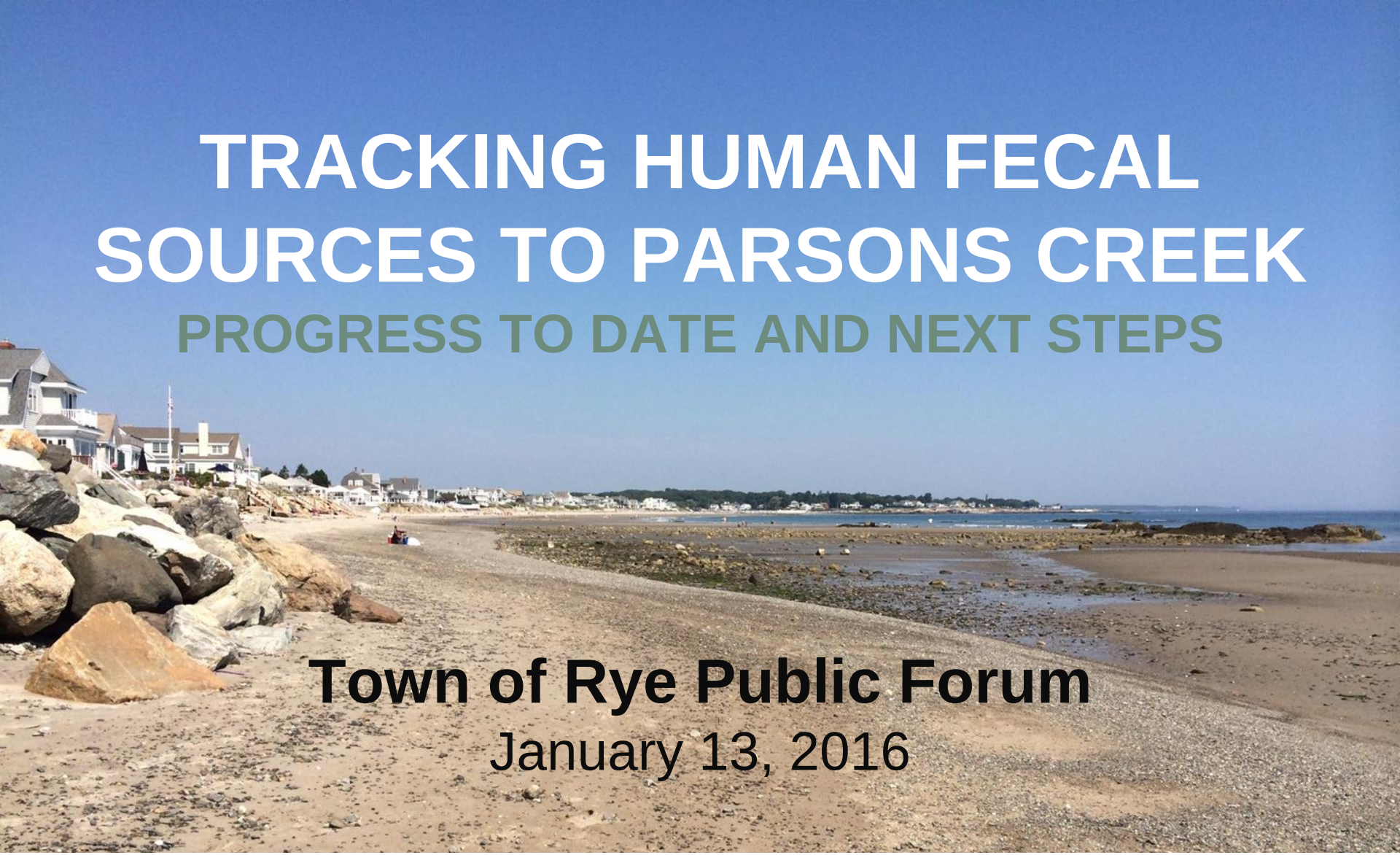
TRACKING HUMAN FECAL SOURCES TO PARSONS CREEK

PROGRESS TO DATE AND NEXT STEPS



Town of Rye Public Forum

January 13, 2016

Collaboration among partners: Town of Rye, NH Department of Environmental Services, and FB Environmental Associates

KEY POINTS

1. **Problem is clear: fecal contamination in Parsons Creek is impacting beaches and public health**

2. **Problem being addressed by decade-long, stepwise process with clear goal in mind. Monitoring will always be necessary.**

3. **Problem is difficult to tackle due to uncertainty in fecal indicators**

OUTLINE

EARLY PROJECT HISTORY

- Efforts by local leadership and partners
- Suspected sources of fecal contamination

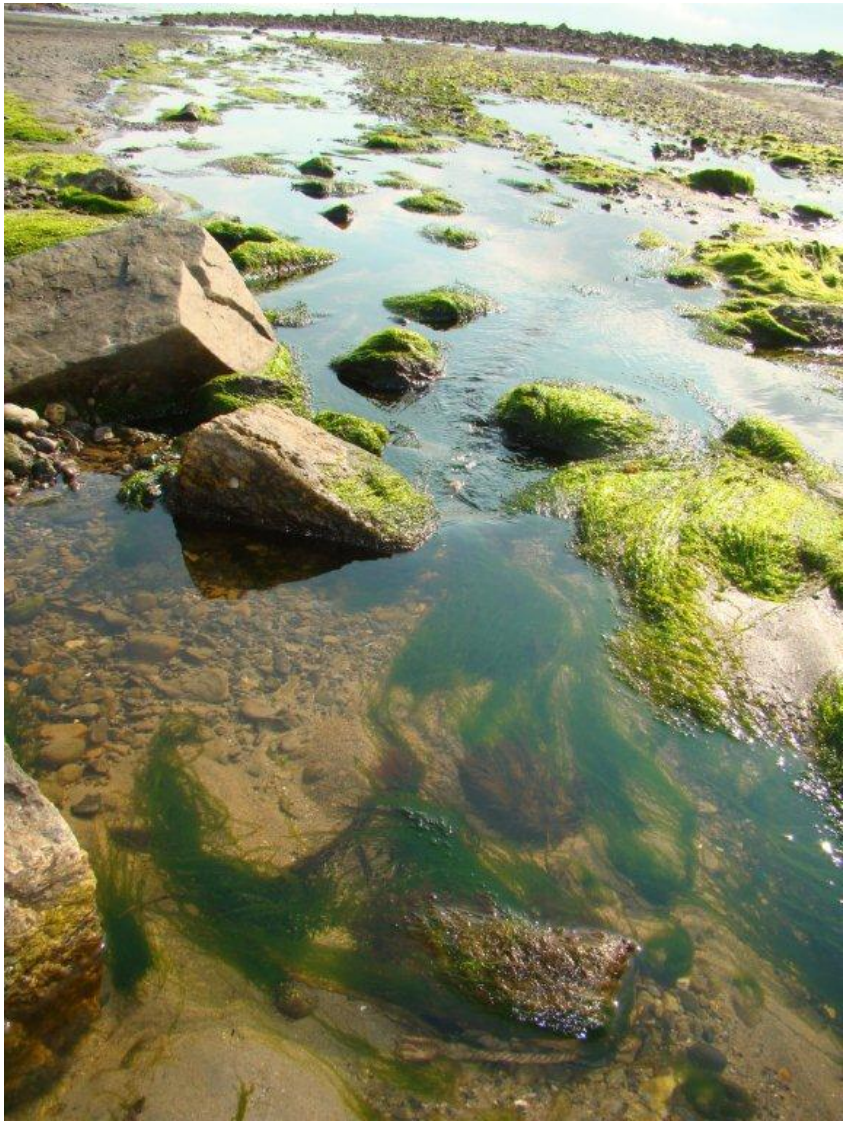
CURRENT CONDITIONS

- Overview of water quality
- Source tracking methods
- Uncertainty in FIB source tracking

RESTORATION OUTCOMES & GOALS

- Implementation, Phases I and II
- Next Steps
- Challenges

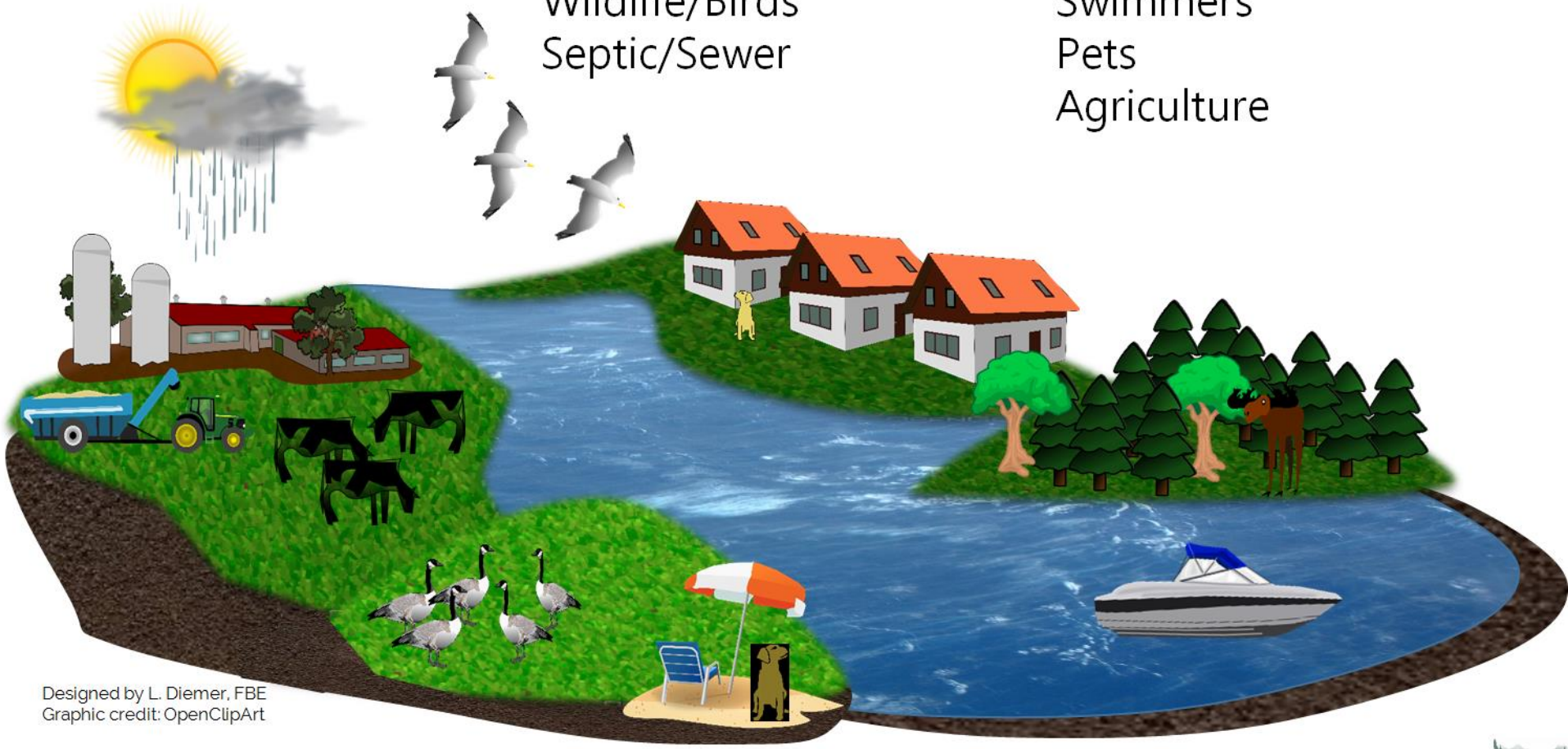
Time for Q&A at the end



SOURCES OF FECAL INDICATOR BACTERIA

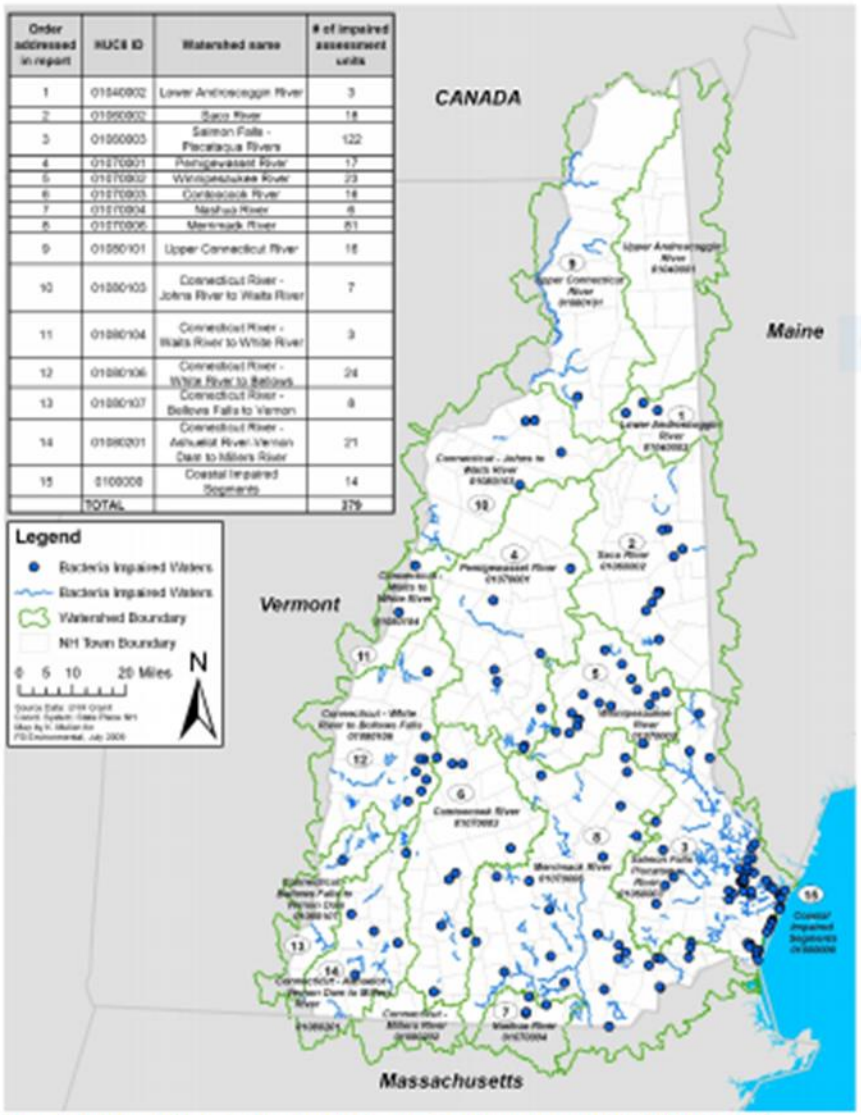
Stormwater runoff
Wildlife/Birds
Septic/Sewer

Overboard discharge
Swimmers
Pets
Agriculture



Designed by L. Diemer, FBE
Graphic credit: OpenClipArt

BACTERIA-IMPAIRED WATERS



Order addressed in report	HUC8 ID	Watershed name	# of impaired assessment units
1	01040002	Lower Androscoggin River	3
2	01060002	Saco River	18
3	01060003	Salmon Falls - Piscataqua Rivers	122
4	01070001	Pemigewasset River	17
5	01070002	Winnipesaukee River	23
6	01070003	Contoocook River	16
7	01070004	Nashua River	6
8	01070006	Merrimack River	61
9	01080101	Upper Connecticut River	16
10	01080103	Connecticut River - Johns River to Wells River	7
11	01080104	Connecticut River - Wells River to White River	3
12	01080106	Connecticut River - White River to Bellows	24
13	01080107	Connecticut River - Bellows Falls to Vernon	8
14	01080201	Connecticut River - Ashuelot River Vernon Dam to Millers River	21
15	0100008	Coastal Impaired Segments	14
	TOTAL		379

Figure 1-1: Map of Bacteria Impaired Waters in New Hampshire, by HUC 8 Watershed.

- Bacteria used as indicator of fecal contamination (e.g., FIB)
- 300+ bacteria-impaired segments
- Concentrated in populated Seacoast Region

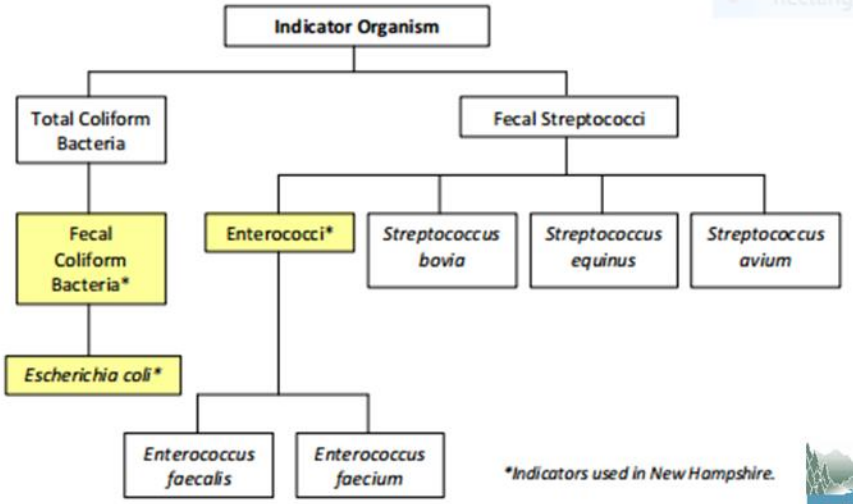
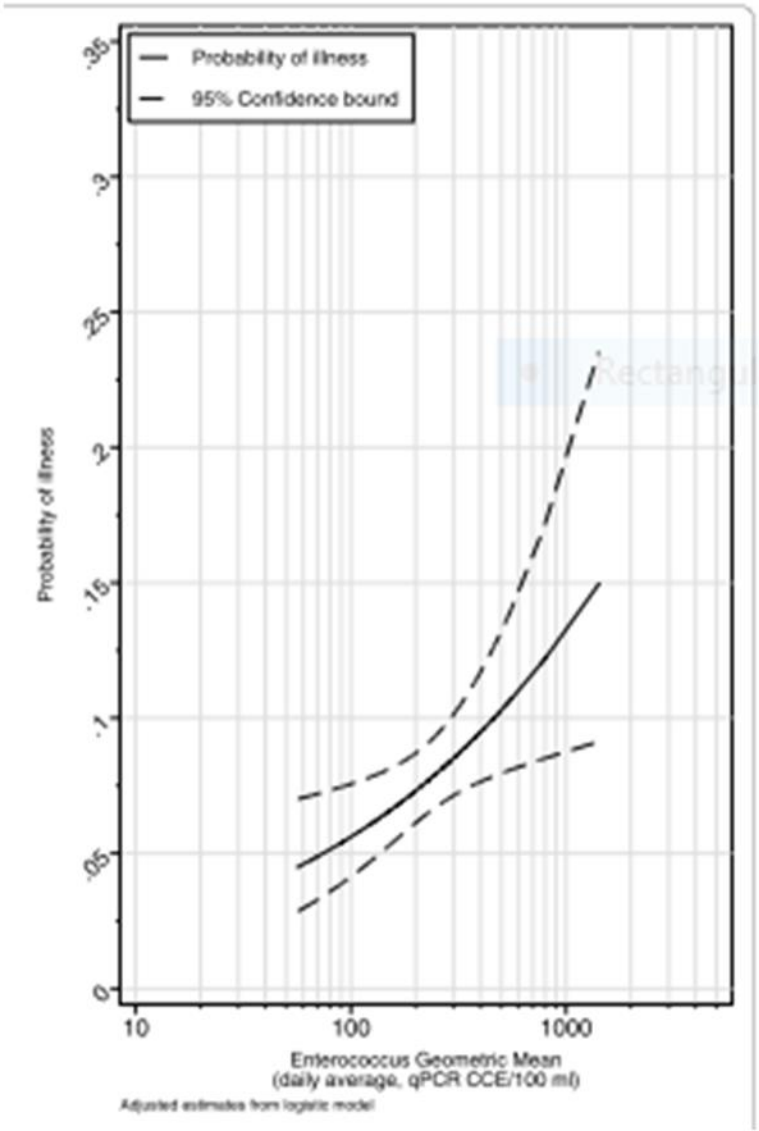


Figure 2-1: Relationship among Indicator Organisms (USEPA, 2001).

WHY SHOULD WE CARE ABOUT FIB?



- Indicator of human health risk
- GI illness correlated to Enterococci

Wade et al. 2010

PROJECT HISTORY

R-WD-01-3

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

Prepared by

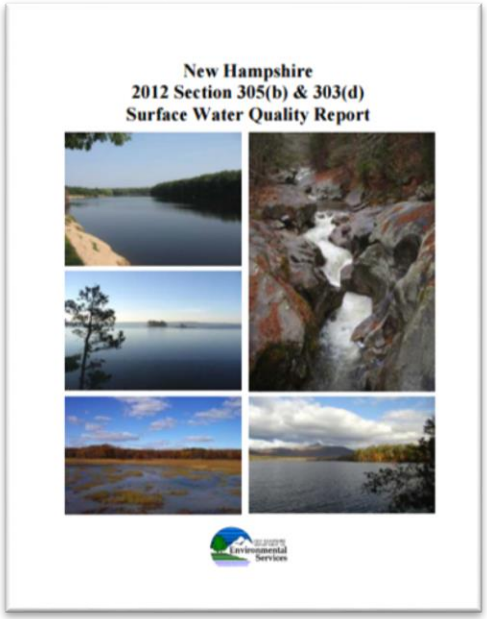
Chris Nash, Shellfish Program Manager
Andrew Chapman, Shellfish Program Specialist

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

December 2000

2000 - NHDES Sanitary Survey

- Identified Parsons Ck as primary source of bacteria to beach (based on sampling & surveys)
- Shellfish Program established prohibited zone at creek mouth

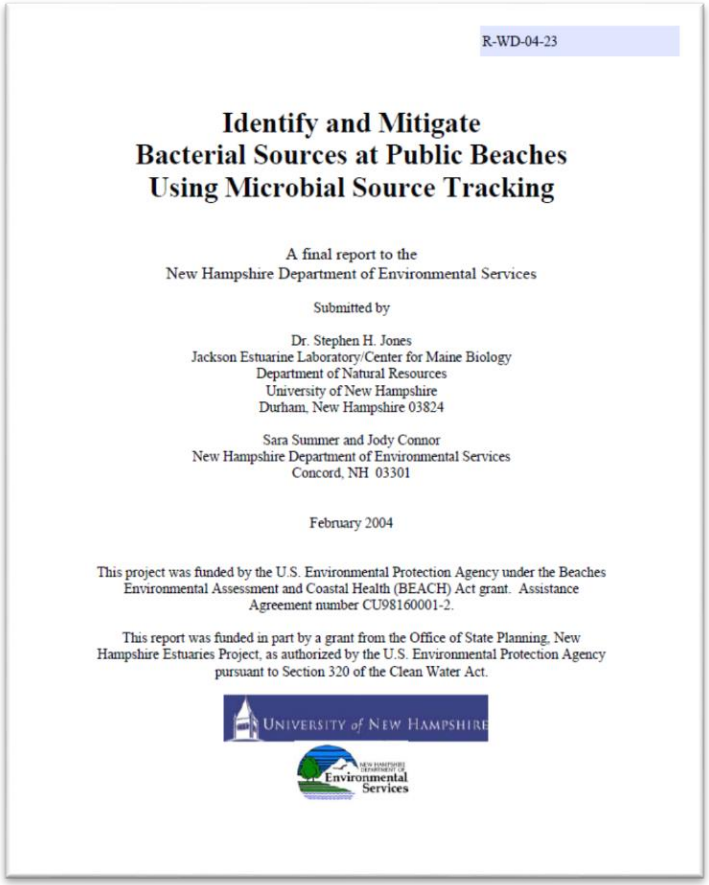


New Hampshire
2012 Section 305(b) & 303(d)
Surface Water Quality Report

2002 - NHDES 303(d) List of Impaired Waters

- Impaired for PCBs, mercury, and dioxin, but primarily for **bacteria** for primary contact recreation

PROJECT HISTORY



R-WD-04-23

Identify and Mitigate Bacterial Sources at Public Beaches Using Microbial Source Tracking

A final report to the
New Hampshire Department of Environmental Services

Submitted by

Dr. Stephen H. Jones
Jackson Estuarine Laboratory/Center for Maine Biology
Department of Natural Resources
University of New Hampshire
Durham, New Hampshire 03824

Sara Summer and Jody Connor
New Hampshire Department of Environmental Services
Concord, NH 03301

February 2004

This project was funded by the U.S. Environmental Protection Agency under the Beaches Environmental Assessment and Coastal Health (BEACH) Act grant. Assistance Agreement number CU98160001-2.

This report was funded in part by a grant from the Office of State Planning, New Hampshire Estuaries Project, as authorized by the U.S. Environmental Protection Agency pursuant to Section 320 of the Clean Water Act.

UNIVERSITY of NEW HAMPSHIRE

Environmental Services

2004 - NHDES Beaches Program

2004/8 - MST Ribotyping (Jones)

- Human dominant during dry weather (17% wet vs 44% dry - septics)
- 31% wildlife during wet weather (found otter, deer, and seagull)

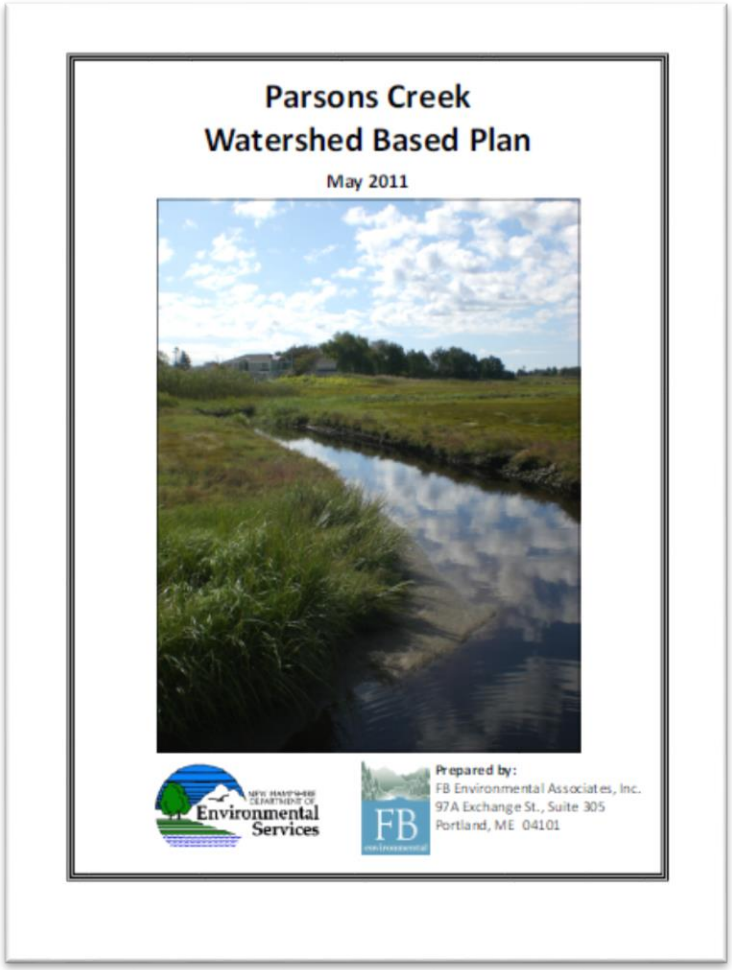
2008-10 - NHDES/FBE Monitoring

- Coastal Beach Watershed Bacteria Source Investigation *(used Generalized Watershed Loading Function model)*

2010 - NH Bacteria TMDL

- 71% reduction needed for single sample Entero (less stringent criteria)
- 89% reduction needed for geomean Entero

PROJECT HISTORY

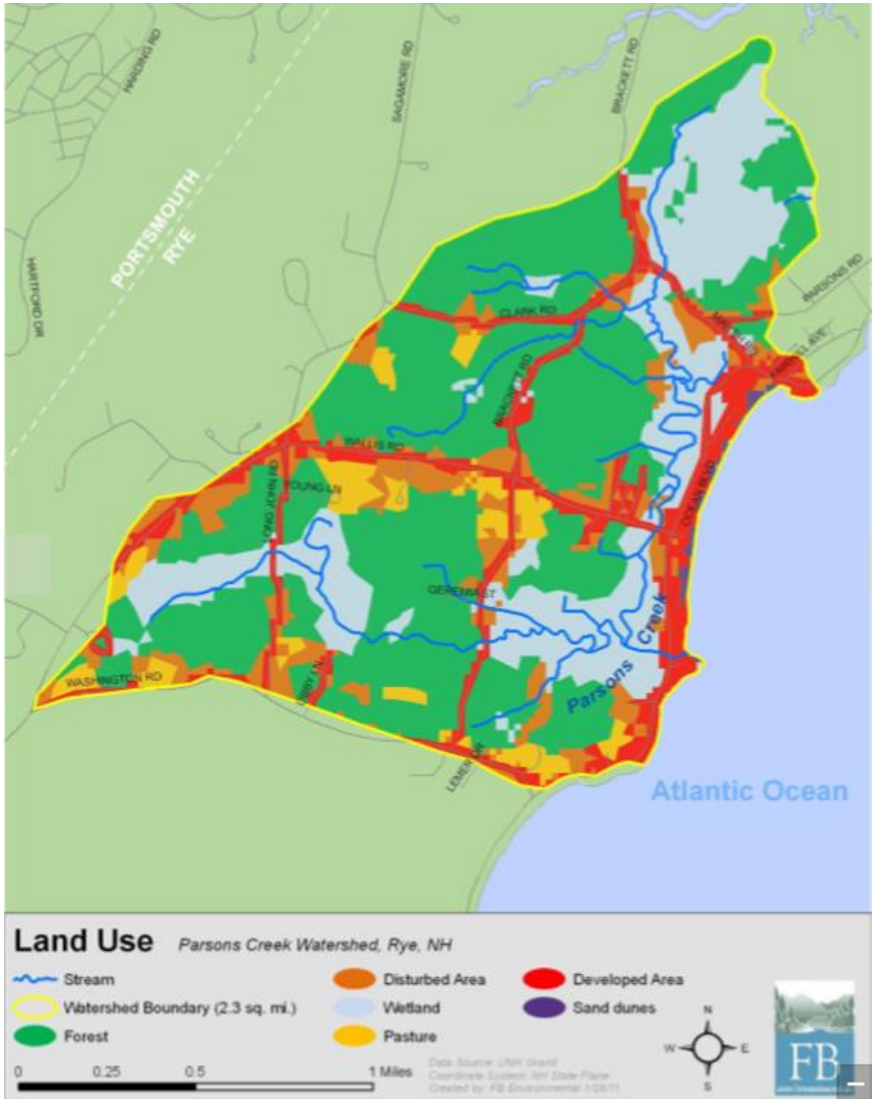


2011 - Parsons Creek WBP

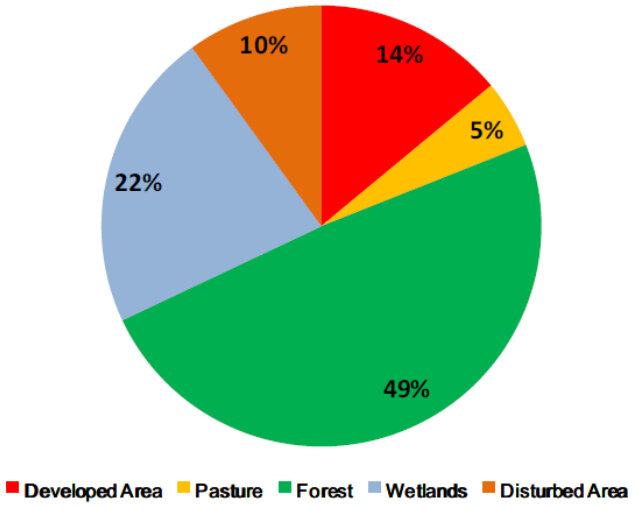
- FBE/NHDES - EPA 319 funding
- 2009 surveys of storm drain network and pollution sources near hotspot sites
- Identified priority areas for follow-up remediation and monitoring
- Town efforts:
    1. posted proper pet waste pick-up signs
    2. organized community clean-ups
    3. applied for more grants
    4. better enforced construction site runoff regs
    5. mapped catch basins
    6. maintained road cleaning schedule

SUSPECTED SOURCES

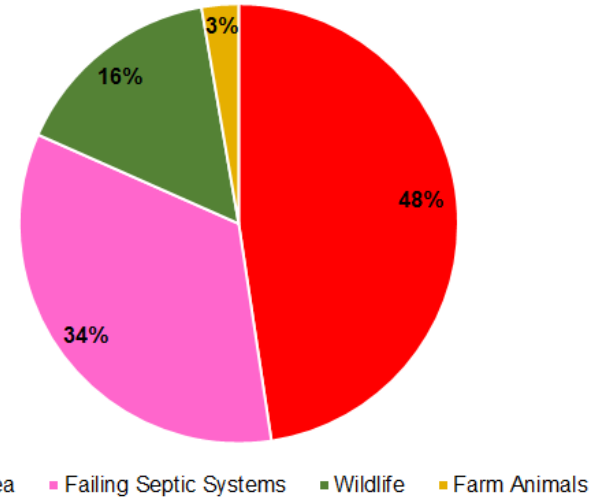
POLLUTION IN THE STREAMS REACHES PUBLIC BEACHES



Land Use



Bacteria Load Sources



SUSPECTED SOURCES

SUSPECTED SOURCES OF FECAL CONTAMINATION TO PARSONS CREEK

1. STORMWATER RUNOFF OF WASTE

- Multiple possible sources: human, canine, farm animals, and wildlife

2. SEPTIC SYSTEMS

- Estimated that 24% of septic systems in watershed likely inadequate
- Low-lying topography close to groundwater; sandy soils

WATER QUALITY REVIEW OF PARSONS CREEK & BEACHES

DATA STRUCTURE

- **BEACH DATA**

  NHDES Beaches Program (3 ft water, regular monitoring sites)

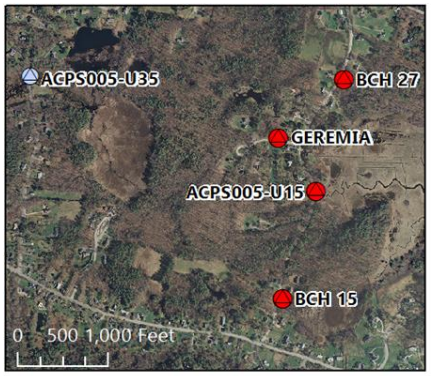
  NH Shellfish Program (3 ft water; offshore, multi-year study)

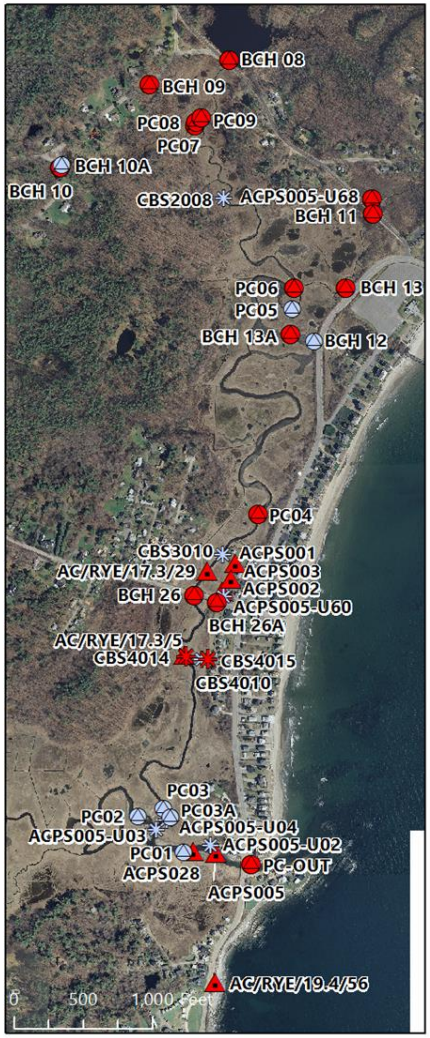
  FBE/Town/NHDES (seeps, pipes, shoreline, investigative)

DATA STRUCTURE

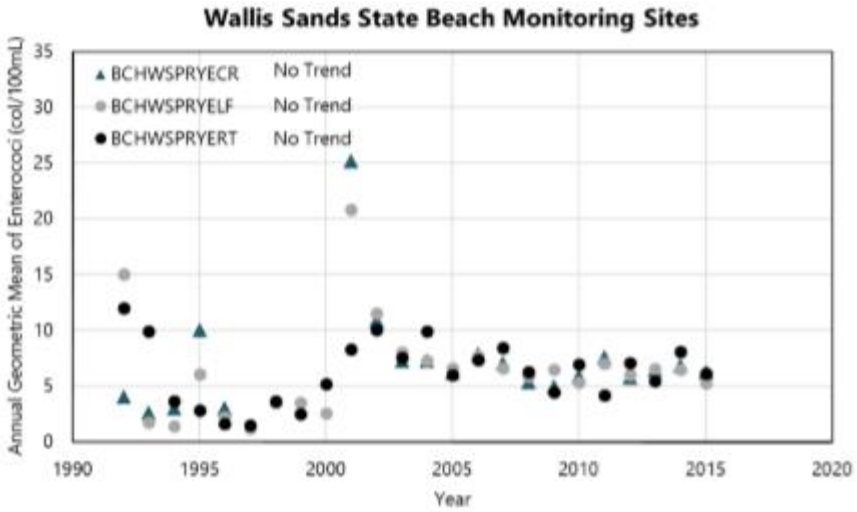
- **WATERSHED DATA**

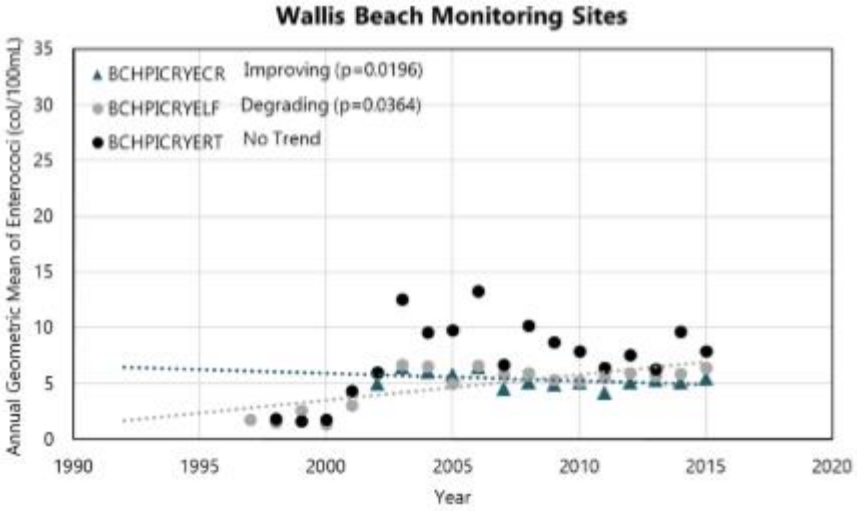
  NHDES/FBE/Town (Surface grabs, pipes, culverts, investigative, multi-year monitoring sites)





BEACH RESULTS





NHDES Beaches Program sites within acceptable criteria (entero)

NH Shellfish Program sites (1999-2009); 4 exceeded criteria (fecal)

Multiple investigative seeps exceeded criteria (entero)

BEACH RESULTS

Site 7 (retaining wall) where Canine Sable alerted for human fecal contamination in 2015. Photo Credit: FBE.

Beach seeps near beach access point and Parsons Creek outlet where Canine Sable alerted for human fecal contamination in 2015. Photo Credit: FBE.

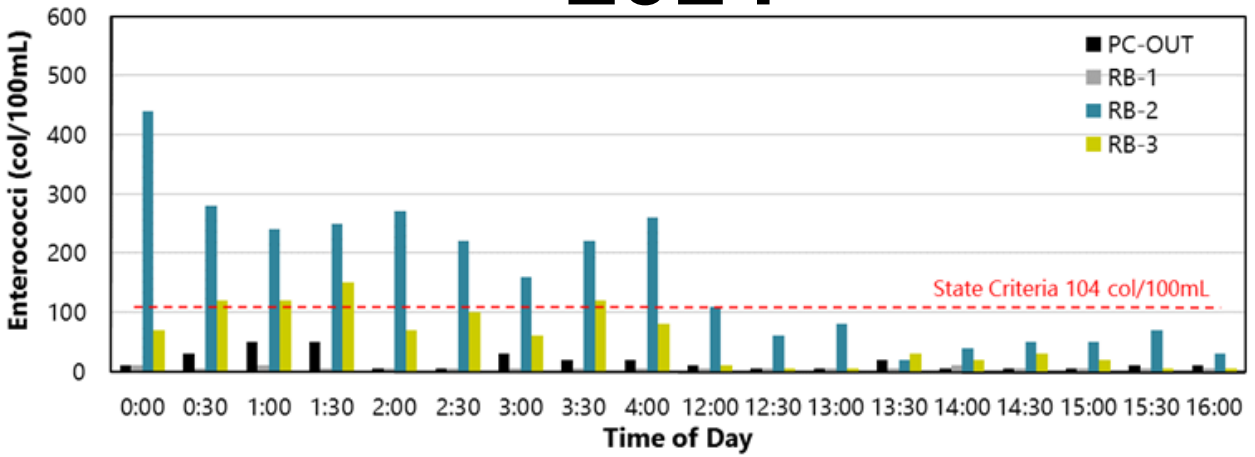
10 sites alerted to human waste by canine detection in 2015

5 sites alerted in 2013

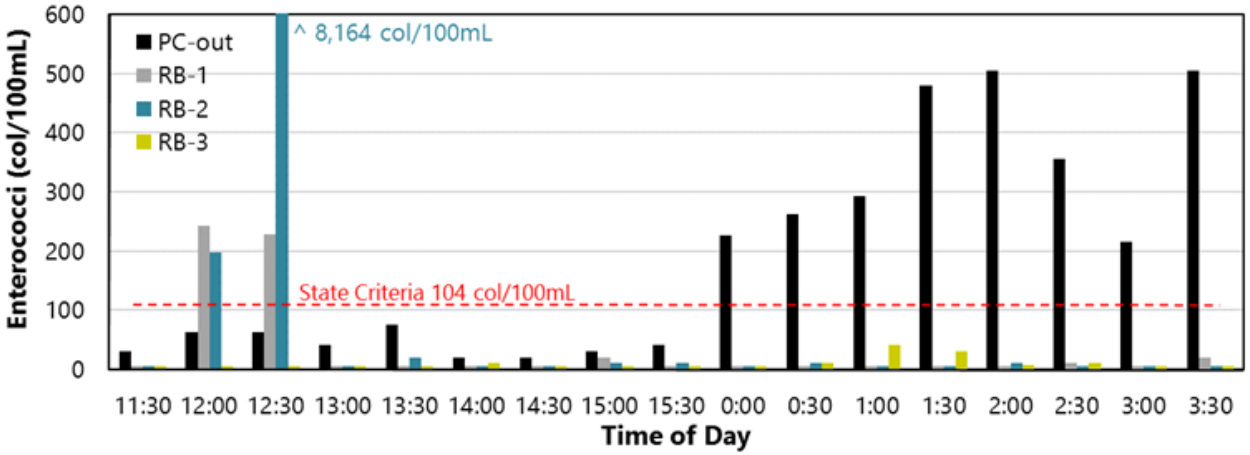
<u>Common area</u> = mouth of Parsons Creek and between outlet and beach access point

BEACH RESULTS

2014



2015



Overnight sampling - multiple samples exceeding criteria (particularly at night – not conclusive since die-off during day)

No common patterns found

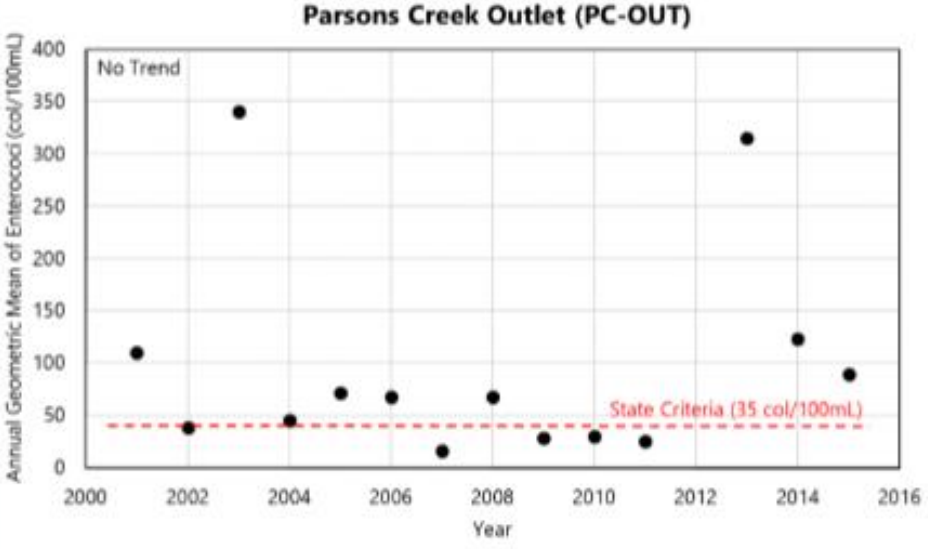
WATERSHED RESULTS

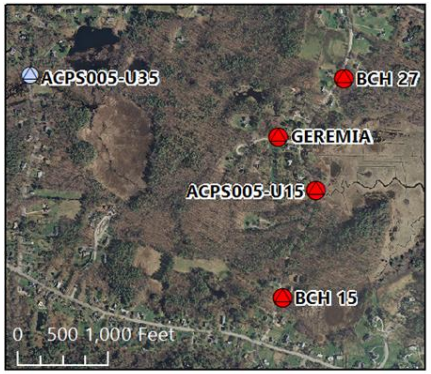
- **Majority of sites exceeded criteria**
- **Consistent issue for Parsons Creek**
- **FIB levels dependent on weather conditions; no trends**

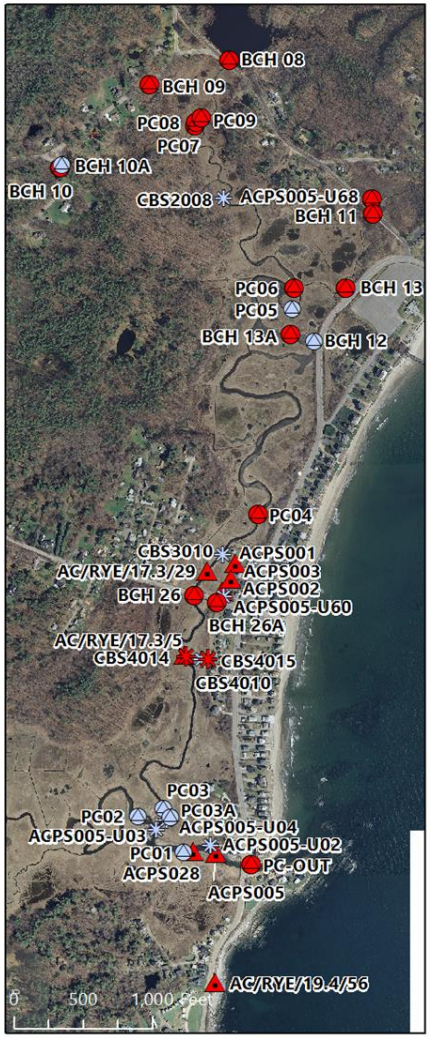
Many families play in tide pools near the outlet of Parsons Creek. Fecal contamination coming from the watershed poses a threat to public health. Photo Credit: FBE.

MAP LEGEND

- E. coli (Meets Criteria)
- E. coli (Exceeds Criteria)
- Enterococci (Meets Criteria)
- Enterococci (Exceeds Criteria)
- Fecal coliform (Exceeds Criteria)







WATERSHED RESULTS

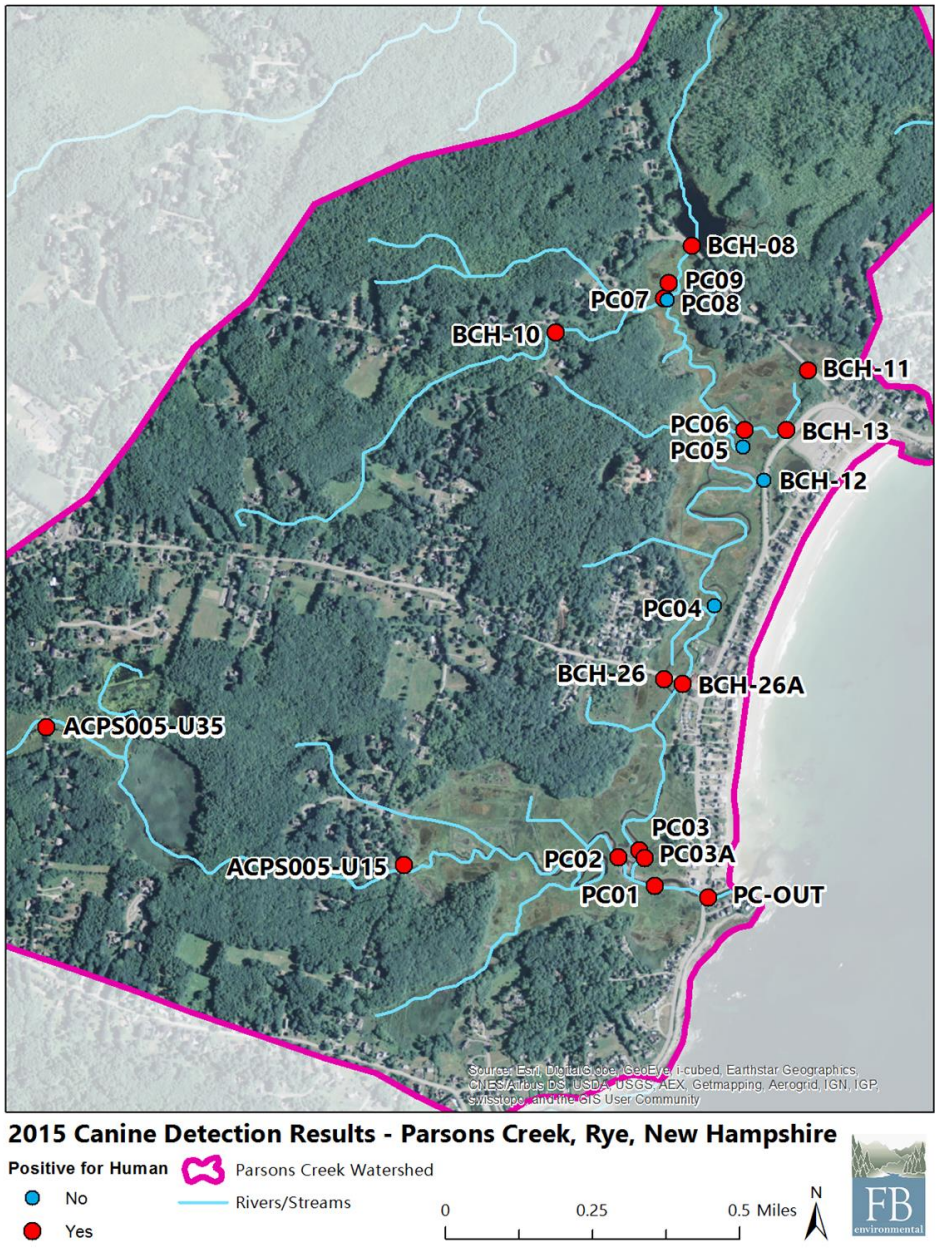
16 of 20 sites indicated human waste by canine detection in 2015

7 of 7 sites indicated human waste by canine detection in 2013

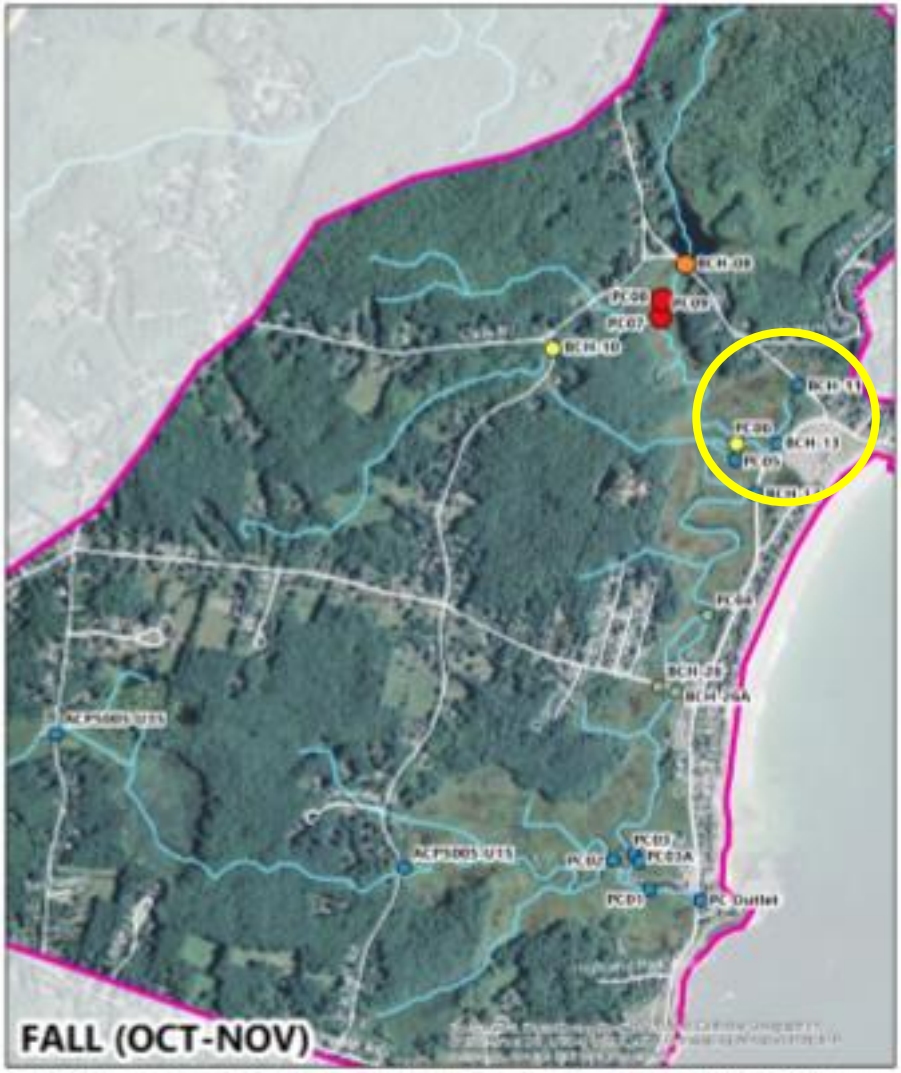
Human fecal contamination present throughout river

Canine Logan sniffing out the area around BCH26A on Wallis Road in 2013. Photo Credit: FBE.

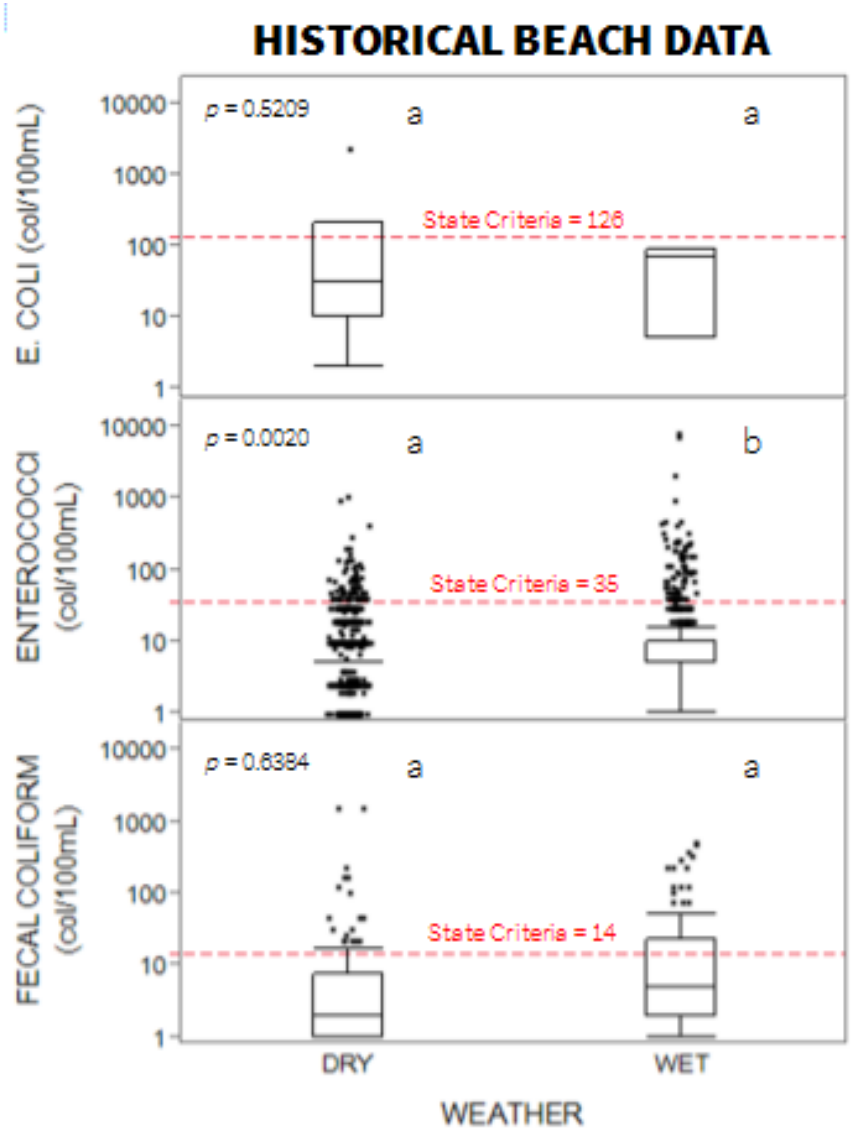
Canines Logan (left) and Sable (right). Photo Credit: FBE.

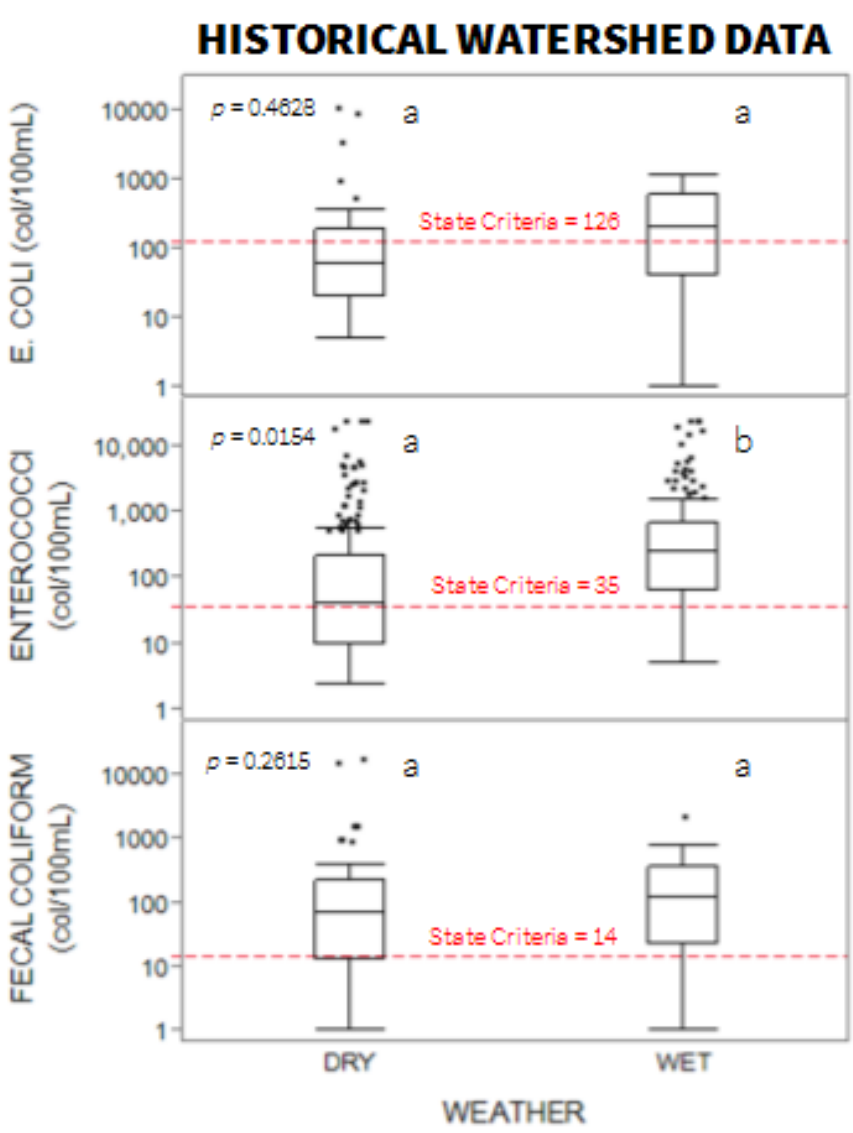


WATERSHED RESULTS

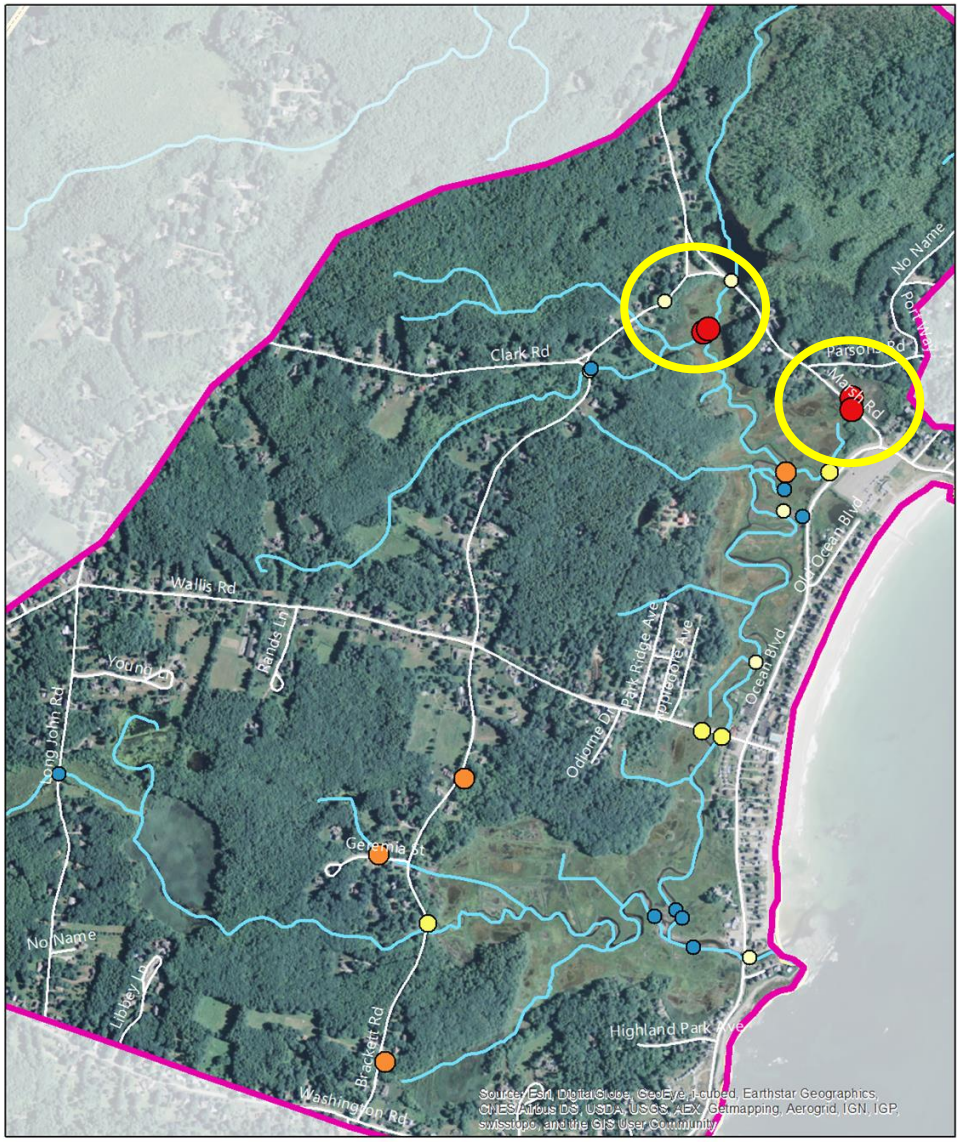


WET-DRY WEATHER ANALYSIS





HOTSPOTS



Enterococci Results - Parsons Creek, Rye, New Hampshire

Geomean (col/100mL)

- 0-34
- 35-103
- 104-207
- 208-415
- 416-2000
- Parsons Creek Watershed
- Rivers/Streams
- Roads

0 0.125 0.25 Miles

N

FB environmental

SUMMARY

BEACH

- Most beach sites meet criteria, but human waste present at beach outlet, suggesting low-level contamination issue

WATERSHED

- Fecal contamination consistent issue for creek; likely cause of beach contamination
- Human waste found present at majority of sampling sites, indicating diffuse problem (septic systems)
- Seasonal change in FIB may reflect residency duration (septic systems)

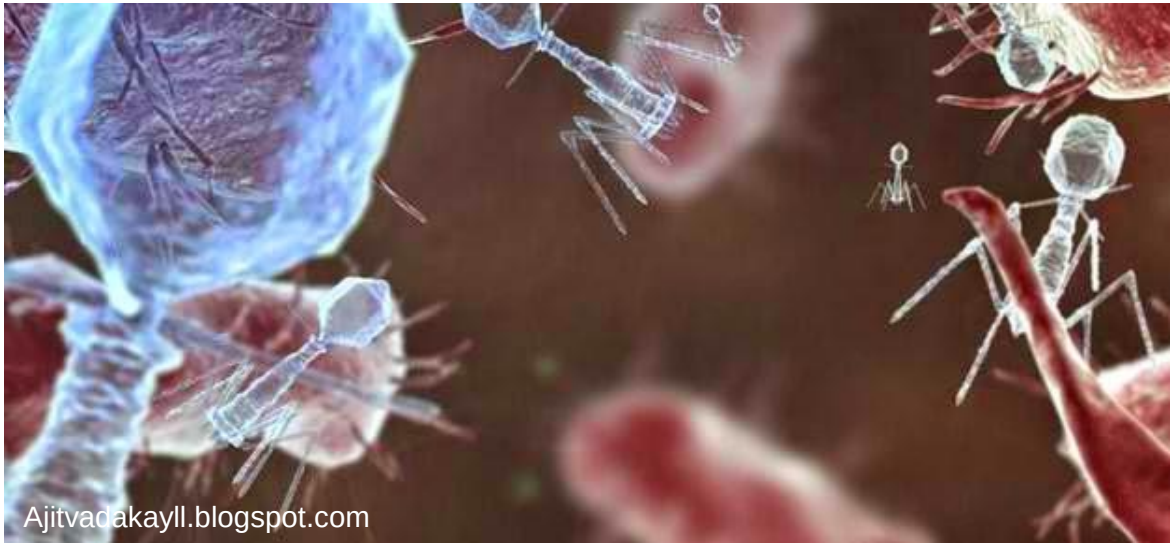
WET/DRY WEATHER

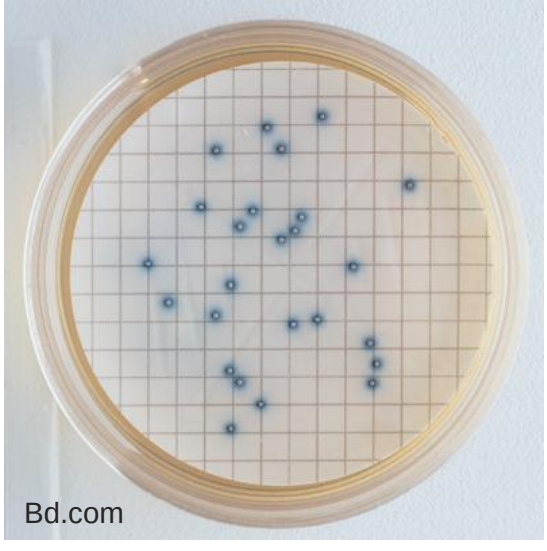
- Both surface runoff (wet) and groundwater (dry) show potentially equal contributions to fecal contamination

UNCERTAINTY

SCIENCE BEHIND BACTERIA MONITORING

- FIB imperfect indicator for viral pathogens in fecal matter (variability)
- Challenging to interpret for source tracking
- Use caution when interpreting data and how results correlate to human health risk





RESTORATION ACTIONS

GOAL *Restore water quality in Parsons Creek by reducing stormwater runoff from impervious cover and bacterial input from malfunctioning septic systems.*

2012-14 Parsons Creek Watershed Management Plan Implementation, Phase I

Grant funded by NHDES 319 program

Installed 4 BMPs; some bacteria reduction likely

Developed septic database and risk factor priority map

Public outreach (survey, website, events, materials)

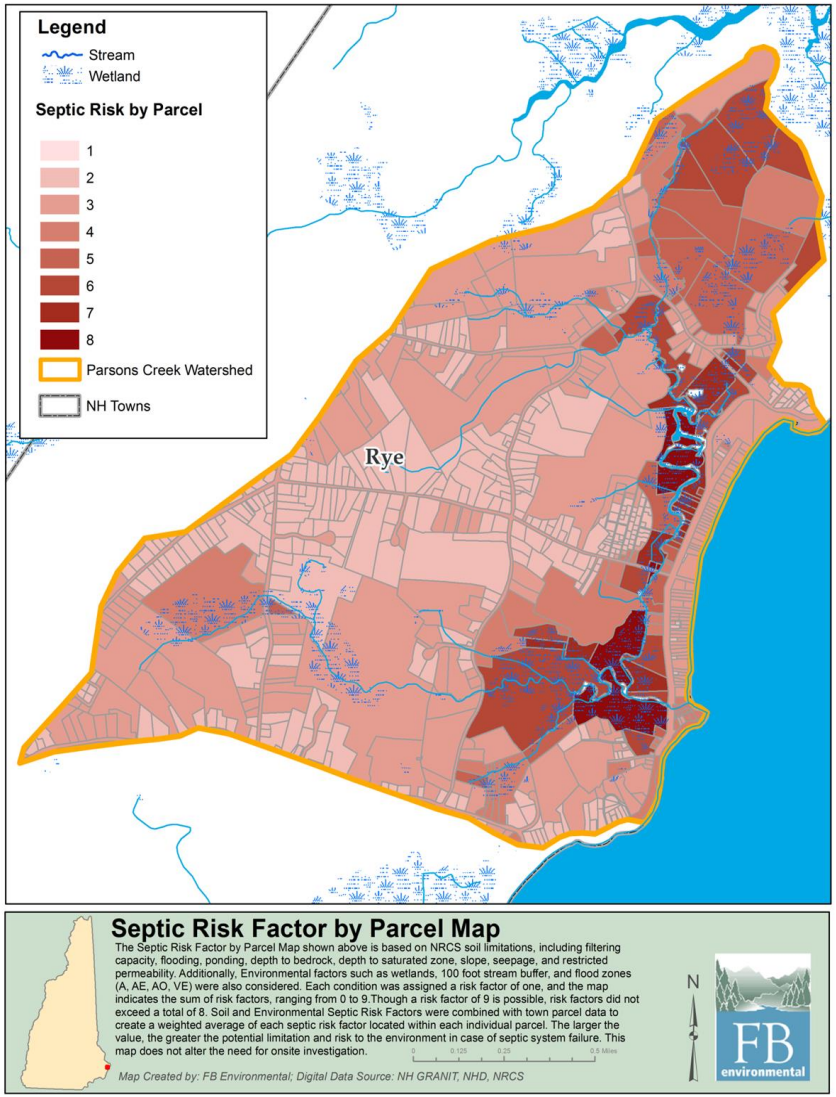
Example BMPs

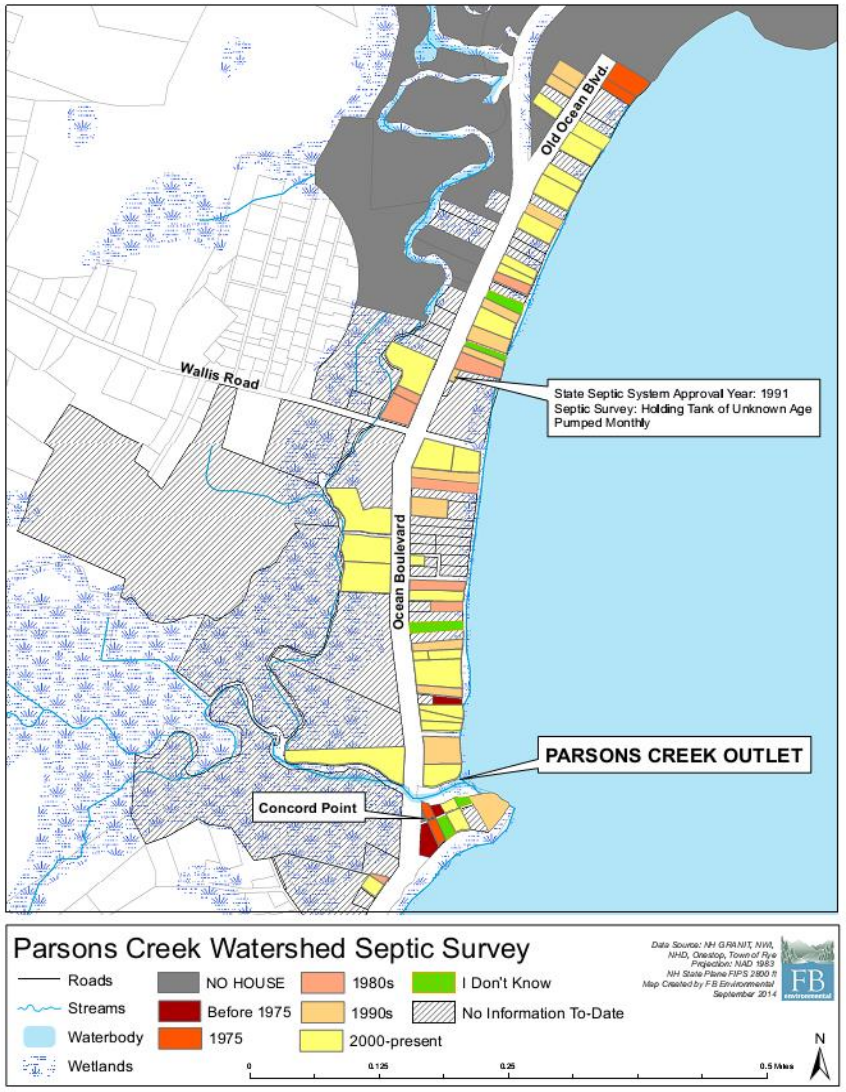
Marsh Road – Buffer Plantings

BEFORE

AFTER

SEPTIC SYSTEMS





Septic system database and risk assessment mapping; prioritized parcel list

Septic survey of 123 parcels along Ocean Boulevard (26% installed since 2000)

PUBLIC OUTREACH

Parson's Creek Watershed Implementation Project

A watershed assistance grant awarded by the NH Department of Environmental Services with funds from Section 319 of the EPA's Clean Water Act

Grant Financials

Federal Funds: $42,465
Town of Rye in-kind Match: $30,493
Total: $72,958

What the Grant Covers:

1. Stormwater Best Management Practices (BMPs)
2. Water Quality Sampling
3. Septic System Database and Investigations
4. Education & Outreach

Septic System Database

The goal of the septic database task is to facilitate municipal management of septic systems by ranking systems according to risk of pollution to Rye's streams, estuaries, and beaches. The database will assist town departments in ensuring that septic systems are properly maintained.

Septic System Survey 2014

A door-to-door septic system survey is planned for August 2014. This survey is designed to collect baseline information about the state of septic systems within the watershed, and is also used as a tool to educate watershed citizens about nonpoint source pollution, septic system management, and how these topics affects water quality in Parsons Creek.

Water Quality Sampling

Six bacteria sample events were conducted in 2013 (currently underway in 2014) under various weather conditions at eight locations throughout the Parsons Creek watershed.

Stormwater Best Management Practices (BMPs)

Stormwater BMPs help protect water quality by preventing or reducing the delivery of pollutants to our streams and lakes. Simple BMPs, such as dripline trenches and rain gardens, are easy to design and install, and go a long way to protecting Parsons Creek!

Before and after photos from a Rain Garden Installed on Geremia Street

Four Stormwater BMPs have been installed in the Parsons Creek Watershed to treat polluted runoff before it reaches the creek.

- Wallis Road Buffer
- Marsh Road Buffer
- Brackett Road Buffer
- Geremia Street Rain Garden

Education & Outreach

- Workshop Opportunities for Watershed Residents
- Presentations to the Town Selectman and Planning Boards
- Steering Committee Meetings
- Various Educational Flyers & Brochures
- Outreach at Rye Farmer's Market

Funding for this project was provided in part by a Watershed Assistance Grant from the NH Department of Environmental Services with Clean Water Act Section 319 funds from the U.S. Environmental Protection Agency.

Parsons Creek Watershed Clean Water Project

Funded under Section 319 of the Clean Water Act by USEPA and NHDES

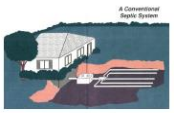
The Town of Rye has received a grant from NHDES to address high levels of bacteria in Parsons Creek. Bacteria from the Creek can affect the water quality of Rye's beaches and lead to beach closures.

Parsons Creek:

- Located in Rye, New Hampshire, in Rockingham County.
- Its watershed is 2.28 square miles;
- Drains to the Atlantic Ocean;
- Parsons Creek consists of two main branches which have a confluence near a single mouth. The west branch extends from Wallis Rd due east through Massacre Marsh to the outlet. The north branch begins east of Brackett Road above Marsh Road Pond and flows south through Wallis Marsh before crossing Wallis Rd and meeting the west branch. The mouth is located east of Ocean Boulevard just north of Concord Point.

Where does the bacteria come from?

Malfunctioning Septic Systems



Stormwater Runoff

Animal Waste

What does the grant cover?

- Septic System Inventory
- Identification of Bacteria Sources
- Installation of Best Management Practices
- Water Quality Sampling
- Public Outreach

For more information, contact: Emily DiFranco
FB Environmental Associates, Portsmouth, NH
emilyd@fbenvironmental.com, (603) 343-6311
www.fbenvironmental.com/

PUBLIC OUTREACH

RESTORATION ACTIONS

GOAL *Restore water quality in Parsons Creek by reducing stormwater runoff from impervious cover and bacterial input from malfunctioning septic systems.*

2015 - 2017 Parsons Creek Watershed Management Plan Implementation, Phase II

Septic system pump-out regulation

Some funding for septic evaluation and replacement in "hotspot" areas

Public outreach to promote septic system care and maintenance

Installation of 2 - 4 BMPs in "hotspot" areas

Expanded monitoring to track sources throughout watershed

NEXT STEPS

Address groundwater sources of fecal contamination

- update septic system database on regular basis
- conduct septic system surveys in priority neighborhoods (near hotspot sites or where history unavailable)
- pass and enforce septic system health regulation (pump-outs every 3 years)
- evaluate individual properties for septic system functioning near hotspots
- consider feasibility study of engineered solutions for septic systems in watershed
- consider groundwater study of homes near beach seeps near the outlet to determine septic system functioning

NEXT STEPS

Address surface runoff sources of fecal contamination

- continue to locate candidate sites for BMP implementation to address stormwater runoff
- continue to secure funding that implements these candidate BMP sites
- continue to track and monitor existing BMP condition and fix or improve sites as necessary
- add canine waste disposal stations near walking trails

NEXT STEPS

Enhance public outreach program

- continue to distribute educational materials and reports to the public via the Town's website
- educate homeowners on proper disposal of pet waste and maintenance of septic systems
- appoint a Parsons Creek Committee (~ 5 members)

Continue/expand monitoring program

- continue water quality sampling under varying weather conditions to track changes in FIB over time
- expand number of regular monitoring sites to better bracket source areas of fecal contamination
- expand duration of sampling to include seasonal analysis
- conduct sampling using other methods (MSC)(MST)

CHALLENGES

- Regulation of septic system maintenance; evaluation of older systems
- Consistent indicators for fecal pathogens
- Landowner support/awareness

WRAP-UP

1. **Problem is clear: fecal contamination in Parsons Creek is impacting beaches and public health**

2. **Problem being addressed by decade-long, stepwise process with clear goal in mind**

3. **Problem is difficult to tackle due to uncertainty in fecal indicators**

THANK YOU / Q&A