SWAMP
Surface Water
Ambient Monitoring
Program

CENTRAL VALLEY BACTERIA SOURCE IDENTIFICATION SCREENING STUDY

What is it?

The purpose of this study was to perform a preliminary investigation of the occurrence of bacteria in Central Valley water bodies and evaluate potential sources. Specific monitoring objectives were to:

- Evaluate seasonal bacteria concentrations and trends in selected water bodies.
- Determine whether specific pathogens (E. coli O157:H7 and salmonella) are present.
- Evaluate potential sources of fecal contamination and group potential sources to human, cattle, or other animals.
- Document the presence of source identifier DNA in viable vs. non-viable Bacteriodales cells in relation to the presence of E. coli and pathogens.
- Make recommendations for future bacteria source identification studies.

Harding Drain.

Sixteen monitoring sites were selected based on a review of existing bacteria data and land use. The sites had a history of elevated bacteria results and were potentially influenced by a variety of sources. Samples were collected on four events representing spring runoff, summer irrigation, fall dry season, and winter runoff. Samples were analyzed for E. coli, pathogens (E. coli O157:H7 and Salmonella spp), Bacteriodales, and Bacteriodale viability.

Sutter Creek.

E.coli is a fecal coliform bacteria that is commonly used as a pathogen indicator. E. coli is a good general assessment tool because of existing assessment thresholds and the ability to compare results with other data from these water bodies. E. coli O157:H7 and Salmonella results were used to help determine the presence of actual pathogens in the water bodies.

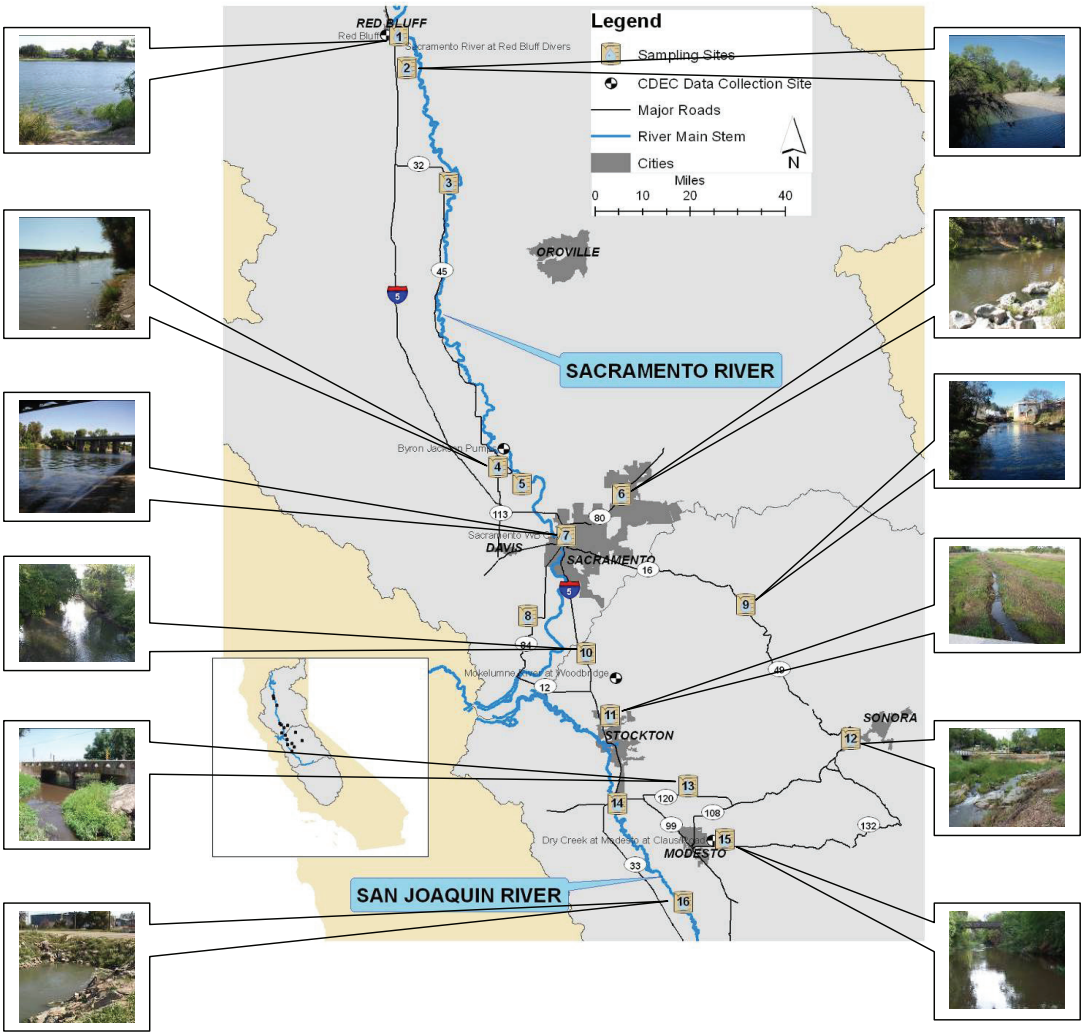
Bacteriodales are anaerobic, intestinal bacteria with a short survival period outside their host. Host specific molecular assays (human, cow, dog, and universal warm blooded animals) were used to help identify fecal sources. Bacteriodale viability was used as an indicator of how recently the fecal material entered the water body.

Why is it important?

Illness caused by exposure to pathogens is a concern for water-contact recreation and drinking water. Many Central Valley rivers and streams are used for contact recreation, including activities like swimming, rafting, and kayaking. Recent outbreaks of E. coli O157:H7 and Salmonella in food have also raised concerns about water supply systems and management practices used in raising crops.

Monitoring conducted by both SWAMP and the Irrigated Lands Regulatory Program has found elevated concentrations of E. coli in water bodies throughout the Central Valley. In many instances, E. coli concentrations exceeded the USEPA guideline of 235 MPN/100 mL for full contact recreation. Some sites exceeded the guideline during every sampling event, while others exceeded the guideline only during flushing rainfall events.

Information on the distribution of elevated E. coli levels and likely sources is necessary to make informed management decisions to protect water quality and public health.



How will this information be used?

All monitoring data from this study was entered into the SWAMP database and is available to the public through the California Data Exchange Network (CEDEN). The report and findings have been shared with interested Water Board programs and agencies, and is available to the public at the link below.

The findings from this report emphasize the need for additional monitoring and continued work to improve methods for source identification. While 98% of samples indicated fecal inputs from warm blooded animals, 27% of samples indicated inputs from cows and only 9% of samples indicated inputs from humans. E. coli levels were higher at sites with human and cow fecal inputs. Over forty percent of samples had detectable levels of Salmonella, but there was no noticeable correlation between Salmonella levels and source. Only two samples tested positive for E. coli O157:H7.

For more information click here.