Pathogenic Vibrio Species Occurrence in Southern California

Pathogenic *Vibrio* species occur naturally and can cause illness

- Naturally occurring in marine and brackish waters and shellfish
- Many can cause human disease: most commonly ***V. parahaemolyticus, V. vulnificus,*** *V. alginolyticus*, and *V. cholerae*
- ~80K cases in the US per year (CDC)
  - ~ 60% classified as foodborne
  - ~ 35% non-foodborne, with the majority reporting recent exposure to a body of water

V. parahaemolyticus **GI illness**

V. vulnificus **wound infections**

Problem Statement

- Cases on the rise globally, with more cases during the Summer
- Increased prevalence of Vibrio associated with rising sea surface temperatures
- Limited information regarding Vibrio abundance in California waters and shellfish

After Recent 'Heat Dome,' Washington Issues Warning Not to Eat Raw Shellfish

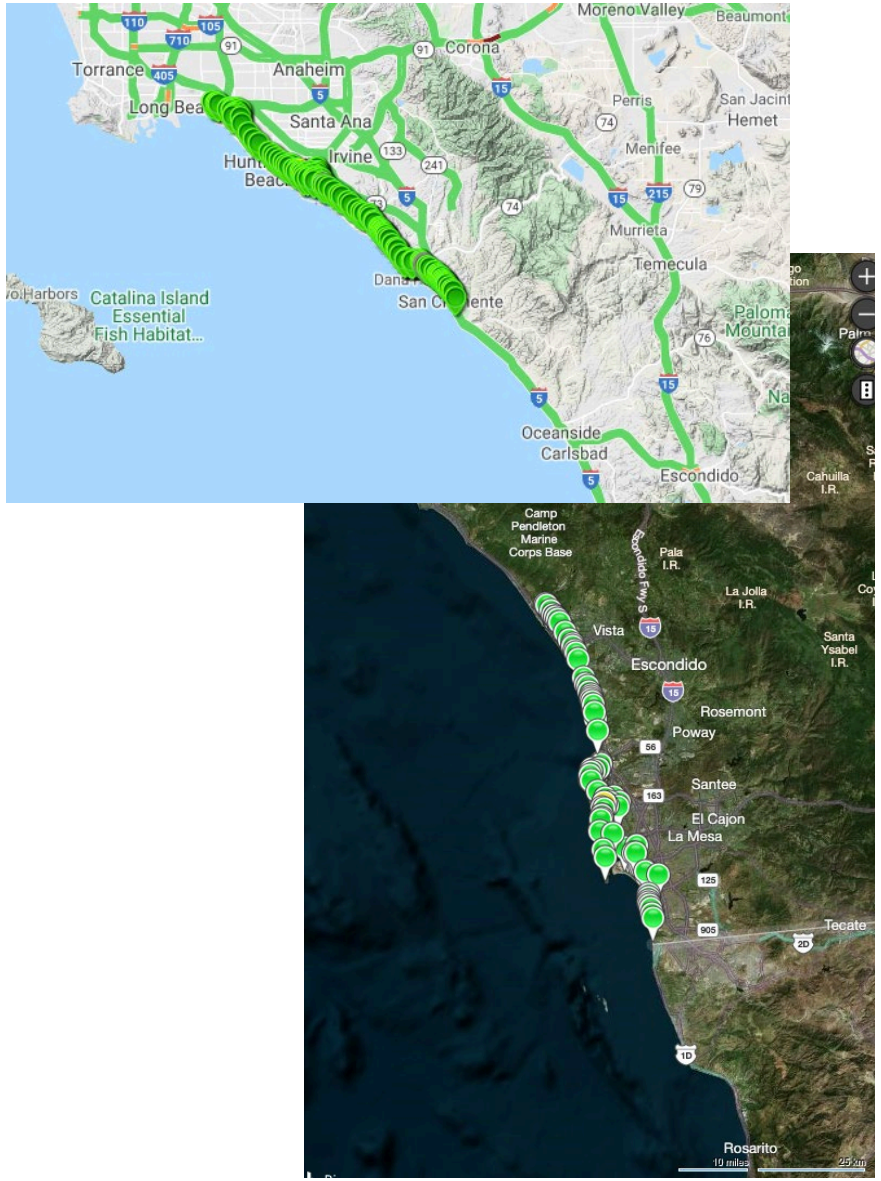
Health officials said that high temperatures and low tides were likely to blame for an outbreak of vibriosis, an intestinal disease associated with eating raw oysters and other shellfish.

Oysters being harvested in Samish Bay, north of Seattle. Liz O. Baylen/Los Angeles Times, via Getty Images

https://www.nytimes.com/2021/07/22/us/oysters-washington.html

Limited monitoring within California

- Robust beach monitoring program for subset of GI-pathogens
- Don’t monitor for Vibrio at any of these locations
- No monitoring program for wild shellfish or surface waters
- CDPH requires routine monitoring for *V. parahaemolyticus* in shellfish
  - Within Southern California, 1 location- commercial oyster farm



Approach

- We have looked for opportunistic circumstances where we can take Vibrio measurements

    1. Newport Bay Study:
        - Sampled water column and oyster tissues concurrently
        - High spatial resolution in one Bay

    2. San Diego Study:
        - Water samples from 3 Bays
        - Sites sampled monthly for an entire year

- Measure *V. parahaemolyticus* and *V. vulnificus* as well as species-specific virulence genes

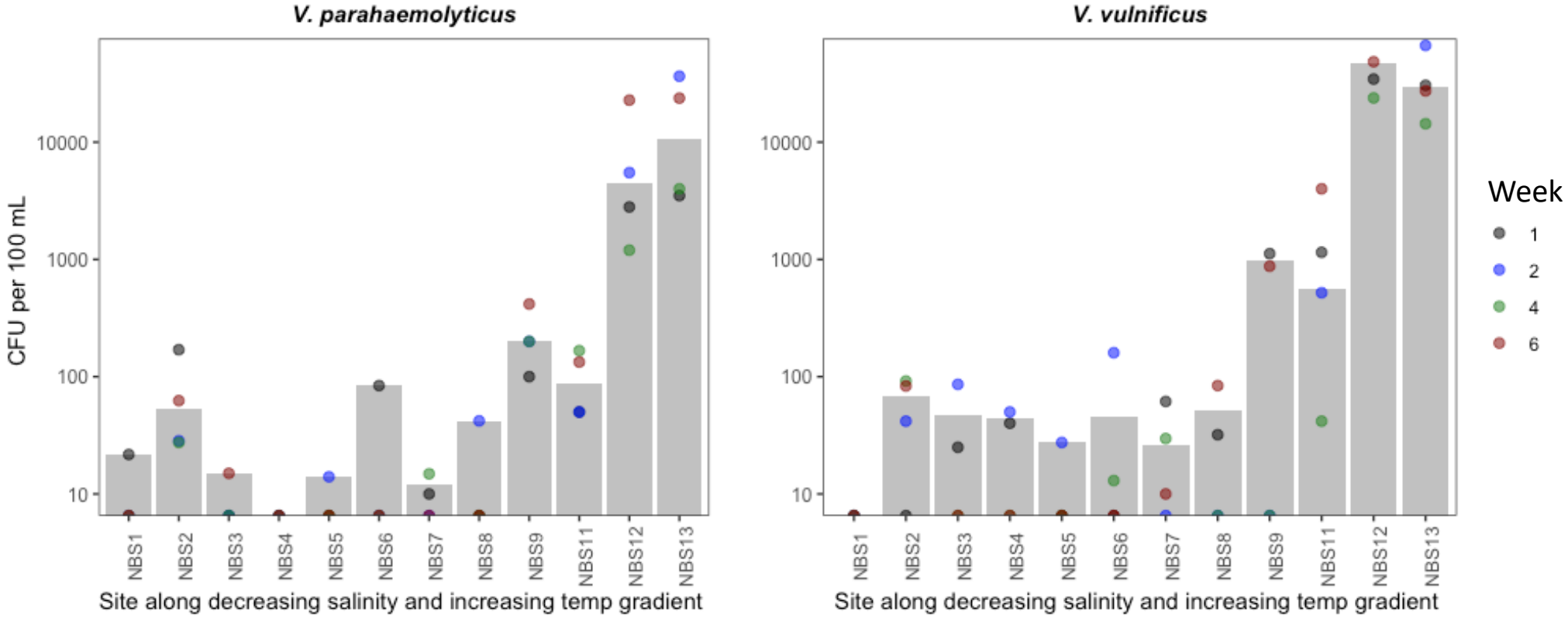
Study questions

- **Do we detect pathogenic Vibrio species and virulence genes in local coastal waters and shellfish?**

- What environmental conditions are associated with pathogenic *Vibrio* species occurrence – biotic and abiotic?

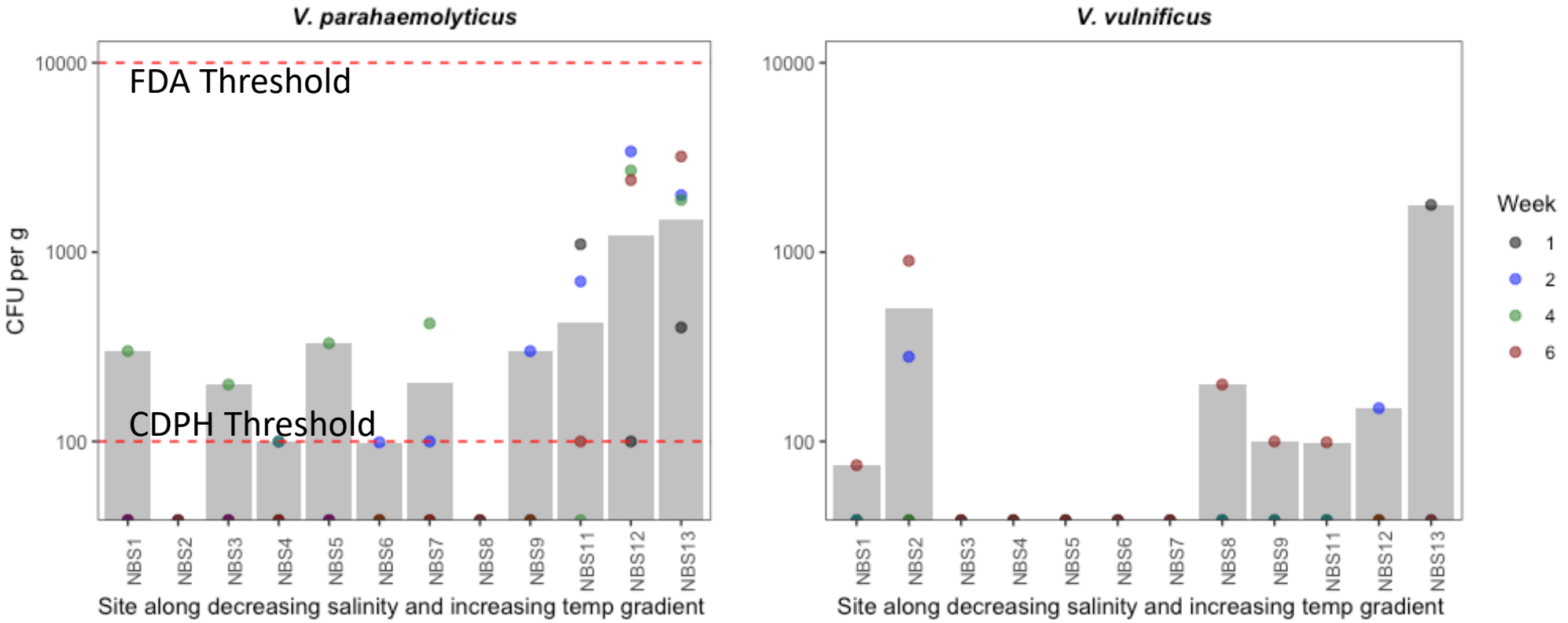
Pathogenic *Vibrio* species detected in Newport Bay costal waters

Water column concentrations



Pathogenic *Vibrio* species detected in Newport Bay shellfish

Concentrations in the oysters



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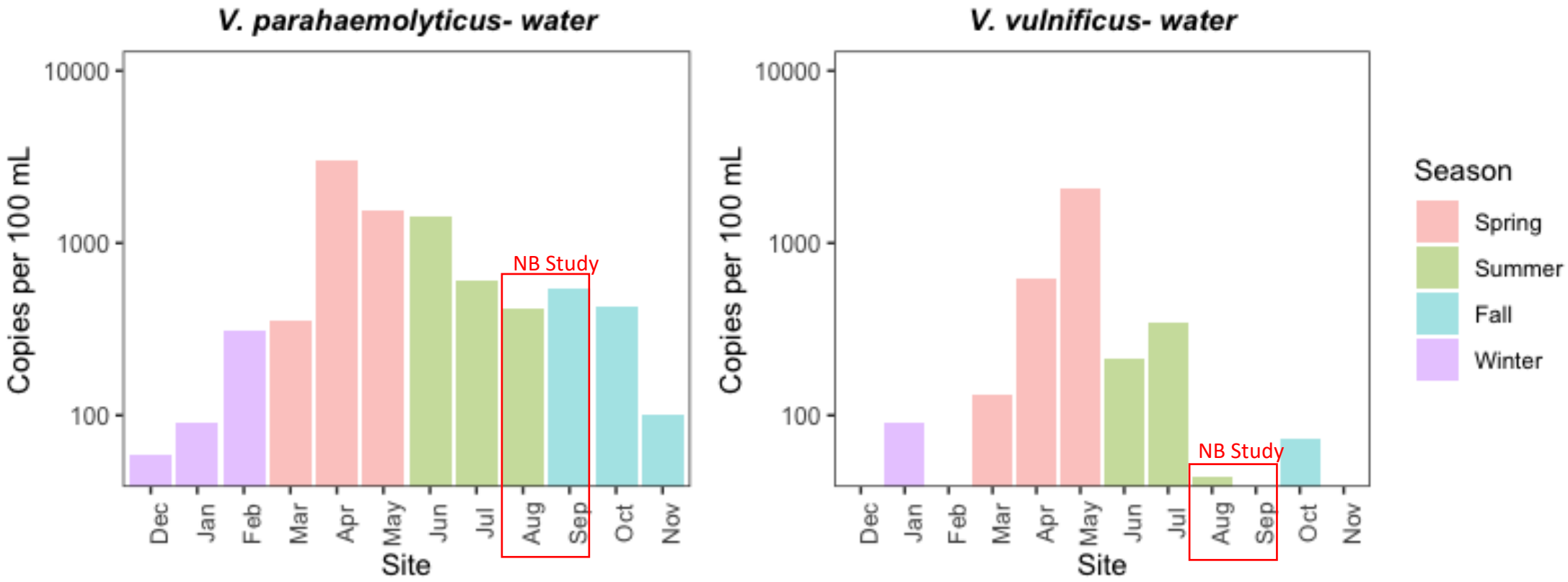
Pathogenic *Vibrio* species detected across 3 San Diego Bay with seasonal trends apparent.



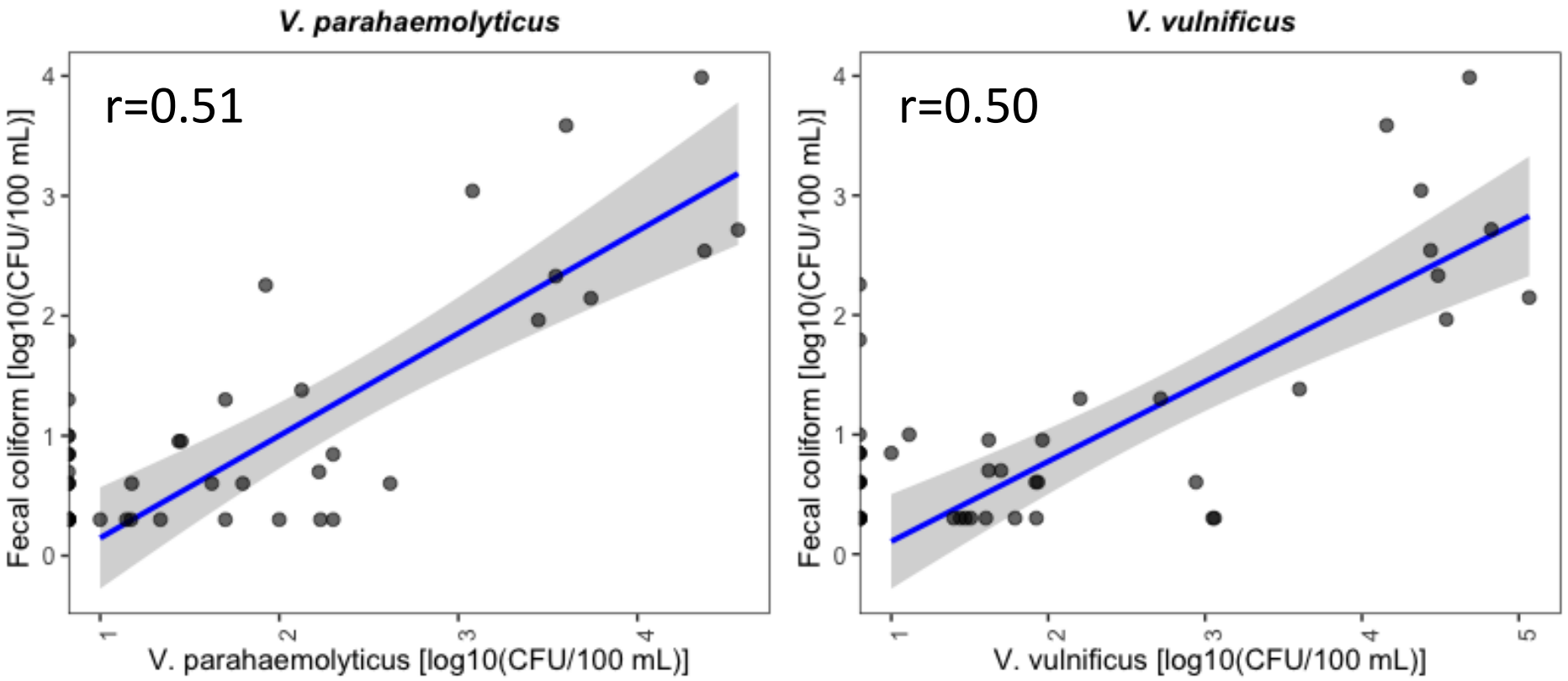
- Pathogenic species abundances also varied seasonally

Our questions

- Do we detect pathogenic Vibrio species and virulence genes in local coastal waters and shellfish?

- **What environmental conditions are associated with pathogenic *Vibrio* species occurrence – biotic and abiotic?**

Water column *Vibrio* concentrations correlated with fecal coliform levels



Next Steps

- Pathogenic Vibrio are everywhere we look, something SCCWRP is keeping an eye on
  - Working to improve and automate measurement of pathogenic Vibrio
  - Expanding screening for other species such as *V. alginolyticus*
  - Teasing apart relationship with environmental co-variates

- Evaluate risk associated with concentrations of pathogenic Vibrio species measured in local waters and shellfish

Questions?