

Pathogen Report 2022



Purpose

Hudson River Park is part of the Community Water Quality Testing Program (CWQTP), a coalition of dozens of boathouses, universities, and community members organized by the Billion Oyster Project (BOP). From May to October, the coalition samples recreational water-use sites in all five boroughs and New Jersey. This community-driven effort seeks to provide accurate, site-specific health and safety data to keep boaters and recreators informed of weekly sewage contamination. Through weekly testing for the fecal indicator bacteria genus *Enterococcus*, the CWQTP helps to inform tens of thousands of water users each year.

What is MPN?

MPN stands for Most Probable Number of colony-forming units (CFUs) of bacteria in 100mL of water. It is the concentration of enterococcus in a sample. Below 35 MPN is safe for indirect contact, above 105 MPN is unsafe, and between is unsafe if levels persist. New legislation has changed the criterion to assessing 30-day geometric means, which must fall below the 35 MPN threshold.

Key Questions

- How do sewage contamination levels vary each year?
- How does rainfall affect sewage contamination?



Fig. 1 (above) | Water sample being transferred via pipette

Fig. 2 (below) | One Enterolert* Quanti-tray* with high levels of *Enterococcus* contamination (blue fluorescence)



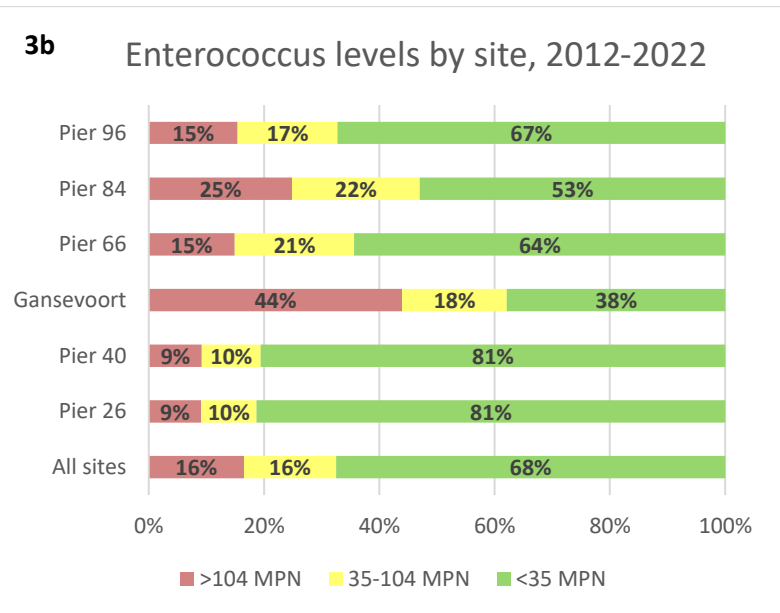
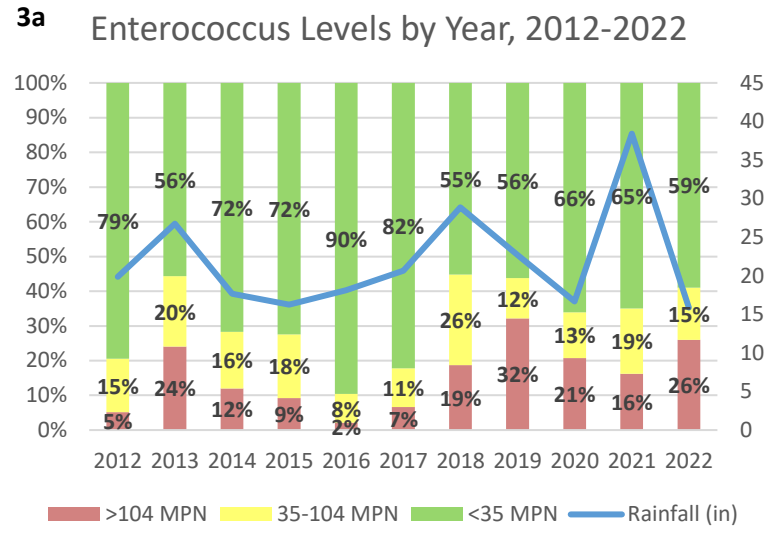
Methods

- Samples from Piers 26, 40, 66, 84, 96, and Gansevoort Peninsula were tested weekly for the presence of *Enterococcus* using IDEXX Enterolert protocols from 5/19 – 9/29.
- *Enterococcus* levels were assessed according to DOH standards.
- Findings were reported to BOP weekly.
- Data analyzed with Microsoft Excel.

Major Findings

Enterococcus levels within Hudson River Park were relatively similar between 2021 and 2022 (**Fig. 3a**). Piers 40 & 26 continued to exhibit highest frequency of safe days (~80%), followed by midtown sites (~60%), and then Gansevoort (~40%), likely due to the peninsula’s physical structure reducing water flow & combined sewer outfall (CSO) proximity (**Fig. 3b**). Out of ~70 sites monitored across the whole of NYC in 2022, 3 of the top 5 cleanest were in the Park: Piers 26, 40, and 66! See [Billion Oyster Project’s page](#) for more details on samples from all sites.

Combined sewer systems, which make up 60% of NYC’s sewage infrastructure, are designed to release untreated sewage and rainwater into NYC waterways during precipitation events that exceed the system’s capacity. For this reason, rainfall continues to be a primary factor influencing sewage contamination in the Hudson River and New York Harbor. The variability of these fecal contamination spikes is high despite significant correlation with rainfall, illustrating the importance of high frequency, site-specific sampling that is often not performed by agencies.



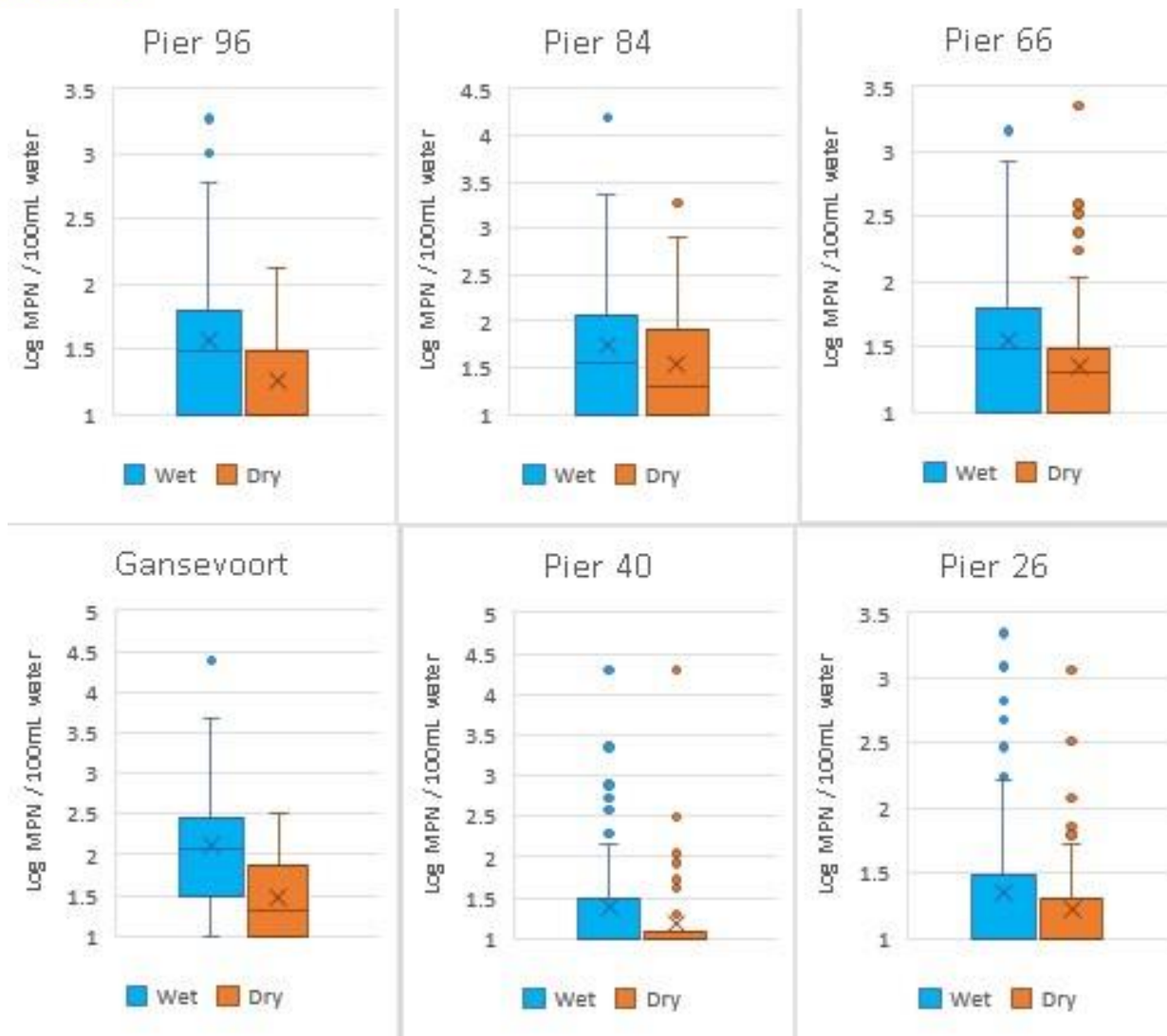


Fig. 4 | Wet vs dry weather *Enterococcus* concentrations in Hudson River Park
Wet weather is defined as >7.5mm of rain within week prior to sampling. Data were transformed to aid in visualization due to heavy right skew of outliers.

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All sites showed significantly higher bacteria levels during wet weather (**Fig. 4**). Even just 7.5mm (1/3") of rainfall within a few days prior to sampling significantly increases sewage contamination levels ($p < 0.05$), indicating that CSOs should be a major focus of any water quality improvement measures in the future. Monthly geometric means are not especially accurate with only 4 samples per site per month.

In an effort to examine the difference in results between IDEXX Enterolert and traditional membrane filtration, Hudson River Park partnered with the Interstate Environmental Commission (IEC). Duplicate field samples were taken at Pier 26 and Pier 40 which showed little significant difference.

In general, the Park recommends caution when recreating after periods of significant rainfall. Due to the Hudson's strong tides and currents, contamination typically lasts only 24-48 hours before it becomes dissipated and moves out into deeper waters where it is diluted.

Takeaways

The River Project frequently finds that sites within Hudson River Park's bounds show MPN levels in line with EPA recreational standards (<35 MPN) despite presence of multiple CSO outfalls in the park. This is likely due to high flow rates in the Hudson River within the Park. In general, *Enterococcus* contamination is highly variable between years, even month to month, exhibiting high stochastic variation, belying the need for continued, high frequency monitoring, and innovative modeling techniques.

Last year, Park staff partnered with Columbia University researchers and Cantina Design to produce an easy-to-interpret water quality dashboard based on the pre-existing

HRECOS network and high-frequency enterococcus sampling around storm events to produce a model that estimates bacterial contamination based on precipitation (**Fig. 5**). Though any model has its limitations, the daily estimation of risk is on a much finer scale than weekly test results, and is intended to further inform park-goers and NYC water-users of up-to-date environmental conditions. View the full dashboard [here](#).

Hudson River Park's water quality supported indirect contact for recreation 306 out of the past 365 days.

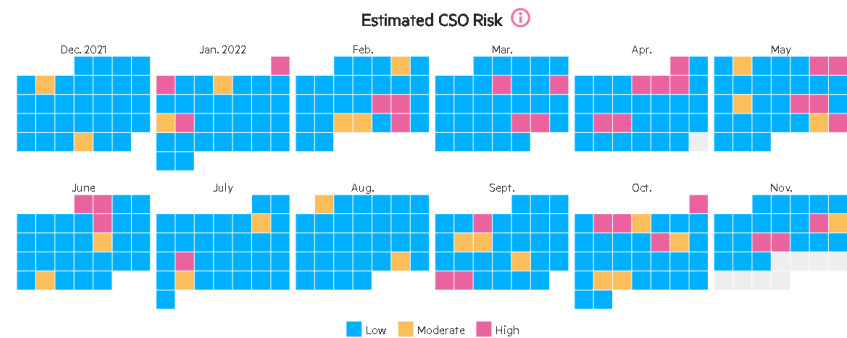


Fig. 5 | Cantina dashboard showing estimated risk of water contact based on precipitation data. Learn more [here!](#)

Future Directions

Moving forward, HRPK River Project will continue its participation in the CWQTP to provide robust contamination data for NYC's recreators and water users while gathering information on sewage contamination levels within the Estuarine Sanctuary.

References

Billion Oyster Project (2021). Williamsburg Field Station. <https://www.billionoysterproject.org/williamsburg-lab>