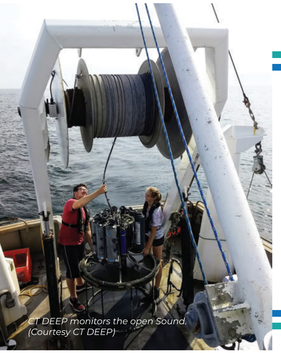
Making The Grades

How's the water? It's the question our water quality team is asked most often, and our reports rely on science and data to provide nuanced answers. Our **Long Island Sound Report Card** examines data from combinations of water quality indicators to evaluate the ecological health of Long Island Sound's open waters and bays, ultimately grading how favorable the water is for supporting aquatic life. This differs from the **Long Island Sound Beach Report** which uses other data types to measure water quality at beaches against safe-swimming standards.

Elected officials and stakeholders in New York and Connecticut have used these reports to secure state and federal funding for projects that protect water quality: upgrading wastewater and stormwater infrastructure, installing green infrastructure, and restoring wetlands.



CT DEEP monitors the open Sound. (Courtesy CT DEEP)

All data included in the grades for this Report Card were collected in 2023.

Open Water Data

Open water data are from water monitoring programs conducted by the Connecticut Department of Energy and Environmental Protection (which monitors the Eastern, Central, and Western Basins, as well as parts of the Eastern Narrows), the Interstate Environmental Commission (Eastern Narrows and portions of the Western Narrows), and the New York City Department of Environmental Protection (Western Narrows). Open water grades are determined by factoring in the data from four indicators: dissolved oxygen, chlorophyll *a*, water clarity, and dissolved organic carbon.

Bay Data

Save the Sound launched the Unified Water Study in 2017 to better understand water quality in bays and harbors. We standardized procedures and equipment that partner groups use for measuring levels of dissolved oxygen, chlorophyll *a*, water clarity, seaweeds, and oxygen saturation. The resulting data allows apples-to-apples comparisons of water quality in unique bays from easternmost Connecticut to New York City then back out to eastern Long Island. Bay grades are made possible by all the participating Unified Water Study groups.

Six of the 57 bay segments are receiving Report Card grades for the first time: Mumford Cove, Poquonnock River, Guilford Harbor, inner and outer Bridgeport Harbor, and Westchester Creek.

Save the Sound staff collecting UWS data in Hunter Island Bay, NY.

Save the Sound joined fellow organizations and Long Island residents in calling for clean water investments.

Take Action

Our behaviors and consumption habits impact the health of waterways across the region.
Changes in our everyday actions can go a long way toward protecting and restoring Long Island Sound.

Reduce Water Usage
Lighten the load at overburdened water treatment plants and reduce wear and tear on pipes.

Maintain Your Sewers
Private sewer lines and septic systems should be regularly inspected, repaired, and pumped out. Replace outdated systems with new technology that can remove more nitrogen.

Shrink Your Carbon Footprint
Use public transportation, walk, or bike when you can; shop local; switch to energy-efficient appliances.

Plant Native
Native plants need less watering in yards, help filter pollutants along waterways, and provide food and shelter to wildlife.

Eliminate or Reduce Fertilizer Use
Don't overfeed your yard! Use organic, slow-release fertilizers —and only once or twice a year. Leave grass clippings on the lawn as natural fertilizer.

Make Your Voice Heard
Urge elected officials to enact policies that protect clean water. Use your purchasing power to reward companies that put the environment first.

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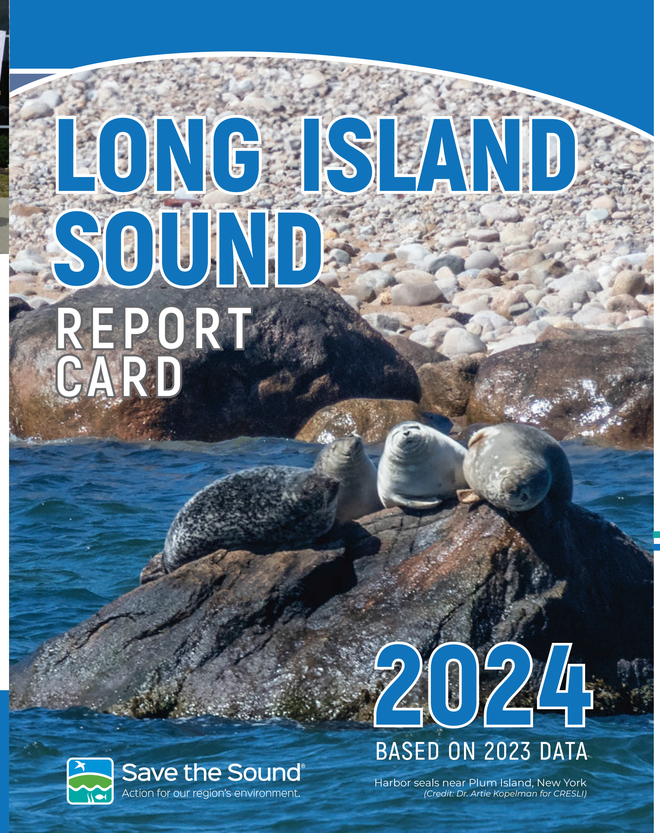
www.SaveTheSound.org

Save the Sound®
Action for our region's environment.

LONG ISLAND SOUND REPORT CARD

2024

BASED ON 2023 DATA



Harbor seals near Plum Island, New York.
(Credit: Dr. Artie Kopelman for CRESLI)

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Action for our region's environment.

Nitrogen Pollution Requires Range of Solutions

Nitrogen pollution is a leading stressor to Long Island Sound. Excess nitrogen fuels algae blooms which lower dissolved oxygen, killing fish and other animals in the water; contributes to the loss of eelgrass and tidal marshlands; and diminishes biodiversity in one of the country's largest estuaries.

A major source of nitrogen pollution in the open waters comes from wastewater of the more than nine million people living in the watershed. Nonpoint source pollution in the bays is more nuanced, coming from a range of sources including lawn fertilizers and nitrogen-rich stormwater runoff from developed areas. Fossil fuel emissions have added tremendous amounts of nitrogen to the air, which subsequently leads to high concentrations of nitrogen in precipitation falling directly into the Sound. This runoff and polluted precipitation grow more problematic as storms increase in frequency and severity due to climate change. Our behavior pollutes the Sound, but we can change our behavior to reduce nitrogen pollution.

Reducing fertilizer usage, shrinking impervious surface coverage abutting bays, and ensuring municipalities are complying with their Municipal Separate Storm Sewer System (MS4) permits can help. More solutions include continued upgrading of outdated wastewater infrastructure, such as the ambitious plans in motion for the West End Treatment Plant in Bridgeport, CT; the repairs of miles of underground sewer pipes committed to by coastal municipalities in Westchester County; and the grant programs that enable home and business owners on Long Island to replace hundreds of thousands of septic systems with new nitrogen-reducing systems.

Then there's a generational gamechanger: Renewable Rikers, a state-of-the-art wastewater treatment facility on Rikers Island in the Western Narrows envisioned to replace four outdated facilities. Full implementation isn't anticipated until 2060, however, and the Western Narrows is struggling right now. Though this basin represents only two percent of the open waters of the Sound area-wise, its nitrogen pollution problem is the most severe and urgent.

Long Island Sound has come so far. The seasonal low-oxygen area in the open Sound has decreased dramatically. More state and federal funding is available for infrastructure upgrades than ever before, and awareness of the challenges continues to increase among the general public and elected officials. Still, intensive development is destroying coastal marshes and forests, old infrastructure gets older every day, and the consequences of climate change worsen at an alarming rate.

Our actions must reflect the urgency of the moment.

2023 Beach Grades displayed in the Sound Health Explorer

Dive into the Data and *Take Action* on SoundHealthExplorer.org

Good data can engage communities and drive action.

Sound Health Explorer is an interactive tool that couples recent and historic data from your local bay, beach, or open Sound region with things you can do to make a difference.

Explore the health of Long Island Sound at **SoundHealthExplorer.org**.

How's the Water?

Good water quality supports a diverse community of animals, plants, and habitats. It is characterized by high dissolved oxygen and water clarity, and low chlorophyll *a*, dissolved organic carbon (DOC), and seaweed. Common symptoms of poor water quality are low dissolved oxygen levels (hypoxia) and algae blooms (evidenced by high chlorophyll *a* and/or seaweed). While some algae are essential to support the base of the food web, too much nitrogen from human sources stimulates excessive growth. As algae and the animals that feed on them respire, die, and decompose, oxygen in the water is depleted.

Warm water holds less oxygen than cool water, and climate change is raising water temperatures. According to the Long Island Sound Study, when data from all monitoring stations are averaged, the annual Sound-wide water temperature increased by 3.7 percent from 1960 to 2023. This warming trend threatens to undermine hard-won water quality improvements, even with all the investments in reducing nitrogen pollution.

Water Quality in the Open Sound

In general, water quality remains excellent in the eastern segments of Long Island Sound, largely driven by greater tidal exchange with the Atlantic Ocean and lower population density and development. Water quality trends in the Eastern (A+) and Central Basins (A) are stable, and while the Western Basin received an A- in 2023, its 16-year trend remains variable.

There are indications of moderate improvements in the Narrows. The overall grade for the Western Narrows remains an F, but the 16-year trend shows some improvement. The DOC grade trend is improving, and the chlorophyll *a* grade is the best the Western Narrows has received for any indicator dating back to 2008. The Eastern Narrows overall is considered variable, but DOC and chlorophyll *a* show moderate improvement. These encouraging trends can be linked to significant investments and efforts to reduce nitrogen pollution; those efforts must continue to protect and restore water quality in the open Sound.

Water Quality in Our Bays

Each of the more than 100 bays along the margins of Long Island Sound is unique, differing in their depth, shape, the condition of any tributaries and groundwater that flow into them, and their proximity to the waters of the open Sound. Their challenges are also unique, as each bay receives different percentages of nitrogen pollution from multiple sources. In many bays along the North Shore of Long Island, a leading source is the prevalence of onsite septic systems, which were never designed to remove nitrogen. On the Sound Shore of Westchester County, lawn fertilizer can be particularly problematic. Stormwater runoff is an increasing threat to water quality in urbanized areas, such as the Bronx and Queens, where impervious surface coverage is significant, as well as the developed portions of the coastal watershed in Fairfield County. Solutions, too, are more localized, and we must continue to use high-quality information, such as this Report Card and other materials, to identify sources of nitrogen pollution in any given bay and prioritize addressing the ones with the greatest potential impact first.

Of the 57 bay segments monitored across 43 bays, 42% received a C, D, or F grade. Only 11 received an A. The grades show hypoxia as the most pervasive problem, followed by its companion stressors —high chlorophyll *a* and excess seaweed.

Open Water Indicators

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 DOC.

Dissolved Oxygen

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

Chlorophyll *a*

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

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 thrive.

Seaweeds

Seaweeds are common in healthy salt water systems. However, excessive accumulation can be harmful to environmental health and indicate excess nitrogen pollution.

Oxygen Saturation

Healthy water should have oxygen levels in equilibrium with the air, termed 100% saturation. Water quality problems are indicated when oxygen is consistently higher or lower than 100% saturation.

Bay Indicators

These water quality indicators are selected to measure the environmental health of Long Island Sound waters and assess their ability to support aquatic life and marine habitats.

Western Narrows

Received an F (49%), similar to 2021 (51%), with moderate improvement in the 16-year trend. However, this part of the Sound has received an F grade every year going back to 2008 and requires continued attention.Water clarity, chlorophyll *a*, and dissolved oxygen are variable. Dissolved organic carbon is an F in 2023 but is improving.

Eastern Narrows

Received a B (84%), which is an improvement from 2021 (75%). The Eastern Narrows remains in a variable state after seeing steady improvement from 2008 to 2017. Dissolved oxygen received a D- (62%) in 2023 which is indicative of a stressed aquatic environment in need of continued measures to restore water quality. Dissolved organic carbon and chlorophyll *a* are seeing moderate improvements which could be a good sign for future years.

Western Basin

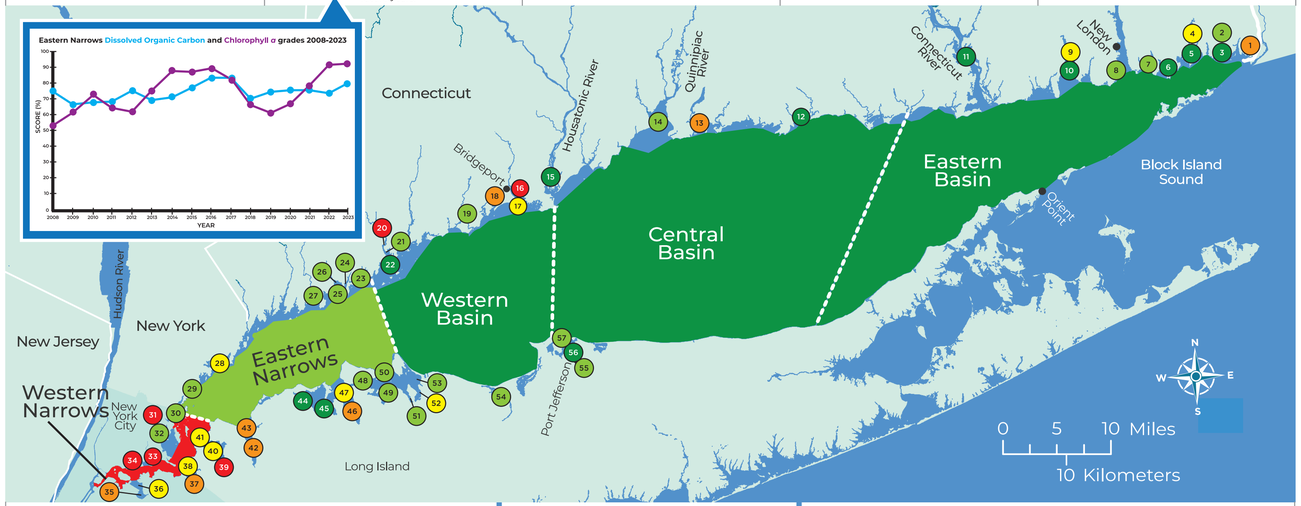
Received an A- (90%), similar to 2021 (88%), with a variable 16-year trend. The lowest grade was a C (74%) in dissolved oxygen which shows the continued need for improvement in a vital environmental health indicator. This area is less developed than the Narrows but is still densely populated and showing signs of human impact.

Central Basin

Received an A (95%), similar to 2021 (93%). Water quality has been stable over the past 16 years, consistently supporting marine life. It is the largest area of open water covered by this Report Card and is well-flushed with water from the Atlantic Ocean.

Eastern Basin

Received an A+ (99%), the same as 2021 (99%). Water quality has been stable over the past 16 years, never dropping below an A. This region has a much lower coastal population with large tracts of undeveloped land. It has strong tidal exchange, being so close to the Atlantic Ocean.



Eastern Narrows Provides Reason for Optimism

Despite the population density and highly developed suburban and small urban areas that surround it, the Eastern Narrows demonstrates hopeful signs of moderate improvement. This suggests that pollution reduction efforts in recent decades are working. The Eastern Narrows' dissolved organic carbon grade has shown progress over the last 16 years (from a C in 2008 to a B-). Relatedly, chlorophyll *a* levels have gotten better, too (since the F in 2008, grades have fluctuated and are back at an A-). These results helped the Eastern Narrows receive an overall grade of B (up from a D+ in 2021), meaning that 98% of the open waters of Long Island Sound earned an overall B grade or better for 2023.

KEY

2023 Season Grades

- A (90-100%)
- B (80-90%)
- C (70-80%)
- D (60-70%)
- F (0-60%)

16-Year Trend

- Improving
- Stable
- Variable
- Declining

How Are the Scores Calculated?

Save the Sound and its science advisors grade water quality indicators using scientifically derived scales developed with a Technical Advisory Committee of scientists and water managers from agencies around the Sound. Some indicators are used for both the Sound and the bays, while others are unique to the deeper Sound or the shallower bays, reflecting the differences in these types of systems. For more information on the scoring methods, visit:
www.soundhealthexplorer.org/fishable

Bay Grades

Bay data provided courtesy of the organizations listed above each location.

Clean Up Sound & Harbors

1	Wequetequock Cove	D-
4	Mystic River	C-
5	Mystic Harbor	A-

New England Science & Sailing Foundation

2	Inner Stonington Hbr	B+
3	Outer Stonington Hbr	A
6	Alewife Cove	B

Project Oceanology

6	Mumford Cove	A-
7	Poquonnock River	B

Save the River — Save the Hills

9	Inner Niantic River	C+
10	Outer Niantic River	A-

Connecticut River Conservancy

11	Connecticut River	A-

East River Watershed Research Institute

12	Guilford Harbor	A-

Friends of the Farm River Estuary

13	Farm River	D+

River Advocates of South Central Connecticut

14	New Haven Harbor	B+

Town of Stratford Conservation Department

15	Outer Housatonic River	A

Ash Creek Conservation Association

16	Inner Bridgeport Harbor	F
17	Outer Bridgeport Harbor	C+

Bridgeport Regional Aquaculture Science and Technology Education Center

18	Black Rock Harbor	D+

Town of Fairfield Conservation Department

19	Mill Rvr (Southport Hbr)	B-

Harbor Watch

20	Inner Norwalk Harbor	F
21	Middle Norwalk Harbor	B

The Maritime Aquarium at Norwalk

22	Outer Norwalk Harbor	A-

Town of Darien

23	Scott Cove	B
24	Darien Harbor	B
25	Cove Harbor	B-

SoundWaters

26	Holly Pond	B-
27	Stamford Harbor	B+

East Basin Enterprises, LLC

28	Mamaroneck Harbor	C

Save the Sound

29	New Rochelle Harbor	B-
30	Hunter Island Bay	B-
31	Inner Eastchester Bay	F
32	Outer Eastchester Bay	B-

SUNY Maritime

33	Westchester Creek	F

Bronx River Alliance

34	Bronx River	F

Guardians of Flushing Bay

35	Inner Flushing Bay	D-
36	Outer Flushing Bay	C+

Interstate Environmental Commission

37	Inner Little Neck Bay	D
38	Outer Little Neck Bay	C-
39	Inner Manhassett Bay	F
40	Middle Manhassett Bay	C
41	Outer Manhassett Bay	C

Coalition to Save Hempstead Harbor

42	Middle Hempstead Hbr	D
43	Outer Hempstead Hbr	D+

Friends of the Bay

44	Mill Neck Creek	A-
45	Oyster Bay	A-
46	Inner Cold Spring Hbr	D+
47	Outer Cold Spring Hbr	C+

Cornell Cooperative Extension of Suffolk County Marine Program

48	Lloyd Harbor	B-
49	Huntington Harbor	B
50	Huntington Bay	B+
51	Centerport Harbor	B+
52	Northport Harbor	C
53	Northport Bay	B

Salonga Wetland Advocates Network

54	Nissequogue River	B

Setauket Harbor Task Force

55	Inner Port Jefferson Hbr	B+
56	Middle Port Jefferson Hbr	A-
57	Outer Port Jefferson Hbr	B+