

# Making Water Quality Science Accessible: Community Science, Field Monitoring, and Comparative Data Analysis in the Narragansett Bay and the Salton Sea

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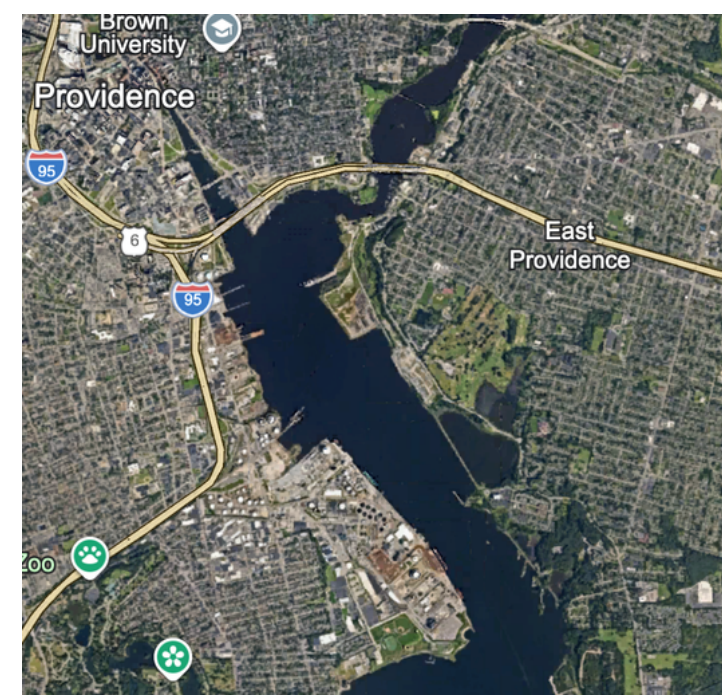
## Motivation and Background

This project explores two approaches to making water quality information more **accessible** and **community-centered**.

### PORT OF PROVIDENCE

- The Port of Providence has **public shoreline spaces** important for community use.
- Community members have expressed **concerns** about environmental conditions in these spaces.
- This project investigates water quality at **community-identified locations** to determine the effects of **industrial activity** along the port.

Providence River, Rhode Island



### SALTON SEA

- Created in the early 1900s when the Colorado River breached an irrigation canal.
- Once a **popular recreation area**, decades of **nutrient pollution** have **degraded water quality**.
- This project places **community science data** from 2021-2025 into ecological context through comparisons with nationwide U.S. lake datasets.

Salton Sea, California



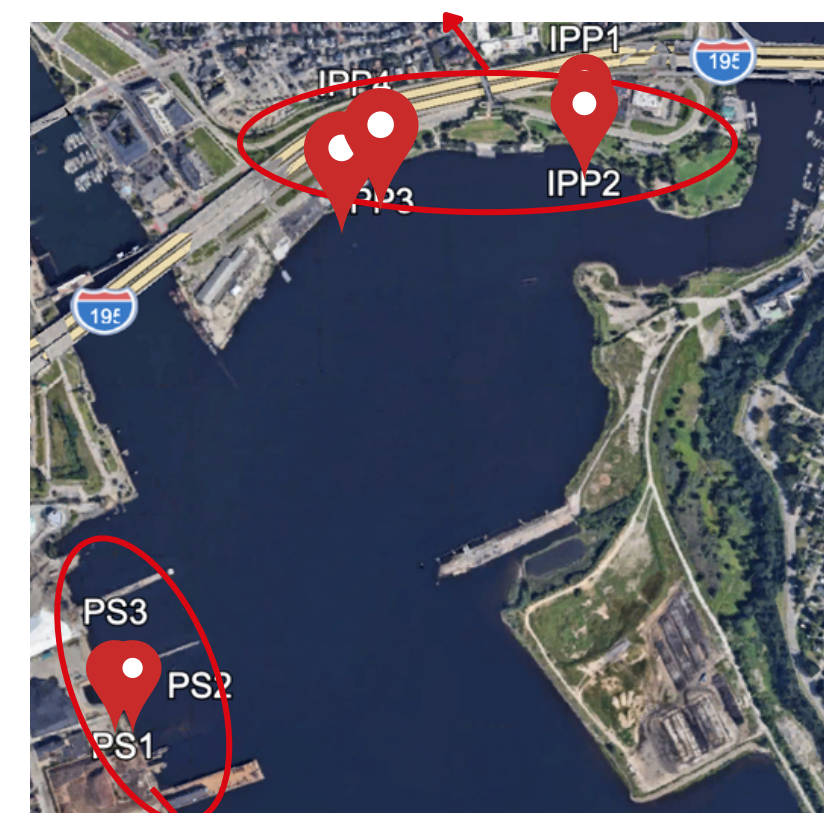
## Providence: Community-Guided Water Monitoring

### WATERSPEAK

- Monthly bilingual community events with the **People's Port Authority**.
- Discussions with community members about their environmental concerns help to clarify sampling priorities and desired sites.

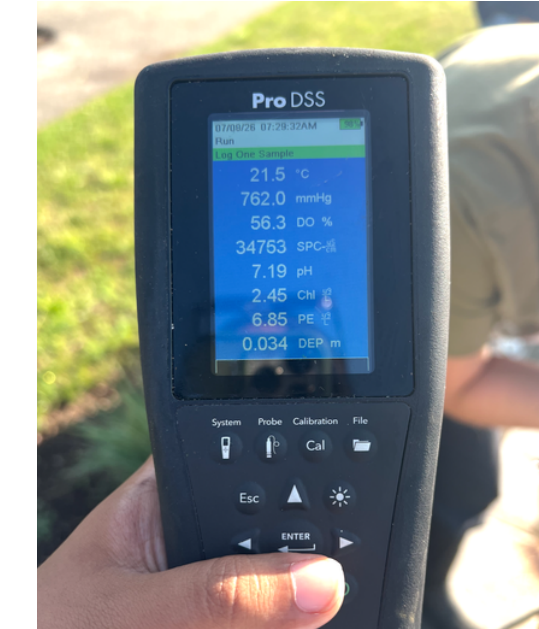
### FIELD SAMPLING SITES AND METHODS

**India Point Park**  
former industrial area, now public park



**Public Street Shoreline Access Point**  
community space between a salt pile and a scrap metal facility

YSI ProDSS



- Dissolved oxygen %
- Temperature
- Chlorophyll-*a*
- Specific conductivity
- Phycocyanin (PC) fluorescence

### RESEARCH AND VISUAL AIDS

#### Port of Providence Industrial Activity

Facilities around the Port of Providence that handle hazardous waste and can release pollutants into the air.

Hazardous Waste & Air Permit Sites

What is Hazardous Waste?

Hazardous waste can be **toxic, flammable, corrosive, or reactive**.

**METALS:** Lead, Chromium, Mercury  
Can be toxic to people and the environment

**SOLVENTS:** Benzen, TCE/ PCE  
Can contaminate ground water

**PETROLEUM:** Waste oil/sludge  
Can contain petroleum and toxic metals.

**OTHER:** Cyanide, PCBs  
Includes toxic or persistent chemicals.

KEY: air permit hazardous waste inactive hazardous sites

What can be released into the air?

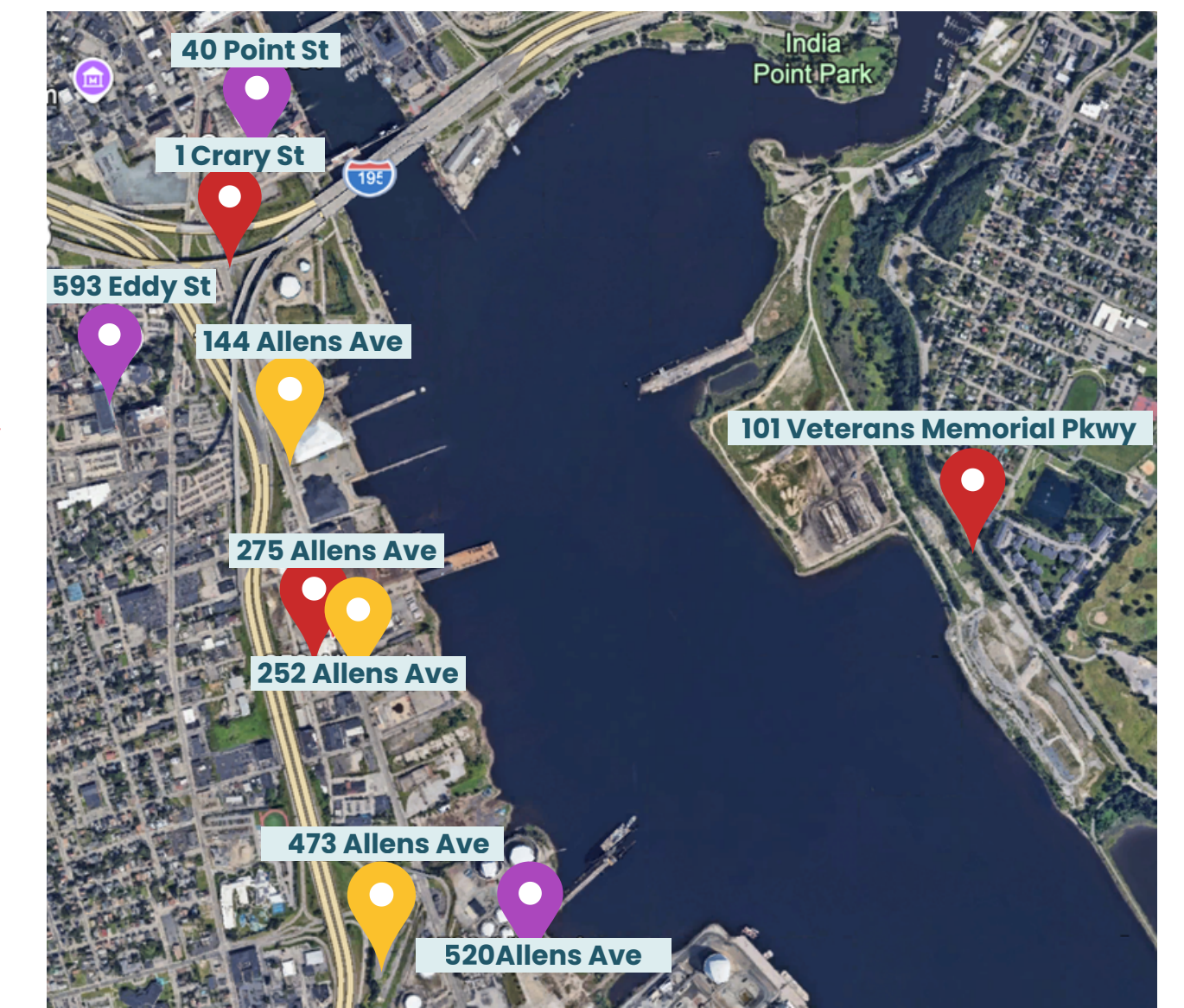
Air permits **limit** the amount of pollutants industrial facilities can release.

**NITROGEN OXIDES** **PARTICULATE MATTER** **VOCs**  
Can contribute to smog and poor air quality  
Tiny particles produced by combustion  
Vapors from fuels and other chemicals

**HAZARDOUS AIR POLLUTANTS**  
Pollutants that can harm health or the environment

#### Why does it matter?

These industrial facilities are located along the Port of Providence and can impact the bay and its surrounding communities. Hazardous waste and air pollutants can affect **human health** and the **environment** if they are not properly managed. Understanding these facilities helps us better understand our local environment.



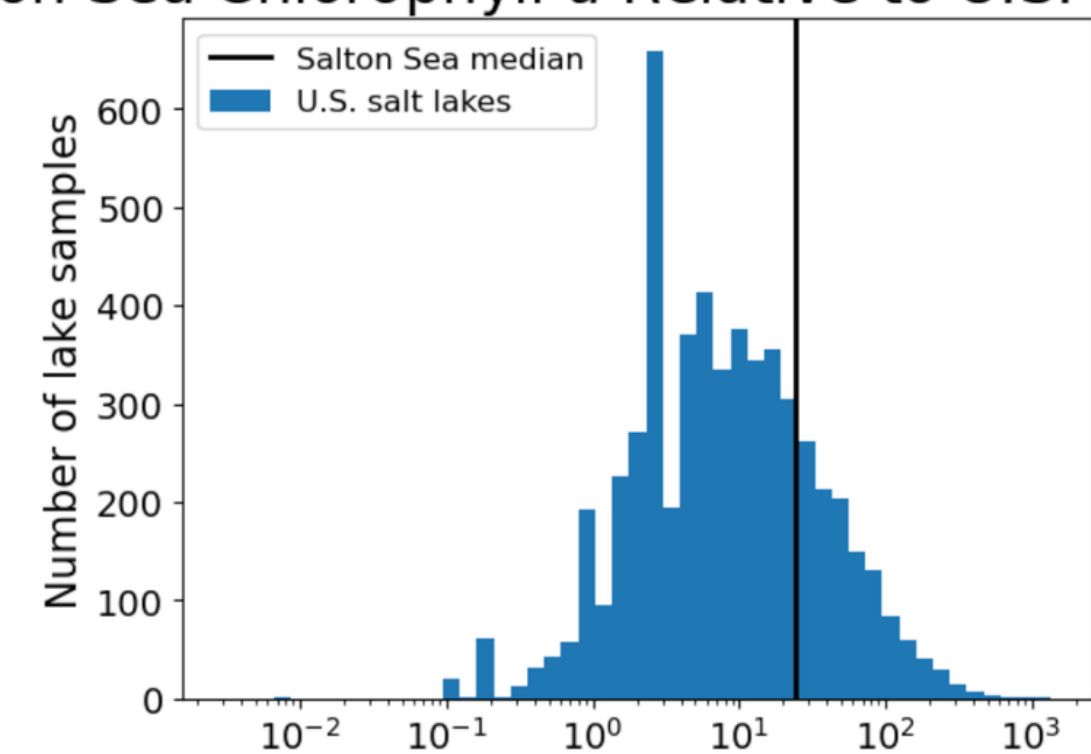
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### Community Questions → Resources

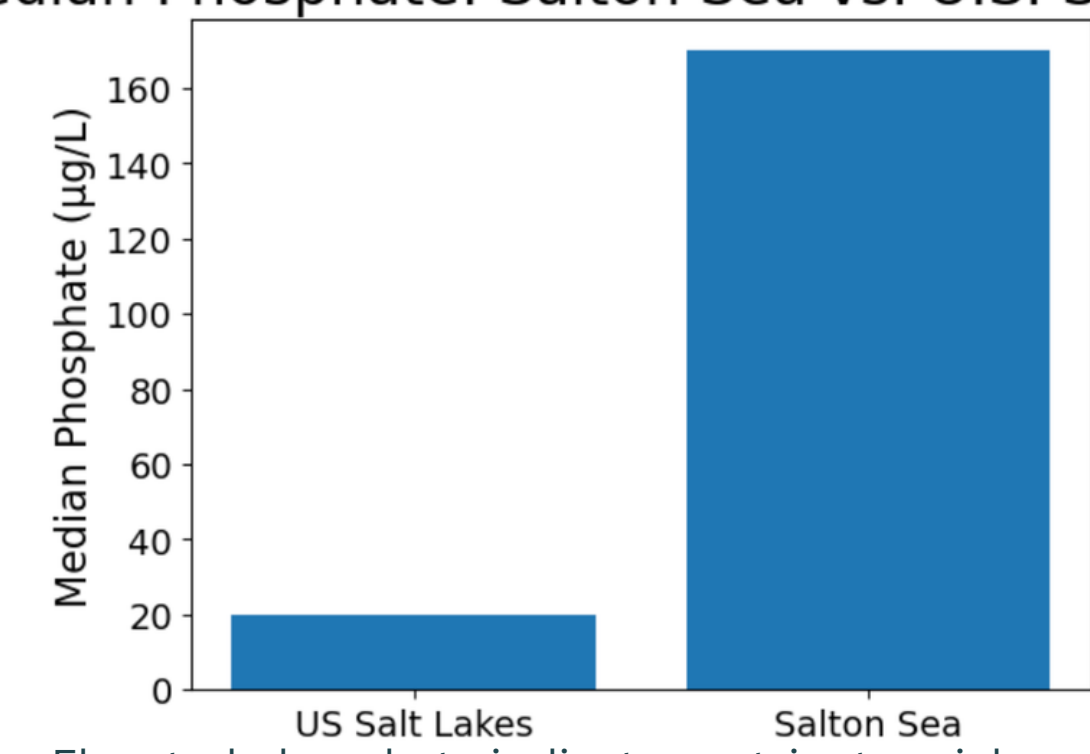
- Community concerns guided research into industrial facilities and potential pollutants (**Title V permits** and **hazardous waste records**)
- Developed **bilingual visual resources** and contributed to the creation and Spanish translation of **25+ Waterspeak materials**.

## Salton Sea: Community Science Data in Context

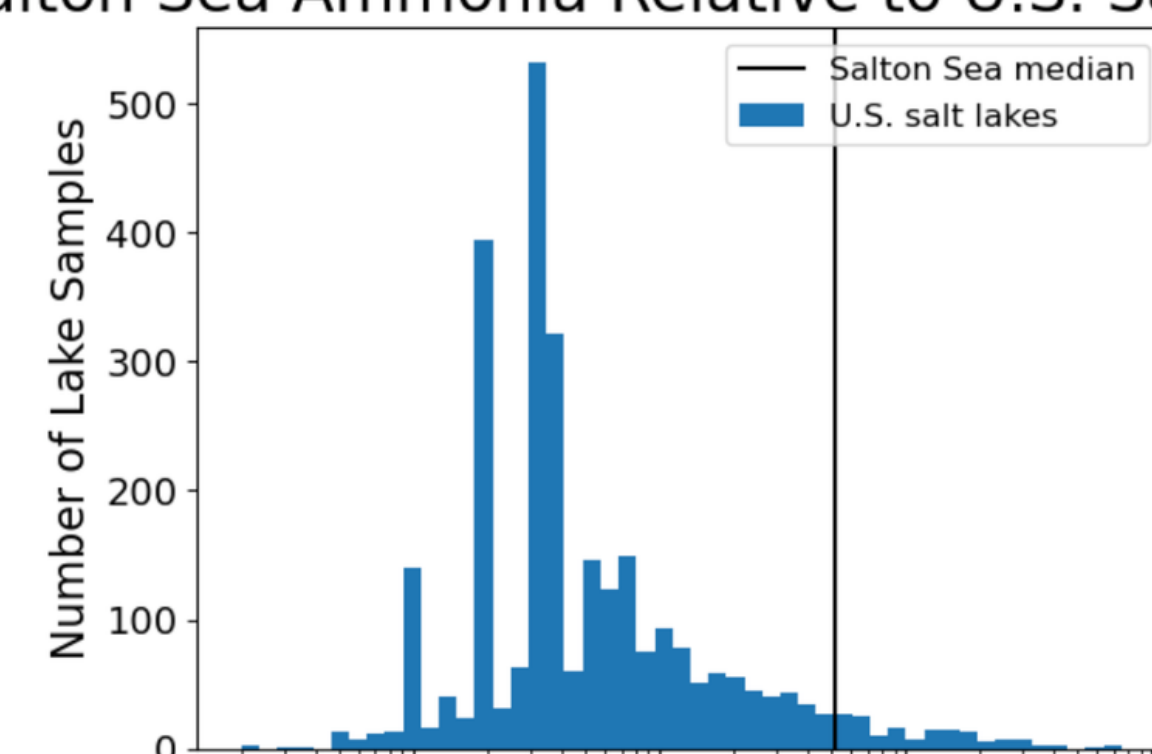
Salton Sea Chlorophyll-*a* Relative to U.S. Salt Lakes Median Phosphate: Salton Sea vs. U.S. Salt Lakes Salton Sea Ammonia Relative to U.S. Salt Lakes



High chlorophyll-*a* indicates elevated algal biomass.

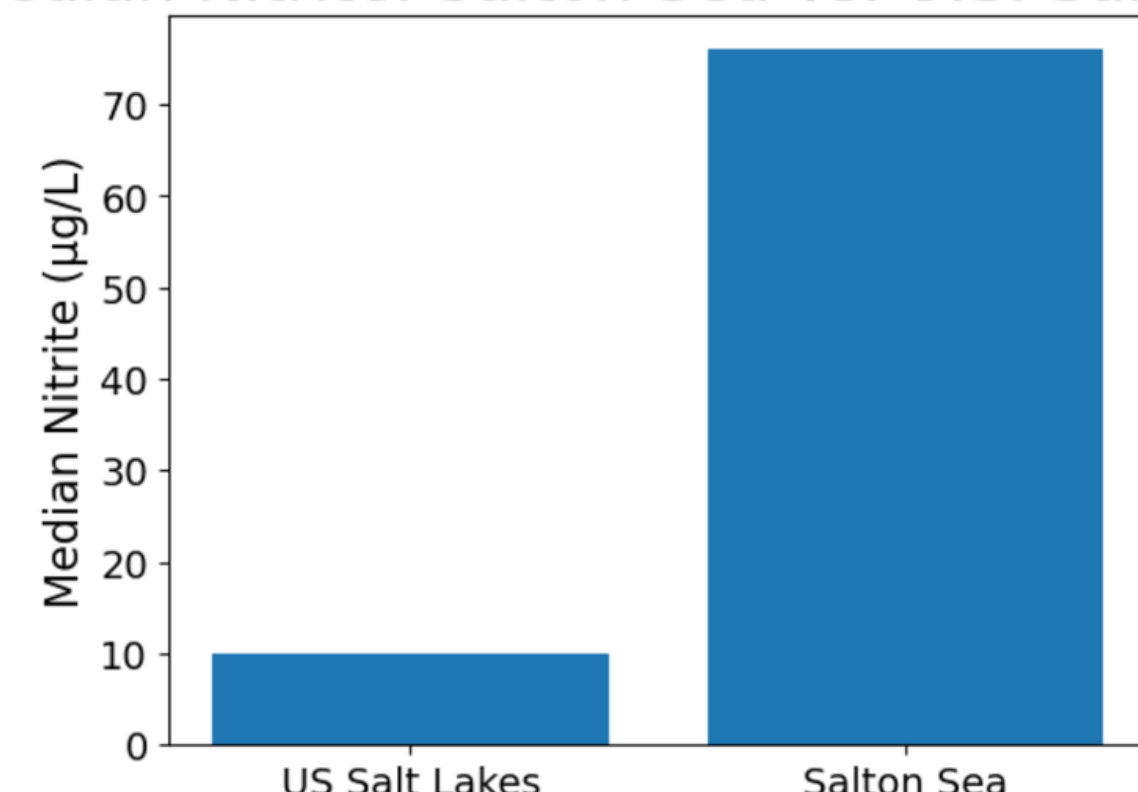


Elevated phosphate indicates nutrient enrichment.



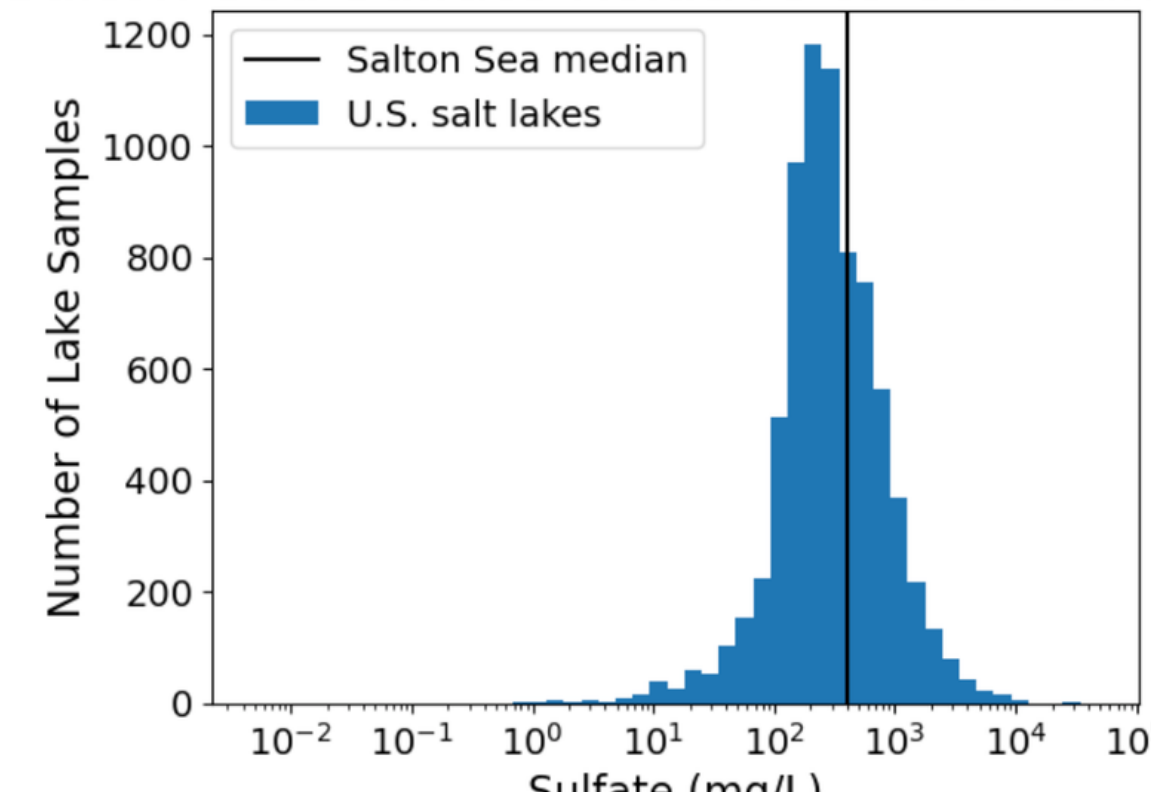
Elevated ammonia is consistent with impaired water quality.

Median Nitrite: Salton Sea vs. U.S. Salt Lakes



Substantially elevated nitrite concentrations relative to U.S. salt lakes.

Salton Sea Sulfate Relative to U.S. Salt Lakes



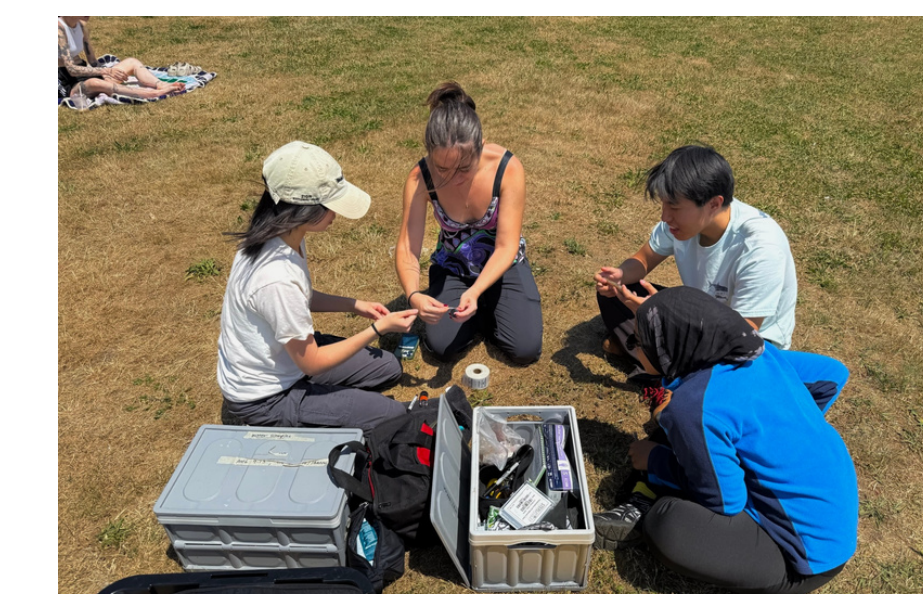
High sulfate levels reflect hypersalinity.

Figures compare Salton Sea community science data with a nationwide database of U.S. salt lakes. Comparable analyses using all U.S. lakes, including freshwater lakes (not shown), yielded similar patterns.

U.S. lake chemistry data from LAGOS-US LIMNO (Shuvo et al. Environmental Data Initiative, 2023).

## Conclusions

- Water quality varied substantially among sampling sites in the Port of Providence, highlighting **localized environmental conditions**.
- The degraded water quality of the Salton Sea **limits community recreation** and contributes to ongoing **ecosystem decline**.
- Both approaches translated complex science into **accessible, community-centered information**.



## Acknowledgements

This work was made possible by the Department of Earth, Environmental, and Planetary Sciences (DEEPS) at Brown University, all community scientists collecting data at the Salton Sea, the Waterspeak community participants, and the People's Port Authority. I would like to personally thank Mara Freilich for giving me the opportunity to conduct this research, as well as the sampling team, Maysha, Derrick, Claire, Ijeoma, Karsen, and Shailja, and everyone in the Freilich Lab who supported me this summer.

Compared with both all U.S. lakes and U.S. salt lakes, the Salton Sea exhibited substantially elevated chlorophyll-*a*, phosphate, ammonia, nitrite, and sulfate concentrations, indicating **degraded water quality** and **eutrophic conditions**.