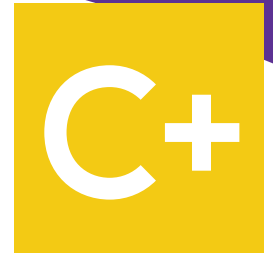


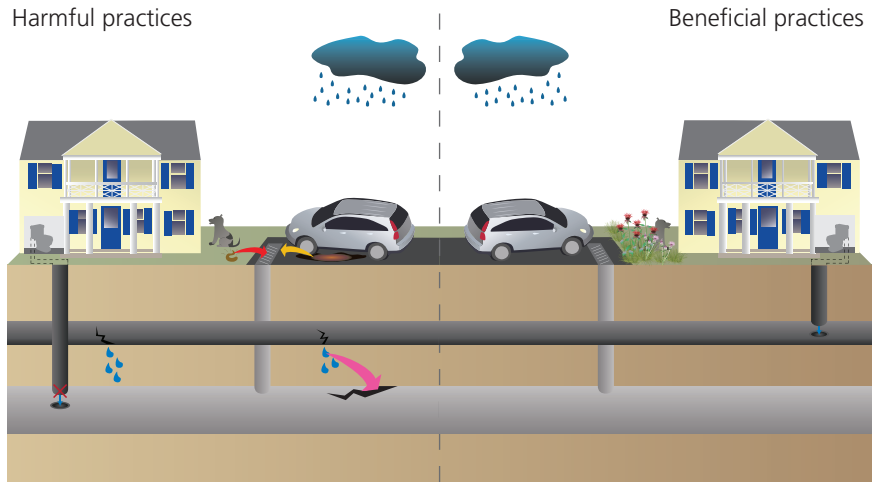
# Norwalk Harbor Report Card



# Following the water's trail from your house, into the river, and to the Harbor

The way land is used in a watershed has a significant effect on water quality. In areas where there are more impervious surfaces, such as parking lots, streets, and roofs, water from storms and even light rain can flow quickly and directly into a storm drain system. This water flow, called runoff, transports a wide variety of pollutants (such as sediments, excess nutrients, bacteria, and toxic man-made chemicals) into nearby streams, rivers, and the Harbor.

This type of pollution, often difficult to control, is called Nonpoint Source Pollution (NSP). NSP can cause the destruction of fish and macroinvertebrate habitats, promote the growth of excessive and unwanted algal blooms that contribute to hypoxia (low dissolved oxygen) events in Long Island Sound, and introduce dangerous chemicals into local waterways. These pollutants that run off the land threaten the biological integrity of the Sound and the recreational and commercial value of this important resource. In addition to the harmful effects on the overall Sound, negative impacts can be seen locally in Norwalk River and Harbor.



- | Infrastructure   | Pollution Sources         | Inputs    |
|------------------|---------------------------|-----------|
| Storm water pipe | Oil                       | Bacteria  |
| Sewer pipe       | Pet waste                 | Nutrients |
| Storm drain      | Illegal hookup            | Toxicants |
| Rain garden      | Broken and leaking sewers |           |

*Nonpoint source pollution can enter Norwalk Harbor from pet waste, illegal hookups, broken pipes, and car oil spills. When proper sewer and car maintenance practices and rain gardens are used, pollution is prevented.*

## Your actions can help improve the Harbor!



Compost yard waste, like leaves and grass into valuable soil for lawns and gardens, maintain vegetative buffers along stream banks to prevent erosion, and be mindful of the use of fertilizers and chemicals. Photo: Earthplace.



Be a considerate pet owner. Never throw pet waste into storm drains or into rivers, streams, or coastal waters. Pet waste contains bacteria that can cause diseases and threaten the safety of those who come in contact with the water. Photo: Michael Sean Terretta.



Participate in river and coastal clean-up events. By removing discarded trash and debris from our waterways, you will help protect water quality and the aesthetics of the environment. Photo: Earthplace.



Be a responsible boater. Never dump trash or debris overboard. Recycle plastics and glass containers and keep them out of our waterways. Photo: Jay K. Schwartz.

# Norwalk River and its watershed

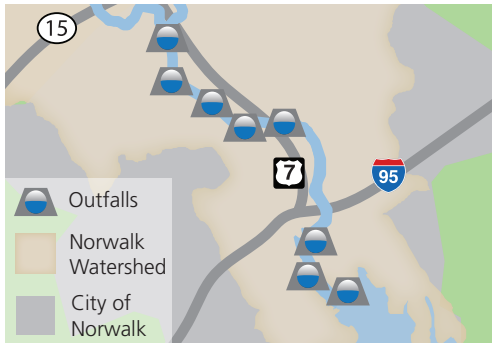
Covering approximately 40,000 acres (64.1 square miles), the Norwalk River Watershed lies in portions of six municipalities in Fairfield County, Connecticut (Norwalk, Ridgefield, Wilton, Redding, New Canaan, and Weston), and one town in Westchester County, New York (Lewisboro). The headwaters of the river are located in the Great Swamp near Ridgefield, Connecticut. The River first flows north, makes a 180-degree turn, and then flows to the south for 20 miles along the US Route 7 corridor, where it enters the Norwalk Harbor and Long Island Sound.

The watershed has two public reservoirs within its borders and several public recreational spots for swimming and fishing. Recreational uses of the Harbor include bird watching, shellfishing, rowing, and kayaking. The Harbor also serves as a hub for a large and financially important commercial shellfish harvesting industry.



*Aerial view of Norwalk Harbor in June 1987.  
Photo: US Army Corps of Engineers.*

## Pollution a continuing concern for Harbor



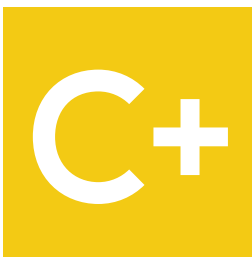
*Locations of storm sewer outfalls in Norwalk River and Harbor.*



*Storm drain outfall at Moody Lane.  
Photo: Earthplace.*

Nonpoint Source Pollution comes from many sources, and often enters waterways as a result of rainfall and snowmelt. Underground storm drain piping can carry rainwater great distances to outfalls that discharge it into rivers, streams, or coastal waters. Impervious surfaces in urban areas, such as parking lots and buildings, prevent rainwater from infiltrating the soil. When rainwater soaks into the ground, the earth filters out pollutants and the water recharges the groundwater sources. When water carrying pollution from the land flows into rivers and streams, the pollution ends up in the Harbor and can cause algal blooms and fish kills.

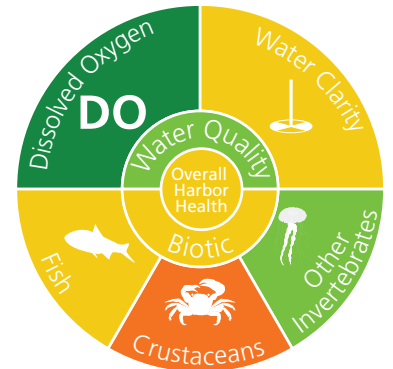
There are four wastewater treatment plants within the Norwalk River Watershed that release treated wastewater into the Norwalk River. The largest is the Norwalk Municipal Treatment Facility, which has a capacity to treat 18 million gallons of wastewater per day. These plants produce Point Source Pollution, which is pollution from a single source. Wastewater treatment plants are regulated and operate under a permit from the Connecticut Department of Energy and Environmental Protection. Most of the plants have been upgraded with advanced treatment methods that produce water which is less damaging to the receiving waters. Advanced treatment plants remove excess nutrients like nitrogen and phosphorus, and bacteria and other microorganisms that can harm humans. Unfortunately, they cannot remove other dangerous man-made chemicals, like heavy metals and pharmaceuticals.



# Harbor water quality good, fish & crustaceans need improvement

## Overall Harbor Health **C+**

Norwalk Harbor scored 78% (C+). This grade is considered moderate. Dissolved oxygen scored 97% (A), a very good grade, and water clarity scored 70% (C-), a moderately poor grade. The biotic indicators—fish, crustaceans, and other invertebrates—had a range of scores. Other invertebrates scored the highest with 80% (B-), moderately good, followed by fish with 73% (C), moderate, and crustaceans with 68% (D+), poor. The Harbor Health score is the average of the water quality (83%, B) and biotic (74%, C) indices.

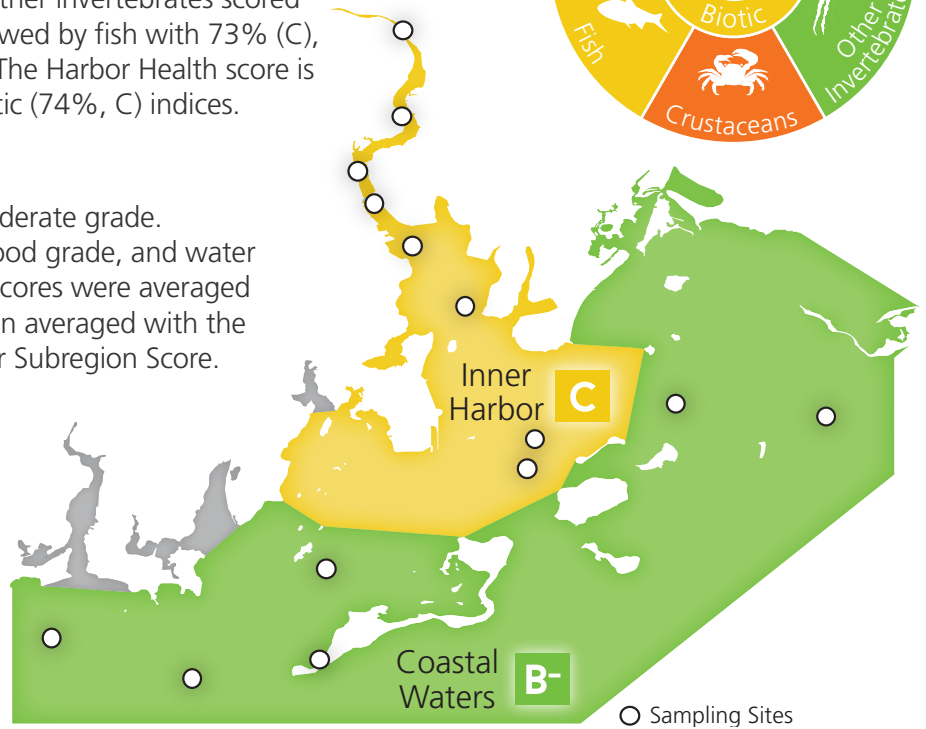


## Inner Harbor **C**

The Inner Harbor subregion scored 74% (C), a moderate grade. Dissolved oxygen scored 86% (B), a moderately good grade, and water clarity scored 62% (D-), a poor grade. These two scores were averaged into a water quality index, 74% (C) which was then averaged with the biotic index, 74% (C), into the overall Inner Harbor Subregion Score.

## Coastal Waters **B-**

The Coastal Waters subregion scored 80% (B-), a moderately good grade. Dissolved oxygen scored 100% (A+), a very good grade, and water clarity scored 72% (C-), a moderately poor grade. These two scores were averaged into a water quality index, 86% (B) which was then averaged with the biotic index, 74% (C), into the overall Coastal Waters Subregion Score.



## How is health calculated for Norwalk Harbor?

The aim of this report card is to provide a transparent, timely, and geographically detailed assessment of ecological health for Norwalk Harbor. Scores are determined by comparing two water quality indicators (dissolved oxygen, water clarity) and three biotic indicators (fish, crustaceans, other invertebrates) to scientifically derived thresholds or goals. Dissolved oxygen and water clarity are measured by site, while fish, crustaceans, and other invertebrates are measured harbor-wide. The two water quality indicators were averaged into a water quality index, and the three biotic indicators were averaged into a biotic index. These two indices were averaged to produce each subregion score. Each subregion score was weighted by area to reach the Overall Harbor Score. For more information about methods, please visit [longislandsound.ecoreportcard.org](http://longislandsound.ecoreportcard.org).



- A** 90–100%: All water quality and/or biotic indicators meet desired levels. Quality of water in these locations tends to be very good, most often leading to preferred habitat conditions for aquatic plants and animals.
- B** 80–90%: Most water quality and/or biotic indicators meet desired levels. Quality of water in these locations tends to be good, often leading to acceptable habitat conditions for aquatic plants and animals.
- C** 70–80%: There is a mix of good and poor levels of water quality and/or biotic indicators. Quality of water in these locations tends to be fair, leading to sufficient habitat conditions for aquatic plants and animals.

- D** 60–70%: Some or few water quality and/or biotic indicators meet desired levels. Quality of water in these locations tends to be poor, often leading to degraded habitat conditions for aquatic plants and animals.
- F** 0–60%: Very few or no water quality and/or biotic indicators meet desired levels. Quality of water in these locations tends to be very poor, leading to unacceptable habitat conditions for aquatic plants and animals.
- ID** Insufficient Data (ID) is a designation used for areas where there is either insufficient or no data to give a grade on desired health levels.

# Water quality monitoring in Norwalk River

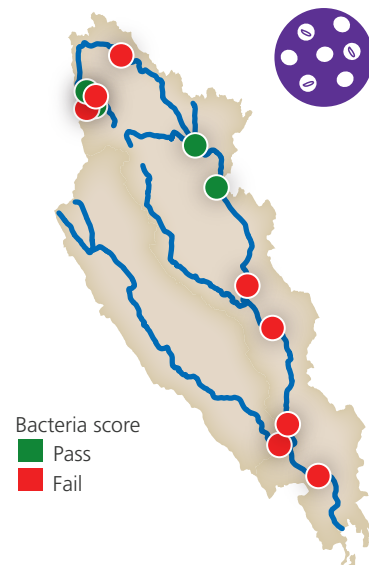
Harbor Watch was established in 1986 to restore the biological integrity of Long Island Sound and its watershed through credible water quality research. In 1993, it became incorporated as a program of Earthplace, and the water quality monitoring program has greatly expanded in Norwalk Harbor and Norwalk River. While this report card only includes an analysis for Norwalk Harbor, as additional indicators are added in the River, a River report card will be created in the future. Key indicators of nutrients and turbidity are not yet being measured, which are necessary to create a River report card. While some indicators are missing, there is currently sampling of dissolved oxygen, conductivity, bacteria, and water temperature. Each of these indicators are valuable to help understand water quality in Norwalk River.



A stream in Norwalk River. Photo: Earthplace.



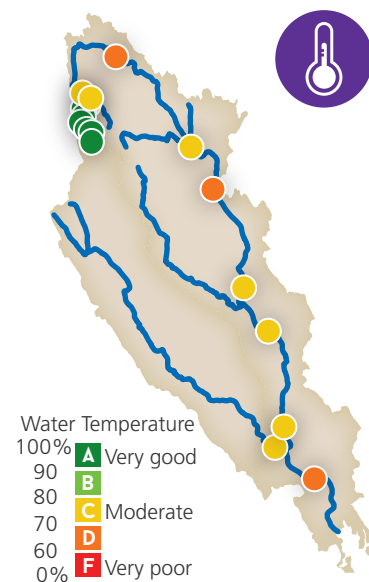
**DO** **Dissolved oxygen**  
 In rivers and streams, where water is actively flowing, dissolved oxygen levels should be high. Dissolved oxygen is important for fish and benthic organisms (small animals and insects that live in the river). In rivers, dissolved oxygen is used as a Vital Sign indicator, which means it can show localized problems, but generally levels should be high.



**Bacteria**  
 Bacteria (*E. coli*) is an important indicator monitored in Norwalk River. Bacteria is a human health indicator in swimming areas. However, Norwalk River is designated by Connecticut as a non-swimming area. This map shows the sites where bacteria meets the non-swimming designation.



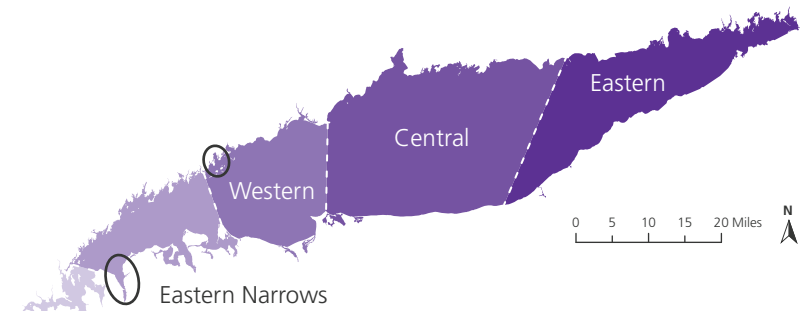
**Conductivity**  
 Conductivity is a measure of how many ions are in water. When conductivity levels are high, plants and animals living in the water become stressed and may not survive. Conductivity levels are high in the northern part of Norwalk River, due to natural geologic conditions as well as human pollution sources such as wastewater treatment plants and stormwater runoff.



**Water Temperature**  
 Water temperature is an important indicator to determine river health. Appropriate water temperature is vital for fish, such as trout, which are stocked in Norwalk River. If the temperature levels become too high, the fish cannot reproduce and may not survive. This map shows temperature levels that support or do not support trout habitat.

# Bringing the pieces together across Long Island Sound

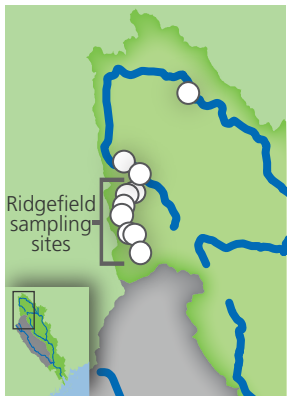
The Norwalk Harbor report card is part of a larger effort to assess Long Island Sound health on an annual basis. Long Island Sound has been studied for many years, with a variety of reporting frameworks (e.g., State of the Sound) in place to communicate Sound health. However, an ecosystem health report card approach synthesizes environmental data annually, so that citizens and decision makers can evaluate the overall effects of restoration, conservation, and management activities on water quality and ecosystem condition. There are numerous local programs in small embayments throughout Long Island Sound that monitor water quality and other indicators on a more focused scale than is conducted by state and federal governments. As these embayment monitoring programs grow, their data become increasingly valuable to tell the story of annual Long Island Sound



Western Narrows  
Eastern Narrows  
The Long Island Sound and embayment report cards will provide a picture of overall health. Circles on the map show the locations of two embayments.

ecosystem health. Bringing embayment report cards together with the Long Island Sound report card communicates a complete picture of ecosystem health in the area.

## Methods used for the Norwalk report card



Several sites near Ridgefield had limited sampling data.

Despite the excellent data collection techniques and data availability from Earthplace, data gaps, in both space and time, appeared in the dataset. These gaps are important to note for current health and future analysis. In both the River and Harbor, there is no monitoring of nutrient indicators, such as nitrogen or phosphorus. Earthplace is currently developing nutrient monitoring and plans to include these indicators in the next few years.

In Norwalk Harbor, sites in the coastal waters subregion include only three samples for dissolved oxygen. Sites in both the Coastal Waters and Inner Harbor subregions only have limited dissolved oxygen data sampling. Due to limited temporal sampling, the dissolved oxygen score for the coastal waters subregion is not very robust.

There are several sites in Norwalk River where limited data were available and all are located near Ridgefield (see map). Sampling began in September and ended in December. There are between 9 and 14 samples included, but there are no data from the spring and summer. The lack of temporal sampling for these sites make the dissolved oxygen, conductivity, and water temperature scores less reliable.

## About the Norwalk Harbor report card



Key participants at a workshop to develop the Norwalk Harbor report card.  
Photo: Anthony Kung.

For information on specific methodologies, indicators, thresholds and subregion designations, visit [longislandsound.ecoreportcard.org](http://longislandsound.ecoreportcard.org). To find out more about efforts to protect and restore Long Island Sound visit [www.longislandsoundstudy.net](http://www.longislandsoundstudy.net). This report card was produced by Earthplace, Harbor Watch, and the Integration & Application Network at the University of Maryland Center for Environmental Science and published in June 2015. Funding was provided by the U.S. EPA's Long Island Sound Study, Long Island Sound Futures Fund, and Long Island Sound Funders Collaborative. The report card provides a geographically specific assessment of Norwalk Harbor health for 2013. For more information please contact [harborwatch@earthplace.org](mailto:harborwatch@earthplace.org), follow us on Facebook at [www.facebook.com/HarborWatch](http://www.facebook.com/HarborWatch) or [www.earthplace.org](http://www.earthplace.org). Cover photo: Katherine Hooper Photography.

