

Civic Science Monitoring for Pathogen Indicators on the Lower Raritan River

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Problem

- Little water quality data exists that can inform the safety of primary and secondary contact recreation on the Lower Raritan River.
 - non-bathing beaches and access points
- Data is not available to the public in a timely manner



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(i) https://www.njbeaches.org/#reports



The Department of Environmental Protection administers the New Jersey Cooperative Coastal Monitoring Program. From mid-May to mid-September, local health departments monitor recreational beach water quality. On this web site, you will find current beach status, water quality sample results, reports of beach advisories and beach closings, information on other events that affect beaches and daily updates from our coastal surveillance flights.



The New Jersey State Sanitary Code's water quality standard for bathing beaches is determined by the concentration of the indicator bacteria,

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Goal 1- Create a civic-scientist supported water quality monitoring program for the Lower Raritan

- Heather Fenyk, Lower Raritan Watershed Partnership
 - Volunteer coordination, website
- Interstate Environmental Commission-
 - EPA approved QAPP, free training and lab analysis!
- Rutgers Cooperative Extension of Middlesex County
 - R3C grant, volunteers
- Rick Lathrop, CRSSA, Rutgers
 - Grad (Julie Blum) and undergraduate student
- Many volunteers







Sampling Locations





Goal 1

- Create a civic-scientist supported water quality monitoring program for the Lower Raritan
 - Weekly monitoring on Thursdays.
 - Pathogens (Fecal coliform and *Enterococcus*)- grab samples
 - DO, Temp, salinity, pH- YSI probe
 - visual assessment data
 - 6 non-bathing beach sites from Piscataway to South Amboy.
 - Real-time reporting



- Enterococcus and Fecal coliform
- Enterococcus

GERS

- Spherical shaped bacteria found in warm blooded animals
- Indicator of other human pathogens
- Survives in marine waters
- DEP standard- 104 cfu/100ml or 35 cfu for 30 day geometric mean



Photo credit: Jessica Bonamusa



Training

- May, 2019- 20 volunteers
- Why we monitor
- Sampling protocol- EPA QAPP
- YSI pre and post calibration
- Sampling team coordination and schedule



Riverside Park, Piscataway







Rutgers Boathouse, New Brunswick







Edison Boat Basin





Ken Buchanan Park, Sayreville







South Amboy Waterfront Park





2nd Street Park, Perth Amboy









Summary results

- 6 sites, 22 weeks from May 23rd- October 10th
- 133 total samples

GERS

- *Enterococci* <10- 6000 cfu
- Temperature- 15.1- 28.1 (C.)
- DO- 3.74- 17.98 mg/L
- Salinity- 0.09- 28.58 ppt



Enterococci exceedances by site (n= 22)

	Percent				
Site	exceedances				
Riverside Park, Piscataway	95%				
Rutgers Boathouse, New					
Brunswick	73%				
Edison Boat Basin	82%				
Ken Buchanan Park,					
Sayreville	68%				
South Amboy Waterfront					
Park	41%				
2nd St Park, Perth Amboy	64%				
These results are preliminary and awaiting					
quality control. Enterococci standard= 104					

TGERS

Metuchen Riverside Park. Piscatawa (440) Ediso Perth Middlesi Amboy 🚔 1 h 21 min 0 2 2nd Street Highland Park Edison Franklin Townshin Boat Basin **Rutgers Boathous** e (77) South Ken Ambo Buchanan Park North Brunswick Google Township Savreville

Menlo Park Mall

These results are preliminary and awaiting quality control. Enterococci standard= 104 cfu/100 ml for single sample or 30 cfu/ 100ml for 30 day geometric mean.



Golden Toilet Award at Pier 40



2019 Enterococci exceedances by month

Month	Exceedances	Samples	
May	67%	n=12	
June	71%	n=24	
July	47% n=30		
August	70%	n=30	
September	96%	n=24	
October	50%	n=12	

These results are preliminary and awaiting Quality Control. Enterococci standard= 104 cfu/100 ml for single sample or 35 cfu/ 100ml for 30 day geometric mean.





2 Day Antecedent Precipitation (in.) New Brunswick Station



Histogram of *Enterococci* Levels



Enterococci (cfu/100ml)

Water Temperature (C.)



Spearman's Correlation Matrix

		<i>Enterococci</i> (CFU)	Water Temp (C.)	2 day antecedent PCP	DO mg/L
	Spearman's				
Enterococci (CFU)	p-value	_			
Water Temp (C.)	Spearman's rho	-0.148			
	p-value	0.09			
2 day antecedent	Spearman's rho	0.236	-0.021		
РСР	p-value	0.006	0.81		
DO mg/L	Spearman's rho	0.064	-0.348	-0.034	
0.	p-value	0.465	< .001	0.698	—

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THE STAR-LEDGER, AFFILIATED WITH NJ.COM SUNDAY, SEPTE

MIDDLESEX COUNTY

Program reveals river's water is gross

Lower parts of the Raritan often are befouled with fecal bacteria, monitoring shows

Michael Sol Warren For The Star-Ledger

The same kind of fecal bacteria that reg- not designated for swimming." ularly shuts down swimming at bayside beaches along the Jersey Shore is often sor with Rutgers Cooperative Extension of found at high levels in the lower stretches of Middlesex County, and Heather Fenyck, the the Raritan River, a Rutgers University pro-

the Lower Raritan Watershed Partnership to have 20 volunteers monitor water quality at six sites on the River in Middlesex County

The six sites - Riverside Park in Piscataway, the Rutgers Class of 1914 Boathouse in teer program is to fill a need for recent water New Brunswick, the Edison Boat Basin and quality information that residents could Riverwalk, Ken Buchanan Riverfront Park in Sayreville, Raritan Bay Waterfront Park in the river. South Amboy and 2nd Street Park in Perth Amboy - are popular recreation spots.

New Jersey regulations require that lifeguarded beaches be closed to swimming if more than 104 enterococci bacteria colonies are found per 100 milliliters of sampled water. Enterococci levels at the six Raritan sites ranged from less than 10 colonies to more than 6,000, according to Rutgers. a regular basis to monitor these sites where A 30-day average from Aug. 15 to Sept. 12 we know that people are out on a regular ranged from 156 to 960.

But Michele Bakacs, an associate profeswatershed partnership's executive director, both said that the Raritan sites are fre-Since May, Rutgers has partnered with quently used for recreation like fishing, kayaking, canoeing and crabbing. On hot days, volunteers conducting sampling sometimes found people wading in the water.

Because of that, the goal of the volunconsider before deciding whether to head to

"Probably the most important issue is that the public has not had a lot of access to water quality information." Bakacs said.

Fenyck said she would like the state to monitor all popular water recreation sites with the same rigor that lifeguarded swimming beaches already get.

"We really want the state to take action on basis engaging with the water in one way or







Ulcerative mycosis, caused by the fungus (or water mold) known as *Aphanomyces invadans*

Outreach





Goal 2 and next steps

- Microbial source track down for hot spots
- Meet with townships

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- Real-time public data access
 - NYC Water Trail Assoc.
 - Raritan Hydrologic Observatory
- Annual monitoring



Thank you

- Lower Raritan Watershed
 Partnership
- Interstate Environmental Commission
- NYC Water Trail Assoc.
- Rick Lathrop, Dept of Ecology and Natural Resources
- Sustainable Raritan River Initiative
- Shakir Valentine
- All our fabulous volunteers!!





Questions?



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