

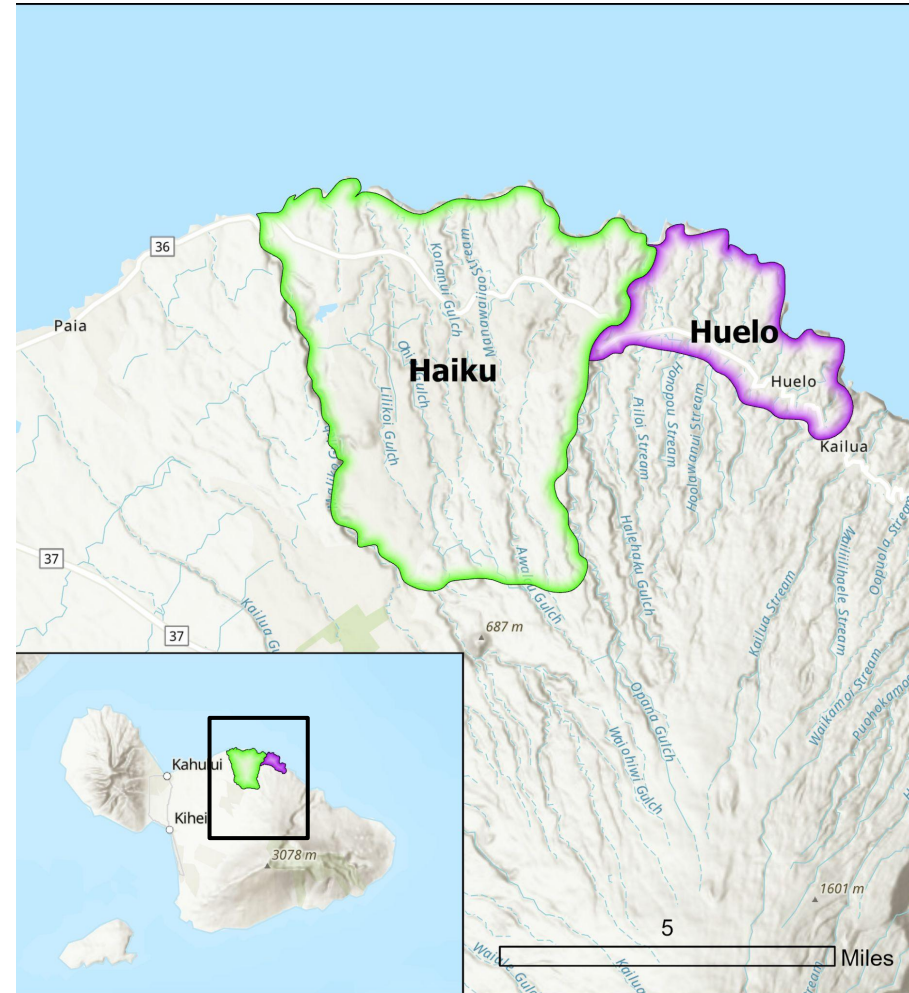
Community-Led Research Initiatives in Ha'ikū-Huelo

Chris Shuler, Lucienne D., Brandon B., Laf Y., Scott W. Phill L., Raina M., Ute, Kris K. Charles S.



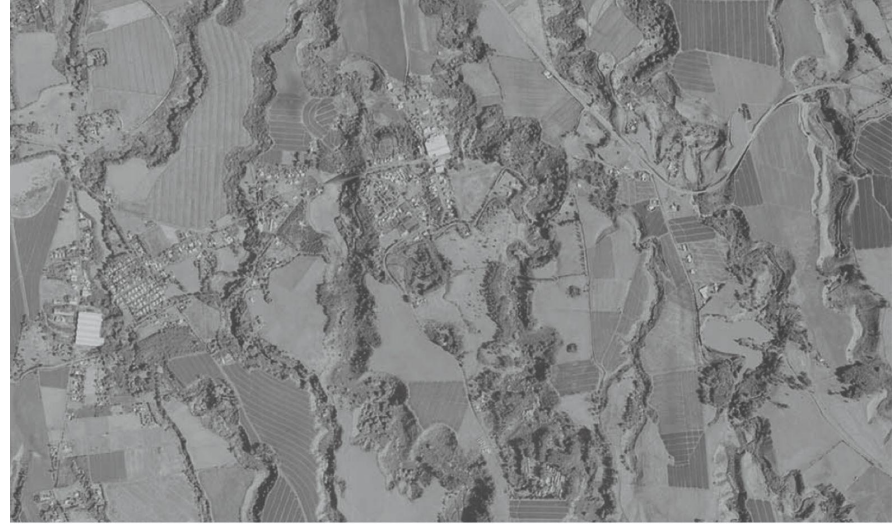
Study Setting: Ha'ikū- Huelo

- 9,000 - 10,000 residents
- Generational families, young families, very diverse socioeconomically
- Formerly pineapple and ranch land
- Now diversified ag and residential
- 7,000 on county water (400 more on list)
- ~ 50-100 families on private wells
- Others on catchment, springs, streams
- Adds up to LOTS of community interest in water resources matters



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Ha'ikū-Huelo Recreational Stream Sampling

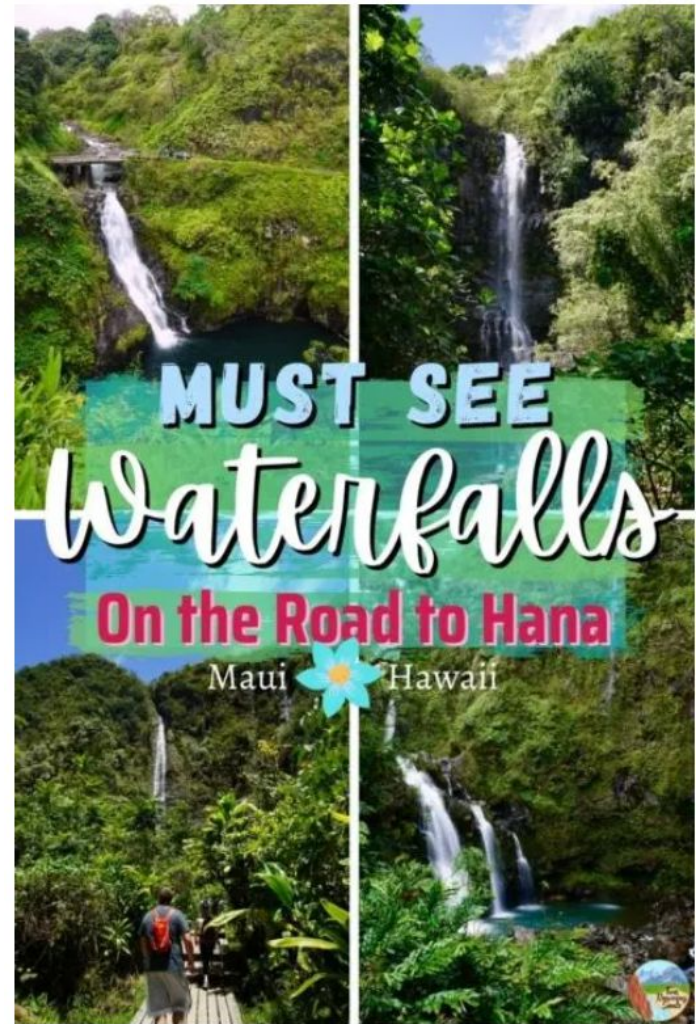
Leads: Lucienne D., Scott W.



Motivation

Are our streams safe for swimming?

- Over 50 streams in E. Maui, many used extensively by locals and visitors
- Twin Falls (Ho'olawa Stream) receives 500+ visitors/day
- Currently there are 0 stream monitoring programs or protocols for recreational freshwater



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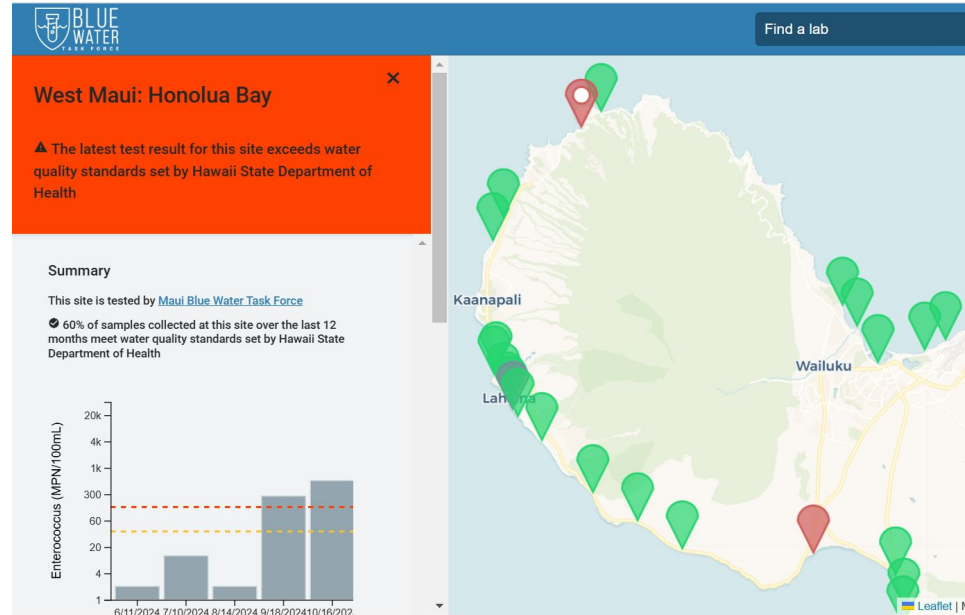
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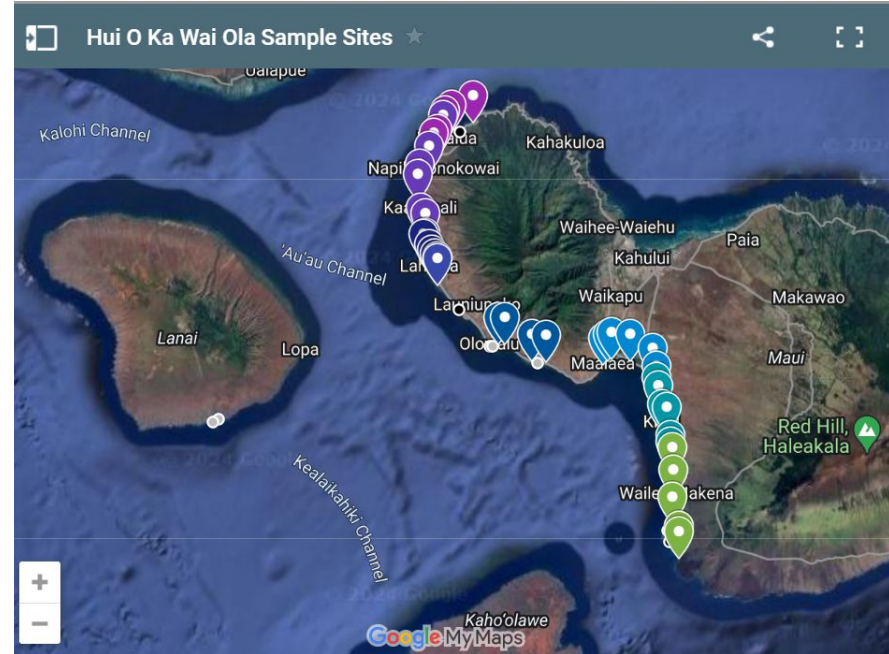


Maui Surf Rider Water Quality Dashboard

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Hui o Kai Wai Ola Water Quality Dashboard

Dog Pond

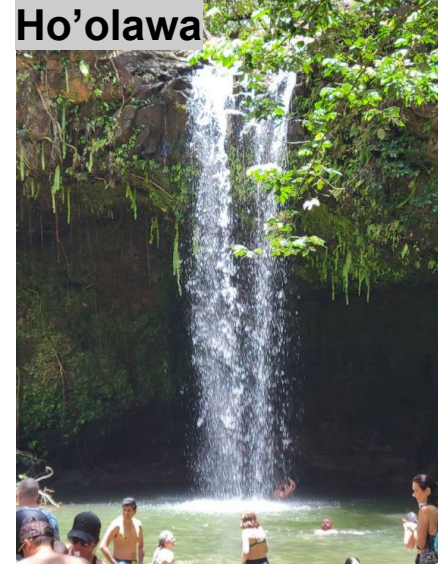


Stream Sampling

Identified need and interest in generating community-owned WQ data

Obtained 1-yr pilot grant from Maui County to develop a testing program

Ho'olawa



Na'ili'iliha'e



- Selected 4 high use locations to sample regularly, Plus ad hoc locations via community input
- All data live on HCA Website

Honopou



Regular sample locations

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Ha'ikū
Community
Association

Ha'iku Water Quality



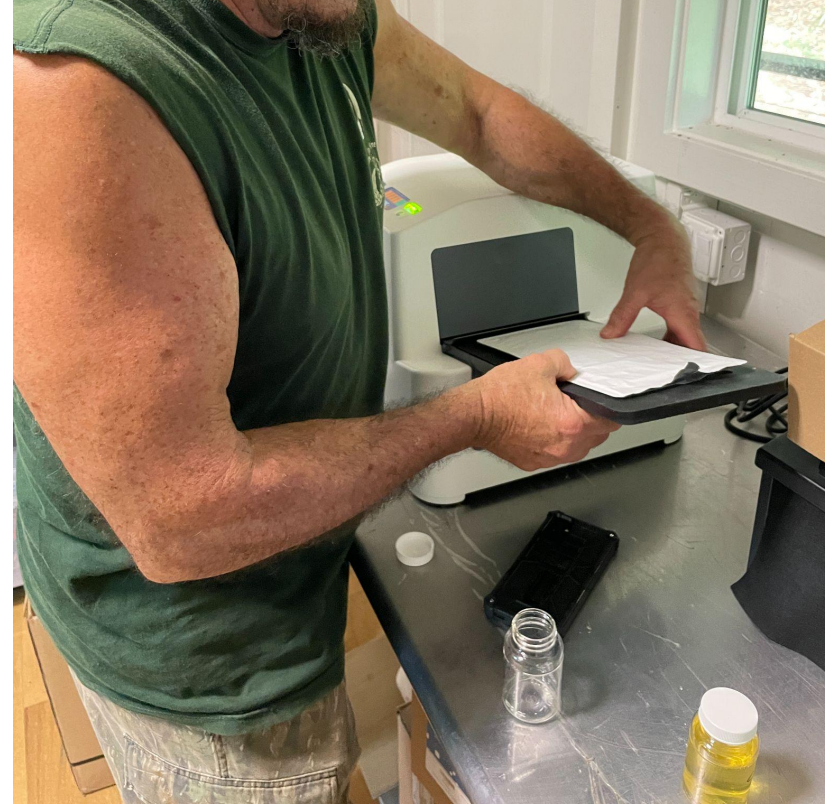
Testing Protocol and Methods

- As possible, follow established Hui O Ka Wai Ola QAP
- Testing for:
 - Dissolved Inorganic Nutrients
 - Turbidity
 - E. coli, TC, Enterococcus
 - WQ Parameters (Sal, pH, DO, etc)
- Testing 4 streams every 1-2 weeks
- Bacteriological samples run at community lab space



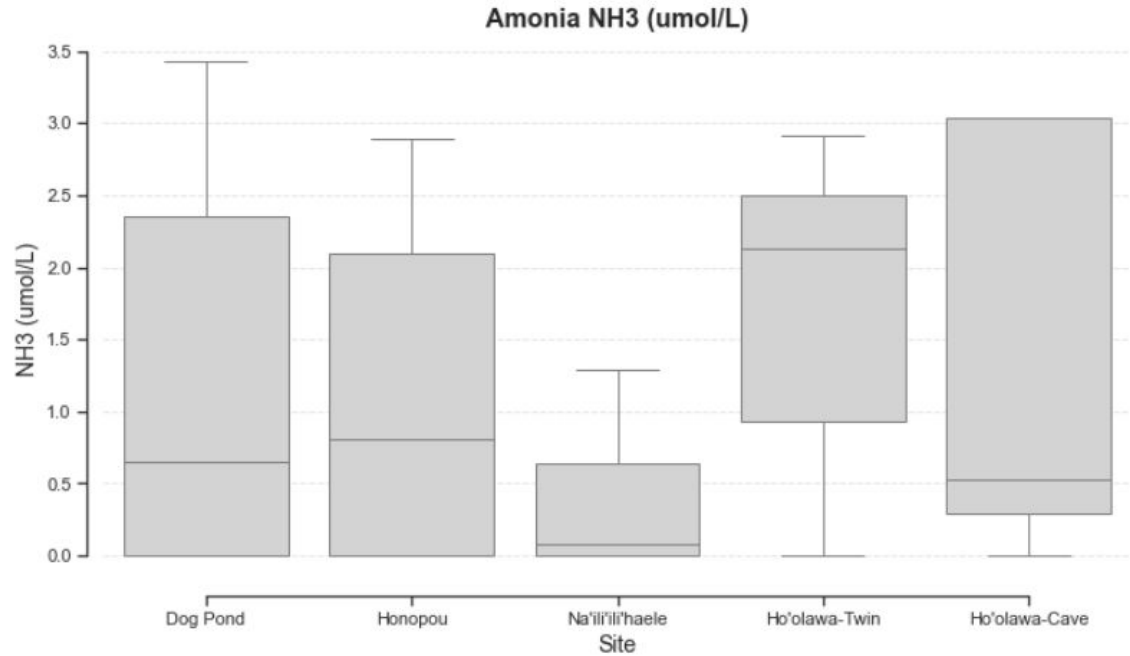
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Preliminary insights

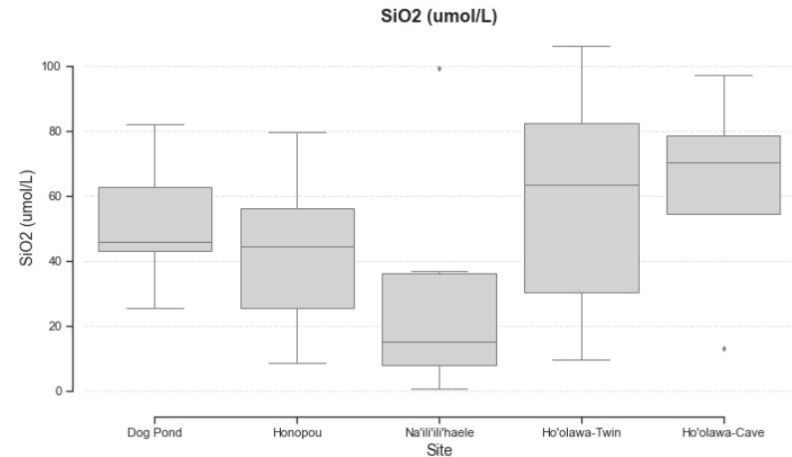
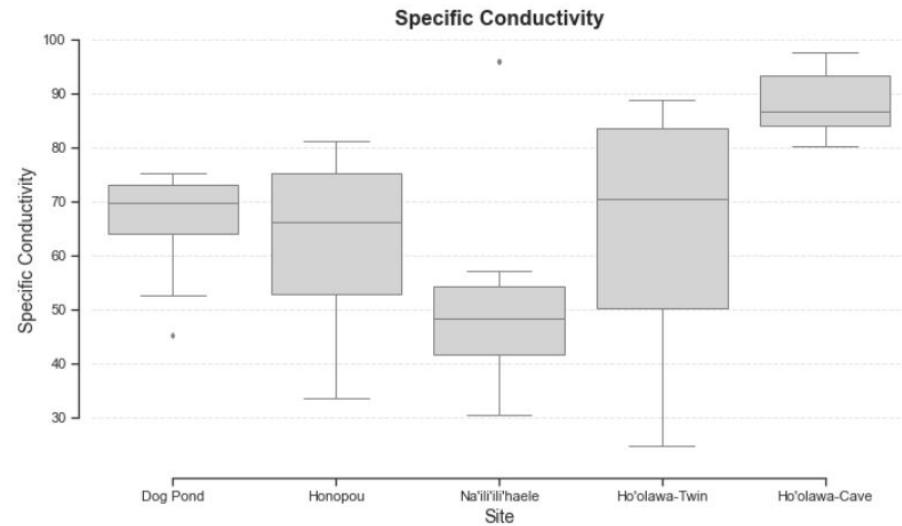
Possible sources of human impact?



Preliminary insights

Possible sources of human impact?

How much time does the water spend underground?

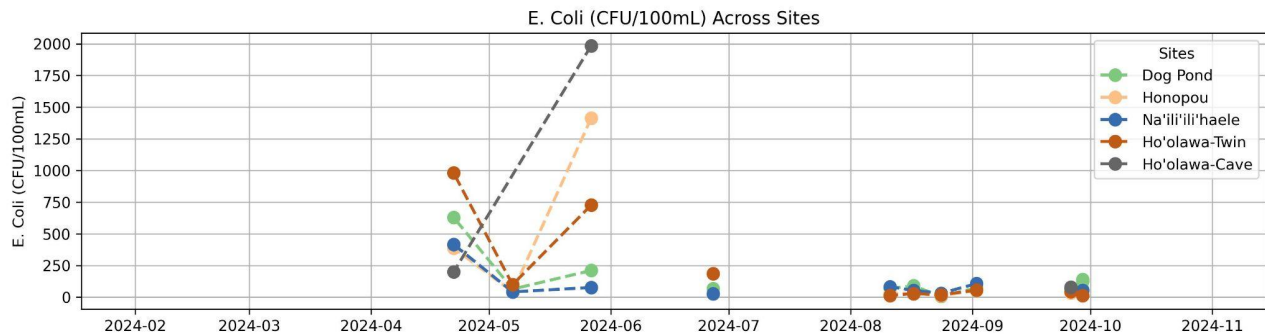
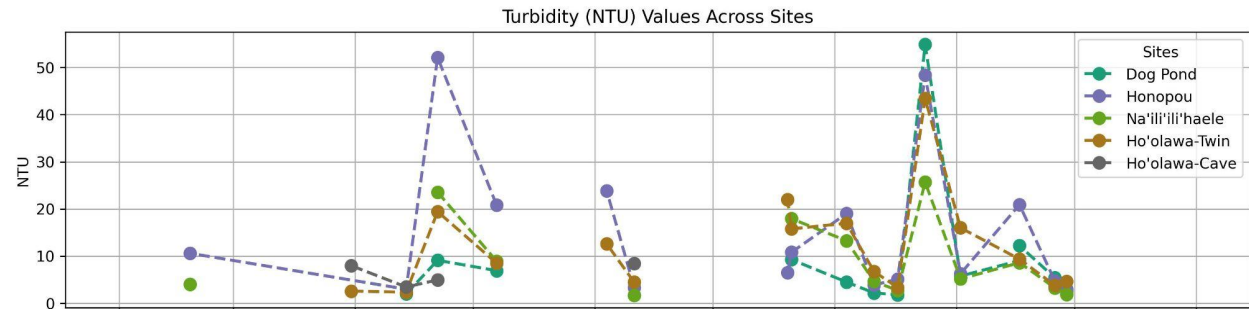
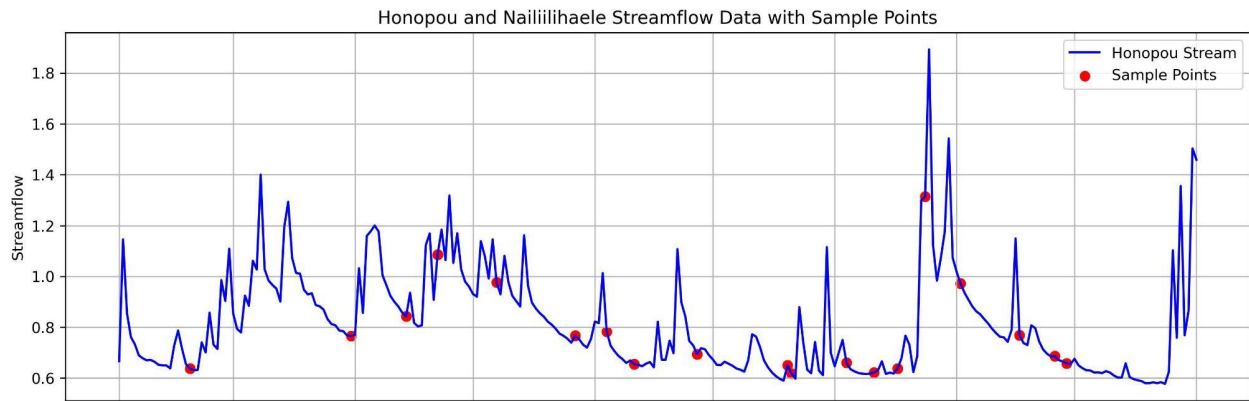


Preliminary insights

Possible sources of human impact?

How much time does the water spend underground?

How does WQ vary with time, and across different flow stages?





Future work:

Continuing to sample for the remainder of the year

Have proposal for 2nd year of funding in

Hoping to be able to continue monitoring long-term

Hoping to partner with researchers to expand sampling capacity/scope (Inc. lepto, other pathogens ??)

Water Availability in Ha'ikū-Huelo Maui

By Brandon Bees

Advisor: Christopher Shuler

Committee: Henrietta Dulai, Leo Geng, Diamond Tachera



Motivation



Maui County DWS Meeting:
Long-Range Water Use Plan

Does Haiku have enough
water for the future?

Where is the water
coming from?

What's in the water?

Who gets the water and
who does not?

What risks does climate
change pose to local
water sources?



HCA Love Your Streams Day
Community Event

Objectives and Approach

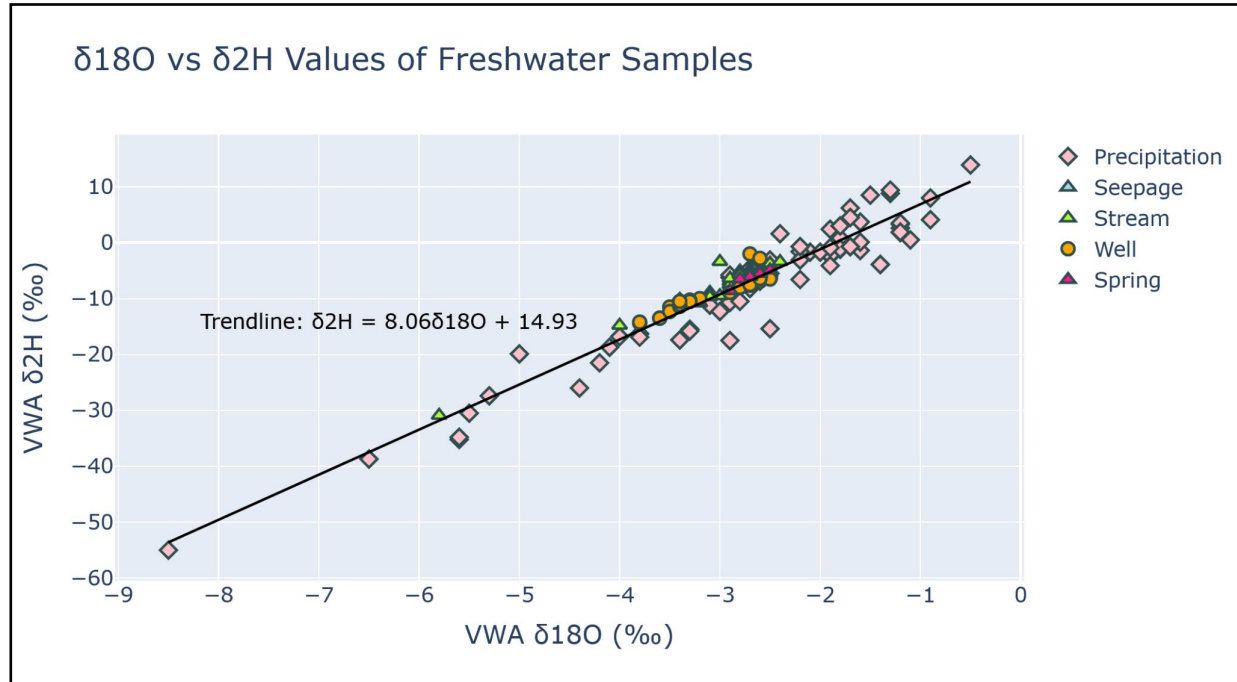
- 1) Using water quality to understand the relatedness of different water sources
 - Sampling Wells, Springs, Streams
 - Precip. Isotope collectors
 - Water Isotopes, Major Ions, etc..
- 2) Historical and Future Rainfall Analysis
 - 1920-2024
 - Future Scenarios
- 3) Groundwater Modeling
 - Scenario development using USGS model (MODFLOW)



Insights: Surface water-groundwater interactions

Recharge elevation is apparent in water isotope samples

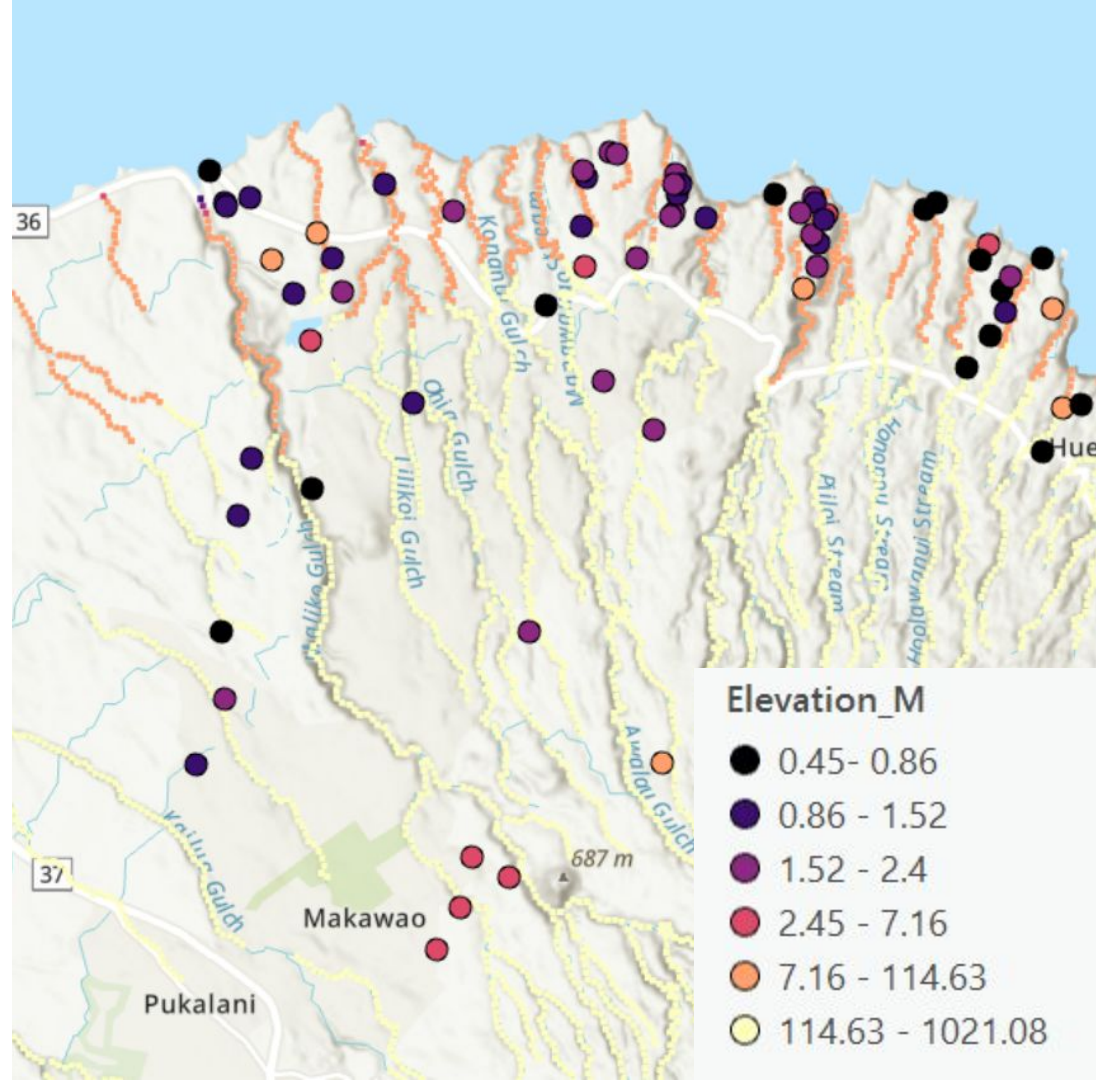
Well water and stream/spring water have clearly different source elevations



Insights:

Groundwater heads also indicate that stream and basal well sources are distinct, in western Haiku

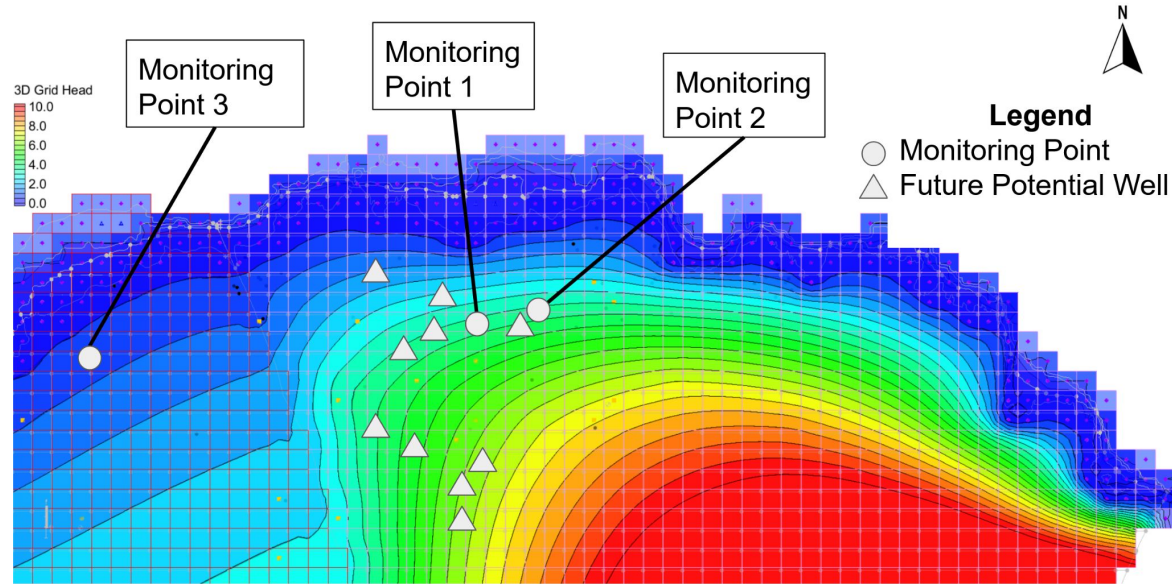
Geochemical signal is less clear in on easterly streams, and connectivity remains uncertain.



Insights: Groundwater Model Results

Model Setup

- Ran scenarios with up to 10 hypothetical pumping wells, pumping up to 1 MGD
- Simulated water table drawdown at 3 different locations



Insights: Groundwater Model Results

Model results

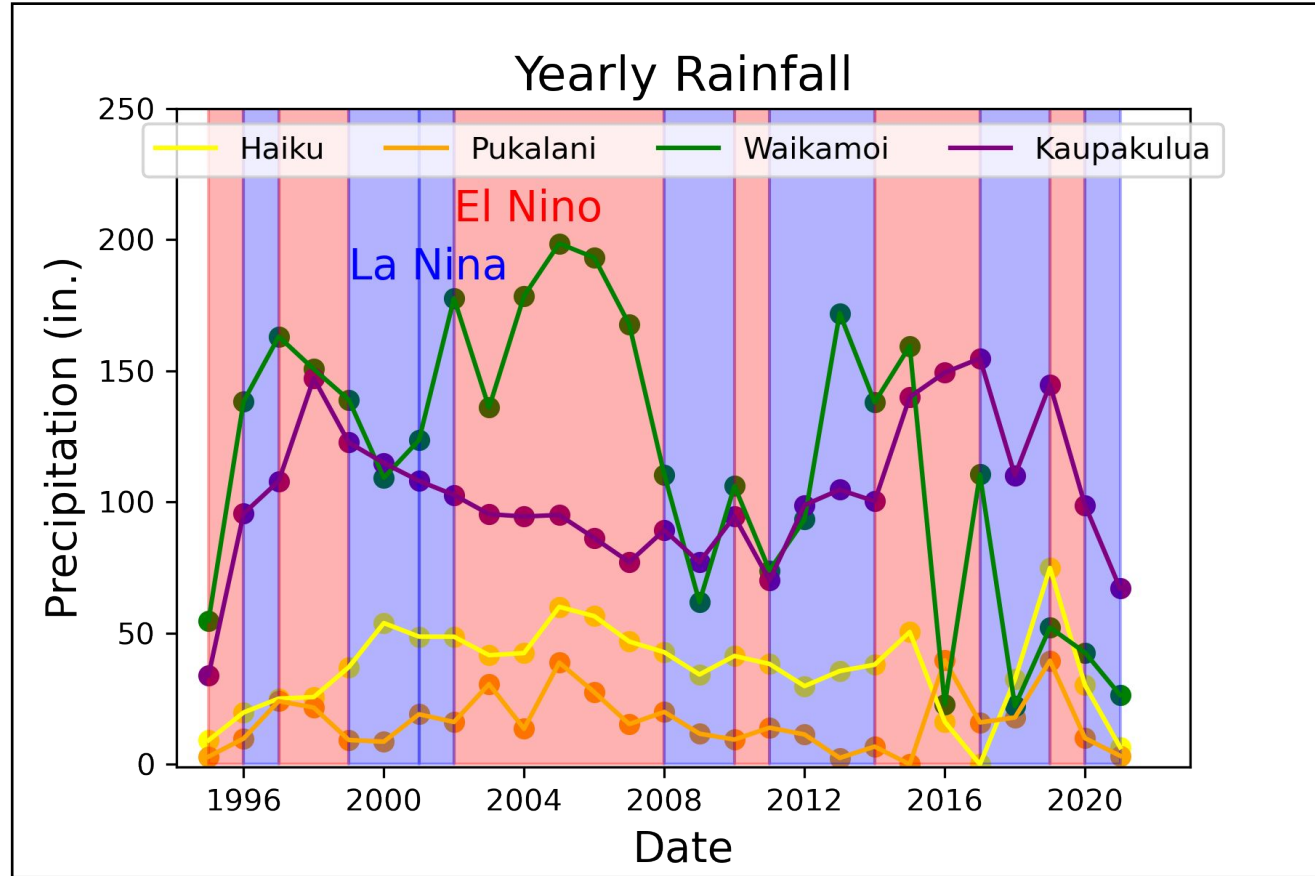
- Impacts from large wells are highly dependent on location and magnitude of new development
- Impacts range between negligible to over 13% in water table reduction

Scenario	Number of Wells	Pumping Rate for each well (mgd)	Monitoring Point 1 (% change)	Monitoring Point 2 (% change)	Monitoring Point 3 (% change)
B	0	0	Original head: 7.42 m	Original head: 2.50 m	Original head: 1.92 m
1	10	1	-13.2	-1.7	-1.1
2	10	0.67	-11.1	-2.9	-3.0
3	10	0.33	-6.0	-1.4	-1.5
7	6	1	-6.6	-2.3	-2.9
8	6	0.67	-4.4	-1.6	-1.9
9	6	0.33	-2.2	-0.8	-1.0
13	2	1	-1.6	-0.9	-1.1
14	2	0.67	-1.0	-0.6	-0.7
15	2	0.33	-0.5	-0.3	-0.4

Insights: Rainfall Trend Analysis

Explored impacts of ENSO:

(its complicated, La Niña = drier dry seasons, El Niño wetter wet seasons)

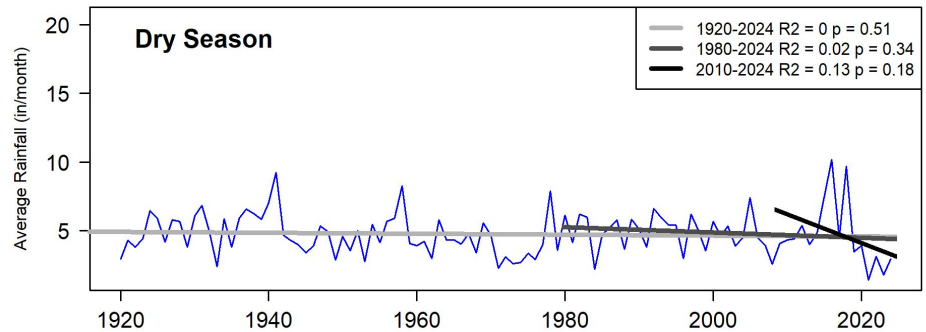
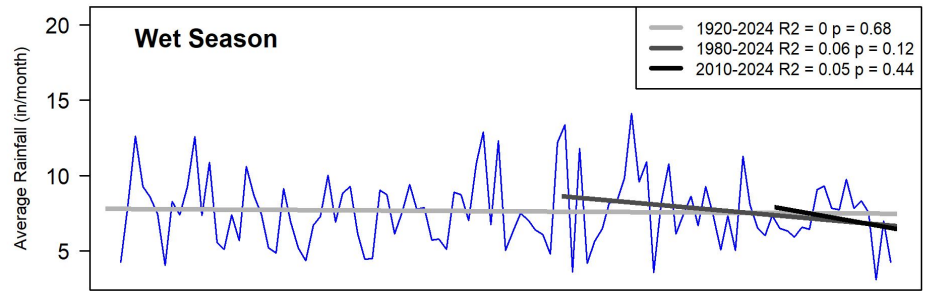
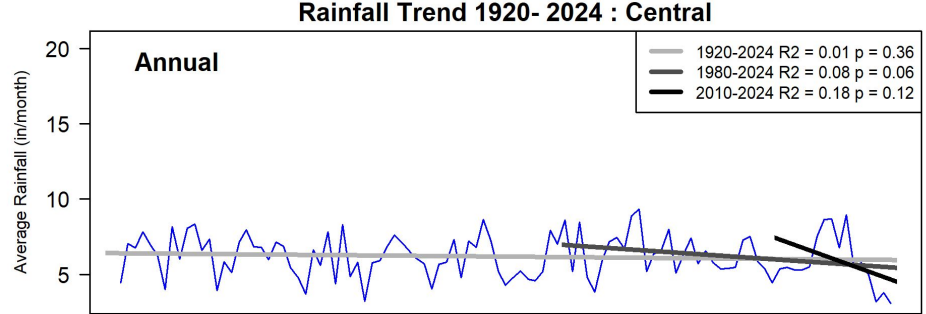


Rainfall Trend Analysis

Explored impacts of ENSO:
(it's complicated, La Niña = drier dry seasons, El Niño wetter wet seasons)

Explored historical trends:
(not looking great)

Reviewed future climate models:
(Maybe wetter, in 2100?)



Assessing Historical Pesticide Impacts on Ha'ikū and Napili Water Quality

Lead: Charles Schull, Advisor: C. Shuler

A photograph of an outdoor water treatment facility. The scene features a complex network of bright blue pipes and valves mounted on concrete blocks. To the right, there is a large white cylindrical tank with a dark grey top. The facility is situated on a paved area, with a chain-link fence and lush green vegetation in the background under a blue sky with scattered clouds.

Motivation

Historical pineapple farming and potential DBCP, TCP, and EDB contamination

Health risks: DBCP linked to kidney damage and infertility

Ha'ikū and Napili residents want to have information on local water quality



FUMAZONE* 86

NEMATICIDE

SOIL FUMIGANT FOR CONTROLLING SOIL BORNE PLANT PARASITIC NEMATODES and FOR USE IN THE MANUFACTURE OF OIL SOLUTIONS, EMULSIFIABLE LIQUIDS, AND GRANULATED NEMATOCIDAL FORMULATIONS

ACTIVE INGREDIENT: 1
1,2-dibromo-3-chloropropane and related halogenated C₃ aliphatics 85.5%
INERT INGREDIENT 14.5%
†Contains 12.1 Pounds Active Ingredient per Gallon.

E.P.A. Registration No. 464-313-ZA
E.P.A. EST. 464-AR-1

AGRICULTURAL CHEMICAL
Do Not Ship or Store with Food, Feeds, or Clothing

WARNING

KEEP OUT OF REACH OF CHILDREN • HARMFUL LIQUID AND VAPOR • COMBUSTIBLE MIXTURE • CAUSES SKIN IRRITATION AND BLISTERS ON CONTACT • CAUSES IRRITATION OF EYES, NOSE AND THROAT • MAY BE ABSORBED THROUGH SKIN
MAY BE HARMFUL OR FATAL IF SWALLOWED

Do Not Breathe Vapor • Keep Container Closed • Do Not Get in Eyes, on Skin, or on Clothing • Do Not Take Internally • Use Only in a Well-Ventilated Area Wash Thoroughly with Soap and Water After Handling and Before Eating and Smoking • Do Not Contaminate Feed and Foodstuffs • Keep Children and Pets Off Treated Area until This Material Has Been Washed into Soil • Keep Away From Heat and Open Flame

In case of contact, immediately remove (i.e., laminate) shoes and clothing and wash skin with soap and water. Flush eyes with plenty of water for at least 15 minutes and get medical attention. Do not wear

Objectives and Approach

Objective

Using a co-production model with the Haiku and Napili communities, investigate the extent and magnitude of DBCP contamination in groundwater from private wells and municipal water sources.

Approach

Sample local wells and water sources, test for DBCP, TCP, and EDB at the WRRC lab with GCMS

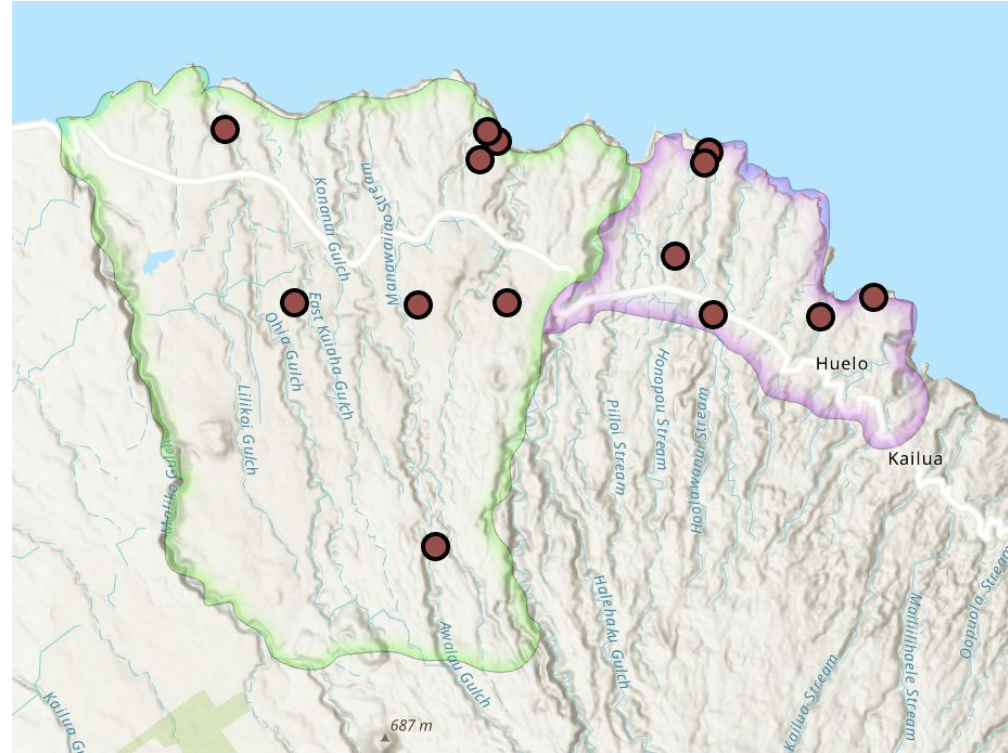
Assess trends and patterns in historical municipal well data

Community engagement and regular updates to participants



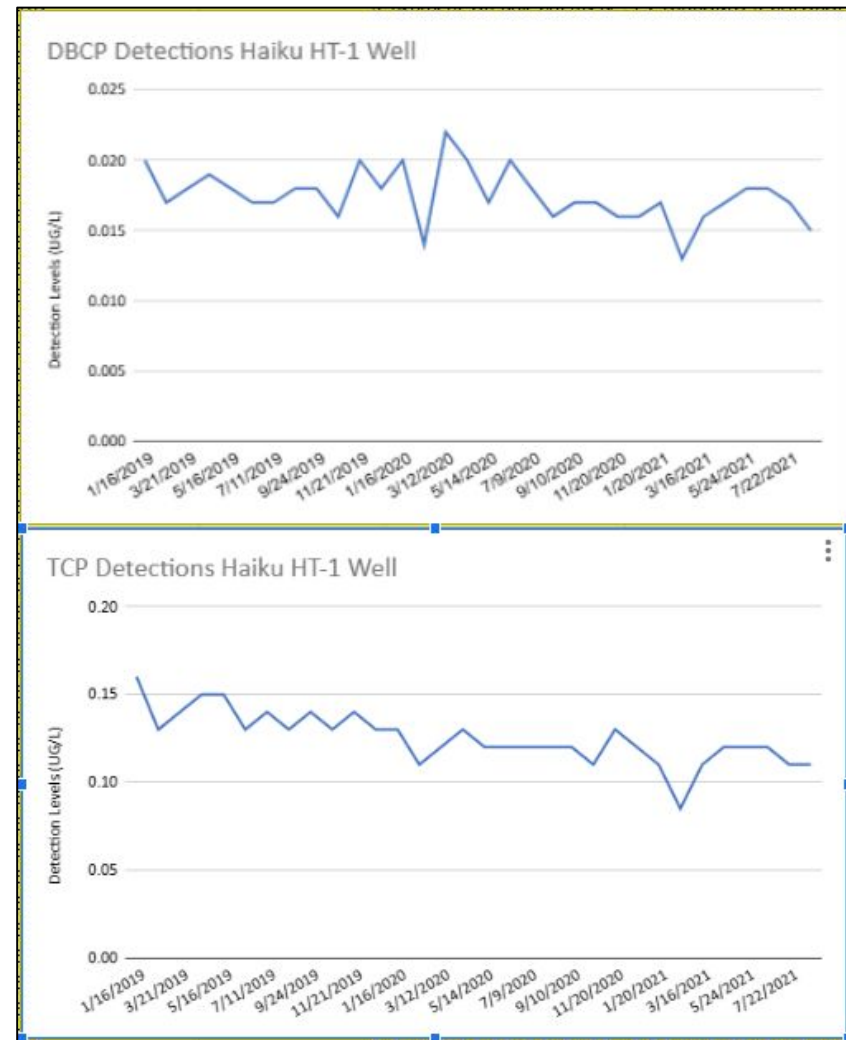
Progress so far

- 14 Ha'ikū-Huelo samples taken from private well owners
- County data preliminary analysis indicates declining trends



Progress so far

- 14 Ha'ikū-Huelo samples taken from private well owners
- County data preliminary analysis indicates slowly declining trends



Wrap up

What is our kuleana as UH researchers?

How can we target and and seek to understand community concerns?

How to we promote and respect community ownership of data, and the data production process?

How do we establish local collaboration and trust?

Where is the balance between ensuring data quality and accessibility through established standards in community research?

Mahalo



Funding and Support

- County of Maui
- Haiku Community Association
- Nuestro Futuro Foundation
- Private donors
- UH Maui College
- UH Manoa WRRRC
- Twin Falls
- HCF- Maui Strong Fund

Acknowledgements

- Well and spring owners
- Precip collection station hosts
- Local and State agencies
- Student and community volunteers