

10/23/2025

Waiʻanae Community Meeting

Circulation and Environmental Properties of Coastal Waters in Pōkaʻī Bay, Waiʻanae, Oʻahu

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Introduction

Question:

- Is the jetty causing decreased water quality at the beach park?

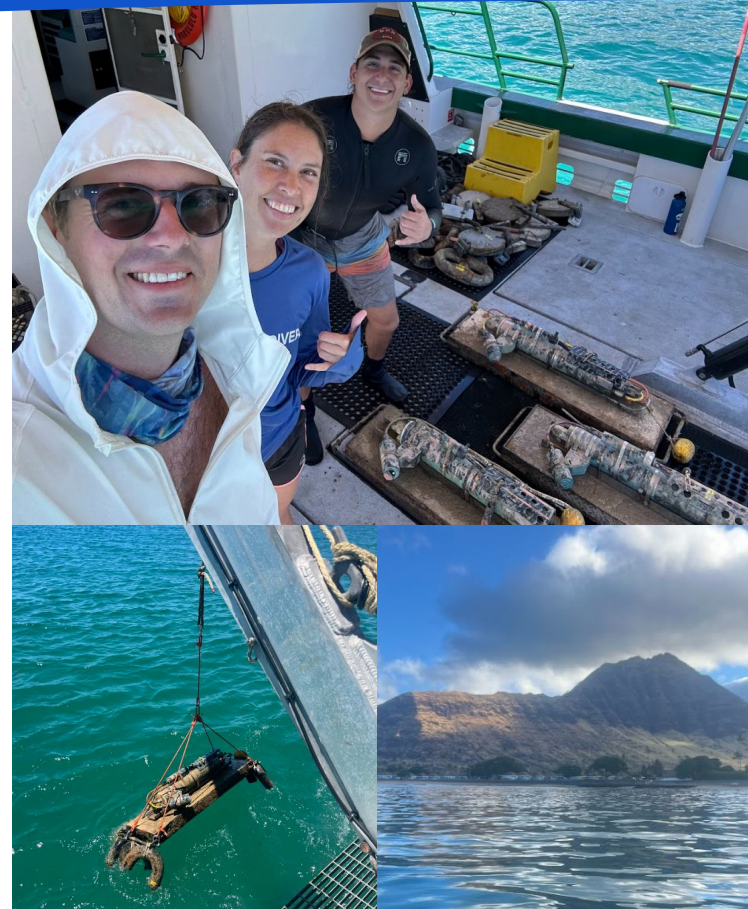
Goals:

- Understand current patterns
- Measure nutrients, bacteria, and physical properties of the water
- Identify sources of pollution



Methods

- Moored instrumentation (Aug-Sep 2024)
 - Current tilt meters (n=8)
 - Pressure, salinity, temperature (n=3)
 - Turbidity, Chlorophyll *a* (n=3)
- Bottle samples at 11 sites (Aug 2024)
 - *Enterococcus*, nutrients, nitrogen isotope source tracking
 - High, low, incoming, outgoing tides



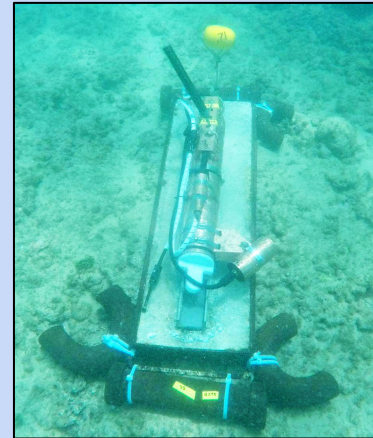
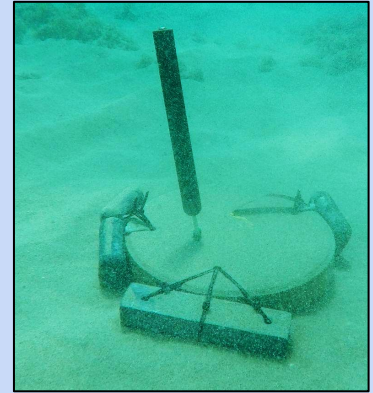
Methods: Map of activities



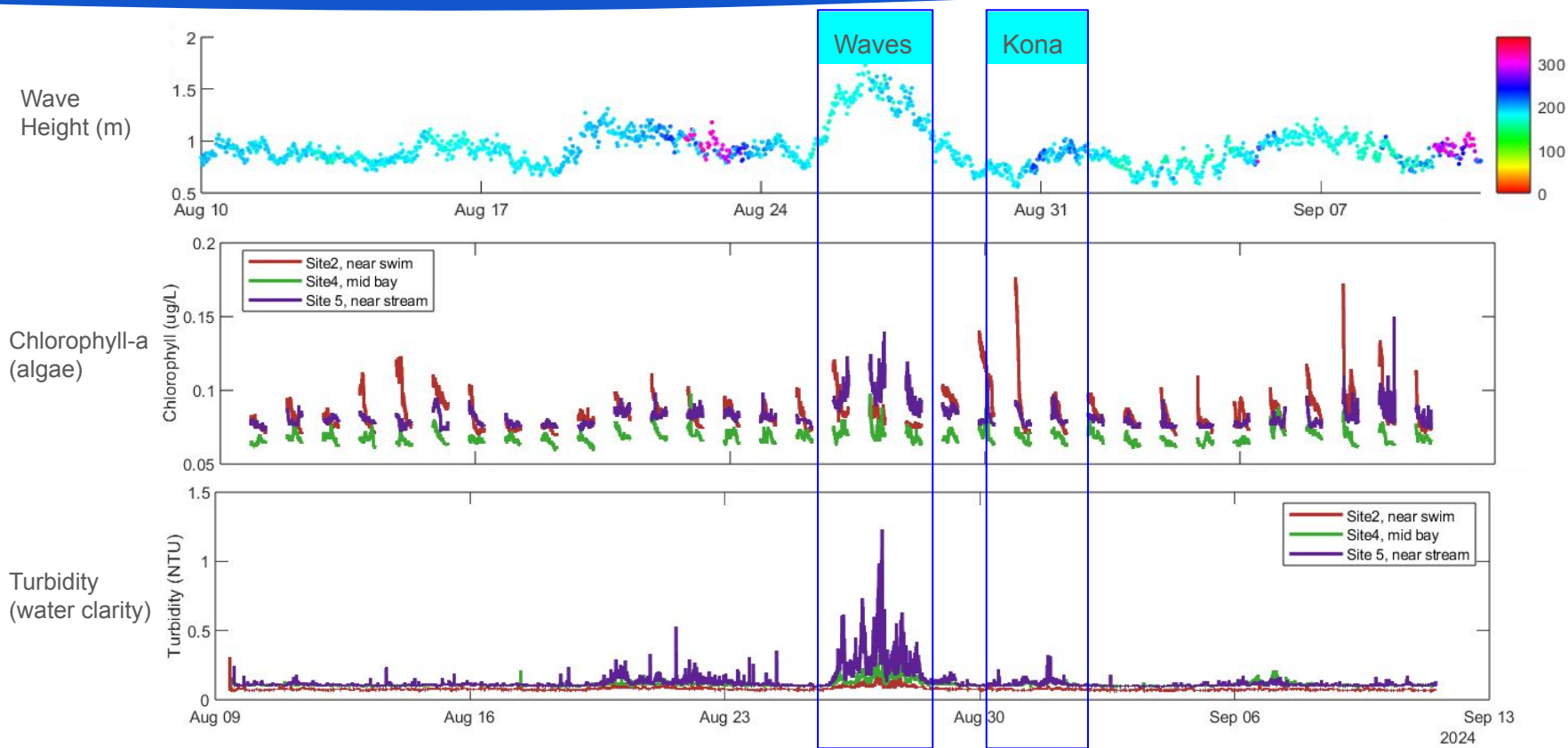
○ Water samples only

◆ Lowell TCM-4 tilt meter
(speed and dir)

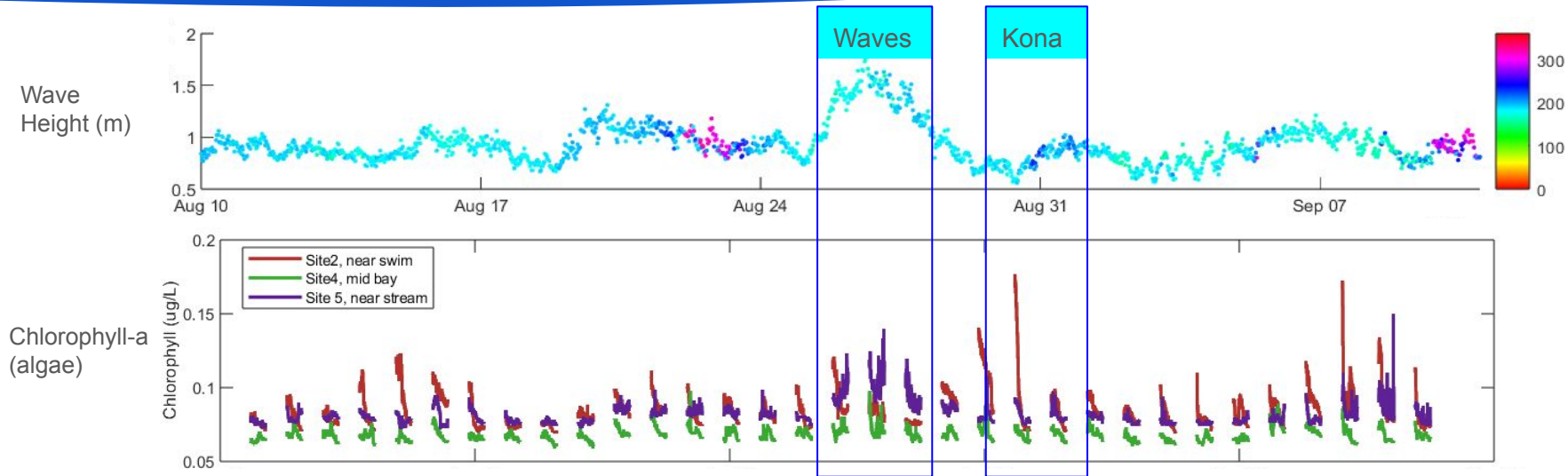
△ Seabird CTD
(cond-temp-depth)
ECO-FLNT
(turbidity and chlorophyll-a fluorescence)
TCM-4 tilt meter
(speed and dir)



Results: Waves, chlorophyll-a, turbidity

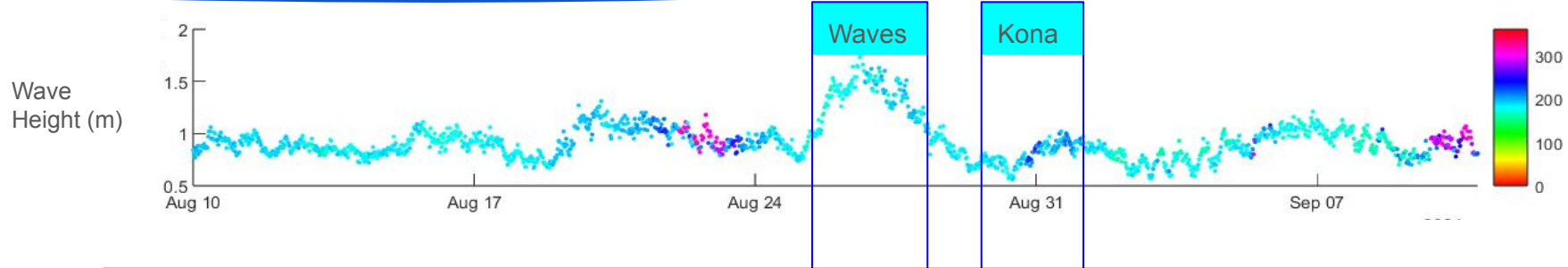


Results: Waves, chlorophyll-a, turbidity

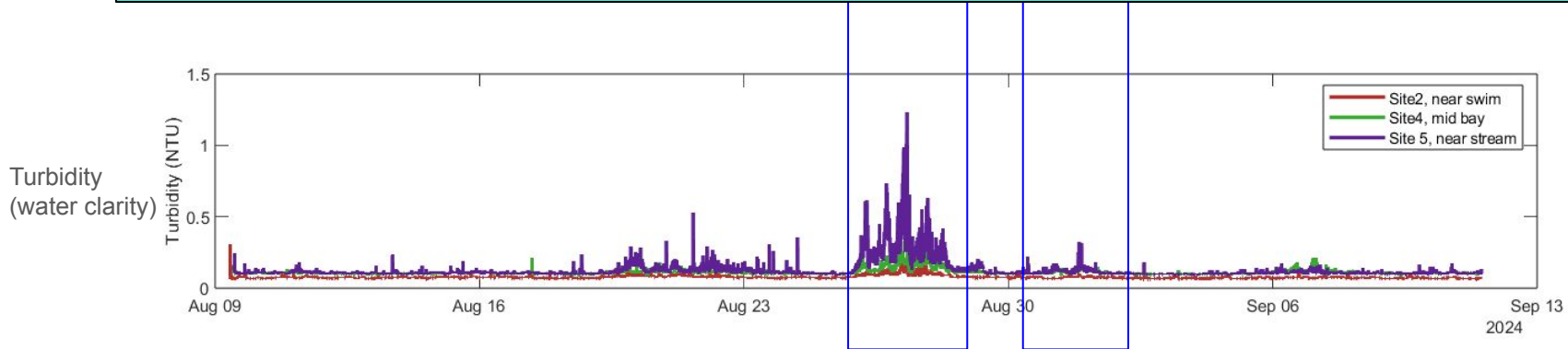


Chlorophyll-a was highest near the swimming area (red) and second highest near the stream (purple).
This indicates nutrient input and retention in the area.

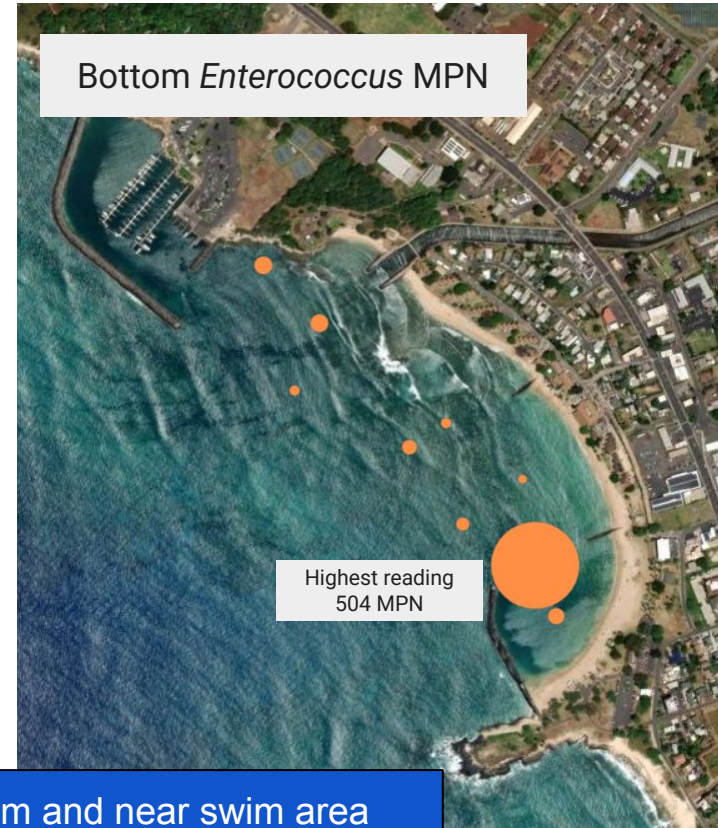
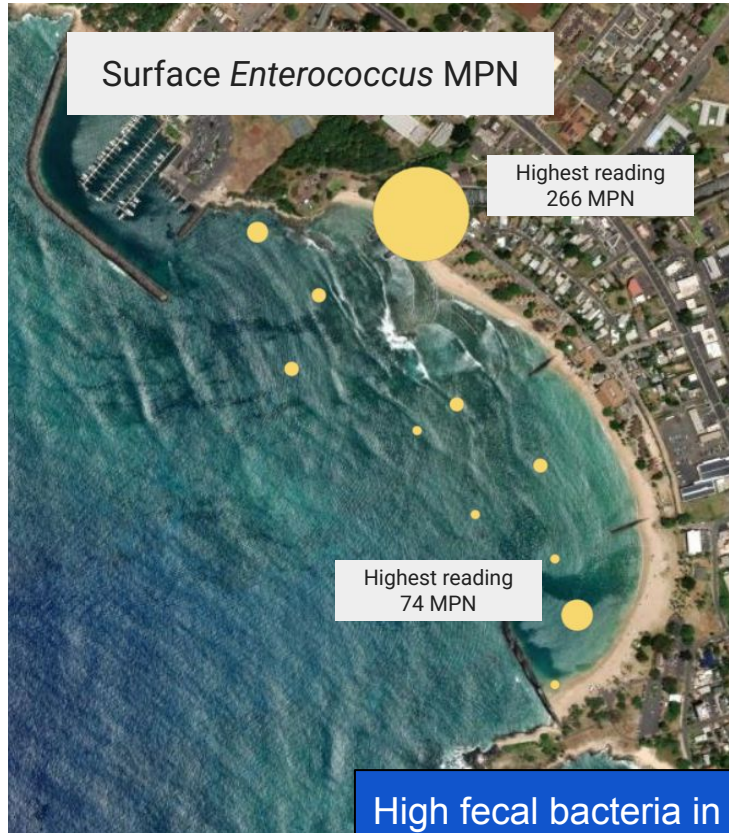
Results: Waves, chlorophyll-a, turbidity



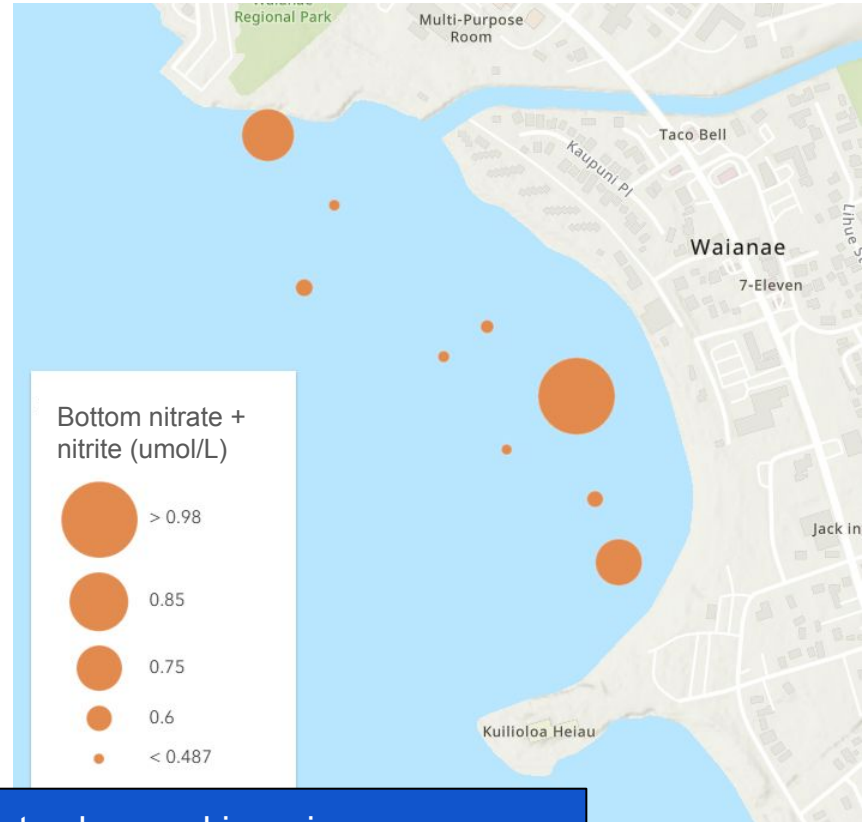
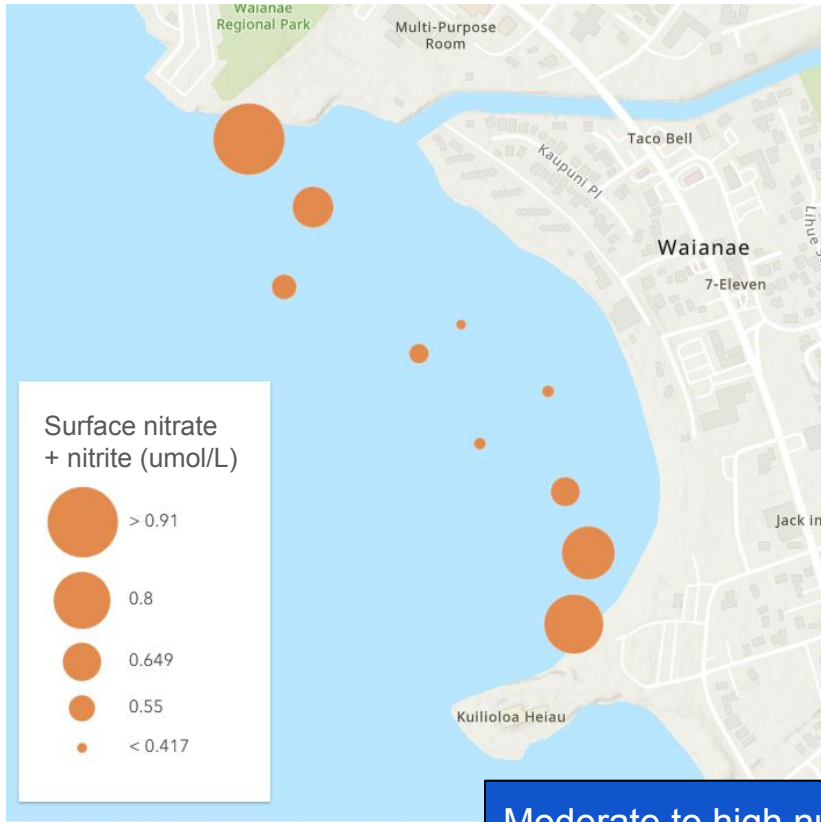
Turbidity was highest near the stream (purple), especially with higher wave action. This indicates sediment from the stream and wave re-suspension



Results: Fecal Indicator Bacteria

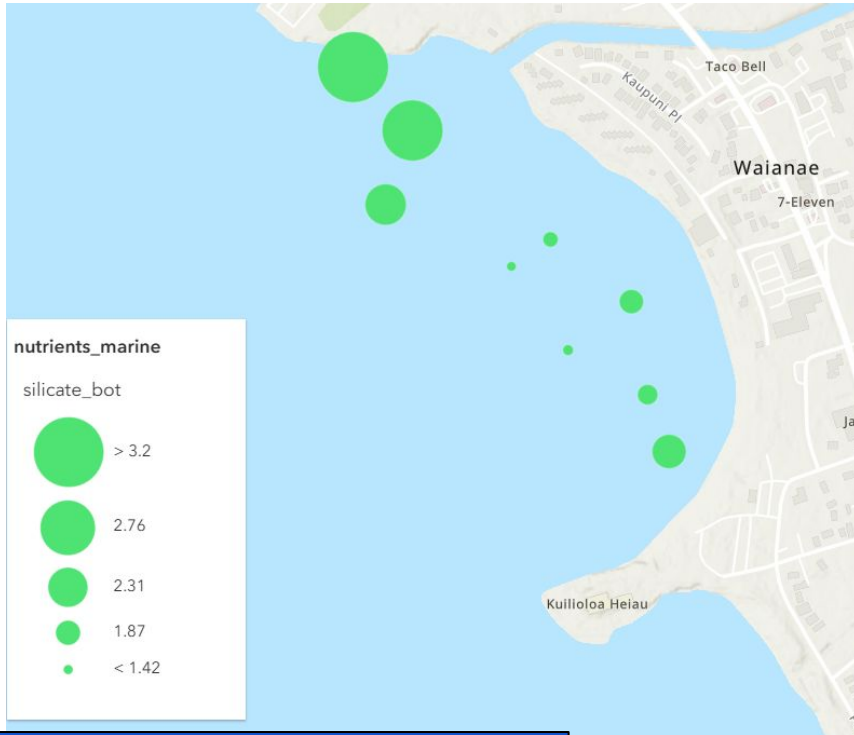
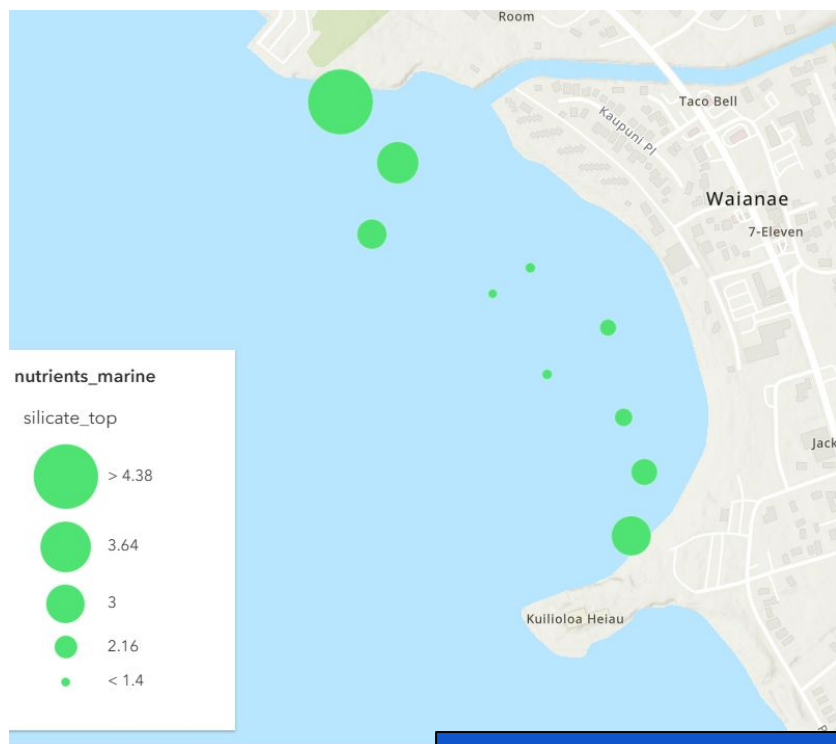


Nutrient data: Marine nitrate+nitrite



Moderate to high nutrients observed in swim area
Highest in stream (omitted because it is so much higher)

Nutrient data: Marine silicate



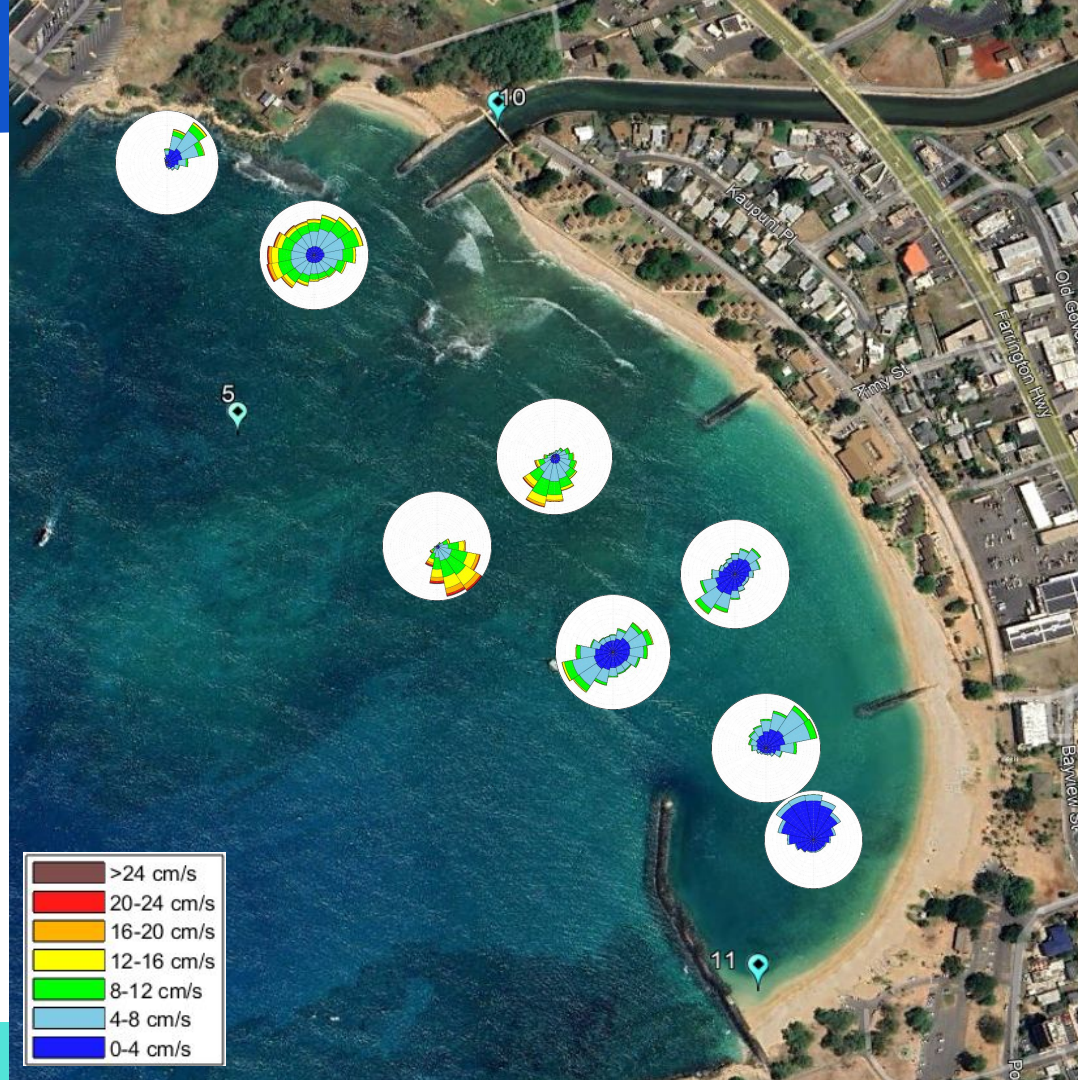
Higher silicate in north bay, moderate in south bay.
Can indicate submarine groundwater discharge

Current flow data

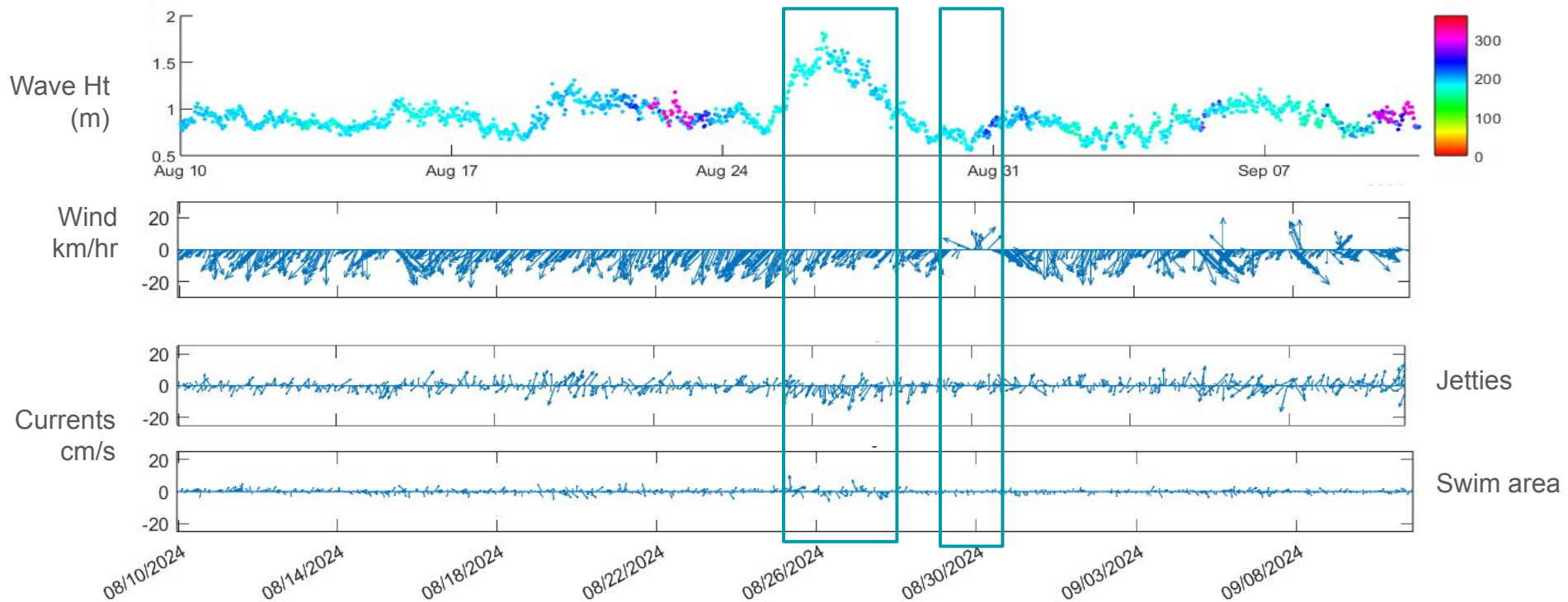
Blue = slow
Green/Yellow = medium
Orange/Red = fast

Slow current in swim area

Low water movement in and out
of jetty area in south bay



Wave and Wind Effects on Currents

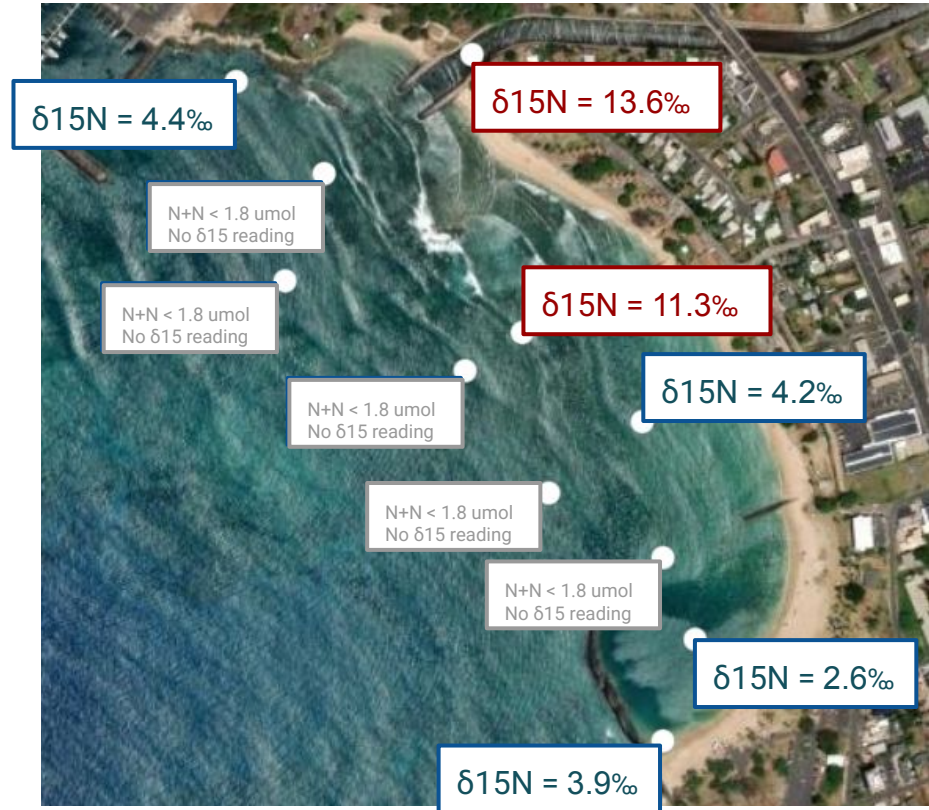


Current magnitudes are very small within the swim area
A moderate swell coincided with an increase in current speed
Kona winds coincided with a decrease in current speed

Pollution Source Tracking

- Nitrogen comes in two species, N-14 and N-15.
- If N-15 is high, wastewater pollution is likely

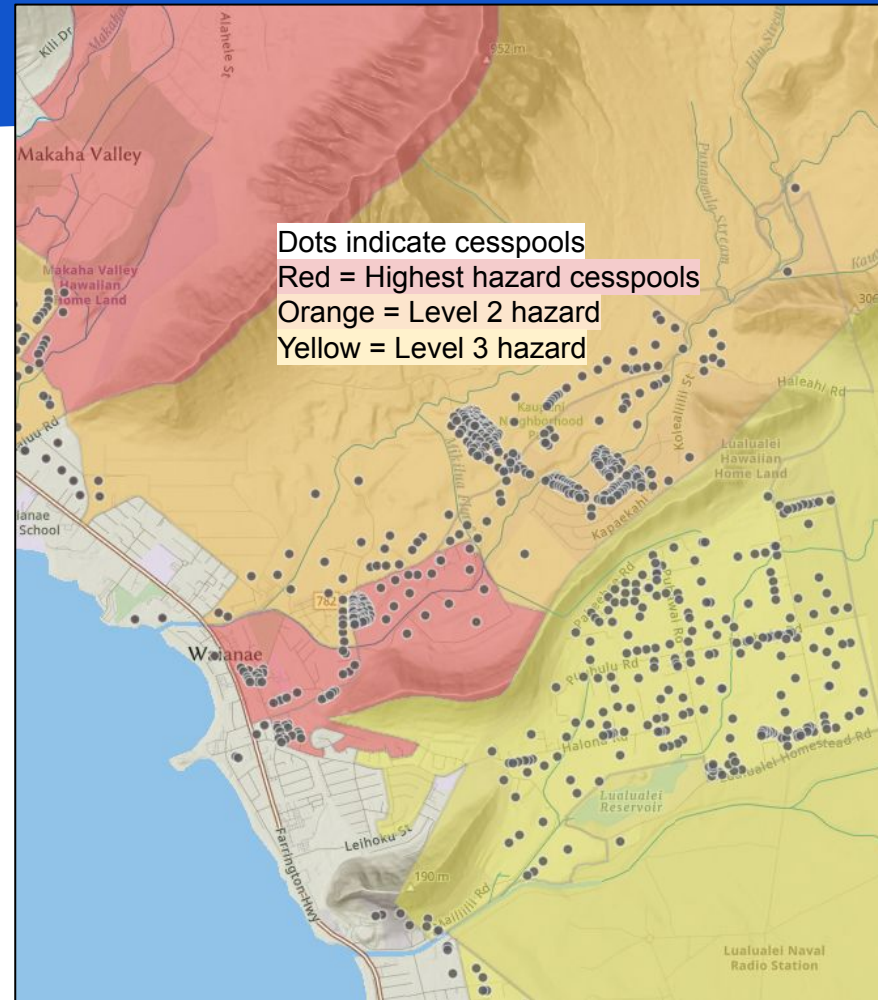
Wastewater pollution is evident in the stream and near the surf break



Pollution Source Tracking

Wastewater pollution is evident in the stream and near the surf break

366 cesspools in the valley:
these are the likely cause of
wastewater contamination



Why might people get sick after swimming?

- Low circulation in swim area = stagnant water
 - Pathogens can linger → more encounters
- Possible sources of pathogens
 - Skin (staph)
 - Dirty diapers
 - Polluted stream water transported across bay and trapped
 - Contaminated submarine groundwater discharge
 - Nearby cesspools or public bathrooms
- Wastewater pollution
 - Observed in stream and near surf break
 - Wastewater nitrogen was not observed in swim area
 - However, high fecal bacteria did occur in swim area



Mahalo and Questions

