

Long Island Sound Report Card 2018

Grading the water quality and ecosystem health of the Urban Sea



Save the Sound®

Investing in Sewage Treatment Improves Water Quality

When New York and Connecticut built our sewage treatment plants decades ago, the public appreciated the reduction of fecal bacteria and other contaminants that allowed for swimming and sports, and harvesting of healthy shellfish. Considered less of a threat at the time was the devastating impact of high volumes of human-sourced nutrients on ecosystem health and the quality of life in coastal communities.

By the 1980s, the steady increase in population and the nutrients excreted by humans into our toilet bowls caught up with Long Island Sound; traditional sewage treatment plants do not remove these nutrients. Harbors full of dying fish and shellfish, dirty beaches, and waters almost devoid of oxygen got the attention of the public and EPA.

In 2000, EPA, New York State, and Connecticut agreed to make a significant investment in a clean and healthy Sound. More than two billion dollars were invested over the following 16 years to treat nitrogen at dozens of sewage treatment plants that discharge to the Sound—ultimately achieving a 58.5% reduction in the amount of nitrogen entering Long Island Sound from those plants.

And it seems to be working! While ecosystems don't change overnight, this Report Card shows how a coordinated investment in treating our sewage is improving water quality in the open waters of the Sound. Most importantly, dissolved oxygen—critical to sustaining aquatic life—is improving in the far western Sound. After decades, the low oxygen zone found in the Western Sound each summer is shrinking and fish die-offs are smaller and less frequent.

Pressure from increasing human population, rising temperatures, and other ecosystem stressors requires that we continue to ratchet down on the amount of nitrogen entering the Sound from all sources, including fertilizers and the roughly 500,000 septic systems in coastal communities.

Read on to learn how you can help!

Take Action



Reduce water usage

Install high-efficiency appliances and fixtures. Don't overwater your lawn.



Eliminate or reduce fertilizer use

Leave grass clippings on the lawn. Don't use fertilizer. Or reduce amount by 50% and apply at the right time – around Labor Day or Memorial Day.



Keep litter out of waterways

Don't put garbage in street catch basins. Switch to reusable bags, straws, water bottles, and coffee mugs.



Pump out your septic system

Have your septic system inspected and pumped out every 3 years.



Care for your pipes

If you have back-ups in your sewer line, have it video inspected and repair any cracks.



Go native

Plant native plants, especially along any waterfront on your property or in your community.



Above: Wards Island Wastewater Treatment Plant in NYC, Randall's Island

Water Quality In Your Bay or Harbor

Ask a shoreline resident about the Sound and they'll likely talk about their local harbor, cove, or bay. These inlets, or "embayments," are often where people have the most direct and intimate contact with the Sound. Each is unique, with varying water quality influenced in large part by the conditions on the land that drains to the embayment, including the community's infrastructure, and development patterns. Sadly, many of these embayments exhibit signs of ecosystem stress—algae blooms, low oxygen, and loss of desirable plants and animals. And research shows that these embayments do not all respond in the same way to Sound-wide management activity.

Until recently we have not had a good measurement of how the 100+ embayments of Long Island Sound are faring in terms of environmental health, and how they compare with one another. Thanks to a Sound-wide community monitoring program launched in 2017, we are now gathering those data!

The *Unified Water Study* is a collaborative network of monitoring groups, trained and coordinated by Save the Sound, which is following the same monitoring protocol in 36 embayments. The program spans the full length of Long Island Sound. Look for results from this monitoring program in future Report Cards.

Learn more about the *Unified Water Study: LIS Embayment Research* at savethesound.org/unified-water-study



Above: Save the Sound measuring algae / seaweed with a rake

2018 Unified Water Study Sites



Water quality illustrates changes in Long Island Sound's ecological health

Water Quality Indicators

Nutrients (nitrogen, phosphorus, carbon) are the building blocks for life, but too much in a natural system can lead to problems. Our communities contribute excess nutrients to the Sound from wastewater, septic systems, fertilizer, and fossil fuel burning. Nutrients fertilize excessive growth of plantlike organisms, leading to algae blooms. As these organisms and the animals that feed on them respire, die, and decompose, oxygen in the water is depleted.

The indicators below capture the impact of high nutrient inputs.

O₂ Dissolved Oxygen

Low levels of dissolved oxygen impact marine life, reducing growth and reproduction, and, at low enough levels, causing death.

Water Clarity

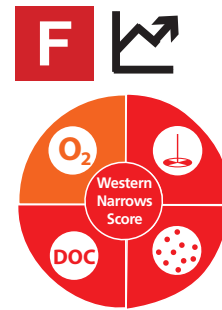
Water clarity is a measure of how far light penetrates through the water. Clear water allows fish to find prey and helps underwater plants to thrive.

Chlorophyll *a*

Chlorophyll *a* measures the amount of phytoplankton in the water column. These microalgae use nutrients entering Long Island Sound to grow.

DOC Dissolved Organic Carbon

Dissolved organic carbon is relatively stable, making it a good indicator of human impacts. Most human sources of nutrients are high in dissolved organic carbon.



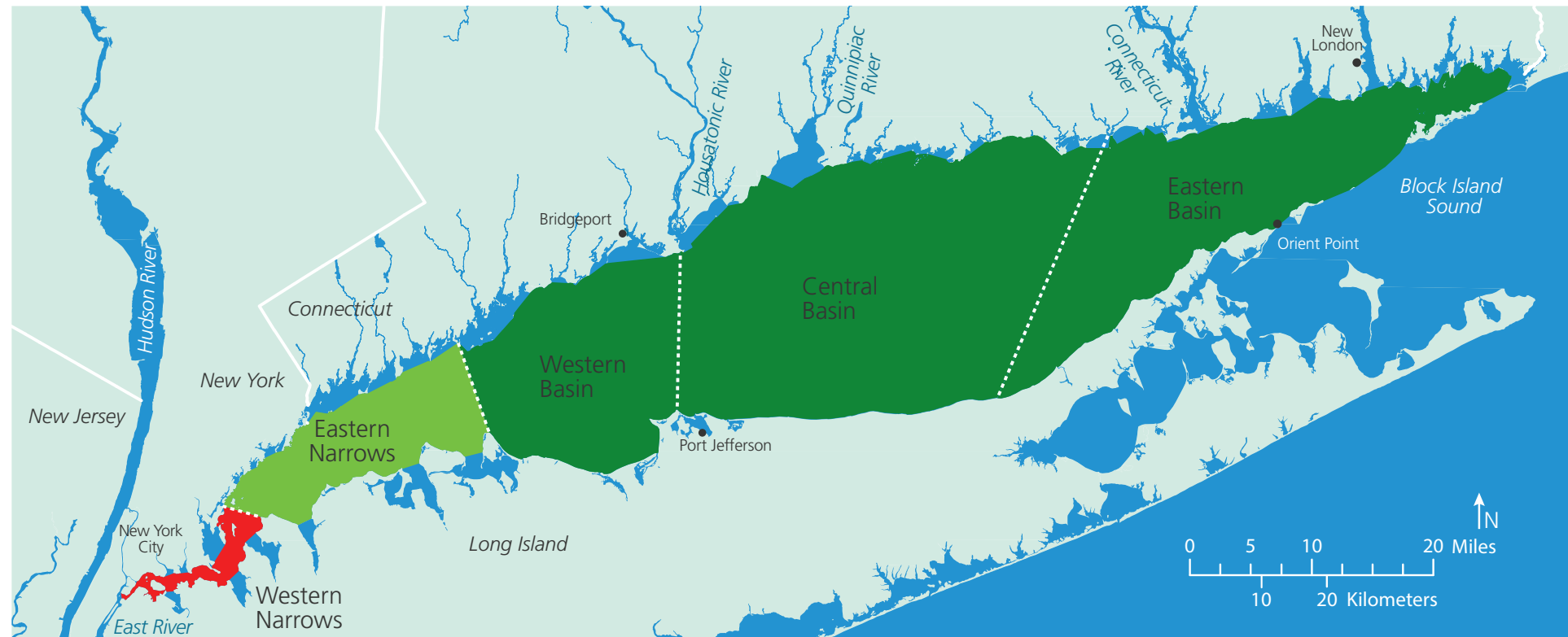
Western Narrows

The Western Narrows received an F (45%). This part of the Sound is still suffering from nitrogen pollution stemming from human waste and stormwater runoff. The area is densely developed, heavily populated, and has very little exchange with the Atlantic Ocean.



Eastern Narrows

The Eastern Narrows received a B- (82%). This region still needs to improve its dissolved oxygen levels; however, overall water quality has improved over the past decade. Reductions in nutrient load to the Western Narrows likely contribute to improvements in this region.



Western Basin

The Western Basin received an A- (92%). This region has shown the most notable improvement in water quality over the last decade, as the summer zone of low oxygen continues to shrink. This area is less developed than the Narrows but still densely populated.



Central Basin

The Central Basin received an A (96%). Conditions have been consistently supportive of marine life over the past decade. The large expanse of open water in this region and increased flushing with the Atlantic Ocean both contribute to good water quality.



Eastern Basin

The Eastern Basin received an A+ (100%). This region's water quality has been consistently very good over the past decade. This area has a lower population with a mix of rural, suburban, and agricultural uses, and is well-flushed with cooler, cleaner water from the Atlantic Ocean.

How are the scores calculated?

In this Report Card, Save the Sound and its science advisors compare water quality indicators (dissolved oxygen, water clarity, chlorophyll *a*, and dissolved organic carbon) to scientifically derived thresholds or goals. These indicators are then combined into an overarching Water Quality Index, which is presented as a regional grade. For more information about methods, please visit longislandsound.ecoreportcard.org.

How's the Water?

This Report Card shows water quality results from the 2017 monitoring season with a trend designation based on 10 years of data (left), and 10 years of monitoring data by indicator (right). A longer view is important because water quality is variable on a year to year basis, with "good years" and "bad years," so 10 years or more of data are necessary in order to detect a trend.

Over the past decade we see improvements to Sound water quality. A particular focus of conservation efforts has been dissolved oxygen levels, where we are now beginning to see improvements, resulting in large part from upgrades to sewage treatment plants designed to remove nutrients.

Improvements are most notable in the Eastern Narrows and the Western Basin. The Western Narrows remains an area under ecological stress. This region, home to New York City, is disadvantaged by both the heavy development of the land and the low level of tidal exchange with the Atlantic Ocean.

At the other end of the Sound, the Central and Eastern Basins have a history of excellent water quality—welcome news for the scores of fish that enter the Sound to reproduce each year, supporting the web of life on the Atlantic seaboard.

2017 Season Grade

- A** 90–100%
- B** 80–90%
- C** 70–80%
- D** 60–70%
- F** 0–60%

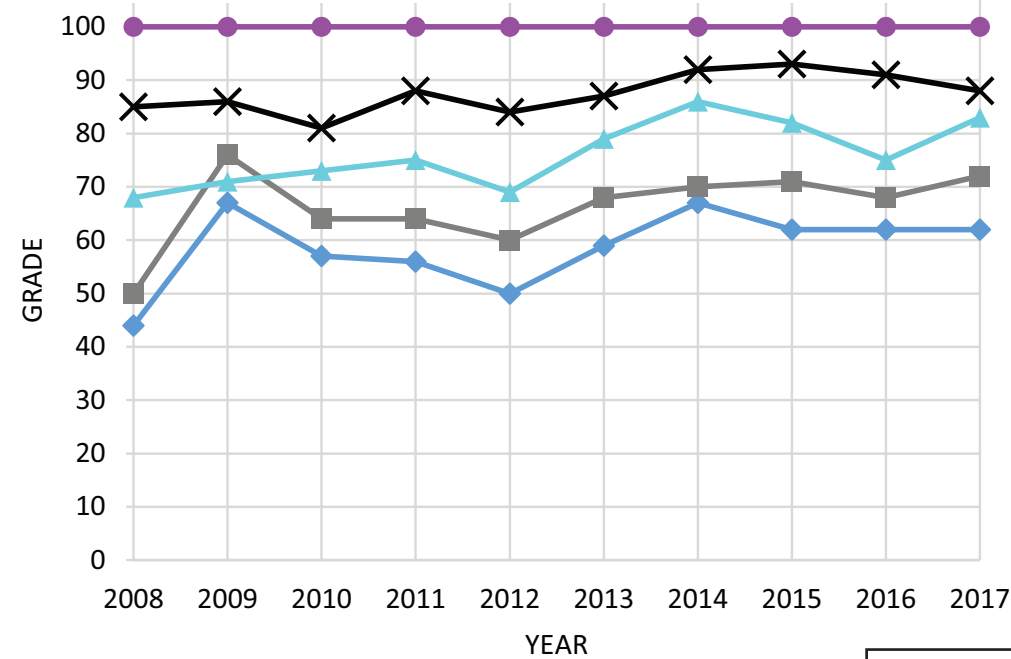
10 Year Trend

- IMPROVING
- STABLE
- DECLINING
- VARIABLE

The grades in this Report Card are based on 2017 open water data.

Water Quality Trends: Grades for Each Indicator by Region, 2008-2017

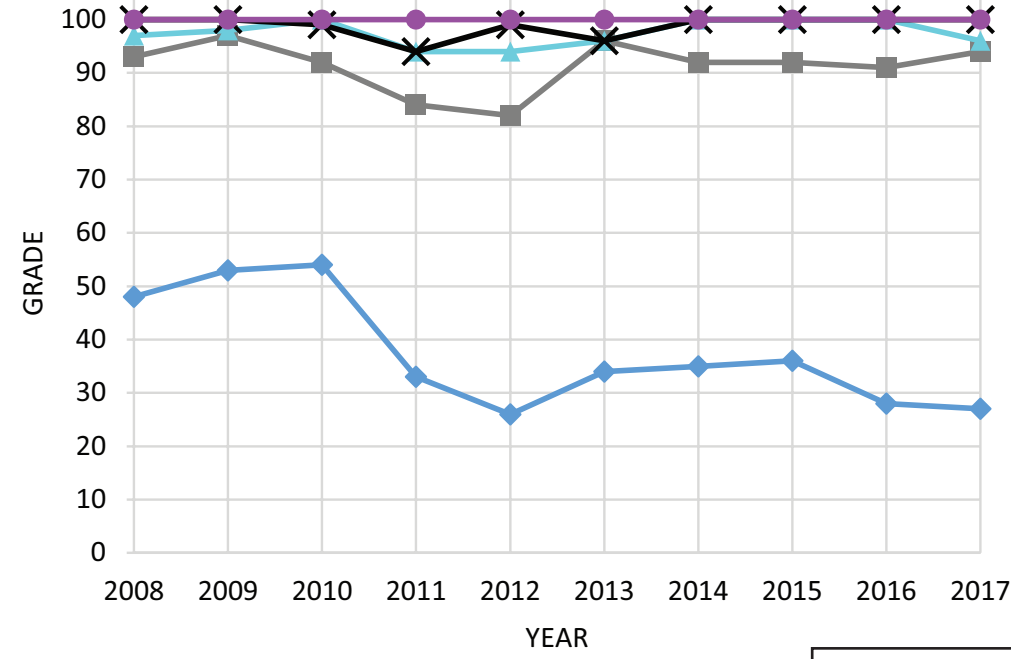
O₂ DISSOLVED OXYGEN



Fish and other aquatic life need oxygen to breathe. Low dissolved oxygen levels, called hypoxia, can be caused by the decay of excessive amounts of organic matter in the water. Hypoxia reduces habitat quality and can result in mass fish kills. Overall, dissolved oxygen levels have improved or sustained at a healthy level in the Sound over the past decade. Oxygen levels are still unacceptably low in the Western Narrows and need continued improvement in the Eastern Narrows.



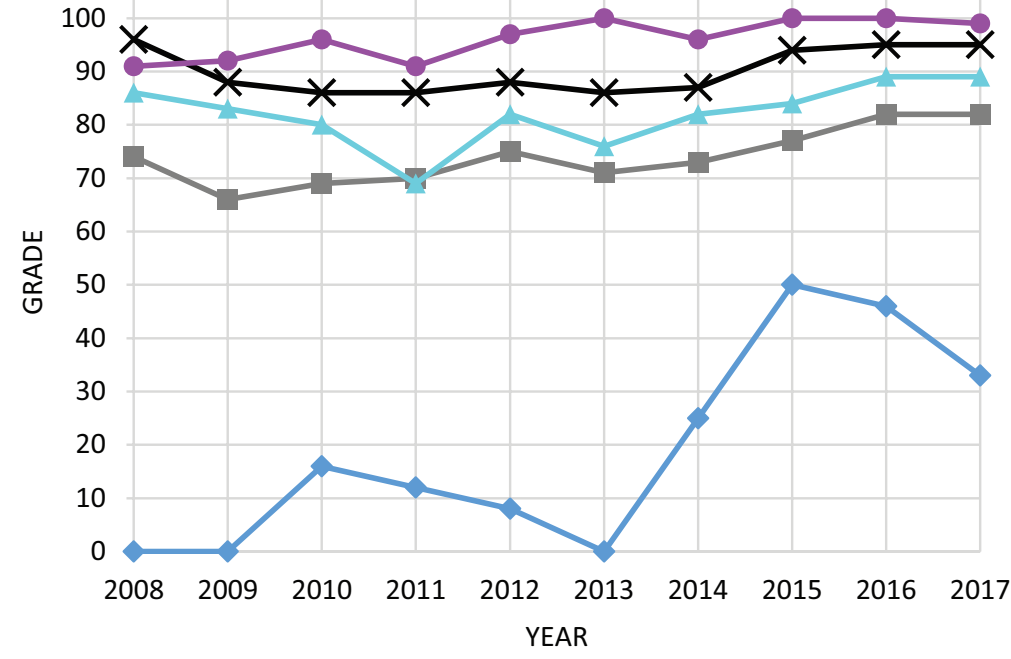
WATER CLARITY



Cloudy water inhibits growth of desirable plants and makes it hard for fish to find food. All regions in the Sound have acceptable water clarity except for the Western Narrows. This is not surprising when you consider how densely developed this area is. Rain water full of sediment and all forms of debris flows into the Western Narrows. On top of that, New York City's sewage infrastructure processes and discharges over 1 billion gallons (1500 Olympic swimming pools) of wastewater directly into the city's waterways every day. When it rains, however, millions of gallons of untreated sewage are dumped directly into the waterways around the city.

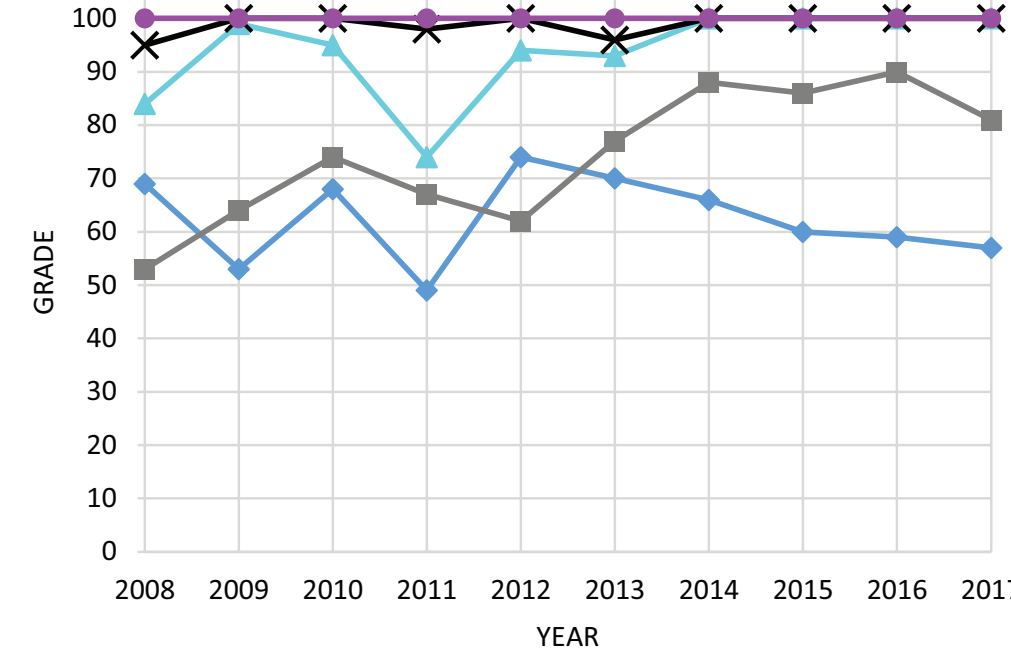


DOC DISSOLVED ORGANIC CARBON



Dissolved Organic Carbon is a reliable measure of the nutrients (including nitrogen and phosphorus) humans are contributing to the Sound. Nutrients support the base of the Sound's food web, but too many nutrients stimulate water quality problems by over-fertilizing the Sound. There is a clear west-to-east gradient with the western end of the Sound showing more dissolved organic carbon, and therefore more adverse impacts from human activities. Most regions show improvement over the last 10 years, with the Western Narrows still stressed but improving dramatically.

CHLOROPHYLL a



Chlorophyll a is a measure of microscopic algae in the water. While algae are an important part of the ecosystem and form the base of the food chain, high levels of nitrogen can result in excessive and sometimes toxic algal blooms. Over the past decade, chlorophyll a levels have been variable in the Western Narrows. Levels have improved to an acceptable level in the Eastern Narrows and Western Basin, reaching the desirable levels seen in the Central and Eastern Basins. However, algal blooms are a problem in many harbors, bays, and coves around the entire Sound.

The Bounty of Long Island Sound

Long Island Sound is an estuary—one of the most productive types of ecosystems on Earth. It's home to countless marine species including 170 known species of fish, as well as sea turtles, seals, whales, and dozens of species of migratory birds.

The Sound and the natural areas draining to it are an economic engine providing approximately 200,000 jobs and ecosystem services valued at between \$17 billion and \$37 billion a year. Millions of people enjoy the Sound's fresh fish and shellfish year-round, and the pleasure of open beaches every summer.

Long Island Sound has 220+ beautiful beaches, more than half of which are open to the public. Continued investment in our sewage infrastructure is required to keep our beaches, and our shellfish, healthy and accessible for public enjoyment. Clean water is at the center of Long Island Sound's productivity and shoreline residents' quality of life!



Pollution affects shellfish harvests and local economies.

Below: Greenwave harvesting kelp in Long Island Sound

This Report Card does not include data or grades for fecal bacteria levels in Sound waters; however, in 2019 we will publish a LIS Beach Report.

For historic data on the Sound's beach water quality, visit SoundHealthExplorer.org.



About the Long Island Sound Report Card

This Report Card provides a geographic assessment of annual Long Island Sound ecosystem health for 2017.

Visit longislandsound.ecoreportcard.org for more information.

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Save the Sound®

Data provided courtesy of:



New York City Department of Environmental Protection