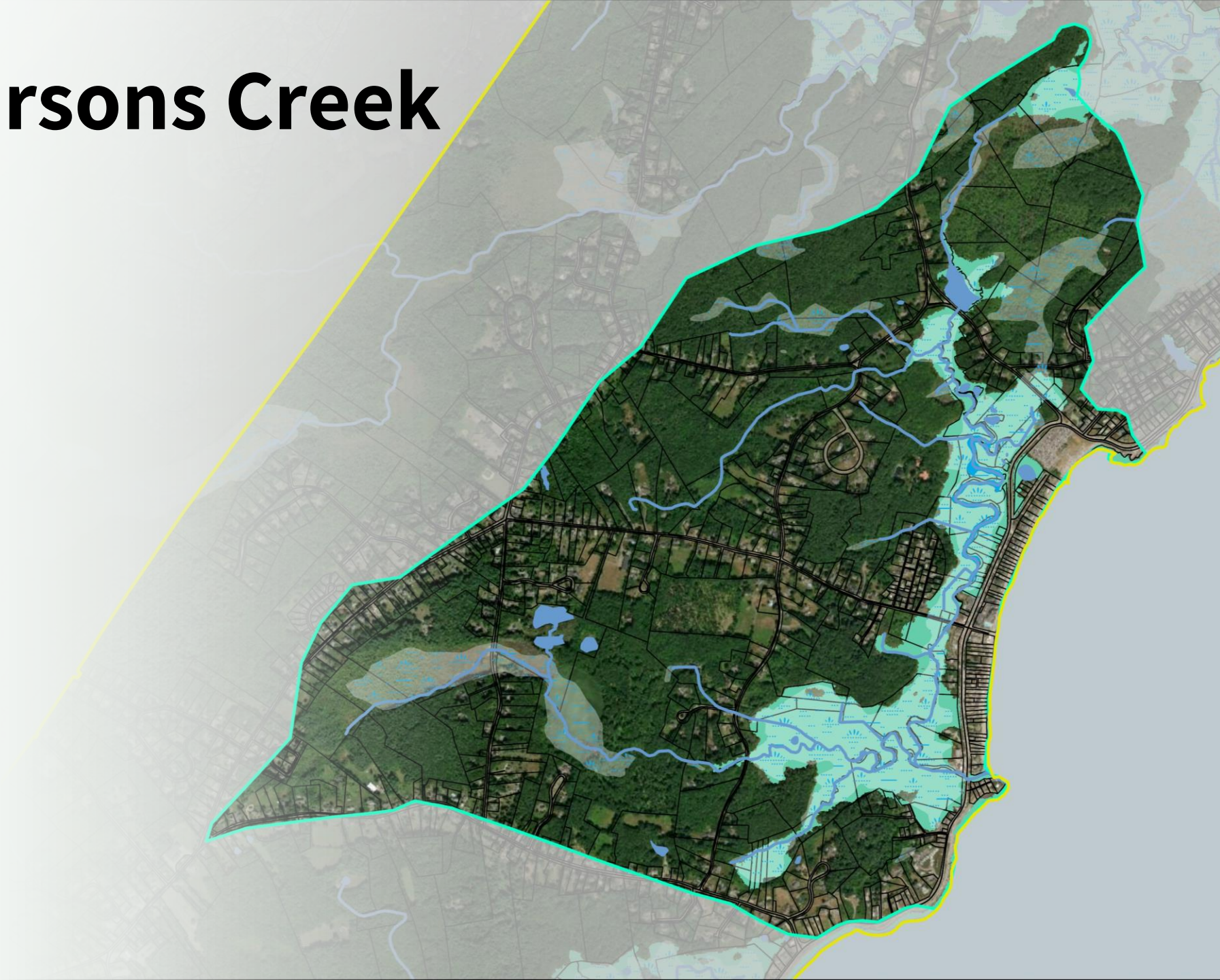


Restoring Parsons Creek Rye CWSRF

Rye Select Board Meeting
June 12, 2023

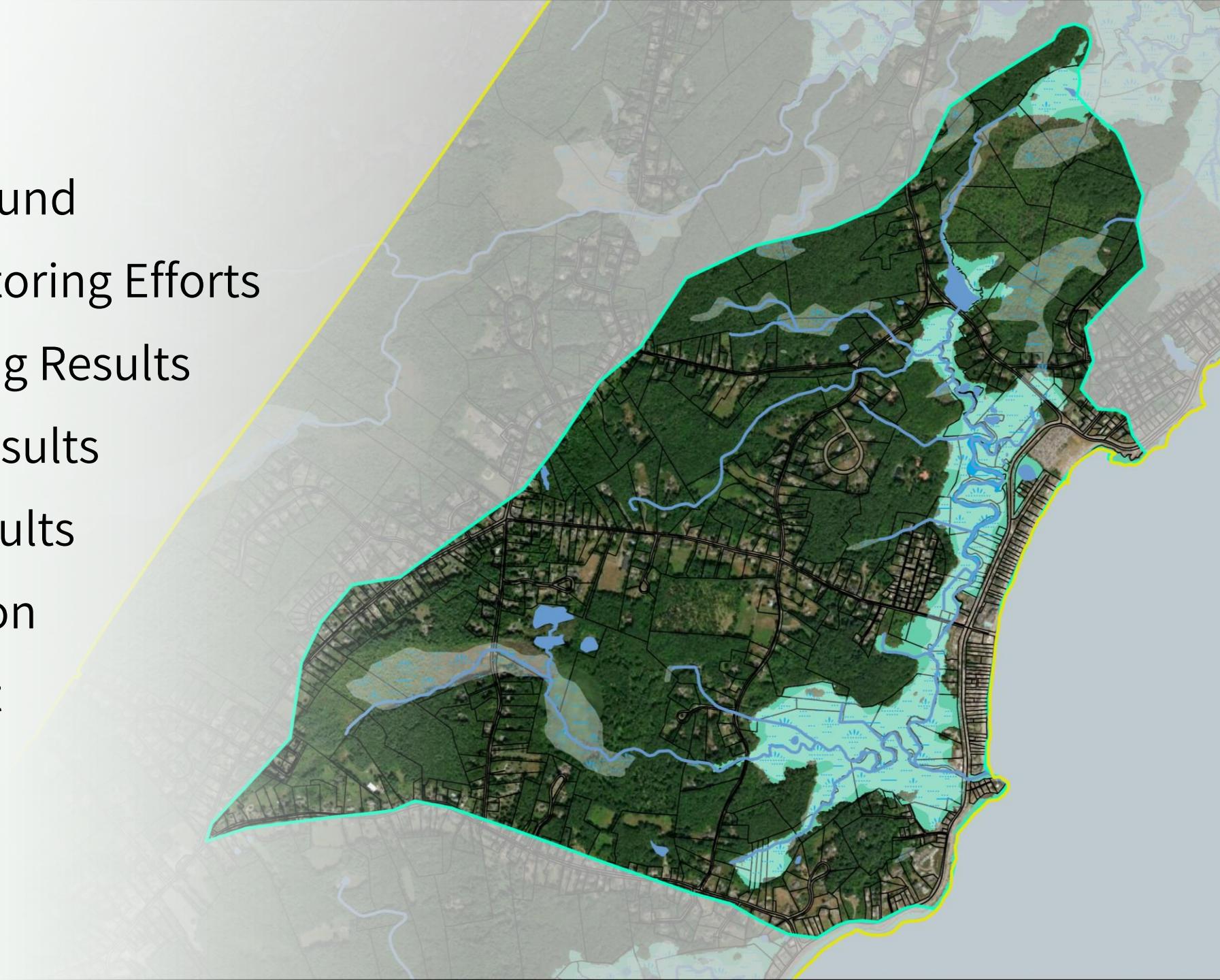


Luke Frankel & Laura Diemer
FB Environmental Associates



Outline

- Watershed Background
- Water Quality Monitoring Efforts
- Historical Monitoring Results
- 2022 Monitoring Results
- 2022 PhyloChip Results
- PhyloChip Discussion
- Next CWSRF Project



Parsons Creek Watershed

- Comprised of Class B waterbodies
- 5 different assessment units
 - 3 freshwater rivers (Parsons Creek East and 2 unnamed)
 - 1 lake (Marsh Road Pond)
 - 1 estuary (Parsons Creek)
- Enterococci criteria:
 - 104 MPN/100mL (single sample)
 - 35 MPN/100mL (geomean)
- Bacteria Impairments:
 - Parsons Creek
 - Parsons Creek East



Water Quality Monitoring Efforts

- Preliminary bacteria source identification (2008)
- Parsons Creek Watershed Based Plan (2011)
- Regular Enterococci monitoring (2013-Present)
- Additional monitoring efforts:
 - Canine scent detection (2013, 2015)
 - Beach seep monitoring (2015-2016)
 - Storm event monitoring (2017)
 - Groundwater monitoring (2018)
 - Nutrients (2017-2022)
 - PhyloChip (2022)



Canine scent detection in 2013. ©FBE.



Sampling on June 1, 2023. ©FBE.



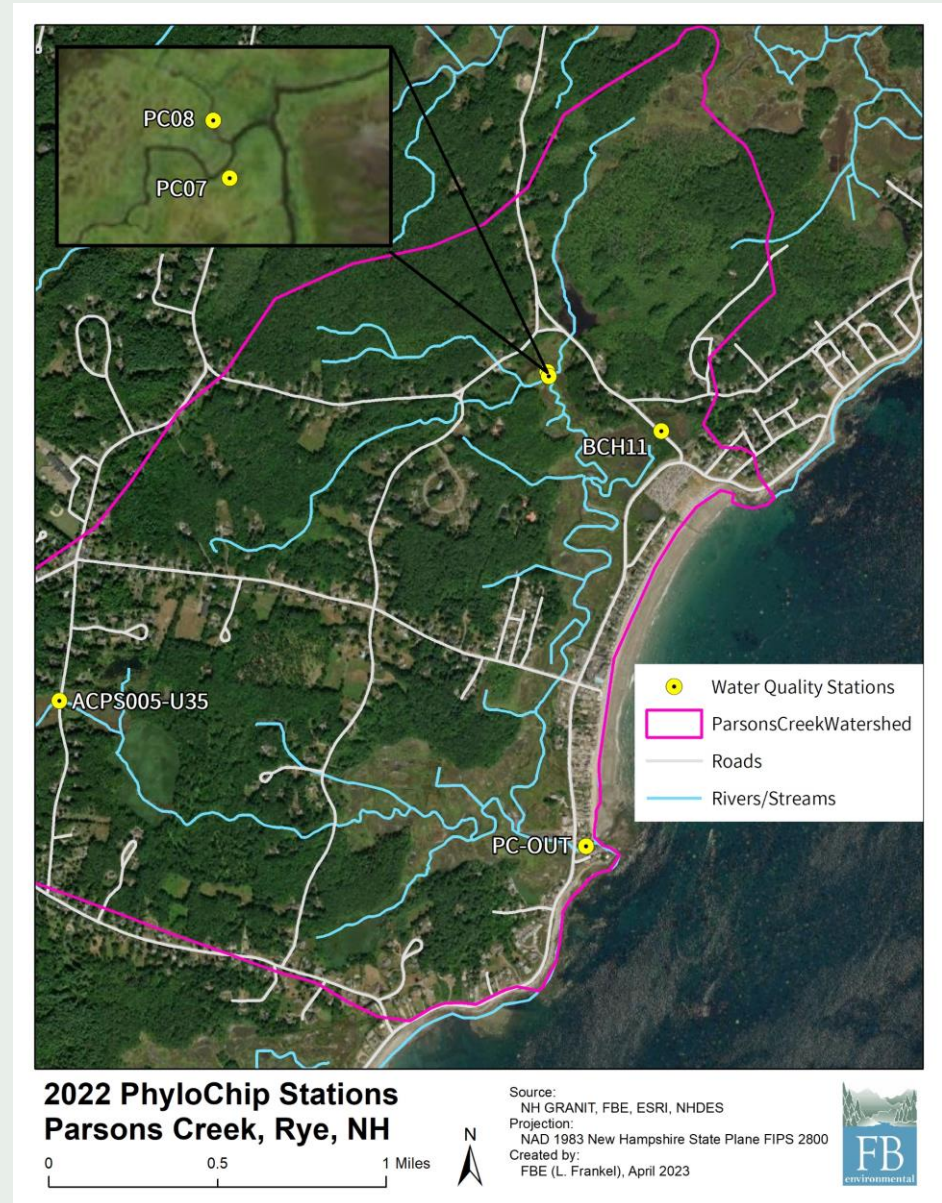
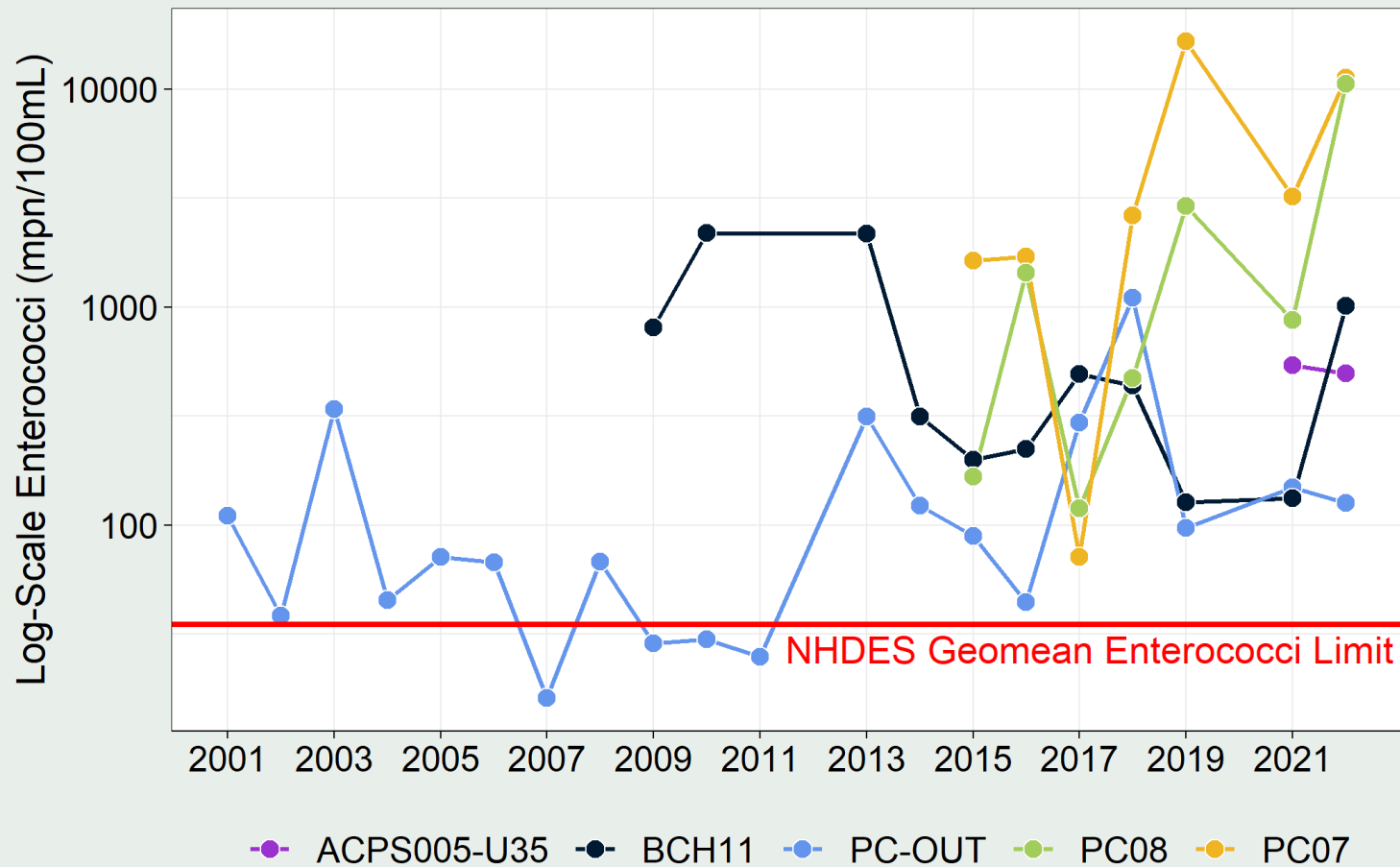
Beach seep monitoring in 2016. ©FBE.



Groundwater monitoring 2018. ©FBE.

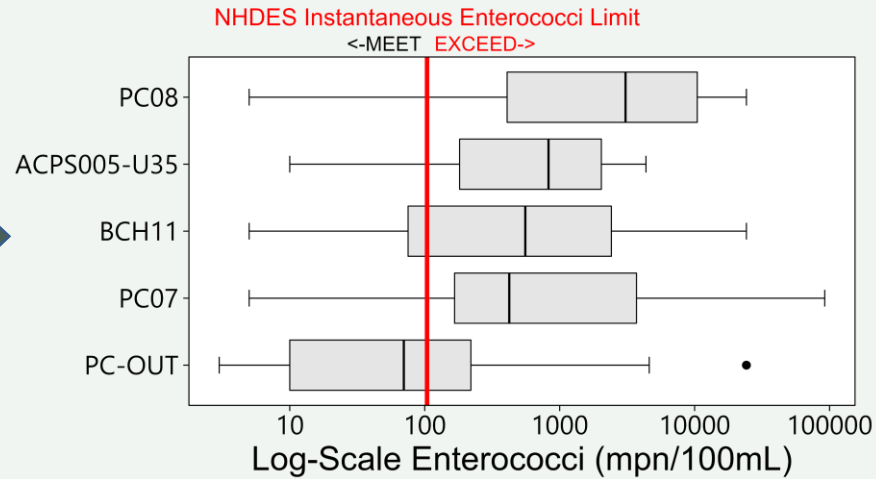
Historical Monitoring Results

Enterococci continue to remain high in Parsons Creek

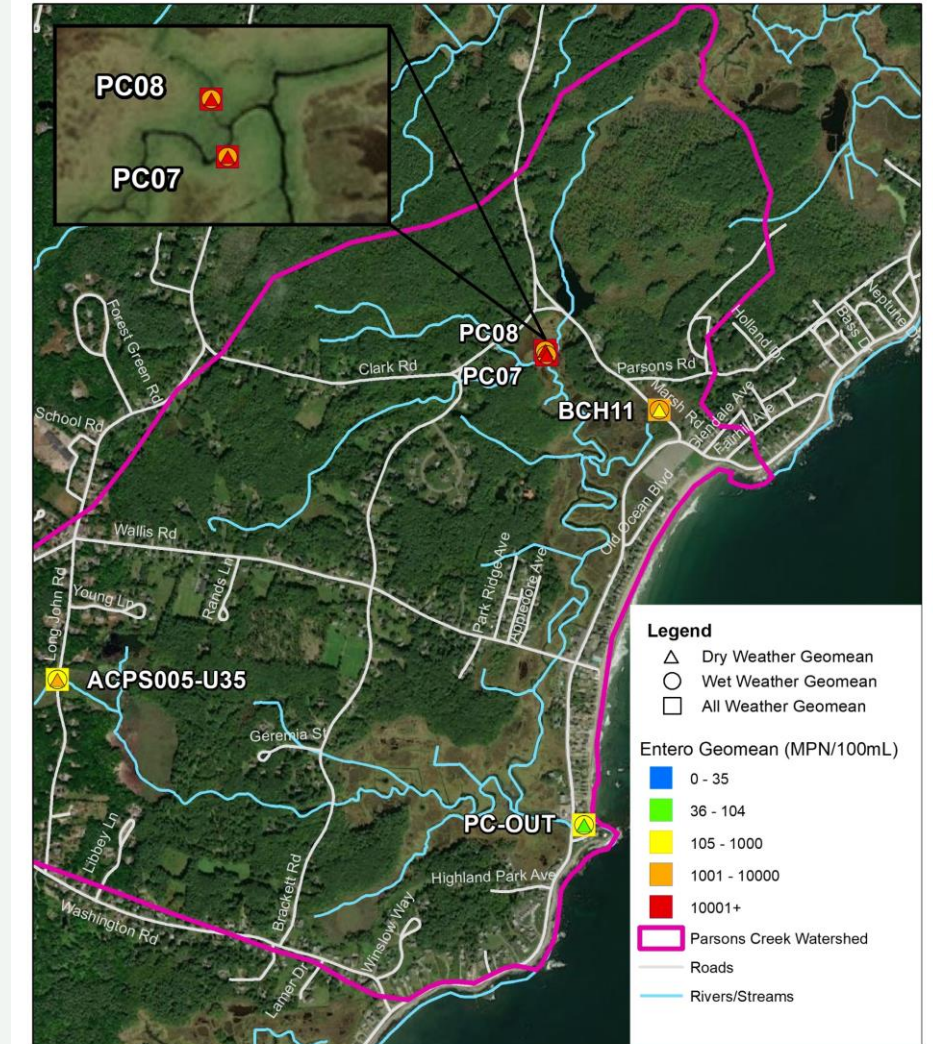
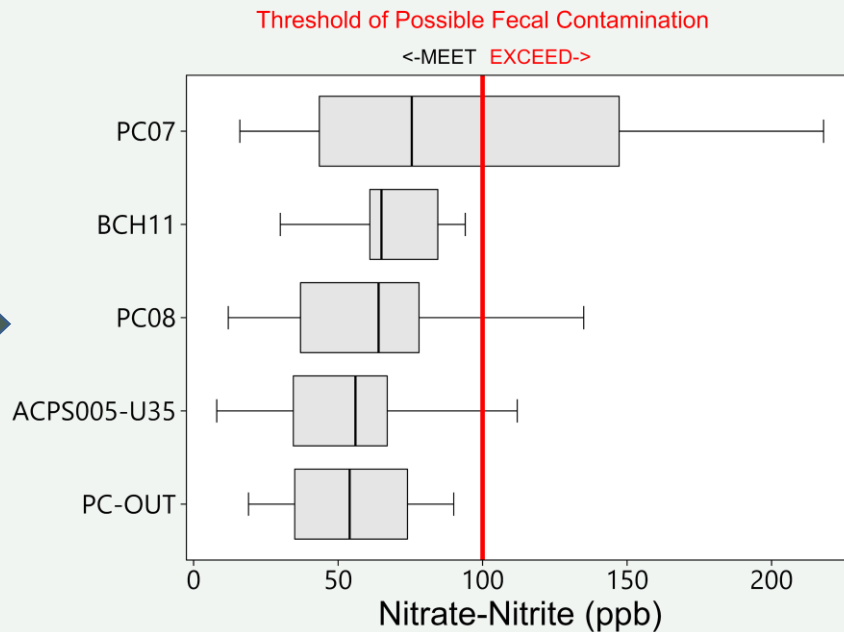


2022 Monitoring Results

Enterococci



Nutrients



2022 Bacteria Results Parsons Creek, Rye, NH

Source: New Hampshire GRANIT, FB Environmental, ESRI, Watershed Area from NHDES. Projection: NAD 1983 New Hampshire State Plane FIPS 2800. Created by FB Environmental (M. Kosalek), October 2022

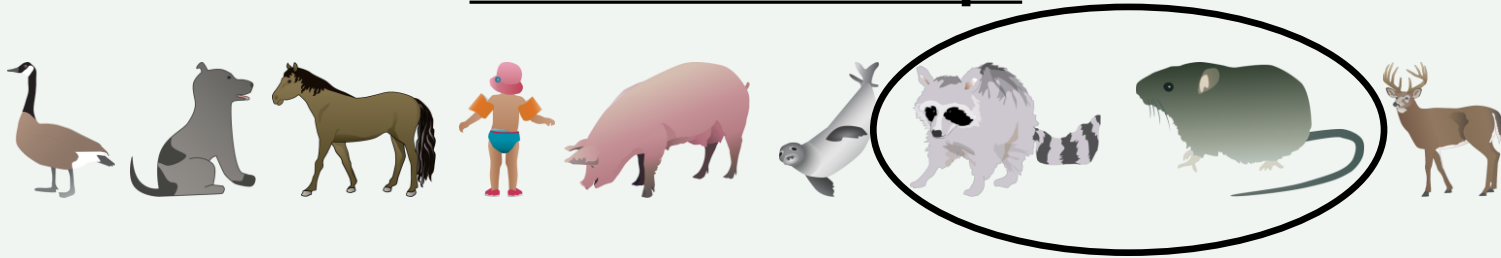


2022 PhyloChip Results

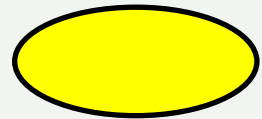
Sampling

- 5 events (2 wet, 3 dry)
- All 5 stations

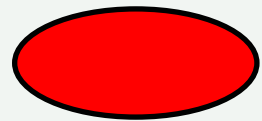
Nine Animal Groups



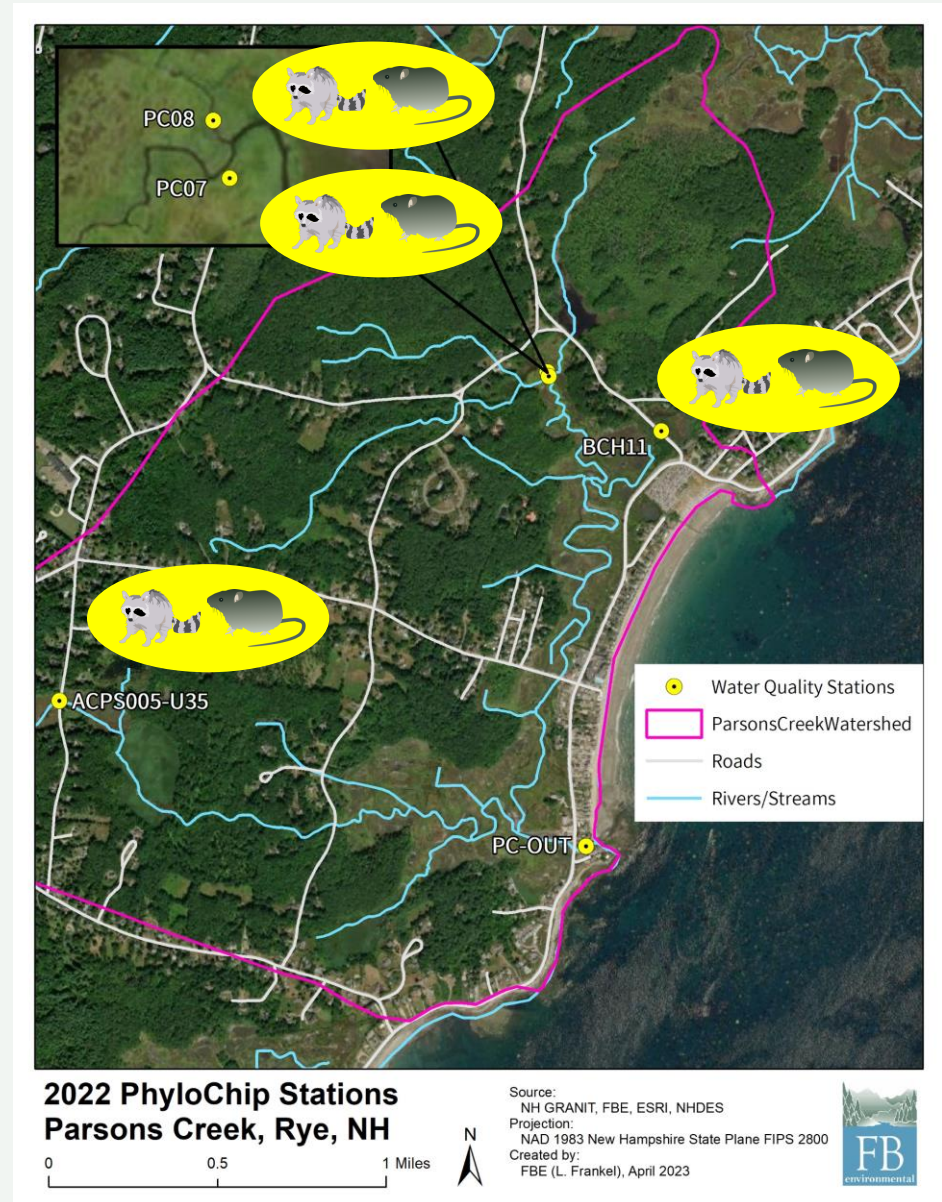
Predicted Contributions



Potential Source: 0.1 – 0.2



Clear Source: > 0.2



2022 PhyloChip Results

Potentially Harmful Bacteria

- Streptococcus



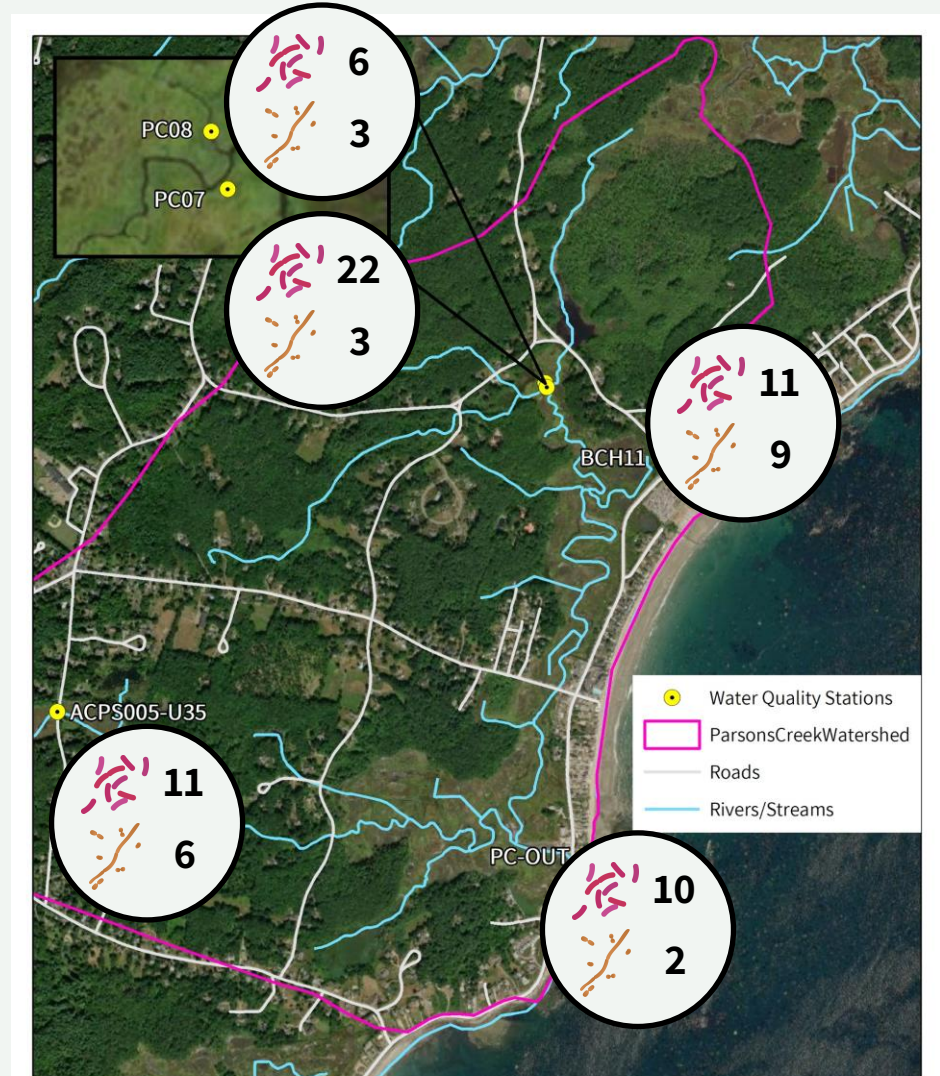
Strep throat; pink eye; meningitis; impetigo; bacterial pneumonia

- Staphylococcus



Skin infection

Max Number of Genera Present



2022 PhyloChip Stations
Parsons Creek, Rye, NH

0 0.5 1 Miles



Source:
NH GRANIT, FBE, ESRI, NHDES
Projection:
NAD 1983 New Hampshire State Plane FIPS 2800
Created by:
FBE (L. Frankel), April 2023



PhyloChip Discussion – No Human or Bird?

- Lack of sensitivity: The salt marsh likely altered and/or dampened the human fecal matter signature such that PhyloChip was unable to detect it.

Unlikely scenarios

- Microbial mismatch: Microbial communities in Parsons Creek may not have matched those in Veracet's library, causing lower predicted contributions. The human and bird groups in the library use the largest set of samples, therefore this is unlikely.
- Matrix interference: Particulates in samples may have caused DNA extraction and processing issues. Thousands of bacteria commonly found in water were identified, making this unlikely.
- Low bacteria levels: Watershed management efforts have caused human waste contamination to be undetectable. Other efforts (canine scent detection, DNA ribotyping, Enterococci sampling) suggest that this is unlikely.



Next CWSRF

- Groundwater modeling and septic risk identification
 - 50ft x 50ft resolution groundwater modeling by Dr. Jayne Knott
 - Septic system elevations from site plans
 - Solute transport modeling of bacteria
- Water quality sampling for model calibration/validation
 - Expanding annual monitoring to include groundwater monitoring for water quality parameters and tracers
- Public outreach
 - Workshop for residents to learn about septic system maintenance and the results of the study





Questions?

