Data-Driven, Results-Oriented

Elected officials in Connecticut and New York use the Report Card to support their cases for funding on the federal, state, and local levels, and it's worked. On October 6, 2020, Save the Sound released its 2020 Report Card, painting a data-driven picture of the ecological health of the open waters of Long Island Sound and of 50 bays and bay segments. Ten days later, Connecticut's senators, Richard Blumenthal and Chris Murphy, delivered a letter to the Committee on Appropriations and the Subcommittee on Interior, Environment, and Related Agencies, referencing that report throughout what they called a "request for robust funding" for Long Island Sound. They cited the findings that more than half the bays included in the Report Card received "low water quality scores."

Students enjoy a UWS outing in Stonington Harbor, CT. (photo courtesy of NESS)

Senators Blumenthal and Murphy were not alone in wielding the Report Card grades and data to push for increased investments in programs and projects that would benefit the 16,000-square mile Long Island Sound watershed. The Environmental Protection Agency's Long Island Sound Study received a record $31 million in federal funding in 2022, which supports upgrading sewage treatment infrastructure, reducing stormwater pollution, restoring wetlands, creating fish passages, protecting shellfish beds, and funding water quality monitoring projects such as the Unified Water Study. All these actions fuel water quality improvements across Long Island Sound, precisely the goal of this biennial Report Card.

The Unified Water Study: Measuring the Health of Our Bays

Save the Sound launched the Unified Water Study in 2017 with two goals: standardizing the procedures of measuring water quality in bays around Long Island Sound and ensuring consistency of the data collected. Such coordination is critical, especially when your network of partner groups continues to expand. The 2021 UWS season featured 24 groups working in 53 bays and bay segments, giving the study a presence in nearly half of the unique bays along the margins of the Sound.

Only 23 out of 53 bays and bay segments are in good health, receiving grades of B- or better. It's important to understand how water quality challenges in bays differ greatly from the open Sound. Small bays and inland segments of larger ones suffer from poor tidal flushing and impacts from local human-sourced pollution flowing in from rivers, streams, and groundwater. Excess nitrogen from sewers, septic systems, abundant and sometimes unnecessary lawn fertilizer applications, and fossil fuel usage are some of the major contributors to detrimental conditions for marine life in Long Island Sound bays.

Setauket Harbor Task Force covers three segments of Port Jefferson Harbor, NY, for the UWS.

Unified Water Study crew collects samples in Eastchester Bay, NY, in 2021.

Take Action

Our waterways are a mirror of how we live on the land, so you have a direct role in the health and well-being of the Sound. Join the movement to protect and restore Long Island Sound by taking these important actions.

Reduce Water Usage

Lighten the load at overtaxed water treatment plants and reduce wear and tear on pipes.

Plant Native

Native plants reduce water usage in yards, help filter pollutants along waterways, and provide food and shelter to wildlife.

Maintain Your Sewers

Private sewer lines and septic systems should be regularly inspected, repaired, and pumped out. Install septic systems that remove nitrogen.

Make Your Voice Heard

Tell elected officials you want policies that support clean water. Use your purchasing power to reward companies that put the environment first.

Keep Litter Out of Waterways

Use less plastic. Reusable bags, straws, water bottles, and cups keep harmful plastics out of oceans and away from marine life.

Eliminate or Reduce Fertilizer Use

Use half the amount, only around Labor Day or Memorial Day. Leave grass clippings on the lawn as a natural fertilizer.

This Report Card provides a geographic assessment of Long Island Sound ecosystem health for 2021. It was produced by Save the Sound and made possible thanks to the generous funding from the John and Daria Barry Foundation. Data collection was funded by EPA's Long Island Sound Study. Science direction was provided by Jamie Vaudrey, Ph.D. and Jason Krumholz, Ph.D. Document printed on a wind-powered press with renewable energy, post-consumer recycled paper, and vegetable-based inks.

www.SaveTheSound.org

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

LONG ISLAND SOUND REPORT CARD 2022

Stepping Stones Lighthouse, Long Island Sound off Kings Point, New York

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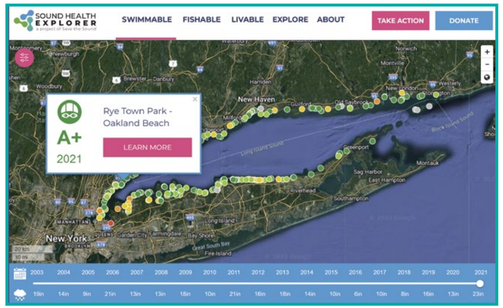
Bracing for Climate Change and Future Challenges

Understanding the impact that climate change has on Long Island Sound starts with a basic principle of physical chemistry: the warmer the water, the less oxygen it can hold. That's troubling, considering the study by Michael Whitney and Penny Vlahos, professors in the Department of Marine Sciences at the University of Connecticut in Groton, CT, published in *Environmental Science & Technology* in 2021. They found that waters of western Long Island Sound are warming at a rate of 0.8° Celsius (1.44° Fahrenheit) per decade, which "favors hypoxia." Many longtime residents of the region remember the severe hypoxic and anoxic conditions that plagued the Sound back in the 1970s and 1980s, when fish kills were commonplace in the Western Basin and the Eastern and Western Narrows, and lobsters were literally crawling onto land in a futile attempt to survive.

The ecological health of Long Island Sound, on the whole, has improved. Hypoxic areas have begun to reduce in extent since those dire days, thanks primarily to widespread efforts to reduce nitrogen pollution. But water temperature is rising and wastewater treatment plants are struggling to keep up with increased population and stormwater inflow and infiltration, limiting their nitrogen treatment efficiency. The trend of decreased nitrogen loads and associated water quality improvements has largely plateaued, and in some places, shows signs of regression.

The challenge for the future remains clear: nitrogen pollution reduction must remain a priority moving forward, in all areas of Long Island Sound. Coordinated conservation efforts, investments in infrastructure that upgrades wastewater treatment and reduces stormwater runoff, and commitment from elected officials and an engaged public must continue. Otherwise, all the slow gains we have made in recent years threaten to be undone by indisputably rising temperatures.

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



2021 Beach Grades displayed in the Sound Health Explorer

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, and seaweed. Common symptoms of poor water quality are low dissolved oxygen levels, called 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 of algae. As algae and the animals that feed on them respire, die, and decompose, oxygen in the water is depleted.

Water Quality in the Open Sound

Current water quality grades are largely consistent with recent years, though some of the overall water quality improving trends observed in the 2018 Report Card have not continued. In general, water quality is excellent in the east to poor in the west. This is driven by greater tidal exchange with the Atlantic Ocean and lower population density in the east, and reduced circulation and increased population and development in the western Sound.

Water quality trends in the Eastern and Central Basins are stable. All other basins in the Report Card are in a variable state of change. These areas saw substantial improvement in the late 2010s, as great effort was made starting in 2001 to reduce nitrogen entering the Sound from sewage treatment plants. These regions have largely leveled off in recent years with potential regressions starting to surface. However, of significance, the Western Narrows is showing a promising improving trend in its dissolved organic carbon grade. The last few years have shown that resting on previous accomplishments while expecting water quality to continue to improve is a poor assumption. Efforts must continue to protect and restore water quality in the Sound. Success or failure on this front will determine if these basins will move towards overall improvement or if previous gains are lost due to pollution paired with impacts from climate change.

Water Quality in Our Bays

Each bay is unique and that is reflected in its water quality. Of the 53 segments monitored across 40 bays, 57% received a "C," "D," or "F." Eleven segments received an "A." Bays are highly susceptible to local pollutants, and while efforts underway should produce some future success stories, the low overall grades show the impact pollution has on coastal waters. This is especially true where tidal exchange with the open Sound is low and pollutant loads from the rivers and streams are high. The grades show hypoxia as the biggest problem, followed by its companion stressors – high chlorophyll *a* and excessive seaweed.

Open water data provided courtesy of:
CT Dept. of Energy & Environmental Protection (CT DEEP)
NYC Dept. of Environmental Protection (NYC DEP)
Interstate Environmental Commission (IEC)

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 (51%). Although an increase from 2019 (44%), the 14-year trend remains variable. This basin is in fluctuation, hopefully toward overall improvement, with chlorophyll *a*, water clarity, and dissolved oxygen grades in a variable state while DOC is improving.

Eastern Narrows

Received a C (75%), similar to 2019 (74%). The Eastern Narrows remain in a variable state after seeing notable improvement from 2008 to 2017. Dissolved oxygen received a D- (62%) in 2021 which is indicative of a stressed aquatic environment in need of further measures to restore water quality.

Western Basin

Received a B+ (88%), similar to 2019 (86%), with a variable 14-year trend. Dissolved oxygen received a C (74%) which was the lowest grade in the basin. This area is less developed than the Narrows but is still densely populated and showing signs of human impact.

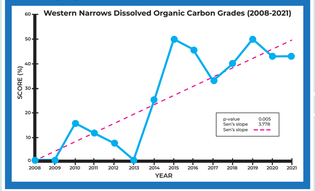
Central Basin

Received an A (93%), similar to 2019 (95%). Water quality has been stable over the past 14 years and is consistently supportive of marine life. It is the largest area of open water contained in the Report Card and is well-flushed with water from the Atlantic Ocean.

Eastern Basin

Received an A+ (99%), the same as 2019 (99%). Water quality has been stable over the past 14 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 next to the Atlantic Ocean.

The **dissolved organic carbon** indicator grades are showing significant improvement from 2008 to 2021.



Finding Encouragement in an F

The Western Narrows once again received an F on its overall grade. But there's good news. Dissolved organic carbon, a measure of the nutrient concentration in the water in relation to human sources, is red, having a score of 43 (F). But that number is up from a 0 in 2008. It is the one indicator in the Western Narrows where the 14-year trendline qualifies as improving. DOC can be viewed as the leading edge of long-term change, and if the hard work to reduce excess nitrogen entering this portion of the Sound continues, we may be seeing the first steps in the long road to ecological recovery.

KEY

2021 Season Grades

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

14-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

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	A-
3	Outer Stonington Hbr	A
6	Alewife Cove	B+

Save the River — Save the Hills

7	Inner Niantic River	B-
8	Outer Niantic River	A-

Connecticut River Conservancy

9	Connecticut River	B

Friends of the Farm River Estuary

10	Farm River	C

River Advocates of South Central Connecticut

11	New Haven Harbor	C+

Town of Stratford Conservation Department

12	Outer Housatonic River	A

Ash Creek Conservation Association

13	Black Rock Harbor	D+

Town of Fairfield Conservation Department

14	Mill Rvr (Southport Hbr)	B-

Harbor Watch

15	Inner Norwalk Harbor	D-
16	Middle Norwalk Harbor	C+

The Maritime Aquarium at Norwalk

17	Outer Norwalk Harbor	A-

Town of Darien

18	Scott Cove	A-
19	Darien Harbor	B+
20	Cove Harbor	A-

SoundWaters

21	Holly Pond	B-
22	Stamford Harbor	A-

Derecktor Shipyards

23	Mamaroneck Harbor	C

Save the Sound

24	New Rochelle Harbor	B-
25	Hunter Island Bay	C-
26	Inner Eastchester Bay	F
27	Outer Eastchester Bay	C

Bronx River Alliance

28	Bronx River	F

Guardians of Flushing Bay

29	Inner Flushing Bay	F
30	Outer Flushing Bay	D+

Interstate Environmental Commission

31	Inner Little Neck Bay	D+
32	Outer Little Neck Bay	C
33	Inner Manhassett Bay	D+
34	Middle Manhassett Bay	C+
35	Outer Manhassett Bay	B

Coalition to Save Hempstead Harbor

36	Middle Hempstead Hbr	D
37	Outer Hempstead Hbr	C+

Friends of the Bay

38	Mill Neck Creek	D
39	Oyster Bay	B
40	Inner Cold Spring Hbr	D
41	Outer Cold Spring Hbr	C+

Cornell Cooperative Extension of Suffolk County Marine Program

42	Lloyd Harbor	C
43	Huntington Harbor	C-
44	Huntington Bay	B
45	Centerport Harbor	C+
46	Northport Harbor	C
47	Northport Bay	C+

Salonga Wetland Advocates Network

48	Nissequogue River	B-

Setauket Harbor Task Force

49	Inner Port Jefferson Hbr	C
50	Middle Port Jefferson Hbr	A-
51	Outer Port Jefferson Hbr	A-

North Fork Environmental Council

52	Mattituck Creek	B-
53	Goldsmith Inlet	B-

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