

The Peconic Estuary, the expansive network of bays and waterways nestled between the North and South Forks, represents the geographic, ecological and cultural heart of the East End. As a National Estuary Program, the Peconic Estuary Partnership (PEP) developed the [2020 Comprehensive Conservation and Management Plan \(CCMP\)](#) that identifies four long-term goals. This 2020 Peconic Estuary Annual Water Quality Report tracks whether we are meeting our identified water quality targets to achieve our goals for Peconic Estuary waters. Clean water supports fish, shellfish, and wildlife ecosystem health, provides for safe recreation in and on the water, and seafood that is safe for consumption. This Report will enable PEP to track progress on meeting our CCMP goals for Resilient Communities Prepared for Climate Change, Clean Waters for Ecosystem Health and Safe Recreation, and Healthy Ecosystem with Abundant, Diverse Wildlife over the next decade.

Monitoring The Estuary

The Suffolk County Department of Health Services (SCDHS) has carried out [periodic water quality sampling](#) in the Peconic Estuary since 1977. In 2012, the Peconic Estuary Partnership partnered with the United States Geological Survey (USGS) to install two Continuous Water Quality Monitoring stations in the Peconic Estuary, one in [Orient Harbor](#) and another at the mouth of the Peconic River in [Riverhead](#). Together, the SCDHS and USGS monitoring systems provide temporal and spatial sampling of the water quality conditions within the estuary. The data presented in the Annual Water Quality Report is collected at these monitoring stations. For the purposes of reporting and management, the estuary has been segmented into 3 sections: Western, Central, and Eastern Estuary-segment delineation correlates with the New York State Department of Environmental Conservation (NYSDEC) Priority Waterbodies List boundaries. The SCDHS conducts [Bathing Beach water quality monitoring](#) at 28 beaches in the watershed- locations are mapped on page 3.

2020 at a Glance

PEP has set targets for Water Clarity, Chlorophyll-a, Dissolved Oxygen and Pathogens. A summary of if the PEP is meeting targets in the Estuary segments in 2020 is presented below. Detail on pages 2-4 and on the PEP website.

WATER CLARITY & CHLOROPHYLL-A

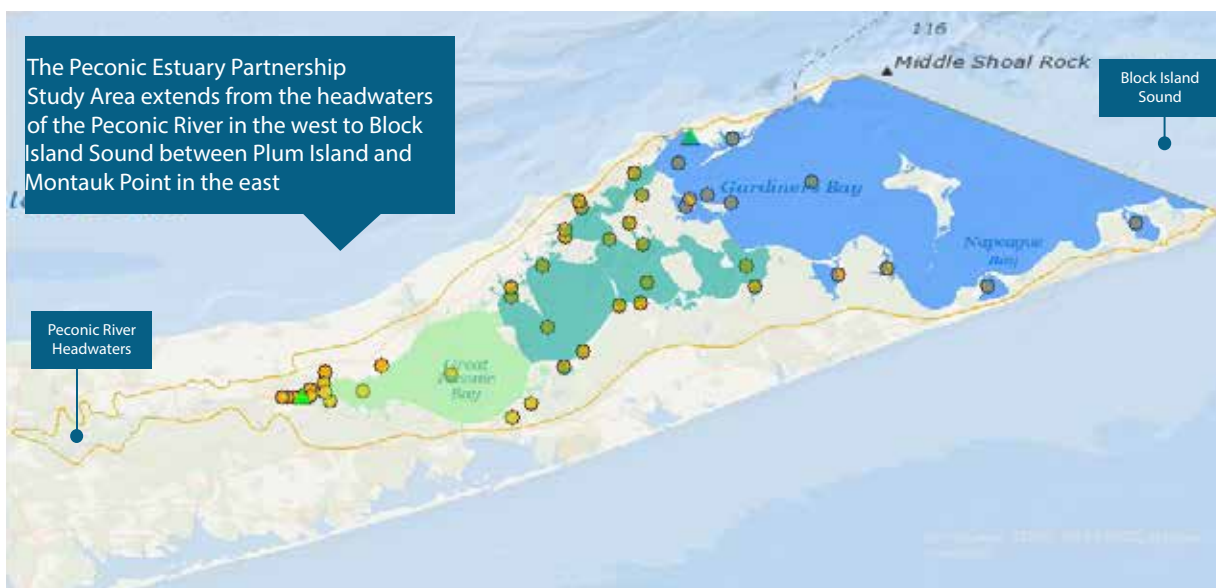
Western Estuary ✗
Central Estuary ✓
Eastern Estuary ✓

DISSOLVED OXYGEN

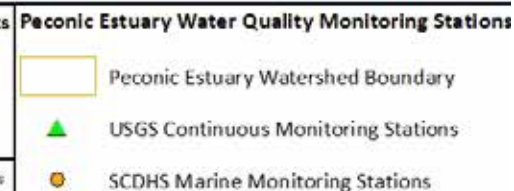
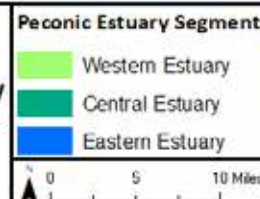
Western Station ✗
Eastern Estuary ✓

PATHOGENS

6 occurrences of bathing beaches exceeding the criteria regarding acceptable levels of *Enterococci* adopted by the NYS Health Department at least one time.



Peconic Estuary Marine Water Quality Monitoring Stations Long Island, NY



Stay the Course Target met. Continue to monitor and report annually on parameter. Continue planned projects.

Caution Small-magnitude and/or short duration failures to meet target. Review monitoring data. Begin/ continue

Technical Advisory Committee and Management Conference development of specific management recommendations.

Alert Target not met. Continue to implement or develop management actions to get back on track.

Water Clarity & Chlorophyll-a

Increased algae blooms correlate with higher chlorophyll-a levels and lower water clarity leading to lower light availability. The duration of time and magnitude of exceedance of water clarity and chlorophyll-a targets are assessed together to track progress toward water quality goals. Learn more on the [PEP website](#).

WATER CLARITY

Higher water clarity means that more sunlight can reach submerged aquatic vegetation (SAV), such as eelgrass, which need sufficient sunlight in order to grow and survive. SAV provides important habitat for fish, shellfish and invertebrates. Reduced water clarity can be caused by algal blooms, eroded sediments from runoff, or disturbed bottom sediments from wind or human activities. Water clarity is measured by the depth at which a Secchi disk is visible from the water's surface at [SCDHS marine monitoring stations](#) in the Peconic Estuary. A Secchi disk is a white and black disk that is lowered down into the water - the depth at which the disk is no longer visible is taken as a measure of the how clear the water is. Higher water clarity is signified by greater Secchi disk depths. **The PEP's target for water clarity:** Median Secchi disk depths should be 2 meters (m)/ 6.5 feet (ft) or greater during the April 1 through October 31 growing season.

CHLOROPHYLL-A

The concentration of chlorophyll-a, the pigments in plants that absorb sunlight and facilitate photosynthesis, in the water is an indicator of the amount of algae in the water. Chlorophyll-a measurements can be used as an indirect indicator of algal presence and growth and interfered nutrient levels. Chlorophyll-a samples are collected at [SCDHS marine monitoring stations](#) in the Peconic Estuary. **The PEP's target for chlorophyll-a:** Median chlorophyll-a concentrations should be no greater than 5.5 ug/L during the April 1 through October 31 growing season.

One of the most serious issues affecting water quality in the Peconic Estuary is excess nitrogen loading, which can cause harmful algae blooms, low dissolved oxygen, low light availability, and degraded aquatic habitats. The Report tracks water clarity, chlorophyll-a and dissolved oxygen to measure the impacts of nutrient pollution and our progress.



Stop Light Graphic of Combined Water Clarity and Chlorophyll-a at Peconic Estuary SCDHS Stations by Estuary Segment
2010-2020



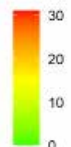
The Stop Light Graphic reflects the combined outcomes for chlorophyll-a and water clarity based on analysis of exceedance duration and magnitude of targets for each parameter. Water clarity and Secchi disk depth median values during the growing season at SCDHS stations were averaged within the Estuary segment. Tracking the attainment outcomes provides the framework from which Estuary management actions can be developed and initiated. For each year and segment, a color-coded management action is assigned.

Dissolved Oxygen

Dissolved Oxygen (DO) in the water column is necessary for fish and other aquatic organisms to live. Concentrations can be impacted by the amount of algae that is in the water column, the associated photosynthesis and decomposition rates, natural variations in temperature, and wave action and mixing. DO concentrations indicate the amount of oxygen available for aquatic organisms in the Peconic Estuary. DO concentrations are measured every 6 minutes at the two USGS Continuous Water Quality Monitoring stations in the Peconic Estuary ([Riverhead](#) & [Orient Harbor](#)). **The PEP's target for DO:** DO concentrations should comply with New York State's acute (never less than 3 mg/L) and chronic (> 4.8 mg/L as daily average in 90% of measurements) DO criteria.

Stop Light Graphic of Maximum Sequential Days Monthly Below DO Concentration Target at Peconic Estuary USGS Stations

2013-2020



The Stop Light Graphic reflects the sequential number of days with a 24 Hour mean measurement below 4.8 mg/L at Peconic River and Orient Harbor Stations. For each month and station, a color-coded management action is assigned.

Values are relative to a threshold of 4.8 mg/L.

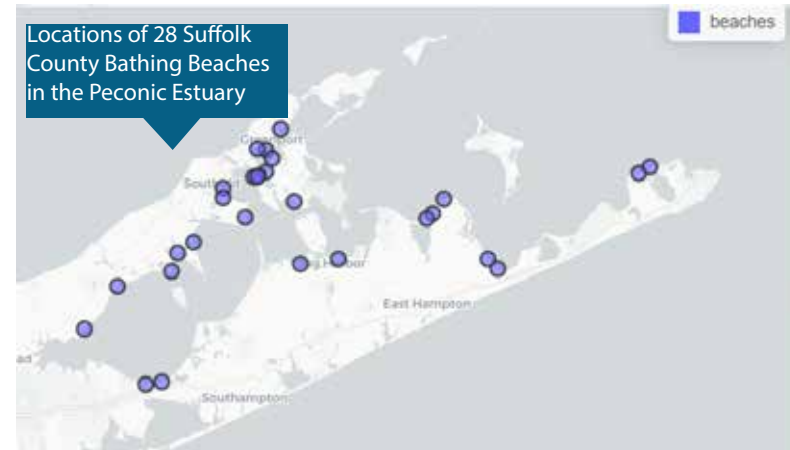
Pathogens

Pathogens are viruses, bacteria, fungi, and protozoans that cause diseases in humans, other animals or plants. It is difficult to directly measure the concentration of specific pathogens in sea water due to the variable nature of their occurrence. Instead, the potential for the presence of human pathogens in the water is measured using bacterial indicator species. Fecal indicator bacteria, total and fecal coliform bacteria, originate in the intestines of warm-blooded animals. Their presence in the water indicates that the waste of a warm-blooded animal, which may include pathogens, has entered the water. A type of fecal indicator bacteria that is monitored at the Suffolk County bathing beaches in the Peconic Estuary is *Enterococcus* bacteria.

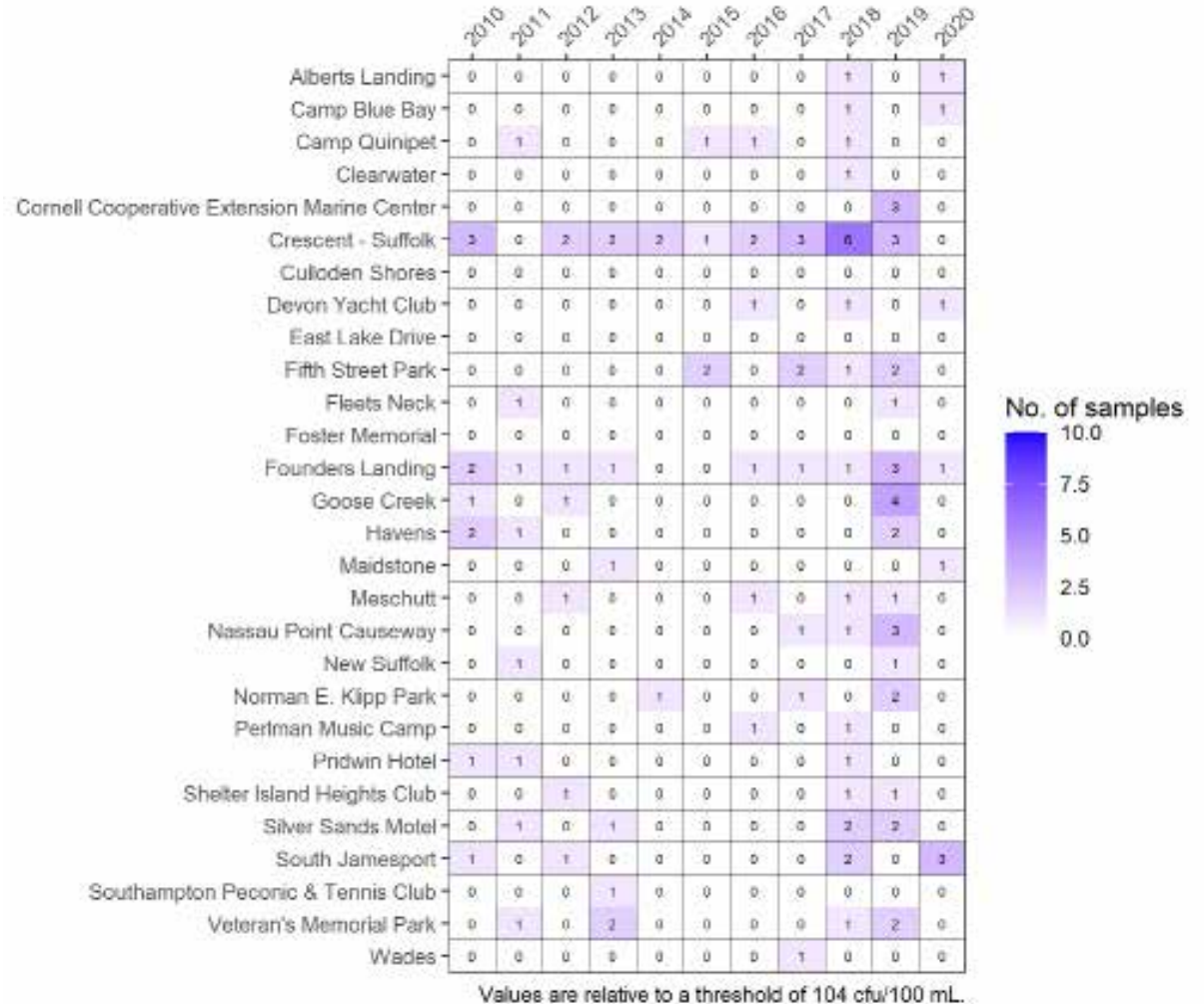
The PEP's target for pathogens: *Enterococcus* counts at estuarine/marine swimming beaches should not exceed 104 colony forming units per 100 milliliter water sample (104 cfu/100mL).

There were 6 occurrences of bathing beaches exceeding the criteria regarding acceptable levels of *Enterococci* adopted by the NYS Health Department (104 cfu/100mL) at least one time in 2020. The Suffolk County Bathing beaches in the Peconic Estuary are overall very clean, note the beaches represented in the Report are only those beaches that are monitored by the SCDHS as part of the [Bathing Beach Monitoring Program](#). The Suffolk County bathing beaches in the watershed are Tier 2 and Tier 3 beaches- meaning the beaches have a moderate to low relative risk associated with their use.

Note: Monitoring of Coliform bacteria and classification of shellfish growing areas is conducted by the NYSDEC, Division of Marine Resources Shellfish Sanitation Unit to routinely monitor the presence of pathogens. NYSDEC classifies shellfish growing areas as certified (open) or uncertified (closed) based on the results of the surveys- that information is not represented in this Report. The [NYSDEC Public Shellfish Mapper](#) can be viewed for this information.



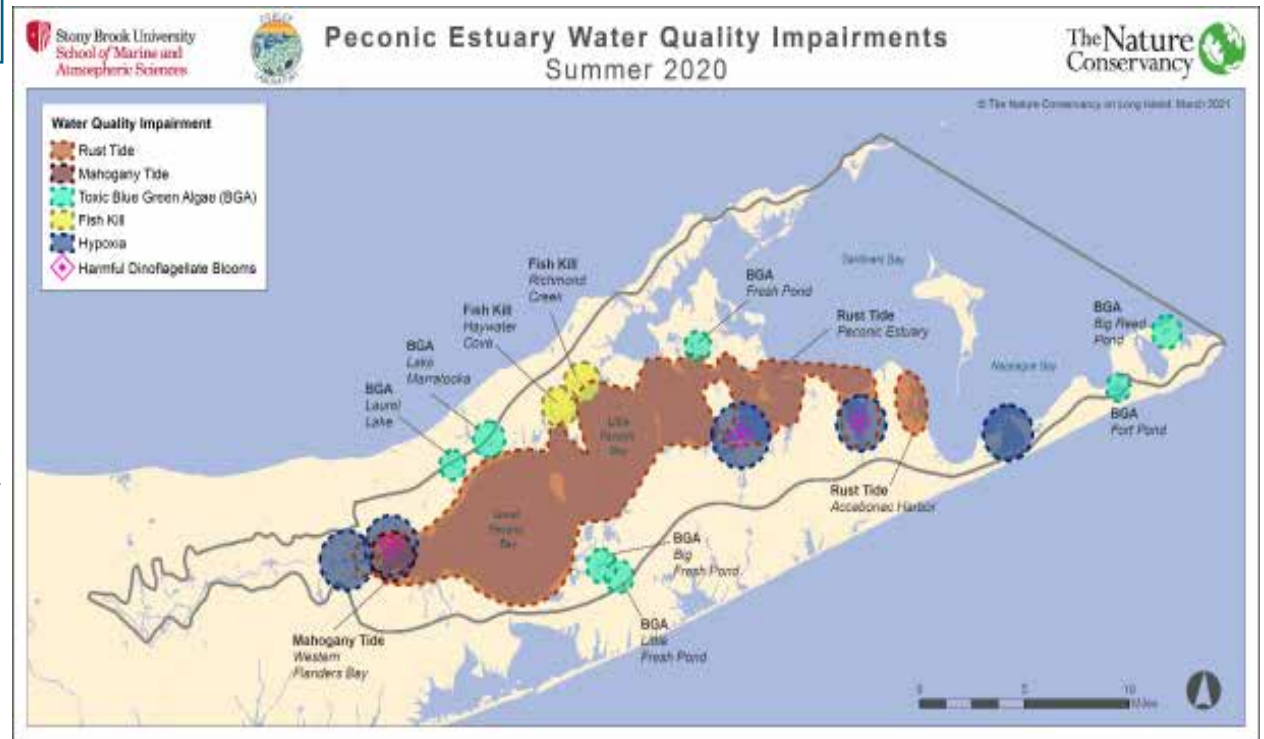
Pathogen Exposure Risk at Suffolk County Bathing Beaches in the Peconic Estuary
Number of Samples that Exceeded *Enterococcus* Counts of 104 cfu/100 mL within 24 Hours at Bathing Beaches 2010 -2020



Harmful Algal Blooms

A Harmful Algal Bloom (HAB) is a small subset of algal species – including diatom, dinoflagellate and cyanobacterial blooms – that produce toxins and/or grow excessively to high cell concentrations, harming humans, other animals and the environment. Seasonal HAB monitoring is conducted by with several partners- Suffolk County, NYSDEC and The Gobler Lab at SUNY Stony Brook University. The PEP has committed to tracking and reporting on harmful algal blooms on an annual basis as the adoption of numerical targets are not currently anticipated for this parameter. See Long Island Water Quality Impairments, Summer 2020 map, which illustrates where HABs were recorded during the season as tracked by our partners.

The areas labeled Rust Tide on the map signify that the phytoplankton species *Cochlodinium polykrikoides* was present in significant numbers. The areas labeled Mahogany Tide signify that the phytoplankton species *Prorocentrum minimum* was present in significant numbers. The areas labeled Toxic Blue Green Algae on the map signify that the microscopic organisms *Cyanobacteria sp.* were present in significant numbers.



The boundaries in this map are approximate, it should not be assumed that each occurrence covers 100% of the area delineated.

HABs and Risks

Rust Tide- A HAB observed in marine waters. Rust tide poses no effect on humans. A severe rust tide may harm fish and shellfish because it produces a hydrogen peroxide-like compound that can damage gill tissue, juvenile fish and shellfish seem especially susceptible to gill damage from rust tide blooms. A harmful secondary effect of is reduced DO levels in the water as the HAB cells die, sink to the bottom and are consumed by bacteria which may take up available oxygen.

Mahogany Tide- A HAB observed in marine waters. Mahogany tide poses no effect on humans and no direct threat to fish and invertebrates. The main concern is that it can bloom for long periods of time and in dense enough concentrations to harm seagrasses by blocking out the sunlight they need to survive. The secondary effect of reduced DO levels in the water is an additional concern.

Toxic Blue Green Algae- A HAB seen in marine and freshwaters. Many cyanobacteria blooms produce neurotoxins or hepatotoxins that can harm, or even kill zooplankton, fish, shellfish, marine mammals, humans and pets. Toxic blue green algae blooms have caused hypoxia (DO below 2-3mg/L) and anoxia (DO at 0mg/L)), contributing to fish kills, foul odors and contact dermatitis in humans after recreational contact.