Milwaukee AOC Beach Remediation

Overview of the Assessment

Remediation projects on two Lake Michigan beaches in Milwaukee, Wisconsin were evaluated for the impact they had on *E. coli* concentrations in beach water.

Assessment Questions

Are *E. coli* concentrations in beach water lower after remediation projects were completed at two of Milwaukee's **Area of Concern (AOC)** beaches?

Did the amount of precipitation during swim season impact the effectiveness of remediation?

Main Findings

Post-remediation beach water samples from **Bradford Beach** had a lower average *E. coli* concentration during the recreational season after the installation of rain gardens. Analysis by t-test showed the lower post-remediation average was statistically significant. Thus, remediation efforts at Bradford Beach were successful at lowering overall *E.coli* concentrations in beach water.

Additionally, the average *E. coli* concentration was significantly lower in both low and high rain swim months after remediation.

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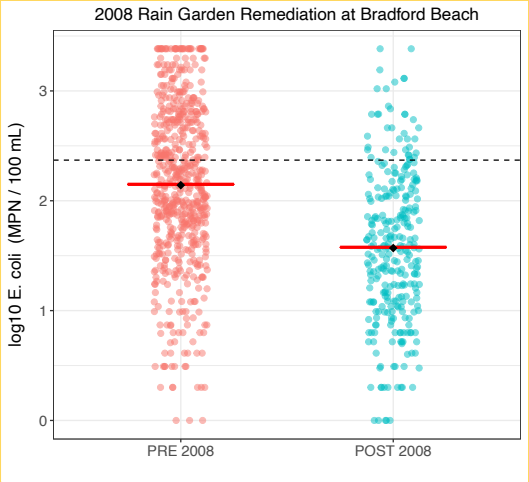
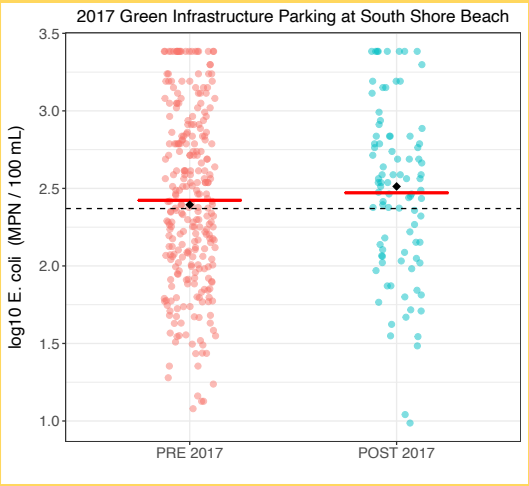
Bradford Beach

Overall concentrations of *E. coli* found in beach water sampled PRE and POST 2008 rain garden installation at Bradford Beach stormwater outfalls.



South Shore Beach

Concentrations of *E. coli* found in beach water sampled PRE and POST 2017 green infrastructure parking lot installation adjacent to the South Shore swimming area.



Figures: The *E. coli* counts (MPN/100 mL) were provided by Milwaukee Health Department and rain data was collected from NOAA weather service. Red line = average; black diamond = median; dotted line = *E. coli* advisory limit of 235 CFU/100 mL water sample

Note: The same datasets were used to analyze differences in average E. coli *concentrations in low rain versus high rain months during the swim season. Full results are available in the* ***Beach Closings Management Actions Project*** *final report.*

Post-remediation beach water samples from **South Shore Beach** showed a slightly higher average *E. coli* concentration during the recreational season compared with pre-remediation, but these differences were not statistically significant. However, it is important to note that there were only three years of sampling at the beach post-remediation and the findings may have been influenced by the high water levels of Lake Michigan in those years. By these data, the green infrastructure parking lot does not appear to be adequate in reducing *E. coli* concentrations in beach water and additional management measures are needed.

More Information

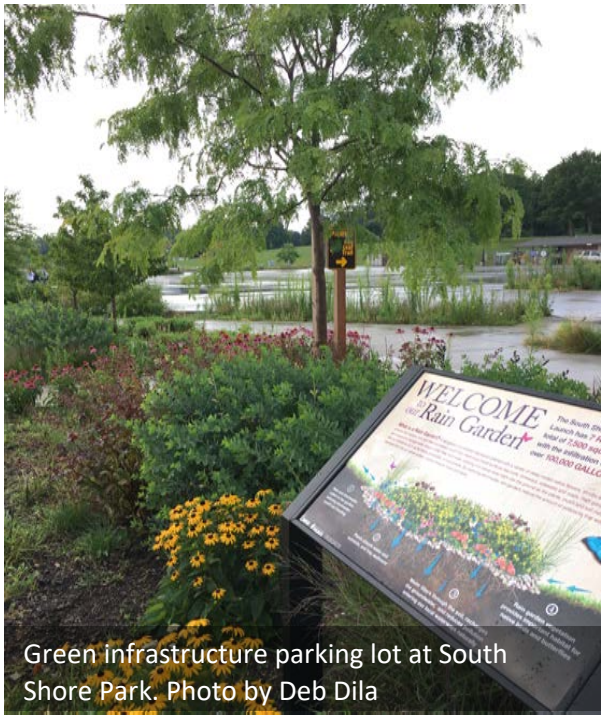
Milwaukee, Wisconsin has four AOC beaches on Lake Michigan, and two of those beaches have undergone remediation efforts to help reduce *E. coli* counts in beach water. Stormwater runoff, moist sand, gulls, and mats of *Cladophora* algae can all be sources of *E. coli* in beach water.

In 2008 rain gardens were constructed around Bradford Beach stormwater outfalls to facilitate infiltration into the sand, thus naturally filtering the polluted stormwater that previously ran directly across the beach to the swimming area. Since then, beach sand is groomed on a daily basis and dogs are used to patrol the beach for gulls. Beach grooming and gull abatement reduce the *E. coli* concentration in sand and decrease the possibility that sand will be a reservoir of *E. coli* that continually pollutes beach water.

In 2017 a green infrastructure parking lot was constructed at South Shore Park adjacent to the swimming beach. The lot contains rain gardens, bioswales, trees and storm pipe drainage to limit direct stormwater pollution to the lake. The parking lot undoubtedly reduces runoff pollutants such as motor oil, chemicals, and sediments from reaching the water and it provides healthy ecosystem services. However, South Shore beach has poor water circulation (due to a breakwater) and its proximity to a marina make it a poor swimming area. The lake doesn't flush the beach with fresh water as it would an open lake beach. Redesignating the swimming area to 500 feet south of its current location, where there is an opening in the breakwater, is an alternative that could provide consistently lower *E. coli* concentrations at South Shore Beach. More information can be found in our information sheet *South Shore Beach: Improving beach health for swimming and recreation*.

Management strategies to keep beach water *E. coli* concentrations low

- Continue or begin gull abatement using patrol dogs, high grasses, educating beach goers and other deterrents.
- Continue beach grooming and minimize standing water with beach nourishment (replenishing sand) to limit establishment of *E. coli* reservoirs.
- Remove *Cladophora* mats.
- Monitor stormwater outfalls when present at beaches. Check outfalls for flow in dry weather and sewage contamination in stormwater runoff.



Green infrastructure parking lot at South Shore Park. Photo by Deb Dila

This review was funded by the Great Lakes Restoration Initiative through Wisconsin Department of Natural Resources.

Data review was conducted by the McLellan lab at the University of Wisconsin-Milwaukee School of Freshwater Sciences. More information can be found in the final report which will be posted at https://sites.uwm.edu/mclellanlab/publications/

E. coli *concentrations were from the Milwaukee Health Department beach monitoring program archived at dnr.wi.gov and rain data was from NOAA weather service.*