1	9.34	1	5.3	1	4.6	1	7.8	1
D Number of clinger taxa	27	5	20	3	28	5	28	5	26	5	27	5	26	5	28	5	23	5	35	5	36	5	24	5
I % Dominance (3 taxa)	32.17	5	52.14	3	32.82	5	39.47	5	29.51	5	34.95	5	45.63	5	41.5	5	49.49	5	39.96	5	43	5	48	5
TOTAL SCORE		34		24		32		32		32		34		32		34		35		32		36		34
BIOLOGICAL CONDITION CATEGORY																								
Maximum score of 50.																								
Each metric scored: 1=low, 3=moderate, 5=high																								
OTHER COMMUNITY COMPOSITION METRICS THAT ARE INDICATIVE OF BIOLOGICAL CONDITION																								
Total abundance (m2)	1848		1950		2631		2631		1523		3325		2385		1972		1732		1312		1229		2098	
D EPT taxa richness	20		19		21		18		19		21		20		22		21		26		27		22	
D Predator richness	6		7		6		8		8		6		9		7		9		11		12		8	
D Scraper richness	8		8		7		7		6		6		5		6		6		11		8		9	
D Shredder richness	3		2		2		2		2		3		2		5		3		5		6		5	
D %intolerant taxa	0.15		0.14		9.2		0.1		0.18		0.32		0.9		1.28		0		7.1		0.35		0.9	
I % <i>Baetis tricaudatus</i>	10.33		25.79		13.5		4.19		10.07		8.25		10.54		5.1		0.58		1.1		0		0	
I %Collector	54		54.48		55.32		51.94		62.9		63.75		79.28		72.9		36.35		46		75		22	
I %Parasite	7.57		2.34		6.03		4.09		4.42		4.69		3.77		3.6		25.3		7.8		3.2		35	
I %Oligochaeta	0.15		0.28		0.2		0.51		7.24		0		0		0.7		0.58		0.9		0.7		0.2	
I Number tolerant taxa	11		7		22		12		13		13		14		19		17		24		25		29	
I %Simuliidae	0.44		0.14		1.94		1.43		3.36		5.5		4.97		1.5		0.15		0.5		0.5		0	
I %Chironomidae	12.95		3.59		24.34		12.99		23.14		15.53		35.24		11.5		19.42		11.13		21.5		8.6	
L,M & H comparisons with a Pacific Northwest montane stream with high biological integrity.																								
I= Metric value generally increases with declining biological integrity.																								
D= Metric value generally decreases with declining biological integrity.																								
L= Low biological integrity.																								
M= Moderate biological integrity.																								
H= High biological integrity.																								
BIBI scores between 0-24.																								
BIBI scores between 25-39.																								
BIBI scores >40.																								

## B. Comparison of Data to Benchmark Criteria of Parameters of Concern

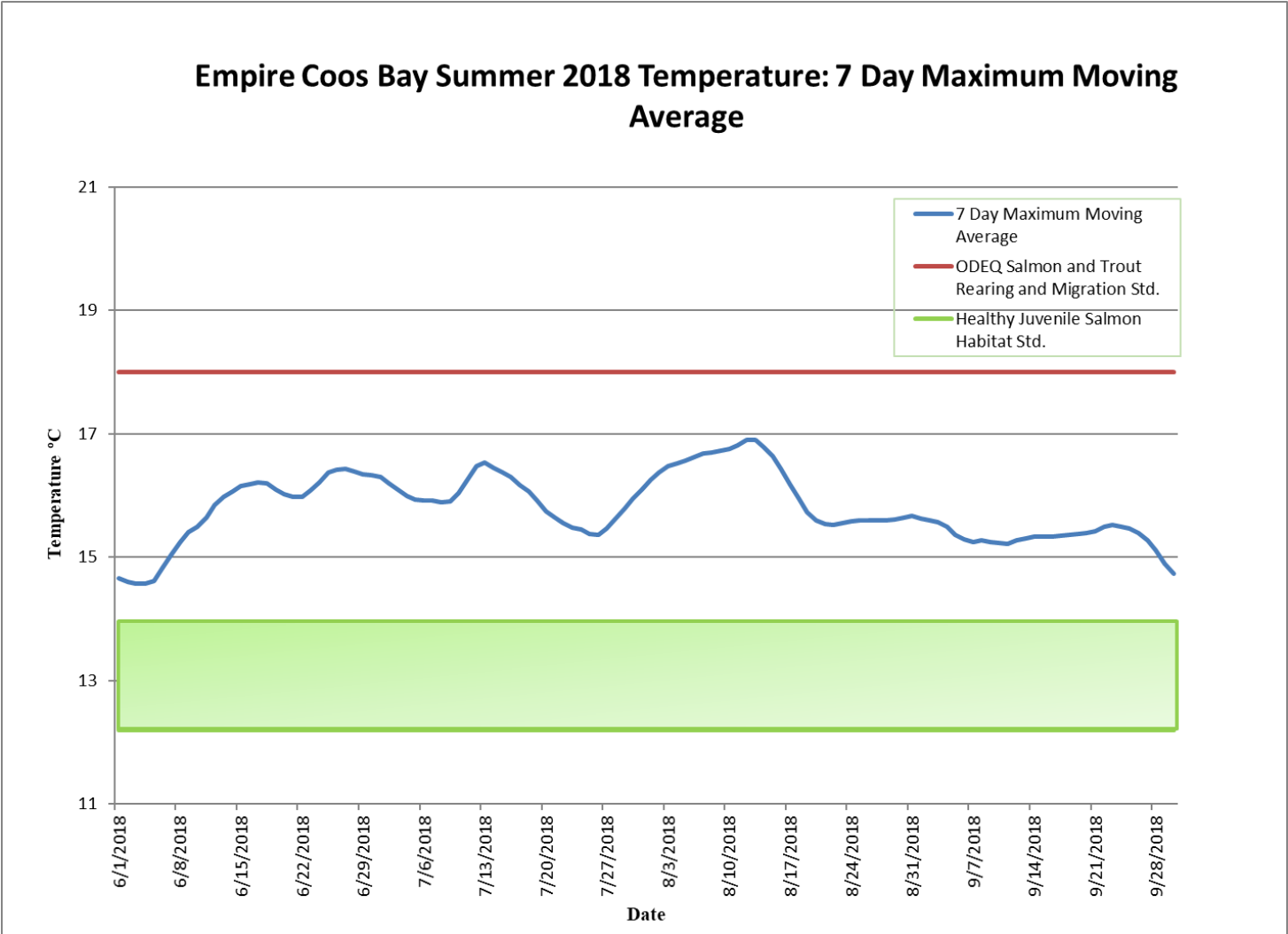
### Temperature

BLM Site – Lower Coos Bay Estuary:



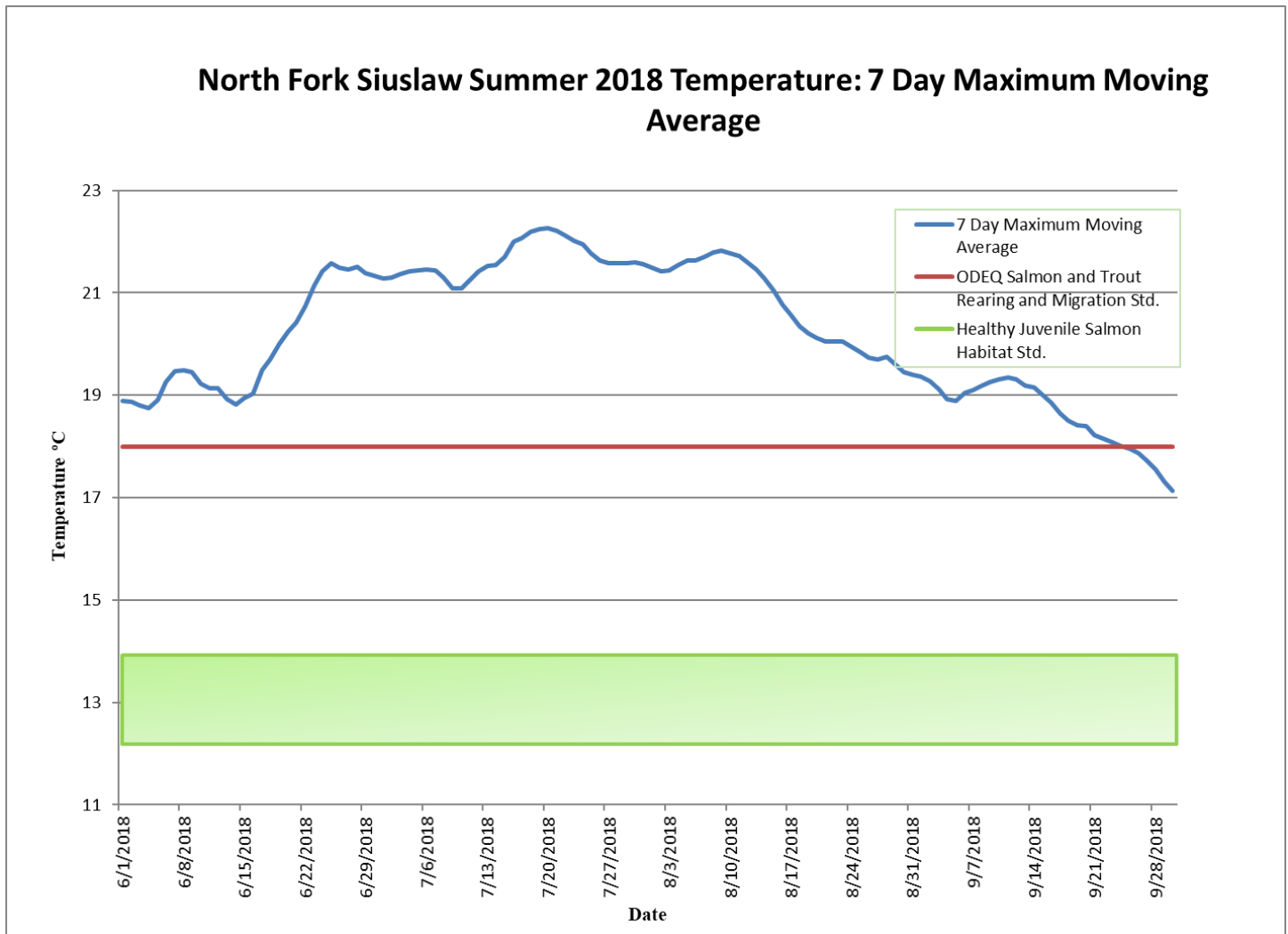
**The maximum temperature measured at the BLM Coos Bay Sonde Station was 18.17 °C.** The 2018 summer and early fall 7 day maximum moving average for temperature at this site did not exceed the ODEQ summer/early fall water temperature standard for salmon and trout rearing and migration (18°C). The 2018 summer and early fall 7 day maximum moving average did exceed the healthy juvenile salmon habitat temperature standard (12.2°C -13.9°C).

Empire Docks Site – Lower Coos Bay Estuary:



**The maximum temperature measured at the Empire Docks Sonde Station was 17.21°C.** The 2018 summer and early fall 7 day maximum moving average for temperature at this site did not exceed the ODEQ summer/early fall water temperature standard for salmon and trout rearing and migration (18°C). The 2018 summer and early fall 7 day maximum moving average did exceed the healthy juvenile salmon habitat temperature standard (12.2°C -13.9°C).

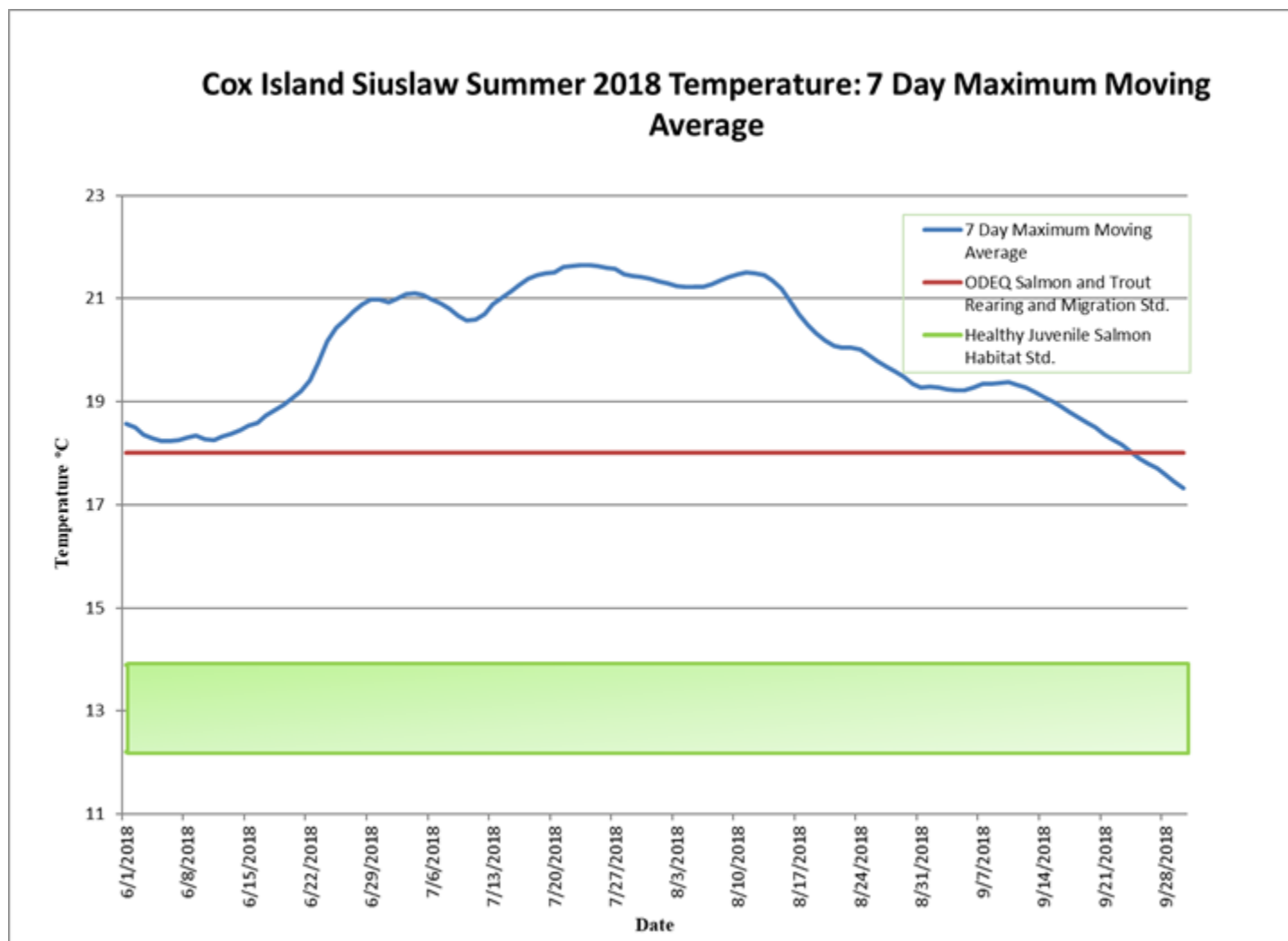
## North Fork Siuslaw– Lower Siuslaw Estuary:



**The maximum temperature measured at the North Fork Siuslaw Sonde Station was 22.88 °C.** The 2018 summer and early fall 7 day maximum moving average for temperature at this site exceeded the ODEQ summer/early fall water temperature standard for salmon and trout rearing and migration (18°C) for most of the summer. The 2018 summer and early fall 7 day maximum moving average also exceeded the healthy juvenile salmon habitat temperature standard (12.2°C -13.9°C).

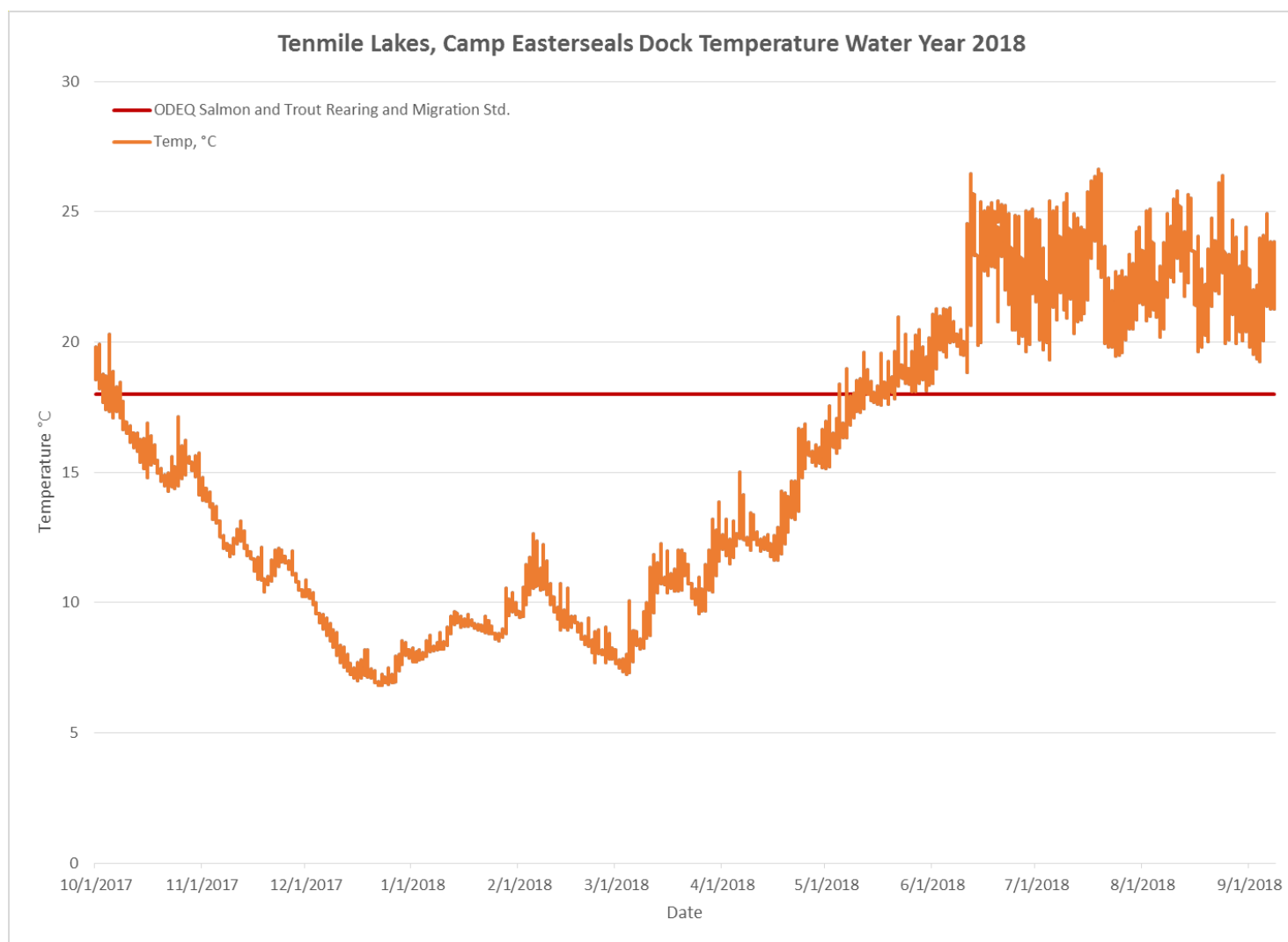


## Cox Island– Lower Siuslaw Estuary:



**The maximum temperature measured at the Cox Island Sonde Station was 22.17 °C.** The 2018 summer and early fall 7 day maximum moving average for temperature at this site exceeded the ODEQ summer/early fall water temperature standard for salmon and trout rearing and migration (18°C) for most of the summer. The 2018 summer and early fall 7 day maximum moving average also exceeded the healthy juvenile salmon habitat temperature standard (12.2°C -13.9°C).

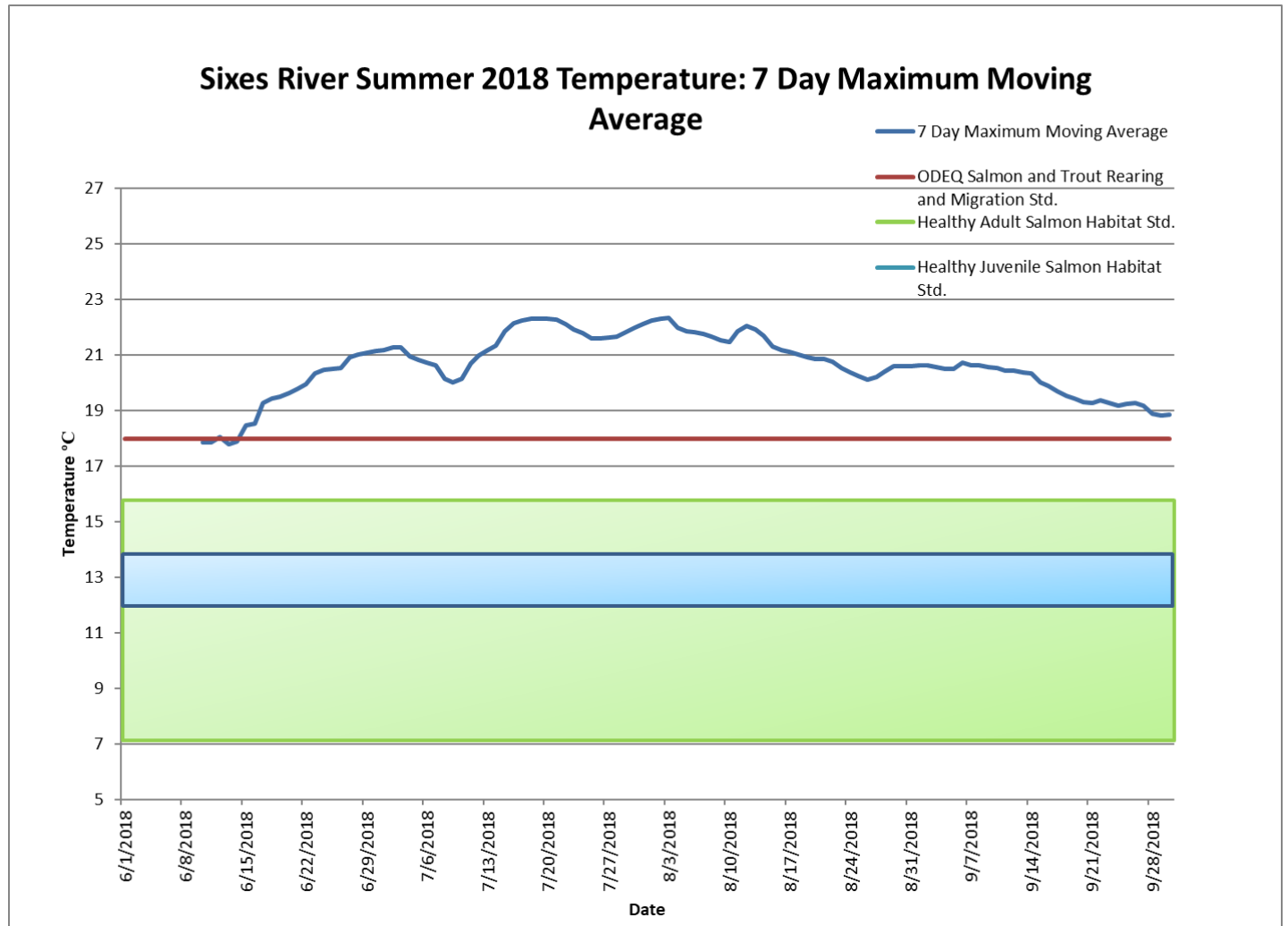
## Camp Easter Seals Dock– North Tenmile Lake:



**The maximum temperature measured at the Camp Easter Seals Hobo Station was 26.6 °C.** The 2018 summer and early fall 7 day maximum moving average for temperature at this site exceeded the ODEQ summer/early fall water temperature standard for salmon and trout rearing and migration (18°C) and peaked at over lethal levels (25°C). 2018 summer and early fall 7 day maximum moving average also exceeded the healthy juvenile salmon habitat temperature standard (12.2°C -13.9°C).

## Sixes River – Freshwater

The maximum temperature measured at the Sixes River Hobo Station was 22.7 °C. The 2018 summer and early fall 7 day maximum moving average for temperature at this site exceeded the ODEQ summer/early fall water temperature standard for salmon and trout rearing and migration (18°C) for most of the summer. The 2018 summer and early fall 7 day maximum moving average also exceeded the healthy juvenile salmon habitat temperature standard (12.2°C -13.9°C) as well as the healthy adult salmon habitat temperature standard (7.2°C-15.6°C).

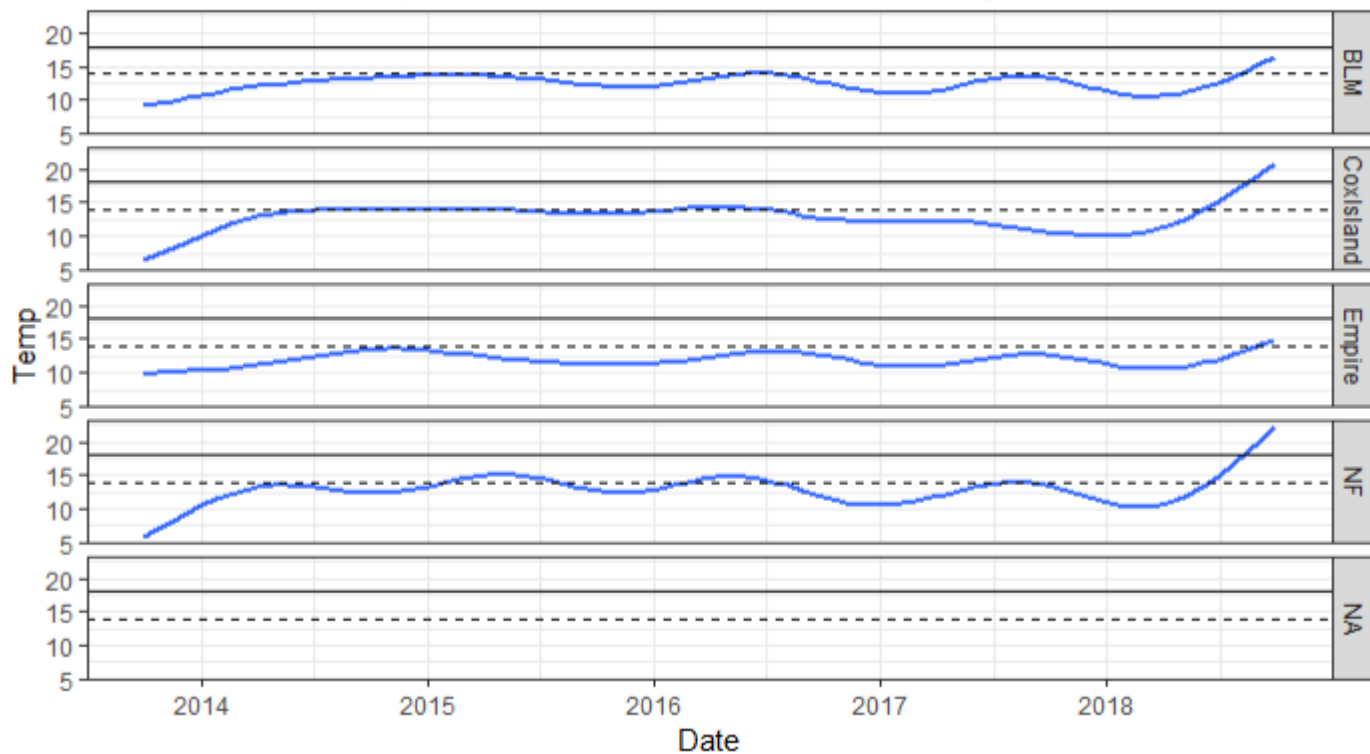


## Temperature Data Over Time

The following graphs show temperature data collected from 2014 to 2018 for the Tribes' continuous water quality monitoring sites and 2015 to 2018 for the Tribes' seasonal sites.

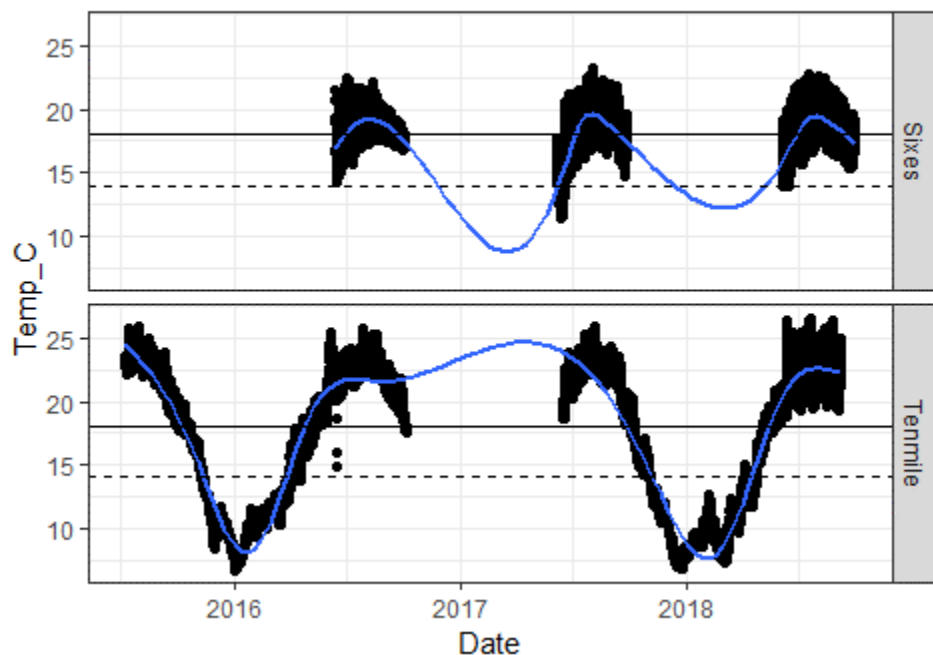
### Temp over Time 2014-2018

18C threshold for healthy salmon and trout, 14C threshold for healthy juvenile habitat



### Temp over Time 2015-2018 Sixes & N Tenmile

18C threshold for healthy salmon & trout, 14C threshold for healthy

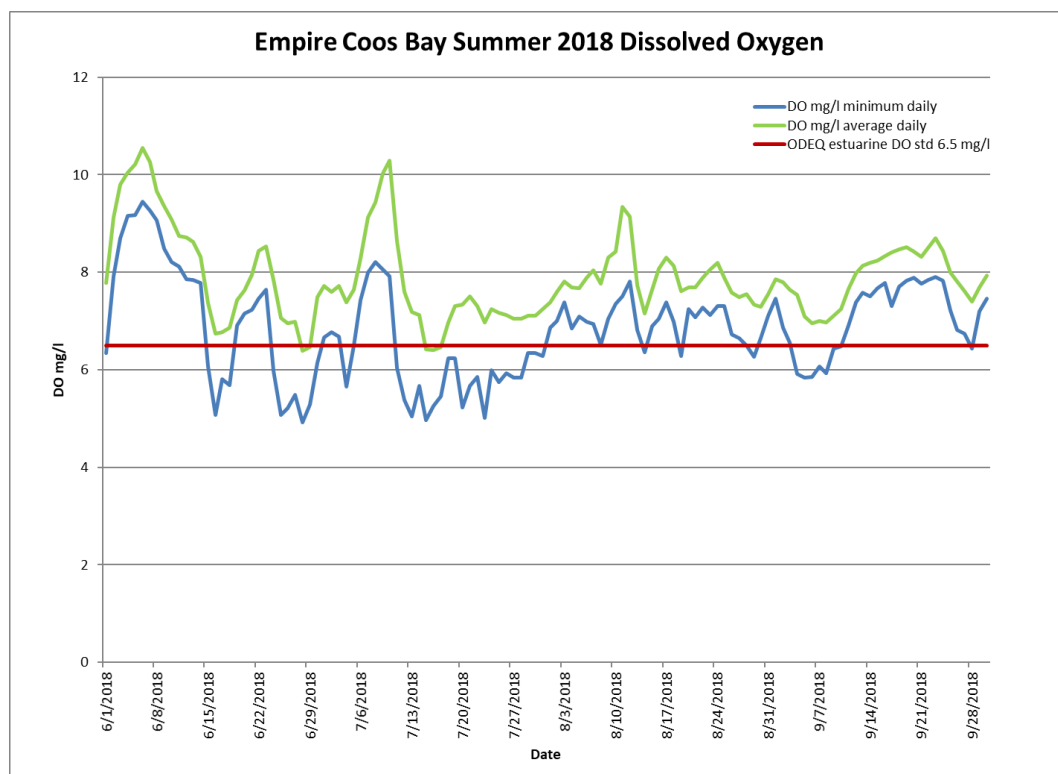
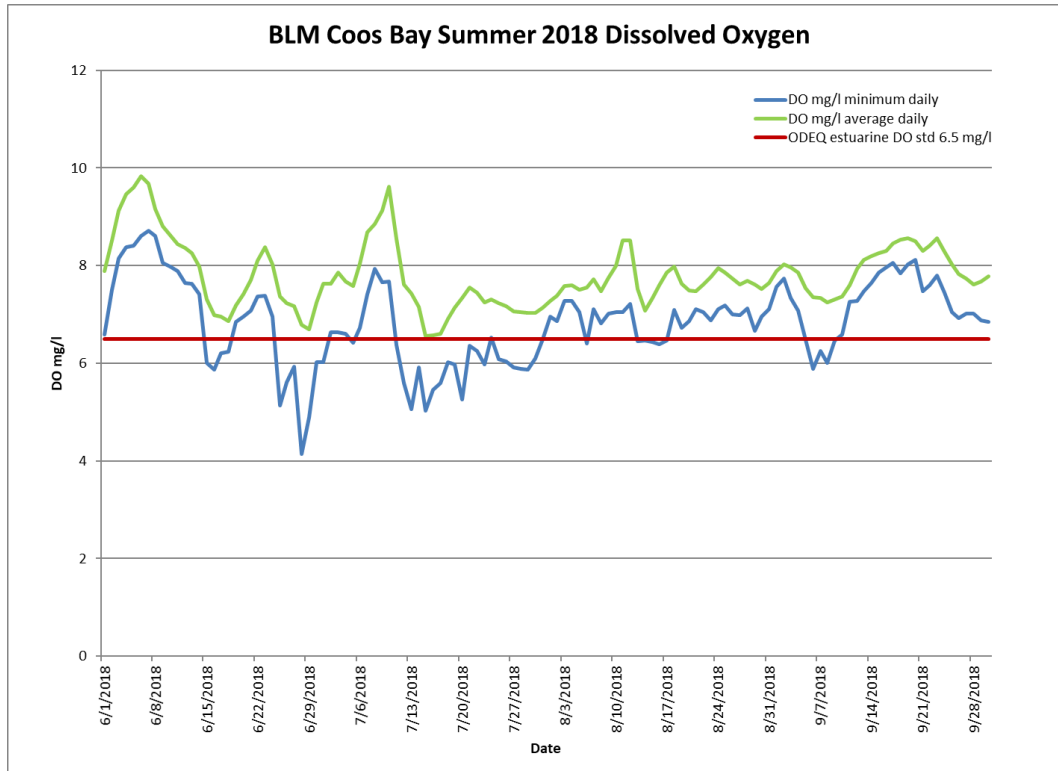


Note: temperature data for Sixes' 2015 water year is absent as a data logger was lost.  
Also, the data gap for the North Tenmile Lakes' data has been attributed to animal/human interference.

## Dissolved Oxygen

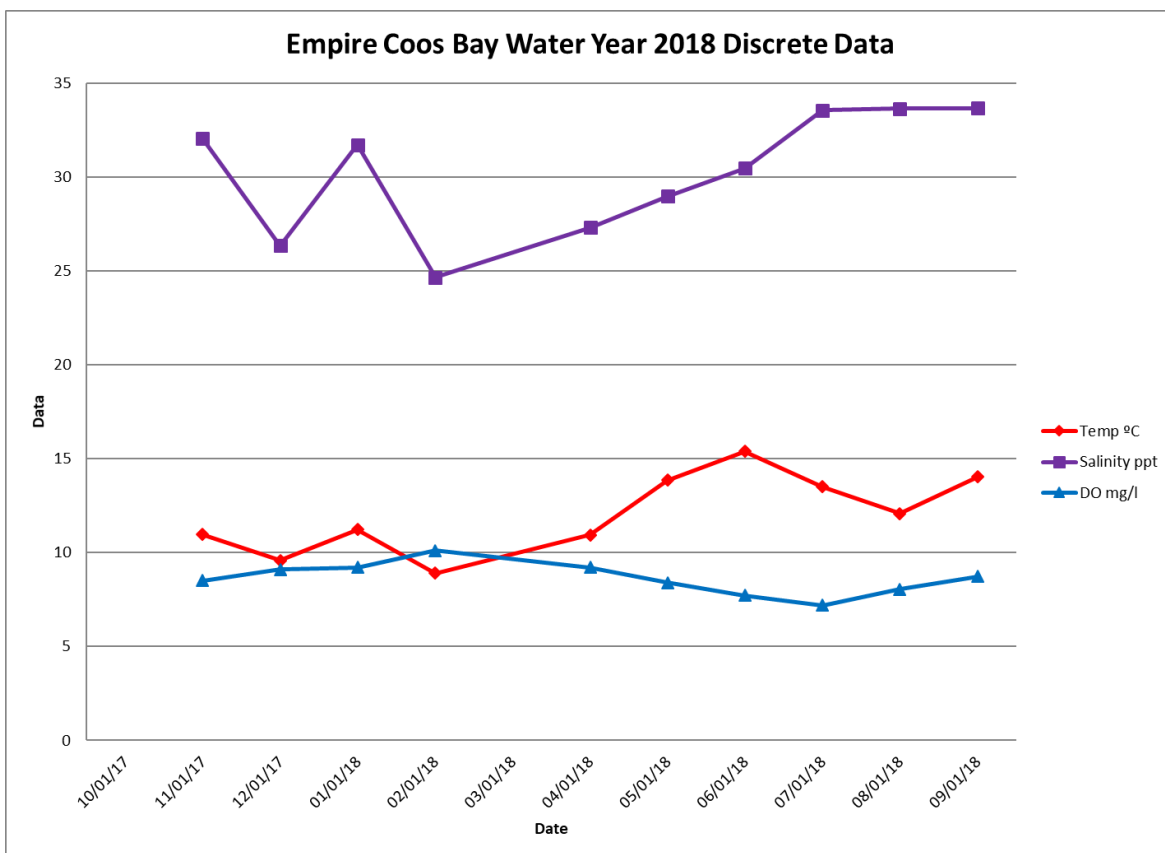
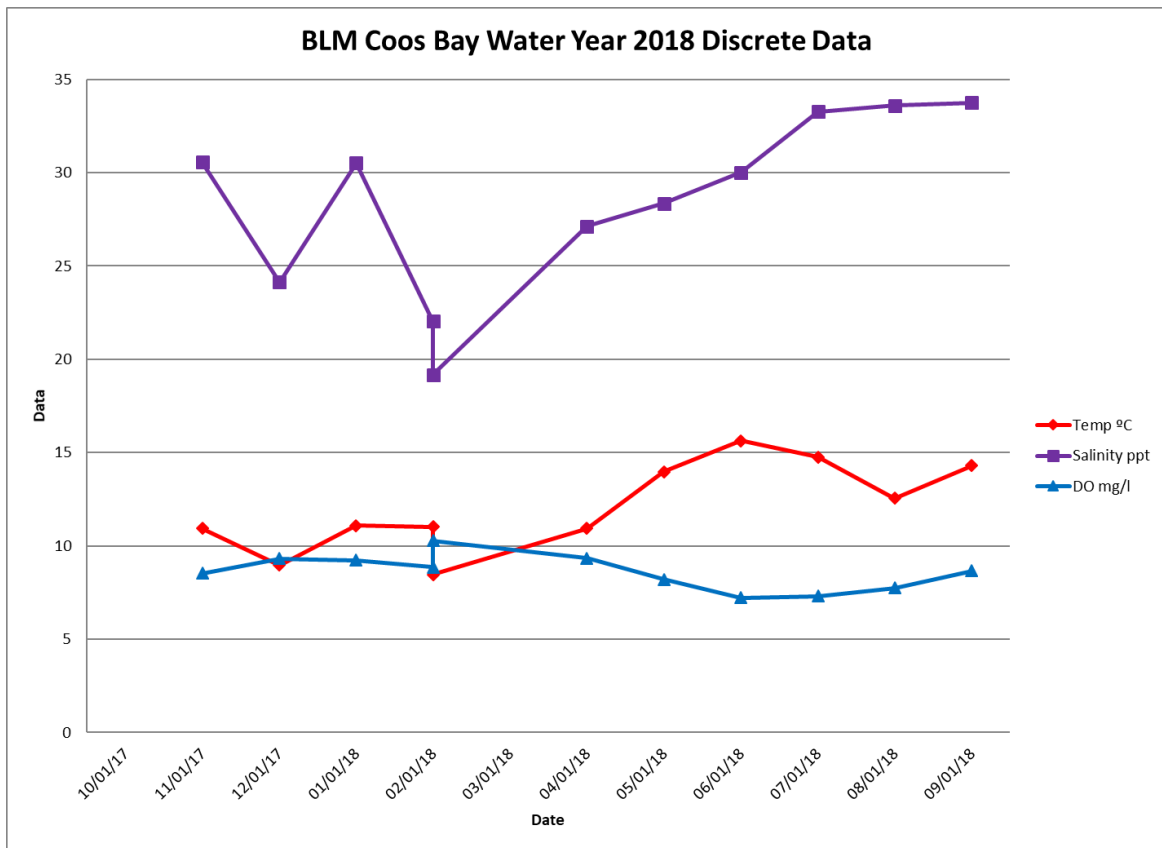
### **BLM and Empire Dock Sites – Lower Coos Bay:**

Minimum dissolved oxygen recorded at the Coos Bay BLM and Empire Dock stations failed to meet the ODEQ estuarine dissolved oxygen criteria of not less than 6.5 mg/l for a portion of the summer. Continuous data collected at these sites is showing a downward trend in dissolved oxygen when compared to last year's continuous data.

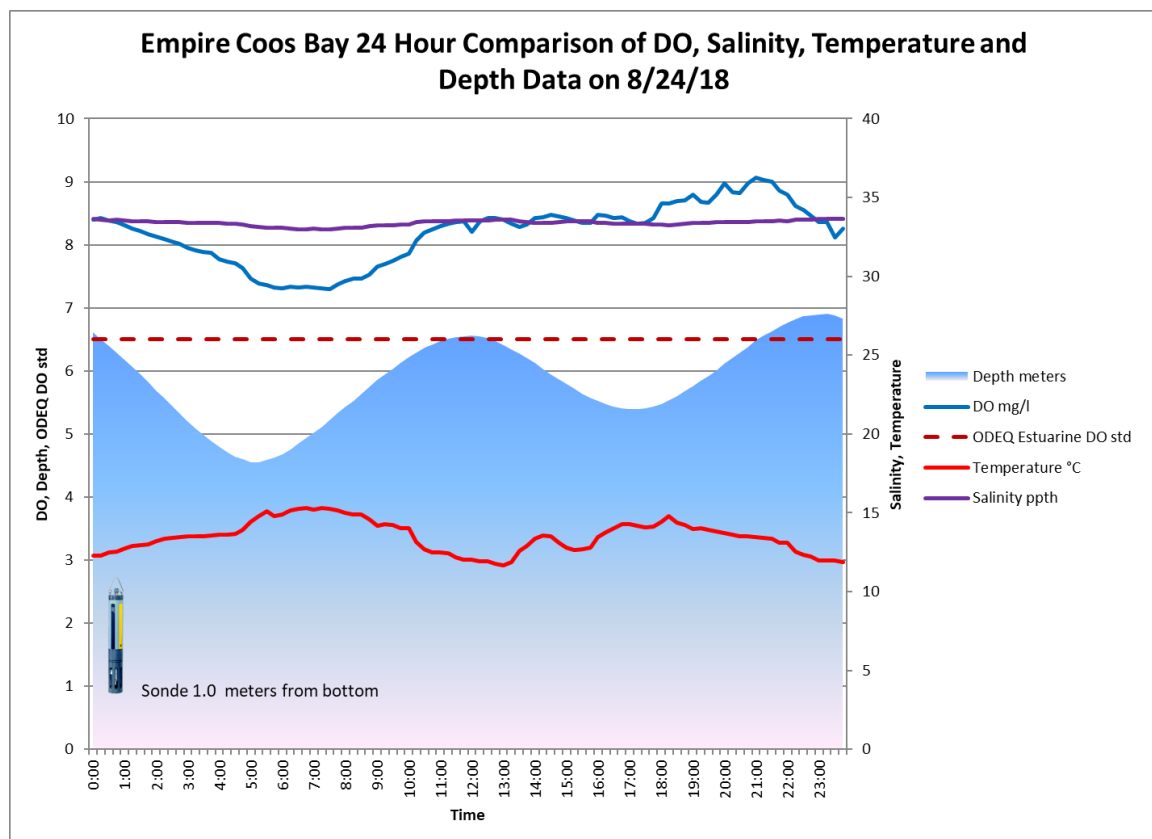
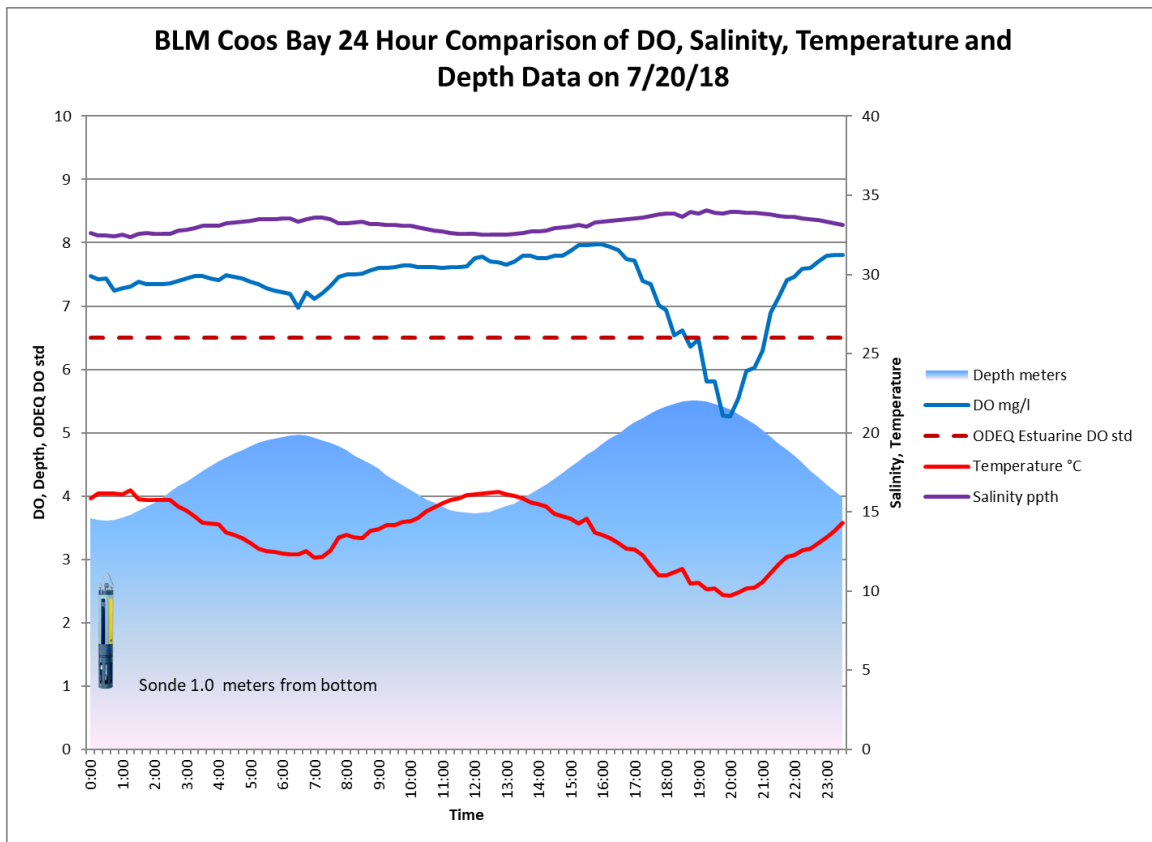




The following charts display discrete dissolved oxygen, temperature and salinity data collected by our program for Water Year 2018. These charts show a relationship between increasing water temperature and declining dissolved oxygen levels.

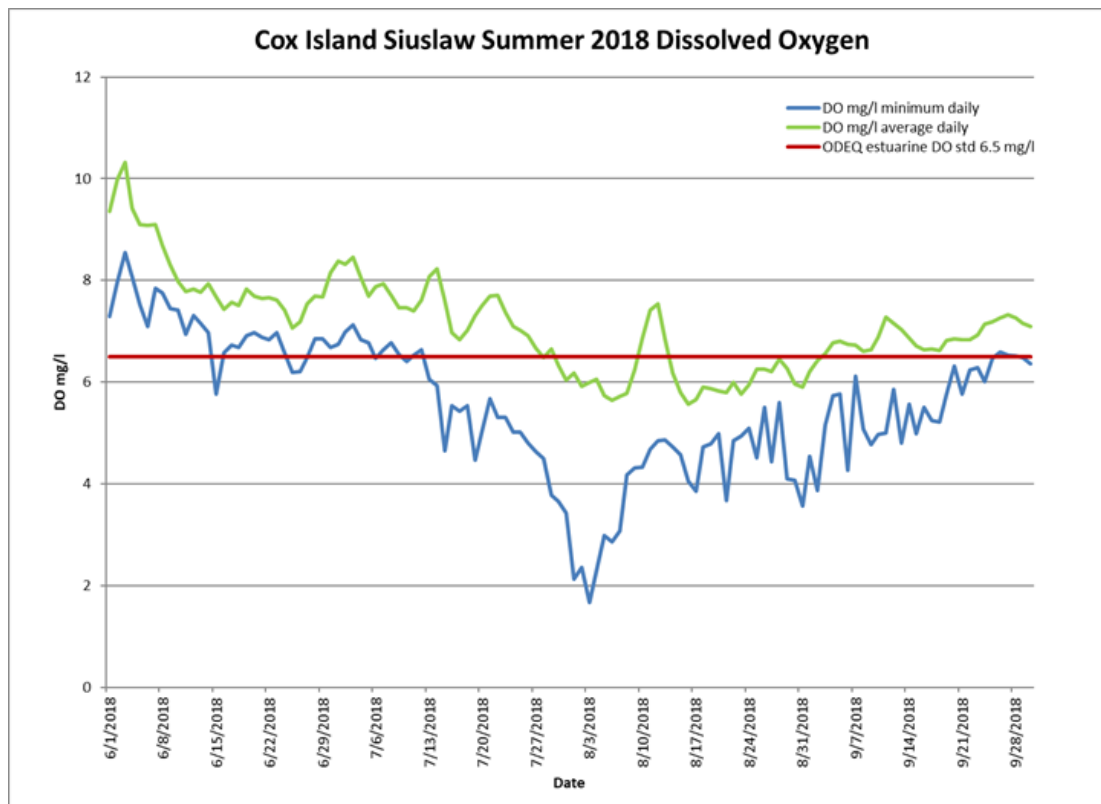
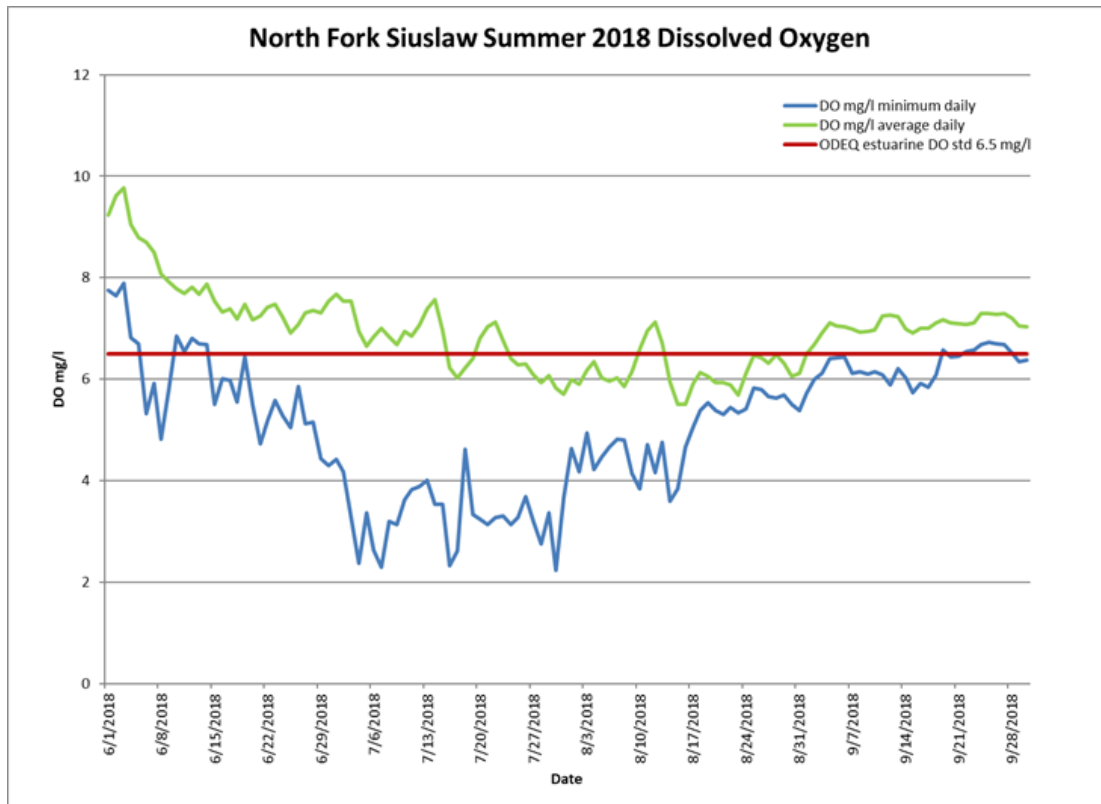


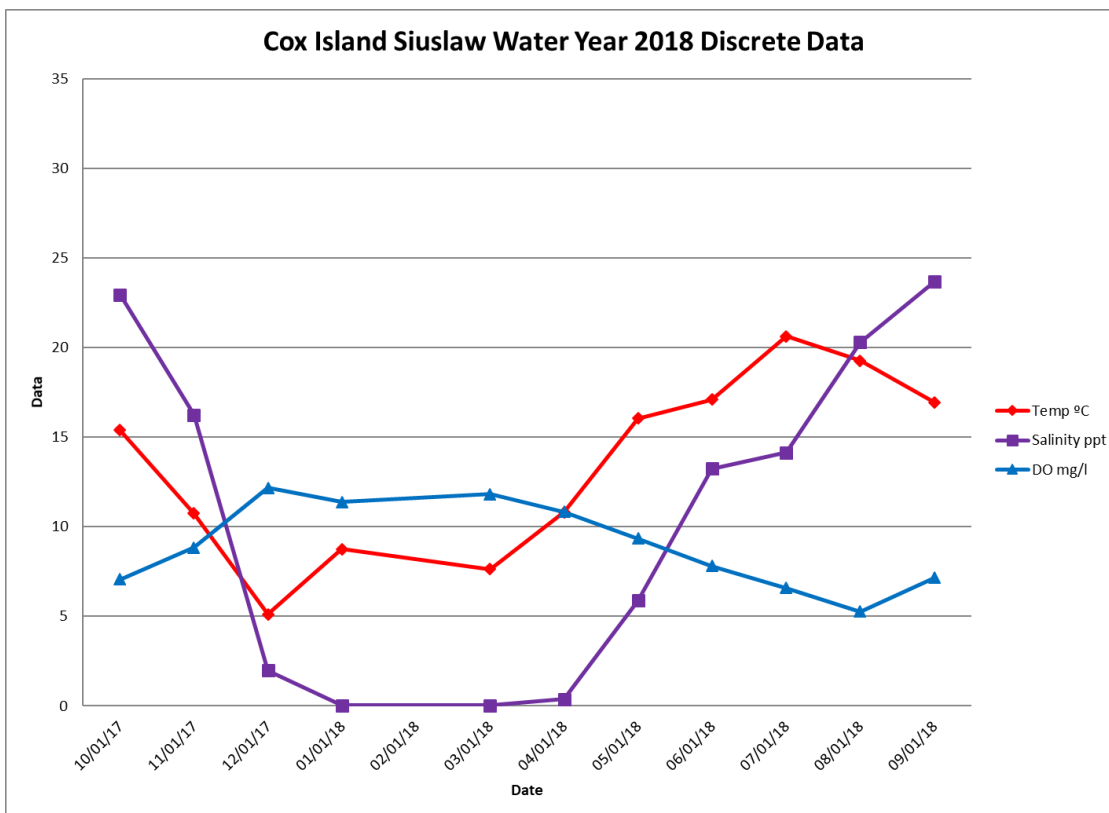
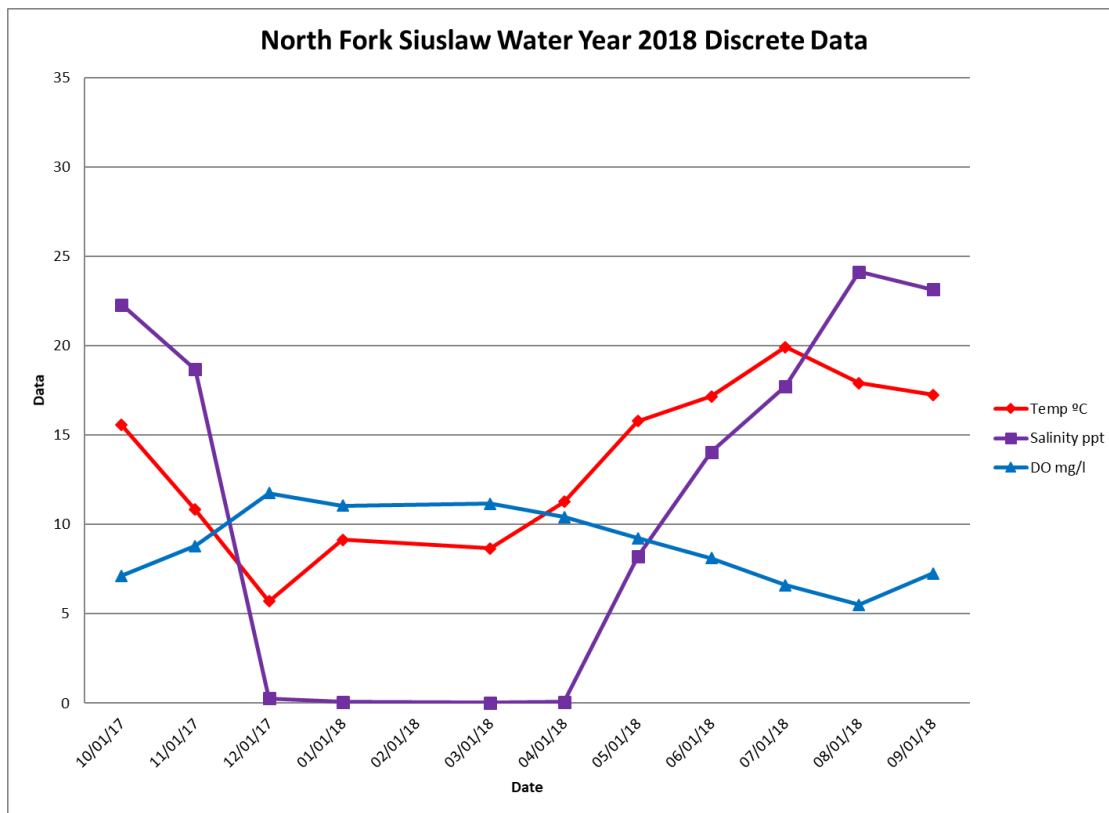
The following charts show the tidal influence in the Coos Bay estuary on select water quality measurements over a 24-hour period on selected days in 2018. The influx of marine water during incoming tides is usually associated with decreasing temperatures and increases in dissolved oxygen as seen at the Empire site. However, the BLM site for this particular selected day appears to be experiencing upwelling of oxygen poor water, resulting in low dissolved oxygen concentrations.



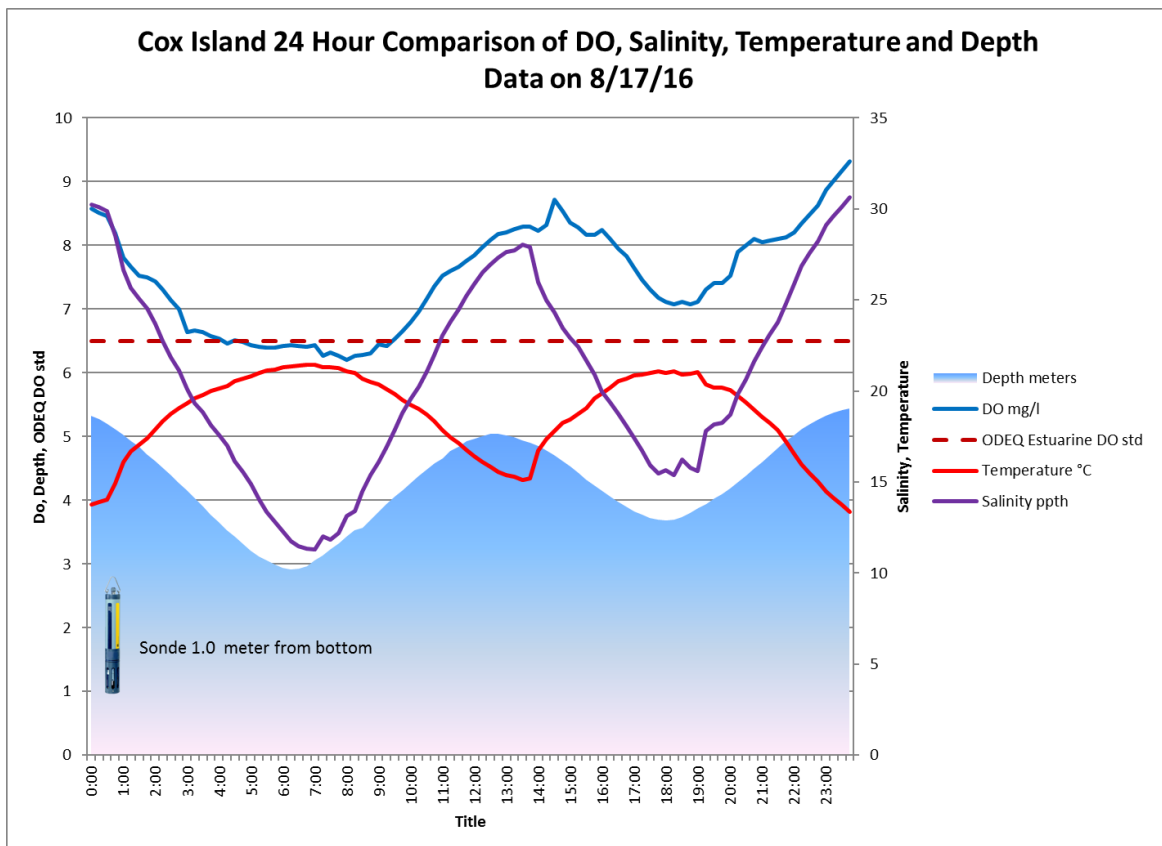
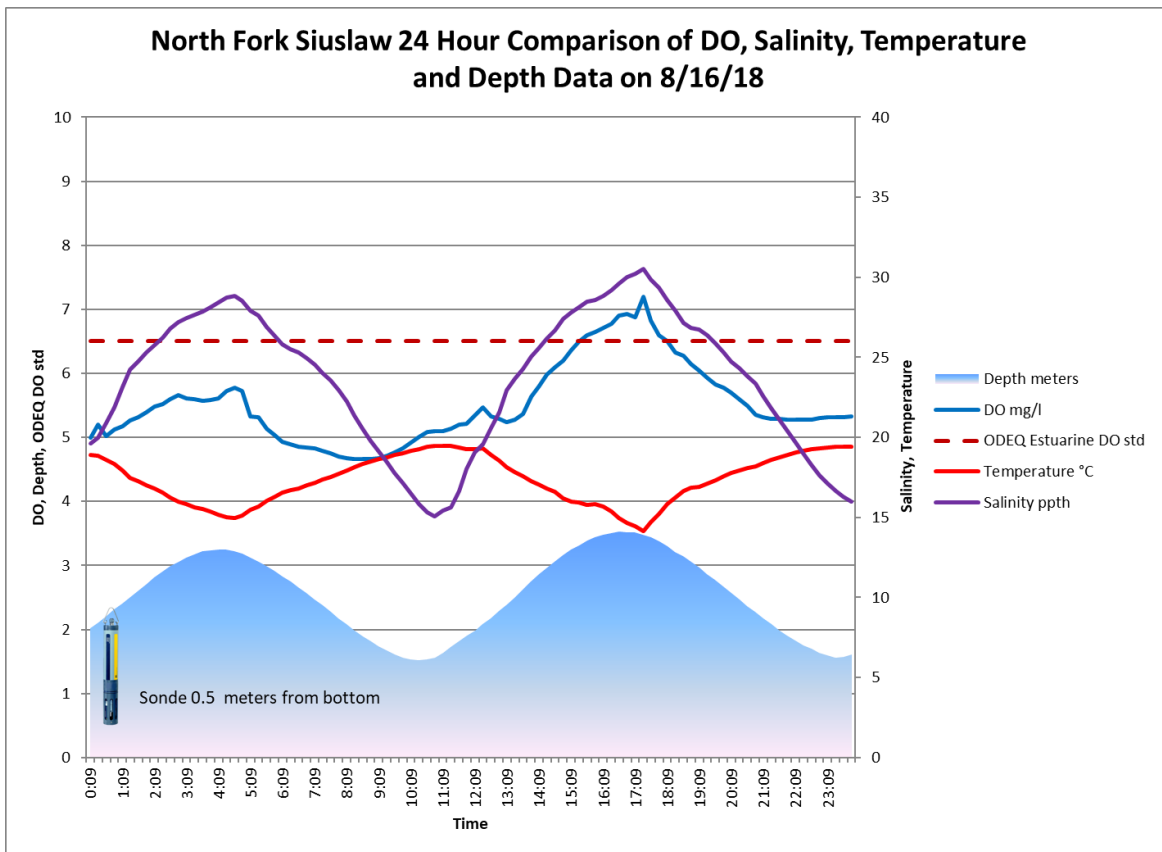
### North Fork Siuslaw and Cox Island Sites – Lower Siuslaw Estuary:

Discrete and continuous dissolved oxygen data collected by the Tribes' Integrated Water Quality Monitoring Program at the North Fork and Cox Island stations indicate that the concentration of dissolved oxygen at these sites consistently declines every year beginning in late spring/early summer through fall. The following charts display dissolved oxygen, temperature and salinity data collected by our program for Water Year 2018. These graphs show a relationship between increasing water temperature and declining dissolved oxygen levels.





The following charts show the tidal influence in the Siuslaw estuary on select water quality measurements over a 24 hour period on selected days in 2018. The influx of marine water during incoming tides is associated with decreasing temperatures and increases in salinity and dissolved oxygen.



### C. Summary of the Extent of Waters that Meet Designated Uses or Tribal Goals

BENEFICIAL USES	MISERY CREEK	MAINSTEM SIUSLAW RIVER	NORTH FORK SIUSLAW RIVER	KENTUCK SLOUGH	COOS RIVER	SIXES RIVER	TENMILE LAKE
PRIMARY HUMAN CONTACT/CULTURAL AND CEREMONIAL USES	NOT ENOUGH DATA TO DETERMINE	NOT FULLY SUPPORTED	NOT FULLY SUPPORTED	NOT ENOUGH DATA TO DETERMINE	NOT FULLY SUPPORTED	NOT FULLY SUPPORTED	NOT ENOUGH DATA TO DETERMINE
SECONDARY HUMAN CONTACT	NOT ENOUGH DATA TO DETERMINE	NOT ENOUGH DATA TO DETERMINE	NOT ENOUGH DATA TO DETERMINE	NOT ENOUGH DATA TO DETERMINE	NOT ENOUGH DATA TO DETERMINE	NOT ENOUGH DATA TO DETERMINE	NOT ENOUGH DATA TO DETERMINE
RESIDENT FISH AND AQUATIC LIFE	NOT ENOUGH DATA TO DETERMINE	NOT FULLY SUPPORTED	NOT FULLY SUPPORTED	NOT ENOUGH DATA TO DETERMINE	NOT FULLY SUPPORTED	NOT FULLY SUPPORTED	NOT FULLY SUPPORTED
ANADROMOUS FISH PASSAGE	NOT ENOUGH DATA TO DETERMINE	NOT FULLY SUPPORTED	NOT FULLY SUPPORTED	NOT ENOUGH DATA TO DETERMINE	NOT FULLY SUPPORTED	NOT FULLY SUPPORTED	NOT FULLY SUPPORTED
SHELLFISH GROWING/HARVESTING	N/A	NOT ENOUGH DATA TO DETERMINE	N/A	N/A	NOT ENOUGH DATA TO DETERMINE	N/A	N/A

### D. Description of Why Waters are Potentially Not Meeting Designated Uses or Goals

#### North Fork Siuslaw

#### **Temperature and Dissolved Oxygen – Resident Fish and Aquatic Life; Anadromous Fish Passage**

The North Fork Siuslaw River underwent high summer and early fall temperatures accompanied by regular minimum dissolved oxygen readings that do not meet the ODEQ Estuarine Standard of 6.5 mg/l. The riparian habitat upstream of the site is highly disturbed and lacking in shade producing canopy. The lack of shade provided in the upstream riparian corridor likely contributes to the high summer and early fall temperatures recorded at the North Fork Siuslaw Sonde site. Elevated temperature likely contributes to the low dissolved oxygen levels recorded at the site. Mechanisms for lower summer DO, related to increasing temperature, include lower mg/l at saturation, increasing salinity, lower turbulence and increased biological demands.

#### **Nitrogen– Resident Fish and Aquatic Life; Anadromous Fish Passage; Primary Human Contact/Cultural and Ceremonial Uses**

The North Fork Siuslaw River experienced total nitrogen levels that exceeded the Tribes' adopted standard of > 200 ug/L for marine waters. These high levels of nitrogen could be contributing to low dissolved oxygen levels that are observed during the summer and early fall as well as accelerated algae growth that could potentially affect primary human contact/cultural and ceremonial uses if those particular algal species in question produced toxins that affected designated uses.



## **Cox Island**

### **Temperature and Dissolved Oxygen – Resident Fish and Aquatic Life; Anadromous Fish Passage**

The Mainstem Siuslaw River experienced prolonged high summer and early fall temperatures that exceeded the ODEQ summer/early fall water temperature standard for salmon and trout rearing and migration (18°C) accompanied by decreasing dissolved oxygen readings that do not meet the ODEQ Estuarine Standard of 6.5 mg/l. The riparian at this site as well as up and downstream has been highly disturbed and lacks shade producing canopy. The lack of shade likely contributes to the high summer and early fall temperatures recorded at the Cox Island Sonde site. Elevated temperature likely contributes to the low dissolved oxygen levels recorded at the site. Mechanisms for lower summer DO, related to increasing temperature, include lower mg/l at saturation, increasing salinity, lower turbulence and increased biological demands.

## **North Tenmile Lake**

### **Temperature– Resident Fish and Aquatic Life; Anadromous Fish Passage**

The Camp Easter Seals Dock site withstood high temperatures during the summer and early fall. Temperatures at times peaked at above lethal levels (25°C), which suggests that dissolved oxygen levels may not be adequate to support resident fish and aquatic or salmonid and petromyzontid fish spawning and rearing. More research is warranted.

### **Nutrients– Resident Fish and Aquatic Life; Anadromous Fish Passage; Primary Human Contact/Cultural and Ceremonial Uses**

North Tenmile Lake experienced high early fall total nitrogen levels that exceeded the Tribes' adopted standard of >750 ug/L for fresh waters and high total phosphorus levels that exceeded the Tribes' adopted standard of >25 ug/L for lakes/reservoirs. The Camp Easter Seals Dock site also did not meet the Tribes' adopted standard of >15 ug/L for lakes without thermal stratification for chlorophyll *a* during the early fall. These high levels of nutrients could be expediting eutrophication and contributing to low dissolved oxygen levels. High levels of nutrients have also been accelerating toxin producing algal blooms (*Microcystis Spp*), which has greatly impacted the Tribes' designated uses for this particular waterbody, especially primary human contact/cultural and ceremonial uses.

## **Coos Bay**

### **Temperature and Dissolved Oxygen – Resident Fish and Aquatic Life; Anadromous Fish Passage**

The Coos Bay Estuary bore relatively lower summer and early fall temperatures as compared to the Siuslaw River. However, dissolved oxygen levels were lower than previous years. Lower dissolved oxygen levels in the bay may be the result of summer upwelling events where oxygen poor waters infiltrate the bay during high tides.

### **Nitrogen– Resident Fish and Aquatic Life; Anadromous Fish Passage; Primary Human Contact/Cultural and Ceremonial Uses**

The Empire Docks site experienced high total nitrogen levels that exceeded the Tribes' adopted standard of > 200 ug/L for marine waters. These high levels of nitrogen could be contributing to low dissolved oxygen levels that are observed during the summer and early fall. More research is warranted.

## **Sixes River**

### **Temperature – Resident Fish and Aquatic Life; Anadromous Fish Passage**

Historically, the Sixes River site has combated predictively high summer and early fall temperatures that peak at lethal levels (25°C). Although located in a completely different watershed, riparian conditions at this site are similar to those found upstream of the North Fork Siuslaw Sonde site discussed above. Lack of shade provided in the upstream riparian corridor likely contributes to the high summer and early fall temperatures recorded at the Tribes' Sixes River monitoring site, which suggests that dissolved oxygen levels may not be adequate to support resident fish and aquatic or salmonid and petromyzontid fish spawning and rearing. More research is warranted.

## **IV. Discussion of Issues of Tribal Concerns**

### **Data Gaps**

#### **Dissolved Oxygen**

In order to better understand the cause of low summer dissolved oxygen levels, the Tribes are planning to collect diel nutrient and Chlorophyll samples where plausible. The expected result of these sampling events is a better understanding of whether the summertime low dissolved oxygen levels are potentially associated with algae production that may be caused by nutrient loading.

#### **Nutrients**

A more robust nutrient and phytoplankton/harmful algal bloom monitoring program will need to be instituted to determine if nutrients are a contributing factor to HAB's resurgence in the last 3 years.

#### **Conclusion**

Data collected by our program in the 2018 water year appears to indicate that trends are occurring at our sites similar to those observed by our program in previous years. Daily impairments to water quality (e.g. temperature and dissolved oxygen) continue to occur during the Dry Season. Temperature trends are showing lower lows and higher highs as time progresses, especially for the North Fork water quality monitoring site. Also, nutrients appear to be increasing dramatically compared to years passed.

## **V. Water Quality Data Submission**

Water Quality data (continuous- datalogger/sonde and discrete-grabs) for WY2018 is being formatted for submission. Continuous data will not be uploaded due to the size of data sets. The Tribes will provide the raw QC'd data by request. The discrete-grab data will be uploaded to WQX. Nutrient, Chlorophyll, and bacteria data for WY2018 will be uploaded via WQX by June 2019.