

Parsons Creek

Where we've been and where we're going

Maggie Kosalek

Project Manager

Cayce Dalton

Senior Project Manager



FB
environmental

Agenda

1. Introductions
2. History of work in Parsons Creek.
3. Recommendations from the 2025 Watershed Management Plan.
4. Future Steps.



Parsons Creek Water Quality Standards

According to the NHDES 303(d) list:

Designated Use	Aquatic Life Integrity					Fish Consumption (Fish Consumption Advisory)	Potential Drinking Water Supply	Primary Contact Recreation	Secondary Contact Recreation	Shellfish Consumption (Fish Consumption Advisory)						
Parameter	DO Sat	Salinity	Water Temp	pH	Dissolved Oxygen	Mercury	PCBs	E. coli	Fecal Coliform	Enterococcus	Enterococcus	Dioxin	Mercury	PCBs	Fecal Coliform	
NHDES Category	3-ND: There is no data, or the data is unusable, for the Parameter, Designated Use, or Assessment Unit.				3-PNS: There is some but insufficient data to assess per the CALM*, however, the data that is available suggests that the parameter is Potentially Not Supporting (PNS) water quality standards (e.g., there is one exceedance).	5-M: There is an impairment per the CALM* by a pollutant that requires a TMDL. The impairment is marginal.		3-PNS: There is some but insufficient data to assess per the CALM*, however, the data that is available suggests that the parameter is Potentially Not Supporting (PNS) water quality standards (e.g., there is one exceedance).		4A-P: There is an impairment per the CALM* by a parameter which is a pollutant and an EPA-approved TMDL has been completed. However, the impairment is more severe and causes poor water quality conditions.		3-PNS: There is some but insufficient data to assess per the CALM*, however, the data that is available suggests that the parameter is Potentially Not Supporting (PNS) water quality standards (e.g., there is one exceedance).		5-M: There is an impairment per the CALM* by a parameter which is a pollutant that requires a TMDL. The impairment is marginal.		4A-P: There is an impairment per the CALM* by a parameter which is a pollutant and an EPA-approved TMDL has been completed. However, the impairment is more severe and causes poor water quality conditions.

*CALM = Consolidated Assessment and Listing Methodology; used by NHDES to make assessments.

Parsons Creek Water Quality Standards



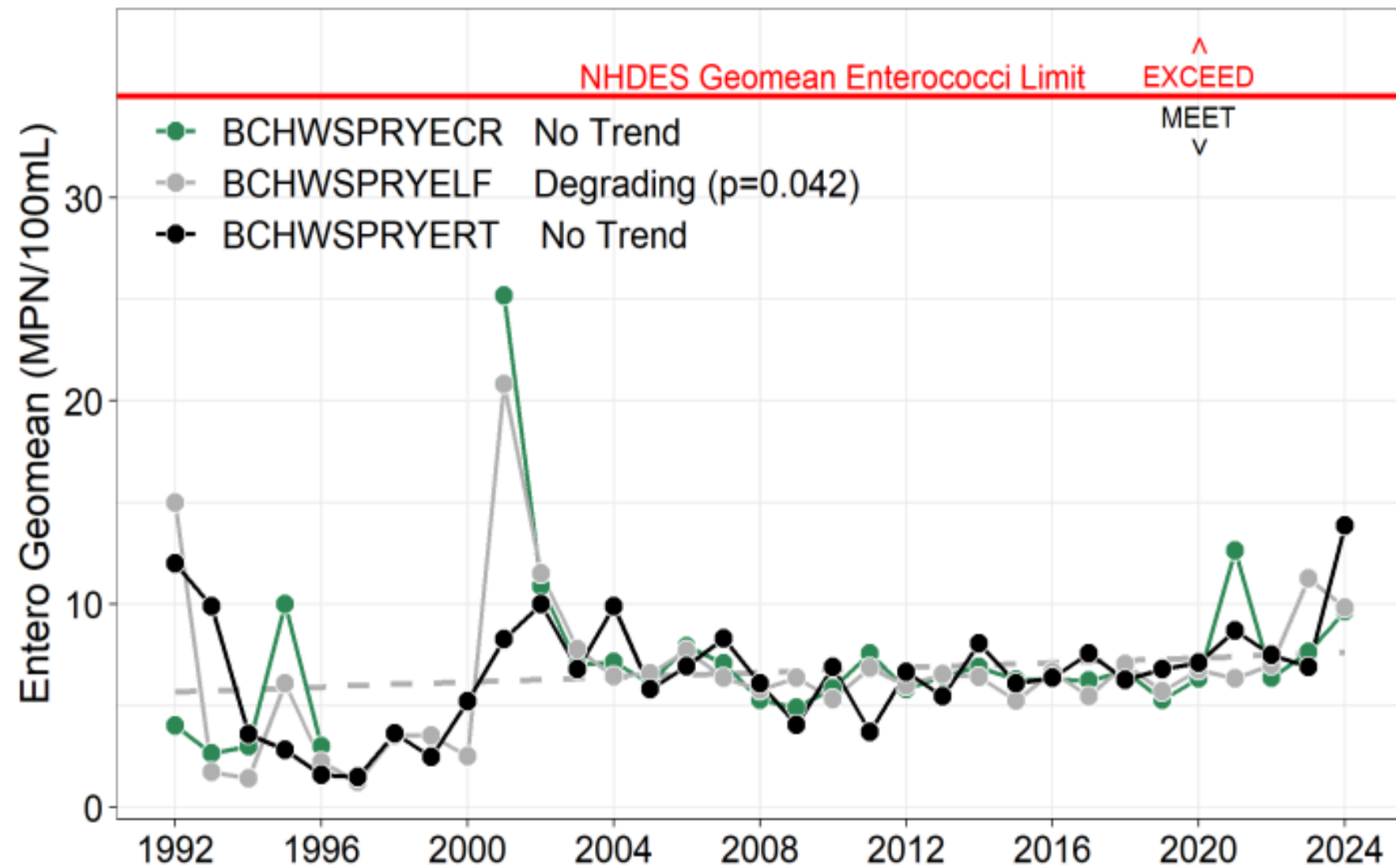
Parameter	Class B Criteria
Dissolved Oxygen	>75%, based on daily average >5 mg/L, based on instantaneous reading
Fecal Indicator Bacteria (Enterococci)	Not more than: (1) A geometric mean based on at least 3 samples obtained over a 60-day period of 35 MPN/100mL , unless naturally occurring; or (2) 104 MPN/100mL in any one sample, unless naturally occurring.

Work to date

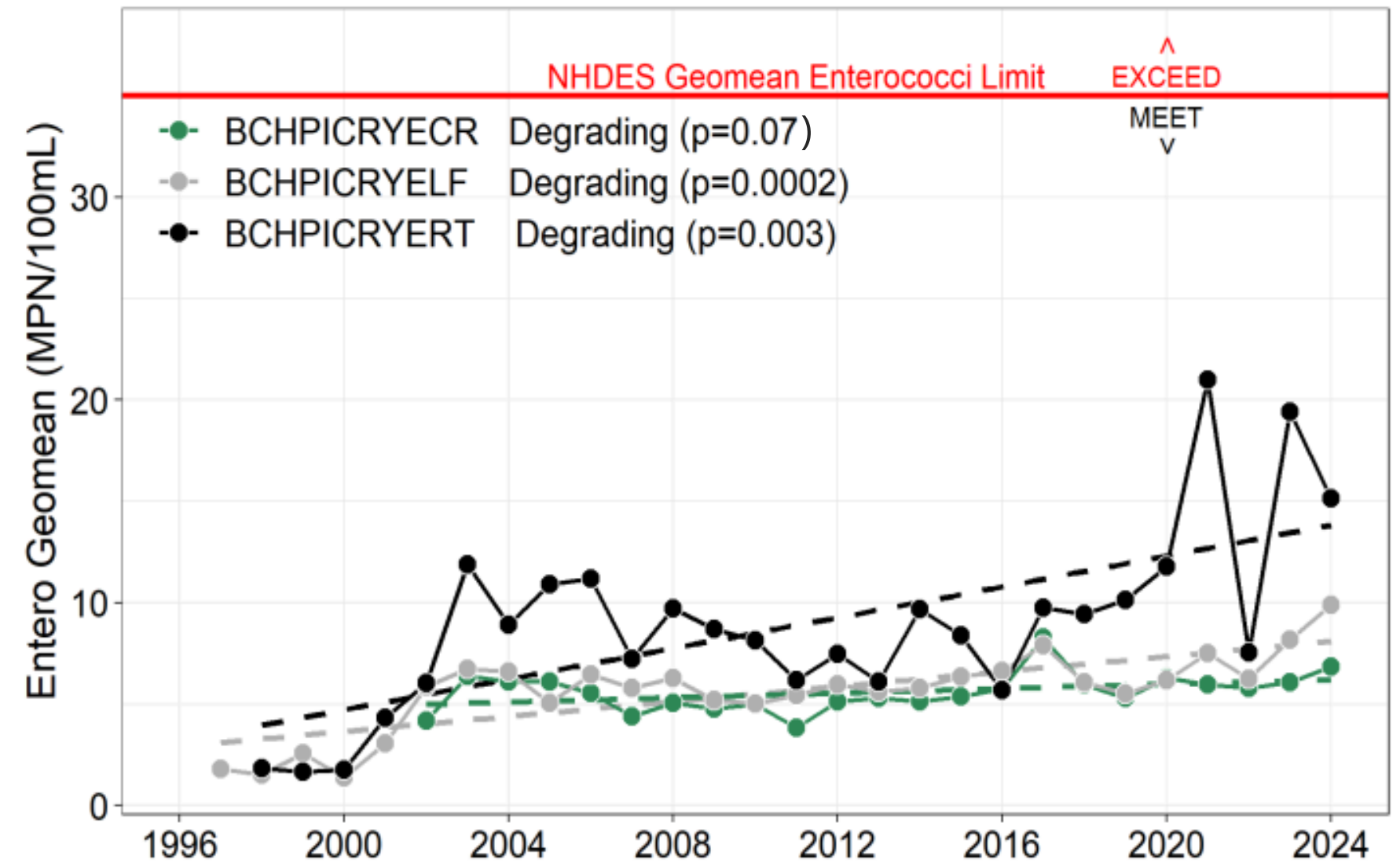
Work	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026		
Water Quality Monitoring																													
Beach bacteria	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
Bacteria														█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
Dissolved oxygen														█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	
Canine source tracking														█		█													
Beach seeps															█	█													
Storm sampling (nitrate and bacteria)																	█												
Optical brighteners																		█						█					
Ammonia																		█						█	█	█	█		
Groundwater (bacteria and nutrients)																		█											
Nutrient																						█	█						
mtDNA (human, rat, raccoon)																									█	█			
Other Studies																													
Gulf of Maine sanitary survey	█																												
Preliminary Bacteria Source Identification Summary for New Hampshire Coastal Beach Watersheds									█																				
NH Statewide Bacteria TMDL Watershed Management Plan											█																		
HydroAnalysis Septic Report																		█											
Sea level and groundwater rise risk assessment (Restoring Parsons Creek CWSRF)																										█			
Watershed Management Plan Update																										█			

Beach Monitoring (1992-Present)

Wallis Sands State Beach Monitoring Sites



Wallis Beach Monitoring Sites



Both beaches impaired for fish & shellfish consumption due to mercury, PCBs, & dioxin

Gulf of Maine Sanitary Survey (2000)

- A sanitary survey conducted by the Shellfish Program in 2000 (NHDES 2000) found several active straight pipes and failing septic systems providing major bacteria loads to Parsons Creek.
- Parsons Creek is believed to be the primary source of bacteria to Pirates Cove Beach and may also be a significant source to the other beaches.
- Based on high bacteria counts, the Shellfish Program established a prohibited zone at the mouth of Parsons Creek in 2000.

R-WD-01-3

**SANITARY SURVEY REPORT
FOR THE
ATLANTIC COAST, GULF OF MAINE,
NEW HAMPSHIRE**

Prepared by

**Chris Nash, Shellfish Program Manager
Andrew Chapman, Shellfish Program Specialist**

**NH Department of Environmental Services
360 Corporate Drive, Suite 2
Pease Tradeport
Portsmouth, New Hampshire 03801**

December 2000



Preliminary Bacteria Source ID (2008)

Review of potential sources including WWTF, storm drains and runoff, wildlife, septic systems, beach-goers, pets, sand and beach wrack, remove wastewater discharges, and boats.

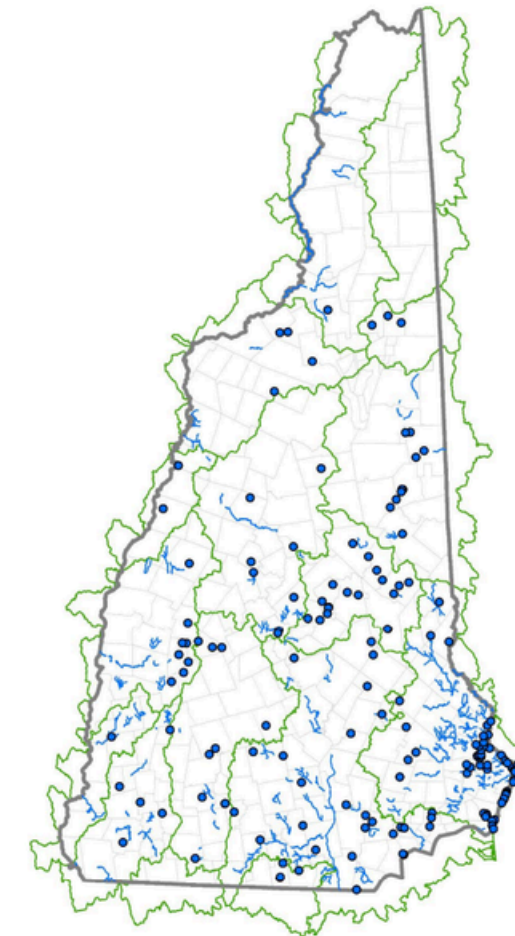
- WWTF – Wallis Sands Beach has a small package plant treating wastewater and grey water from its onsite facility. The plant's design flow is 0.006 MGD and it discharges directly to the Atlantic Ocean just north of Wallis Sands Beach. Secondary treatment is achieved using a large sand filter, underlain by a collection box, which is then followed by UV disinfection. In recent years, bacteria levels from the Wallis Sands WWTF have been very low. In 2008, Chris Nash and the Shellfish Program team conducted a dye study to evaluate transport of wastewater leaving the package plant.
- Storm drains and runoff – High wet weather bacteria levels have been measured as part of beach program sampling. Storm event runoff has been observed to carry large bacteria loads directly to the beaches and also to the seacoast via Parsons Creek.
- Wildlife – MST surveys were conducted in Parsons Creek during 2001, 2002, and 2003. The primary sources of bacteria were found to be human, but otters, deer, and seagulls (Jones 2008). Sea gulls, tern and other birds have been observed at the beaches.
- Septic systems – There are reportedly as hundreds of septic systems in the watersheds contributing to these beaches. The MST surveys (2001-2003) conducted in Parsons Creek, which drains much of the contributing area, found that human waste was the primary source of bacteria. Based on this information, septic systems appear likely to be significant sources of bacteria in these watersheds.
- People at the beach – Many people visit these beaches each year. Thus, it is likely that beach visitors are sources of bacteria.
- Pets – The MST surveys (2001-2003) identified dogs as a bacteria source. Dog are not allowed at Wallis Sands Beach at any time and are forbidden from Pirates Cove and Foss Beaches during beach hours (9-5).
- Sand and Beach Wrack – Wet sand and seaweed have been sampled as part of MST investigations at several New Hampshire coastal beaches (Jones 2008). Beach wrack and underlying sand were consistently observed to have very high Enterococci counts and appear to be significant sources of bacteria.
- Remotely located wastewater discharges and other remote sources – Bacteria loads may be carried by the coastal currents to these beaches from a nearby WWTF or other sources. The shellfish program measures bacteria at significant levels at distances of over 1000 feet from shore. As a result, we know that bacteria are present in the currents that travel past these beaches.
- Boats – Vessels situated both immediately adjacent and remotely are potential sources of bacteria to the beach, although the magnitude of this potential source is largely unknown.

Statewide Bacteria TMDL (2010)

- Parsons Creek officially declared impaired for bacteria

Final Report

New Hampshire Statewide
Total Maximum Daily Load (TMDL)
for Bacteria Impaired Waters



Final Report September, 2010

Watershed Management Plan (2011)

Parsons Creek Watershed Based Plan

May 2011



Prepared by:
FB Environmental Associates, Inc.
97A Exchange St., Suite 305
Portland, ME 04101

Bacteria Monitoring (2013-Present)

FBE BACTERIA GEOMEANS

Parsons Creek Watershed | Rye, NH

LEGEND

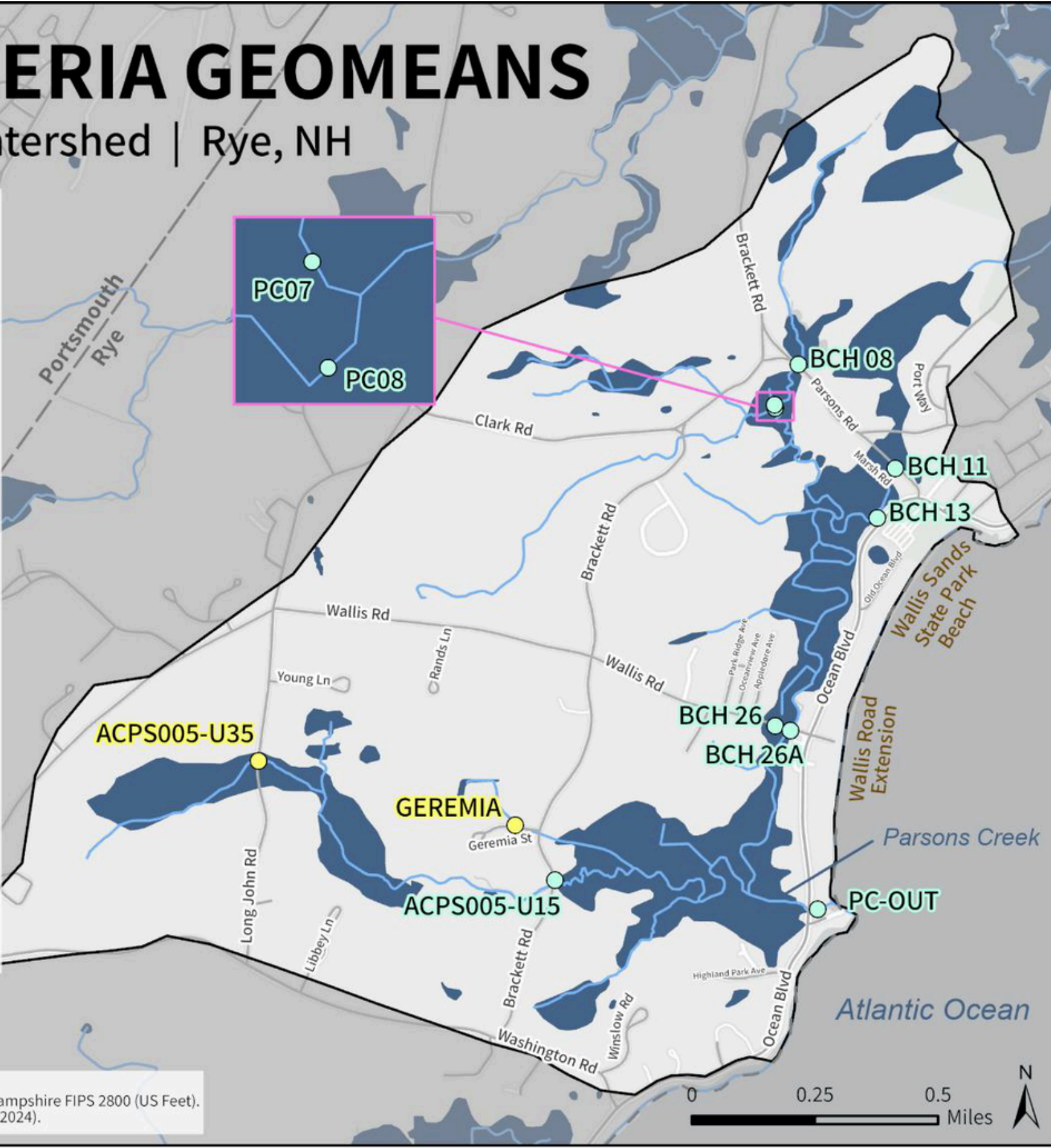
- Parsons Creek Watershed
- Streams
- Town Boundaries
- Roads
- Waterbodies

Sampling Sites

- Non tidal
- Tidal

Enterococci Geomean
in table below

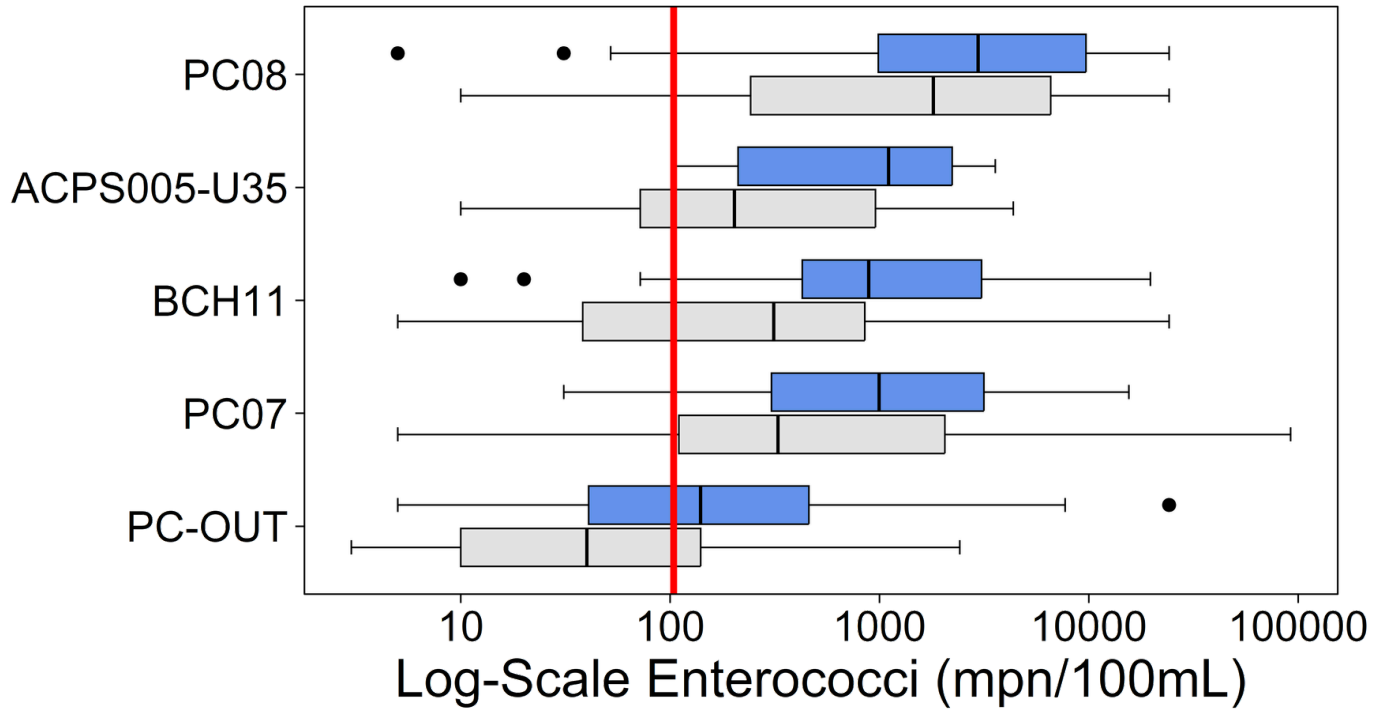
- 0-35 (meets primary contact rec. standard)
- 36-175 (meets secondary contact rec. standard)
- 176-1,000
- 1,001+



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
North Stem														
BCH08							●							
PC07							●	●	●		●	●	●	●
PC08							●	●	●		●	●	●	●
BCH11			●	●	●		●	●	●		●	●	●	●
BCH13			●	●	●									
BCH 26			●	●	●									
BCH 26A			●	●	●									
PC-OUT			●	●	●		●	●	●		●	●	●	●
West Stem														
ACPS005-U35							●				●	●	●	●
GEREMIA			●	●										
ACPS005-U15			●	●	●									

NHDES Instantaneous Enterococci Limit

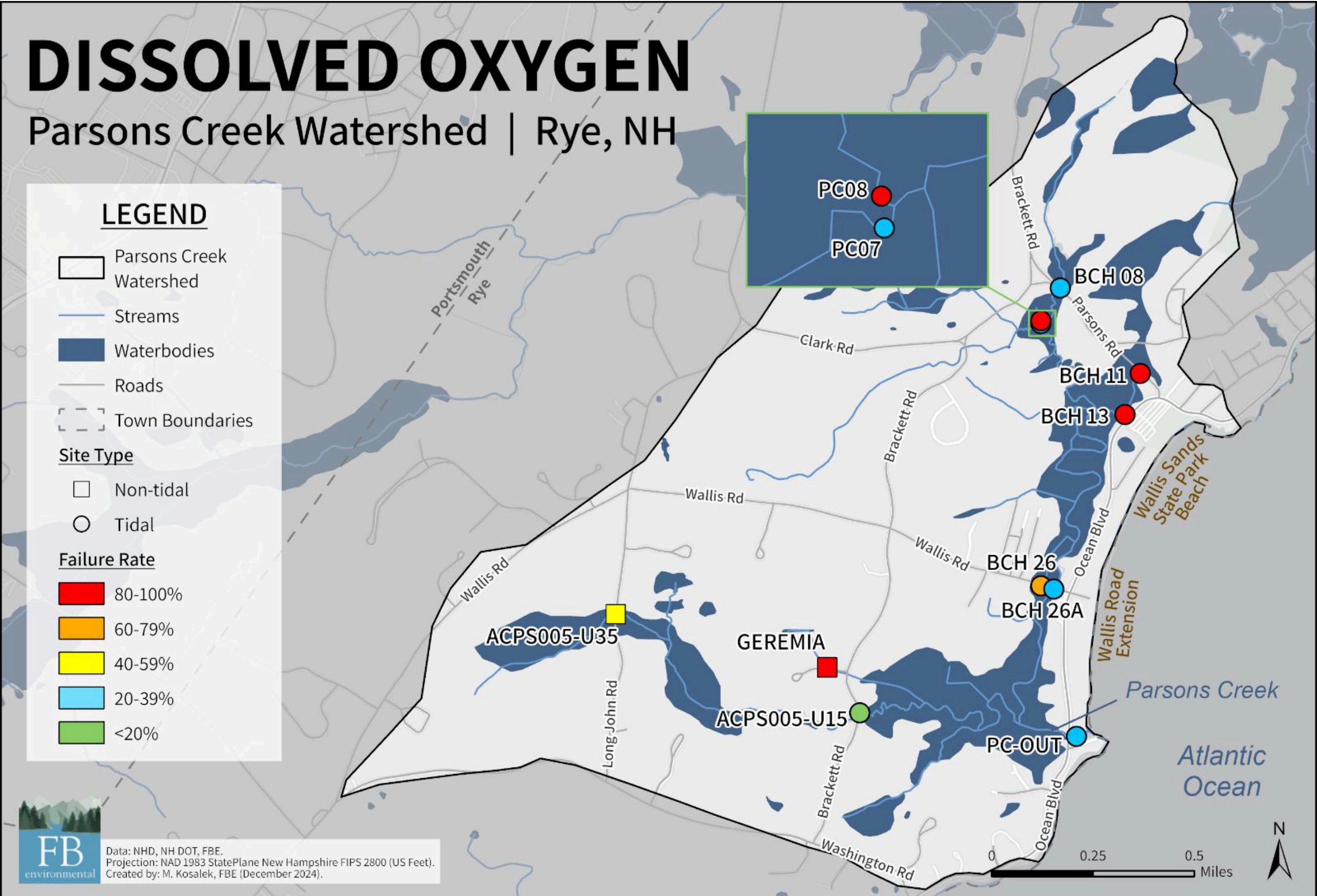
<-MEET EXCEED->



☐ Dry ☐ Wet

Data: NHD, NH GRANIT, NH DOT, FBE.
Projection: NAD 1983 StatePlane New Hampshire FIPS 2800 (US Feet).
Created by: M. Kosalek, FBE (November 2024).

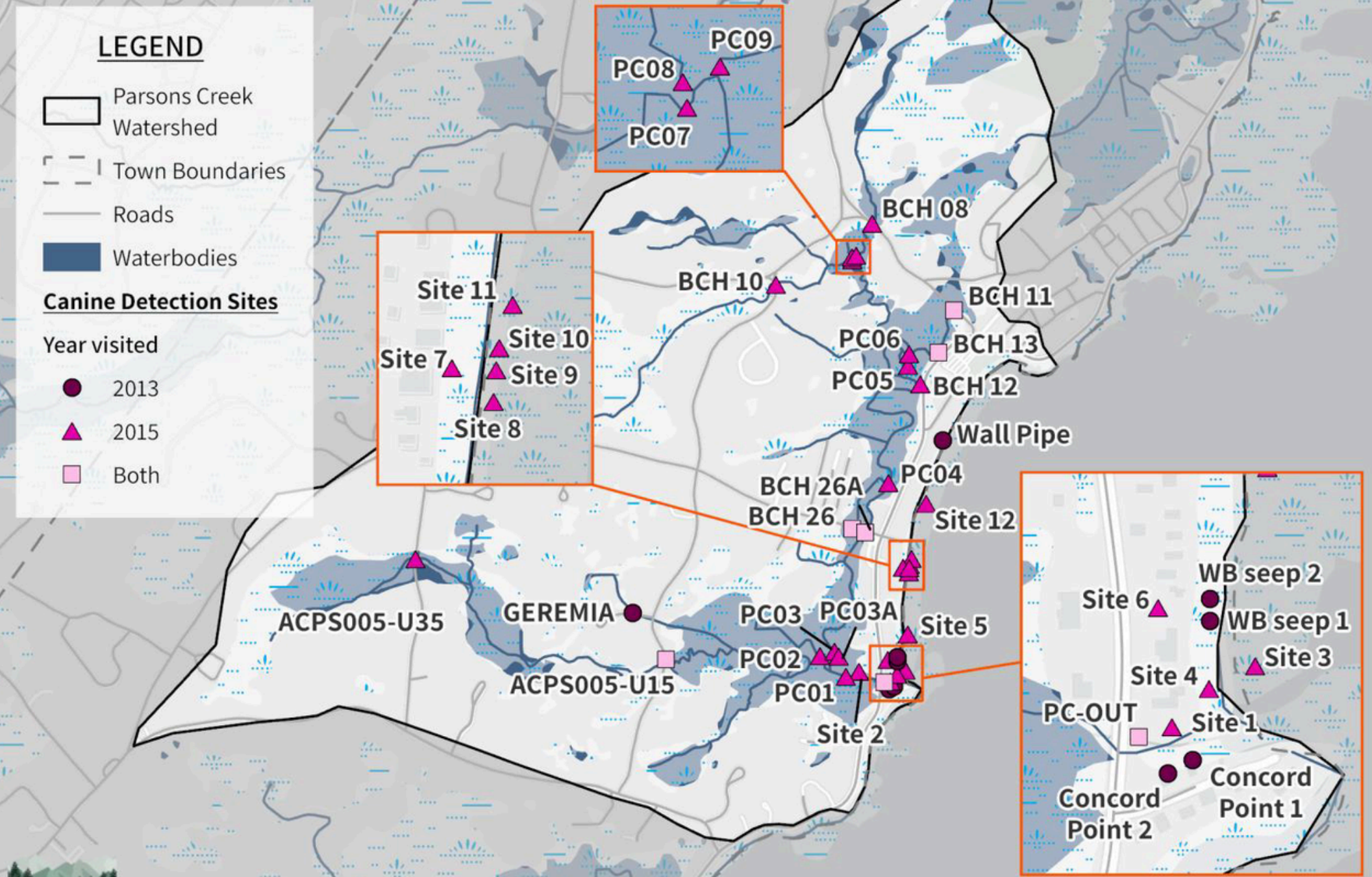
Dissolved Oxygen Monitoring (2013-Present)



Canine Source Tracking (2013 & 2015)

CANINE DETECTION SITES

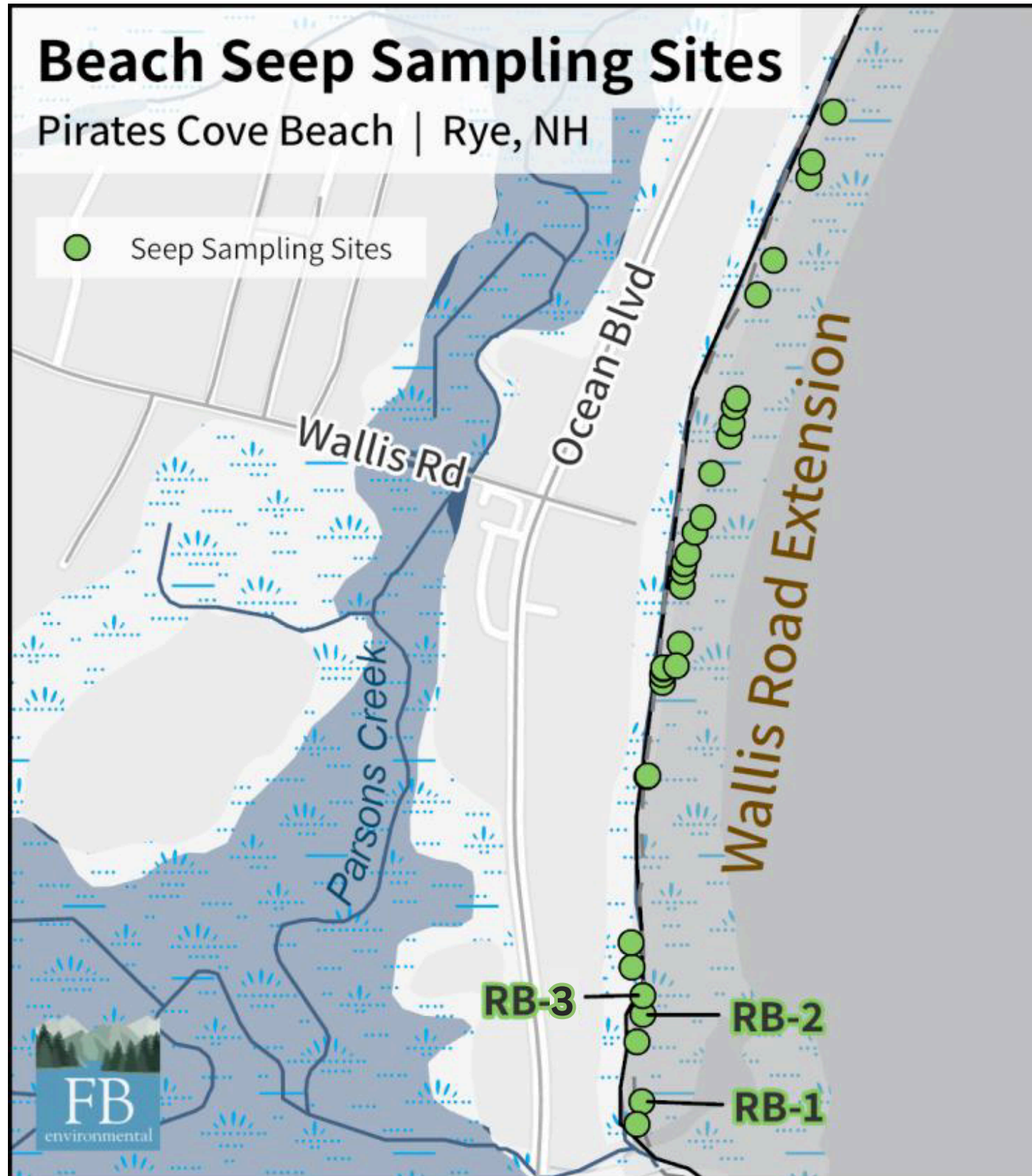
Parsons Creek Watershed | Rye, NH



	Wall Pipe	Concord Point 2	Concord Point 1	Site 1	Site 10	Site 11	Site 12	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	WB seep 1	WB seep 2	ACPS005-U15	ACPS005-U35
2013	Y	Y	Y													Y	Y	Y	N
2015				Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y			Y	Y

	BCH 08	BCH 10	BCH 11	BCH 12	BCH 13	BCH 26	BCH 26A	GEREMIA	PC01	PC02	PC03	PC03A	PC04	PC05	PC06	PC07	PC08	PC09	PC-OUT
2013		Y	Y	Y	Y	Y	Y	Y											Y
2015	Y	Y	Y	N	Y	Y	Y		Y	Y	Y	Y	N	N	Y	Y	N	Y	Y

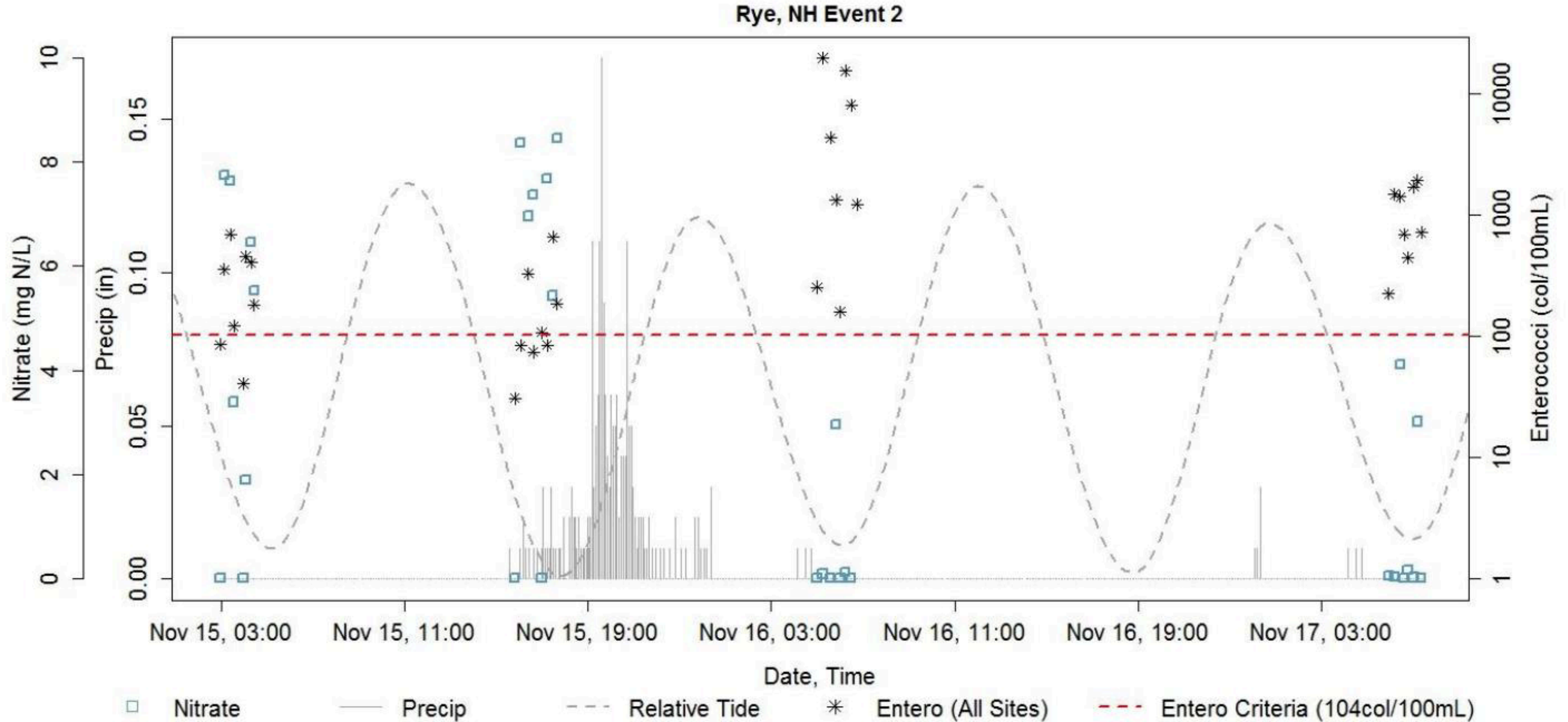
Beach Seeps (2014 & 2015)



Site	Enterococci Geomean (MPN/100mL)	
	2014	2015
RB-1	6.5	7.5
RB-2	36.3	8.6
RB-3	16.3	7.2

Beach seep sampling locations. All unlabeled sites were only sampled once and results were well within the acceptable threshold. Labeled sites were sampled 34-36 times each for each year, and the resulting geomeans are displayed in Table 5.

Storm Sampling (2014 & 2015)



Optical Brighteners (2017 & 2023)



Optical brighteners: Chemicals found in laundry detergent. If these show up in water, it's a sign that human wastewater might be present.

2017

- Tested at BCH08, PC07, PC08, BCH11, PC-OUT, and ACPS005-U35 - ***none found.***

2023

- Tested at Tested at PC07, PC08, BCH11, PC-OUT, and ACPS005-U35 - ***none found.***

Ammonia (2017 & 2023-Present)



Ammonia: Found in raw sewage, but it quickly breaks down. High levels in surface water can signal a nearby, recent leak of untreated wastewater.

- **2017:** Monitored during a storm - ranged from 1-3 ppm across the storm, exceeding fecal contamination guideline of 0.9 ppm, indicating human wastewater discharge.
- **2023:** BCH11 had one sample exceed guideline and three samples at 0.5 ppm. All other sites below guideline.
- **2024:** All samples below threshold.
- **2025:** All samples below threshold.

HydroAnalysis Septic Report (2017)

- Study to examine how well septic systems work in the watershed and develop recommendations.
- Identified the watershed as having low-lying land, sandy soils, and a high water table in many locations, a combination that makes septic systems more likely to fail or underperform.
- 99.4% of septic systems in the watershed are within 100 feet of a stream, wetland, or waterbody.
- Recommendations include updating code to allow for alternative septic technologies such as holding tanks, mounded systems, aerobic treatment units, recirculating media filters, constructed wetlands, trickling filters, disinfection systems, and membrane bioreactors.

FINAL REPORT

Recommendations for Individual Sewage Disposal Systems that
Minimize the Release of Pathogenic Organisms to the Parsons Creek
Watershed

Rye, New Hampshire

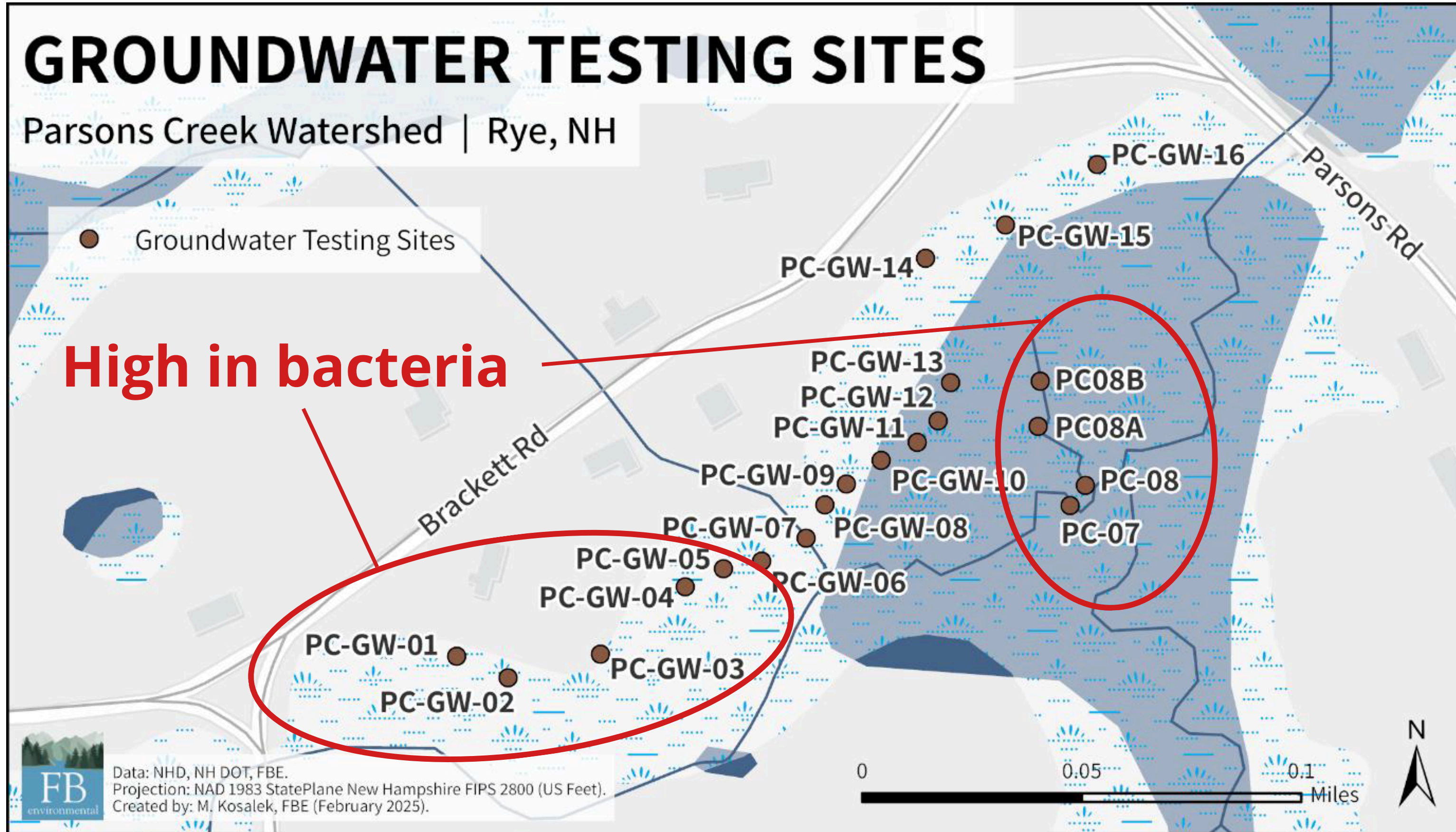
December 20, 2017



HydroAnalysis

606 Elwyn Road
Portsmouth, NH 03801
481 Great Road, Suite 3
Acton, MA 01720
603-343-6311

Groundwater Testing (2018)



Nutrient Testing (2021 & 2022)

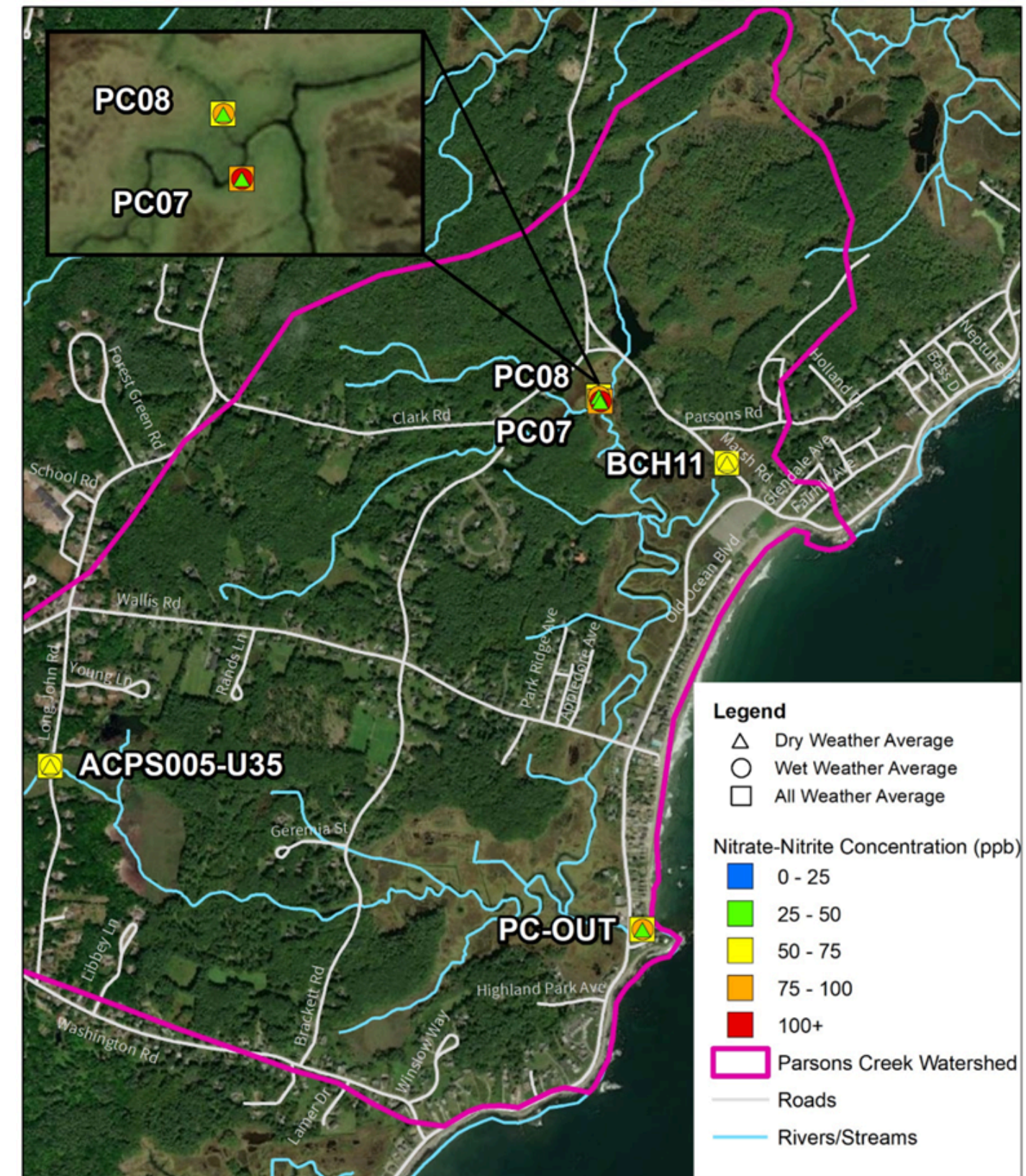


Phosphorus: Retained by soils. Having one meter of unsaturated soil between leach field and groundwater will greatly retain phosphorus.

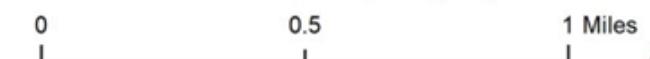


Nitrogen: Moves easily through soils and can travel longer distances.

The presence of moderate nitrogen and low phosphorus levels in Parsons Creek suggests widespread, low-level pollution likely coming from many septic systems that are only partially treating wastewater, rather than a few failing systems leaking large amounts of raw sewage.














**2022 Nitrate-Nitrite 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













mtDNA Testing (2024 & 2025)

	6/4/2024	7/2/2024	7/17/2024	8/7/2024	9/10/2024	10/8/2024
ACPS005-U35			 2	 2	 2	
PC08	 2	 2	 2			
PC07		 2				
BCH11	 2					 3
PC-OUT						 4
Starfish CB	×	×	×			×
Wallis Outfall	×	×	×	 2		×
Geremia Outfall	×	×	×			×

Colors denote corresponding enterococci value (MPN/100mL):

 0-104  105-1,000  1,001-5,000  5,000+

	6/4/2025	7/2/2025	8/1/2025	9/4/2025	9/8/2025	10/14/2025
ACPS005-U35	 2	 3	 3	 2		
PC08		 4				
PC07		 2	 2		 2	
BCH11					 2	 1
PC-OUT						

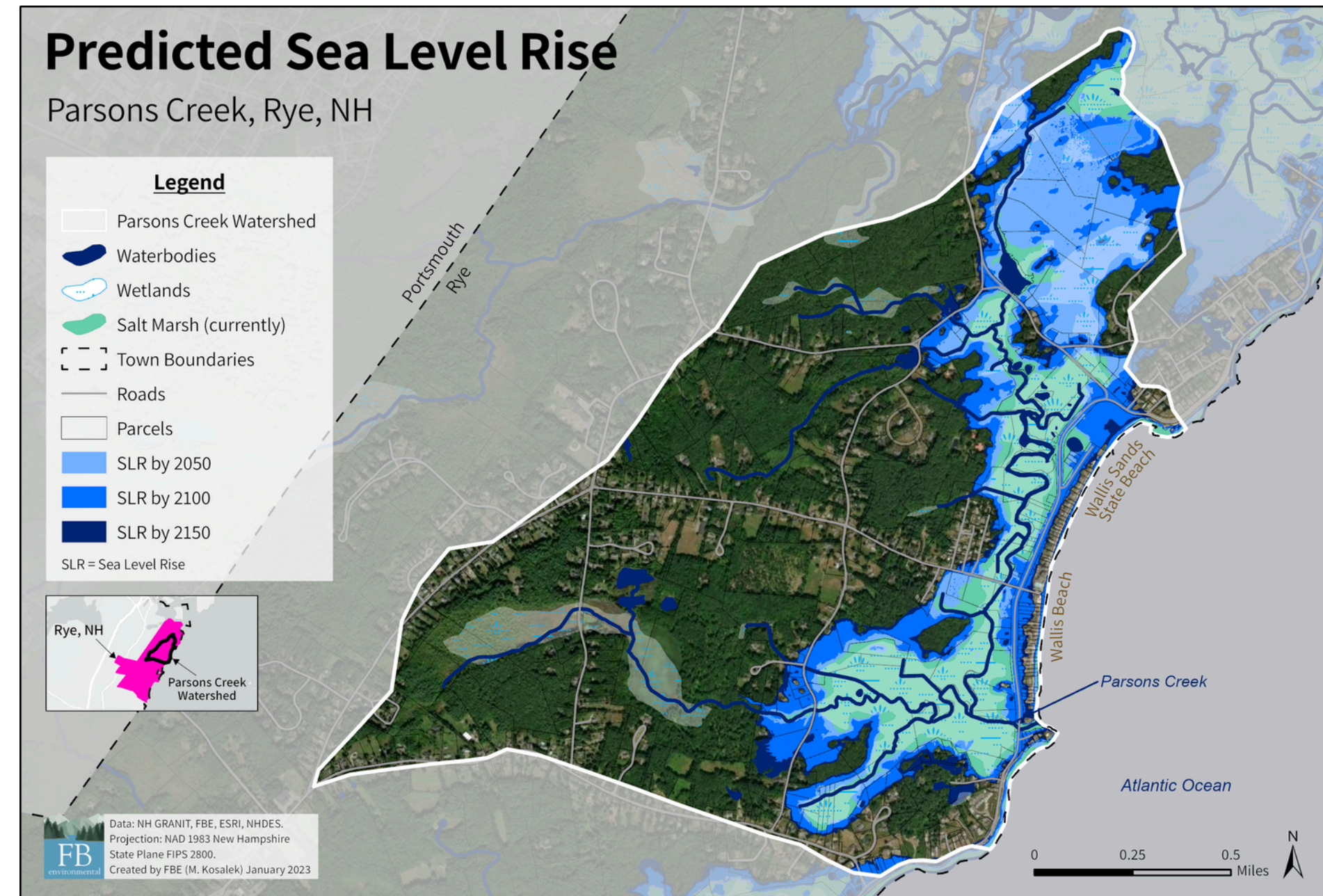
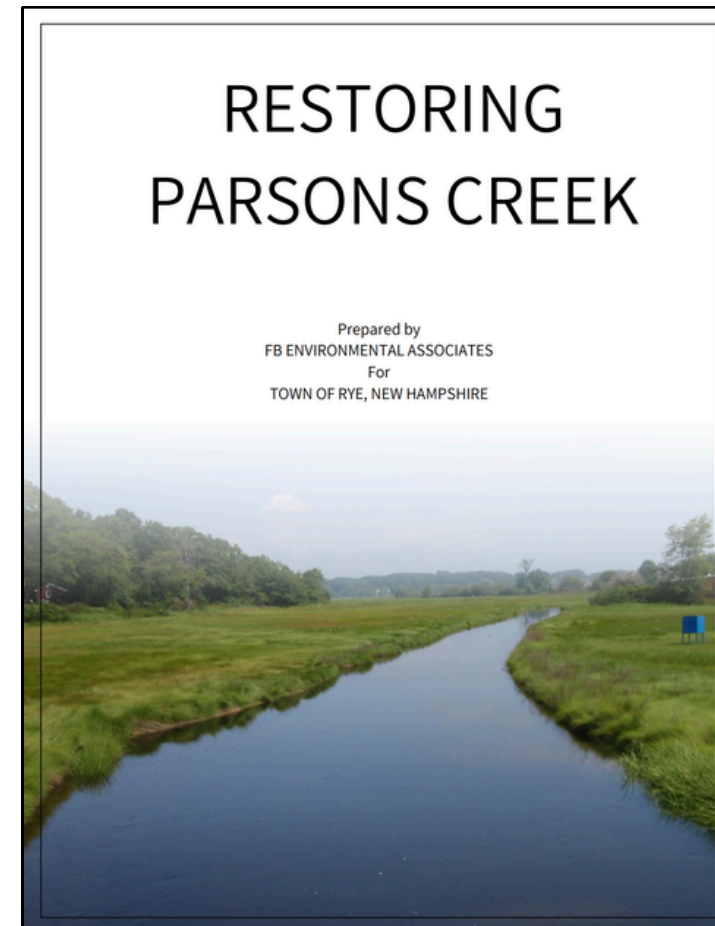
Colors denote corresponding Enterococci value (MPN/100mL):

 0-104  105 - 1,000  1,001 - 2,419  > 2,419

CWSRF (2025)

Study to examine how climate change will impact the watershed (sea level rise, storm surge, groundwater rise, high tides). Groundwater rise likely to have a large impact on septic systems, decreasing filtration of bacteria as the water table rises.

- Developed a proposed septic system health regulation.
- Recommendations included continuing bacteria testing, performing a septic system risk assessment and database, implementing the health regulation, and continuing outreach.



Watershed Management Plan Update (2025)

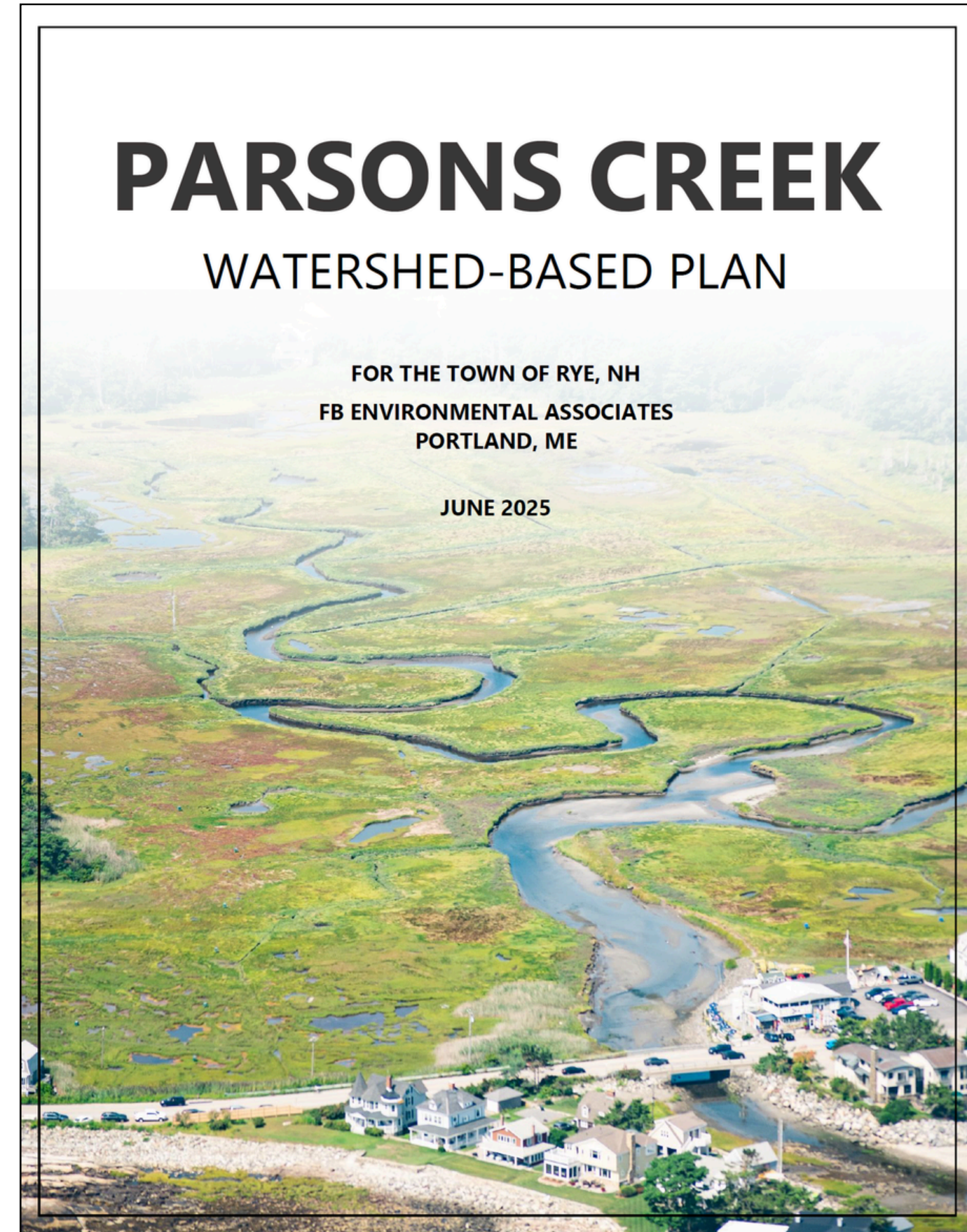
2025 Water Quality Goal

Site	Enterococci		
	Geometric Mean (MPN ¹ /100mL)	Criteria (cts/100mL)	Reduction Needed to Meet Criteria
PC07	1,117	175	84%
PC08	2,192	175	92%
BCH11	556	175	69%
ACPS005-U35	364	175	52%
PC-OUT	124	35	72%
Average			74%

2011 Water Quality Goal

TMDL: 89% reduction needed to meet Enterococci geometric mean sample criteria.

WMP: 90% reduction needed to meet fecal coliform geometric mean sample criteria.



Action Plan Overview

1 Implement WBP

Identify responsible parties & ensure completion of tasks

2 Install BMPs

Install BMPs at watershed survey sites

3 Improve septic systems

Identify and replace failing septic systems & improve septic practices

4 Implement outreach & education

Develop sustained outreach strategies to improve water quality

5 Manage new & existing development

Identify priority parcels for conservation & collaborate with local land trusts

6 Monitor WBP effectiveness

Conduct monitoring and investigative sampling to evaluate action plan progress

7 Obtain funding

Apply for EPA Section 319 grants; obtain funding for other key initiatives

Top Priority Action Items

- Item 1.a.** Create a “Parsons Creek Committee”
- Item 3.a.** Add septic system leachfield, distribution box, and lateral line inspections requirements to pump-out regulation
- Item 3.b.** Develop a robust dataset of soil types, groundwater levels, & septic system locations to identify areas vulnerable to septic system underperformance & pollution
- Item 3.c.** Develop a cost-share program, such as a user fee, to finance septic system inspections, upgrades, and/or replacements
- Item 4.e.** Conduct outreach to Zoning Board of Appeals on impacts of variances in the watershed
- Item 6.a.** Maintain annual water quality monitoring in Parsons Creek
- Item 6.d.** Re-delineate the Parsons Creek watershed boundary



Next Steps

Funding Opportunity: Clean Water State Revolving Fund

- Through NHDES
- For stormwater planning and infrastructure projects
- Has provided up to \$75k-\$100k in principal forgiveness over past 10 years
- No match required
- Competitive application

Next Steps

Funding Opportunity: Clean Water State Revolving Fund

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- No match required
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Application Support: New England Environmental Finance Center's Water Infrastructure Network

- Assists with on-ramping projects to apply for CWSRF
- Fund application and some preliminary preparation

**FBE won two CWSRF projects in 2025 in collaboration with NEEFC*

Potential Project Idea

Task 1. Soils, Groundwater, Watershed Boundary, and Septic System Mapping

Task 2. Reactivate and/or Install Groundwater Wells for Long-Term Monitoring

Task 3. Expand the Septic System Inspection Protocol Beyond the Septic Tank

Task 4. Septic System Inspection Pilot Program

Task 5. Feasibility Study of Septic System Utility/Responsible Management Entity

Task 6. Education & Outreach

**Town responsibility: project management administration only*