

**RISING  
WATERS**



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# Analysis of Water Quality Near Homeless Encampments Along Santa Rosa Creek and Russell Creek

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May 2, 2023

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Lily



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Anna



Athena



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Ylla



**GOAL: Examine the correlation between homeless activity and water quality in urban creeks in Santa Rosa**

Water was tested upstream and downstream of areas with frequent homeless encampments on Santa Rosa Creek and Russell Creek



***Deciding WHERE to test the water***

# RUSSELL CREEK



# SANTA ROSA CREEK



***Deciding HOW to test the water***



Water temperature, pH, conductivity



Grab sampling of water



**Lab analysis**

nitrogen, phosphorus, ammonia, total suspended solids, fecal bacteria (Enterococcus, *E. coli*)

***Deciding HOW to measure  
homelessness***




# Quantifying Levels of Homelessness

Where accessible, we walked between water sampling locations and took pictures to determine **Encampment Likelihood Score (1-5)**.


1	Low confidence of homelessness (just a toothbrush, shirt, toilet paper)	
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2	Sleeping artifact but probably not recently used or washed away from original location	
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3	Minimal more recent sleeping artifact(s)	
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4	Many bags +/- sleeping artifacts but no tent or person	
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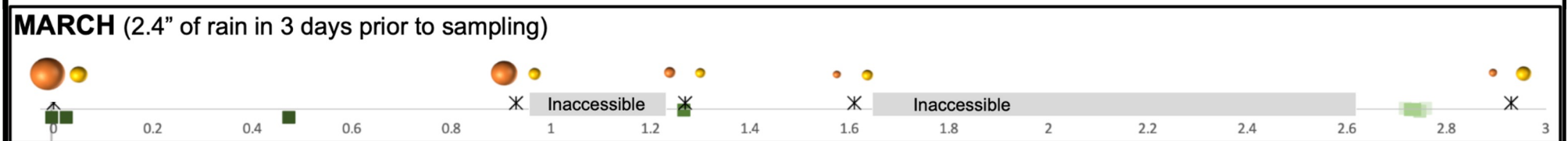
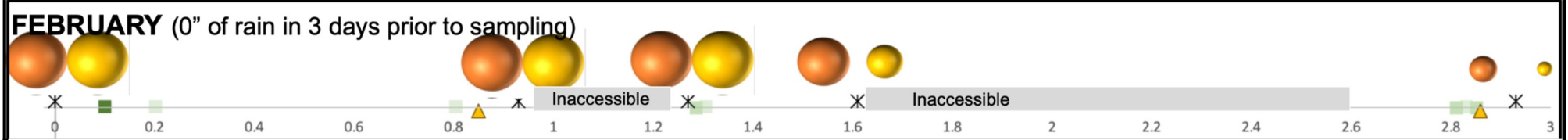
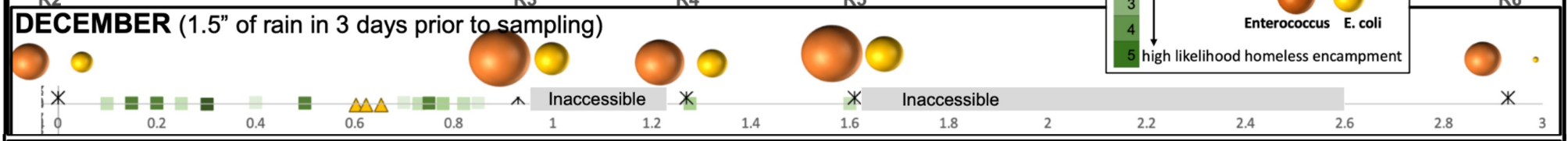
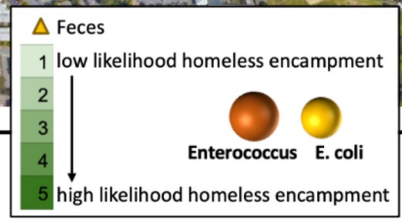
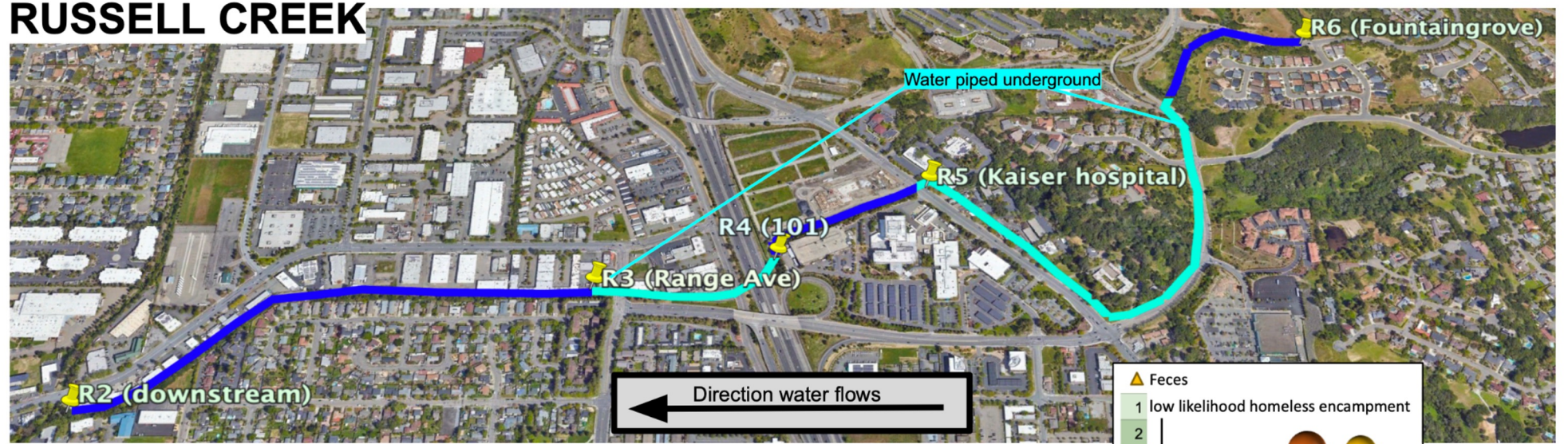
- Sleeping artifacts
- Cardboard sheet
  - Blanket
  - Sleeping bag
  - Pillow
  - Cushion

5	Definitely homelessness (complete tent structure OR person present with supplies OR many bags with sleeping materials) (some photos have comments @ a person present)	
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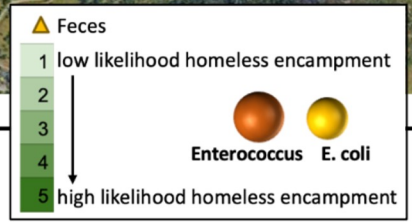
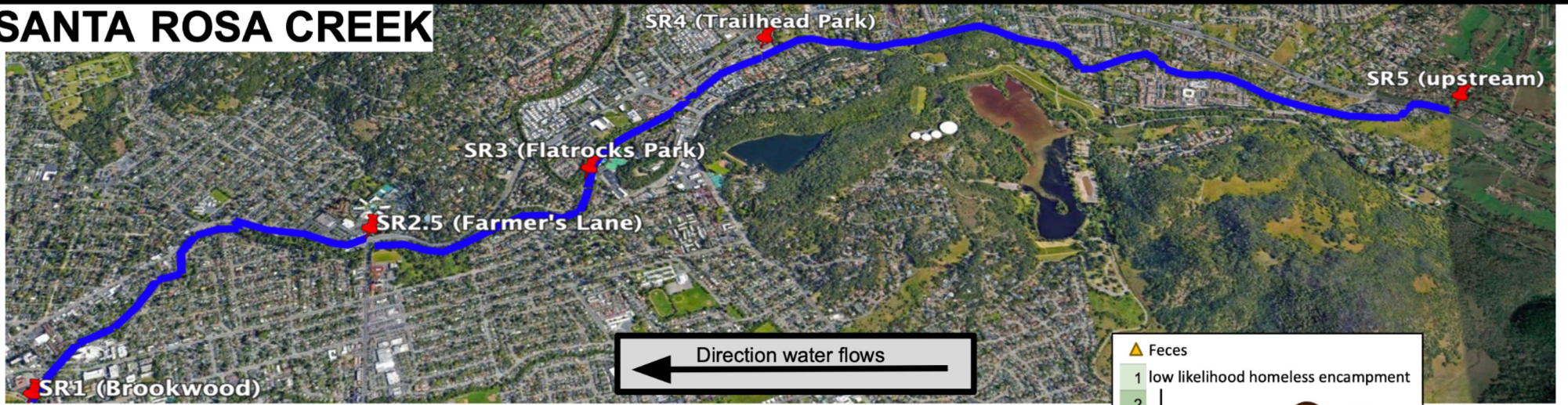
# ***Results***

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

# RUSSELL CREEK



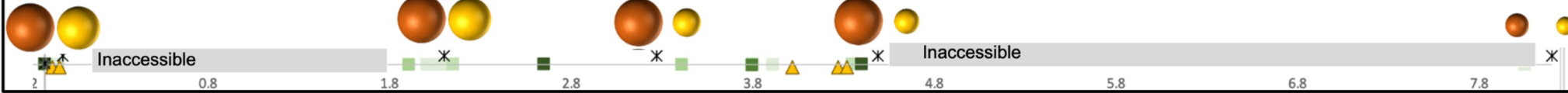
# SANTA ROSA CREEK



## DECEMBER (1.5" of rain in 3 days prior to sampling)



## FEBRUARY (0" of rain in 3 days prior to sampling)



## MARCH (2.4" of rain in 3 days prior to sampling)



**April 11th: Russian River Watershed Association Presentation**

**April 13th: Poster shown at CSU-WATER Annual Conference in Monterey**

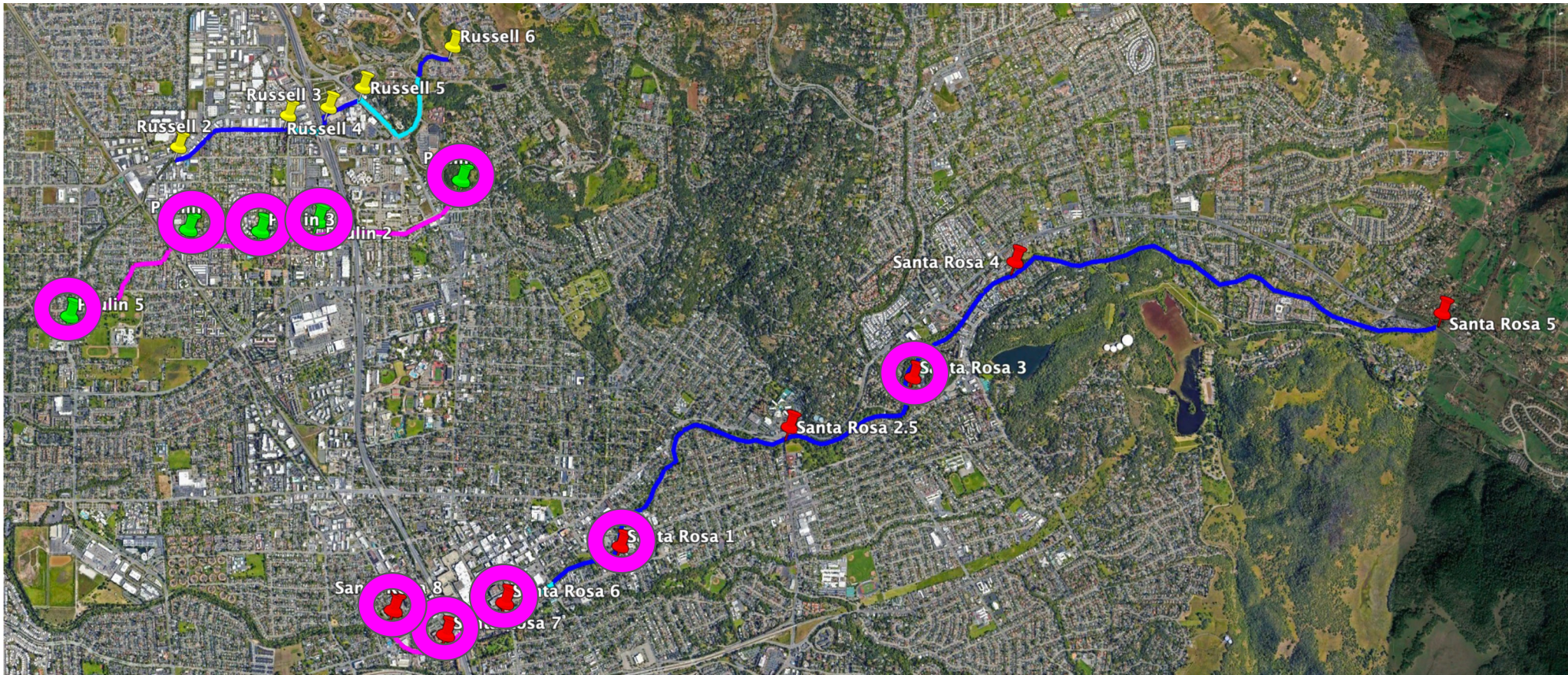
**May 2nd: Poster shown at SSU Student Research Symposium**



***Next Steps***

# APRIL 27 WATER SAMPLE

- Extend downstream on Santa Rosa Creek to Prince Memorial Greenway
- Add Paulin Creek







**Santa Rosa 8**  
Prince Memorial  
Greenway @ Pierson



**Santa Rosa 7**  
Prince Memorial  
Greenway after 101  
(many encampment  
structures)



**Santa Rosa 6**  
Beginning Prince  
Memorial  
Greenway





**Paulin 5**  
@ Marlow  
(downstream)

**Paulin 4**  
@ Coffey Lane

**Paulin 3**  
@ Hardie's Lane  
(saw homeless)

**Paulin 2**  
Downstream of 101  
@ McBride

**Paulin 1**  
Upstream of Chanate  
(expected clean)



## NEXT STEPS: BACTEROIDES TESTING

### OPTION A

Choose three locations to test one water sample for human vs bird vs dog fecal source  
COST FOR 1 SAMPLE: \$750

### OPTION B

Run this experient in local lab using protocol provided by John Griffith at Southern California Coastal Water Research Project (SCCWRP)  
COST FOR 1 SAMPLE: \$70 (plus one-time equipment and training costs)

### PROCEDURE

- Collect water samples \$5
- Filter bacteria out of the water (Laguna treatment plant? SSU?) \$10
- Flash freeze bacteria in liquid nitrogen, store in -80 freezer No cost if we can borrow
- Homogenize the bacteria using a BeadBeater; freeze extracts Up to \$5,000
- DNA purification (using SSU equipment) \$10
- qPCR run in 96 well plates (using SSU equipment) \$20
  - Labor cost: \$25 (10 sample minimum)
  - Training cost

## NEXT STEPS: DEEPER LOOK AT SURROUNDING AREA

- SUMMER 2023: 2 students
- FALL 2023: research class
  
- Storm drain map (culverts)
- Who can we partner with to get more information about homeless activity?
  - Homeless clean out schedules

# Thank You

- Aaron Nunez and Nick Sudano, Santa Rosa City Water Department
- Rachel McCormick and her team at the Laguna Treatment Plant
- Rich Fadness, North Coast Regional Water Quality Control Board
- Kerry Wininger, SSU Center for Environmental Inquiry
- Funded by Rising Waters
- School of Social Science Dean's Student Travel Award

# Project Timeline

March 2022	Initial meeting: SSU Center for Environmental Inquiry, Santa Rosa Water Department, Regional Water Quality Control Board
August 2022	Planning with collaborators
September 2022	Students being project design
October 2022	Sampling locations and protocol finalized
November 2022	Water sampling and protocol adjustments
December 2022	Field work and midsemester report...further protocol adjustments
January 2023	Winter Break
February 2023	Field work
March 2023	Field work and data analysis
April 2023	Field work and present at CSU-Water conference (Monterey) and SSU Student Symposium