

**Water Year 2009
Bacteria Sampling Report
for the
Klamath River Estuary**



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I. Introduction

Since time immemorial the Klamath River has been the source of life and the primary influence and focus of Yurok Culture. Though current reservation boundaries are confined to a strip of land a mile wide on either side of the Lower Klamath River, ancestral territory encompassed land many times this area. Because of the central role the river has always played in their life ways, the health and preservation of the river system has become an essential part of contemporary Yurok culture. Today the Yurok people continue to use local waters for ceremonial and subsistence activities that can be impacted by poor water quality. This report summarizes the bacteria sampling performed in the Klamath River Estuary in Water Year 2009.

E. coli and Enterococci

Escherichia coli (*E. coli*) and enterococci are two types of fecal coliform bacteria. They reside in and originate from the intestinal tracts of warm-blooded animals with primary sources being human and livestock excrement. Contact with high levels of these bacteria can lead to a variety of health complications ranging from mild cramps to severe gastrointestinal distress and death in extreme, untreated cases. Primary sources of contamination on the Klamath River Estuary include human activity, failing septic systems and livestock that have free access to waterways within the watershed. In compliance with the Yurok Tribe Coastal Monitoring Program Sampling and Analysis Plan, if the level of *E. coli* exceeds 235 Most Probable Number (MPN), or 61 MPN for enterococci, per 100 ml sample, immediate retesting is to be performed.

Total Coliforms

Coliform is a family of bacteria common to soils, plants and animals. It encompasses numerous genera, only some of which are a threat to human health. As fecal coliforms are a sub-group of total coliforms, the presence and concentration of total coliforms is used as a relative indicator of fecal coliform levels. Primary sources of total coliforms on the Klamath River Estuary include the degradation and decomposition of organic plant and animal matter in the surrounding environment. Normal bioprocessing occurring in local soils provides for the reproduction of non-fecal coliform bacteria, and thus an increase of total coliforms in the summer months is seen during this season of increased biological activity. The California Water Quality Control Board's California Ocean Plan establishes a single sample retesting limit of 10,000 MPN per 100ml sample for total coliform.

II. Methods

At each sampling site 100 milliliter (ml) grab samples were collected in sterile, sealed sample bottles provided by Humboldt County Department of Public Health Lab. While wearing sterile Nitrile gloves, the seal and lid were removed from the bottle ensuring that the inside of the lid and no portion of the threaded opening of the bottle came into contact with any surface other than the water being sampled. The sample bottle was then submerged one foot below the surface while angled 45 degrees upstream. At one foot below the surface the bottle was rotated vertical and brought to the surface. The cap was replaced and the sample was placed on ice for same day transportation to the lab.

Sample location, sampling time, and bottle number were recorded for lab records. Sampling location, name of sampler, number of bathers present at sampling location, runoff quantity, amount and type of debris present in the water, tide information, length of beach, time and any additional pertinent

information were recorded for departmental records. Samples were delivered the same day to the Humboldt County Department of Public Health laboratory in Eureka, CA following appropriate and documented chain of custody procedures.

III. Site Selection

YTEP collected water samples for bacterial analysis at the following locations. (See Figure 1)

- **Klamath River Estuary (KE)**
- **Klamath River Above KCSD Waste Water Treatment Plant (KR>WTP)**
- **Klamath River Below KCSD Waste Water Treatment Plant (KR<WTP)**

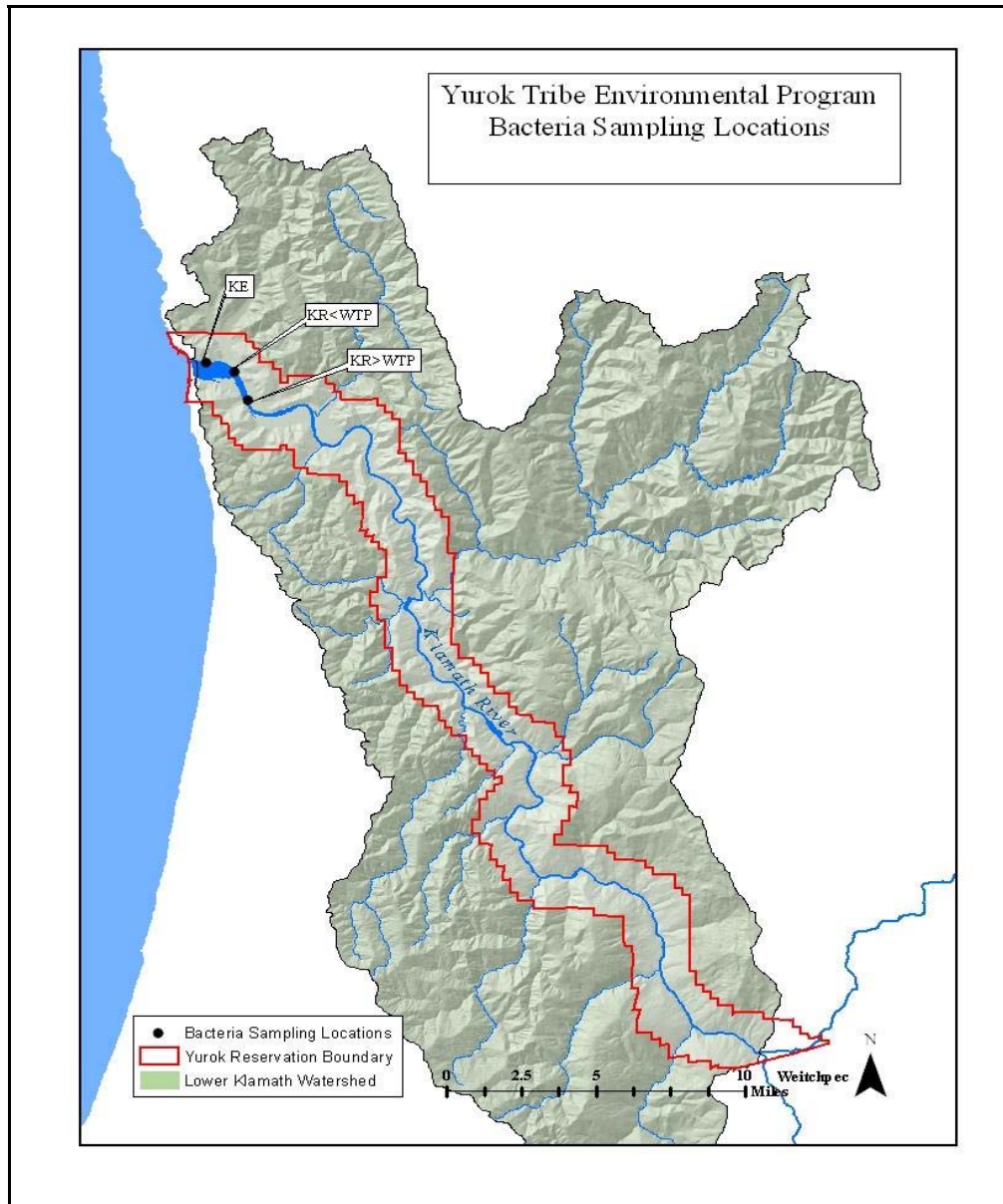


Figure 1. Sampling Site Locations



Figure 2. Klamath River Below Waste Water Treatment Plant sampling site (KR<WTP)



Figure 3. Klamath River Above Waste Water Treatment Plant sampling site (KR>WTP).



Figure 4. Klamath River Estuary sampling site (KE)

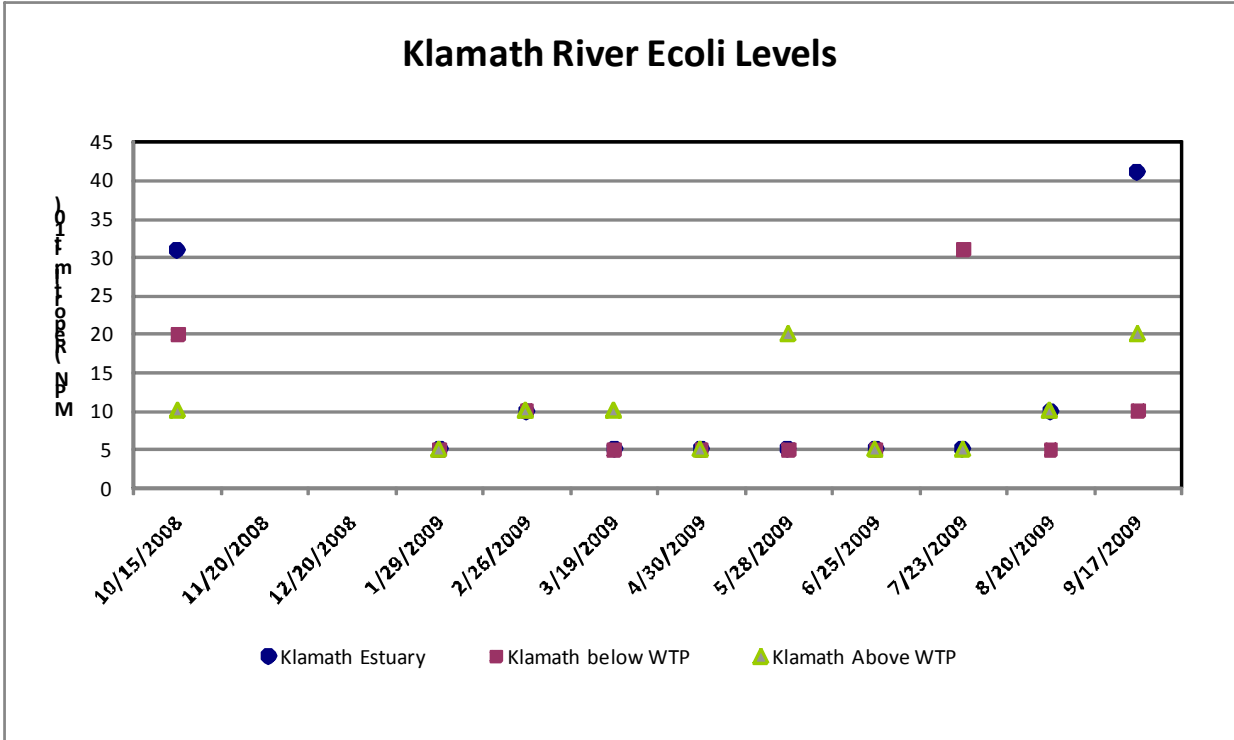


Figure 5. *E. coli* results from water collected within the Klamath River Estuary in Water Year 2009*.

*All results reported below detection limit have been altered to half of the reportable detection limit of 10 mpn for graphing purposes.

*Data was not collected in November or December.

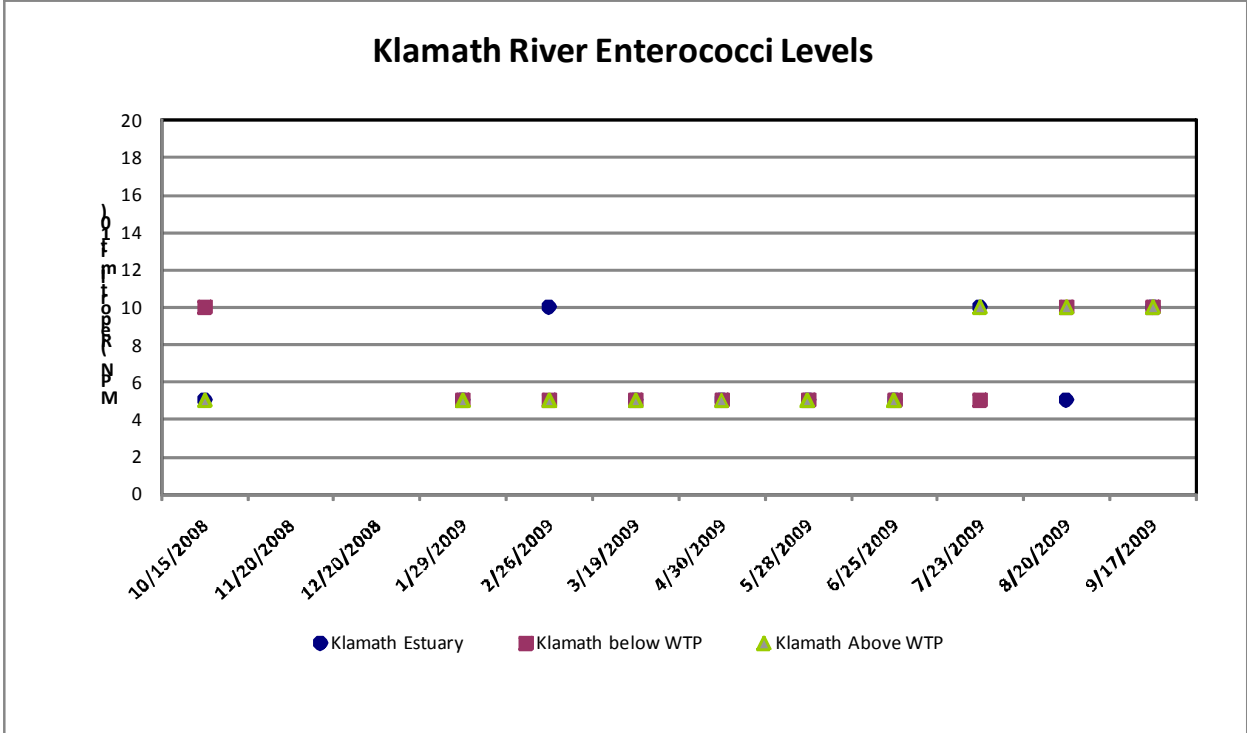


Figure 6. Enterococci results from water collected within the Yurok Reservation in Water Year 2009*.

*Note that all results reported below detection limit have been altered to half of reportable detection limit of 10 mpn for graphing purposes.

*Note that data was not collected in November or December.

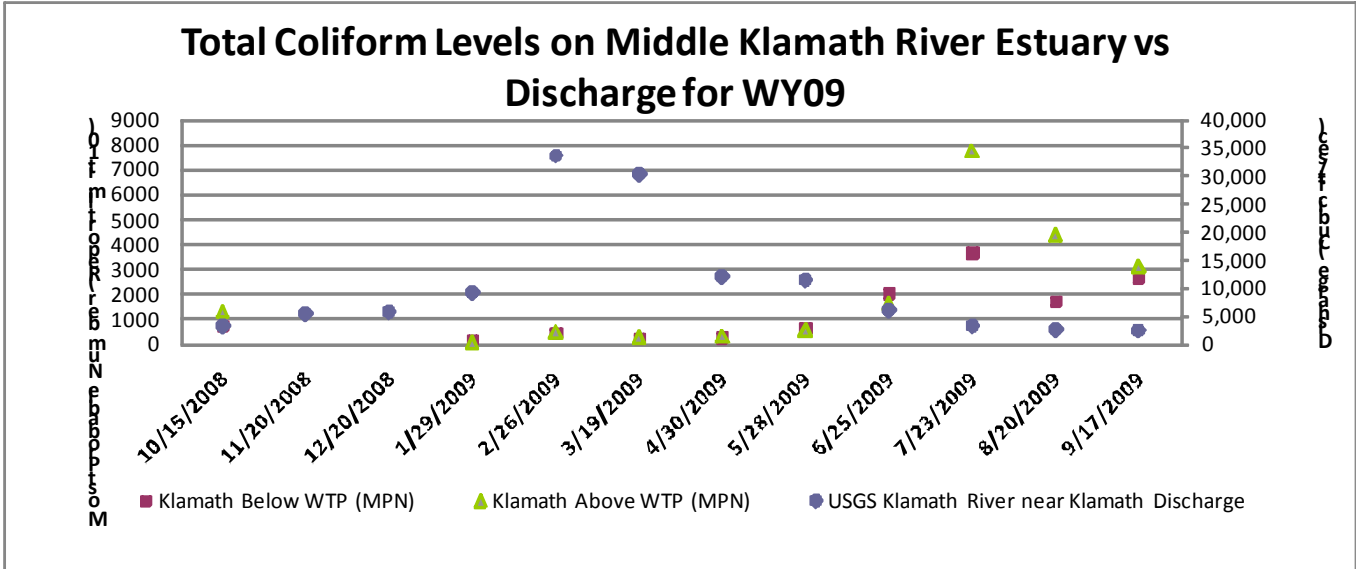


Figure 7. Total Coliform results from water collected within the Yurok Reservation in the Water Year 09

* Note that data was not collected in November or December.

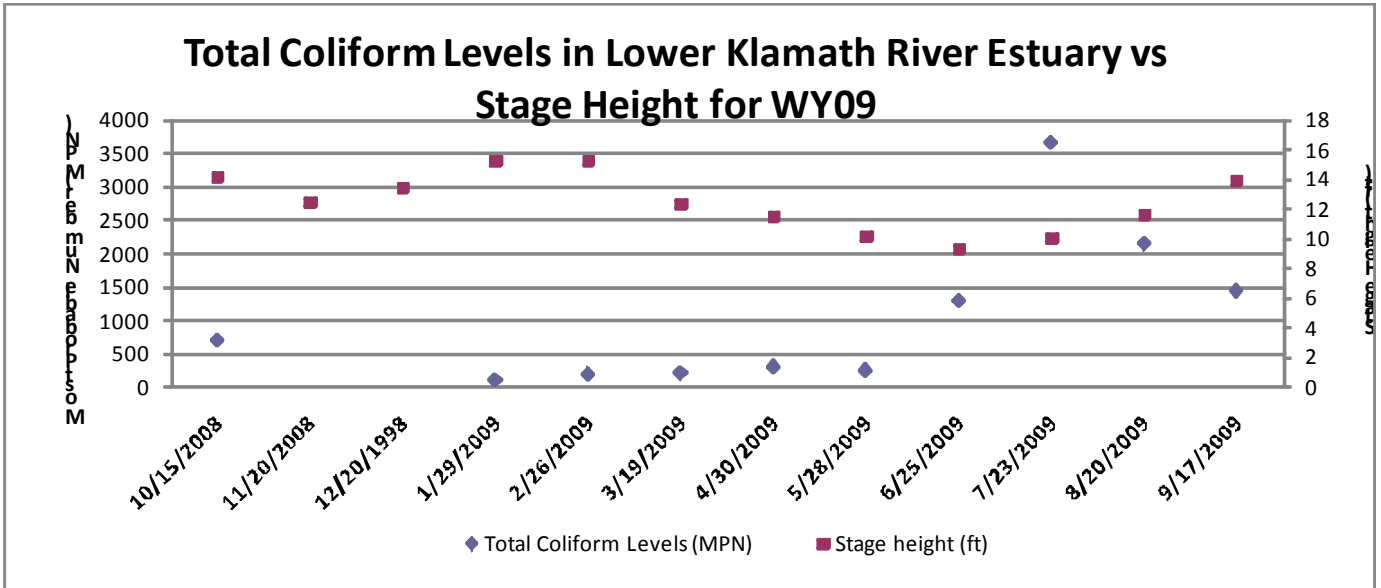


Figure 8. Estuary Stage Levels vs Bacteria for Water Year 2009

* Data not collected in November or December

V. Discussion

Total Coliform

Total coliform was found present throughout the water year, with levels dropping off during the winter and spring months, and peak numbers occurring during the summer in July. This is expected due to lower quantities of clean water entering into the river system during the dry, summer months. This decline in volume of high quality water causes a reduction in the dilution of bacterial concentrations normally observed during the wet, winter months. Total coliform levels also increase through the summer months due to more stagnant water and a higher abundance of biological activity. No sample taken in the Water Year 2009 exceeded the single sample maximum limit of 10,000 MPN/100ml sample for recreational use established by the California State Water Resources Control Board. The highest level of total coliform detected was 7701 MPN/100 ml and was recorded on 07/23/09 above the water treatment plant. The lowest level detected was 63 MPN per 100ml sample taken on 1/29/09 also above the water treatment plant.

Ecoli

Throughout the water year, all *E. coli* samples collected showed results well below the retesting limit of 235 MPN/100ml sample for recreational use set forth by the Yurok Tribe Coastal Monitoring Program Sampling and Analysis Plan. 16 of the 30 samples taken, or approximately 53 percent, tested at or below the minimum detection limit of 10 MPN/100 ml sample. The highest *E. Coli* level, 41 MPN per 100 ml sample, was measured at the estuary on 9/17/09.

Enterococci

There were no enterococci levels exceeding the retesting limit of 61 MPN per 100ml sample measured during water year 2009. In fact, all of the samples were either at or below the 10MPN/100ml sample detection limit throughout the entire year.

Total coliform levels were on average found to be higher above the water treatment plant than below it. *E.coli* and enterococci levels however did not show any trends in relation to the water treatment plant. All results tend to show higher total coliform levels in late summer months during lower flows, however, all results are well below the MPN threshold set forth by the Yurok Tribe Coastal Monitoring Program Sampling and Analysis Plan for a single sample analysis. This indicates that in Water Year 2009, coliform forming units were not a source of bacterial pollution in the Klamath River Estuary.

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\\192.168.164.2\environmental\1.0 Water\1.2 Scientific Reports and Data\1.2.2 Data, QA, and
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