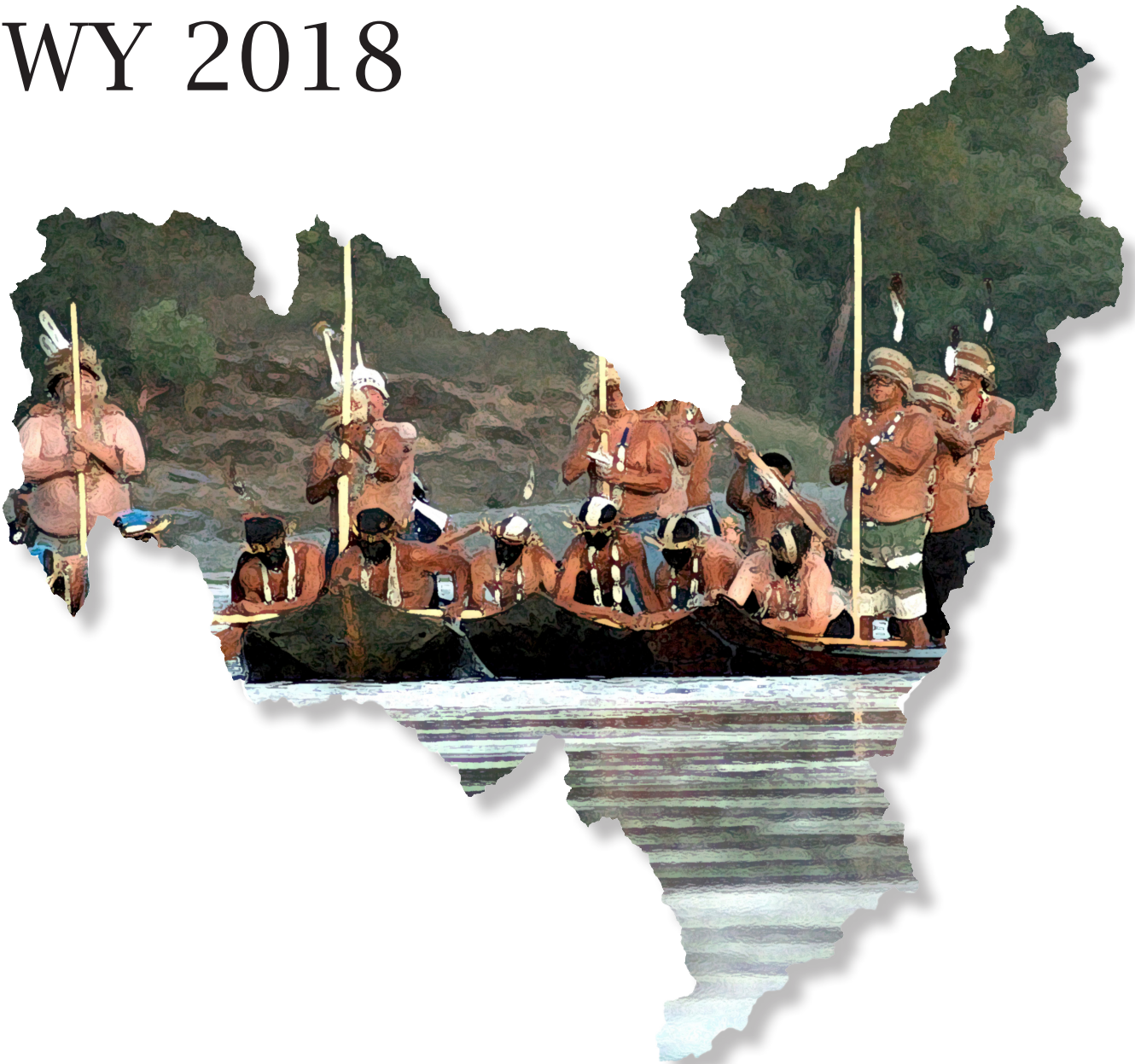


Water Quality Monitoring Hoopa Valley Tribe WY 2018



HOOPA VALLEY
TRIBAL ENVIRONMENTAL PROTECTION AGENCY

PREPARED BY

BRIAN MCCAUGHEY
GIS ANALYST/DATABASE COORDINATOR

GARY COLEGROVE
ENVIRONMENTAL PLANNER II



On the cover:

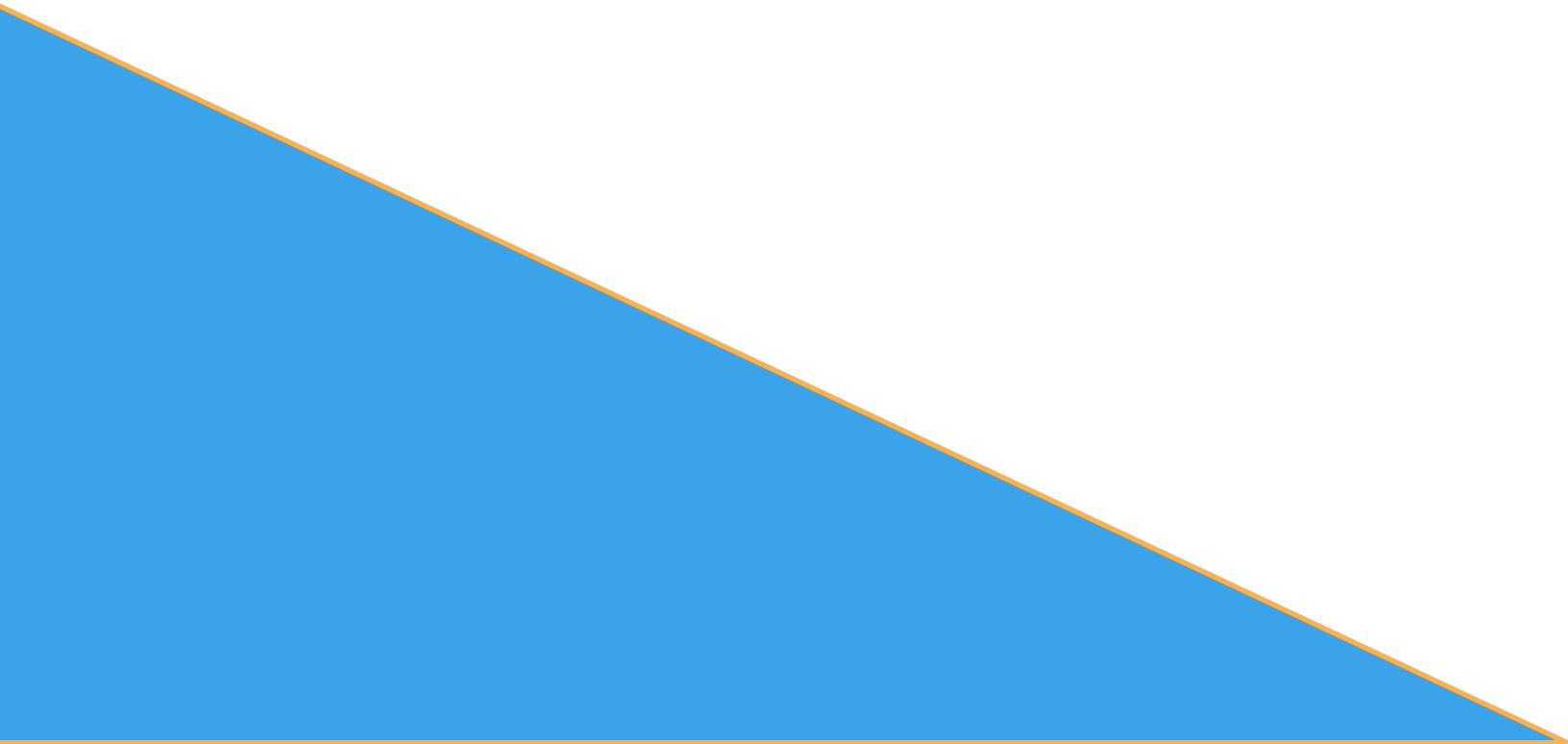
Hoopa Valley Tribe Boat Dance Ceremony

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Content

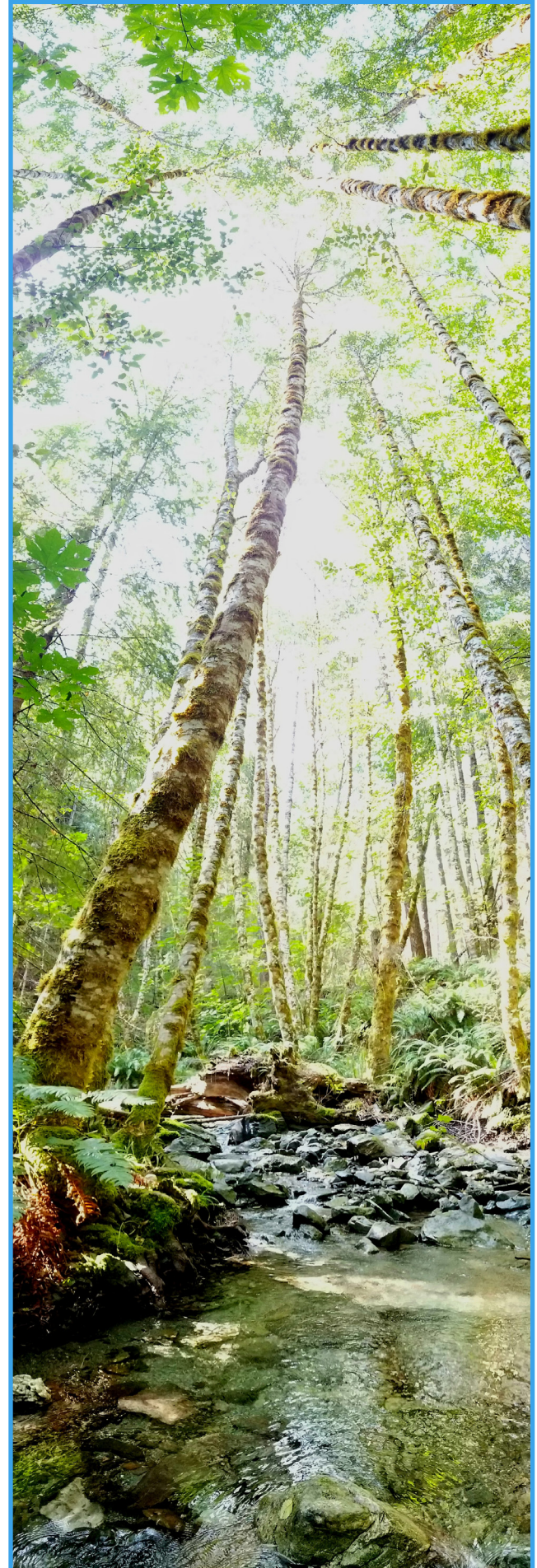
Background	1
Purpose	2
Trinity River Basin Map	3
Methods.....	4
Definitions of Water Quality Parameters	5
Benthic macroinvertebrates	6
Definitions of Parameter Thresholds.....	7
Monitoring Locations.....	8
River and Stream Conditions.....	9-20



Background

IN September of 2002, the U.S. Environmental Protection Agency (USEPA) approved the Hoopa Valley Tribe's Water Quality Standards and Water Quality Control Plan (WQCP). These standards are designed to "restore, maintain and protect the chemical, physical, biological, and cultural integrity of the surface waters of the Hoopa Valley Reservation (HVIR); to promote the health, social welfare, and economic well-being of the Hoopa Valley Tribe, it's people, and all the residents of the Hoopa Valley Indian Reservation; to achieve a level of water quality that provides for all potential uses; and to provide for full protection of threatened and endangered species." The primary objective of the Hoopa Tribal Environmental Protection Agency (TEPA) water quality monitoring program is to ensure that HVIR water bodies meet their respective beneficial uses, as outlined in the WQCP. TEPA also monitors HVIR waterways for the collection of trend, baseline, implementation, effectiveness, validation, and compliance monitoring data.

TEPA monitors various water quality parameters on an annual basis for the Tribe's beneficial uses as outlined in the WQCP. TEPA utilizes deployable instruments that collect and store various water quality parameters as well as physical collection of samples that are analyzed in TEPA's water quality laboratory or sent to an outside lab for analysis.

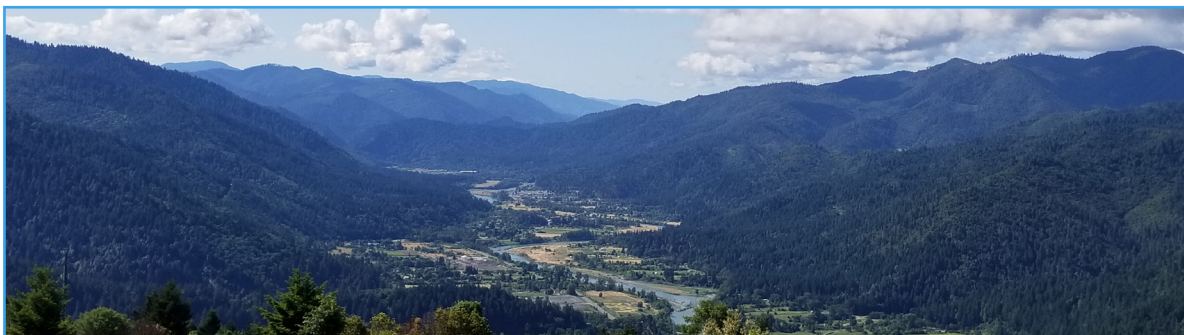


Purpose

Water quality on the HVIR can potentially be impacted from upstream activities both on and off Reservation. The Trinity River watershed is comprised of approximately 165 river miles and 2,936 square miles of watershed most of which is outside the reservation and subject to activities that have the potential to be detrimental to downstream water quality. Human activity that may impact Reservation waters include: impoundments and subsequent flow reductions, stream diversions for agricultural and hydropower uses, runoff from illegal and legal marijuana cultivation, and sedimentation from road building, logging and landslides. Current monitoring activities and data acquisition focus on the Trinity River and Klamath Rivers, as well as the major tributaries to the Trinity River within the Reservation boundaries.

Water quality affects people who live along the Trinity River and its tributaries within the HVIR. Many people spend significant amounts of time fishing, recreating and gathering cultural materials in or near our many waterways and it is therefore important that the community be provided information regarding the quality of these waters in a concise and straight forward manner. It is the intent of this document to convey such information in a way that can be understood by all participants of water related activities.

The following sections describe the types of water quality information that is collected and reported on an annual basis. The information is broken out and displayed by individual watersheds for each of the tributaries within the Hoopa Valley Reservation.



Trinity River Basin



The Trinity River watershed encompasses 2,936 square miles of rugged forested mountains with its highest elevation of 8,888 feet at Sawtooth peak in Trinity County and its lowest elevation of 190 feet where the Trinity River confluences with the Klamath River on the Yurok Reservation in Weitchpec. The Trinity River spans 165 miles from its confluence through the Coastal and Klamath Mountain ranges from Northeastern Humboldt County to Northwestern Trinity county. The Trinity River is home to many small communities who rely on the River's many beneficial uses including fish habitat and spawning, drinking water, ceremonial purposes as well as recreation. About 80 percent of the Trinity River watershed is Federal land managed by the U.S. Forest Service and the U.S. Bureau of Land Management. The remaining 20 percent is privately owned, with about half owned by logging companies.

Methods

TEPA maintains three Continuous Data Recording (CDR) stations on the Hoopa Valley Reservation. These stations are located at the South Boundary, Red Rock on the Trinity River, and the Saints Rest Bar on the Klamath River, and record data between June 1st and October 1st of each year. Parameters are collected utilizing YSI EXO multiparameter sondes, and include: water temperature, conductivity, pH, turbidity, dissolved oxygen and blue-green algae.

TEPA also deploys continuous water temperature monitoring probes on all major tributaries to the Trinity River and at strategic locations within the mainstem and within the Klamath River. Typically, these probes are installed and recording data from June 1st to October 1st of each sampling season.

In addition to the data recording sondes and probes, TEPA also initiates a series of water quality field samples throughout the sampling season. Field samples are collected from the water column and in some cases from the substrate of the targeted sample locations. Samples collected from the water column include: nitrogen, phosphorous, microcystin and fecal coliforms (E.Coli). Samples collected from the substrate include algae and macroinvertebrates. All samples are either processed at TEPA's water quality laboratory or shipped to various credentialed laboratories for processing by technical experts. Nutrients and algae samples are processed in the State of Washington, microcystin samples are processed at the EPA Region 9 laboratory located in Richmond, CA, macroinvertebrates are processed by a local taxonomist in Eureka, CA and fecal coliforms are processed on site in the TEPA laboratory. For a list of monitored water quality parameters and water quality parameter thresholds **see Tables 1 & 2.**



**Water
Quality
Sonde**



**Temp
Probe**

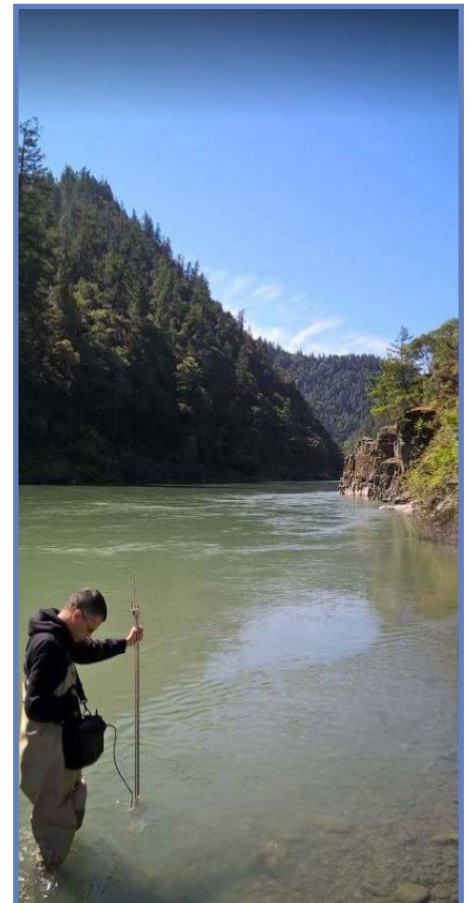


Table 1

Definitions of Water Quality Parameters

Parameter	Definition
Microcystin Toxin	Microcystins are a class of toxins produced by freshwater cyanobacteria; primarily <i>Microcystis aeruginosa</i> . They are hepatotoxic, i.e. able to cause serious damage to the liver. Humans are exposed by swallowing, skin contact with or inhaling contaminated water.
Total Nitrogen and Total Phosphorus	High concentrations of phosphorus and nitrogen can result in excessive growth of aquatic plants such as cyanobacteria, phytoplankton, macrophytes and filamentous algae, which can lead to unhealthy levels of pH and dissolved oxygen
Dissolved Oxygen	Dissolved oxygen (DO) refers to the amount of oxygen dissolved in water and is particularly important in aquatic ecology. Adequate levels of DO are essential for fish and other aquatic organisms. Low levels of DO can cause stress to organisms, making them more susceptible to disease or predation, while extreme low levels can cause direct mortality.
Water Temperature	High water temperatures are associated with low dissolved oxygen, can promote the spread and growth of disease-causing organisms, and disrupt fish behaviors and lifecycles.
pH	pH is an indicator of acidity or alkalinity. Wide fluctuations in pH caused by environmental factors from day to night can stress fish and aquatic organisms that are accustomed to more stable conditions.
Turbidity	Turbidity is a measure of the cloudiness or haziness in water caused by suspended solids (eg sediment, algae). Turbidity is expressed in Nephelometric Turbidity Units (NTU) and is measured using a relationship of light reflected from a given sample.
Fecal Coliform	<i>Escherichia coli</i> (E.coli) are a species of fecal coliform bacteria that is specific to fecal material from humans and other warm-blooded animals. Sources of fecal contamination to surface waters include wastewater treatment plants, on-site septic systems, domestic and wild animal manure, and storm runoff.

Benthic macroinvertebrates

Benthic macroinvertebrate samples are collected in many of the tributaries to the Trinity River within the Hoopa Valley Reservation annually. Benthic macroinvertebrates are the developing stages of many different kinds of “bugs” that as adults emerge from the water and are known as dragonflies, may flies, stone flies, caddis flies etc. These “bugs” during their time under water are an important food source for many aquatic species including trout, salmon and steelhead. These “bugs” can also provide us information regarding the quality of water and stream health.

Macroinvertebrates are collected in nets held to the bottom of the stream as the gravels and rocks are disturbed upstream and the “bugs” are washed into the net by the current. The sample from the net is then placed into collection jars and preserved before sending them to a taxonomist for identification. The taxonomist will break out the sample by species and count the individual “bugs” and compare the numbers to the Northern California Index of Biological Integrity and each sample is given a ranking score based on the amount and type of “bugs” collected in the sample. There are certain macroinvertebrates that are very sensitive to pollutants and some are very tolerant of pollution, so if a large amount of pollution tolerant species are in the sample and very few intolerant species then the data and the scores would reflect some sort of environmental stressor is present in the water and vice versa for clean unpolluted water.



Table 2

Definitions of Parameter Thresholds

Trinity River

Monitoring Parameter	Threshold	Time Period
PH	7.0 – 8.5	All year
Dissolved Oxygen	> 11.0 mg/L	All year
Water Temperature 7 Day Average	17.0C	May 23 - June 4
	20.0C	June 5 - June 15
	23.5C	June 16 - September 14
	19.0C	September 15 - Oct. 31
Fecal Coliform (E. Coli.)	126 CFU	All year

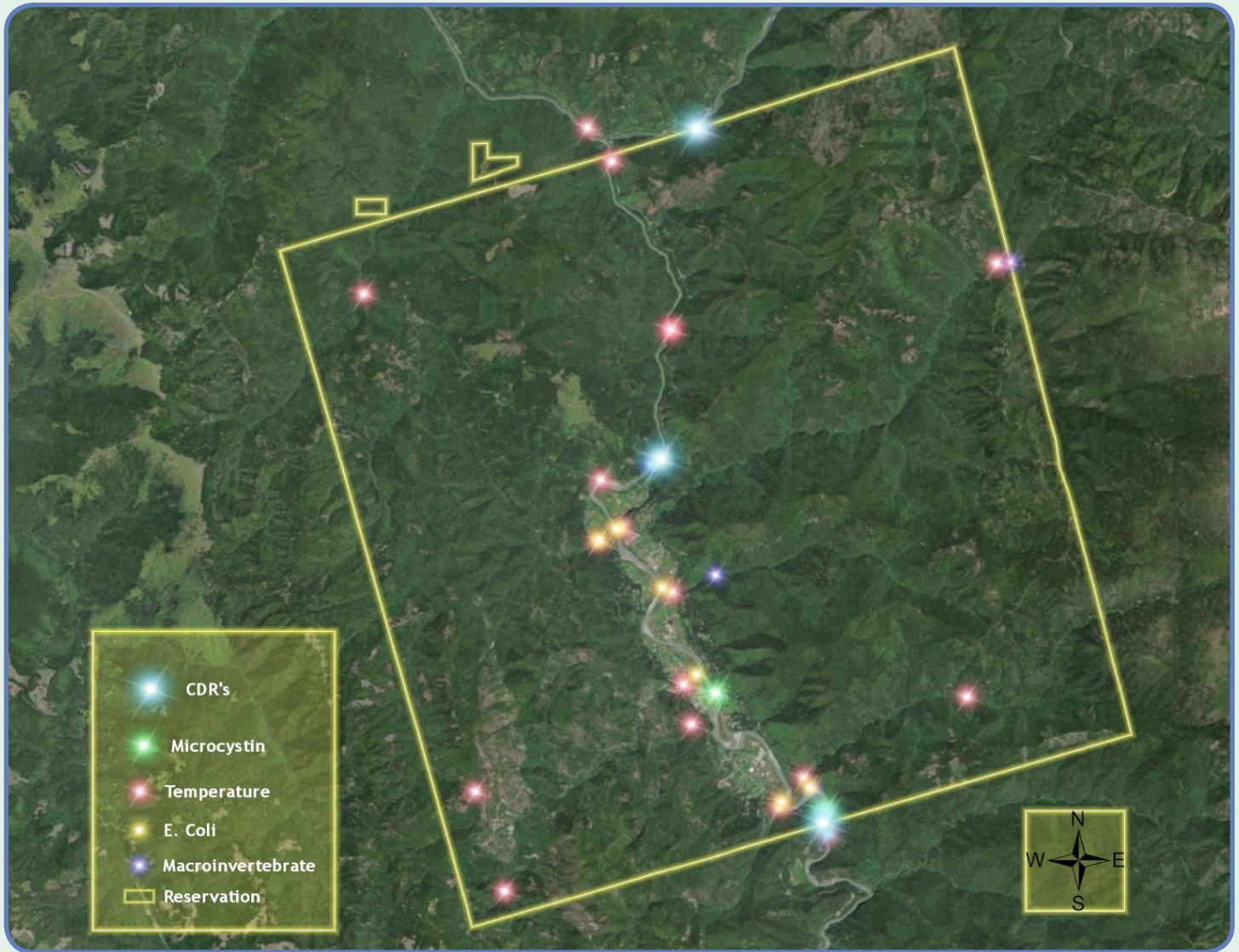
Klamath River

Monitoring Parameter	Threshold	Time Period
PH	7.0 – 8.5	All times
Dissolved Oxygen	> 11.0 mg/L	Min. 7 day moving average
Periphyton chlo-a	150 mg chlo-a/m ²	All times
Total Nitrogen	0.2 mg/L	All times
Total Phosphorus	0.035 mg/L	All times
Microcystin	< 8 ug/L	All times

Tributaries

Monitoring Parameter	Threshold	Time Period
PH	7.0 – 8.5	All times
Dissolved Oxygen	> 11.0 mg/L	All times
Water Temperature Maximum Weekly Average	14.0C	May 23 - June 4
	17.0C	June 5 - July 9
	20.0C	July 10 - September 14
	16.0C	September 15 - Oct. 31
Fecal Coliform (E. Coli.)	126 CFU	Shall not exceed

TEPA Monitoring Locations

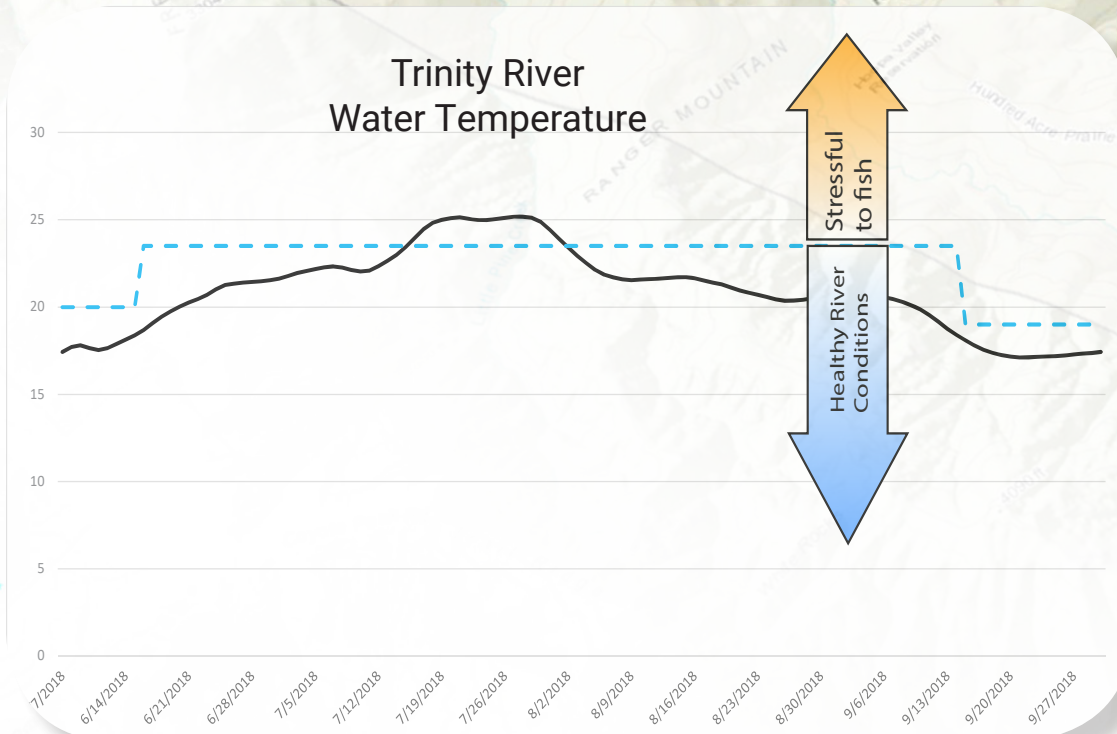


The map above illustrates the monitoring locations that TEPA utilizes to gather the necessary information that is required to evaluate water quality conditions on a reservation wide basis.

THE TRINITY RIVER

The Hoopa Tribal EPA maintains two continuous data recording (CDR) sites along the Trinity River in Hoopa. The South Boundary site collects and records water quality data as it enters the reservation from the approximately 147.5 river miles of watershed influences. The Red Rock site collects and records water quality data as it exits the Hoopa Valley to monitor any changes in water quality that may be caused by human activity within the Reservation urban area.

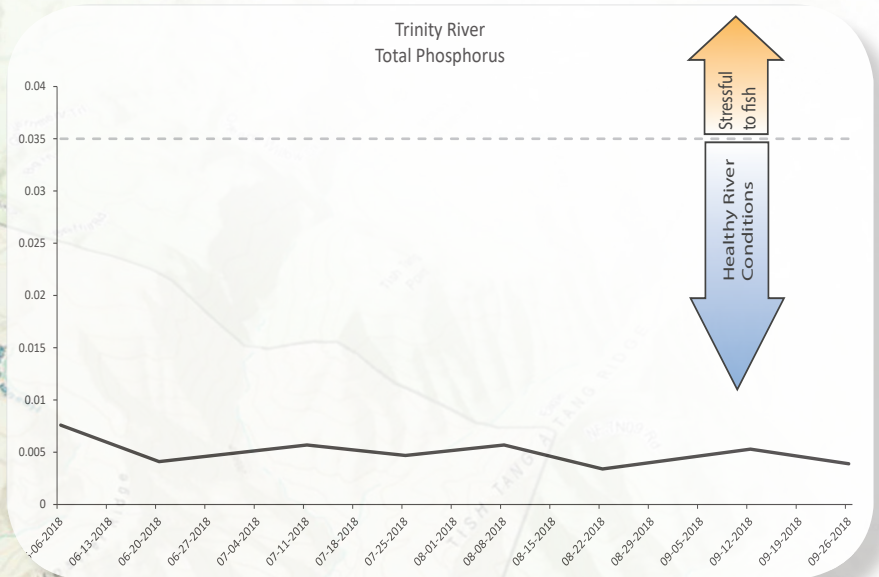
Red Rock C



7 day average water temperature exceeded the 23.5 °F threshold from mid-July to the beginning of August.

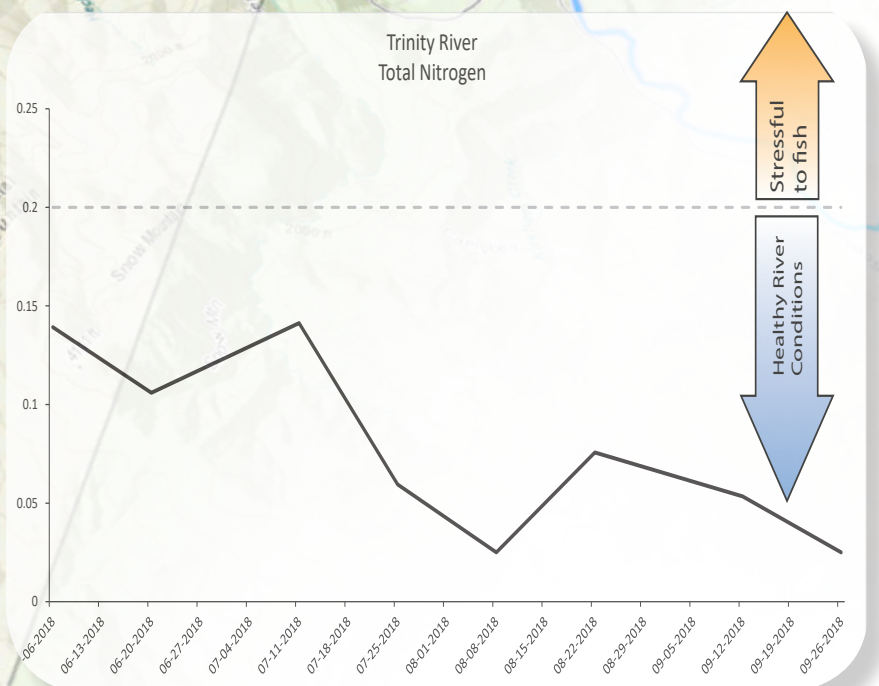
Total Phosphorous

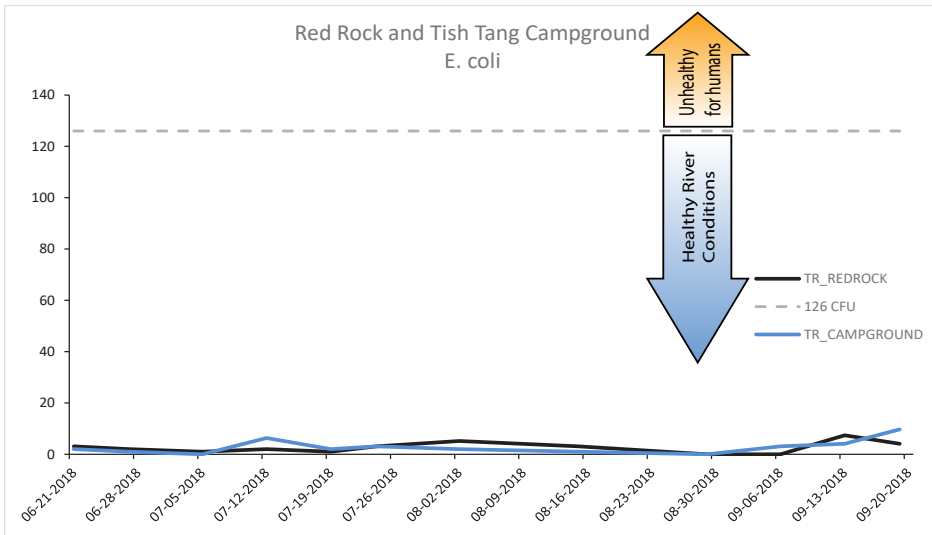
remained below the threshold for the entire 2018 sampling season. Phosphorus tends to attach to soil particles and can end up in surface water through runoff.



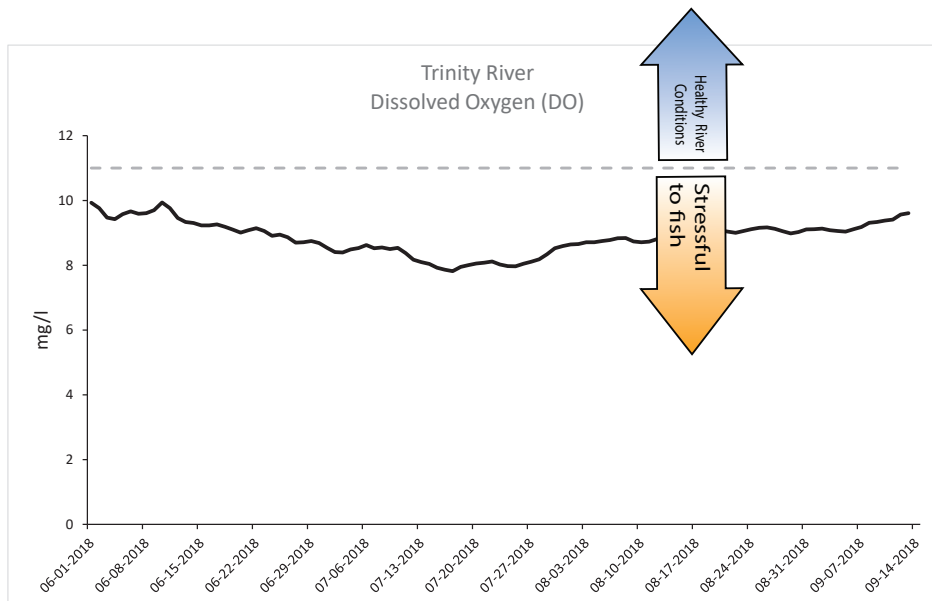
South Boundary CDR

Total Nitrogen remained below the threshold for the entire 2018 sampling season. Excess nitrogen in surface water can cause overstimulation of growth of aquatic plants and algae including blue green algae. Too much algae and plant growth can deplete oxygen levels during die off causing stress to fish and other aquatic species.

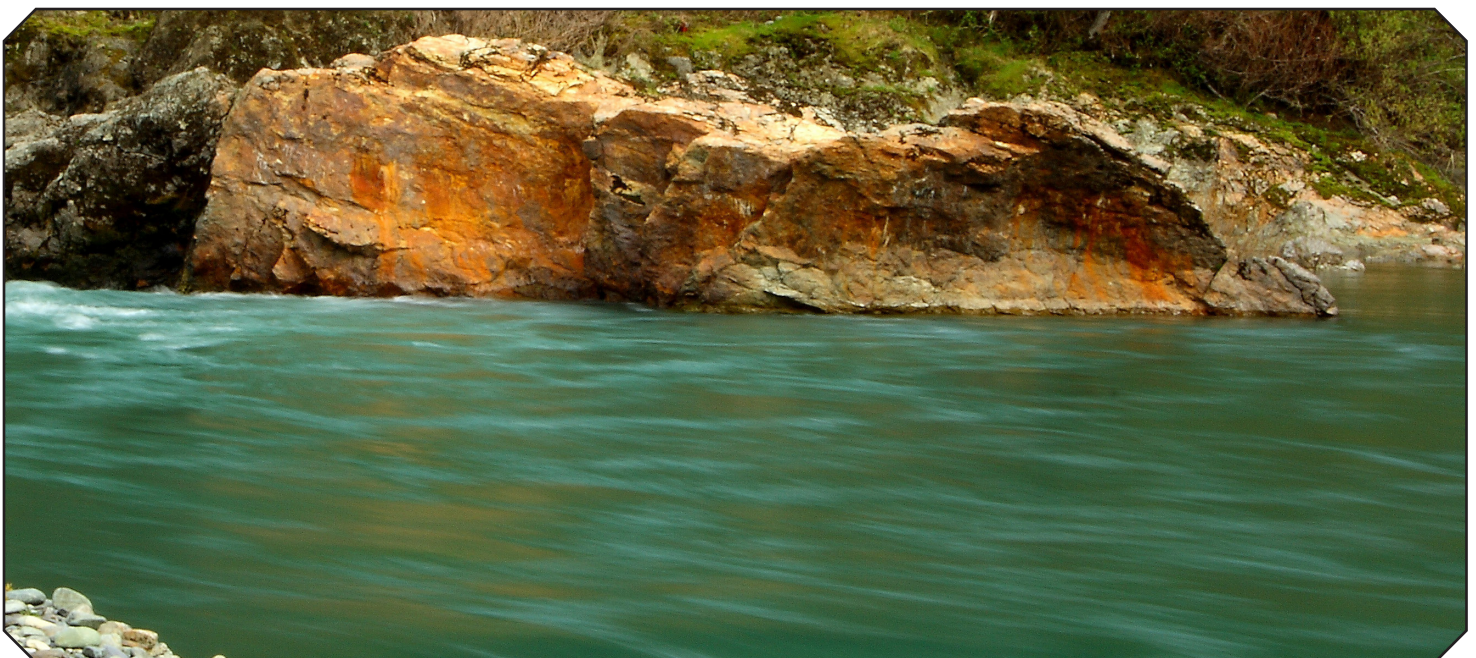




Fecal Coliform (E. coli) monitoring on the Trinity River at popular recreational areas throughout the 2018 summer season has tested well below the level of concern for contact recreation.



Dissolved Oxygen (DO) below the water quality standard of 11mg/l is considered stressful to fish and other aquatic species. Trinity River DO remained in the stressful region throughout the entire sample season.



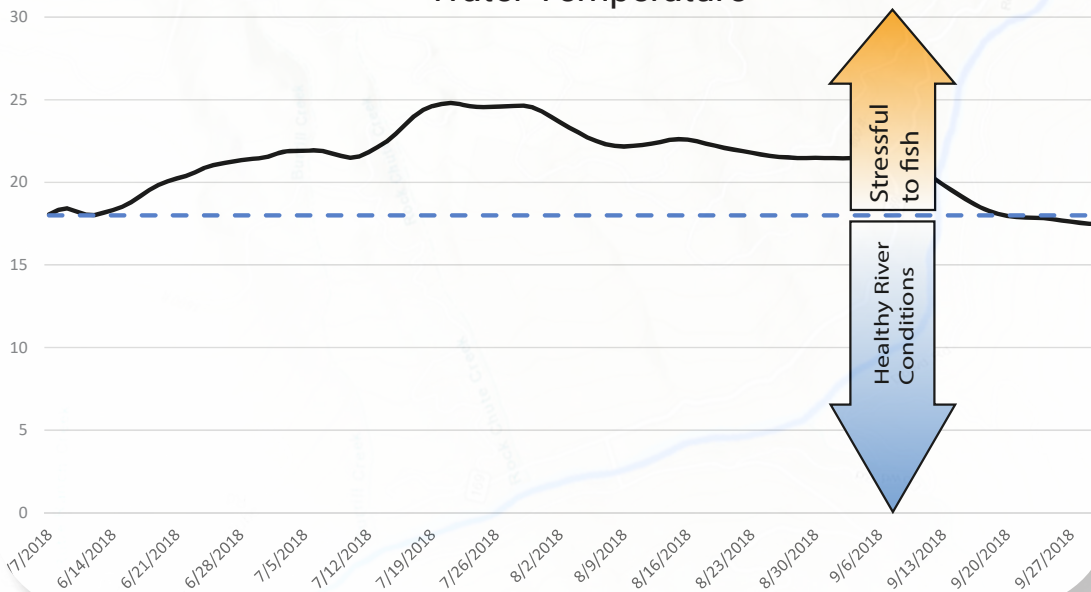
THE KLAMATH RIVER



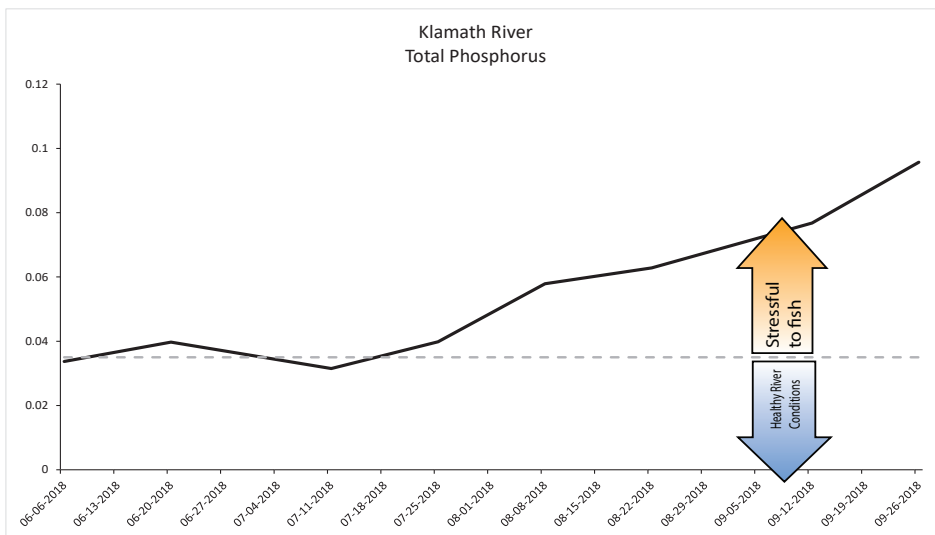
TEPA maintains a CDR site on the Klamath River at Saints Rest Bar as well. The Hoopa Reservation crosses over a small portion of the Klamath River at this site. The Saints Rest CDR monitors and records water quality data for compliance with the Hoopa Tribes Water Quality Standards for the Klamath River.

Saints Rest CDR

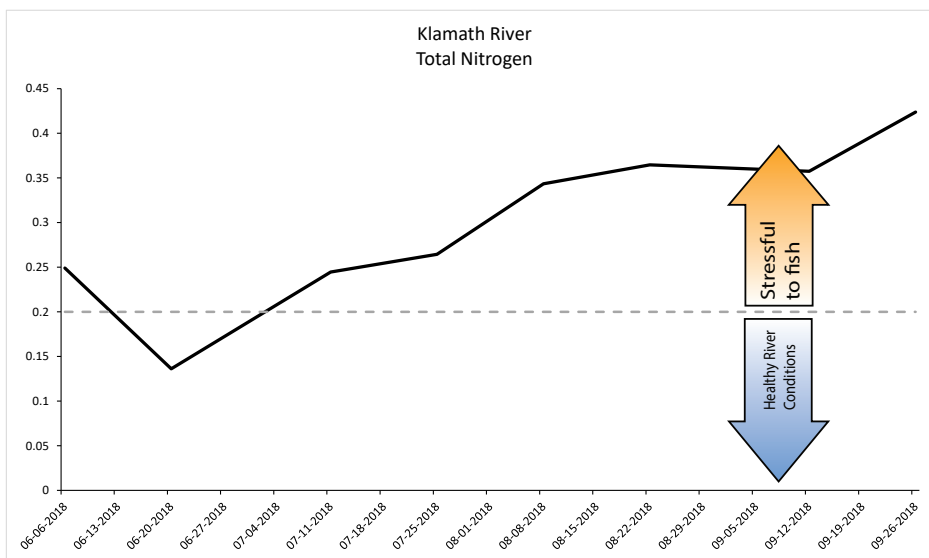
Klamath River
Water Temperature



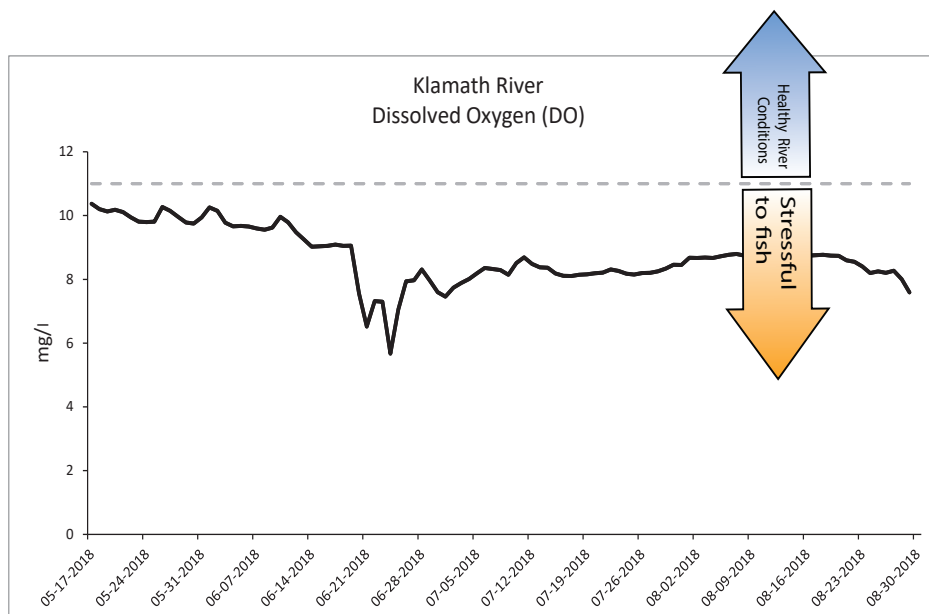
Water Temperature for the Klamath River at Saints Rest was above the 18 C° upper limit from the beginning of June through the end of September and was considered stressful to fish and other aquatic species for most of the summer sampling season.



Total Phosphorus remained above the threshold from mid July until the end of the sample season in October.

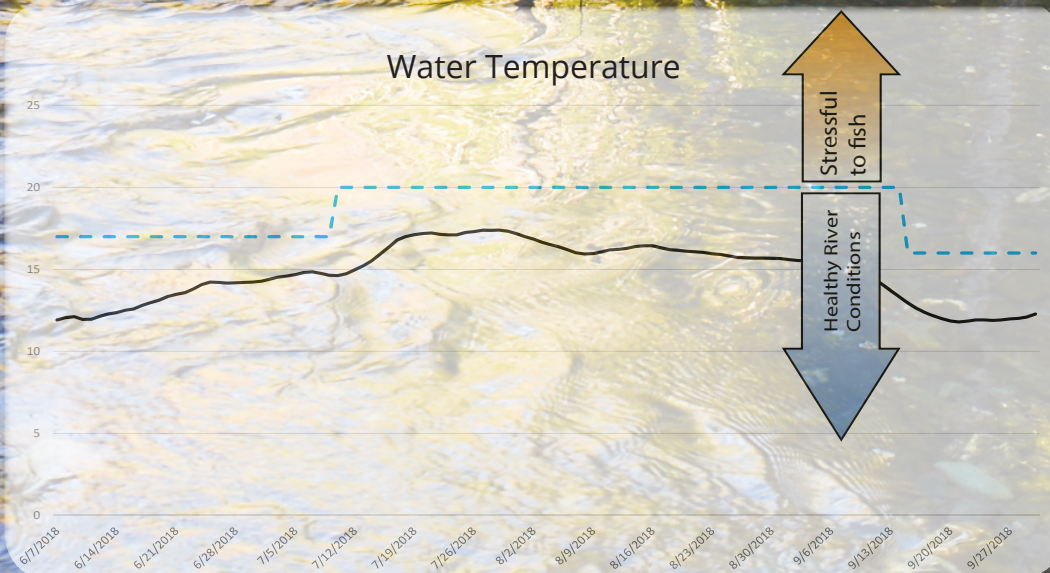


Total Nitrogen exceeded the threshold at the end of June and remained high throughout the sampling season.



Dissolved Oxygen remained below adequate levels for healthy aquatic species for the entire sampling season from May through October.

PINE CREEK



7 day average water temperature was below the 23.5 °F threshold from June through September.

SUPPLY CREEK

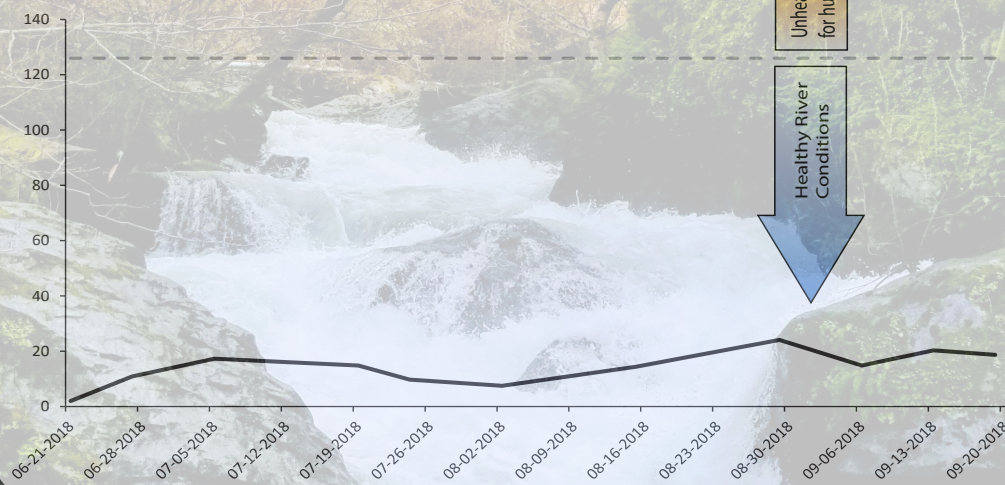


Macroinvertebrate

Index of Biological Integrity gives Lower Supply Creek a score of **GOOD** for water quality. Physical Habitat scores at 64.5% indicate that the creek is partially supportive of aquatic life.

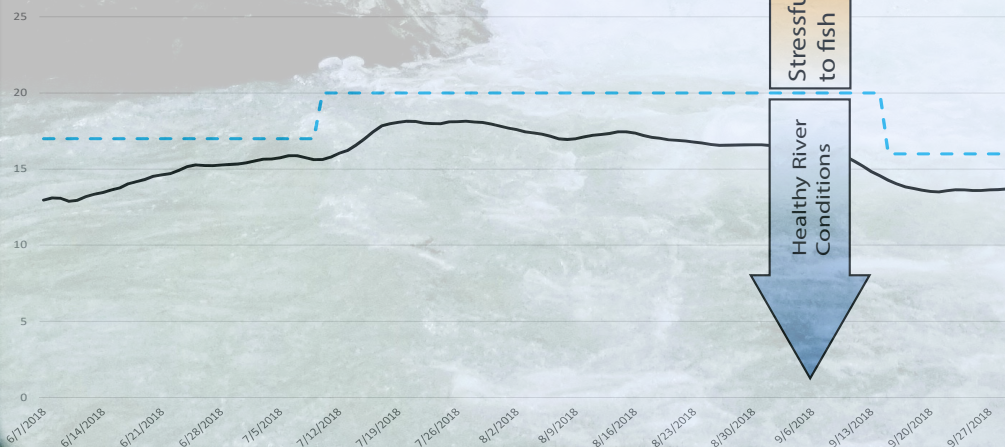


E. coli



E. coli readings were below the 126 CFU threshold from June through September.

Water Temperature



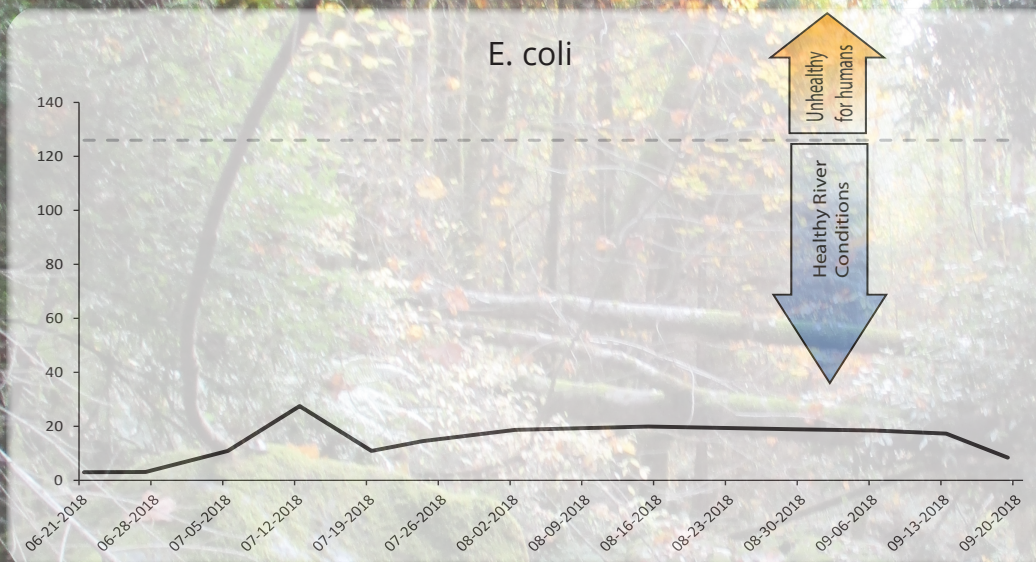
7 day average water temperature was below the 23.5 °F. threshold from June through September.

CAMPBELL CREEK

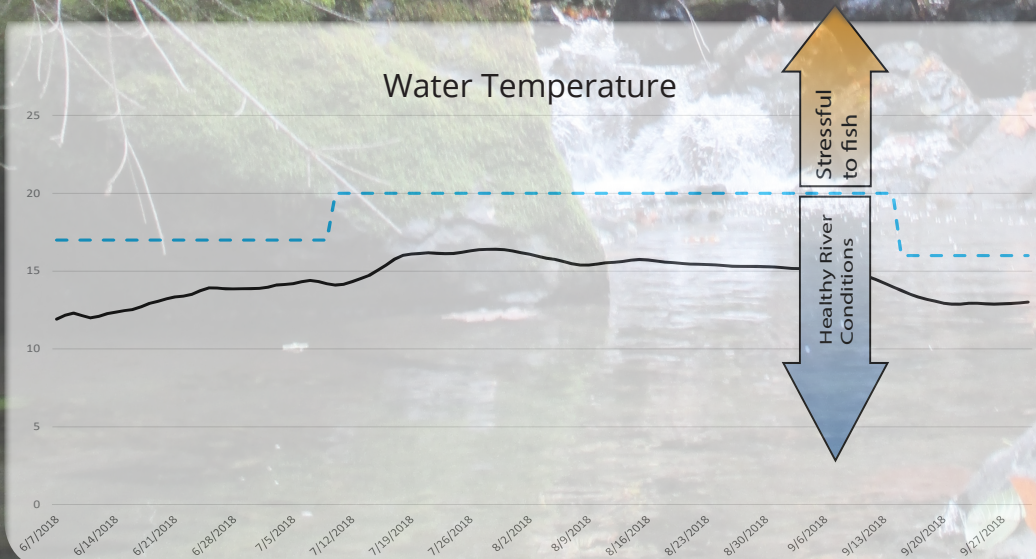


Macroinvertebrate

Index of Biological Integrity gives Lower Campbell creek a score of **GOOD** for water quality. Physical Habitat scores at 84.5% indicate that the creek is supportive of aquatic life.

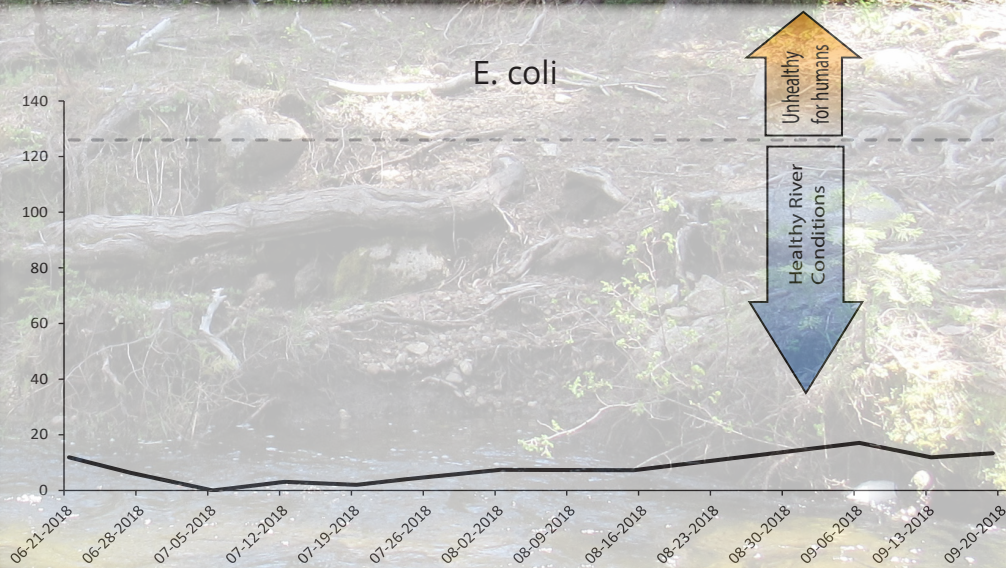


E. coli readings were below the 126 CFU threshold from June through September.

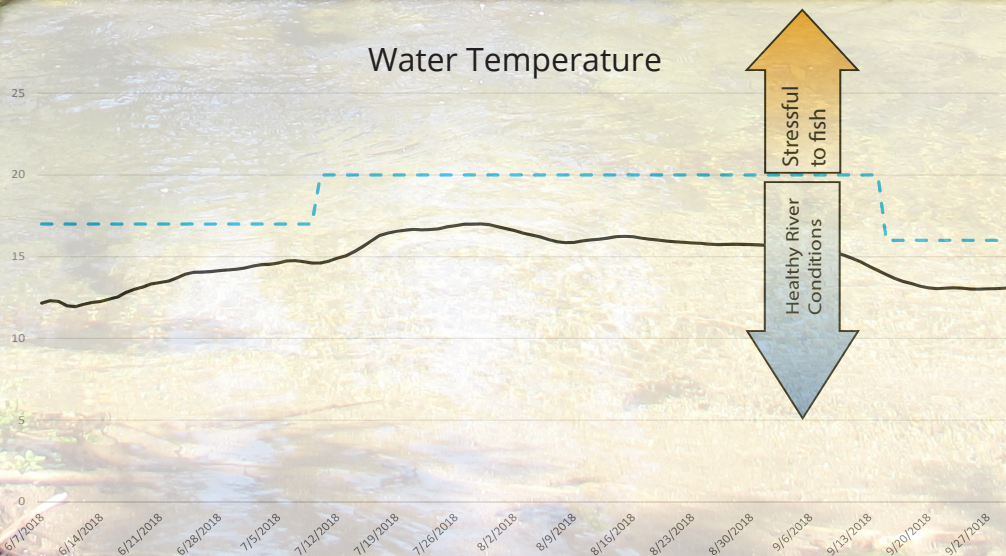


7 day average water temperature was below the 23.5 °F. threshold from June through September.

TISHTANG CREEK



E. coli readings were below the 126 CFU threshold from June through September.



7 day average water temperature was below the 23.5 °F threshold from June through September.

MILL CREEK

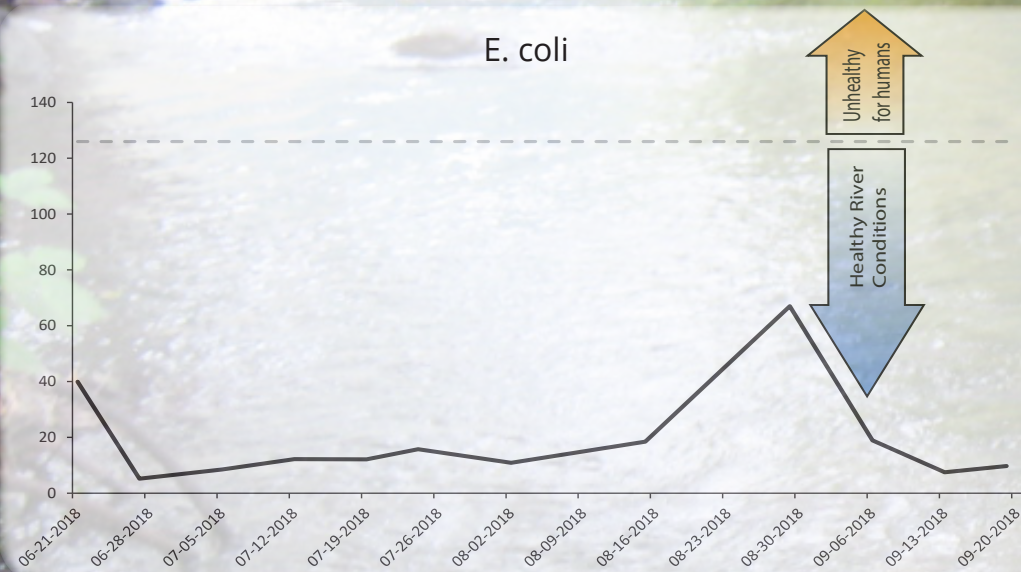


Macroinvertebrate

Index of Biological Integrity gives Lower Mill Creek a score of **GOOD** for water quality. Physical Habitat scores at 84.0% indicate that the creek is supportive of aquatic life.

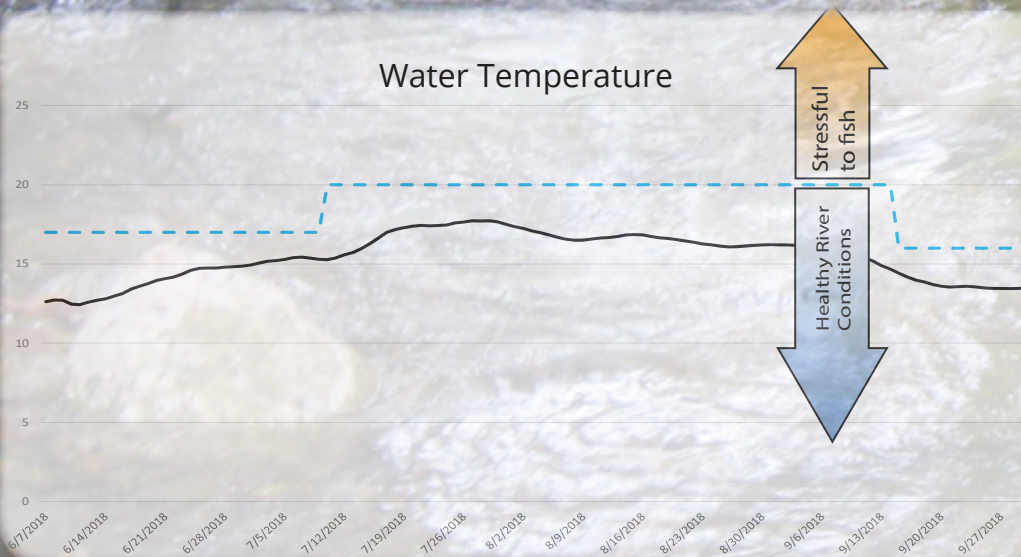


E. coli



E. coli readings were below the 126 CFU threshold from June through September.

Water Temperature

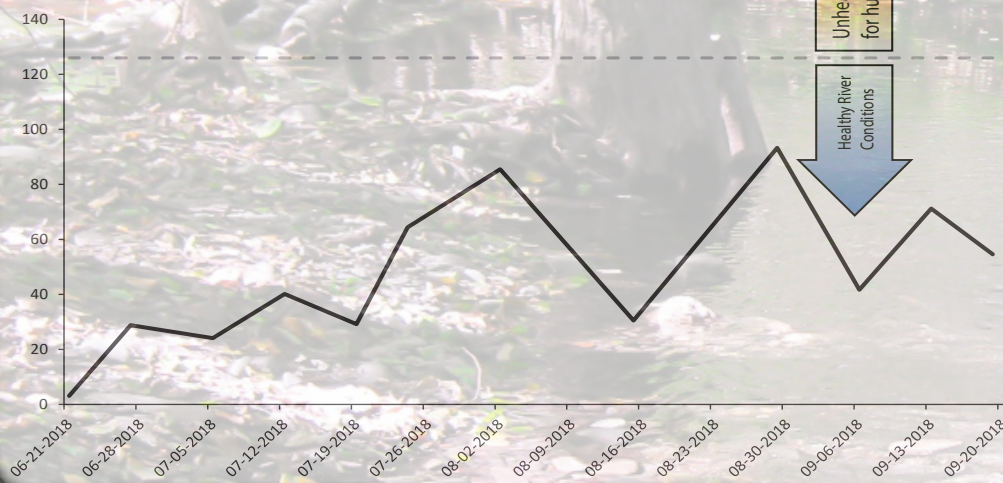


7 day average water temperature was below the 23.5 °F. threshold from June through September.

HOSTLER CREEK



E. coli

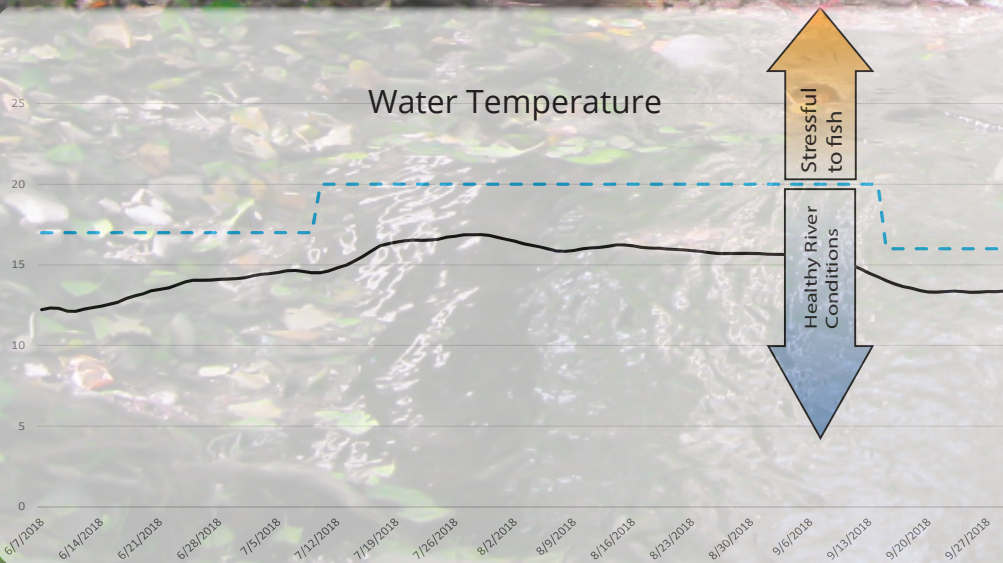


Unhealthy
for humans

Healthy River
Conditions

E. coli readings were below the 126 CFU threshold from June through September.

Water Temperature

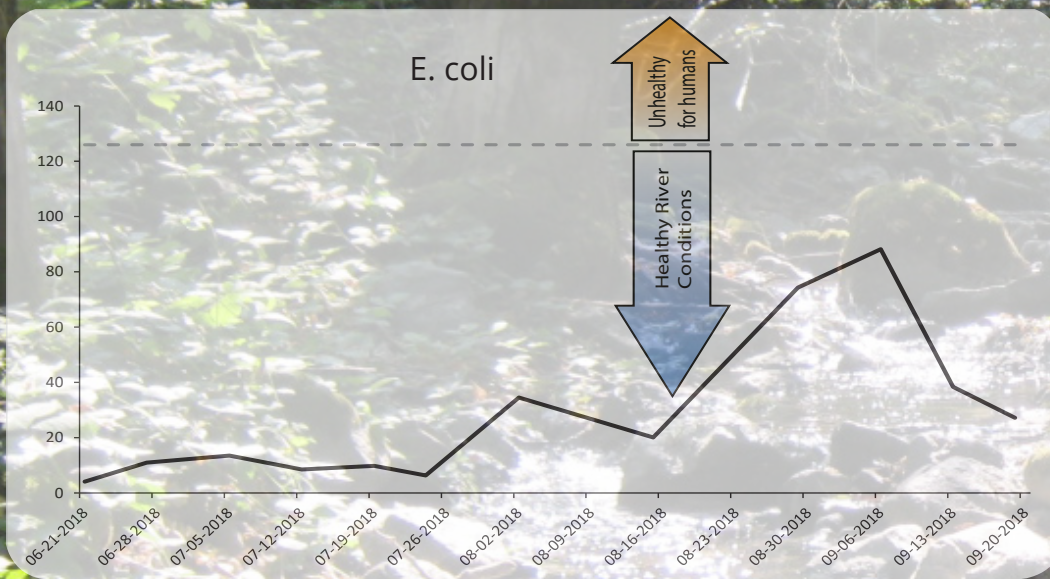


Stressful
to fish

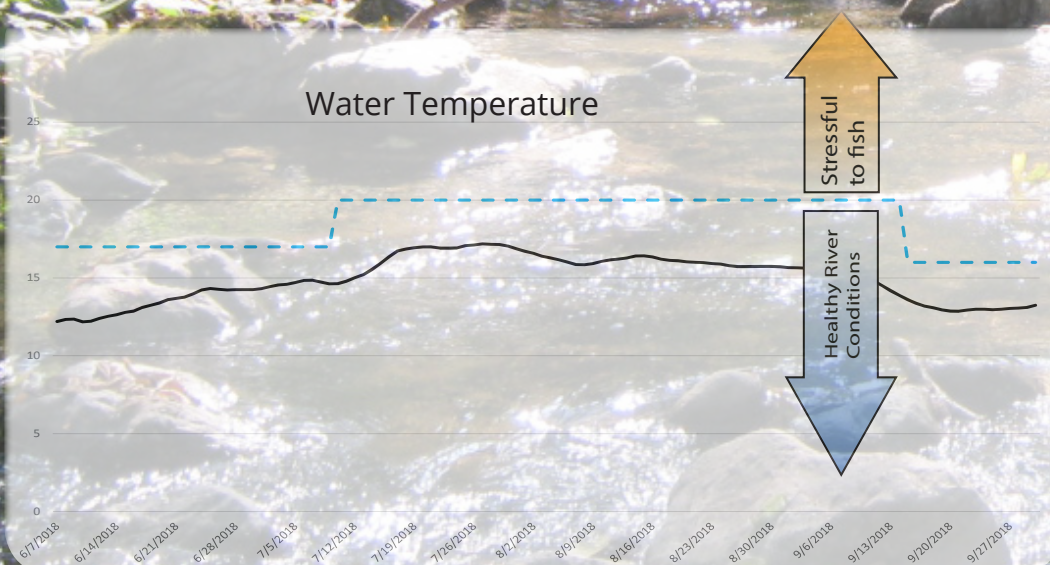
Healthy River
Conditions

7 day average water temperature was below the 23.5 °F threshold from June through September.

SOCTISH CREEK



E. coli readings were below the 126 CFU threshold from June through September.



7 day average water temperature was below the 23.5 °F threshold from June through September.