

Monitoring Water Quality Near Homeless Encampments on Santa Rosa Creek

GEP 396 Water Research Methods, Sonoma State University

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Introduction

- The recent increase in homelessness across California has raised concerns about water quality in urban creeks.
- The goal of this project is to examine if there is a correlation between homeless activity and water quality in urban creeks in Santa Rosa.**
- In partnership with the City of Santa Rosa Creeks Team, we monitored evidence of homelessness along 15 miles of Santa Rosa Creek from October 2023 - April 2024 and compared homelessness levels to levels of the fecal bacteria *E. coli* detected in water samples.
- Results from data collected at the end of the dry season show that the *E. coli* levels (from any animal source, including humans) were higher in areas where homelessness was recorded.
- Results from the spring show a decrease in *E. coli* levels throughout the creek, which could be due to the rains and resulting fast flowing water flushing bacteria downstream.

Methods

- A datasonde measured water temperature, pH, dissolved oxygen, and conductivity
- Grab water samples were collected in a sterile glass bottle attached to a dipper pole, transferred to plastic bottles, and transported on ice
- Santa Rosa's Laguna Treatment Plant Environmental Lab analyzed the water samples for phosphorus (EPA 200.7 method) and *E. coli* (IDEXX Colilert quatitray method)
- The Santa Rosa Creek Team provided reports on where they noted evidence of unoused individuals on their weekly visits to remove trash along Santa Rosa Creek
- Daily rainfall data was collected from Weather Underground
- Daily flow rate along Santa Rosa Creek was collected from the USGS gauge 11466320 at Willowside Road on Santa Rosa Creek



Left: students collecting water samples.

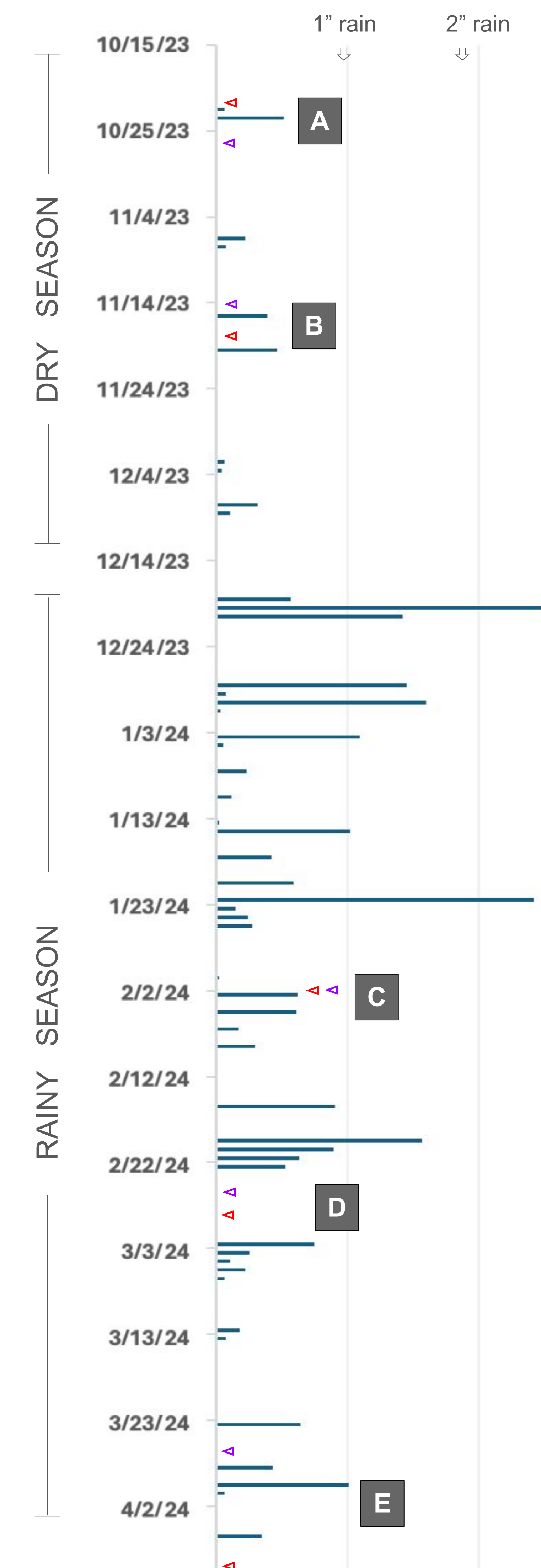


Right: representative homeless encampment.

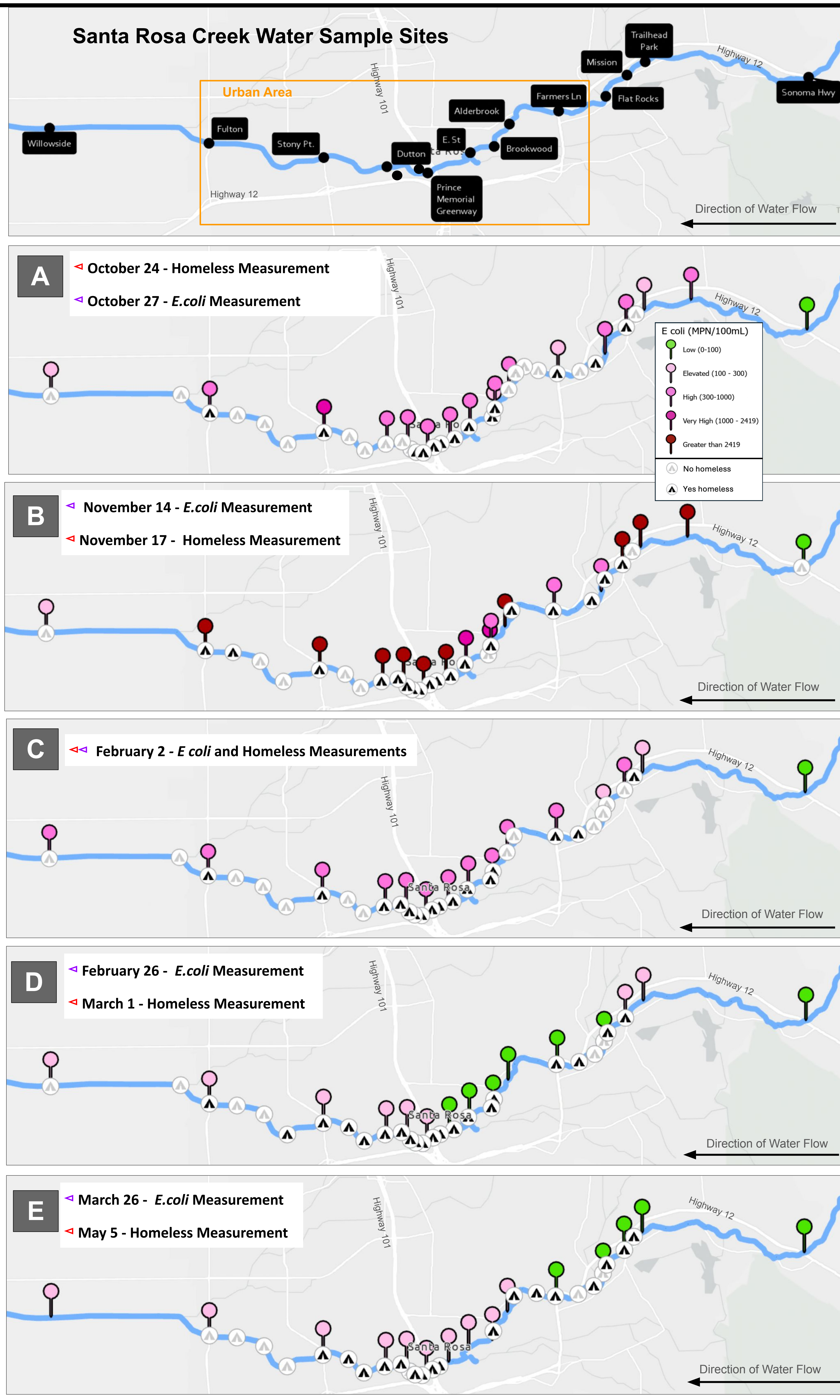
Acknowledgements

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Timeline of Rainfall and Data Collection



Parameter	Unit	Acceptable Range	Results (n=79)	Percentage of Data Points Within Acceptable Range
E coli	MPN/100mL	<100	20 - 2420+	20%
Phosphorus	mg/mL	<0.05	0.04 - 0.39	25%
Dissolved O ₂	%	>80	63 - 102	83%
Dissolved O ₂	mg/L	>5	6.2 - 12.1	100%
Water temp	°C	N/A	9.2 - 13.0	100%
pH	N/A	6.5 - 8.5	7.1 - 8.6	100%
Conductivity	µs/cm	200-1000	190-564	100%



Conclusions

- Homelessness was consistently reported in the urban area of Santa Rosa Creek throughout the study.
- The Santa Rosa Creeks Team regularly reported cleaning up human feces at the following locations: Mission Blvd, Yulupa Ave, Farmers Ln, Brookwood Ave, along the Prince Memorial Greenway from Santa Rosa Ave to Dutton Ave, Stony Pt Rd, and Fulton Rd.
- At the end of the dry season in October (Panel A) and November (Panel B), we found a correlation with high levels of *E. coli* in areas with the highest concentrations of homeless encampments, especially in the Prince Memorial Greenway region.
- Elevated rainfall began in mid-December. Data collected in February and March (Panels C, D, and E) showed that some homeless sites were less used during the rainy season, although most remained occupied.
- Panel C shows that *E. coli* levels were reduced after the first heavy rains of the season.
- Panels D and E show very low levels of *E. coli* upstream of the Prince Memorial Greenway region during late February and early March, when the water was rushing very fast down the creek.
- Measurements of the USGS stream gauge near at Willowside Rd confirmed that the water flow rate increased as the rainfall amount increased (data not shown).
- We consistently measured low levels of *E. coli* at the most upstream site, Sonoma Hwy.
- We were surprised to find elevated levels of *E. coli* at the most downstream sampling location (Willowside Rd) throughout the study as this location was far from services and not impacted by homelessness.

Next Steps

- It is important to note that the *E. coli* detected could come from either human or animal feces.
- We are collaborating with scientists in the SSU Biology Dept and the Southern California Coastal Water Research Project to test our water samples for relative amounts of the HF183 gene using qPCR, which tests specifically for human feces, ruling out other animal sources (such as dogs or birds).