

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



Date issued: Sept. 2011

Time period this report covers: October 2009 – September 2010

Tribal contact: Howard Crombie, Director Department of Natural Resources

phone: 541.888.7511

email: hrcrombie@ctclusi.org

Contents

I. Introduction	3
Atlas of Tribal Water Resources	3
II. Water quality monitoring program and assessment methods	4
III. Data Analysis Results	14
IV. Discussion of Issues of Tribal Concern	32
 Appendix A: Results of Routine 106 Monitoring Program Monthly Bacteria Data	 34
Appendix B: QA/QC	36

I. Introduction

This assessment report focuses on data collected by the Tribes' intermediate 106 water quality monitoring program in waters of or pertaining to the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians' (CTCLUSI) reservation or other Tribal lands.

Environmental issues within the Tribes' ancestral watersheds can take many years to develop or may have an immediate impact on our natural and cultural resources. The Tribes' Department of Natural Resources (DNR) overarching goal is to continuously strengthen and modify the Tribes' capacity to develop and sustain environmental programs that address environmental issues pertaining to Tribal lands and watersheds. Below is a broad list of environmental issues occurring within the Tribes' ancestral watersheds, in no particular order of importance.

- Downward trend of salmonid returns and habitat.
- Environmental impacts linked to natural resource extraction.
- Water quality degradation due to point and non-point water pollution.
- Urban and industrial discharges.
- Environmental changes attributed to climate change.
- Spreading of existing and new invasive species.
- Toxins within water, sediment, and traditional foods.
- Maritime spill response and impacts to traditional foods.

Atlas of Tribal Water Resources

Waterbody Type	Count	Size	Unit
Stream/Creek/River	1	0.72	Miles
Lake/Reservoir/Pond	1	54.4	Acres
Ocean Coast	1	2.09	Miles
Tidal Wetlands	2	5.03	Acres

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

- CTCLUSI Reservation and Tribal lands total approximately 358.74 acres.
- This land base includes approximately 1.69 acres of tidelands and 2.09 miles of shoreline.
- Tribal lands are dispersed among three different 4th field HUC watersheds.
 - Sixes: 300,331 acres
 - Coos: 471,477 acres
 - Siuslaw: 496,417 acres
- Waters located on Tribal property consist of:
 - 0.72 miles of rivers and streams.
 - 54.4 acres of lakes
 - 3.34 acres of wetlands, excluding tidelands.
 - One major potable aquifer system is located on the Tribes' Florence, Oregon Reservation. This system is drawing water from the North Florence Dunal Aquifer, an EPA designated sole source aquifer.

II. Water quality monitoring program and assessment methods

A. Introduction

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

B. Monitoring Program Overview

Water quality monitoring is conducted by the CTCLUSI Department of Natural Resources (DNR) staff and is implemented according to the program's EPA approved [QAPP](#).

During the 2010 water year, the Tribes' water quality monitoring program continued to collect baseline estuarine water quality monitoring data at three fixed 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 quality monitoring program implements a combination of 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](#)').

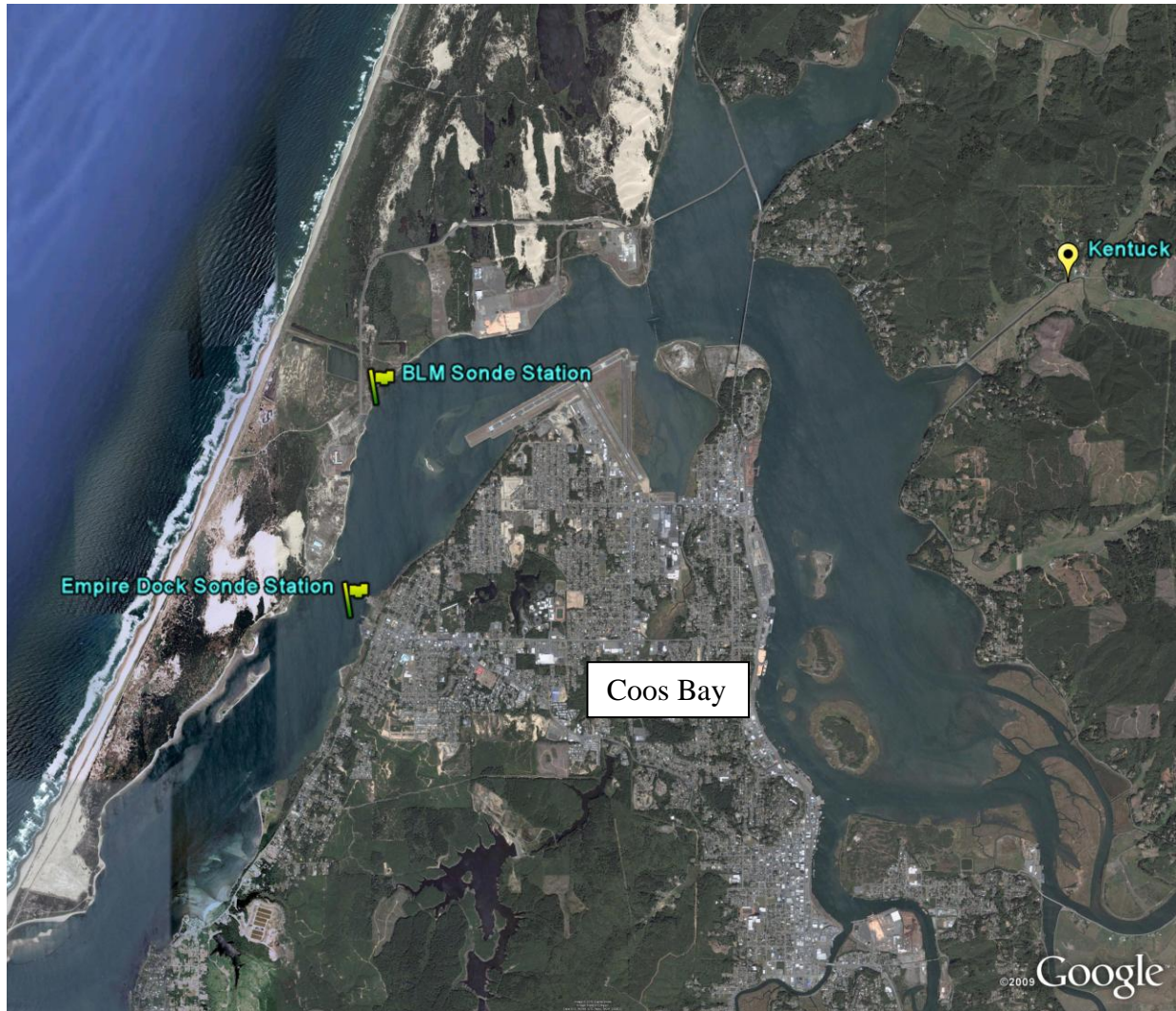
The Tribes' water quality monitoring program also collects discrete water quality data on an annual to quarterly basis (as staff and resources allow) at one freshwater site (Sixes River, located within the Sixes River watershed in Curry County) and one upper estuarine site (Kentuck Slough, located within the Coos watershed lowlands). Protocols implemented for the collection of these data are primarily those outlined in the Oregon Department of Environmental Quality (ODEQ) '[Watersheds Assessment Field Sampling SOP's](#)'.

Monitoring Locations:

Waterbody Name	Lat./Long	Parameters monitored	Monitoring frequency	303d List Parameter(s)
Coos River, Lower Bay – Coos Watershed	43° 24' 50" N 124° 16' 44" W	Field Measurements: Water Temperature, Dissolved Oxygen, Salinity/SpCond, pH, Turbidity, and Depth	Year Round: 15 minute intervals	Parameter: Fecal Coliform Season: Year Around Listed: 2004 Beneficial Use(s): Shellfish growing Status: Water quality limited, 303(d) listed, TMDL needed
		Laboratory: Bacteria (<i>e.coli</i> and enterococci)	Monthly	
		Laboratory: Nutrients (TN and TP)	Annually to Quarterly (as staff and resources allow)	
Coos River, Lower Bay – Coos Watershed	43° 23' 39.19" N 124° 16' 49.42" W	Field Measurements: Water Temperature, Dissolved Oxygen, Salinity/SpCond, pH, Turbidity, and Depth	Year Round: 15 minute intervals	Parameter: Fecal Coliform Season: Year Around Listed: 2004 Beneficial Use(s): Shellfish growing Status: Water quality limited, 303(d) listed, TMDL needed
		Laboratory: Bacteria (<i>e.coli</i> and enterococci)	Monthly	
		Laboratory: Nutrients (TN and TP)	Annually to Quarterly (as staff and resources allow)	
North Fork Siuslaw River – Siuslaw Watershed	43° 58' 40" N 124° 04' 48" W	Field Measurements: Water Temperature, Dissolved Oxygen, Salinity/SpCond, pH, Turbidity, and Depth	Year Round: 15 minute intervals	Parameter: Sedimentation Season: Undefined Listed: 1998 Beneficial Use(s): Resident fish and aquatic life , Salmonid fish rearing, Salmonid fish spawning Status: 303(d) Parameter: Temperature Season: Year Around (non-spawning) Listed :2004 Beneficial Use(s): Salmon and trout rearing and migration Status: Water quality limited, 303(d) list, TMDL needed.
		Laboratory: Bacteria (<i>e.coli</i> and enterococci)	Monthly	
		Laboratory: Nutrients (TN and TP)	Annually to Quarterly (as staff and resources allow)	
North Fork Siuslaw River – Siuslaw Watershed	43° 58' 33.0234 N -124° 3' 41.6124 W	Field Measurements: Water Temperature, Dissolved Oxygen, Salinity/SpCond, pH, Turbidity, and Depth		Parameter: Sedimentation Season: Undefined Listed: 1998 Beneficial Use(s): Resident fish and aquatic life , Salmonid fish rearing, Salmonid fish spawning Status: 303(d) Parameter: Temperature Season: Year Around (non-spawning) Listed :2004 Beneficial Use(s): Salmon and trout rearing and migration Status: Water quality limited, 303(d) list, TMDL needed.
		Laboratory: Bacteria (<i>e.coli</i> and enterococci)	Monthly	
		Laboratory: Nutrients (TN and TP)	Annually to Quarterly (as staff and resources allow)	
Sixes River – Sixes Watershed	42° 48' 39.5" N 124° 26' 43.3" W	Laboratory: Nutrients (TN and TP) and Macroinvertebrates	Annually to Quarterly (as staff and resources allow)	Parameter: Dissolved Oxygen Season: Oct. 15 to May15 Listed: 2004 Beneficial Use(s): Salmon and steelhead spawning Status: Water quality limited, 303(d) listed, TMDL needed. Parameter: Temperature Season: Year Around Listed: 2004 Beneficial Use(s): Salmon and trout rearing and migration Status: Water quality limited, 303(d) list, TMDL needed.
Kentuck Slough – Coos Watershed	43° 25' 51" N 124° 10' 24.3" W	Laboratory: Nutrients (TN and TP)	Annually to Quarterly (as staff and resources allow)	Waterbody Name: Coos River 4th Field HUC Record ID: COOS 17100304 20675 LLID River Mile: Coos Bay1243397433543 7.8 to 12.3 Parameter: Fecal Coliform Season: Year Around Listed: 2004 Beneficial Use(s): Shellfish growing Status: Water quality limited, 303(d) listed, TMDL needed

C. Map of Monitoring Sites

Coos Bay Sonde Stations and Kentuck Sample Site



North Fork Siuslaw Sonde Station



Sixes River Sample Site



D. Total Extent of Waters Assessed

During the 2010 water year, our program continuously monitored baseline water quality at 3 locations on two rivers pertaining to Tribal lands (the Coos and North Fork Siuslaw River). Those data collected at the continuous monitoring stations represent approximately 75% of the total stream and 90% of the total tideland miles (approx. 0.72 miles of rivers and streams and 1.69 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 monitor any wetlands or lakes and did not collect any habitat assessment data other than macroinvertebrates due to funding and staff resource constraints.

E. 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

Designated Use	Coos River/Lower Bay	North Fork/ Mainstem Siuslaw River	Sixes River
Salmon and Trout Rearing and Migration	X	X	X
Commercial and/or Recreational Shellfish Harvesting	X	X	----
Aesthetic Quality	X	X	X
Water Contact Recreation	X	X	X

CTCLUSI does not yet have Tribal or EPA approved water quality standards. Therefore, our program primarily refers to ODEQ water quality standards to evaluate water quality data generated by our monitoring program. In addition to ODEQ criteria, our program refers to the Oregon Watershed Enhancement Board (OWEB) recommended indicator criteria to evaluate total nitrogen, total phosphorus and turbidity data generated by the Tribes' 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			
Aquatic Life	Temp*	D.O.	Turbidity	pH
Salmon and Trout Rearing and Migration	Summer and Early Fall Not greater than 18° C 7-day max daily average	For estuarine water, the dissolved oxygen concentrations may not be less than 6.5 mg/l (for coastal water bodies)	Indicator: 50 NTU maximum above background	6.5 - 8.5
	Citation			
	OAR 340-041-0028: WATER POLLUTION DIVISION 41 WATER QUALITY STANDARDS: BENEFICIAL USES, POLICIES, AND CRITERIA FOR OREGON	OAR 340-041-0016: ibid	OWEB Watershed Assessment Manual	OAR 340-041-0021; 0225 (b);0305 (a): ibid
Water Contact	Enterococci organism levels			
Recreational Uses	No more than 158 colony forming units (158 MPN) per 100 milliliters of marine water			
	Citation			
	Oregon Department of Human Services			
	e.coli organism levels			
	126 E. coli/100 ml (30-day log mean—minimum 5 samples) 406 E. coli/100 ml (no single sample can exceed the criteria)			
	Citation			
	OAR 340-041-0009: WATER POLLUTION DIVISION 41 WATER QUALITY STANDARDS: BENEFICIAL USES, POLICIES, AND CRITERIA FOR OREGON			
Aesthetics	Nutrients		Turbidity	
	Total Phosphorus Evaluation Criteria: greater than 0.05 mg/l Total Nitrate Evaluation Criteria: greater than 0.30 mg/l		Indicator Criteria: Background < 50 NTU + 5 NTU or more Indicator Criteria: Background > 50NTU + 10% or more	
	Citation			
	OWEB Watershed Assessment Manual			

* 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 water quality monitoring data are for the 2010 water year (unless otherwise indicated) and are presented in tabular format.

Lower Coos Surface Water Quality Monitoring Data for Water Year 2010
(Oct 2009 to Sept 2010)*

BLM Sonde Station Discrete Data Summary **							
BLM Grabs Wet Season: 10/01/2009 to 05/31/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	11.20	35.16	22.21	100.98	9.64	7.80	3
Median	11.61	41.86	26.65	98.6	9.04	7.75	2
Minimum	9.89	26.25	16.04	96.70	8.80	7.52	2
Maximum	12.83	49.40	32.26	104.40	10.28	8.20	4
Count	5	5	5	5	5	5	5
BLM Grabs Dry Season: 06/01/2010 to 09/30/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	14.25	45.23	29.29	89.17	7.64	7.71	3
Median	14.3	44.1	28.48	90.8	7.78	7.7	3
Minimum	14.06	42.49	27.32	79.4	6.68	7.64	2
Maximum	14.39	49.09	32.08	97.3	8.46	7.79	5
Count	3	3	3	3	3	3	3
BLM Sonde Station Continuous Data Summary **							
BLM Sonde Wet Season: 10/01/2010 to 05/31/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	11.05	42.05	26.98	96.28	8.92	7.74	6
Median	10.97	42.94	27.52	97.9	9.04	7.79	3
Minimum	5.34	15.11	8.81	68.4	6.33	7.26	0.10
Maximum	15.19	61.82	41.27	132.8	12.38	8.07	956
Count	23324	23324	23324	19391	19391	20004	23297
BLM Sonde Dry Season: 06/01/2010 to 09/30/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	13.45	45.09	29.19	94.15	8.24	7.82	101
Median	13.85	47.24	30.72	94.80	8.45	7.81	5
Minimum	8.05	16.62	9.8	61.00	5.31	7.38	-1
Maximum	17.83	51.80	33.84	112.30	10.04	8.26	999
Count	11708	11708	11708	4320	4320	6294	7515

* Values in bold represent exceedences in maximum single values but are generally considered to be possible anomalies attributable to seasonal extremes (temp) or localized conditions (turbidity). ** 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 Bay Surface Water Quality Monitoring Data for Water Year 2010
(Oct 2009 to Sept 2010)*

Empire Dock Sonde Station Discrete Data Summary **							
Empire Grabs Wet Season: 10/01/2009 to 05/31/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	11.04	38.33	24.37	102.08	9.64	7.85	3
Median	11.33	35.53	22.36	102.90	9.90	7.77	2
Minimum	9.98	30.72	19.05	96.50	8.84	7.69	2
Maximum	11.78	50.18	32.77	106.10	10.19	8.04	4
Count	5	5	5	5	5	5	5
Empire Grabs Dry Season: 06/01/2010 to 09/30/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	13.51	45.85	29.72	90.03	7.80	7.76	3
Median	13.41	8.18	94	29.32	45.3	7.8	3
Minimum	12.99	42.48	27.32	80.1	6.86	7.67	2
Maximum	14.14	49.76	32.53	96	8.34	7.82	5
Count	3	3	3	3	3	3	3
Empire Sonde Station Continuous Data Summary **							
Empire Sonde Wet Season: 10/01/2009 to 05/31/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	11.01	44.03	28.35	102.4	9.44	8.09	4
Median	10.98	45.58	29.4	101.9	9.42	7.98	3
Minimum	5.81	19.32	11.49	30.5	2.8	7.41	0
Maximum	14.6	52.2	34.03	139.7	13.44	8.76	958
Count	23322	23322	23322	16071	16071	23322	23292
Empire Sonde Dry Season: 06/01/2010 to 09/30/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	12.45	47.50	30.87	80.65	7.04	7.94	7
Median	12.86	49.12	32.06	79.00	6.93	7.84	3
Minimum	8.11	25.07	15.31	43.40	3.99	7.44	-0.60
Maximum	17.4	51.79	33.77	171.80	15.78	8.67	925
Count	11709	11709	11709	9556	9556	11709	11699

* Values in bold represent exceedences in maximum single values but are generally considered to be possible anomalies attributable to seasonal extremes (temp) or localized conditions (turbidity). ** 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 Estuary Surface Water Quality Monitoring Data for Water Year 2010
(Oct 2009 to Sept 2010)*

North Fork Sonde Station Discrete Data Summary **							
North Fork Grabs Wet Season: 10/01/2009 to 05/31/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	10.74	6.33	3.96	94.8	10.33	7.70	5
Median	10.29	1.179	0.595	96.85	10.81	7.8	4
Minimum	9.64	0.072	0.03	83.2	7.66	7.09	2
Maximum	13.38	31.99	19.97	101.3	11.38	8.18	15
Count	6	6	6	6	6	6	6
North Fork Grabs Dry Season: 06/01/2010 to 09/30/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	17.37	17.79	10.71	80.00	7.23	7.20	5
Median	17.14	15.49	9.08	76.4	6.77	7.17	5
Minimum	16.15	7.69	4.23	68.8	6.02	7.07	4
Maximum	18.81	30.20	18.78	94.80	8.89	7.36	5
Count	3	3	3	3	3	3	3
North Fork Sonde Station Continuous Data Summary **							
North Fork Sonde Wet Season: 10/01/2009 to 05/31/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	10.19	9.03	5.46	98.91	10.83	7.12	6
Median	9.84	1.63	0.83	99.00	11.02	7.02	4
Minimum	0.37	0.05	0.02	58.90	5.46	6.41	0
Maximum	16.82	47.76	31.00	119.10	15.90	8.12	956
Count	23322	23322	23322	23322	23322	23322	23310
North Fork Sonde Dry Season: 06/01/2010 to 09/30/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	16.40	21.20	13.09	92.78	8.46	7.19	12
Median	16.70	22.51	13.62	90.00	7.87	7.19	3
Minimum	10.04	0.05	00.02	22.40	1.95	6.20	-1
Maximum	21.55	51.39	33.55	159.5	14.08	8.25	911
Count	11708	11708	11708	11708	11708	11708	11707

* Values in bold represent exceedences in maximum single values but are generally considered to be possible anomalies attributable to seasonal extremes (temp) or localized conditions (turbidity). ** 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.)

Cox Island Sonde Station Discrete Data Summary **							
Cox Island Grabs Wet Season: 10/01/2009 to 05/31/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	10.8	5.47	3.44	98.15	10.73	7.60	4
Median	10.04	0.66	0.39	101.4	11.35	7.26	3
Minimum	9.57	0.06	0.03	85.60	7.87	7.14	2
Maximum	14.27	28.72	18.33	103.80	11.73	8.90	6
Count	6	6	6	6	6	6	6
Cox Island Grabs Dry Season: 06/01/2010 to 09/30/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	17.62	14.96	8.81	80.40	7.31	7.21	4
Median	17.16	10.84	6.18	75.80	6.72	7.30	2
Minimum	16.32	10.76	6.12	70.20	6.21	7.00	2
Maximum	19.39	23.28	14.13	95.20	8.99	7.34	8
Count	3	3	3	3	3	3	3
Cox Island Sonde Station Continuous Data Summary **							
Cox Island Sonde Wet Season: 10/01/2009 to 05/31/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	10.67	4.90	2.87	99.69	10.91	7.06	13
Median	10.35	0.57	0.28	99.50	10.98	6.96	4
Minimum	6.99	0.04	0.02	89.90	8.57	6.36	-0.30
Maximum	15.62	43.82	28.17	109.20	12.50	8.08	977
Count	9867	9867	9867	9867	9867	9867	9862
Cox Island Sonde Dry Season: 06/01/2010 to 09/30/2010	Temp (°C)	SpCond (ms/cm)	Salinity (ppt)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/l)	pH	Turbidity (NTU)
Mean	16.00	17.21	10.53	94.26	9.05	7.32	6
Median	25.95	16.44	9.67	169.00	15.58	13.77	4
Minimum	9.84	0.05	0.02	70.00	6.06	6.48	0.20
Maximum	21.18	50.60	33.08	146.30	12.86	8.32	721
Count	17451	17451	17451	14194	14194	17451	17445

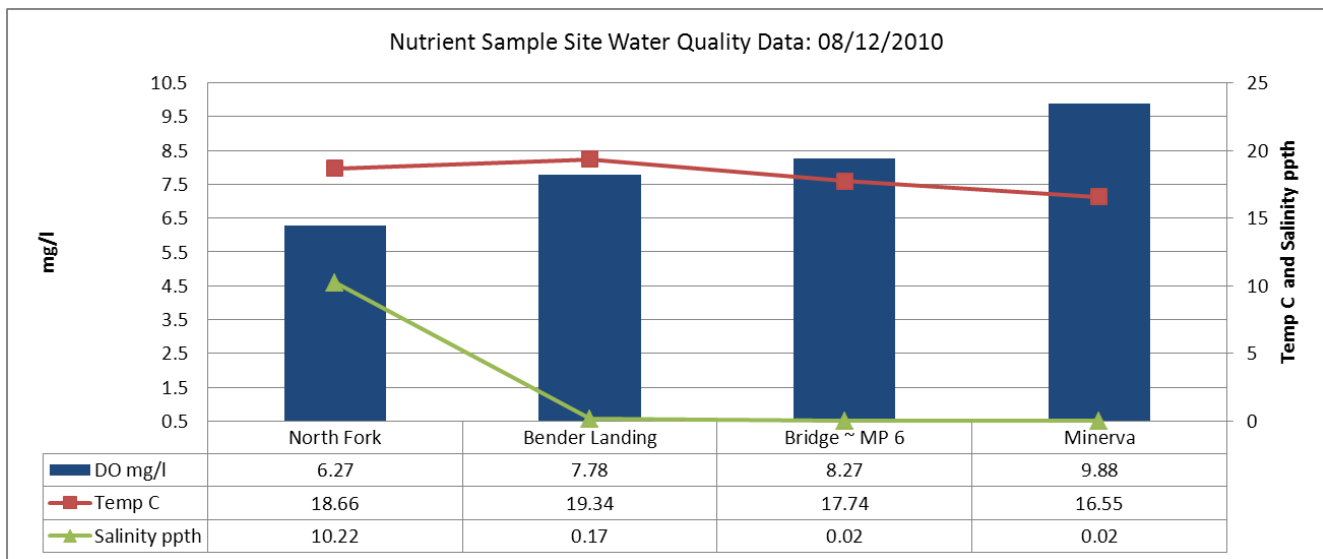
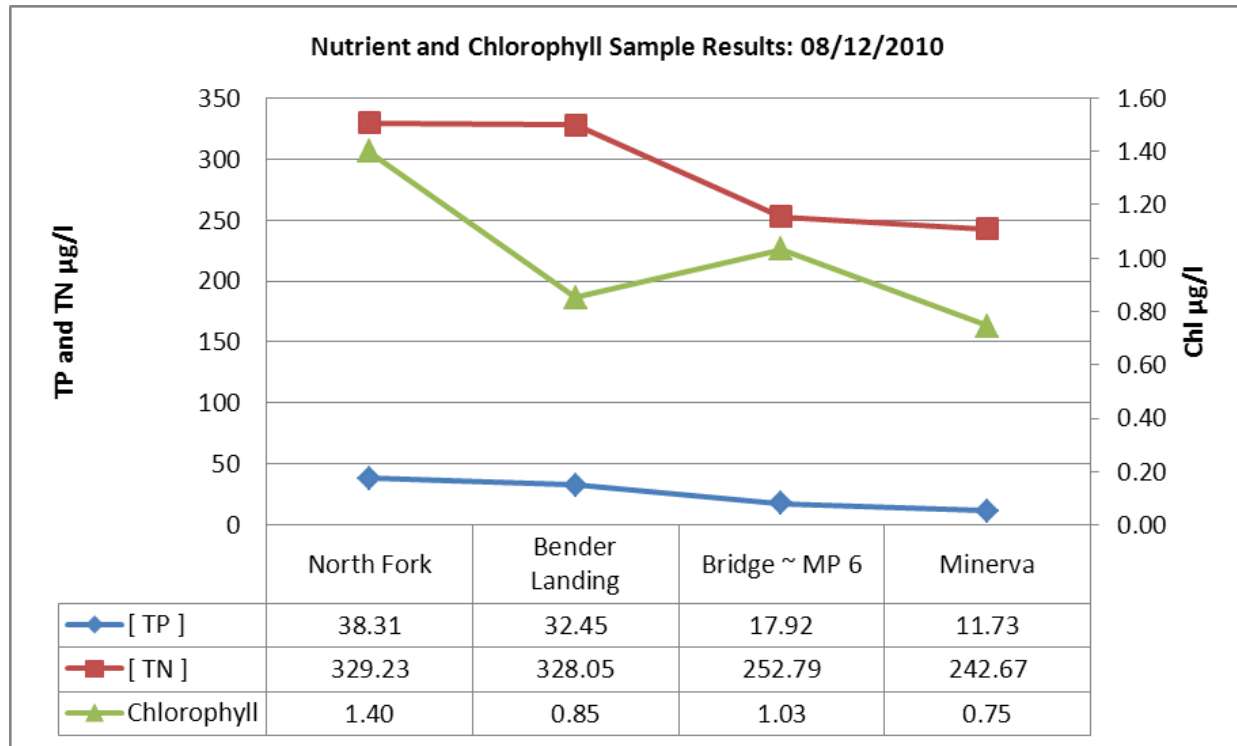
* Values in bold represent exceedences in maximum single values but are generally considered to be possible anomalies attributable to seasonal extremes (temp) or localized conditions (turbidity). ** Estuary habitat tends to have tidal (salinity/ temp) and open water characteristics (high temp/ low DO) that are not comparable to mainstem and side channel water quality parameters.

Nutrient Data – Total Nitrogen (TN) and Total Phosphorous (TP)

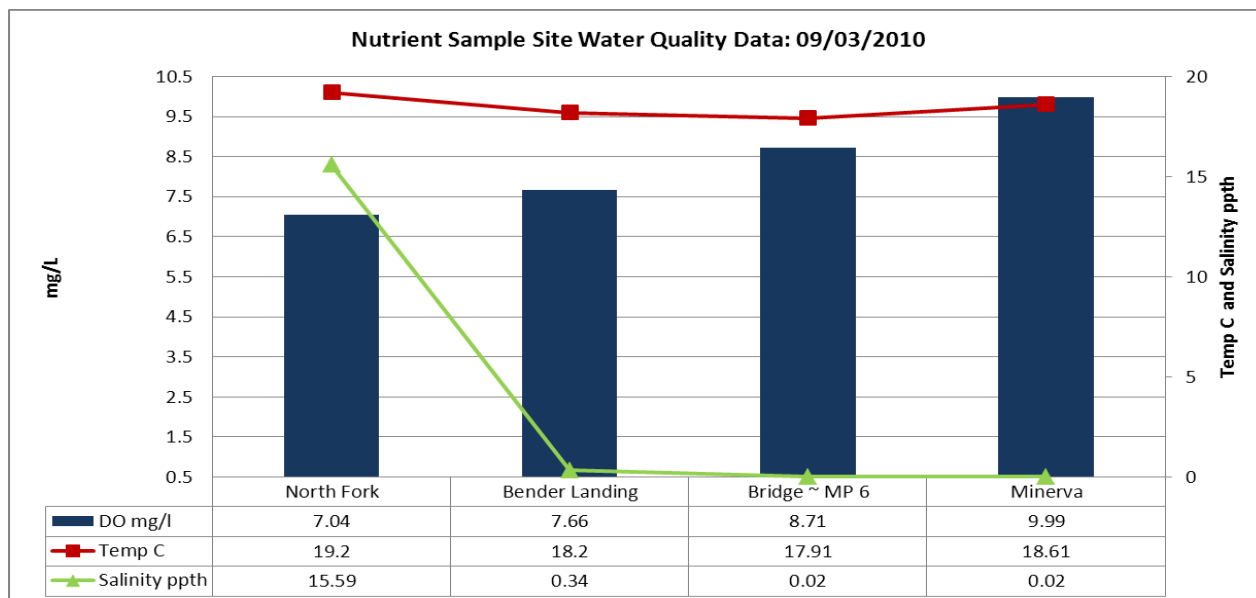
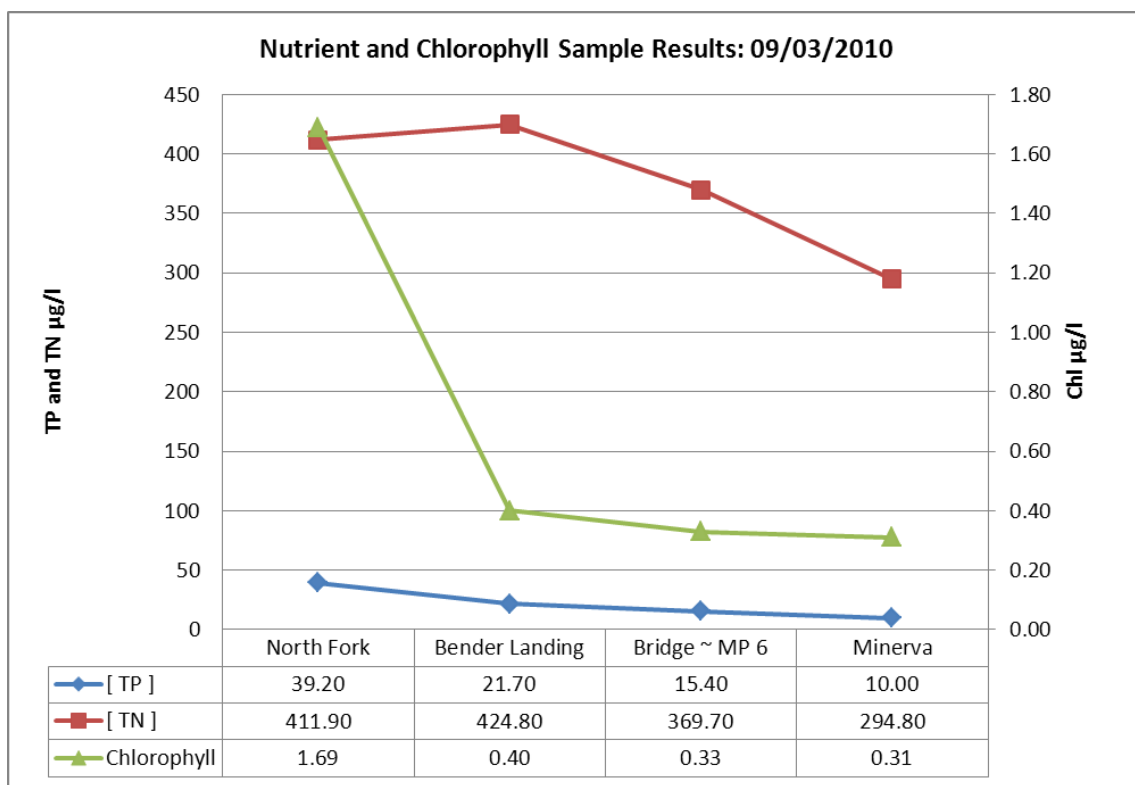
CTCLUSI water quality monitoring data collected on the North Fork Siuslaw during previous years appear to indicate that dissolved oxygen levels at this site decline during warm, dry summer months. Dissolved oxygen levels at the Tribes' North Fork site may also be impacted by algae blooms or excessive benthic macroalgae growth associated with nutrient loading. In an attempt to better understand potential impacts to dissolved oxygen that may be occurring at the Tribes' North Fork sample site, CTCLUSI water quality monitoring staff conducted intensive longitudinal nutrient sampling on the North Fork Siuslaw at the Tribes' North Fork Siuslaw Sonde site and 3 ODEQ proposed sites upriver of the Tribes' site. A map of the sample sites and the results of these sample events are below.



North Fork Siuslaw Intensive Longitudinal Nutrient Sampling Results



North Fork Siuslaw Intensive Longitudinal Nutrient Sampling Results (cont.)



Bacteria Data – Storm Sampling

Although the Tribes' water quality monitoring program has been collecting monthly bacteria samples since 2006, data generated by our program do not appear to indicate that bacteria levels at any of the Tribes' sonde station sites exceed the recreational use criteria for either e.coli or enterococcus. However, the Oregon Department of Environmental Quality (ODEQ) has collected storm related bacteria samples in upper Coos Bay, and the tributaries associated with the bay, that indicate bacteria levels in the Coos Sub Basin during significant storm events likely exceed both the fecal coliform commercial shellfish harvest standard (14 CFU) and the Oregon e.coli single grab recreational criteria (406 MPN).

Due to staff and funding constraints, the Tribes' water quality monitoring program has historically lacked the capacity to implement intensive storm sampling in the Coos Sub Basin. In 2010, the Tribes and ODEQ entered into an intergovernmental agreement for the purposes of forming a partnership with ODEQ to utilize the Tribes' technical on-the-ground and analytical 106 built capacity to implement intensive bacteria storm sampling in the Coos Sub Basin. ODEQ contracted the Tribes' water quality monitoring services to coordinate, collect, and analyze storm samples.

Historically, the Coos River and Coos Bay Estuary system have been monitored extensively by the ODEQ and the Oregon Department of Agriculture (ODA) for benefit of commercial shellfish production. The estuary supports the largest commercial shellfishery in Oregon, as well as recreational shellfish collection areas, some of which are identified by the Oregon Department of Fish and Wildlife (ODFW). Past monitoring and assessment conducted by ODEQ included both fecal coliform and *E. coli* analysis. The work performed by the Tribes' water quality monitoring staff for this project was designed to generate (a) *E. coli* data as it relates to the current water quality standard for water recreation contact and (b) fecal coliform data as it relates to the water quality standard for commercial shellfish production and consumption and recreational or subsistence harvesting.

The overall objective of this intensive storm sampling project was to better understand bacteria concentrations and associated loading in relation to precipitation levels in the Coos Sub Basin for South Coast Basin total maximum daily load (TMDL) development.

The Tribes' EPA approved Water Quality Monitoring Program QAPP Bacteria and water quality monitoring protocols were implemented for this project and the sample sites were representative of waters of or pertaining to Tribal lands.

Sample events were triggered by climatic conditions associated with predicted or actual precipitation levels. The sampling targeted a precipitation event of sufficient magnitude to result in closures to shellfish growing areas according to the ODA Upper and Lower Coos Bay Commercial Shellfish Harvesting Plan (October 2008) (1.5 inches in 24 hours or 2.5 inches in 3 days) with the intention of reflecting runoff conditions after soils reached saturation. The sample run tide times were based upon the low tides predicted by NOAA for Coos Bay or Charleston, OR. Estuary (Bay) sampling runs were conducted starting with the lower estuary sites and ending with upper estuary sites, since low tide occurs later in the upper estuary. Shoreline tributary sampling was conducted when tide gates are open and tributaries are flowing out to the Bay, concurrent to the bay boat sampling.

***The results of the Tribes' routine bacteria sampling during the 2010 water year are in Appendix A. The monthly samples collected by the Tribes' 106 water quality monitoring program were unremarkable at all sites sampled.*

Coos Sub Basin Bacteria Storm Sample Sites

Lower Coos Bay Boat Sample Sites and Tribes' Coos Bay Sonde Stations

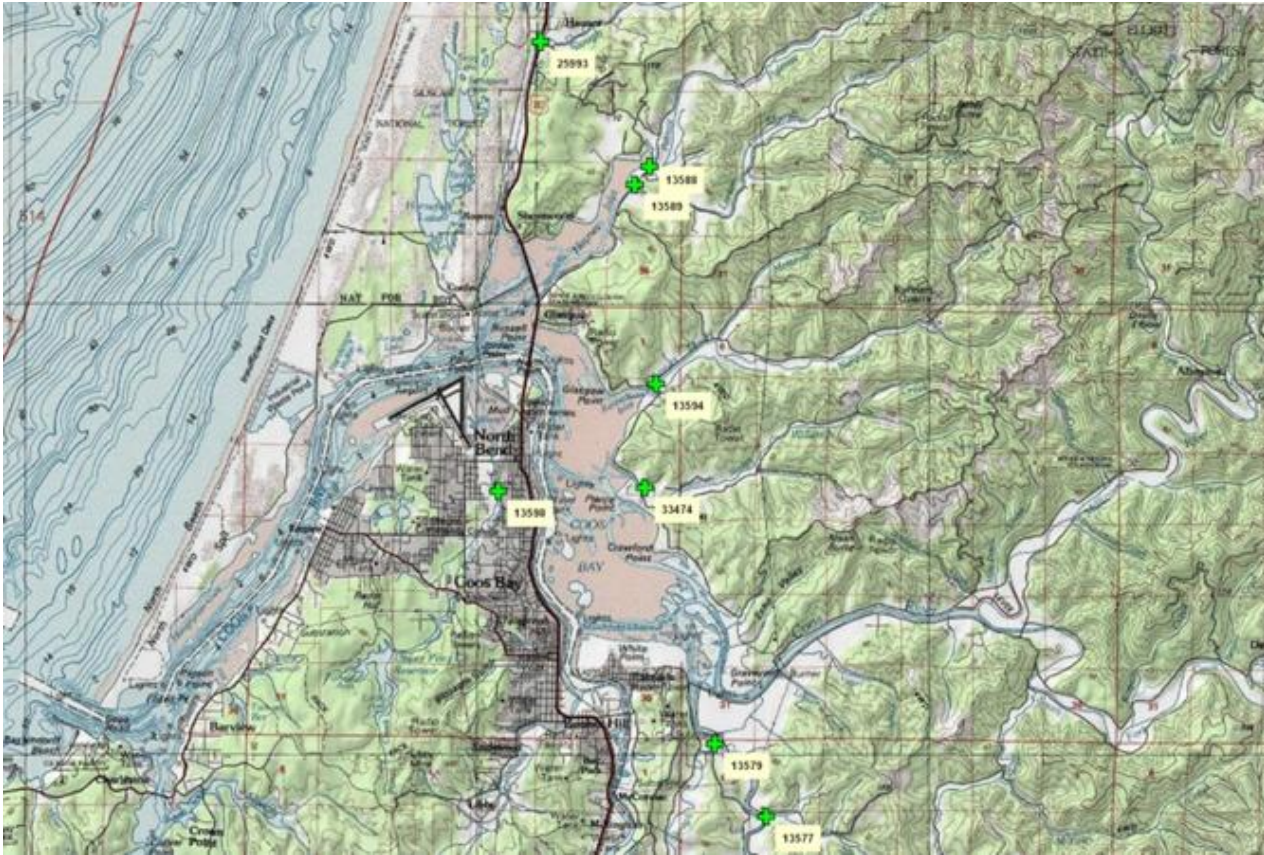


Upper Coos Bay Boat Sample Sites

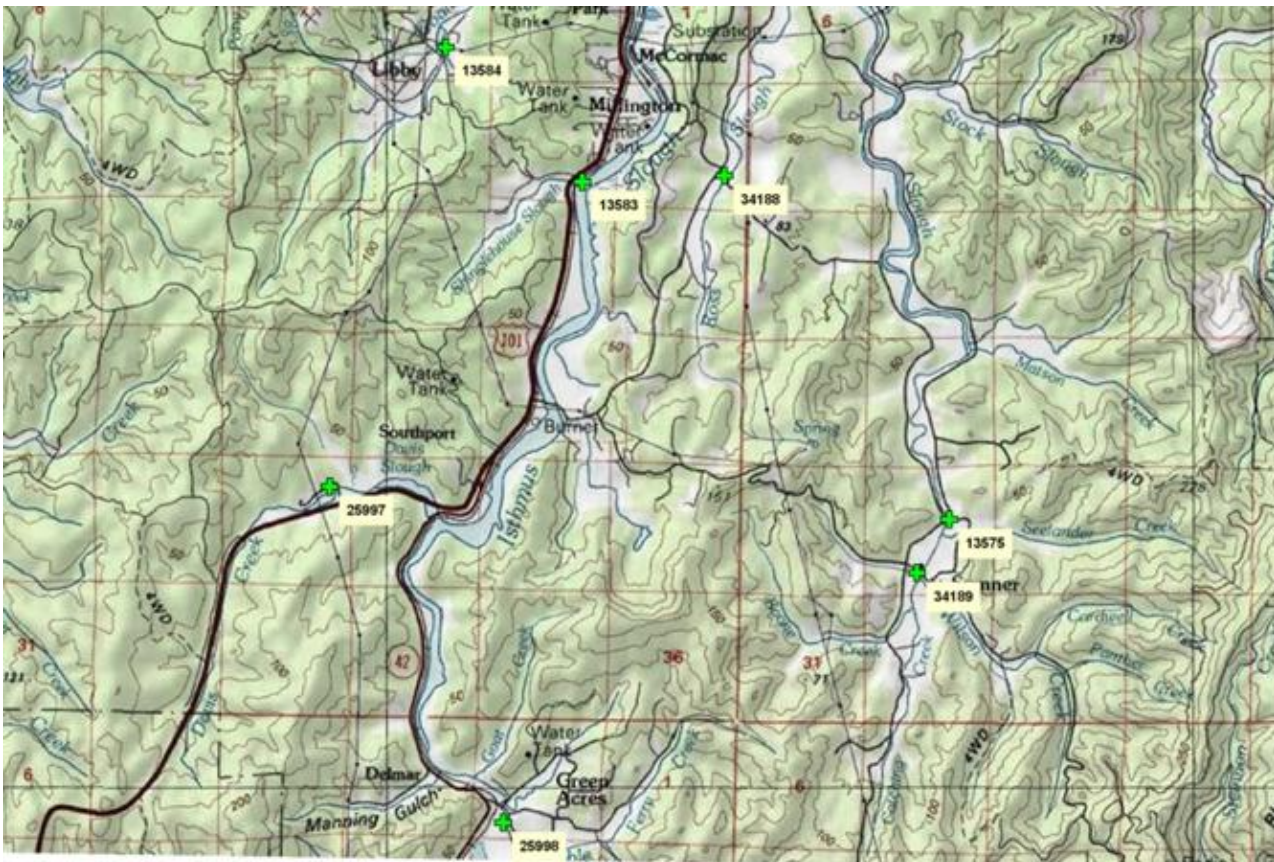


Tributary Sample Sites

North Team



South Team



Storm Sampling Results

Boat Team BacT Sample Results : 06/03 – 06/04/2010

Lower Bay Sites



Upper Bay Sites



Station Identifier	E. Coli (MPN/100 ml) 06/03/2010	Fecal coliform (CFU/100 mL) 06/03/2010	E. Coli (MPN/100 ml) 06/04/2010	Fecal coliform (CFU/100 mL) 06/04/2010
11881	96	170	262	710
11884	388	360	473	430
13379	341	160	135	210
13384	414	300	428	390
13388	313	280	495	310
13518	249	160	262	280
13542	173	190	250	270
13581	243	170	836	220
13587	388	370	350	480
13590	2909	1300	1664	1500
13605	457	280	633	630
18826	216	190	259	320
18827	168	140	161	190
18828	171	110	173	170
18829	173	160	160	210
28918	199	140	135	190

[OAR 340-041-0009](#)

Bacteria

(a) Freshwaters and Estuarine Waters
Other than Shellfish Growing Waters:

(A) A 30-day log mean of 126 E. coli organisms per 100 milliliters, based on a minimum of five (5) samples;

(B) No single sample may exceed 406 E. coli organisms per 100 milliliters.

(b) Marine Waters and Estuarine Shellfish Growing Waters: A fecal coliform median concentration of 14 organisms per 100 milliliters, with not more than ten percent of the samples exceeding 43 organisms per 100 mL.

Coos Bay Shoreline Tributary Teams BacT Sample Results : 06/03 – 06/04/2010

**North Side
Sample Sites**



Station Identifier	E. Coli (MPN/100 ml) 06/03/2010	Fecal coliform (CFU/100 mL) 06/03/2010	E. Coli (MPN/100 ml) 06/04/2010	Fecal coliform (CFU/100 mL) 06/04/2010
13577	1467	540	3076	720
13579	3873	730	2481	1300
13588	3076	480	1314	740
13589	6131	1370	6131	4600
13594	1918	1500	1722	1500
13598	216	280	1178	910
25993	1210	1200	987	1600
33474	771	980	3255	2400

**South Side
Sample Sites**



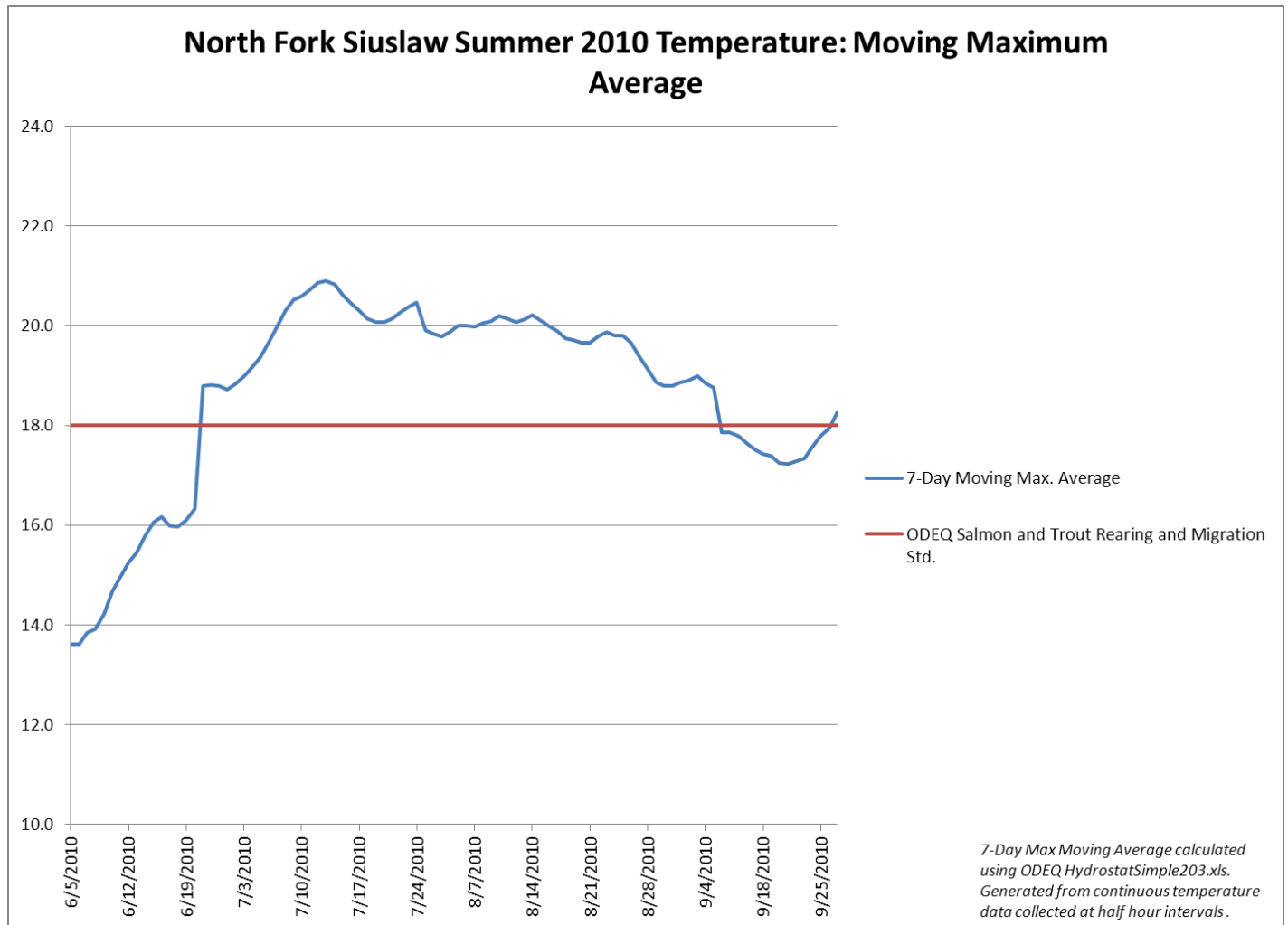
Station Identifier	E. Coli (MPN/100 ml) 06/03/2010	Fecal coliform (CFU/100 mL) 06/03/2010	E. Coli (MPN/100 ml) 06/04/2010	Fecal coliform (CFU/100 mL) 06/04/2010
13575	1376	880	1789	1000
13583	414	400	530	470
13584	1334	820	3076	1700
25997	404	350	776	890
25998	820	550	1500	2000
34188	1100	730	1850	1800
34189	594	560	1314	900

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

Temperature

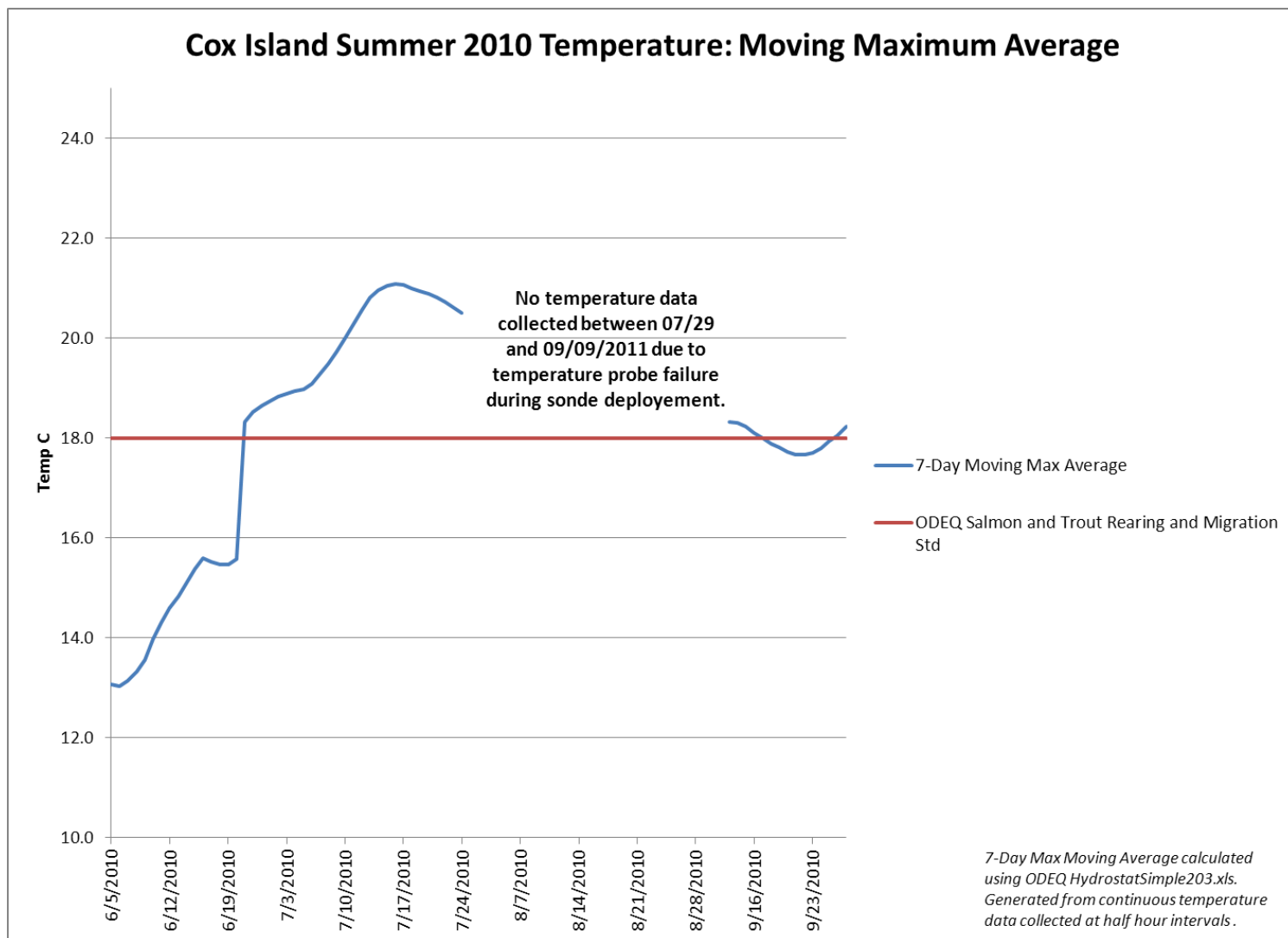
North Fork Siuslaw Sonde Station – Lower Siuslaw Estuary:

The maximum temperature measured at the North Fork Siuslaw Sonde Station was 21.55°C during summer. Further analysis of these data during the time period when the maximum temperature was recorded at the site indicates that the 2010 summer and early fall 7 day maximum daily average for temperature at this site exceeded the ODEQ water temperature standard for salmon and trout rearing and migration (18°C), the designated fish use for the section of the North Fork Siuslaw River monitored at the Tribes' North Fork Siuslaw Sonde Station.



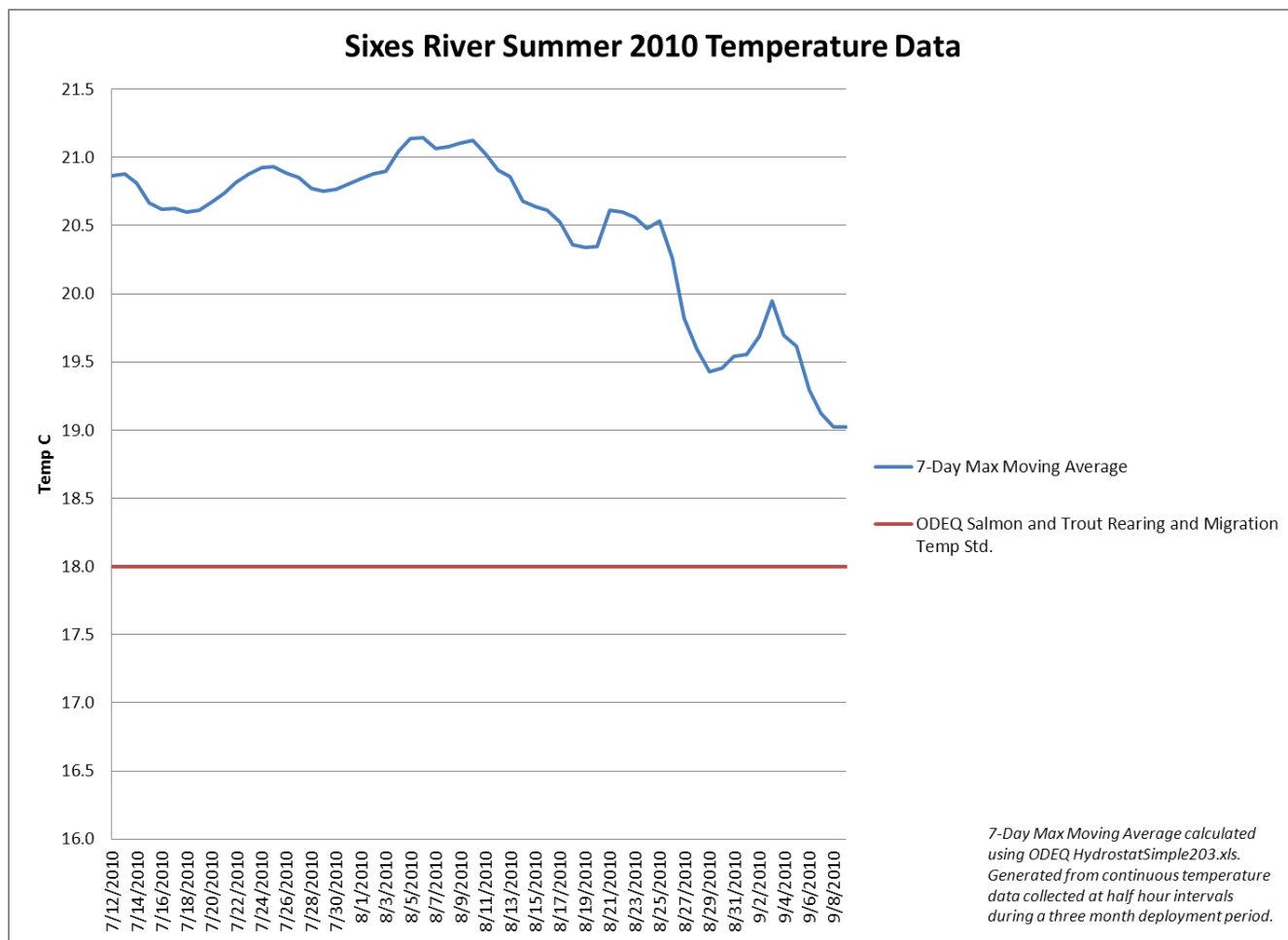
Cox Island Sonde Station – Lower Siuslaw Estuary:

The maximum temperature measured at the Cox Island Sonde Station was 21.18°C during summer. Further analysis of these data during the time period when the maximum temperature was recorded at the site indicates that the 2010 summer and early fall 7 day maximum daily average for temperature at this site exceeded the ODEQ water temperature standard for salmon and trout rearing and migration (18°C), the designated fish use for the section of the Siuslaw River monitored at the Tribes' Cox Island Sonde Station.



Sixes River – Freshwater

The 7 day maximum daily average for the entire summer 2010 continuous temperature data logger deployment at the Tribes' Sixes River monitoring site exceeded the ODEQ water temperature standard for salmon and trout rearing and migration (18°C), the designated fish use for the section of the Sixes River monitored at the Tribes' WQMP.



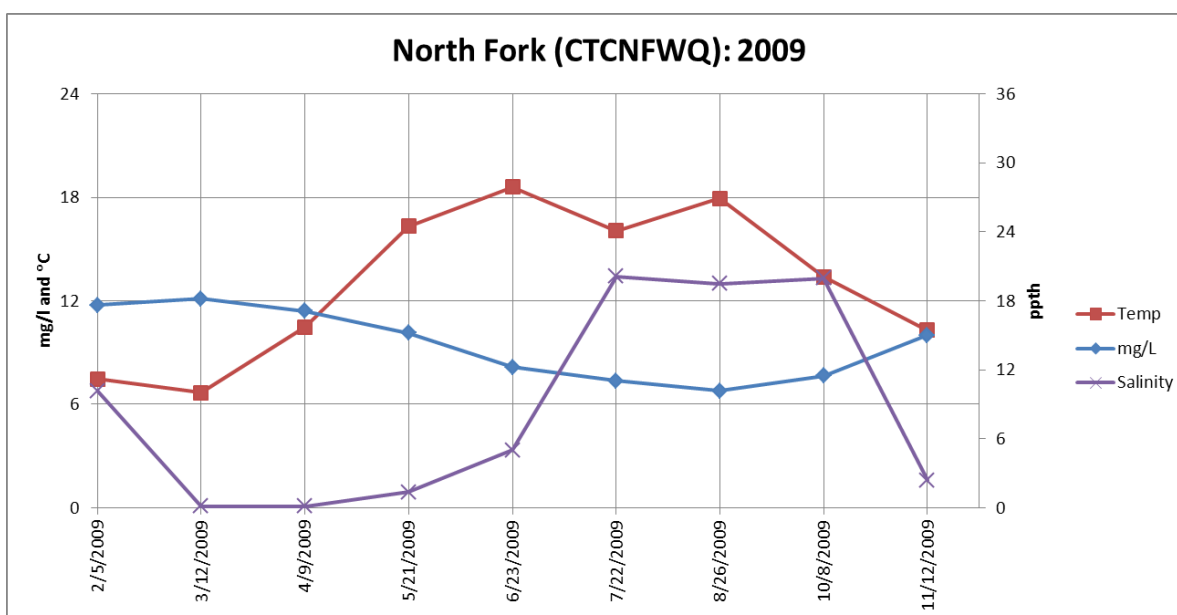
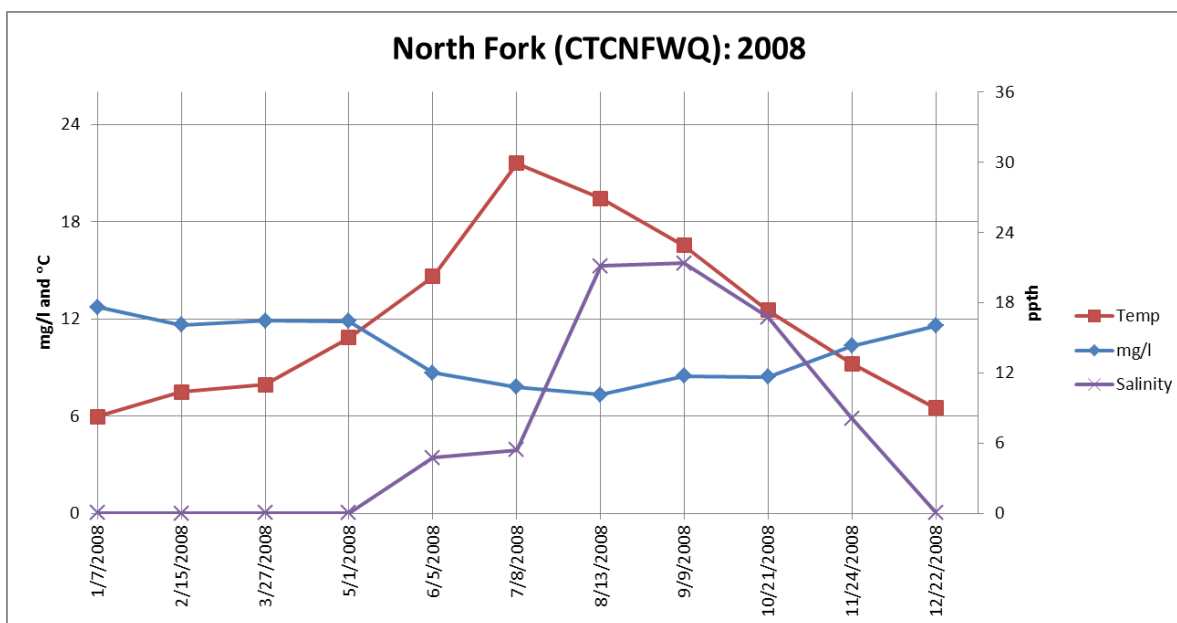
Dissolved Oxygen

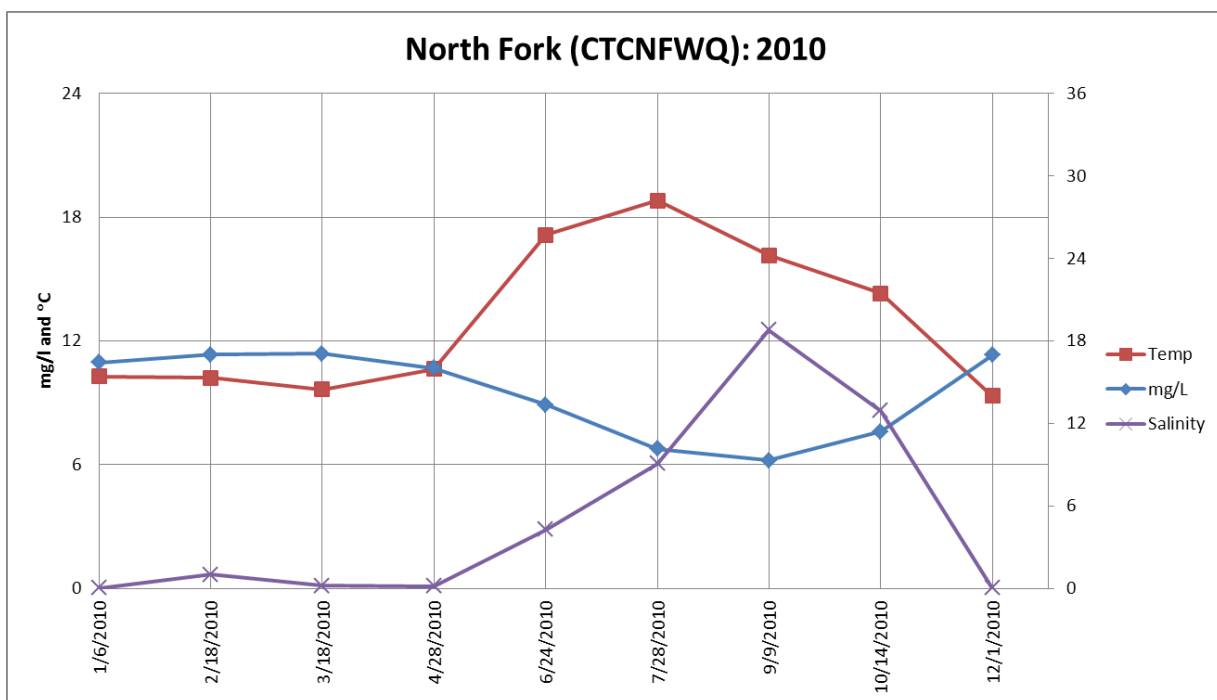
BLM and Empire Dock Sonde Stations – Lower Coos Bay:

Although minimum dissolved oxygen recorded at the Coos Bay BLM and Empire Dock Sonde Stations exceeded the ODEQ estuarine dissolved oxygen criteria of not less than 6.5 mg/l, continuous data collected at these sites do not indicate consistent exceedences of the ODEQ criteria and are likely anomalies attributable to seasonal variability and/or localized site conditions.

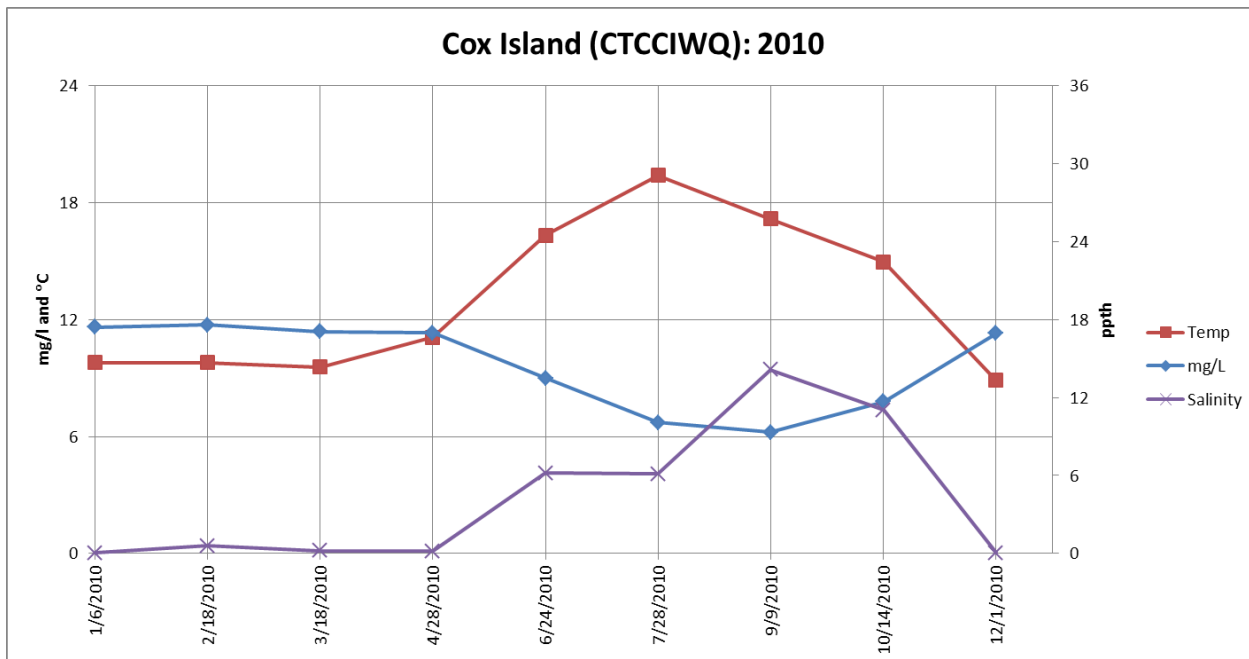
North Fork Siuslaw and Cox Island Sonde Station – Lower Siuslaw Estuary:

Discrete and continuous dissolved oxygen data collected by Tribes' 106 monitoring program at the North Fork Siuslaw Sonde Station indicate that the concentration of dissolved oxygen at this site consistently declines every year beginning in late spring/early summer through fall. The following graphs displaying discrete dissolved oxygen, temperature, and salinity data collected by our monitoring program 2008 – 2010 appear to show a correlation between the seasonal variability of increasing water temperature and declining dissolved oxygen concentrations at the North Fork Siuslaw Sonde Station. Seasonal variability of salinity at the site may also be contributing to the annual decline of dissolved oxygen at the site.

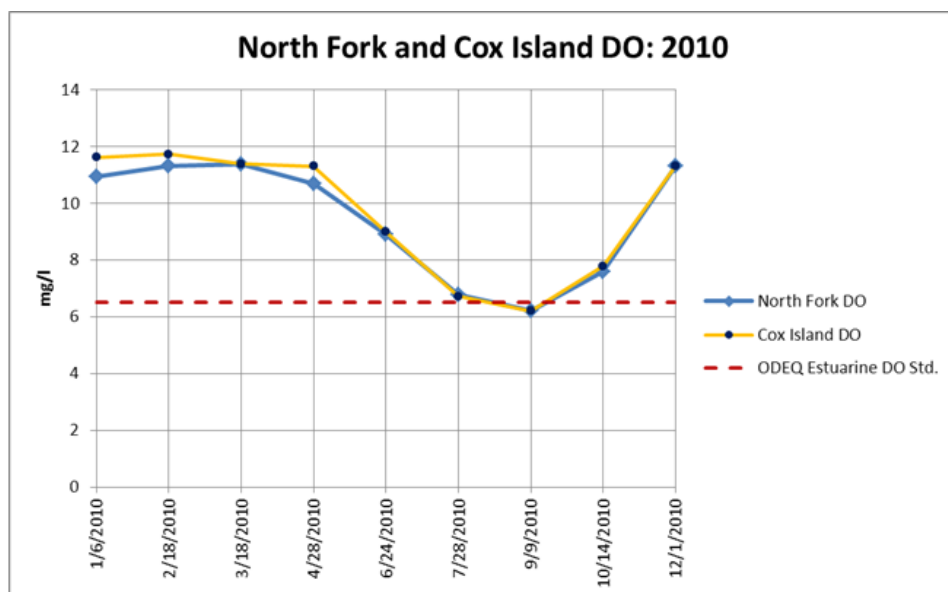




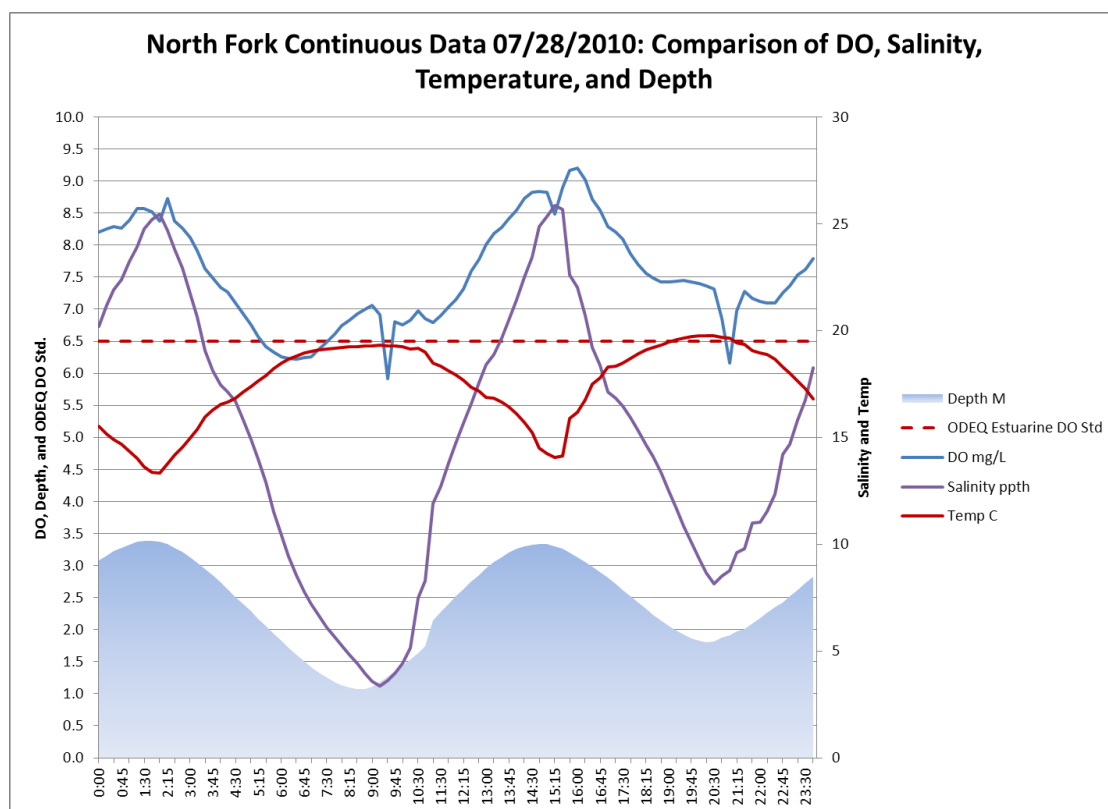
Analysis of our discrete data indicates the same seasonal variability in dissolved oxygen, temperature, and salinity observed at the Tribes' North Fork Siuslaw Sonde site appears to be occurring at the Cox Island site.



2010 Discrete dissolved oxygen data collected by Tribes' at our newly installed Cox Island Sonde Station, located upriver from the confluence of the North Fork Siuslaw and Mainstem Siuslaw Rivers, indicate that the concentration of dissolved oxygen at our Cox Island site also declines at the same time of year as that of the North Fork Siuslaw Sonde Station.

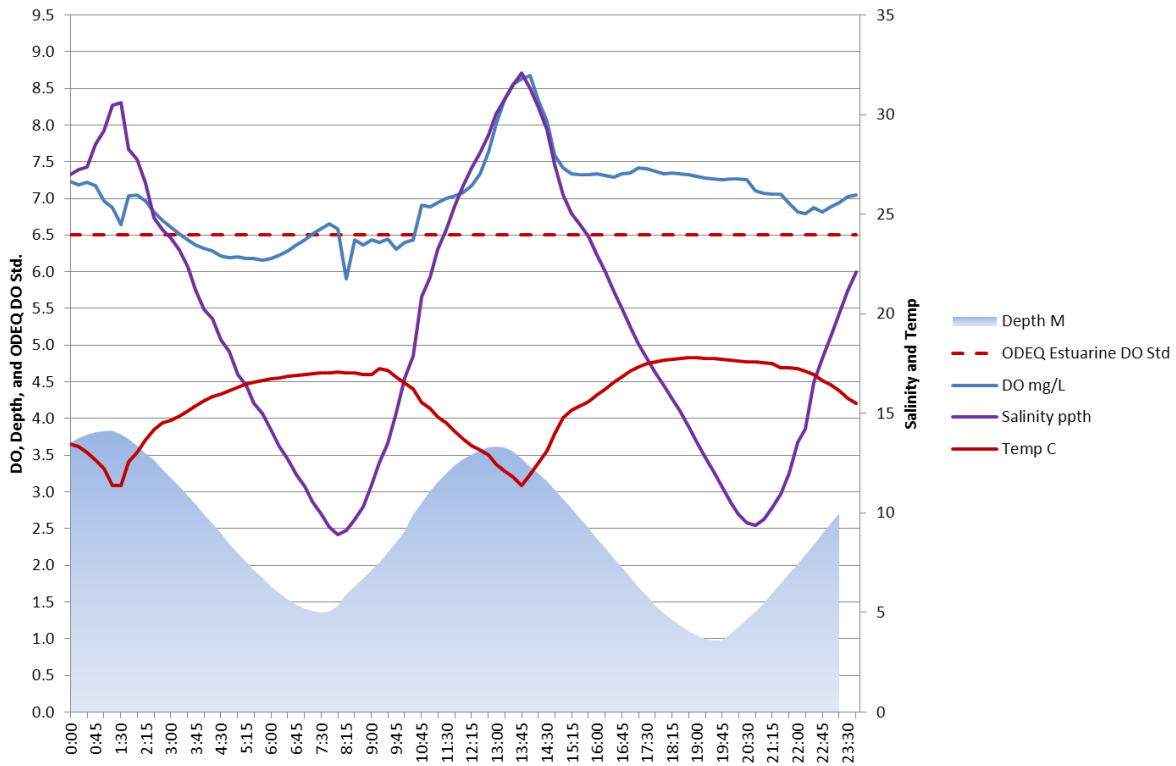


*The Tribes' discrete data are available for download from the EPA 'Modernized STORET Data Warehouse' <http://www.epa.gov/storet/dbtop.html>

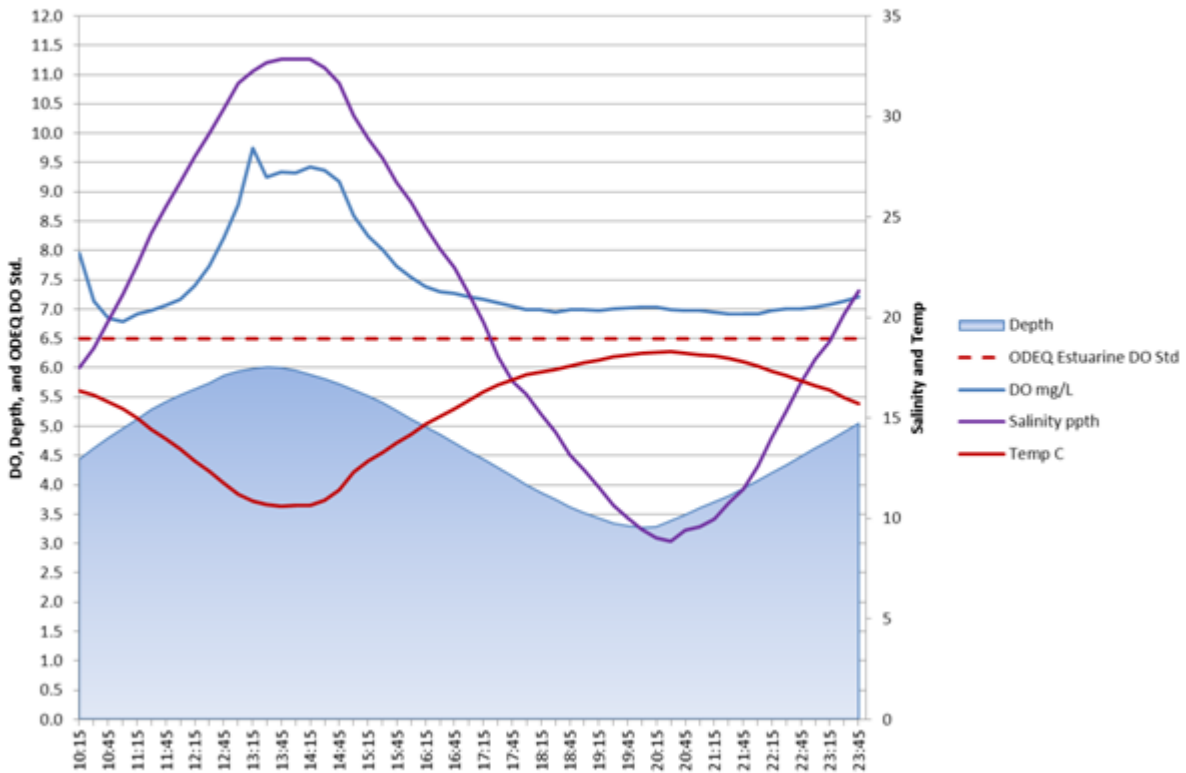


Continuous data collected by our program at both the North Fork Siuslaw and Cox Island sonde stations concurrent with our discrete data collection help verify the trend in DO captured by our monthly discrete monitoring of these sites. The addition of continuous depth (tidal stage) data to the graph above and those on the following page helps to show the impact tidal stage has on dissolved oxygen concentrations at these sites.

North Fork Continuous Data 09/09/2010: Comparison of DO, Salinity, Temperature, and Depth



Cox Island Continuous Data 09/09/2010: Comparison of DO, Salinity, Temperature, and Depth



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

Designated Use	North Fork Siuslaw	Lower Coos Bay	Sixes River
Salmon and Trout Rearing and Migration	Not Fully Supported	Not Enough Data to Determine	Not Fully Supported
Commercial and Recreational Shellfish Harvesting	Not Enough Data to Determine	Not Fully Supported	-----
Water Contact: Recreational Activity	Not Enough Data to Determine	Not Enough Data to Determine	Not Enough Data to Determine
Aesthetics	Not Enough Data to Determine	Not Enough Data to Determine	Not Enough Data to Determine

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

North Fork Siuslaw

Temperature and Dissolved Oxygen – Salmon and Trout Rearing and Migration

The North Fork Siuslaw has high summer and early fall temperatures accompanied by consistently low dissolved oxygen readings. 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. In addition, salinity at the site increases in the summer and the combination of increased salinity and elevated temperatures likely contributes to the low dissolved oxygen levels recorded at the site. However, continuous data collected by our program appears to indicate that there is a link between low dissolved oxygen levels and low tide, when salinity levels are also low.

Sixes River

Temperature – Salmon and Trout Rearing and Migration

The Sixes River has high summer and early fall temperatures. 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.

IV. Discussion of Issues of Tribal Concern

Data Gaps

Dissolved Oxygen

In order to better understand the cause of low summer dissolved oxygen levels recorded at the North Fork and Cox Island Siuslaw sonde stations, the Tribes are planning to collect diel nutrient and chlorophyll samples in the lower Siuslaw Estuary at a site yet to be determined. The expected results of these sampling events is a better understanding of whether the cause of summertime low dissolved oxygen levels recorded at the North Fork and Cox Island sonde stations are potentially associated with algae blooms or benthic macroalgae growth that may be caused by nutrient loading.

Benthic Invertebrate Sampling

The Tribes' would like to build capacity to implement benthic invertebrate sampling at our estuarine sites, in addition to the freshwater benthic macroinvertebrate sampling implemented at our Sixes River site. Data generated from estuarine benthic invertebrate sampling at our Coos Bay and Lower Siuslaw River estuarine sites would greatly enhance our understanding of impacts to water quality that may be occurring in these areas. Benthic infauna data collected by our program would be implemented and processed according to protocols described in the EMAP lab method manual. Data generated from this type of sampling would also help the Tribes quantify the abundance of benthic invertebrate invasive species potentially present at our monitoring sites.

Conclusion

Data collected by our program in the 2010 water year appear to indicate trends are occurring at our sites similar to those observed by our program in previous years. Seasonal impairments to water quality (e.g. temperature and dissolved oxygen) continue to occur at the Tribes' North Fork Siuslaw sonde station and Sixes River continuous summer temperature study site. In addition (thanks to the Tribes' collaboration with ODEQ), we have verified that during significant storm events, bacteria levels in upper Coos Bay increase dramatically.

Appendices

Appendix A. Monthly Bacteria Monitoring Results for 2010 Water Year

Site	Date	Time	E.coli MPN	enterococcus MPN
CTCSRWQ	10/6/2009	12:30	7.5	Not Measured
CTCNSWQ	10/7/2009	9:30	0	0
CTCEDWQ	10/7/2009	10:00	0	0
CTCNFWQ	10/8/2009	10:00	41	0
CTCCIWQ	10/8/2009	10:25	31	0
CTCNSWQ	11/10/2009	13:00	10	0
CTCEDWQ	11/10/2009	13:45	10	0
CTCNFWQ	11/12/2009	12:45	41	0
CTCCIWQ	11/12/2009	13:30	10	0
CTCNSWQ	1/5/2010	11:30	10	0
CTCEDWQ	1/5/2010	12:00	0	10
CTCNFWQ	1/6/2010	12:31	30	10
CTCCIWQ	1/6/2010	13:15	0	31
CTCEDWQ	2/17/2010	11:00	30	0
CTCNSWQ	2/17/2010	11:30	0	0
CTCCIWQ	2/18/2010	13:38	10	10
CTCNFWQ	2/18/2010	14:00	20	0
CTCNSWQ	3/17/2010	10:17	10	0
CTCEDWQ	3/17/2010	10:47	10	0
CTCNFWQ	3/18/2010	11:02	0	0
CTCCIWQ	3/18/2010	11:31	0	0
CTCNSWQ	4/27/2010	9:35	0	0
CTCEDWQ	4/27/2010	10:10	0	10
CTCNFWQ	4/28/2010	10:40	231	0
CTCCIWQ	4/28/2010	11:08	132	0
CTCNSWQ	6/23/2010	9:42	10	0
CTCEDWQ	6/23/2010	10:08	40	0
CTCNFWQ	6/24/2010	11:17	60	10
CTCCIWQ	6/24/2010	11:53	20	10
CTCSRWQ	7/7/2010	11:15	5	Not Measured
CTCNSWQ	7/27/2010	9:43	0	0
CTCEDWQ	7/27/2010	10:14	0	0
CTCCIWQ	7/28/2010	10:27	0	0
CTCNFWQ	7/28/2010	10:55	30	0
CTCNSWQ	9/8/2010	9:36	0	0
CTCEDWQ	9/8/2010	10:00	0	0
CTCCIWQ	9/9/2010	10:00	20	20
CTCNFWQ	9/9/2010	10:30	41	20
CTCSRWQ	9/14/2010	11:05	40	Not Measured

CTCSRWQ = Sixes River Site

CTCNSWQ = BLM Site

CTCEDWQ = Empire Dock Site

CTCNFWQ = North Fork Site

CTCCIWQ = Cox Island Site

Appendix B. QAQC

Quality Control for Meters and Probes:

All meters and probes will be calibrated in accordance to the equipments operations manual prior to field deployment.

Quality Control for Microbiological Water Sampling:

A 1:10 dilution will be used when running analytical E-Coli and *enterococcus* procedures. Field samples will be allowed to reach room temperature (per IDEXX recommended protocols) before they are diluted. 10ml of each water sample will be pipetted into a sterile, freshly opened, 120ml IDEXX sample bottle and quickly capped. After preparing all the samples taken for that day in the same way, distilled water will be decanted into the lab sample bottle so that the bottle is filled to the 100ml line.

Blanks

For every sampling event, blanks of the distilled water used for the 1:10 sample dilutions will be run.

Replicate Samples

One sample site will be chosen as a replicate site for each sampling event.

Split Samples

For every 10 samples taken a split sample will be randomly chosen. A split sample consists of taking an additional 10 ml from the original sample bottle and testing it for E-Coli or enterococcus.

The IDEXX Lab will be quality controlled as specified in the IDEXX User Manual.

Nutrient Sampling Protocol:

Field Grab Samples:

At all sites, field calibration data including water temperature, pH, salinity, specific conductance, and dissolved oxygen will be recorded with a hand-held YSI 650 MDS multi-parameter probe setup. A Hach 2100 turbidity meter will be used to measure turbidity. All grab samples will be taken on the same day between 3 hours before slack low water and slack low water. Efforts will be made to sample during spring tides at low-low tide, although this will not always be feasible due to the timing of tides and schedules of staff. Efforts will also be made to sample following a 72-hour dry period unless it substantially impacts the interval between semi-annual runs.

At each site, three consecutive samples (duplicates) will be collected by either wading or using a 2-L Van Dorn bottle held at 0.5 m above the channel bottom, at the same level as the sonde. Samples from the Van Dorn bottle will be decanted into amber, wide-mouth, Nalgene bottles.

Sample bottles and equipment will be rinsed in tap water three times, acid washed (10% HCL), then in deionized water three times, then ambient water in the field three times. After a sample is collected, sample bottles will be immediately capped, placed on ice in the dark, and returned to the CTCLUSI laboratory. In the laboratory, samples will be stored at 4°C until filtration. Water samples will be filtered within 24 hours of collection.

Entry Verification

Analysis results will be sent from the University of Washington Marine Chemistry Laboratory or other outside laboratory in Excel format. Files will consist of sampling station ID, date, replicate number, and parameter values expressed in unit concentrations.

Instrument/Equipment Testing, Inspection, and Maintenance Requirements

All equipment (meters, probes, lab, and data loggers) will be tested and calibrated prior to deployment as stated in the equipments operations manuals. Equipment that fails to calibrate or is malfunctioning in any other way will not be used to collect water quality data until the equipment is repaired. Equipment log sheets will be placed in a folder to document all calibrations and testing. The Environmental Specialist will ensure that all equipment is in proper working order for the project.

Incubator temperatures will be recorded twice daily during microbiological analysis, with each reading separated by at least 4 hours.