

Impacts of Sunny Day Flooding on Recreational and Shellfish Water Quality

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Sunny day flooding: Temporary overflowing of saltwater onto normally dry land, often occurring during higher than average high tides





Hurricane Chaser Chase

@hurricane_chase



Time lapse of coastal flooding on A1A in Hollywood Beach [#Florida](#).

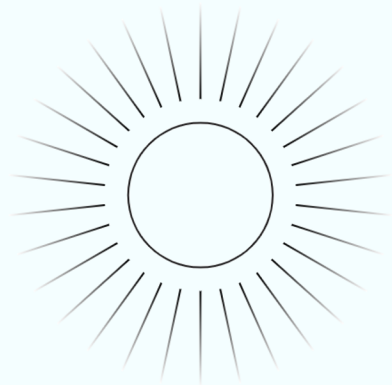
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9:46 AM · Oct 29, 2023 · **28.9K** Views

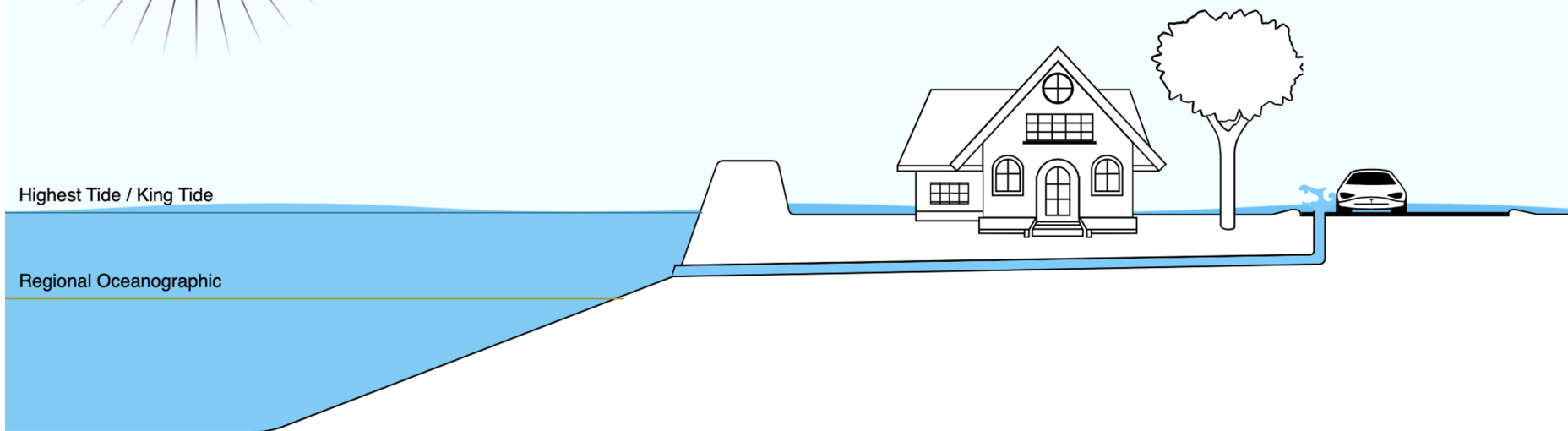


Highest Tide / King Tide

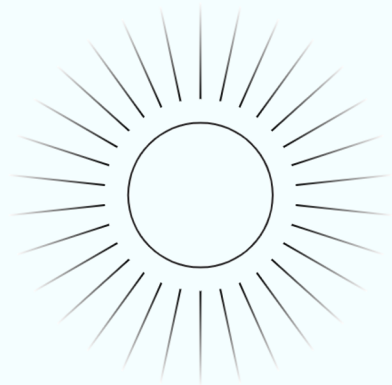


Highest Tide / King Tide

Regional Oceanographic



Source: NOAA



Highest Tide / King Tide



Highest Tide / King Tide

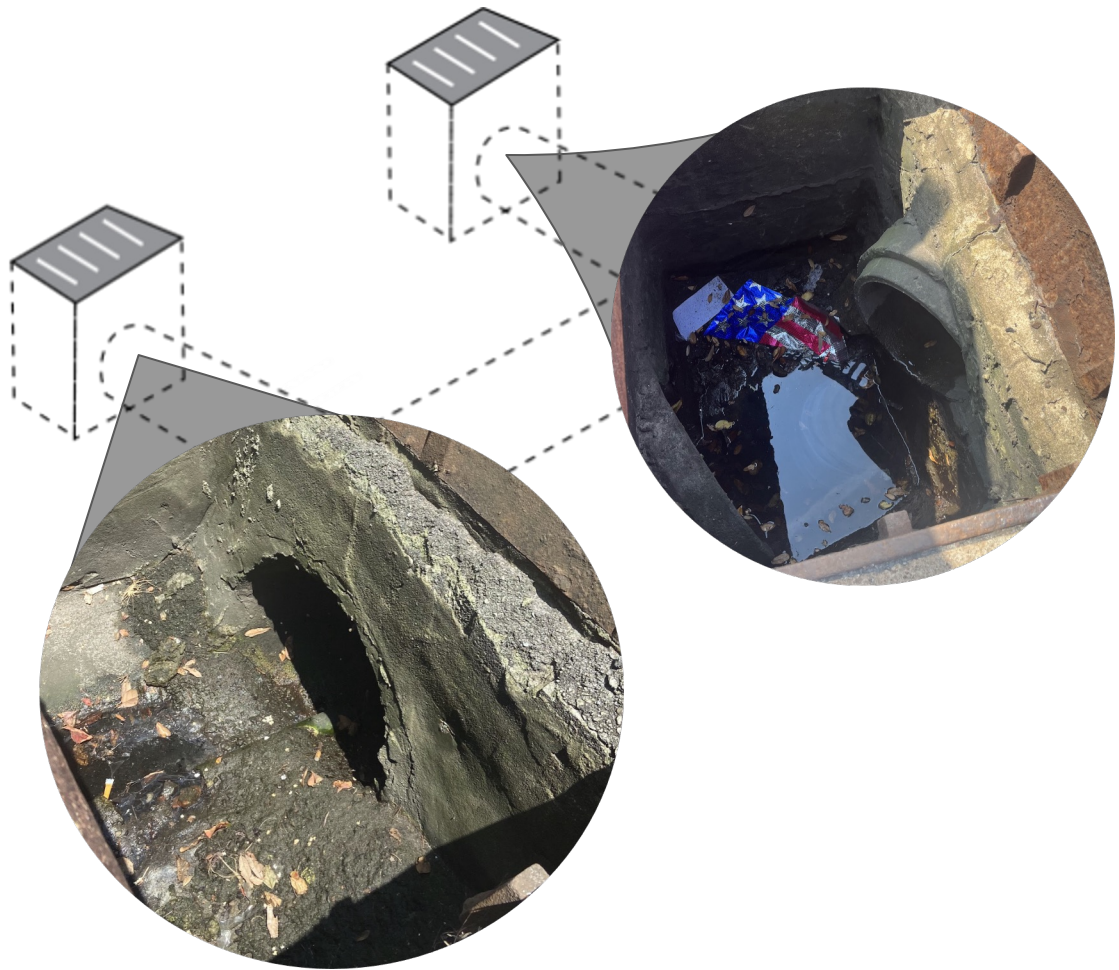
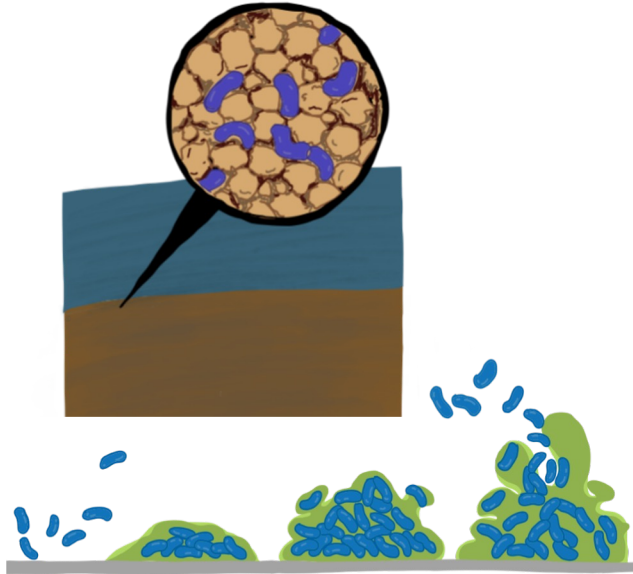
Regional Oceanographic



Exfiltrated sewage

Adapted from NOAA, UMCES IAN

Sediment, pipe biofilms, and stagnant water in the stormwater sewer



Illustrations: Julia Harrison. Catch basin sketch: UMCES IAN.

Household and industrial
pollutants, pet/wildlife feces

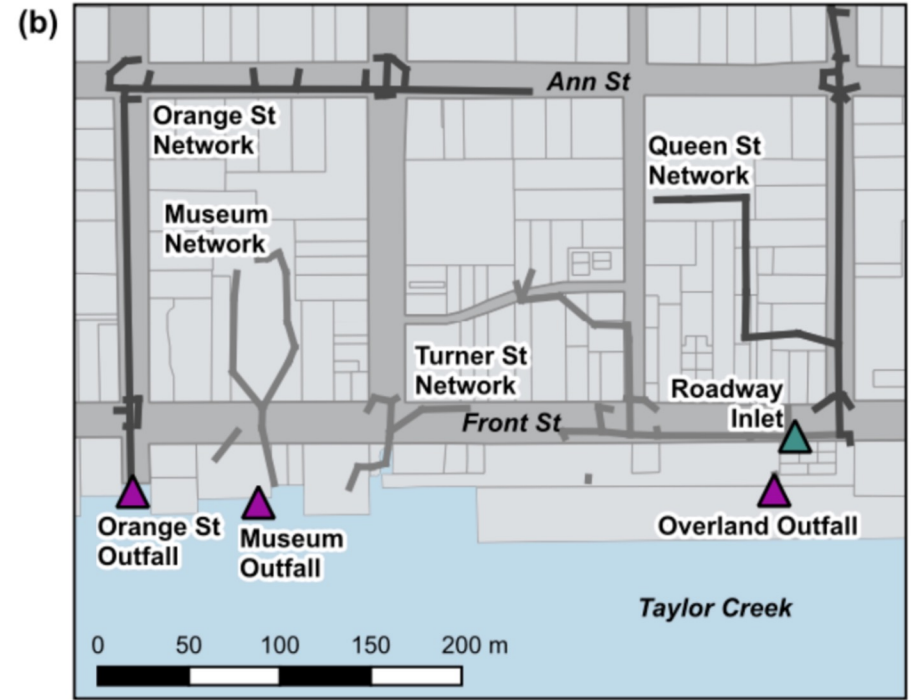
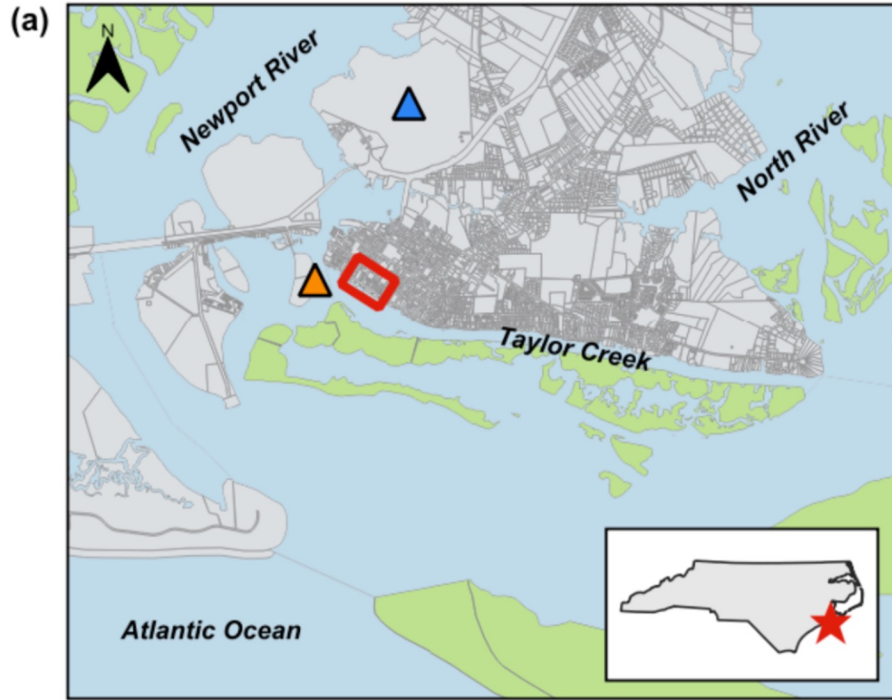


Are tidal floods contributing to water quality impairment in coastal/estuarine waters?



Megan Carr,
PhD Student





Enterococci sampled during king tides in summer 2022 & 2023

**Roadway floodwaters often had high Ent. concentrations,
particularly when floods occurred via the stormwater network**



41 - >24,196 (median = 5,800)

Units: MPN 100 mL⁻¹

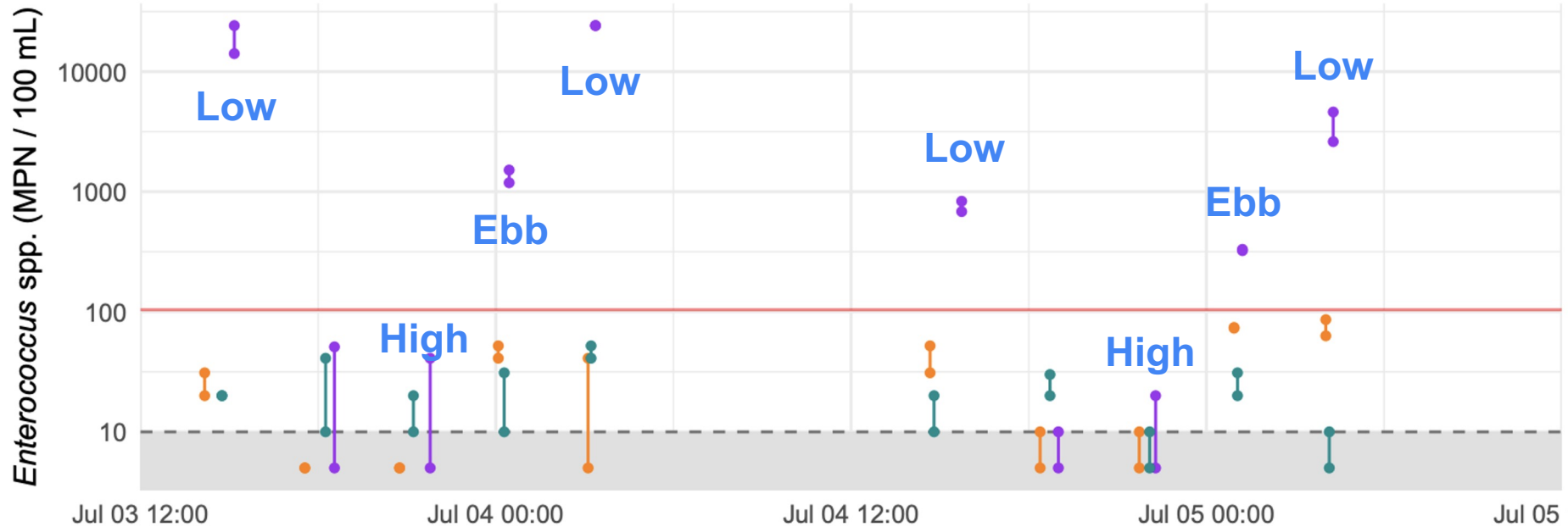


455-547

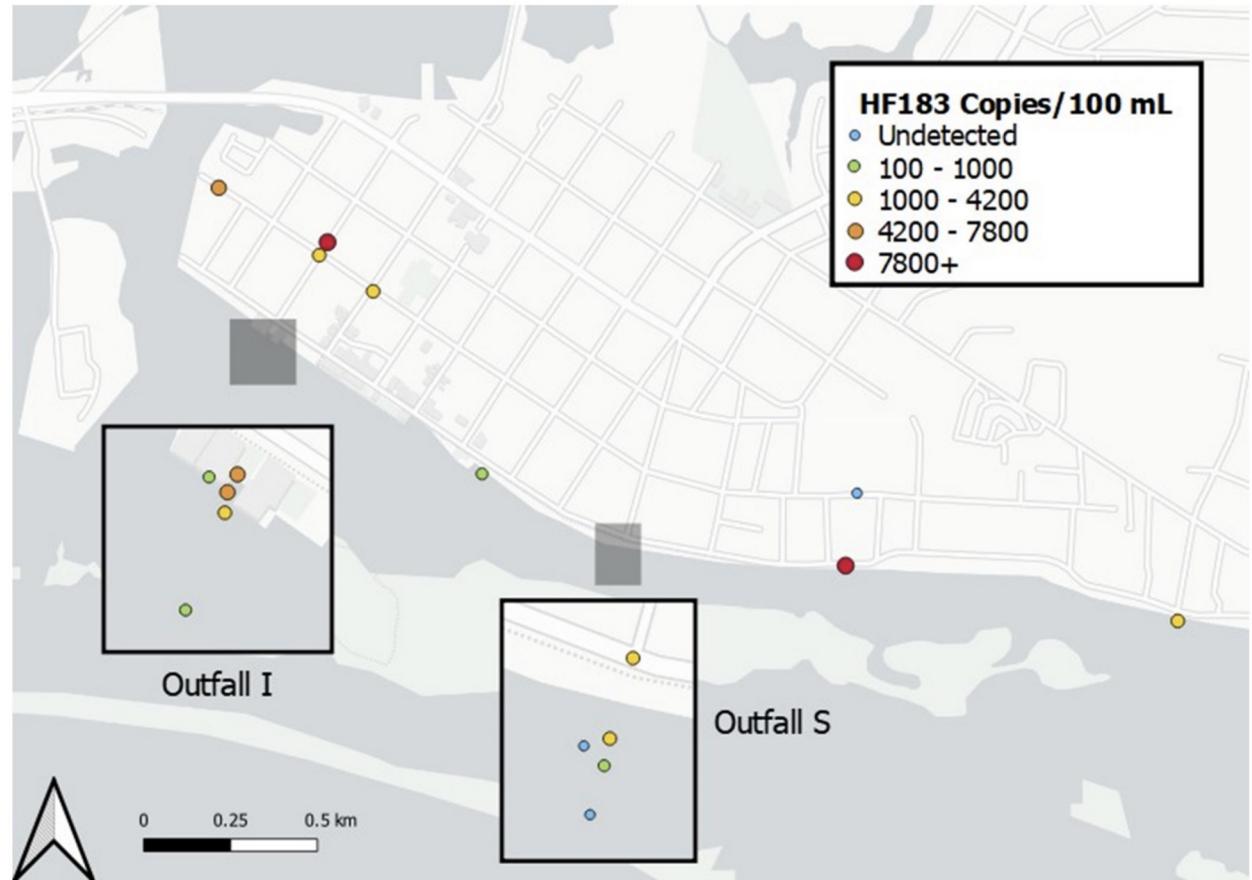


1,056-2,909

Exceedances occurred during ebb/low tide, but not consistently across locations



What's the source?



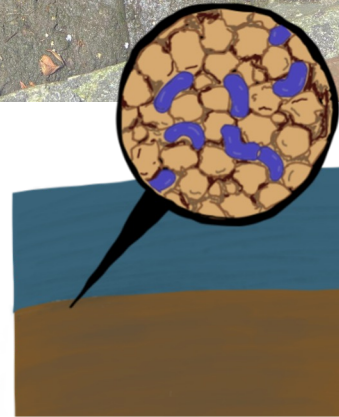
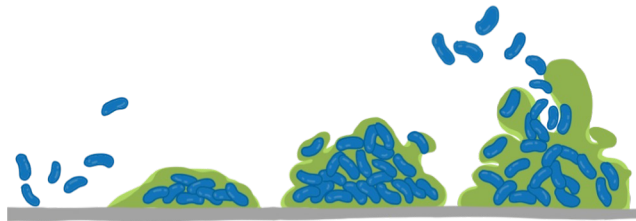
Hart, Blackwood, & Noble (2020), Examining coastal dynamics and recreational water quality by quantifying multiple sewage specific markers in a North Carolina estuary, *Sci. of The Total Env.*

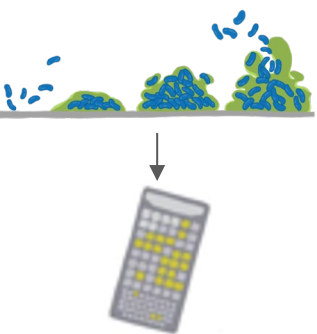
Could stormwater pipe biofilms and catch basin sediment be bacteria reservoirs?

Biofilm

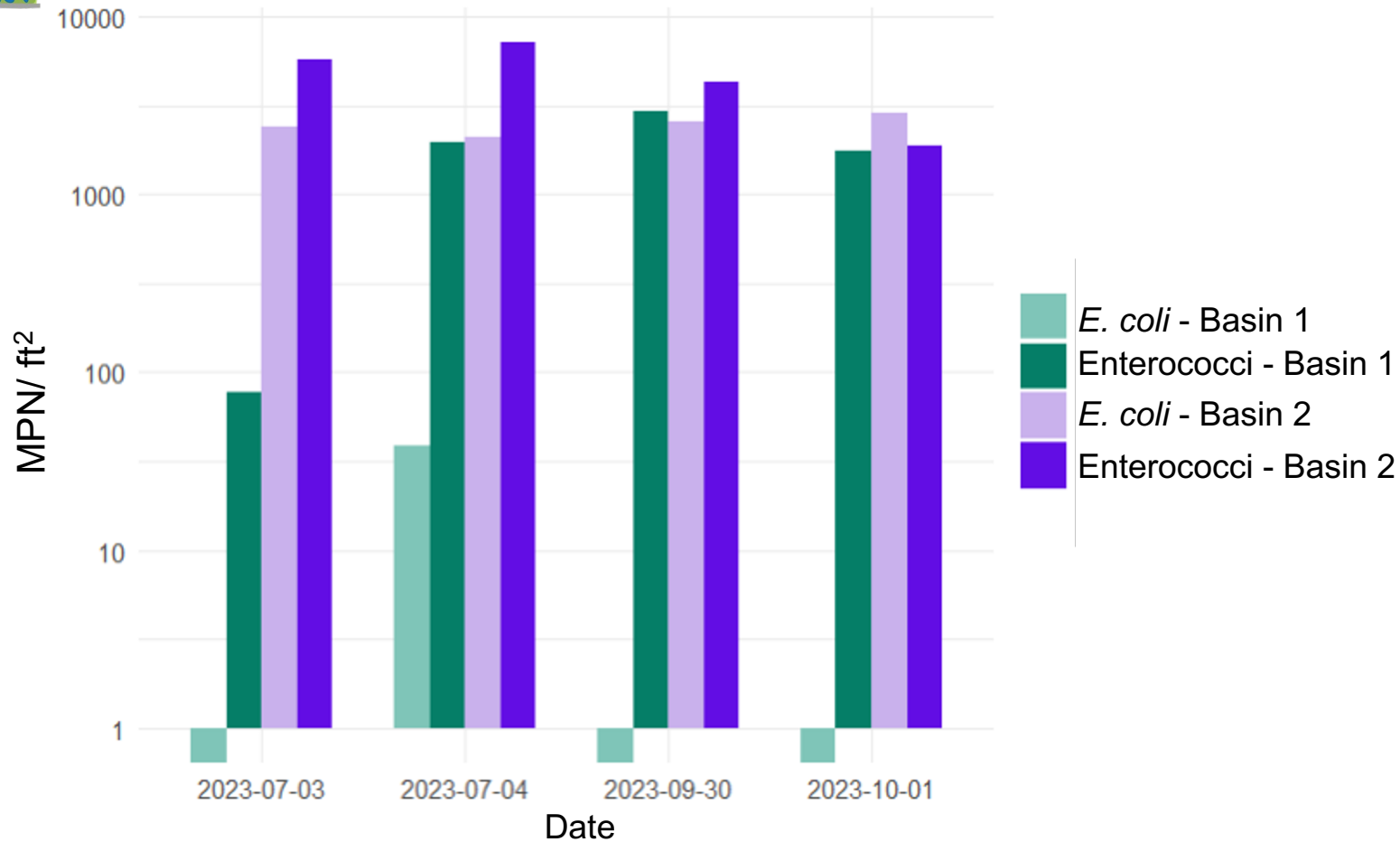


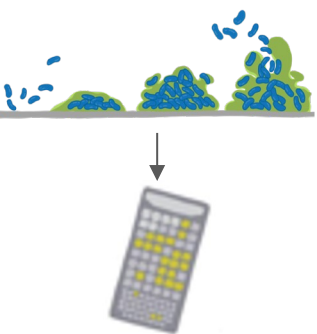
Sediment



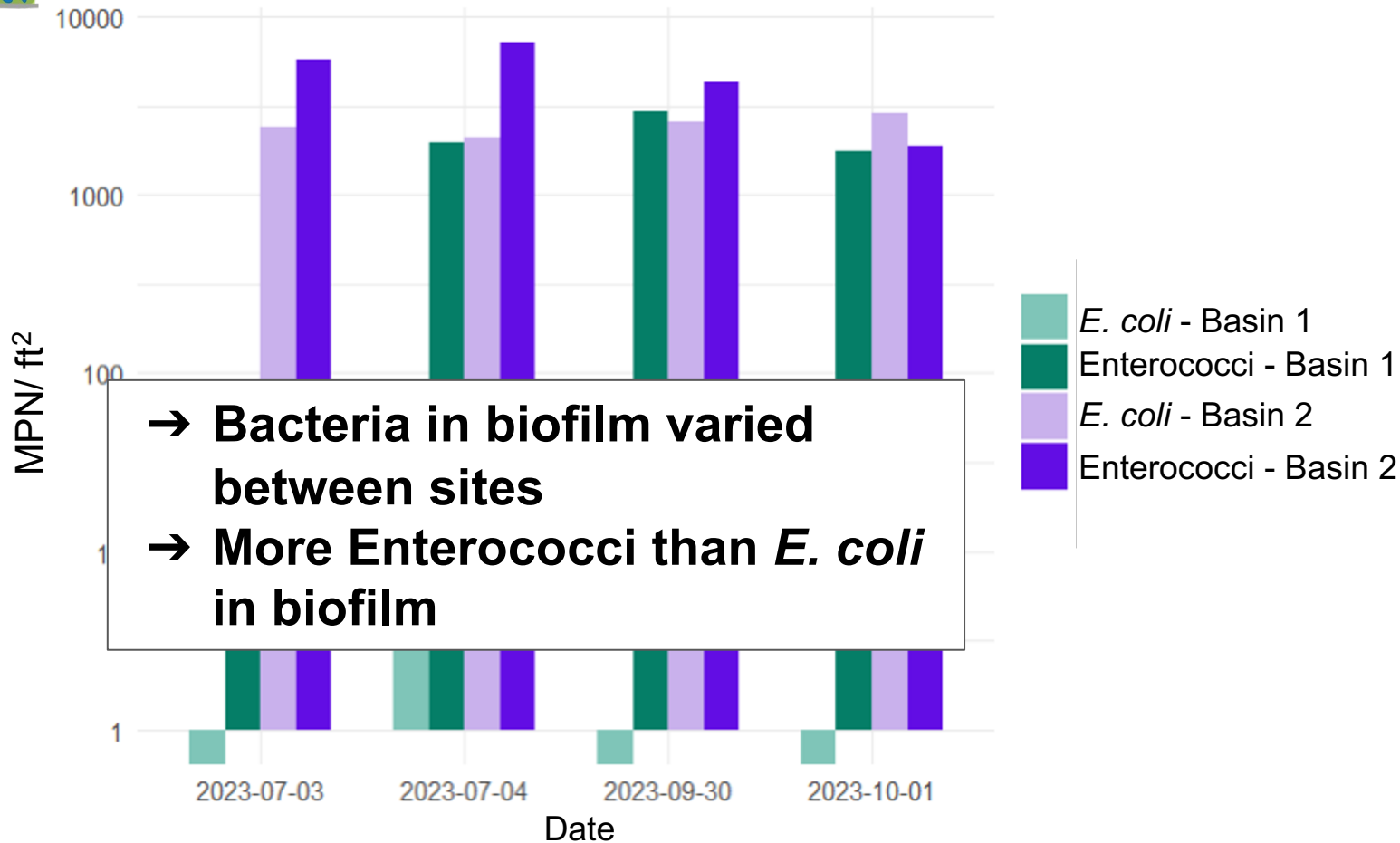


Fecal Indicator Bacteria in Biofilms of Stormwater Network

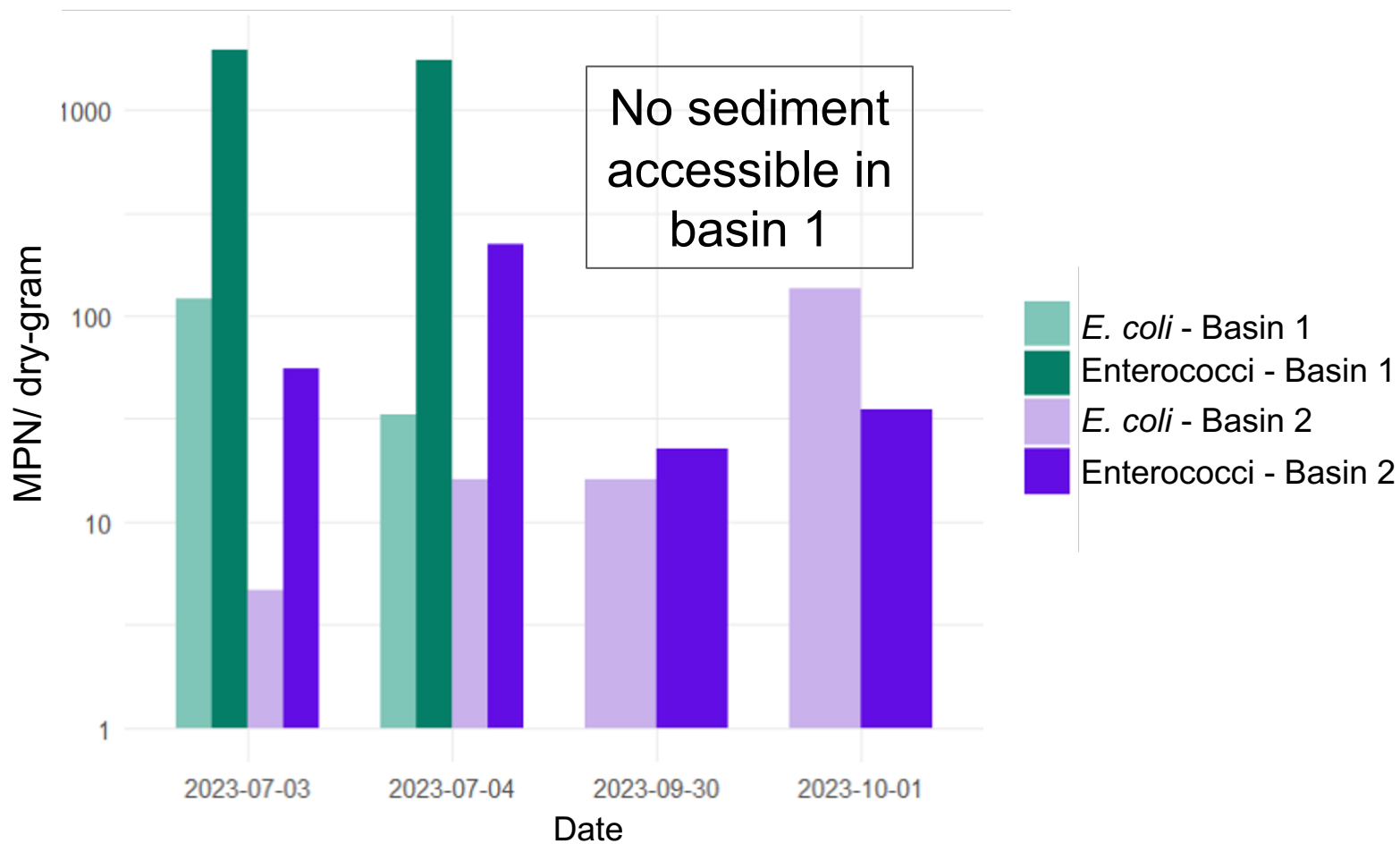




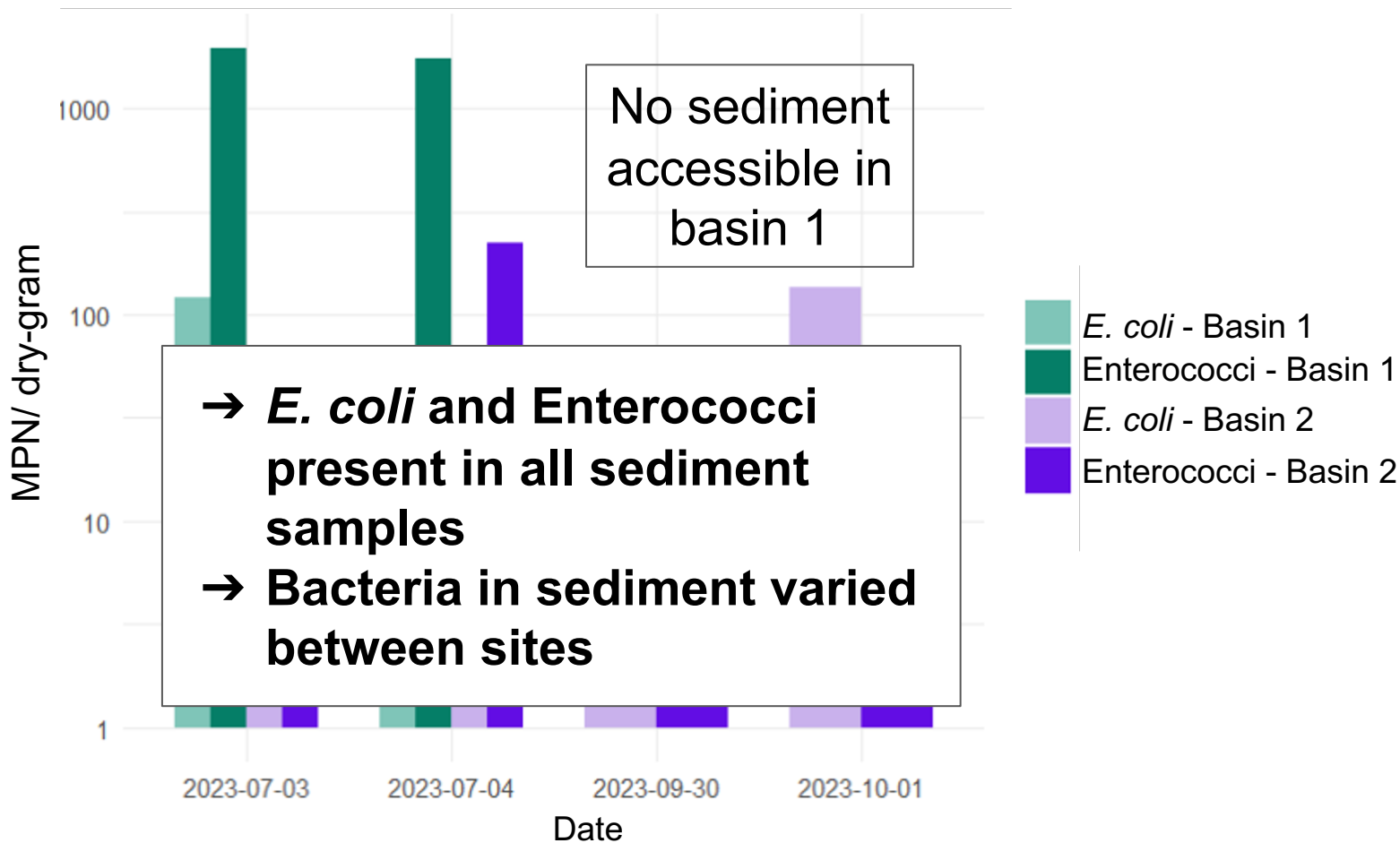
Fecal Indicator Bacteria in Biofilms of Stormwater Network



Fecal Indicator Bacteria in Sediment of Stormwater Network

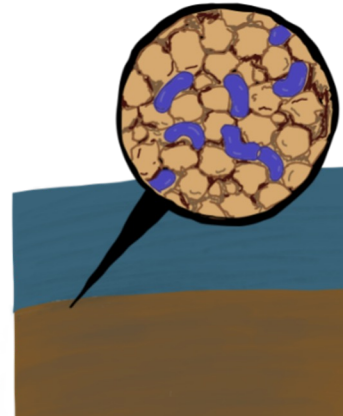
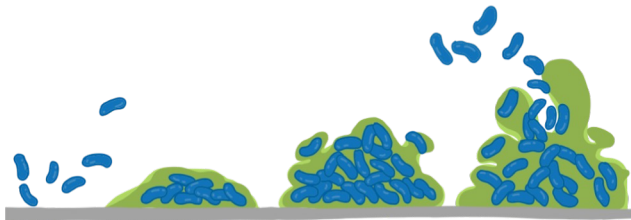


Fecal Indicator Bacteria in Sediment of Stormwater Network



Overall...

- *E. coli* and Enterococci were found in both biofilm and sediment
- Bacteria levels were relatively high, indicating the catch basin biofilms and sediment could be bacteria reservoirs, but more research is needed



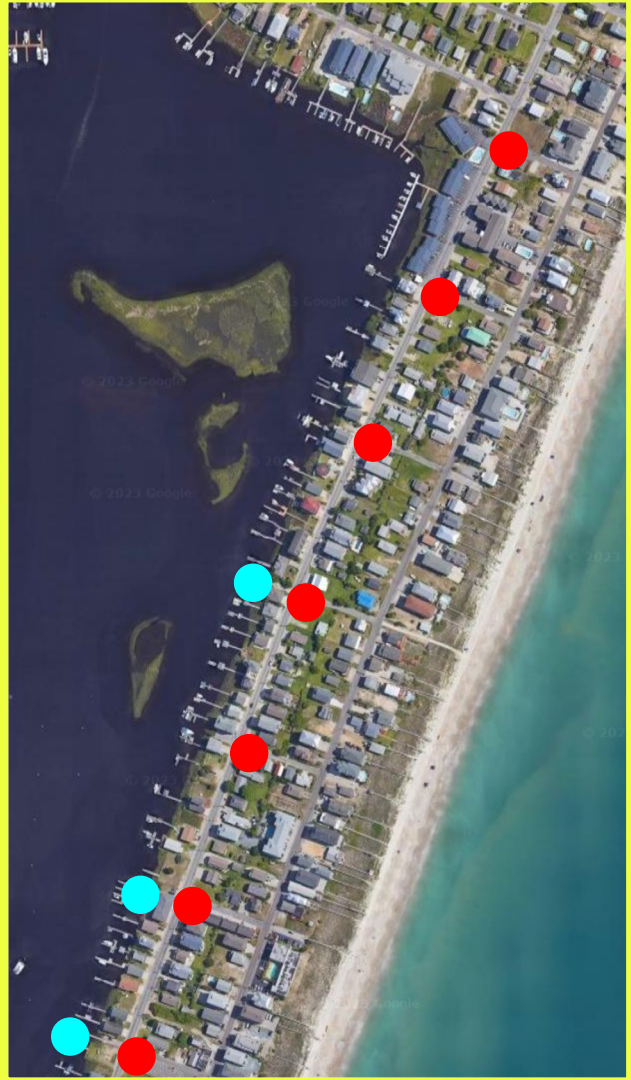
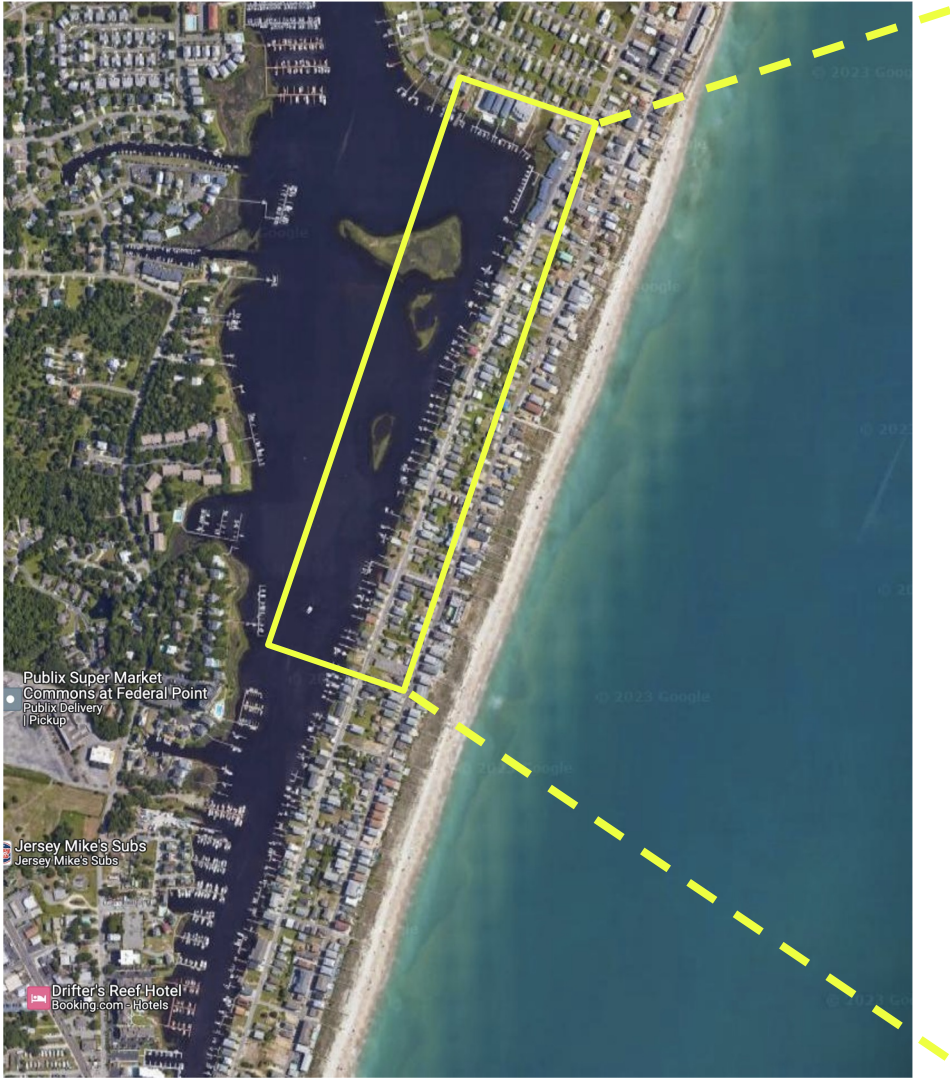
Do tidal floodwaters in other communities also have elevated fecal indicator bacteria concentrations?



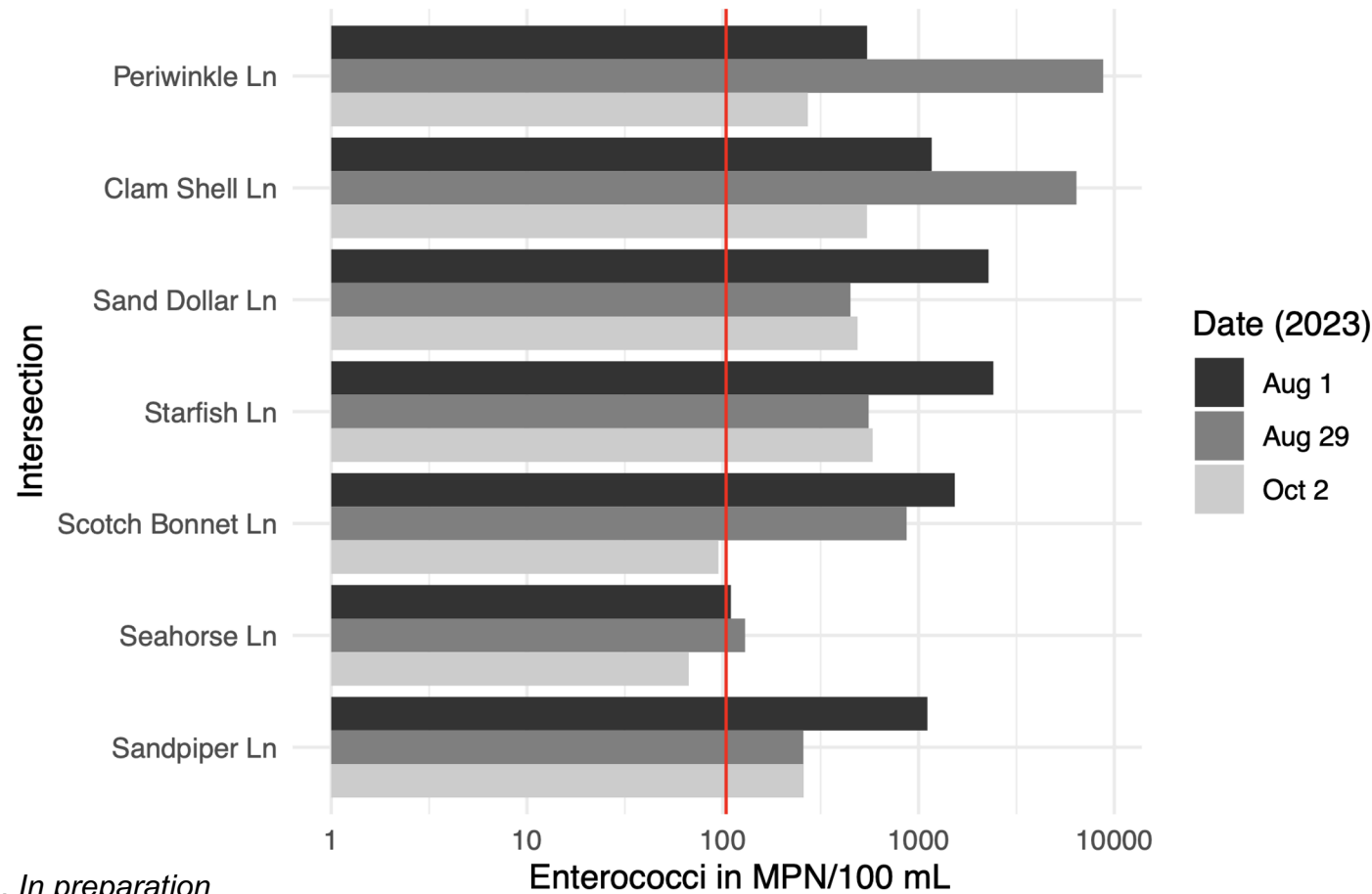
2 Oct 2023



1 Aug 2023



Despite greater flood extent, floodwater Ent. concentrations were high



Conclusions

- Water quality impacts of tidal floods have not been well studied
- In two communities, elevated Enterococci concentrations were documented in roadway floodwaters
- Floodwaters can impact the quality of receiving waters, with duration of impact likely depending on dilution potential
- Sediment and biofilms in underground stormwater infrastructure may act as a reservoir for bacteria
- When assessing environmental factors that have a bearing on water quality, chronic “sunny day” floods should be considered

Exercise Caution: Tidal Floods May Contain Pollutants

- › What is tidal flooding?
- › What do we know about the water quality of tidal floods?
- › What should I do if I encounter tidal floodwaters?
- › Can we predict when tidal flooding may occur?
- › How can I learn more about tidal flooding?

[Download the fact sheet →](#)

go.ncsu.edu/tidalfloods



Stay Safe
from Tidal Flooding

- If exposed to floodwaters, wash hands and wounds with soap and clean water.
- If exposed wounds become infected, seek medical attention.
- Do not allow children to play in floodwater. Disinfect exposed toys.

Thanks for your attention!

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