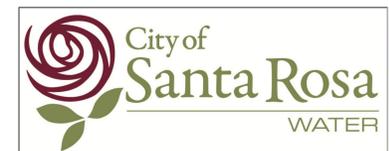


Analysis of Water Quality Near Areas of Homeless Activity on Santa Rosa Creek and Russell Creek



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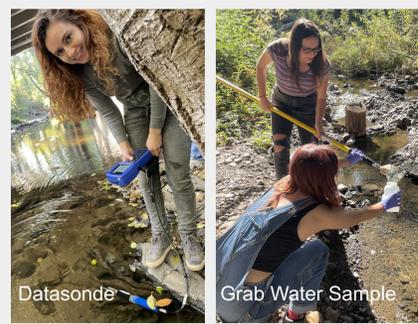


RESEARCH GOAL
Examine the correlation between homeless activity and water quality in two urban creeks in Santa Rosa, CA.

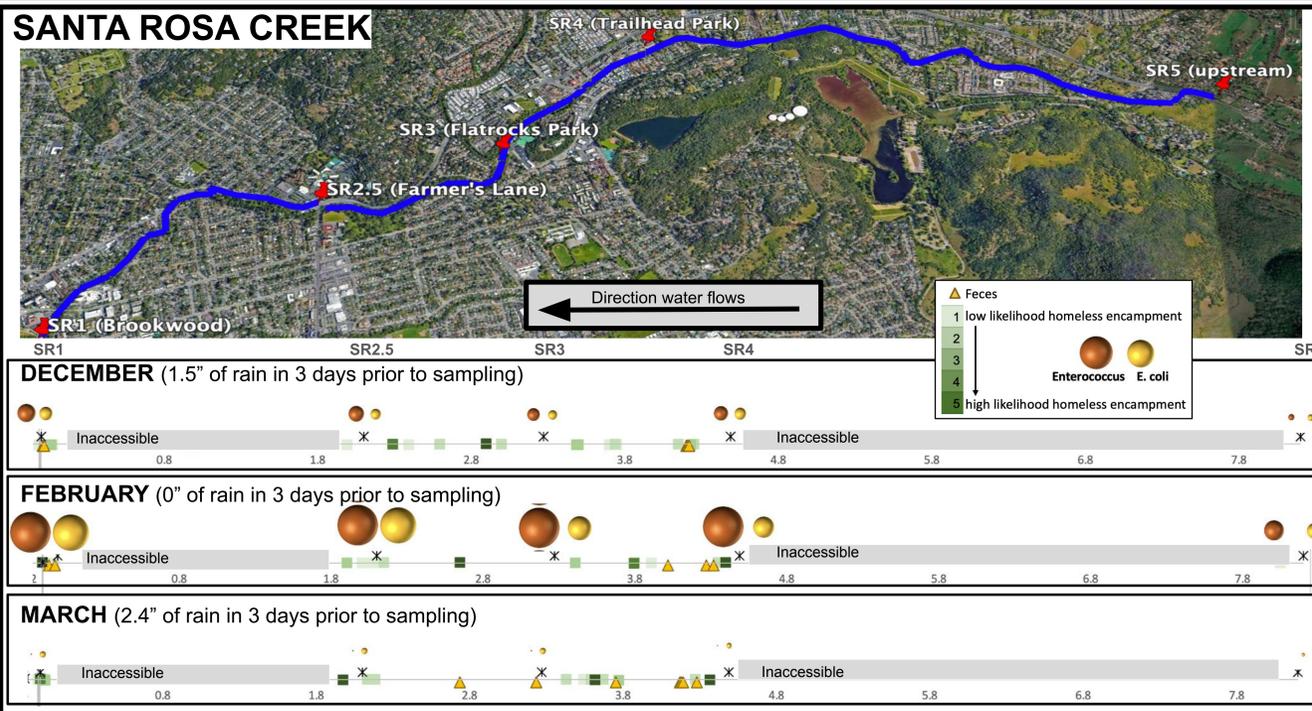
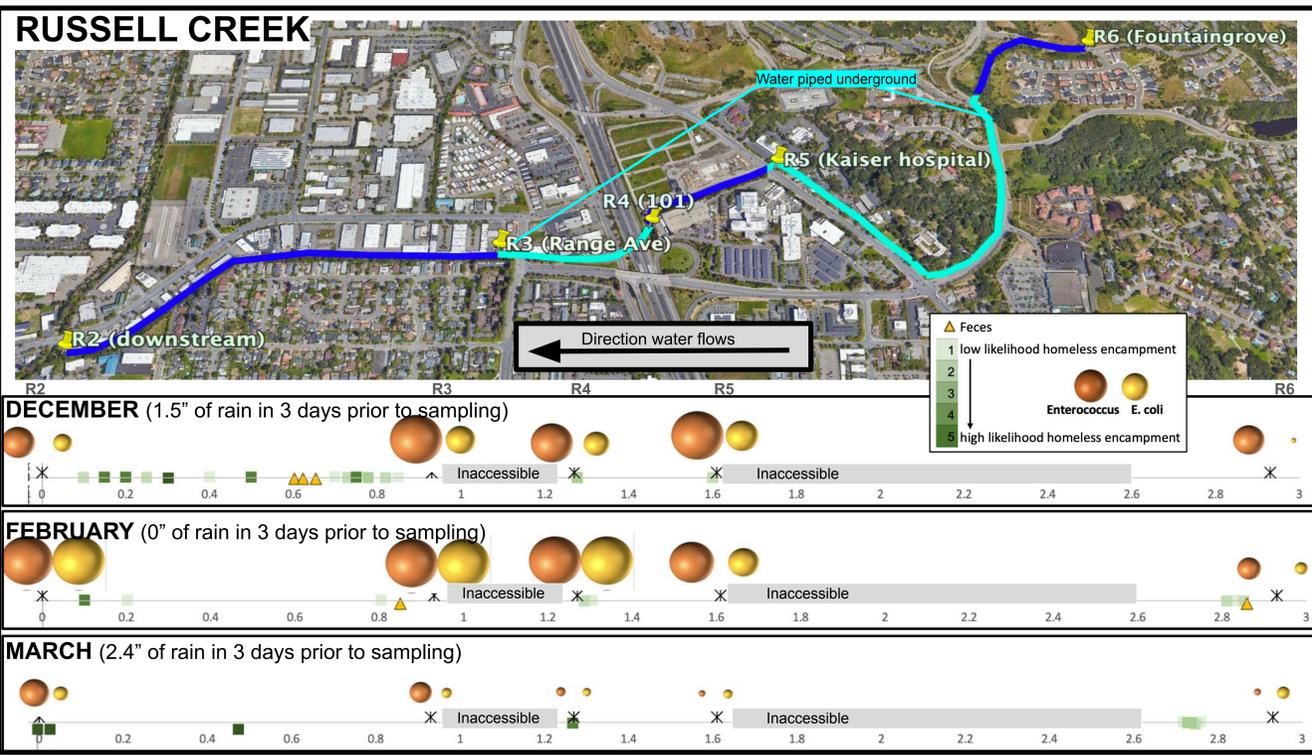
Abstract
Water quality was tested upstream and downstream of areas with frequent homeless encampments on Santa Rosa Creek and Russell Creek. Five locations were chosen per creek. Water samples were taken once per month in December 2022, February 2023, and March 2023. Water quality parameters tested were temperature, pH, conductivity, nitrogen, phosphorus, ammonia, total suspended solids, and two strains of fecal bacteria (Enterococcus and *E. coli*). Where accessible, walking surveys were done along the creek near the water sampling locations to approximate the level of homelessness and presence of fecal matter. We did not detect a consistent correlation between water quality and indicators of homelessness. We observed a decrease in the levels of Enterococcus and *E. coli* at all 10 of our sampling sites following a large rain event in March.

Methods

- A datasonde measured water temperature, pH, and conductivity
- Grab water samples were collected in a sterile glass bottle attached to a dipper pole without disturbing the sediment and transferred to plastic bottles
- Santa Rosa's Laguna Treatment Plant analyzed the water samples for nitrogen, phosphorus, ammonia, total suspended solids, fecal bacteria (Enterococcus, *E. coli*)
- Where accessible, areas of creek near our water sampling locations were monitored for (1) presence of feces and (2) homelessness using photos collected during a walking survey
- The criteria in the table below was used to determine a Homelessness Likelihood Score for each photo taken



Homeless Likelihood Scoring Guide				
1	2	3	4	5
Low confidence of homelessness (some trash, shirt, or toilet paper)	Sleeping artifact but probably not recently used or washed away	Minimal more recent sleeping artifact(s)	Many bags +/- sleeping artifacts but no tent or person	Definitely homelessness (complete tent structure OR person present)
Sleeping artifacts = cardboard sheet, blanket, sleeping bag, pillow, cushion				



	Unit	Acceptable Range	Russell Creek	Santa Rosa Creek
pH		No Standard	7.5 - 8.0	7.8 - 8.4
Temperature	C	No Standard	9.0 - 12.6	6.6 - 10.4
Conductivity	uS/cm	<375	137 - 380	153 - 264
Phosphorus	mg/L	unavailable	0.11 - 0.76	0.08 - 0.10
TSS	mg/L	<100	1.1 - 70	ND - 60
Ammonia	mg/L	unavailable	0.03 - 0.07*	0.02 - 0.05*
Nitrogen	mg/L	unavailable	ND - 3.95**	ND - 3.46**

Other Water Quality Data
The table to the left represents water quality measurements taken throughout the study that were unrelated to fecal bacteria measurements. In consultation with the North Coast Regional Water Quality Control Board, we determined that these values fell within normal limits for regional creeks.

Results and Conclusions

- The 3 horizontal boxes under each map show the data collected in December, February, and March. The x-axis represents kilometers traveled along the creek.
- The orange triangles represent a location where feces was noted.
- The green squares indicate homelessness. The darker green squares represent a higher confidence that someone had recently slept at that creekside location.
- In all months, levels of fecal bacteria (Enterococcus [orange] and *E. coli* [yellow]) increase when moving from the right side (upstream) to the left side (downstream) of the map.
- There is not a consistent correlation between homeless activity (green squares) and fecal bacteria (orange and yellow spheres) measured in water.
- In February, where there was no rain in the 3 days preceding the water sampling, fecal bacteria levels were highest at all locations compared to other months where it rained >1.5" just before the water was sampled. Large rain events seem to flush fecal bacteria out of both Russell and Santa Rosa Creeks.
- Next steps** include adding additional monitoring sites and a Bacteroides test to identify the source of fecal bacteria (human, dog, human) being detected in the water.

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