

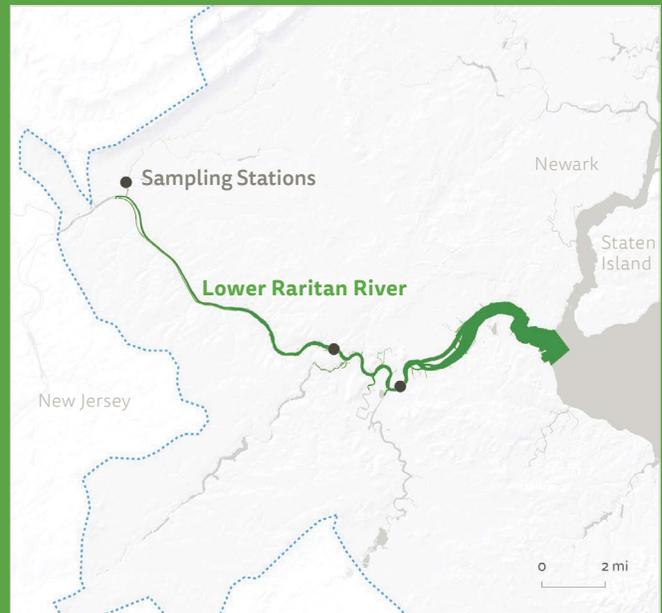
Regional Waterbody Summary

Lower Raritan River

The Raritan River runs eastward through central New Jersey, from Somerset County in the Watchung Mountains out to coastal plains towards Raritan Bay in Middlesex County. This regional analysis addresses the River up to the head of tide near South Bound Brook, New Jersey. The Raritan River has served as a water supply, transportation and trade route that became home to mills and factories from pre-colonial times through the Industrial Revolution. Massive clay deposits along the river allowed for brick manufacturers to flourish in addition to the transportation network from steamboats to rails and highways. A number of riverfront parks, such as Boyd Park in New Brunswick, Johnson Park in Edison, and the Perth Amboy's waterfront and fishing piers can be found in this region.

The economic prosperity that the Raritan brought to the region was threatened in the 1920s by the uncontrolled and accelerated disposal of industrial toxic waste in the river, coupled with an unregulated flow of sewage from a growing population. By 1997, the Raritan was ranked the 14th most polluted river in the United States with over 200 contaminated sites in its watershed, 24 of them federally designated Superfund sites. The historical industrial waste and release of sewage through the CSOs are major factors that affect water quality. In addition, the number of dams that were built throughout the history of the river have disrupted habitat and fish migrations.

The state reports to EPA through their 303(d) and 305(b) lists impairments to aquatic life, fish consumption, primary contact recreation, and shellfish harvesting.



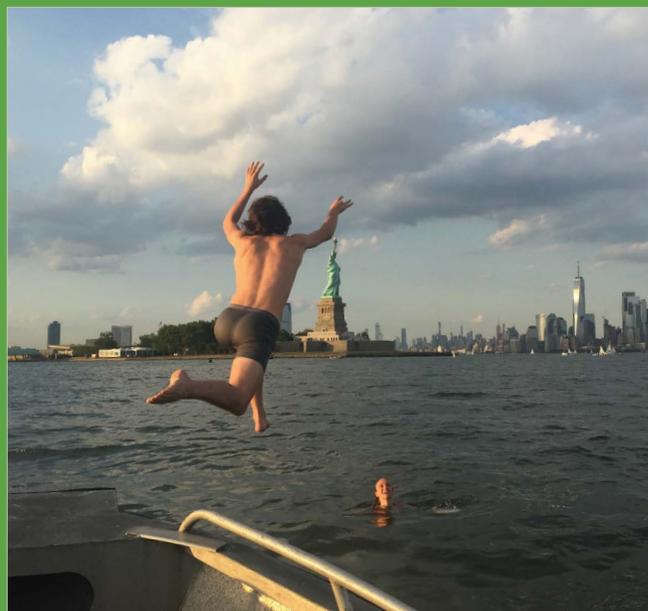
This region is impaired due to benzo[a]pyrene (PAHs), chlordane, DDT, dieldrin, dioxin (including 2,3,7,8-TCDD), *Enterococcus* bacteria, heptachlor epoxide, mercury, PCBs, arsenic, benzene, phosphorus, total suspended solids (TSS), water temperature, and pH. Chlordane, DDT, mercury, and PCBs were all found in fish tissue within this region. TMDLs are needed for all aforementioned causes of impairment. TMDLs have been completed for fecal coliform and mercury in fish tissue for portions of the Raritan.

Waterbody	Water Class NJAC 7: 9B-1.14(d)(1)	Water Quality Criteria	
		Pathogenic Bacteria (cfus/100mL)	Dissolved Oxygen (mg/L)
Raritan River	Class SE1: Shellfish and Bathing	<i>Enterococcus</i> : Monthly GM ≤ 35 or a single sample max > 104	Never < 4.0 at any time
			24-hour average ≥ 5.0

Water Quality Monitoring in the Harbor Estuary

This regional waterbody summary, prepared by the New York-New Jersey Harbor and Estuary Program (HEP) and partners, provides a brief analysis of select water quality data to illustrate the progress toward achieving the fishable and swimmable goals of the Clean Water Act in the Lower Raritan River. It is a companion to HEP's 2021 *Harbor-Wide Water Quality Monitoring Report* (available at www.hudsonriver.org/harborwidewqreport-2021), which presents water quality data collected from 2010 to 2017 from both New York and New Jersey across all 10 different regions of the Harbor Estuary. The full report analyzes four water quality parameters against federal recreational water quality recommendations and guidance documents as well as state water quality standards and criteria, and discusses achievements to date and efforts still needed to achieve fishable and swimmable waters.

This regional waterbody summary describes water quality and key challenges and opportunities for improvement relative to New York's and/or New Jersey's state standards and criteria as of 2020 for pathogenic bacteria (e.g. fecal coliform, *Enterococci*, and *E. coli*) and dissolved oxygen. In the case where multiple water quality standards and criteria are used in a regional waterbody, the highest criteria that is supportive of primary or secondary contact is displayed as the threshold. For swimmable waters, pathogen levels must meet a state's criteria and designated use (i.e., supporting secondary or primary contact recreation). The potential future standard of *Enterococcus* is also discussed where applicable. For fishable waters, dissolved oxygen levels must meet and/or exceed the state's criteria and levels of total nitrogen and chlorophyll-*a* must show at least fair conditions to support aquatic life. Potential investments and opportunities for improvement are showcased, including the National Pollutant Discharge Elimination System (NPDES) and Long Terms Control Plan (LTCP) permits used by the states of New York and New Jersey to reduce pollution



and ensure designated uses of each waterbody are met. Total Maximum Daily Loads (TMDLs) are another tool used by the states and EPA to determine the amount of a pollutant that a waterway can take in and still meet their designated uses and water quality criteria.

Data presented were collected primarily between June 1 and September 30, and compiled from two comparable harbor surveys conducted by the New York City Department of Environmental Protection (NYCDEP) and by the New Jersey Harbor Dischargers Group (NJHDG). As available, select secondary data sources were used to complement results from these two primary data sources. More information on data analysis methods can be found in the full report.

The full report and this regional waterbody summary does not serve to replace New York's or New Jersey's Integrated Water Quality Reports, nor are they meant to be used for compliance purposes. Proposed rulemaking to amend standards and/or criteria introduced by the states are also not explored in this report.

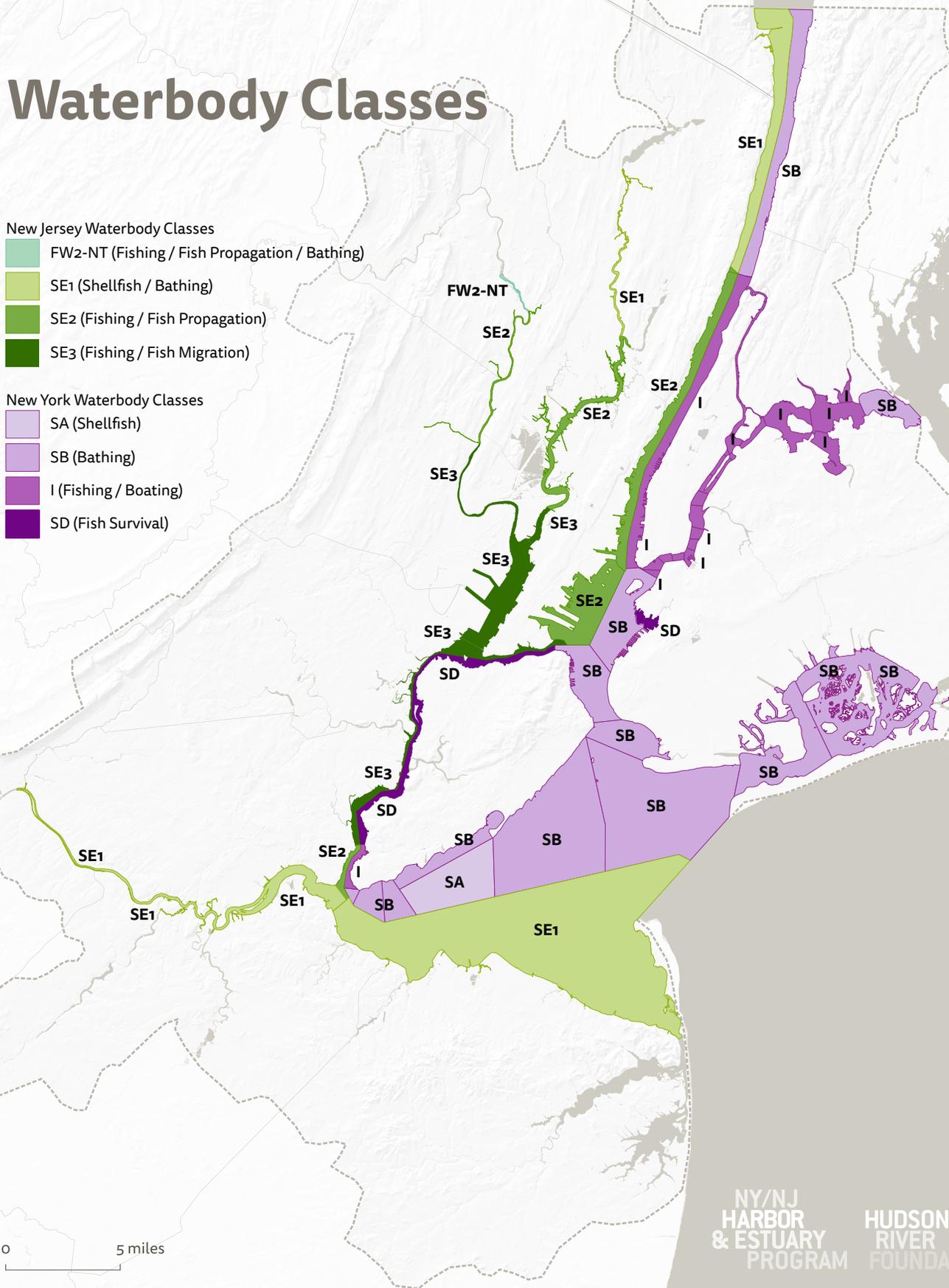
Waterbody Classes

New Jersey Waterbody Classes

- FW2-NT (Fishing / Fish Propagation / Bathing)
- SE1 (Shellfish / Bathing)
- SE2 (Fishing / Fish Propagation)
- SE3 (Fishing / Fish Migration)

New York Waterbody Classes

- SA (Shellfish)
- SB (Bathing)
- I (Fishing / Boating)
- SD (Fish Survival)

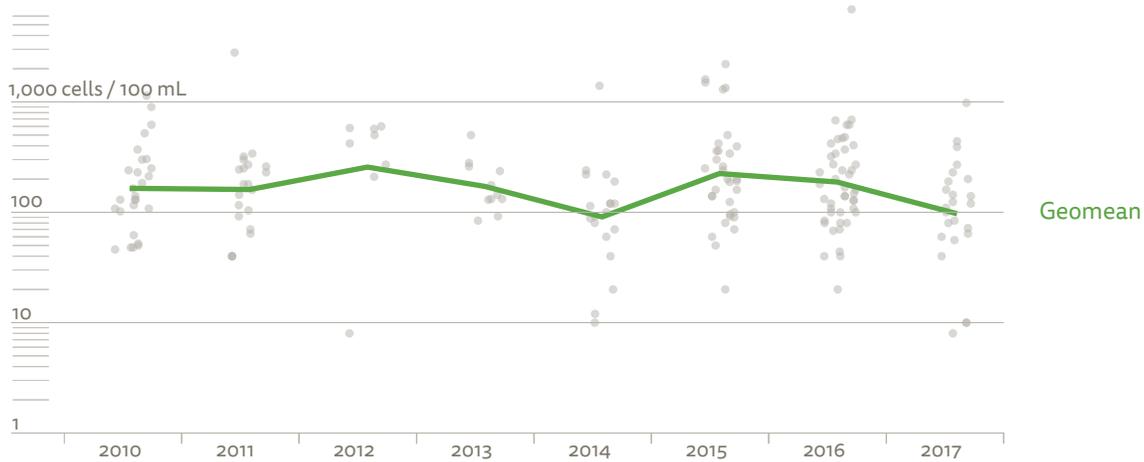


Pathogens

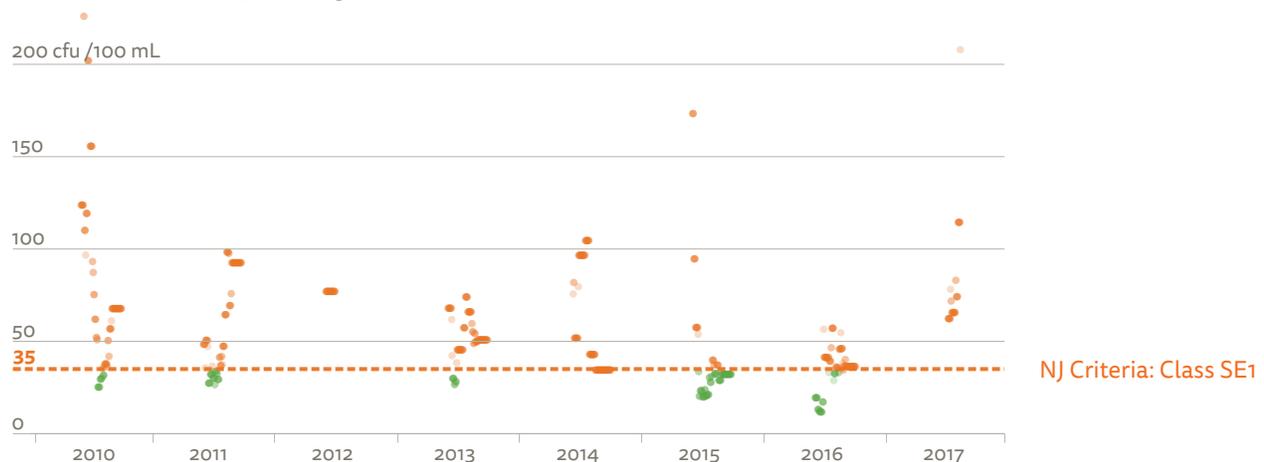
The presence of pathogenic bacteria can limit recreational use of these waterways. Sampling data show variability over time where the geometric means show non-compliance for primary contact recreation in most years. For example, in 2017, 100% of samples for *Enterococcus* were found above the geometric mean criterion and only in 2015 the samples fell below 50%.

With an average of 172 discrete samples per recreational season (June-September) per year, the average geomean for *Enterococcus* in this region is 65 cfu/100mL. *Enterococcus* summer geometric means ranged from 11.7 cfu/100mL to 456 cfu/100mL over the same periods and 25.3% of discrete samples exceeded the *Enterococcus* single sample maximum (> 104 cfus/100mL) criterion.

Fecal Coliform, Summer Surface Bottom and Discrete Samples



Enterococcus, 30 Day Moving Geomean

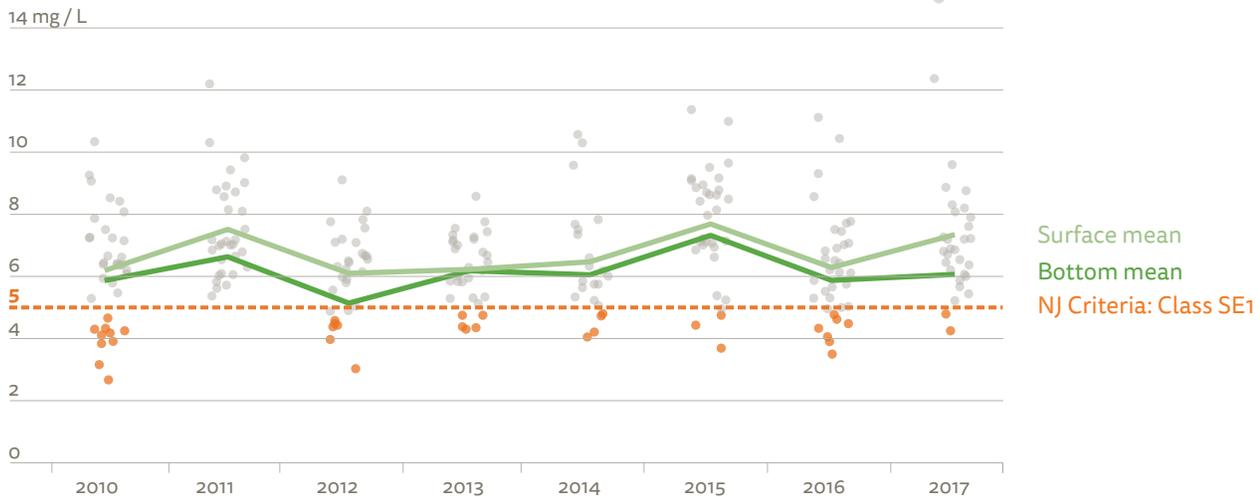


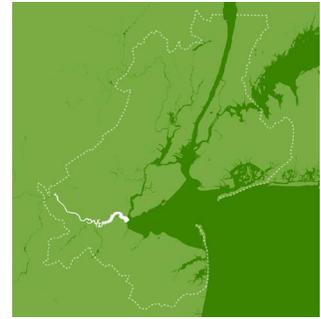
Dissolved Oxygen

Dissolved oxygen (DO) is a critical measure of habitat quality for fish and other wildlife. It is measured at the surface, where sunlight can penetrate to generate photosynthesis, as well as at the bottom, where sunlight is less available. In general, bottom DO concentrations are consistently lower than surface DO concentrations. Daily average concentrations in this region are in compliance with the DO criteria throughout the years

evaluated. In general, fish in this region are not consistently stressed. However, minimum discrete sample concentrations of less than 4.0 mg/L are recorded in four of the eight years evaluated. The percent of time DO samples were less than 4 mg/L was between 0-12% for surface DO and 0-16% for bottom DO. The percent of time DO samples were less than 5 mg/L was between 0-28% for surface DO and between 13-47% for bottom DO.

Dissolved Oxygen, Summer Mean, Surface and Bottom



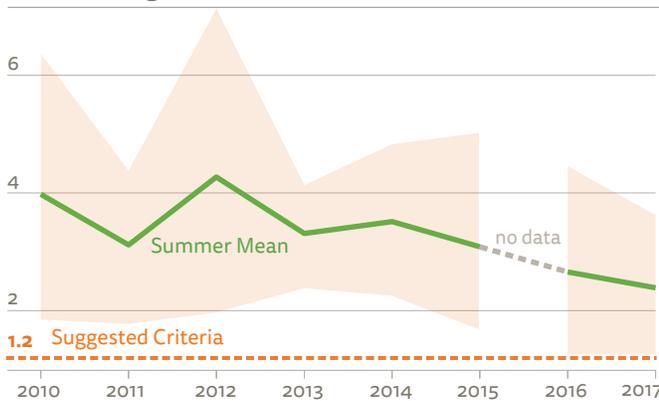


Other Water Quality Parameters

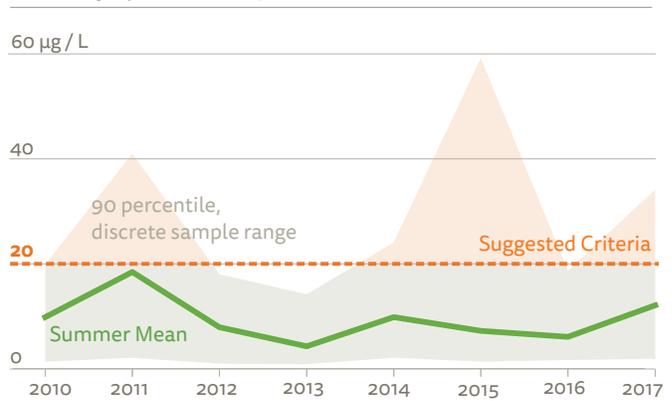
While pathogenic bacteria and dissolved oxygen are the primary criteria used to set water quality standards in New Jersey, measurement of total nitrogen and chlorophyll-*a* provide additional information as to possible causes of low DO as well as the presence of photosynthetic algae and algal blooms. Between 2010 and 2017, the summer means for total nitrogen ranged between 2.39 and 4.27 mg/L, though daily values fluctuated over time and data were not available in 2015. Total nitrogen

levels between 0.4 and 1.2 mg/L is indicative of fair conditions, and water quality would improve with nitrogen levels equal to or below 0.4 mg/L. Concentrations of chlorophyll-*a* of 5 µg/L or below support healthier habitats for fish survival and propagation, while concentrations at or above 20 µg/L increase algal growth. There was a significant spike in 2015 where discrete samples ranged well above the 20 µg/L suggested threshold.

Total Nitrogen, Summer Mean



Chlorophyll-*a*, 90th percentile Surface



Investments and Opportunities for Improvement

EPA and New Jersey have identified combined sewer overflows as a key source of pathogenic bacteria (and other pollutants) that limit recreational use. The City of Perth Amboy is the only CSO permit holder in this region and is responsible for producing a Long Term Control Plan (LTCP). This plan is intended to reduce the volume of CSOs, therefore improving water quality through the management of pathogens. New Jersey LTCPs, submitted to the state in 2020, have a long term (20-40 year) implementation process. The City of Perth Amboy's planned investments through the LTCP ranged from \$375.5 million to upwards of \$396 million (NJDEP, 2020). Potential investments towards the implementation of chemical disinfection of discharge using Peracetic acid (PAA), storage tunnels or tanks, and green infrastructure should result in significant improvements to water quality in the region. In addition, MS4 permits in the region will further address stormwater quality issues related to new development, redevelopment and existing development.

New Jersey CSO permittees are required to consider green infrastructure as a CSO alternative in their current planning phase before the submittal of LTCPs. Green infrastructure projects such as the conversion of impervious surface into rain gardens will reduce levels of nutrient loading and total suspended solids by managing stormwater runoff in the region. With the implementation of LTCPs and efforts to prevent pollution through the MS4 permits, a reduction in pathogens is anticipated, specifically for fecal coliform and *Enterococci*, and nutrients. To improve water quality for fish propagation and survival as well as reduce the occurrence of algal blooms, further efforts are needed to address nutrients such as nitrogen in this region. Additional efforts to remove dams, such as the Weston Mill Dam, will improve habitat connectivity to support fish migrations and aid to reduce flooding throughout the watershed.