COALITION TO SAVE HEMPSTEAD HARBOR
EST. 1986

2023
Water-Quality Report
Hempstead Harbor
(Full Report, Including Appendices)

HHPC
Hempstead
Harbor
Protection
Committee

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prepared by

Coalition to Save Hempstead Harbor

Est. 1986

September 18, 2024

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Smoke-Hazed Sunset - Karen Papasergiou, 5/22/23
Black Skimmers - Martha Braun, 6/15/23
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Acknowledgments

Environmental restoration and conservation require dedication, passion, patience, broad-based community support, and collaboration, as well as large infusions of technical expertise and funding. We therefore gratefully acknowledge the financial support and participation of all who have partnered with the Coalition to Save Hempstead Harbor (CSHH) and the Hempstead Harbor Protection Committee (HHPC) to protect our local environment.

We especially thank the US Environmental Protection Agency (EPA), Long Island Sound Study Office; National Fish and Wildlife Foundation; Long Island Sound Futures Fund; NYS Department of Environmental Conservation (DEC); and Nassau County Soil and Water Conservation District. Special thanks are extended to the Town of North Hempstead, Town of Oyster Bay, and City of Glen Cove for efforts toward the 2023 municipal cleanup of large pieces of debris in Hempstead Harbor.

We are grateful to all who have helped us maintain our water-monitoring programs, including:

- CSHH volunteers;
- Members of local fishing clubs, local beach and marina managers, boaters and sailors, and other community members who report on harbor conditions;
- Town of Oyster Bay Department of Environmental Resources for staff assistance and use of its boat and Department of Parks for use of a Tappen Marina boat slip;
- and Nassau County Department of Health (NCDH) staff members who have facilitated and performed the lab analyses and data reviews for bacteria samples collected weekly at CSHH stations in Hempstead Harbor since the initiation of the core water monitoring program in 1992.

This report was prepared by the

Coalition to Save Hempstead Harbor

with technical advisory review

provided by:

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Introduction

About 30 years ago, the view of Hempstead Harbor was much different from what it is today. The harbor was suffering from air, water, and land-based problems that resulted from past industrial activities along its shores. These problems were the impetus for the formation of a citizens' activist group in 1986, the Coalition to Save Hempstead Harbor. CSHH established Hempstead Harbor's **Citizens Water-Monitoring Program** in 1992 and initially funded the program through membership support, grants from local foundations and businesses, and volunteer services. The program became widely recognized by other groups around Hempstead Harbor and Long Island Sound and quickly was able to garner support from local municipalities and government agencies.

As the program continued, positive changes were occurring not only on the landscape around the harbor, but also on the political landscape, as citizens and government learned to work collaboratively to achieve environmental goals. In 2006, the Hempstead Harbor Protection Committee, a municipal organization formed in 1995, was able to step up to fund the harbor's water-monitoring program through a Long Island Sound Study grant administered by the National Fish and Wildlife Foundation. The grant enabled the completion of an EPA-approved **Quality Assurance Project Plan** (QAPP) in 2006, which further enhanced the credibility of the monitoring program and enabled the HHPC to obtain future federal funds for the program. The QAPP has since been updated and approved by EPA in 2011, 2014, 2019, and 2020. The most recent QAPP (2023) was approved by both EPA and NYS DEC.

During 2007, a copy of the QAPP, water-quality data, and other information from the water-monitoring program were requested for two separate shellfish-related projects. The information was used to help fill out the New York State Department of Environmental Conservation’s (DEC’s) data on the level of pathogens in Hempstead Harbor and to determine whether the harbor could be opened to shellfish harvesting in the near term.

The results of the DEC's rigorous water-quality testing showed that dramatic water-quality improvements had been achieved in Hempstead Harbor. On June 1, 2011, the efforts of all parties that worked for years to improve conditions in the harbor culminated in the **reopening of 2,500 acres of shellfish beds for harvesting** in the northern portion of the harbor–a success story that has been highlighted all around Long Island Sound and beyond.

Initiation of the Monitoring Program

By 1990, there had been a history of chronic sewage spills from the failing wastewater treatment plants that were sited along Hempstead Harbor’s shoreline. These spills along with cutbacks in Nassau County Department of Health's water-quality monitoring program were the factors that motivated CSHH to create a citizens water-monitoring program for Hempstead Harbor. The program was intended as a springboard for public education and outreach, to foster increased awareness of environmental issues, and to encourage public participation in local conservation efforts.

In the early 1990s, at the same time that CSHH developed the water-quality monitoring program for Hempstead Harbor, concerns about the health of Long Island Sound gained increased attention. CSHH recognized that the priorities established under the Long Island Sound Study's **Comprehensive Conservation and Management Plan** (CCMP) (1994) were the same priorities that had to be addressed for Hempstead Harbor, perhaps to a different extent. These priorities were low dissolved oxygen (hypoxia), toxic substance contamination, pathogen contamination, habitat degradation, and floatable debris.

CSHH worked hard to develop a credible water-testing program that could be relied on to indicate the health of the harbor. However, the primary purpose in establishing the program was to encourage all who live, work, and enjoy recreational activities around Hempstead Harbor to renew their interest in the harbor, as well as in Long Island Sound, and to participate in restoration efforts. An important component of the program since its start has been to involve citizens in observing conditions around the harbor and notifying CSHH and appropriate municipal and environmental agencies of unusual events affecting the harbor.

Program Expansion

Over the years, the scope of the water-monitoring program has expanded, as has the network of partners that have supported it. The number of testing parameters and stations has increased to better address watershed issues and improvements.

Scudder's Pond in autumn 2023 (photo by Carol DiPaolo, 11/10/23)

As described in later sections of this report, Scudder's Pond had been identified as a major contributor of bacteria to Hempstead Harbor through stormwater runoff. In 2009, in anticipation of restoration work planned for the pond to mitigate the effects of stormwater runoff, two new monitoring stations were established (CSHH #15A and #15B). The stations are located at the weir that drains water from the pond directly to the harbor and at the outfall across the road that carries pond water as well as runoff from the larger area around the pond. At the same time, a new station was also established at the powerhouse drain outfall (CSHH #14A), which had been identified as the second largest contributor of bacteria to the harbor.

The years of monitoring these stations established a baseline of bacteria levels that occur from May to November. In 2013, the program was expanded to include winter monitoring (November to May) of the pond and powerhouse outfalls. Monitoring these outfalls during the winter has helped us understand what happens to bacteria levels during the coldest months of the year. We were also able to examine changes in bacteria levels as construction work at the pond proceeded and following the completion of the restoration in June 2014. Although weekly winter monitoring for Scudder's Pond ended in April 2016, samples are collected periodically to check on conditions as we continue the winter monitoring focusing on the powerhouse drain outfall.

In 2015, three new stations were established in the outer harbor for the regular monitoring season. These stations are located within or just beyond the boundaries of the certified shellfish beds of Hempstead Harbor and are important for obtaining more detailed information on water-quality conditions in this section of the harbor.

Municipal Watershed-Based Management

As CSHH continued its monitoring efforts, the nine municipalities that share jurisdiction over Hempstead Harbor recognized they also shared the harbor's water-quality problems but did not, individually, have the resources to tackle large harbor issues. It became increasingly evident that they needed a mechanism to overcome the complexities of municipal boundaries and facilitate a more coordinated government approach to water-quality problems. In 1995, the Hempstead Harbor Protection Committee was created and became Long Island's first watershed-based intermunicipal organization, formed to protect and improve the water quality of Hempstead Harbor. CSHH became the first environmental organization to join the committee–as a nonvoting member and technical adviser.

HHPC first focused on abatement of stormwater runoff as it developed a comprehensive Hempstead Harbor Water-Quality Improvement Plan (1998). CSHH's already-existing monitoring program was able to satisfy the plan's water-quality monitoring component. Also, in recognition of the need to balance the diverse uses of Hempstead Harbor, the HHPC secured a grant to prepare the Harbor Management Plan for Hempstead Harbor (2004), which was adopted by all nine HHPC municipalities.

CSHH and HHPC Profiles and Activities

The Coalition to Save Hempstead Harbor and the Hempstead Harbor Protection Committee continue to work closely together on improving Hempstead Harbor's water quality. Each organization has offered separate and valuable contributions to improving conditions around the harbor. At the same time, the two organizations illustrate the great successes that can result from creating valuable partnerships that can pool resources and maximize results to benefit the environment and local communities.

CSHH and HHPC joined other LIS Citizens Advisory Committee members in Washington, DC, for Long Island Sound Day, 10/25/23 (l) and 7/14/22 (r)

CSHH

CSHH's mission, to identify and eliminate environmental threats to Hempstead Harbor and surrounding communities, is longstanding. When CSHH first formed in 1986, it was in response to reports of continued degradation of Hempstead Harbor on a number of fronts. CSHH joined with other community members and successfully prevented a new mass-burn incinerator from being built on the harbor's western shore and shut down a failing incinerator that was operating on its eastern shore. CSHH sponsored the development of a townwide recycling plan for the Town of North Hempstead, offering a solution to problems of solid-waste management, and became a critical watchdog for the harbor as remediation plans were formulated to clean up contaminated sites.

As CSHH developed its Citizens Water-Monitoring Program, it also participated in the meetings and hearings that led to the completion of the Long Island Sound Study's Comprehensive Conservation and Management Plan (1994) and participated in the meetings leading up to the 2015 revision and update of that plan. (CSHH has been a member of the Long Island Sound Study's Citizens Advisory Committee since 1992 and served for three years as chair of its Communications Subcommittee; CSHH is currently a member of the Long Island Sound Study's Water Quality Monitoring Work Group.)

In 1996, CSHH initiated the creation of a soundwide network of environmental organizations and agencies that were conducting water-monitoring programs. This first Long Island Sound Water-Monitoring Work Group provided a forum for reviewing current testing parameters, methodologies, and equipment used by members and for examining testing results in a broader context. Among the work group's achievements was the completion of the **Long Island Sound Mapping Project** (July 1998), which mapped sites monitored around Long Island Sound and identified the agencies and other organizations responsible for testing at those sites. The project was funded through a grant awarded to CSHH, on behalf of the work group, by EPA/Long Island Sound Study.

In 1998, CSHH published ***Hempstead Harbor: Its History, Ecology, and Environmental Challenges***. The book supports the goals of the water-monitoring program, encouraging community members to learn about Hempstead Harbor's importance as a habitat for marine life and other species. It also describes the critical relationship between the ecology of the harbor and sound and the quality of life (and economy) of surrounding communities.

In 2000, CSHH became a partner in **EPA's Environmental Monitoring for Public Awareness and Community Tracking** (EMPACT) program. CSHH worked with the Marine Sciences Department of the University of Connecticut to maintain a telemetry link at the EMPACT website at www.MYSound.uconn.edu, so that water-quality data from Hempstead Harbor could be viewed on the web. (In 2005, the program was discontinued due to logistical problems and lack of funding.)

In 2001, CSHH received the prestigious **Clearwater Award**, announced by The Waterfront Center, a Washington, DC-based educational organization with worldwide membership. CSHH was commended for the scope of its activities in working to improve conditions in and around Hempstead Harbor. Particularly noted were CSHH's book (mentioned above) and the expansion of its water-monitoring program.

In 2002, CSHH was asked by the US EPA Long Island Sound Study Office to plan and coordinate a **Stormwater Workshop** to help prepare Long Island communities to meet the requirements of the EPA Phase II Stormwater Regulations. CSHH received a grant to host the workshop, which was cosponsored by the EPA Long Island Sound Office, Long Island Sound Study, and the New York Sea Grant Program.

In 2009, CSHH initiated a community work group to focus on development of a townwide land-preservation plan. A first step toward a broader land-use preservation plan was to determine the feasibility of a watershed-protection overlay district for Hempstead Harbor. The scope of the Glenwood Road/Powerhouse Drain Stormwater Pollution Abatement Plan (HHPC, 2013) was expanded to include this element. Also in 2009, CSHH became a member of the newly formed **Long Island Sound/New York State Sentinel Site Work Group** (a bistate–New York and Connecticut–approach to understanding climate-change indicators for Long Island Sound and selecting appropriate sites to measure them).

In 2013, CSHH was invited to participate in a project that would establish a report-card system to communicate the health of Long Island Sound. Hempstead Harbor and Norwalk Harbor were to have the first embayment report cards, serving as pilot projects to help launch a **soundwide report-card system**; both harbors have longstanding and credible water-quality monitoring programs and availability of long-term water-quality data.

Since 2016, CSHH has participated in the **Unified Water Study: Long Island Sound Embayment Research** (UWS). The goal of the study is to standardize testing parameters and operating procedures among groups monitoring bays and harbors around Long Island Sound so that a report card can be developed comparing ecological conditions in those bays. CSHH conducts the biweekly UWS program in Hempstead Harbor separate from the harbor's weekly core monitoring program.

In 2018, CSHH was awarded a grant by Patagonia to initiate a **habitat restoration project in Glenwood Landing** to raise community awareness of stormwater runoff problems that contribute bacteria and nitrogen to Hempstead Harbor. Local homeowners participating in the program reserved portions of their property to be planted with native plants to improve soil conditions and reduce runoff. This project concluded in 2020. Also in 2018, the New York State Outdoor Education Association (NYSOEA) recognized CSHH for its long-standing dedication to the ecological health of Hempstead Harbor and Long Island Sound, and CSHH became one of the recipients of **NYSOEA's Environmental Impact Award**.

In 2019, CSHH was awarded a grant from the Nassau County Soil and Water Conservation District (NCSWCD) for the **Tappen Marina monitoring program** in anticipation of a pilot project to raise seed clams in the marina. NCSWCD awarded grants to CSHH in 2020 and 2021 to continue the marina monitoring program. In July 2020, the Town of Oyster Bay staff placed seed clams in floating upweller systems (FLUPSYs) in the marina for the first aquaculture project in Hempstead Harbor. The program included oysters in 2022 and continued through 2023. In January 2022, the Town of Oyster Bay began growing sugar kelp in Tappen Marina; CSHH established Tappen Marina testing stations to monitor water quality around the sugar kelp lines.

CSHH sponsors several shoreline cleanups each season. In April 2023, CSHH coordinated its annual Scudder's Pond cleanup and included water-monitoring and oyster-gardening demonstrations. In September 2022, CSHH coordinated local activities as part of the **International Coastal Cleanup**, as it has for all but three years since 1992, however in

Volunteers for the CSHH Scudder's Pond Cleanup and International Coastal Cleanup (photos by Stephanie Sobel, 4/22/23, and Carol DiPaolo, 9/25/22, respectively)

2022, the cleanup was expanded to be a harborwide cleanup covering four beaches (this cleanup was cancelled in 2023 due to inclement weather). In 2020, in lieu of the International Coastal Cleanup, which was cancelled due to COVID-19, CSHH sponsored a month-long **harborwide "Clean-a-Thon."** In April 2011, CSHH organized an **emergency cleanup of plastic disks** accidentally released from an aeration tank at the Mamaroneck sewage treatment plant. The cleanup resulted in the collection of over 27,000 disks from five beaches around Hempstead Harbor and helped convince Westchester County to send crews to continue cleanup efforts.

Hempstead Harbor spat-on-shell oysters ready to be planted (photo by Carol DiPaolo, 9/17/23)

In 2022, CSHH initiated the first **oyster gardening program** for Hempstead Harbor. Volunteers at three locations helped to maintain the cages that included a total of 30,000 spat-on-shell oysters. At the end of the season, half of the oysters were released to a DEC-approved spawner sanctuary in Cold Spring Harbor, and the other half were released in the newly CSHH-established conservation management area in Hempstead Harbor. CSHH expanded this program in 2023 to four harborwide locations, raising 60,000 spat-on-shell oysters. At the end of the season, all 60,000 oysters were planted in the conservation management area in Hempstead Harbor.

In response to the increase in development pressure around Hempstead Harbor, CSHH commissioned Sarah Meyland, MS, JD (a local aquifer expert), to prepare a 2022 report on the local drinking water supply, "**Water Supply Sustainability for Hempstead Harbor Communities.**" The report is intended as a resource for regional land-use planning.

As of the 2022 regular water-monitoring season, CSHH has collaborated with Dr. Luciana Santoferrara (Hofstra University), who began research on how microbial communities are affected by varying levels of dissolved oxygen. Hofstra students joined CSHH for a portion of the monitoring season to collect samples required for their research with Dr. Santoferrara.

In 2023, CSHH participated in the pilot year of the Long Island Sound Pathogen Monitoring Network. Efforts were coordinated in New York and Connecticut, with the mission to foster collaboration and build capacity for pathogen monitoring and source detection in the Long Island Sound watershed. CSHH's efforts targeted conditions in Dosoris Pond.

CSHH continues to work with other environmental groups and agencies around Hempstead Harbor and Long Island Sound. CSHH has served on **advisory committees** formed to develop local revitalization plans for harbor communities (e.g., Glen Cove Creek Reclamation Committee, Glenwood Landing Steering Committee, Roslyn Waterfront Committee, Glen Cove Waterfront Citizens' Planning Committee, and Glen Cove Master Plan Task Force); **review committees** for restoration-plan proposals (e.g., Scudder's Pond

Restoration Program and Glenwood Road/Powerhouse Drain Stormwater Pollution Abatement Plan); and **technical work groups** (e.g., Long Island Nitrogen Action Plan, Long Island Sound Nitrogen Reduction Strategy, and Long Island Pathogen TMDL Work Group).

HHPC

The idea for addressing Hempstead Harbor's water-quality issues on a harborwide basis was conceived in the mid-1990s by NYS Comptroller Tom DiNapoli (then-NYS Assemblyman) and former Sea Cliff Mayor Ted Blackburn.

In 1995, funds were sought and received from the NYS Department of State, and the Hempstead Harbor Protection Committee (Long Island's first intermunicipal watershed organization) was born. The funds were used to hire a part-time director and to hire coastal experts to prepare an in-depth **Hempstead Harbor Water Quality Improvement Plan** (completed in 1998). Each of the nine municipalities signed an intermunicipal agreement to work cooperatively and to contribute financially to the HHPC.

HHPC event display (photo by Eric Swenson, 10/6/19)

HHPC's municipal members include Nassau County, the Towns of Oyster Bay and North Hempstead, the City of Glen Cove, and the Villages of Sea Cliff, Roslyn Harbor, Roslyn, Flower Hill, and Sands Point. The committee accomplishes its mission to protect and improve the harbor's water quality through planning studies, capital-improvement projects, educational outreach, water-quality monitoring, information and technology sharing, development of model ordinances, coordination of enforcement, and working with other governmental agencies as well as environmental, educational, community, and business groups. HHPC's executive director serves on the Long Island Sound Study's Citizens Advisory Committee, the Board of Directors of the Nassau County Soil and Water Conservation District, and on the Board of Directors of Friends of Cedarmere, Friends of the Bay, and the Oyster Bay/Cold Spring Harbor Protection Committee. These ties and cooperative efforts save each municipality expenses and provide a coordinated approach to solving harbor problems and a year-round focus on harbor issues.

The HHPC prepared the **Scudder's Pond Subwatershed Plan** (2006) and had secured nearly $2.5 million toward the implementation of its recommendations, which began in November 2013 and was completed in June 2014. This subwatershed (located in Sea Cliff) had been identified as one of the most significant contributors of bacteria-laden stormwater runoff to the harbor. A similar study, the **Glenwood Road/Powerhouse Drain Pollution Abatement Plan** for the subwatershed in Glenwood Landing, was completed in December 2013.

In 2007, HHPC applied for federal **No Discharge Zone (NDZ)** designation for Hempstead Harbor; the US EPA approved the application on November 6, 2008. The NDZ designation affords the harbor the necessary legal basis to restrict boaters from discharging their wastes into the harbor and strengthens avenues for enforcement. On September 6, 2011, New York State, following Connecticut's example, banned vessel sewage discharges from its portion of Long Island Sound, including all harbors and bays, making the entire sound a no-discharge zone.

The HHPC has also established a website (www.HempsteadHarbor.org) and a Facebook page to serve as harbor resources. Other efforts have included the production of professional coastal interpretive signage; the production of a series of three television programs; the purchase of a portable display unit that is used at area fairs, festivals, libraries, and town and village halls; the installation of pet-waste stations around the harbor; and intermunicipal cleanups of debris in the harbor.

The HHPC was instrumental in expanding the harbor's designation as a NYS Significant Coastal Fish and Wildlife Habitat Area to encompass the entire harbor. It has also played a role in having harbor trails and land acquisition added to the state's Open Space Plan; having the harbor designated by the Long Island Sound Study as an inaugural "Long Island Sound Stewardship Site"; and having the harbor designated as part of Audubon New York's "Important Bird Areas of New York State." The HHPC has been a great success and has spawned the creation of other intermunicipal efforts, including the Manhasset Bay Protection Committee, Oyster Bay/Cold Spring Harbor Protection Committee, Northport Water Quality Protection Committee, and Peconic Estuary Protection Committee.

Since 1995, the HHPC has received over 25 grants, which have covered much of the committee's costs. The balance of the HHPC's budget (including monetary matches for the grants) is made up of annual dues received from the nine member municipalities.

In 2012, the HHPC received an Environmental Quality Award from the US EPA Region 2 for its efforts in improving water quality in Hempstead Harbor to the point where 2,500 acres of the harbor were reopened to shellfish harvesting for the first time in 45 years. Since the water-quality standards to support shellfish harvesting are the highest of all water-quality standards, this achievement unquestionably demonstrated the water-quality improvements that the HHPC was created to seek. In so doing, Hempstead Harbor also became the first major water body in New York State to achieve this status in several decades. The HHPC continues to work with others to achieve this for the remaining portions of the harbor.

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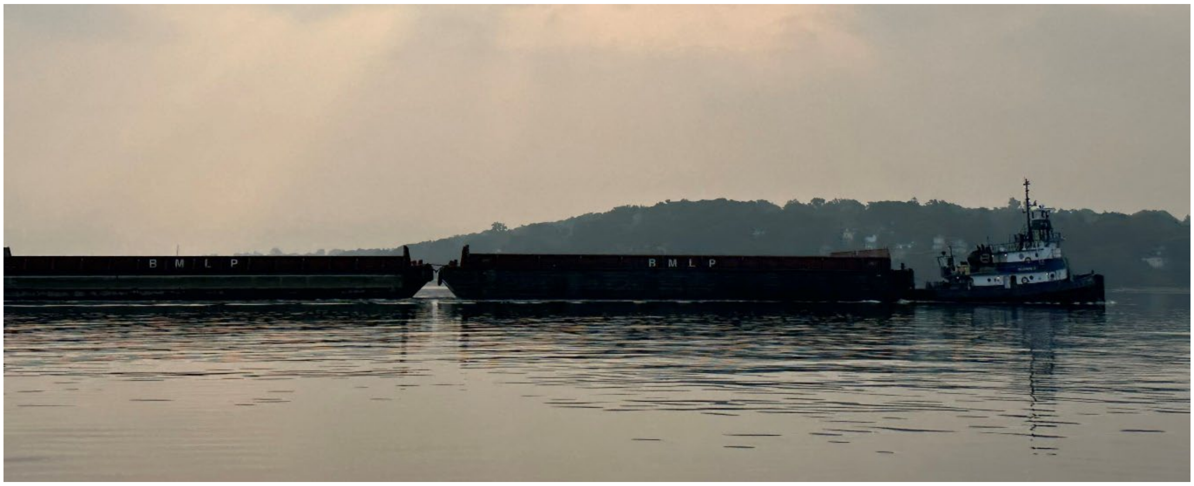
1 Harbor Overview

Hempstead Harbor lies along the north shore of Long Island, bordering the western portion of Long Island Sound, between Manhasset Bay to the west and Oyster Bay to the east. The V-shaped harbor is about 5 miles long from mouth to head, and its shoreline extends about 14 miles from Prospect Point on the west at its mouth to Matinecock Point on the east. For the most part, the harbor presents a beautiful water body that is quiet and uncrowded, though it has widely mixed uses.

Industrial or commercial enterprises were historically concentrated in four areas along the harbor's shoreline. They remain currently, to a much lesser degree, in three areas of the harbor. The former industrial sites degraded the harbor's shorelines, wetlands, and water quality with the effects of oil and sewage spills, toxic contamination, stormwater runoff, air pollution, and industrial discharges. The worst of these effects were noted in the mid-1980s.



Buchanan tug towing barges into Hempstead Harbor at sunrise; view of east shore (photo by Michelle Lapinel McAllister, 6/30/23)

Efforts to restore the harbor resulted in the closure of a landfill, two incinerators, and a sewage treatment plant (STP), as well as the remediation of numerous hazardous waste sites. These dramatic changes have helped to improve the harbor's water quality.

One sewage treatment plant (in Glen Cove) remains and in 2003 was upgraded, using a biological process to remove nitrogen from its discharge. In late 2006, an ultraviolet (UV) light disinfection system was installed to replace the chlorination system. In June 2009, after a backup generator was installed at the STP to make the UV system fully operational, the chlorine vats were emptied and CSHH ceased chlorine testing at the STP outfall, monitoring station CSHH #8. The replacement of the chlorination system with the UV disinfection system offers a significant benefit for water quality because it removes the risks posed by chlorine by-products, which can have an adverse impact on marine life. (In 2008, Nassau County purchased the plant from the City of Glen Cove; in August 2020, Suez North America began the operation of the Glen Cove plant and two other county-owned plants. In January 2022, Suez was purchased by Veolia, a French transnational utility company.)

Wetland restoration projects have been expanded on the western shore of the harbor, south of the former Bar Beach Park, which is now part of the larger North Hempstead Beach Park. (In September 2007, Nassau County transferred ownership of the Hempstead Harbor Beach Park to the Town of North Hempstead, which merged it with the adjacent town-owned Bar Beach Park; in May 2008, the combined beaches were renamed North Hempstead Beach Park.) In 2015, the section of the trail along the western shore just south of the former Bar Beach was completed, and by 2020 the trail was nearly two miles long. Work to restore Gerry Pond in Roslyn was completed in May 2021.

Starting point of the Hempstead Harbor shoreline trail and extension south along the western shoreline (above l and r) (photos by Carol DiPaolo, 5/20/15 and 9/16/20, respectively); new plantings installed by the Town of North Hempstead in 2019 (r) (photo by Kevin Braun, 10/22/19)

Despite the harbor's impaired condition during the 1980s, in 1987 New York State designated Hempstead Harbor a **Significant Coastal Fish and Wildlife Habitat** area, which included the upper portion of Hempstead Harbor, from Mott Point on the west to the Glen Cove breakwater on the east. Over the last 30 years, the harbor's ecosystem has vastly improved, containing a diversity of marine life and water birds. Wetland grasses have recovered a large portion of the lower harbor south of the North Hempstead Beach Park, once again providing a nursery and healthy habitat for marine species and bird populations. Reflecting Hempstead Harbor's dramatic turnaround, its designation as a Significant Coastal Fish and Wildlife Habitat was modified in October 2005 to include the lower portion of the harbor, extending south to the Roslyn viaduct.

By 2009, water quality had improved so dramatically in Hempstead Harbor that the results of water-quality testing undertaken by the NYS Department of Environmental Conservation (DEC) indicated that a portion of the outer harbor could be certified for shellfish harvesting. (The harbor had been restricted for shellfish harvesting for over 40 years.) The testing and regulatory process was completed in 2011, and on June 1, 2011, 2,500 acres of shellfish beds that form a band across the outer harbor were officially reopened for harvesting. In

2021, DEC closed 134 acres of shellfish beds adjacent to Prospect Point in the harbor, while certifying 6,150 acres in Long Island Sound, just beyond the mouth of the harbor (see *Section 3.8.4*).

Today, Hempstead Harbor continues to support many diverse uses and activities. Fuel is transported to the Glenwood Landing terminal (Global Partners LP) that is adjacent to a power plant that has operated since the early 1900s. Farther north, tugboats tow barges to and from a sand and gravel transfer station on the western shore of the harbor and into Glen Cove Creek, which flows from the harbor's eastern shore. In contrast to these commercial uses, recreational uses continue to flourish and expand as the harbor's water quality improves. Marinas and yacht, sailing, rowing, and fishing clubs, which are concentrated in the middle portion of the harbor, are thriving. Town, city, village, and small private beaches are also located along the harbor's shores. As the harbor environment has continued to improve, there has been increased pressure to develop properties along the shoreline, which in time could exacerbate the problems that are currently being mitigated.

The Beacon at Garvies Point, Glen Cove (l) and The Residences at Glen Harbor, Glenwood Landing (r) on eastern shore of the harbor (photos by Carol DiPaolo, 10/25/23)

These diverse and often competing interests must be balanced in planning for the future of Hempstead Harbor. The **Harbor Management Plan** for Hempstead Harbor (Hempstead Harbor Protection Committee, 2004) offers a comprehensive strategy for the municipalities that share jurisdiction over Hempstead Harbor to "work cooperatively to address issues related to the wise use and protection of the harbor's surface waters, natural resources, underwater lands, and shorefront." Environmental challenges and priorities that remain for the harbor include stormwater runoff abatement; reductions in bacteria and nitrogen levels; prevention of inappropriate land use and development, particularly along the shore; and continued remediation of contamination from former industrial activities. All of these issues will have to be addressed in the context of water supply, climate change, sea level rise, and increased flooding.

2 Methods

It is difficult to draw direct relationships among all the variables that affect water quality, and this is the challenge presented every year in attempting to analyze the past season's water-quality data. The graphs presented in this report compare seasonal and long-term averages for various water-quality parameters. The data collected over the years are a critical resource as we look for trends that point to the health of Hempstead Harbor.

Addressing the areas that negatively affect the harbor's water quality is complicated. Some things are within our control–such as nitrogen discharges and other pollution from both point and nonpoint sources; other things, are not–such as rainfall and temperature. However, all of these factors have critical relationships that have an impact on the ecological health and human use of our waters, including swimming, fishing, and other recreational pursuits.

The data collected through the water-monitoring program help us understand the interrelationships that occur in Hempstead Harbor. This information enables us to work with others in addressing harborwide and soundwide issues, so that we can plan and implement best management practices to ensure a healthy environment for the future.

2.1 Quality Assurance Plans

The first Quality Assurance Project Plan (QAPP) for the Hempstead Harbor Water-Quality Monitoring Program was completed in 2006. The QAPP outlines the testing methods and quality assurance and quality control (QA/QC) procedures CSHH has implemented in the program. QAPP revisions were approved by the US Environmental Protection Agency (EPA), Region 2, to reflect changes in the program in 2011, 2014, 2019, and 2020. The QAPP was again revised in 2023 and approved by both EPA and NYS DEC.

The EPA approval of the QAPP broadens the use of the program's data by outside organizations, enables the program to receive federal funding for future monitoring efforts, reiterates CSHH's ongoing commitment to providing high-quality monitoring data for Hempstead Harbor, and demonstrates the reliability of the data presented in this and previous water-quality reports.

CSHH completed data usability assessment reports (DUARs) for 2017-2019 data, which were approved by NYS DEC. Data assessment reports were also completed for 2020-2023; see *Appendix E* for the most recent report.

2.2 Core Program

The core monitoring program for Hempstead Harbor encompasses weekly testing from May through October at stations established in the upper and lower harbor and in Glen Cove Creek. Also included are several shoreline stations; three of these are part of the winter monitoring program, which currently focuses on the Powerhouse Drain Subwatershed.

The principal CSHH stations that are sampled weekly during the regular monitoring season for all program parameters are located between the former Bar Beach (now part of the 36.2-acre North Hempstead Beach Park) and Long Island Sound, as well as in Glen Cove Creek. Lower-harbor stations and others located close to the shoreline can be accessed only during high tide. See *Figures 1-2* for core-program station locations; see *Table 1* for the latitude/longitude points for the monitoring stations. Note that five core-program stations correspond to stations established for the Unified Water Study: Long Island Sound Embayment Research (UWS), as described in *Section 2.3,* and these are indicated in *Table 1.*

Aerial view of upper harbor, eastern shore, from right to left: Glen Cove Creek, Garvies Point, Morgan Park, Crescent Beach, and Matinecock Point in Glen Cove (photo by David North, 7/13/19)

2.2.1 Station Locations

Below is a list of CSHH stations for the core monitoring program.

Upper-harbor monitoring stations also include those by outfalls in Glen Cove Creek and near Scudder's Pond:

- CSHH #1, at Beacon 11 (between Tappen Beach Marina on the east shore and North Hempstead Beach Park on the west shore)
- CSHH #2, at Bell Buoy 6 (a stationary marker near the harbor mouth, east of Mott Point)
- CSHH #3, at the red channel marker C-1, at the mouth of Glen Cove Creek, between the Hempstead Harbour Club and Sea Cliff Beach
- CSHH #8, at the Glen Cove sewage treatment plant outfall pipe
- CSHH #9, outfall about 10 ft west of CSHH #8
- CSHH #10, outfall about 20 ft west of CSHH #8, at the end of the seawall
- CSHH #11, about 50 ft east of CSHH #8
- CSHH #12, about 100 ft east of CSHH #8, in the middle of the creek, north of the bend in the south seawall
- CSHH #13, 60 ft from the Mill Pond cement weir at the head of Glen Cove Creek
- CSHH #15, about 50 yd from Scudder's Pond outfall, near northwest corner of the Tappen Beach pool area
- CSHH #15A, at the Scudder's Pond/Littleworth Lane outfall, north of the Tappen Beach pool area
- CSHH #15B, at the Scudder's Pond weir on the east side of Shore Road
- CSHH #16, a central point in the outer harbor (corresponds with DEC shellfish monitoring station #24)

- CSHH #17, outside Crescent Beach restricted shellfish area across from white beach house
- CSHH #17A, within the Crescent Beach restricted area across from the stream that runs alongside the beach

Lower-harbor stations (except for CSHH #14A, which is tested from shore) are often inaccessible during low tides and are monitored less frequently:

- CSHH #4, north of the sand spit at North Hempstead Beach Park (south section)
- CSHH #5, at Mott's Cove
- CSHH #6, at a point east of the site of the former Town of North Hempstead incinerator, now the waste-transfer station
- CSHH #7, at the southernmost section of the harbor, near the east shore just before the walkway for Bryant Landing buildings (208 senior residential units) and just north of the Roslyn viaduct. (The former marker for this station was a portion of an old oil dock, which was removed during the construction of Bryant Landing buildings.)
- CSHH #14, about 50 yd west of the powerhouse drain outfall
- CSHH #14A, directly from the powerhouse drain outfall (may be mixed with harbor water at higher tide)

Aerial view of lower harbor, looking south, with Harry Tappen Beach on eastern shore and North Hempstead Beach Park north of the sandspit on western shore (photo by David North, 7/13/19)

Figure 1
Core-Program Station Locations

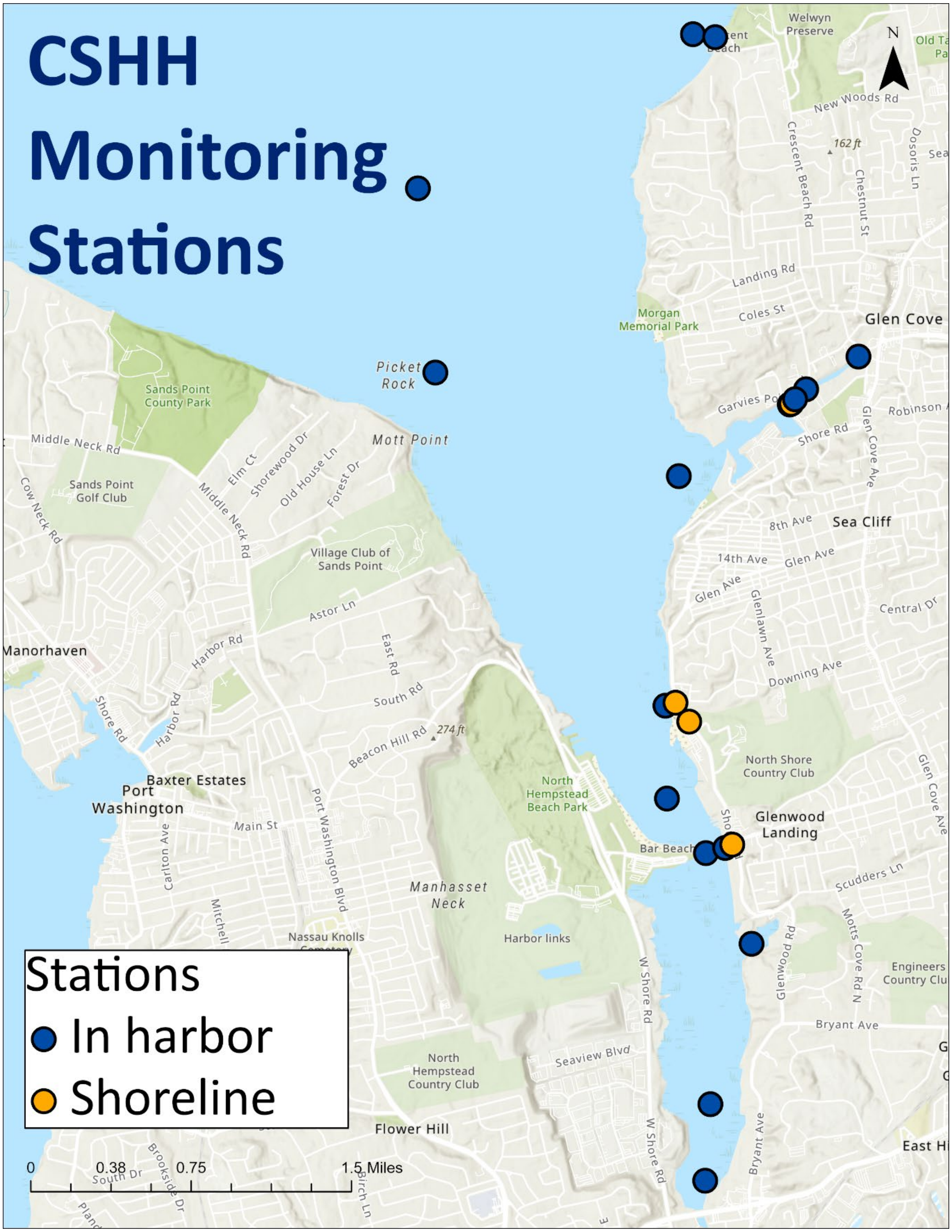


Figure 2
Station Locations for Harbor Sections and Glen Cove Creek

Table 1
Latitude/Longitude Points for Monitoring Stations (NAD 83 Datum)

Station ID	Latitude N	Longitude W
Upper-Harbor Stations		
CSHH #1, Beacon 11 (Corresponds to UWS station HEM-M-01)	40.83189	073.65353
CSHH #2, Bell 6 (Corresponds to UWS station HEM-O-04)	40.86099	073.67362
CSHH #3, red channel marker (Corresponds to UWS station HEM-M-03)	40.85373	073.65202
CSHH #8, adjacent to STP outfall pipe	40.85851	073.64191
CSHH #9, 10 ft west of #8	40.85850	073.64195
CSHH #10, 20 ft west of #8	40.85846	073.64203
CSHH #11, 50 ft east of #8	40.85881	073.64154
CSHH #12, 100 ft east of #8	40.85947	073.64054
CSHH #13, 60 ft from Mill Pond weir	40.86165	073.63583
CSHH #15, about 50 yd from Scudder's Pond outfall, north of Tappen Beach pool area	40.83820	073.65355
CSHH #15A, at outfall north of Tappen Beach pool	40.83837	073.65263
CSHH #15B, at Scudder's Pond weir	40.83709	073.65144
CSHH #16, north of Bell 6 (Corresponds to UWS station HEM-O-05)	40.87349	073.67493
CSHH #17, just outside the Crescent Beach restricted shellfish area (Corresponds to UWS station HEM-O-06)	40.88365	073.65016
CSHH #17A, inside Crescent Beach restricted shellfish area, just off shoreline	40.88343	073.64819
Lower-Harbor Stations		
CSHH #4, east of North Hempstead Beach Park (formerly Bar Beach) near sand spit	40.82815	073.65015
CSHH #5, Mott's Cove	40.82197	073.64619
CSHH #6, east of Port Washington transfer station	40.81114	073.65008
CSHH #7, west of Bryant Landing (former site of oil dock)	40.80596	073.65065
CSHH #14, about 50 yd west of powerhouse drain outfall	40.82848	073.64840
CSHH #14A, at powerhouse drain outfall	40.82872	073.64776

2.2.2 Station Expansion

At the end of the 2004 monitoring season, stations CSHH #9, #10, #11, and #12 were added in the vicinity of the Glen Cove sewage treatment plant outfall (CSHH #8) (in Glen Cove Creek) specifically to provide additional samples for bacteria analysis by the Nassau County Department of Health (NCDH). These stations were added to track the frequency and source of unusual dry- and wet-weather flows that were noticed at discharge points west of the STP outfall and that, on testing, indicated high levels of bacteria; the four stations became a permanent part of the water-monitoring program in 2005.

CSHH #13 was also established to monitor bacteria levels at the head of the creek and became a permanent part of the program in 2007. In 2008, CSHH #13 was set at 60 feet west of the Mill Pond weir to avoid shifting the sampling location as access to the weir varied due to tidal cycles. Samples collected at CSHH #13 can help indicate whether the restoration of Mill Pond is curtailing bacteria inputs to Glen Cove Creek and indicates the effect of fresh water from the large outfall that drains Cedar Swamp Creek. (Construction on the north side of Glen Cove Creek sometimes impaired access to CSHH #13.)

In 2009, the water-monitoring program was temporarily expanded to incorporate areas previously tested by the NYS Department of Environmental Conservation. Thirteen of the stations that were set up in 1988 as sampling points for DEC's shellfish growing area (SGA) #50 were reestablished, and five new stations were added. CSHH collected samples once or twice a week (depending on tidal cycles), and the samples were delivered to the DEC lab for analysis. The purpose of this sampling was to determine whether these areas of the harbor could be reopened for shellfish harvesting in addition to the areas in the outer harbor that were already being slated for reopening (in 2011). Unfortunately, the test results showed that all but two of the stations failed DEC shellfish standards on a regular basis. The stations that were monitored by CSHH in 2009 will not be monitored again for DEC until there are further water-quality improvements in areas of the mid- and lower harbor.

CSHH continues to collect samples at stations CSHH #14, #14A, #15, #15A, and #15B (established in 2009) for bacteria analysis by the NCDH (using water-quality standards for bathing beaches) as an alternative way to monitor discharges from the powerhouse outfall (CSHH #14 and #14A) and Scudder's Pond (CSHH #15, #15A, and #15B). Both subwatersheds were identified as the largest contributors of bacteria to Hempstead Harbor, and remediation plans were developed for both areas and implemented for Scudder's Pond (pond restoration was completed in June 2014). The samples collected established a benchmark of bacteria levels prior to the restoration of the pond and allowed for comparison of levels during and following completion of the restoration work. The restoration work done at Scudder's Pond has helped lower the bacteria levels at those stations. Currently, the Powerhouse Drain Subwatershed (for which water flows to the bottom of Glenwood Road and through a large cement spillway), is considered to be the largest contributor of bacteria into the harbor. Samples collected from this outfall (CSHH #14A) have helped establish conditions prior to any construction or other measures that will be implemented to diminish stormwater runoff in this area.

In 2015, CSHH stations #16, #17, and #17A were added to the monitoring program to further evaluate the water quality in the outer harbor within the recertified shellfish harvesting area and in the restricted area just offshore of Crescent Beach.

CSHH #17A is offshore of the stream that flows into Crescent Beach (photo by Carol DiPaolo, 5/18/22)

Between 2019 and 2022, stations were added and data was collected to monitor water quality around aquaculture projects in Tappen Marina (summer shellfish raising and winter kelp growing). These stations (CSHH #18-22) have since been suspended.

2.2.3 Frequency of Testing and Testing Parameters

Testing for the core Hempstead Harbor monitoring program includes the regular-season and winter-season testing. Testing for the regular season is conducted weekly from May through October, generally on the same day of the week and at the same time, starting at approximately 7 AM and typically continuing for five hours.

Beginning in 2013, weekly collection of water samples during the winter (November through April) was added to the monitoring program for CSHH #15A (outfall that drains from Scudder's Pond and Littleworth Lane, north of Tappen Beach pool), #15B (Scudder's Pond weir), and #14A (powerhouse outfall). The water samples are delivered to Nassau County Department of Health for bacteria analysis (fecal coliform and enterococci). This component of the monitoring program corresponded with the start of the restoration work (November 2013) at Scudder's Pond. (Phragmites removal, dredging of the pond bottom, installation of a new storm-water basin at Littleworth Lane to curtail future sedimentation of the pond, and planting of native plants were included in the restoration work, and the anticipated result was to diminish bacteria loading to Hempstead Harbor.) Winter monitoring continues; as of 2020, winter testing is conducted biweekly for bacteria and nitrogen. Beginning in 2018, winter sample collection has focused primarily on conditions at the Powerhouse Drain Subwatershed; samples from Scudder's Pond outfalls are collected periodically or after heavy rain or snowfall.

For the regular monitoring season, CSHH collects water samples and conducts water-quality tests with the assistance of volunteers as well as municipal staff for boat transportation to sampling sites. Water samples are collected (weather and tidal cycles permitting) from up to 21 testing stations for bacterial analysis by the NCDH. In addition, measurements for dissolved oxygen (DO), salinity, water temperature, pH, and turbidity are taken weekly at CSHH #1-3, #8, #13, and #16-17 and less frequently at CSHH #4-7, #14 and #15, where access is limited by tidal cycles. Samples were collected for nitrite and nitrate analysis at the Town of Oyster Bay lab until 2016 when the facility closed. However, samples continued to be collected for onboard ammonia testing. In 2018, sample collection for nitrogen resumed, and samples were delivered to Pace Analytical Services, LLC, for analysis of nitrite, nitrate, and ammonia (onboard ammonia testing was eliminated). Starting in 2019, nitrogen samples were collected during the regular monitoring season on a biweekly basis from a select 10 stations and delivered to Pace Analytical Services for analysis of nitrite, nitrate, ammonia, and total Kjeldahl nitrogen. A listing of core-program testing parameters, sampling locations, and analyses performed is presented in *Table 2*.

Physical observations are recorded regarding weather conditions, wind direction and velocity, water surface, air temperature, floatables, and wildlife and human activities. Whenever possible, floatable debris is retrieved and brought back to shore for disposal.

Dissolved oxygen (DO), salinity, water temperature, pH, and turbidity are recorded with an electronic meter. Starting in 2023, the YSI EXO2S was used by CSHH for the core monitoring program to measure all parameters listed previously and a YSI ProDSS provided through the UWS is maintained as a backup instrument. (From 2017 to 2022, a Eureka Manta+ 35 multiparameter meter, which was provided to groups participating in the UWS, was used by CSHH also for the core Hempstead Harbor monitoring program.) For the core program, the electronic meter is used starting at 0.5 meter and at 1-meter increments thereafter. At the first station that is monitored for the day (typically, CSHH #1), a replicate vertical profile is conducted as a quality-assurance check. To verify the meter readings, samples are collected from the bottom and tested for DO (using the Winkler titration method) and from a half meter below the surface and tested for pH (using a LaMotte wide-range indicator test kit that uses a color comparator).

CSHH water-monitoring crew members (photos by Michelle Lapinel McAllister, 8/23/23, and Lisa Cashman, 9/14/23)

The YSI EXO2S also measures chlorophyll a (Chl a), which is not a parameter required for the core Hempstead Harbor monitoring program but is a “Tier 1” parameter for the UWS.

Because the same multiparameter meter is maintained and calibrated for both programs (and monitoring events occur on consecutive days), Chl-a levels are recorded for the core program as merely a frame of reference (see *Section 3.6*).

Table 2
CSHH Monitoring-Program Parameters

Parameter	Location	Analyzer or Method	Location of Analysis
Dissolved oxygen	Vertical profile* at CSHH #1-8, 13, 14, 15, 16, and 17	YSI EXO2S	Field
Dissolved oxygen	One station for electronic meter validation	LaMotte 5860-01 (Winkler titration)	Field
Water temperature	Vertical profile at CSHH #1-8, 13, 14, 15, 16, and 17	YSI EXO2S	Field
Water temperature	One station for electronic meter validation	Calibrated digital thermometer	Field
Air temperature	CSHH #1-14, 14A, 15, 15A, 15B, 16-17, and 17A	Calibrated digital thermometer	Field
Salinity	Vertical profile at CSHH #1-8, 13, 14, 15, 16, and 17	YSI EXO2S	Field
pH	Vertical profile at CSHH #1-8, 13, 14, 15, 16, and 17	YSI EXO2S	Field
pH	One station for electronic meter validation	LaMotte 5858-01 test kit	Field
Turbidity	Vertical profile at CSHH #1-8, 13, 14, 15, 16, and 17	YSI EXO2S	Field
Water clarity	CSHH #1-8, 13, 14, 15, 16, and 17	Secchi disk	Field
Chlorophyll a	Vertical profile at CSHH #1-8, 13, 14, 15, 16, and 17	YSI EXO2S	Field
Fecal coliform	Grab sample at half-meter depth or from outfall flow at CSHH #1-14, 14A, 15, 15A, 15B, 16-17, and 17A	Membrane filter, SM 9222 D-2006	Nassau County Department of Health
Enterococci	Grab sample at half-meter depth or from outfall flow at CSHH #1-14, 14A, 15, 15A, 15B, 16-17, and 17A	Membrane filter, EPA 1600	Nassau County Department of Health
Total Kjeldahl nitrogen	Grab sample at half-meter depth or from outfall flow at CSHH #1, 3, 6-8, 12-13, 14A, 15A, and 16	EPA 351.2, Rev. 2.0	Pace Analytical Services, LLC
Ammonia	Grab sample at half-meter depth or from outfall flow at CSHH #1, 3, 6-8, 12-13, 14A, 15A, and 16	EPA 350.1, Rev. 2.0	Pace Analytical Services, LLC
Nitrate	Grab sample at half-meter depth or from outfall flow at CSHH #1, 3, 6-8, 12-13, 14A, 15A, and 16	EPA 353.2, Rev. 2.0	Pace Analytical Services, LLC
Nitrite	Grab sample at half-meter depth or from outfall flow at CSHH #1, 3, 6-8, 12-13, 14A, 15A, and 16	EPA 353.2, Rev. 2.0	Pace Analytical Services, LLC
Precipitation	Village of Sea Cliff	Stratus Precision Rain Gauge (visually read)	Field

**Vertical profiles start at 0.5 meter below surface followed by 1-meter increments.*

2.3 Unified Water Study

The Coalition to Save Hempstead Harbor has participated in the Unified Water Study: Long Island Sound Embayment Research since the program's inception in 2016. Funded by the federal EPA's Long Island Sound Study and administered by Save the Sound, the UWS is an ecological study of Long Island Sound bays in both Connecticut and New York. It is intended to engage citizen scientists in water monitoring by using uniform equipment and methodologies to collect biweekly samples from May through October. In 2023, 26 groups monitored 46 bays, from the Bronx River in NY in the west to the easternmost location at Wequetequock Cove in CT.

Although CSHH conducts monitoring for the UWS as a separate program from the core monitoring program for Hempstead Harbor, to the extent possible CSHH has aligned testing equipment and methodologies for both programs. For example, the same multiparameter meter is used and maintained as per UWS standard operating procedures to measure parameters that are common to both programs (e.g., water temperature, salinity, dissolved oxygen, and turbidity).

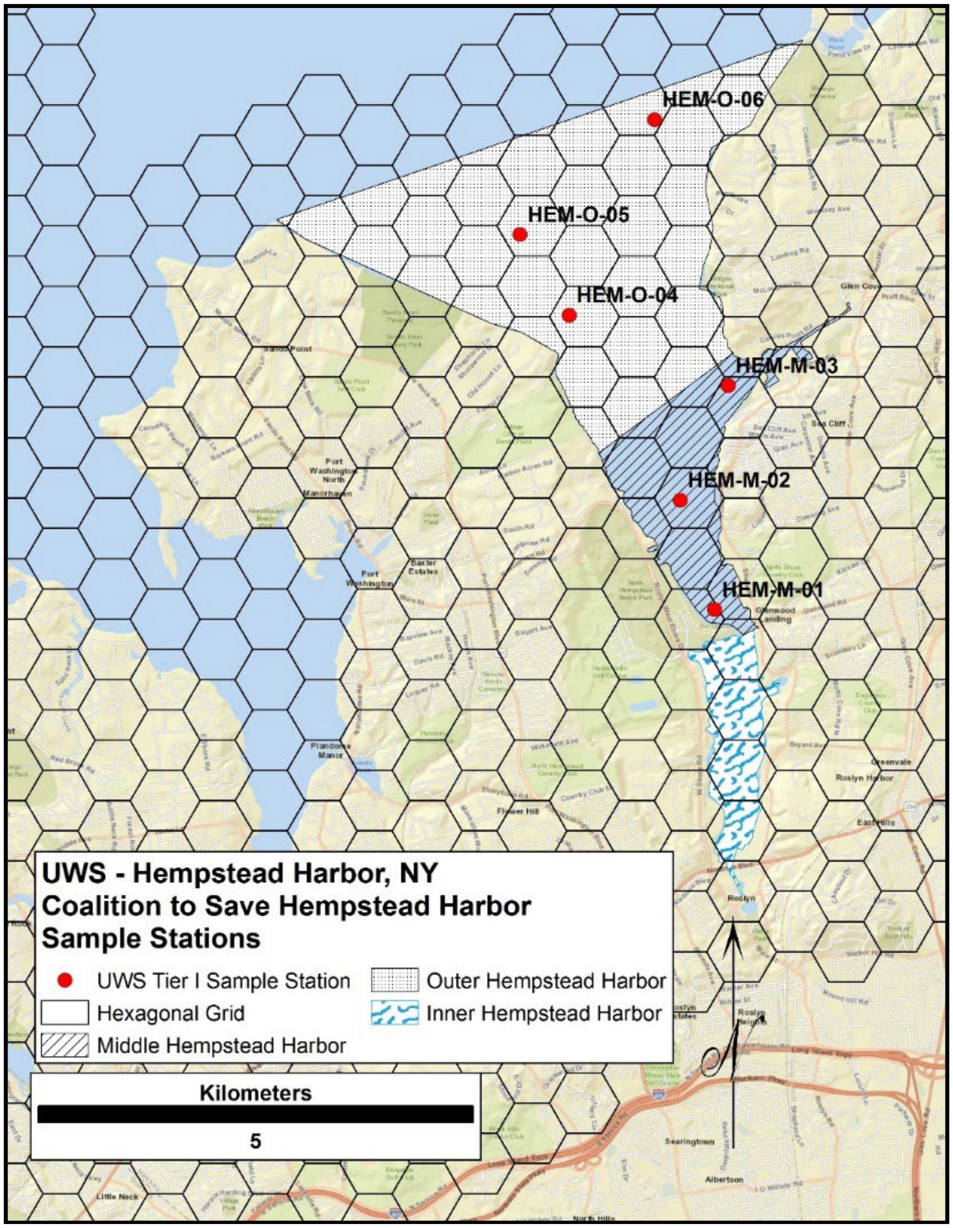
Beacon 11 (l) and Bell 6 (r) are CSHH #1 and #2 for the core program and HEM-M-01 and HEM-O-04 for the UWS (photos by Michelle Lapinel McAllister, 6/30/23)

2.3.1 UWS Station Locations

In 2017, five CSHH/Hempstead Harbor core monitoring program stations were selected to be included in the UWS study and are coded as "HEM" for that study. A hexagonal grid is applied to stations to ensure a requisite distance between station locations. In 2018, a sixth station was added (which does not correspond with a core monitoring program station), and all UWS stations were renumbered as follows:

- HEM-M-01, same as CSHH #1
- HEM-M-02 (added in 2018)
- HEM-M-03, same as CSHH #3
- HEM-O-04, same as CSHH #2
- HEM-O-05, same as CSHH #16
- HEM-O-06, same as CSHH #17

Figure 3
Location of Hempstead Harbor UWS Stations



Credit: Hexagonal grid and UWS station map provided by Peter Linderoth, Save the Sound

2.3.2 UWS Testing Parameters

As mentioned above, UWS monitoring is conducted on a biweekly basis, from May through October. As per UWS protocols, sampling must be completed within three hours of sunrise and so generally begins at approximately 6 AM.

For the UWS, “Tier 1” parameters include water temperature, specific conductivity (salinity), dissolved oxygen, chlorophyll a, and turbidity. UWS protocols specify collecting data at half a meter below the surface and half a meter off the bottom for stations that have a total depth of less than 10 meters; for deeper stations, data is recorded at mid-depth as well. At the end of each survey, four chlorophyll filtrations are performed along with meter readings from the same water that is filtered, and two of the filters are sent to Save the Sound's laboratory for analysis (see also *Section 3.6*).

The program also includes a qualitative macrophyte (aquatic plant, or seaweed) assessment that must be conducted on three days (ideally a week apart) from July 15 to August 7, within three hours of low tide. The assessment may be from a soft shoreline or a submerged area (from a dock or boat). CSHH selected unraked areas of three Hempstead Harbor beaches: Sea Cliff Beach, Harry Tappen Beach, and North Hempstead Beach Park. A photo assessment was completed for each area, and seaweed was categorized by color and general growth type (e.g., sheet, twig-like, or hair-like).

View looking south (l) and close-up of green and red seaweed (r) near Tappen Beach pool (photos by Michelle Lapinel McAllister, 8/7/23)

The results from the UWS monitoring season for all bays are included in a biannual report card, the most recent being the "2022 Long Island Sound Report Card" (encompassing data for seasons 2020 and 2021). This was the second report card to include grades on bay segments and portions of Long Island Sound, i.e., from west to east, Western Narrows, Eastern Narrows, Western Basin, and Eastern Basin. Hempstead Harbor, which connects to the Eastern Narrows segment of the sound (graded "C"), was evaluated with "Outer Hempstead Harbor" receiving a "C+" and "Middle Hempstead Harbor" receiving a "D." Hempstead Harbor's lowest score (F) was for chlorophyll in the middle harbor. (These are the same overall segment grades as in the previous "2020 Long Island Sound Report Card.") These results are surprising given the improvements in water quality observed in Hempstead Harbor over the past 35 years.

2.4 Pathogen Monitoring Network

In 2023, the CSHH participated in the pilot year of the Long Island Sound Pathogen Monitoring Network, which included four monitoring groups representing Connecticut and New York. Launched by the Interstate Environmental Commission, Harbor Watch, Connecticut Department of Energy & Environmental Protection, and Maritime Aquarium, the project is funded through the Environmental Protection Agency's Long Island Sound Office. The mission is to "foster collaboration and build capacity for sewage pollution pathogen monitoring and source detection in the Long Island Sound watershed."

Tidal gates north of the bridge on the west side of Dosoris Pond, station "DP3"
(photo by Evelyn Powers, 5/17/23)

CSHH testing efforts concentrated on four stations located in Dosoris Pond. The testing covered samples for fecal coliform and enterococci bacteria, analyzed by the Nassau County Department of Health. In addition, environmental conditions such as wind direction and speed, tide, weather, and both air and water temperature were recorded. Dosoris Pond has been closed to shellfishing for many years due to suspected bacteria contamination from the watershed, despite a lack of recent testing. With the current monitoring, it is hoped that problem areas can be identified and addressed, potentially leading to the reopening of Dosoris Pond and surrounding areas to shellfishing.

Southeast shore of Dosoris Pond (photo by Carol DiPaolo, 5/17/23)

3 Monitoring Results

This section summarizes the results of CSHH's core monitoring program. Where relevant, long-term data (from 2000 on) are assessed and compared with data from the current season. Appendices A, B, C, and D include data, graphs, and tables constructed with both current and long-term data to supplement understanding of the presented parameters. See *Figures 1* and *2* for station maps.

3.1 Dissolved Oxygen

Dissolved oxygen (DO), the form of oxygen that marine life needs to survive, is an important indicator of the health of our Long Island Sound estuary. Hypoxia (low oxygen) and anoxia (no oxygen) are water-quality problems that commonly occur during the summer in Hempstead Harbor and in other areas in and around Long Island Sound, particularly in the western sound.

Lower DO levels may be the result of a variety of factors, including anthropogenic influences such as nutrient enrichment (i.e., from nitrogen) via wastewater-treatment-plant discharges, overuse of fertilizers in home gardening and golf-course maintenance, and residual oxygen demand in bottom sediments from past industrial activities. Changes in air and water temperature and the physical nature and chemistry of the water can also influence DO levels (see *Sections 3.2* and *3.3*). It is also possible that differences in wind patterns could affect vertical mixing within the water column, resulting in a well-mixed water column during some years and a more stratified water column in others.

Dissolved oxygen operates on a daily cycle, making the timing of data collection important for this parameter. During the day, algae and other organisms produce oxygen as a byproduct of photosynthesis. At night, in the absence of sunlight, only respiration and decomposition occur, which can deplete dissolved oxygen. Therefore, the lowest levels of dissolved oxygen are generally observed in the early morning hours, and levels gradually increase during the course of the day. CSHH core-program surveys are conducted in a routine order such that any given station is surveyed at approximately the same time each week to allow for more accurate short- and long-term assessments (e.g., CSHH #1 is surveyed at about 8 am).

Key Findings – Dissolved Oxygen

- Tidal cycles prevented access to lower-harbor stations from June 21 to September 20, when other stations were exhibiting hypoxia.
- Healthy DO levels (4.8 ppm and above) were observed in 66.9% of all bottom measurements taken in 2023, compared with 61.0% of all bottom measurements in 2022.
- Hypoxic conditions (less than 3.0 ppm) were observed in 14.3% of all bottom measurements taken in 2023, compared with 18.5% of all bottom measurements in 2022.
- Two surface hypoxic readings were observed in 2023, less than the 2022 total of ten surface readings.
- In 2023, there was one anoxic (less than 1.0 ppm) bottom reading, on July 26 at CSHH #2; in the 2022 monitoring season, there was also only one anoxic bottom reading.
- CSHH #13 had the longest duration of bottom hypoxia and the lowest average bottom DO across all stations surveyed in 2023.
- Average bottom DO readings for 2023 were lower than in 2022 and 2021.

Nitrogen accelerates the growth of algae (including phytoplankton). This can result in frequent or prolonged “blooms.” When the cells in the blooms die off, the decomposition process depletes dissolved oxygen that fish, shellfish, and other aquatic organisms need to survive. The larvae of these organisms are often especially sensitive to low DO concentrations. In addition, low DO levels can cause some bacteria to produce hydrogen sulfide, which is a gas that can be toxic to fish.

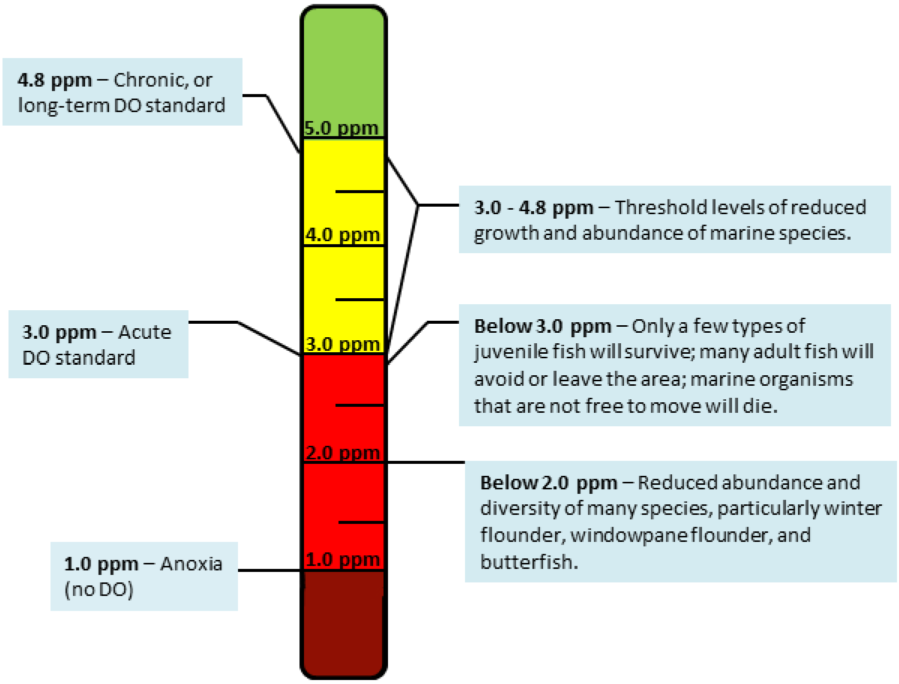
Although algal species produce oxygen during their growth stage through photosynthesis, algal mortality and subsequent decay generally influence DO levels more strongly, especially later in the summer when there are generally higher air and water temperatures. Therefore, productive aquatic ecosystems with larger nutrient loads are more prone to low DO levels. Because most organic-matter decay occurs at the estuary bottom, DO levels tend to be lower at the bottom of the water column and higher at the surface. Density-dependent stratification, such as elevated salinity levels at the harbor bottom, inhibits mixing and exaggerates this effect.

View of Hempstead Harbor looking northeast; high wind and waves can help mix the water column and prevent stratification (photo by Sebastian Li, 2/3/23)

Prior to 2008, DO levels above 5.0 ppm were considered healthy. A revised dissolved oxygen standard was implemented by the NYS DEC on February 16, 2008. For estuarine waters such as Hempstead Harbor, the chronic, or long-term, DO standard is 4.8 ppm. This means DO levels of 4.8 ppm and above are considered to be protective of most marine species, but the severity of impacts, and threshold DO levels where impacts occur, are strongly species dependent. The acute DO standard is 3.0 ppm; if DO concentrations fall below 3.0 ppm, conditions are considered hypoxic. Under hypoxic conditions, many juvenile fish will not survive, many adult fish will avoid or leave the area, and species that cannot leave the area may die. For DO concentrations that are equal to or greater than 3.0 ppm and less than 4.8 ppm, the growth and abundance of certain marine species will be affected (see *Figure 4*). The impact of hypoxia on marine life depends on the duration and area over which low DO levels occur; water temperature, salinity, and distribution and behavioral patterns of resident species also play a role in how marine organisms react to hypoxic conditions.

Percent saturation of dissolved oxygen is also monitored in Hempstead Harbor. Percent saturation is a measure of the amount of oxygen currently dissolved in water compared with the equilibrium amount that can be dissolved in the water and is influenced by variability in water temperature and salinity. In a marine system such as Hempstead Harbor, which has abundant nutrients and organisms, dissolved oxygen levels near the surface can be supersaturated (greater than 100%) during the day due to plant/algal photosynthesis, which produces oxygen. Wind and wave action can also contribute to increased DO levels and higher percent saturation. DO saturation is normally reduced at night due to plant respiration, as well as due to plant or other organic material decomposition.

Figure 4
DO Standards and Effects of Depleted DO on Marine Life



ppm = parts per million

DO measurements collected at the bottom of Hempstead Harbor are considered critical because bottom-dwelling marine life have more difficulty than other marine species in trying to escape low DO conditions. See *Figure 6* for 2023 average bottom DO measurements. Hypoxic conditions (low DO, interpreted to be less than 3.0 ppm in this report) and anoxic conditions (no DO, which, for purposes of this report, is less than 1.0 ppm) have been implicated in fish kills in Hempstead Harbor, particularly of Atlantic menhaden (commonly known as bunker) but also of juvenile flounder and other species.

Table 3
Fish Kill Occurrences since 2001

Years	Fish Kills	Locations	Conditions
2023	None reported	N/A	(Despite extended periods of hypoxia)
2022	Frequent but limited bunker kills with increased die-offs in August	Harborwide, soundwide	Large bunker population, frequent bottom hypoxia (18.5% of all measurements taken)
2021	Limited/scattered bunker kills	Harborwide	Large bunker population; limited bottom hypoxia (9.1% of all measurements taken)
2020	Limited/scattered bunker kills	Soundwide, New Jersey	Large bunker population present; vibrio bacterium present
2019	Limited fish kill (primarily bunker)	Parts of Hempstead Harbor and other bays in western Long Island Sound	Hypoxic and anoxic conditions
2016-2018	None reported	N/A	N/A
2015 (October-November)	Two limited bunker kills	Harborwide	(Corresponded with large bunker population that remained in the harbor through January 2016)
2007-2014	None reported	N/A	N/A
2006 (August)	Small, localized fish kill	Beach at Morgan Memorial Park	Low DO and hydrogen sulfide produced by bacteria
2005	Clam kill	Near CSHH #5 (Mott's Cove)	Lunar/tidal effects exposing clam beds
2001-2004	None reported	N/A	(Despite extended periods of hypoxia)

3.1.1 Seasonal Conditions

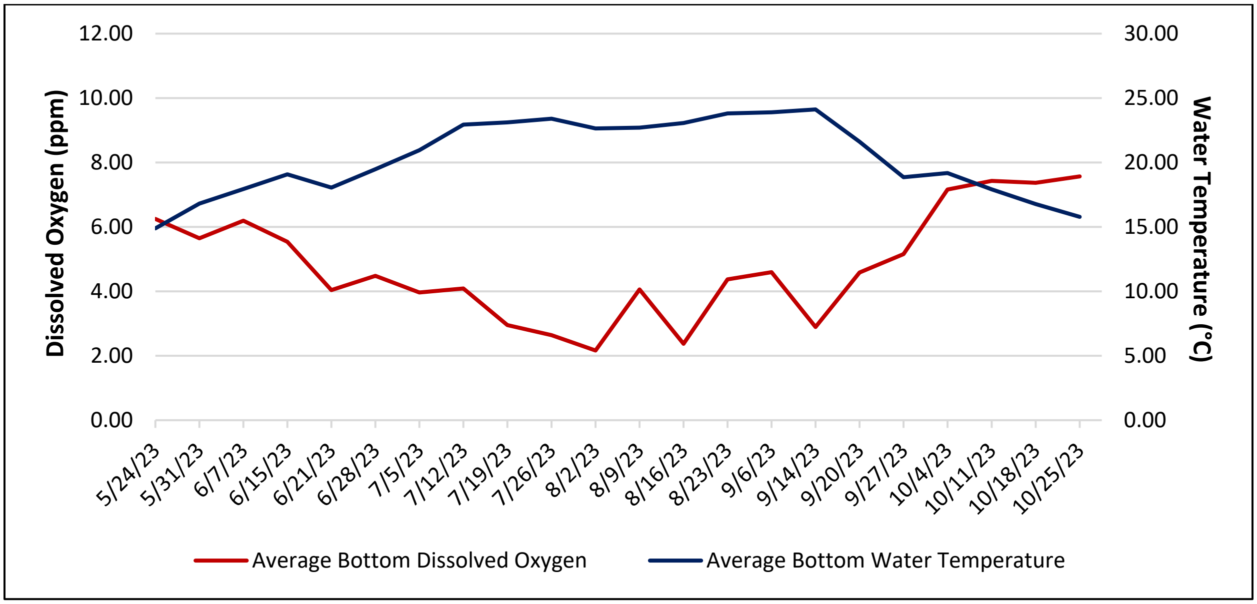
We observed the usual trend of decreasing DO that occurs during the summer season. However, the period over which hypoxic conditions were observed in 2023 started earlier than in 2022 and 2021. The first incidence of hypoxia in 2023 was observed on June 21 at CSHH #13, where hypoxic values were recorded at the bottom. This occurred two weeks earlier than the first incidence of hypoxia in the previous year (July 6, 2022), and several weeks earlier than that in 2021 (July 21). Throughout the rest of June and all of July and

August, hypoxic readings were observed at least once during each monitoring survey (see *Appendix A*). The highest number of stations exhibited hypoxia on August 2. The last hypoxic reading in 2023 was observed on September 20 at CSHH #13, but only at the bottom. This was the only station that was hypoxic on that date. (In 2022, the last survey with hypoxic readings was on September 28; in 2021, on September 3.)

Figure 5

2023 Harborwide Dissolved Oxygen and Water Temperature

Dissolved oxygen and water temperature, recorded at bottom depth and averaged for the entire harbor, are depicted below and illustrate the seasonal trend for both parameters. (In-harbor monitoring was cancelled on May 17 due to high wind and waves, and harborwide sampling was cancelled on August 30 due to thunderstorms; both dates have been omitted from the graph.)



For the entire 2023 regular monitoring season, 14.3% of all bottom readings exhibited hypoxic conditions (DO < 3.0 ppm), 18.9% of bottom readings fell in the 3.0 to 4.8 ppm range, and 66.9% of bottom readings were at healthy levels (≥4.8 ppm). (Although the "healthy" threshold for DO is currently 4.8 ppm, for purposes of this report, we use 5.0 ppm in order to make long-term comparisons; 64.0% of bottom readings in 2023 were ≥5.0 ppm.) (See *Figure 6* and *Appendix A* for 2023 and long-term bottom DO graphs, respectively.)

For all core-program sampling dates in 2023, two surface readings were hypoxic, and both were recorded at station CSHH #13 on July 26 and August 9. Surface hypoxia was observed in 2022 and 2019 but not in 2021 or 2020. In 2022, there were a total of ten surface hypoxic readings.

In 2023, one anoxic (less than 1.0 ppm) bottom reading was observed (on July 26 at CSHH #2). One anoxic reading was observed in 2022 (at CSHH #16), while no anoxic readings were observed in 2021 or 2020.

Dissolved oxygen conditions are influenced by a number of factors that are typical for Hempstead Harbor. However, year-to-year comparisons remain valuable in assessing seasonal conditions. Average bottom DO for the 2023 monitoring season across all stations was 5.48 ppm, compared with average bottom DO for 2022 and 2021 (5.52 ppm and 5.97 ppm, respectively). The percentage of bottom DO measurements that exhibited hypoxic conditions in 2023 (14.3%) was lower than that in 2022 (18.5%), but still higher than that in 2021 (9.1%).

A study using a 1994-2018 dataset on hypoxia noted that bottom dissolved oxygen concentrations at a station in western Long Island Sound (station A4, between Manhasset Bay and Hempstead Harbor) had "pronounced interannual variability," but found a positive trend of 0.48 mg/L per decade, suggesting improvement in oxygen conditions despite increasing bottom-water temperatures at this station (see Section 3.2) *(Whitney, M. and Vlahos, P. (2021). Reducing hypoxia in an urban estuary despite climate warming*). (Note that mg/L is equal to ppm.)

Long-term (2000 to present) dissolved oxygen data for Hempstead Harbor also show high interannual variability. A Mann-Kendall test, a statistical test used to detect trends in long-term data, was performed on monitoring data from 2000-2023, specifically using bottom dissolved oxygen values for the month of August at CSHH #1. (CSHH #1 was chosen as a representative station because it is one of the earliest established stations, is generally the first station monitored during weekly surveys (making the timing of arrival relatively consistent), and is an open-water station.) The results of the test indicate that there is no statistically significant positive or negative trend in this dataset.

3.1.2 Spatial Considerations

Duration of hypoxic conditions typically vary spatially. Of the 13 core-program stations where dissolved oxygen was measured in 2023, six had at least one hypoxic reading (CSHH #1-3, #13, and #16-17). Although this seemingly represents a decrease from 2022 (when 11 stations had at least one hypoxic reading), lower harbor stations in the 2023 monitoring season were inaccessible due to tidal cycles from June 21 through September 20 when other in-harbor stations were experiencing hypoxia. Therefore, we were unable to determine the seasonal DO conditions in this area of the harbor.

In Glen Cove Creek, specifically at CSHH #13, hypoxic readings were consistent throughout most of the summer season. CSHH #13 had nine hypoxic readings at the bottom and two at the surface. Although station CSHH #3 had two bottom hypoxic readings throughout the regular monitoring season, stations CSHH #3 and #8 did not reflect the same conditions observed at CSHH #13. Average bottom DO for CSHH #13 (3.75 ppm), was less than that for 2022 and 2021 (4.55 ppm and 5.05 ppm, respectively). In 2021, there were no hypoxic readings at any Glen Cove Creek stations.

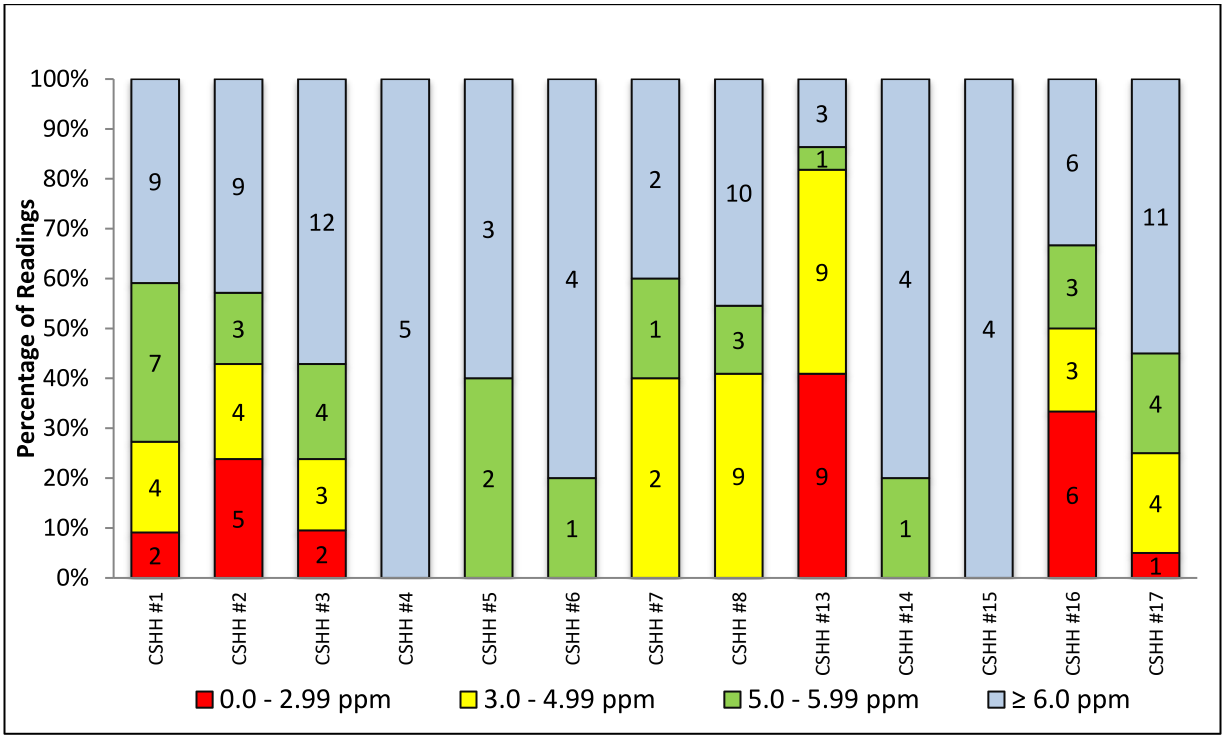
At upper harbor stations (CSHH #2, #16, and #17), hypoxic readings were observed between July 5 and August 16 at bottom. One additional day when bottom hypoxic readings were observed was September 14, but only at CSHH #2 and #16.

CSHH #13 had the highest percentage of hypoxic readings (40.9%), followed by CSHH #16 (33.3%) and #2 (23.8%). It is important to note that in 2023, 10 out of 22 surveys at CSHH #13, were taken west of the usual station because the head of the creek was inaccessible due to tides.

Glen Cove Creek experiences higher nutrient loading than other areas of the harbor. Multiple stormwater outfalls empty into the creek, and the Glen Cove sewage treatment plant is located on the south side of the creek.

Figure 6
2023 Bottom Dissolved Oxygen by Station

Each vertical bar represents one of CSHH's monitoring stations. The bar segments indicate the percentage of all readings taken at a location that falls into each of the four ranges. Numbers inside the bars indicate the number of observations within each DO range. Red segments are representative of hypoxic conditions (DO below 3.0 ppm). DO in the 3.0 to 5.0 ppm range is considered marginal and is shown in yellow. DO at 5.0 ppm and above is considered healthy and is shown in green and blue. Note that stations CSHH #4-7, #14 and #15 were not visited during periods when hypoxia had been observed at other stations. (Although 4.8 ppm is the standard that has been used since 2008, for purposes of the figure below, 5.0 ppm is used.)



3.2 Temperature

Key Findings – Temperature

- Overall, average thermal stratification of the water column was less in 2023 than in 2022 and 2021, indicating more mixing of water in the harbor.
- Average bottom water temperature was 19.89°C and average surface water temperature was 20.28°C.
- Air temperatures recorded on July 12 were the highest of the season at almost all stations.
- Average air temperature for the regular monitoring season was cooler in 2023 than in 2022 and 2021.

Water temperature is monitored to record seasonal and annual changes within the harbor and to determine whether temperature could be affecting marine life, especially organisms in the harbor that are in the southernmost limit of their habitat.

Water temperature is also used to determine the percent saturation of DO within the harbor. As described previously, percent saturation is a measure of the amount of oxygen currently dissolved in water compared with the amount that can be dissolved in the water. Percent saturation is strongly influenced by temperature: the lower the temperature, the higher the DO level must be to reach 100% saturation, and vice versa. For example, at 32ºF (0ºC), DO reaches 100% saturation concentration in water when it is present at a level of 14.6 ppm, whereas at 68ºF (20ºC), 100% DO saturation concentration is reached at 9.2 ppm, and at 77ºF (25ºC), it is reached at 8.6 ppm.

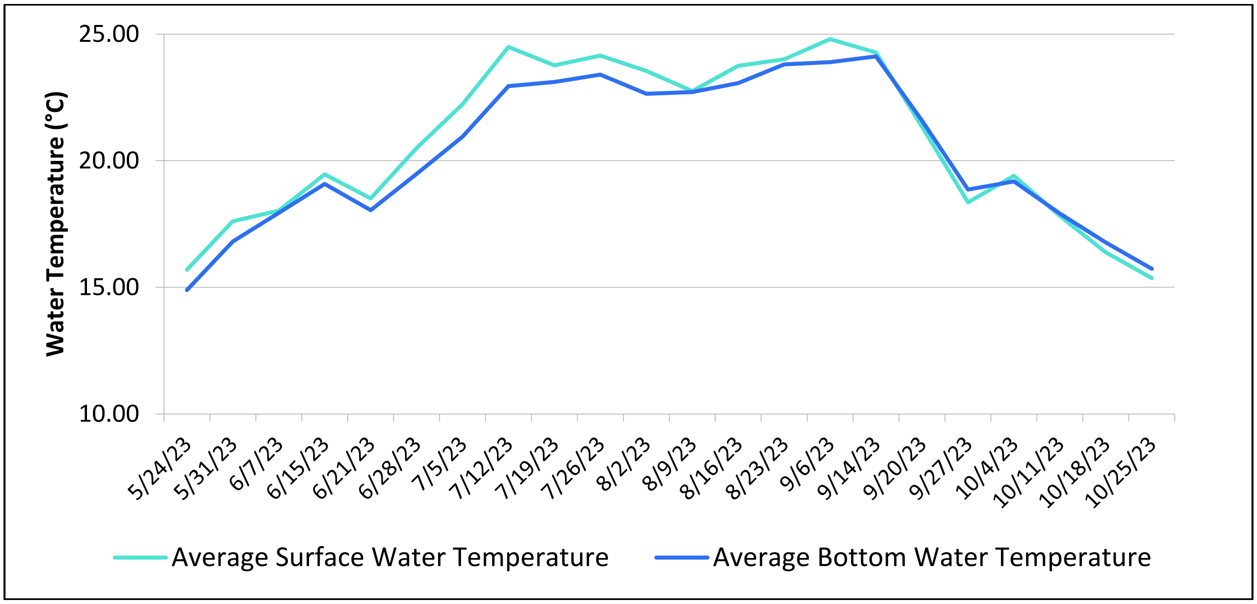
Additionally, temperature monitoring tells us whether the water column is stratified or well mixed. Stratification is a naturally occurring condition whereby water at the surface is warmer while water at the bottom is cooler. Because the colder water is denser, it stays at the bottom and cannot mix easily with the warmer water. This colder water becomes isolated from the surface (where most of the oxygen transfer occurs), which prevents replacement of DO lost through consumption by organisms. Hempstead Harbor does not generally exhibit pronounced stratification, because the harbor is relatively shallow and strongly influenced by tides and currents; vertical mixing continues through much of the season. In 2023, although stratification of the water column was less than in the previous two years, we still observed the anticipated trend that the water column is most stratified from around May through August. The difference between average surface and bottom water temperature in 2023 was 0.39ºC, whereas the difference in 2022 was 0.66ºC; in 2021, the difference was 0.49ºC.

The average surface water temperature for the 2023 regular season was 20.28°C; the average bottom water temperature was 19.89°C. In the 2022 regular season, the average surface temperature was 20.33°C; the average bottom temperature was 19.67°C. See *Appendix A* for additional water temperature monitoring data.

Many factors affect water temperature, but it is representative more of conditions that occur over several days and is not heavily influenced by daily variation in air temperature.

A warming trend has been observed in Long Island Sound (0.03°C per year in the central basin and 0.04°C for the eastern basin, for 1976-2010 data; see *Rice, E. and Stewart, G. (2013), Analysis of interdecadal trends in chlorophyll and temperature in the Central Basin of Long Island Sound*). The western portion of Long Island Sound, influenced most by freshwater inputs, is cooler than the eastern portion, influenced most by ocean water.

Figure 7
2023 Harborwide Average Water Temperature
Average surface and bottom water temperatures are depicted below. In-harbor monitoring was not performed on May 17 and August 30; these dates are omitted from the graph.



The study mentioned previously in *Section 3.1*, which assessed a dataset from 1994-2018 on hypoxia, also noted that bottom water temperatures at the same station (A4) in western Long Island Sound exhibited a warming trend of 0.8*°C* for this time period. Both surface and bottom water temperatures at this station were reported to have strong interannual variability. (See *Whitney, M. and Vlahos, P. (2021), Reducing hypoxia in an urban estuary despite climate warming*.)

Similar to what we found with long-term DO data, long term (2000 to present) water temperature data for Hempstead Harbor show high interannual variability. A Mann-Kendall test, a statistical test used to detect trends in long-term data, was performed on monitoring data from 2000 to 2023, specifically using bottom water temperature values for the month of August at CSHH #1. As was noted previously, CSHH #1 was chosen as a representative station because it is one of the earliest established stations, is generally the first station monitored during weekly surveys (making the timing of arrival relatively consistent), and is an open-water station. The results of the test indicate that there is no statistically significant positive or negative trend for water temperature in this dataset. The variations we see throughout the harbor are likely due to the shallower water of the harbor, freshwater inputs, and the cooler water of western Long Island Sound.

Air temperature affects aquatic temperature, which affects both DO concentrations and biological activity within an aquatic system. Because CSHH records temperature data only during monitoring events, air temperature more strongly reflects the time of day that CSHH monitored a certain location. However, because monitoring events begin at similar times each season and have similar durations (i.e., May through October, and measuring air temperature at stations from approximately 8-11:30 am), changes in air temperature averaged between sites during a season could be indicative of annual variability in weather conditions.

The average air temperature for the 2023 season was 19.9°C. This represents all data points taken using a long-stem digital thermometer throughout Hempstead Harbor for every sampling date. The 2023 summer season was slightly cooler than the summer seasons of 2022 (20.4°C) and 2021 (22.4°C).

Although we had unusually warm temperatures in April 2023, only one official heat wave was recorded during summer 2023 (in early September). (The criteria used for determining a heat wave are at least three consecutive days with high temperatures of 90°F or greater, according to the National Weather Service.) On July 12, average harborwide air temperature was the highest for the monitoring season (27.8°C).

3.3 Salinity

The amount of salt dissolved in a body of water, or salinity, can be influenced by tidal cycles, direct precipitation, freshwater from the watershed (e.g., streams, ponds, rivers, and lakes), and discharges (e.g., stormwater or wastewater). Like temperature, salinity influences water density and is an indicator of how stratified the water column is.

Salinity also affects DO levels; DO saturation is lower in saltwater than in freshwater. For example, the 100% saturation level of dissolved oxygen at 25 ppt salinity is equal to approximately 85% of the saturation level of dissolved oxygen for freshwater (assuming temperature is the same in both instances). In Long Island Sound, salinity generally ranges between 21 ppt and 28 ppt (as compared with the typical salinity level of 32-38 ppt in the open ocean).

Key Findings – Salinity

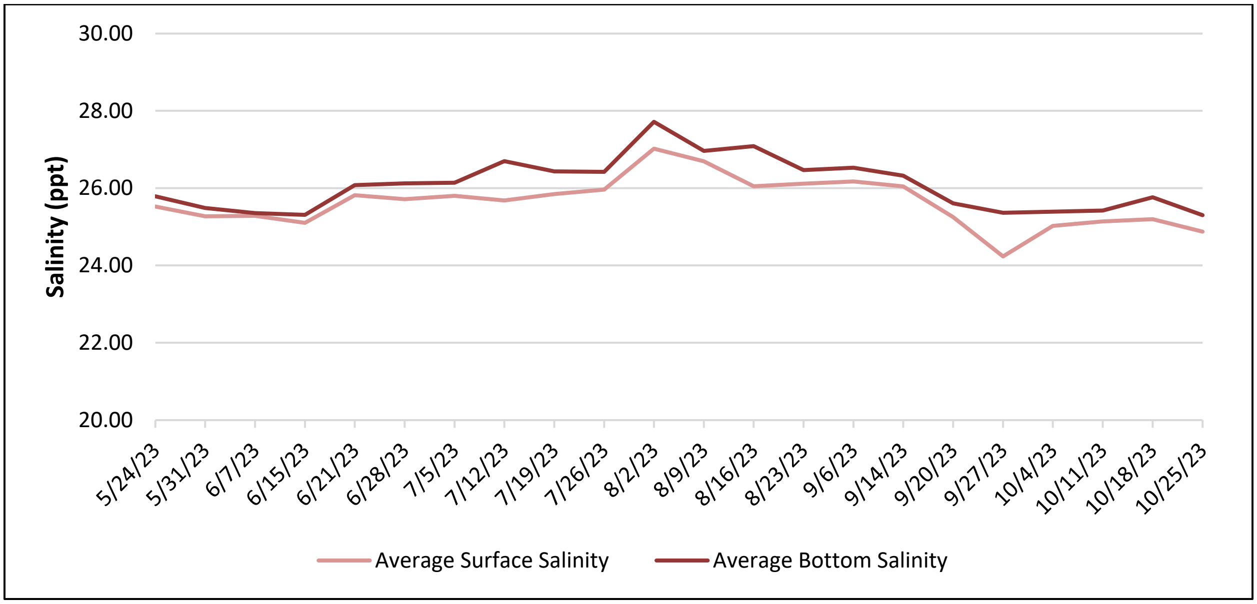
- Harborwide salinity in 2023 was lower than in 2022 for all average surface and bottom measurements, likely due to a higher rainfall total during the 2023 monitoring season.
- CSHH #8 and #13 typically exhibit lower salinity readings compared with other stations due to their proximity to known sources of freshwater input. For this reason, the data from these stations are omitted from the 2023 seasonal averages, which are meant to convey harborwide conditions.

During winter months, salinity tends to be higher, particularly at greater depths. In the spring, salinity is usually lower from more freshwater input. As the summer progresses, salinity levels slowly increase due to rising air temperatures, causing more evaporation in the harbor (see *Figure 8*). Typically, salinity values throughout Hempstead Harbor are approximately 25 ppt, and surface salinity is generally lower than bottom salinity due to more direct freshwater input. In 2023, the average surface salinity for Hempstead Harbor was 25.03 ppt, lower than that in 2022 and in 2021 (26.58 ppt and 25.22 ppt, respectively). The average bottom salinity for Hempstead Harbor in 2023 was 25.85 ppt, lower than that in 2022 (27.00 ppt) and slightly higher than that in 2021 (25.75 ppt). Overall, these results are comparable with typical harborwide salinity conditions.

An increase in the amount of freshwater input to Hempstead Harbor during the 2023 monitoring season, through direct rainfall and runoff, may have contributed to lowered salinity levels (see *Section 3.9*). During the 2023 monitoring season, Hempstead Harbor had higher precipitation levels than what occurred during the 2022 monitoring season, particularly in September. In 2022, Long Island faced abnormally dry conditions throughout the summer and at times was in a moderate to severe drought (see NOAA/National Integrated Drought Information System at https://www.drought.gov/states/new-york). See *Appendix A* for additional salinity data results.

Figure 8
2023 Harborwide Average Salinity

Average surface and bottom salinity data illustrate the seasonal trend. Data from CSHH #8 and #13 are not included in the graph, as they are uniquely affected by known sources of freshwater input and are not representative of harborwide conditions.



3.4 pH

Measurements on the pH scale (0-14) indicate how acidic or basic a waterbody is. Changes in pH can serve as indicators of changes in water chemistry and aquatic life. pH is affected by carbon dioxide (CO_2), which can enter a water body through the respiration of plants during photosynthesis or atmospheric deposition. Increasing amounts of CO_2 from atmospheric deposition can affect pH over decades and reduce alkalinity—the capacity of the water to resist changes in pH that cause acidification. Acidification adversely affects the growth of shellfish and other marine life.

EPA's criteria for healthy pH levels for coastal and estuarine ecosystems range between 6.5 and 9.0 (retrieved from https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table).

Key Findings – pH

- Average surface and bottom pH levels for the harbor in 2023 (7.71 and 7.57, respectively) were consistent with long-term averages (2005-2023; excluding 2022).
- The lowest average surface pH measurement of the season (7.43) was recorded at CSHH #7, whereas the lowest average bottom pH (7.35) was recorded at CSHH #13.
- The highest pH measurement of the season (8.21) was recorded at CSHH #16 at the surface.
- The lowest harborwide average pH was recorded on monitoring dates that also had the lowest average harborwide DO.

Average surface and bottom pH levels for Hempstead Harbor in 2023 were 7.71 and 7.57, respectively. These values are consistent with long-term surface and bottom averages from 2005-2023 (7.76 and 7.61, respectively). (Note that 2022 pH data is excluded due to a pH sensor malfunction on our multiparameter meter.)

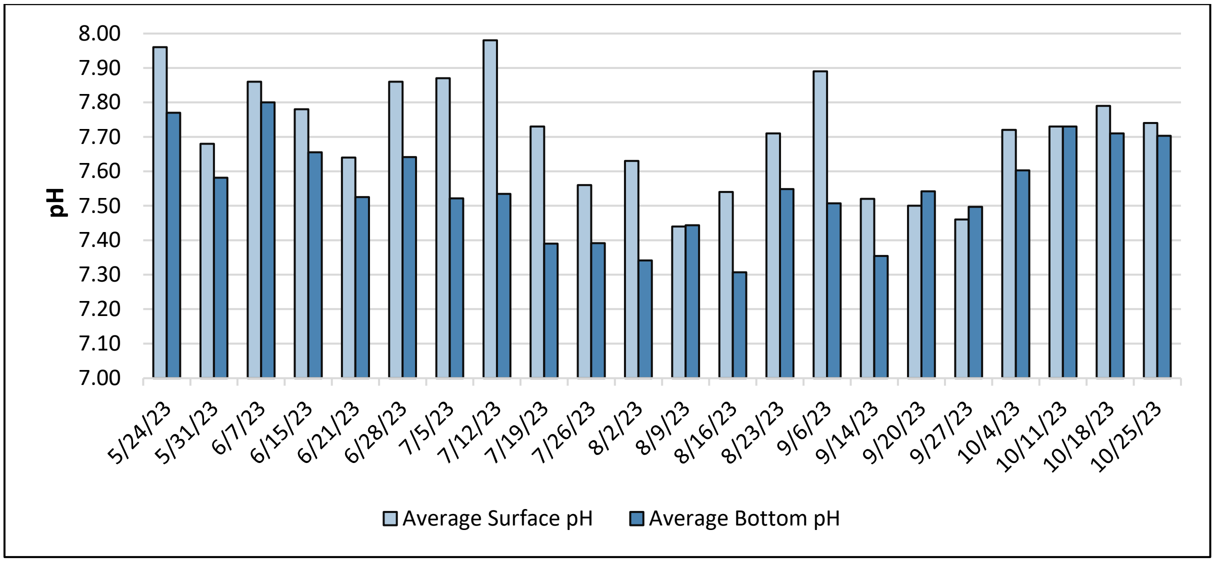
Although there are temporal and spatial variations, the pH levels within Hempstead Harbor generally fall between 7.0 and 8.5. The lowest bottom pH measurement (7.16) was recorded at CSHH #1 on August 16, a day that also yielded low pH values at the bottom for every other station surveyed that day. The highest pH measurement (8.21) was recorded at CSHH #16 on July 12 at the surface.

Research has linked the combination of both low pH and low DO levels with having a more detrimental impact on marine life than low DO alone. (See *Gobler, C.J., et al. (8 January 2014). Hypoxia and acidification have additive and synergistic negative effects on the growth, survival, and metamorphosis of early life stage bivalves.* Retrieved from *http://www.plosone.org/article/info:doi/10.1371/journal.pone.0083648*.)

In 2023, when bottom pH levels were below 7.40, bottom DO levels were also low, sometimes coinciding with hypoxia.

Figure 9
2023 Harborwide Average pH

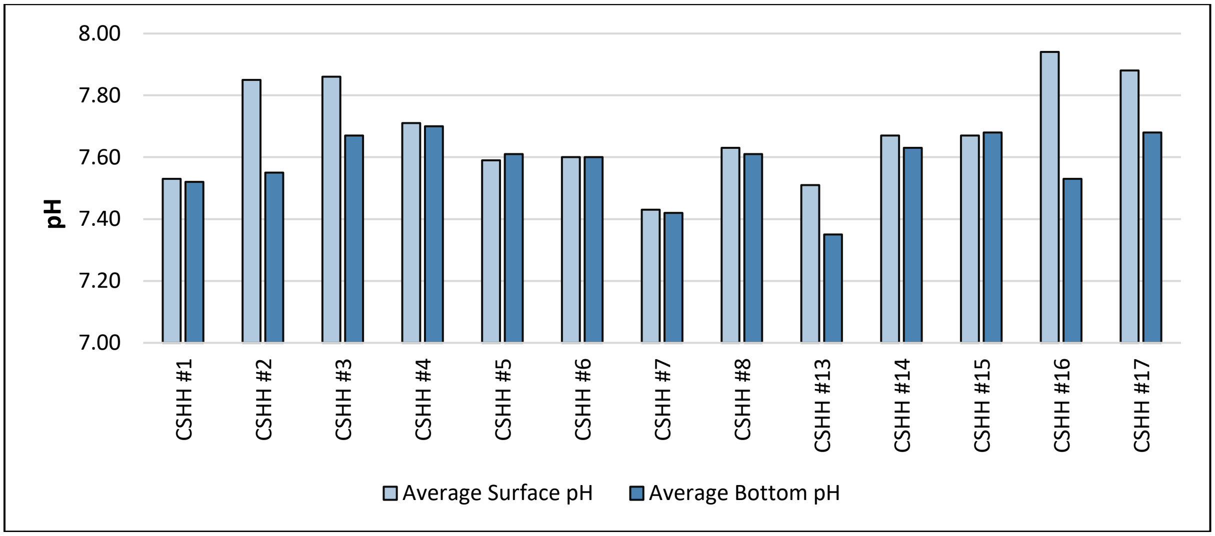
Each set of bars depicts average surface and bottom pH for each monitoring survey throughout the regular water-monitoring season.



In 2023, CSHH #7 had the lowest average surface pH of the monitoring season (7.43), while CSHH #13 had the lowest average bottom pH (7.35) (as well as the lowest average bottom DO). In 2021, CSHH #7 had the lowest average surface and bottom pH (for this report, we compare 2023 pH data with 2021 pH data because of a pH sensor malfunction in 2022). Lower-harbor stations (CSHH #4-7, and #14) generally have lower pH readings than other stations; however, tidal-dependent access to these stations provides fewer profiles, making their averages less representative of the season.

Figure 10
2023 Average Surface and Bottom pH by Station

Each set of bars depicts average surface and bottom pH for each CSHH monitoring station throughout the regular water-monitoring season.



3.5 Water Clarity/Turbidity

Water clarity can be influenced by several factors. Suspended solids, dissolved organic matter, and plankton decrease the clarity of a water body and can vary due to natural events (e.g., tidal flux, rainfall, algal blooms). Human activities that cause eutrophication (excessive nutrients) and sediment loading from uncontrolled runoff also diminish water clarity.

Key Findings – Water Clarity/Turbidity

- The harborwide average Secchi depth for the 2023 season was slightly shallower than the 2022 harborwide average, but deeper than the 2021 and 2020 averages.
- Despite a shallower harborwide average, the range of Secchi-depth readings in 2023 was comparable with typical harbor conditions.
- CSHH #7 had both the lowest average Secchi depth and the highest average turbidity, indicating worse water clarity at this station in 2023 compared with other stations.
- The highest Secchi-depth reading in 2023 was 4.0 m (at CSHH #17). This was the highest Secchi depth since 2000 for the regular monitoring season.

3.5.1 Secchi-Disk Measurements

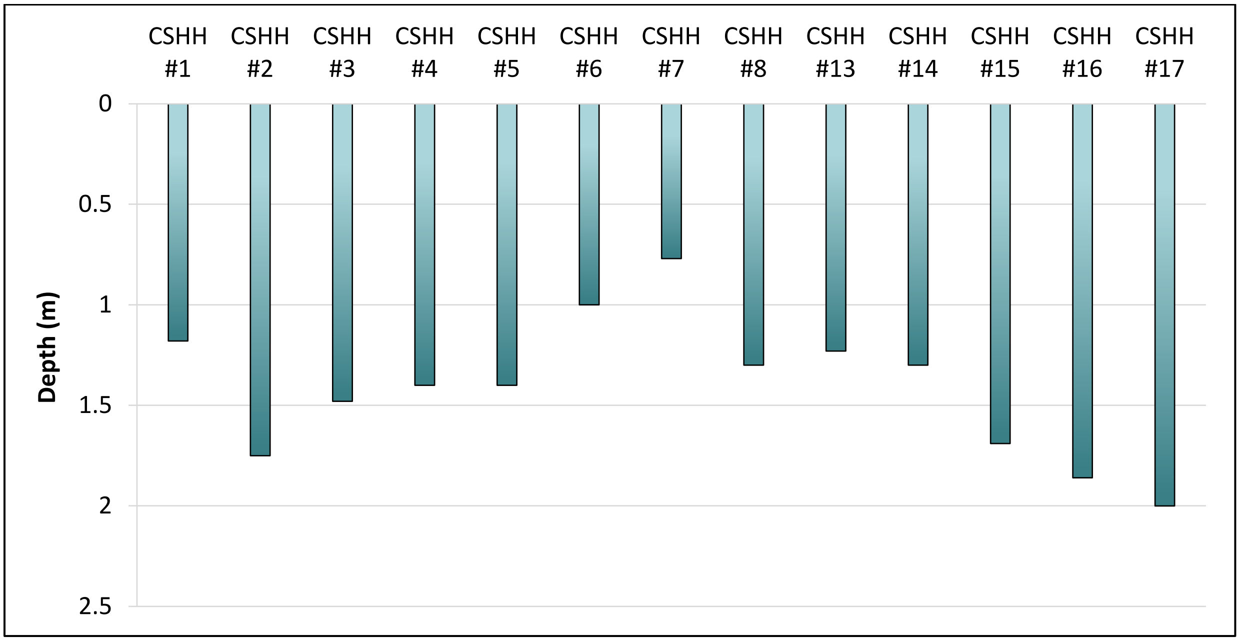
Water clarity is commonly monitored with a Secchi disk–a white (or white and black) plastic disk that is lowered into the water to determine the lowest depth at which ambient light can penetrate the water column. In most nutrient-rich waters, such as Hempstead Harbor and Long Island Sound, the depth at which the Secchi disk is visible depends on the amount of plankton or other suspended matter in the water. Phytoplankton generally give the harbor its usual green to brown color. For Hempstead Harbor, Secchi-depth readings are typically 1 to 2 meters but can range from 0.25 to 4 meters during the monitoring season, depending on the monitoring station.

In 2023, the minimum Secchi depth recorded during the season was 0.4 m, occurring on May 31 at CSHH #6 and #7. The deepest Secchi depth recorded was 4.0 m at CSHH #17 on October 11.

The seasonal and harborwide average of all Secchi-disk measurements was 1.48 m, which was similar to the depth recorded in 2022 (1.51 m) and comparable with typical harbor conditions. We also observed the anticipated seasonal trend of harborwide water clarity worsening by June and improving by late summer and into the fall.

Water clarity tends to vary spatially. On average, CSHH #6 and #7, both located in the lower harbor, had the lowest water clarity in 2023, while upper-harbor stations CSHH #2, #16, and #17 had the highest. Analysis of long-term data (2000-2023) for lower-, mid-, and upper-harbor stations, supports this pattern. Long-term Secchi-depth averages at CSHH #1, #6, and #16 are 1.15 m, 0.98 m, and 1.76 m, respectively (these stations were chosen as representatives for lower-, mid-, and upper-harbor areas).

Figure 11
2023 Average Secchi-Disk Depth by Station
Each bar depicts the average Secchi-disk depth at each of CSHH's monitoring stations. Longer bars represent greater depth in the water column, indicating higher water clarity.



3.5.2 Turbidity Meter Measurements

Although research related to the effect of turbidity on the marine environment is limited, there has been increased recognition of its significance and the need to standardize measurements of turbidity levels. For example, excessive increases in turbidity levels in both naturally low and highly turbid waters may cause harm to fish growth, gill function, and survival.

According to the US EPA's National Recommended Water Quality Criteria—Aquatic Life Criteria Table (referencing the 1986 Quality Criteria for Water) (https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table), turbidity could affect both freshwater and marine species of fish in the following ways:

1. Reduce their growth rate, resistance to disease, and life span
2. Prevent the successful development of fish eggs and larvae
3. Modify natural movements and migrations of fish
4. Reduce the abundance of food available to the fish

Elevated turbidity is generally harmful in most aquatic environments and for most species. Although some species may benefit from turbid conditions (e.g., small increases in turbidity may afford increased camouflage), this increased advantage would be at the expense of other species (e.g., larger predators) and may upset the ecological balance. It is thought that the effect of additional turbidity from human-generated sources depends on the determined "background" turbidity level of the water body (see *Johnson, J. E., and R. T. Hines. 1999. Effect of suspended sediment on vulnerability of young razorback suckers to predation. Transactions of the American Fisheries Society 128:648–655*; *Meager, J.J., et al. 2005. Effects of turbidity on the reaction distance, search time and foraging success of juvenile Atlantic cod (Gadus morhua) Can. J. Fish. Aquat. Sci. 62:1978–1984*). At this time, regulatory agencies have not articulated a quantitative background turbidity level for Hempstead Harbor and Long Island Sound. However, the EPA provides narrative criteria for assessing turbidity. As stated in Title 6 New York Codes, Rules, and Regulations (NYCRR) Article 2: Classifications and Standards of Quality and Purity, "There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions."

Turbidity sampling was initiated for Hempstead Harbor stations in July 2008. At each station monitored, turbidity is measured in nephelometric turbidity units (NTUs).

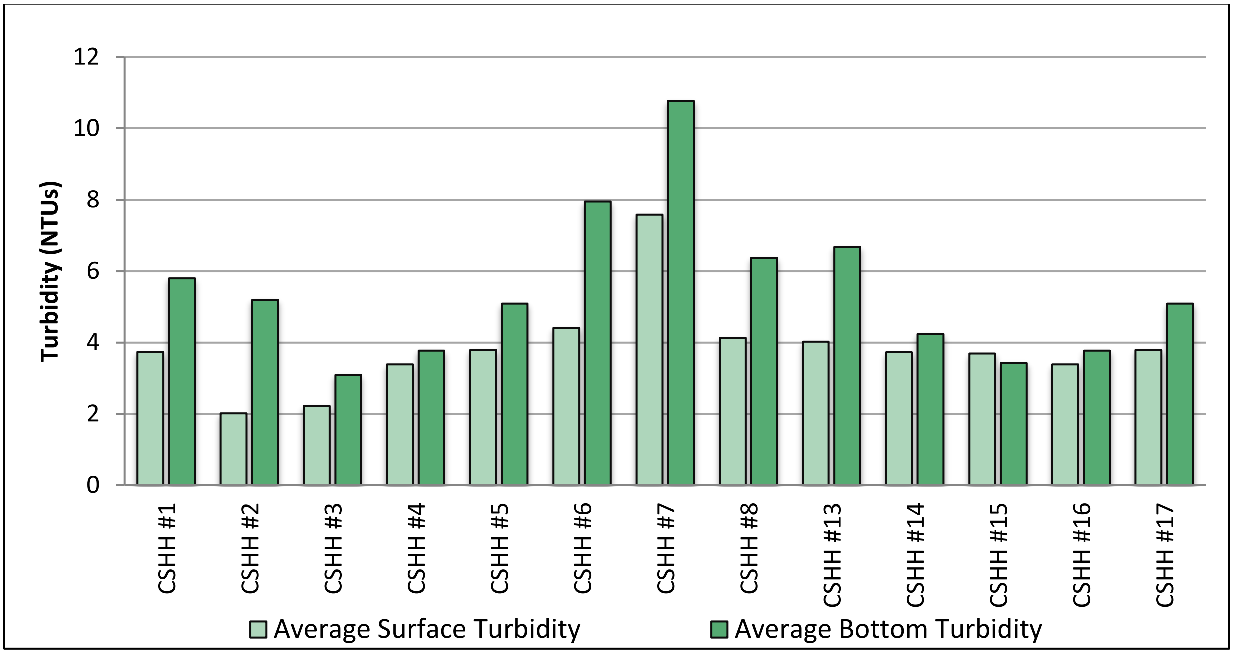
Given that Secchi-disk depth decreases as the water gets harder to see through, it follows that turbidity measurements should generally be inversely related. Measures of conditions at Hempstead Harbor stations clearly indicate an inverse relationship; that is, the lower the Secchi-disk reading (worse water clarity), the greater the measurement by the meter in NTUs (the higher the turbidity).

The "Unified Water Study Embayment Report Card Development," prepared by Save the Sound, provides water clarity reference cut-points for scoring embayments, derived from the National Coastal Condition Report (NCCR) IV. For purposes of the report card, standards for turbidity are informed by the water body's ability to "historically" support submerged aquatic vegetation (SAV). Hempstead Harbor does not currently and has not recently supported SAV, and therefore when using these thresholds for comparative purposes, "good" conditions are achieved when surface turbidity is less than 7.90 NTUs at one-meter depth (which was the case for 90.0% of all surface and bottom observations in 2023), and Secchi depth is greater than 0.62 m (which was the case for 95.9% of all observations in 2023).

The harborwide average surface turbidity for the 2023 regular-monitoring season was 3.15 NTUs. This is slightly elevated from the 2022 harborwide average surface turbidity of 2.62 NTUs but is still within the range of "good" conditions as provided in the "UWS Embayment Report Card Development."

In addition to comparisons with available standards, turbidity can be compared between stations within Hempstead Harbor. Although surface turbidity is primarily assessed, both surface and bottom turbidity averages are utilized in the spatial comparison depicted in *Figure 10*. The highest averages (most turbid readings) for both surface and bottom turbidity were recorded at CSHH #7 (7.58 and 10.77 NTUs, respectively). The lowest averages (least turbid readings) for surface and bottom turbidity were recorded at CSHH #16 and CSHH #17 (1.87 and 2.62 NTUs, respectively).

Figure 12
2023 Average Surface and Bottom Turbidity by Station
Each set of bars depicts the average surface and bottom turbidity for each of CSHH's monitoring stations. Higher turbidity values (higher bars) correspond to lower water clarity.



3.6 Chlorophyll

Chlorophyll is a photosynthetic pigment that causes the green color in algae and plants and is essential to the process of photosynthesis (converting carbon dioxide and water into glucose, releasing oxygen as a byproduct, using energy from the sun). Chlorophyll a (Chl a) is the most abundant form of chlorophyll (others include types b, c, and d). The concentration of chlorophyll present in water is directly related to the amount of suspended phytoplankton (microscopic algae and cyanobacteria) (cyanobacteria, often called "blue-green algae," are photosynthesizing bacteria, not algae). Phytoplankton can be used as indicator organisms to determine the health of a water body, and measuring chlorophyll is a way of tracking the growth of phytoplankton. Excessive concentrations of algae, typically accompanied by high concentrations of nutrients (e.g., nitrogen), can cause the water to have a green, brown, or red appearance and decrease the overall clarity. Significant concentrations of algae are considered a "bloom." As the algae cells die off and decompose, this process can deplete dissolved oxygen, which may result in fish kills. In addition to being aesthetically unpleasing due to discoloration of the water, some species of algae and cyanobacteria produce harmful toxins that affect fish, shellfish, humans, livestock, and wildlife.

Chlorophyll a has been measured as part of the CSHH monitoring program since July 2016, when a FluoroSense handheld fluorometer was first used. The process to measure Chl a generally requires a field reading and then filtering a representative sample, collected the day of the monitoring event, to extract algae. This filter is analyzed by a laboratory with a calibrated fluorometer or spectrophotometer to determine the correlation between the extracted concentration and value recorded in the field. This correlation is then applied to all field readings for that monitoring event. In 2016, field readings were recorded, but filtrations were completed for only two monitoring events, so the data are considered incomplete. From 2017 to present, Chl-a field readings were recorded for the core monitoring program using a multiparameter sonde and used only as a frame of reference.

The sonde values recorded for Chl a are used along with percent saturation for dissolved oxygen as well as observations for color, clarity, and other characteristics of the water to assess whether an algal bloom is in progress. For example, Chl-a values greater than 20 ug/l would indicate a high concentration of phytoplankton. DO saturation greater than 100% during regular season monitoring might also indicate an algal bloom in progress (see also *Section 3.1*).

During the 2023 monitoring season, water color around monitoring stations generally varied from the usual green to brown. Potential algal blooms were more localized and occurred over a shorter timeframe than in the 2022 monitoring season. Unusual brown coloration occurred in Tappen Marina and Glen Cove Creek on June 28. On July 5, the water at Tappen Marina and around CSHH #1 and #2 was an unusual brown color, whereas the water was more of a greenish-brown at CSHH #3 and very brown in Glen Cove Creek.

Greenish-brown water in the boat wake north of Beacon 11
(photo by Michelle Lapinel McAllister, 6/30/23)

3.7 Nitrogen

Ammonia, nitrate, and nitrite are three nitrogen-based compounds that are commonly present in marine waters. Other nitrogen-based compounds include organic nitrogen and nitrogen gas.

Key Findings – Nitrogen

- In 2023, average total nitrogen ranged from 0.96 mg/L at CSHH #6 to 5.3 mg/L at CSHH #14A, indicating impaired conditions.
- Average total nitrogen for each station has gone from a range of 0.12 mg/L – 1.03 mg/L (indicating pristine to impaired conditions) in 2019 to 0.96 mg/L – 2.95 mg/L (indicating impaired conditions) in 2023.
- Average total nitrogen in 2023 was highest at outfall stations—CSHH #14A (5.3 mg/L) and #15A (4.7 mg/L).
- The most prominent form of nitrogen present during winter monitoring was inorganic, specifically nitrate.
- Average total nitrogen and average total inorganic nitrogen were higher during winter monitoring than during the preceding regular season at outfall stations every year since 2019.

3.7.1 The Nitrogen Cycle

Nitrogen is made available to the marine environment through **fixation**, the transformation of nitrogen gas into ammonia by nitrogen-fixing bacteria. Nitrogen is also made available to the marine environment through inputs from the watershed (i.e., point and nonpoint sources), generally originating from fertilizer and human or animal wastes. These inputs occur as **ammonia** (NH_3), **nitrite** (NO_2), or **nitrate** (NO_3) (all of which are inorganic species of nitrogen). **Inorganic nitrogen** can be assimilated into **organic nitrogen**, such as amino acids, proteins, and urea, that are needed for growth and reproduction. **Total nitrogen** (TN) comprises organic nitrogen and inorganic nitrogen. (*Figure 13* presents a diagram of the nitrogen cycle in the marine environment.)

Too much nitrogen can have adverse impacts on water quality, such as the formation of harmful algal blooms, which can be toxic to fish, shellfish, humans, and other mammals. It can also contaminate groundwater and thereby pose health risks, particularly in places like Long Island, where drinking water comes solely from groundwater. Excessive nitrate levels present in drinking water due to contamination from fertilizers and septic systems can lead to "blue-baby" syndrome in infants.

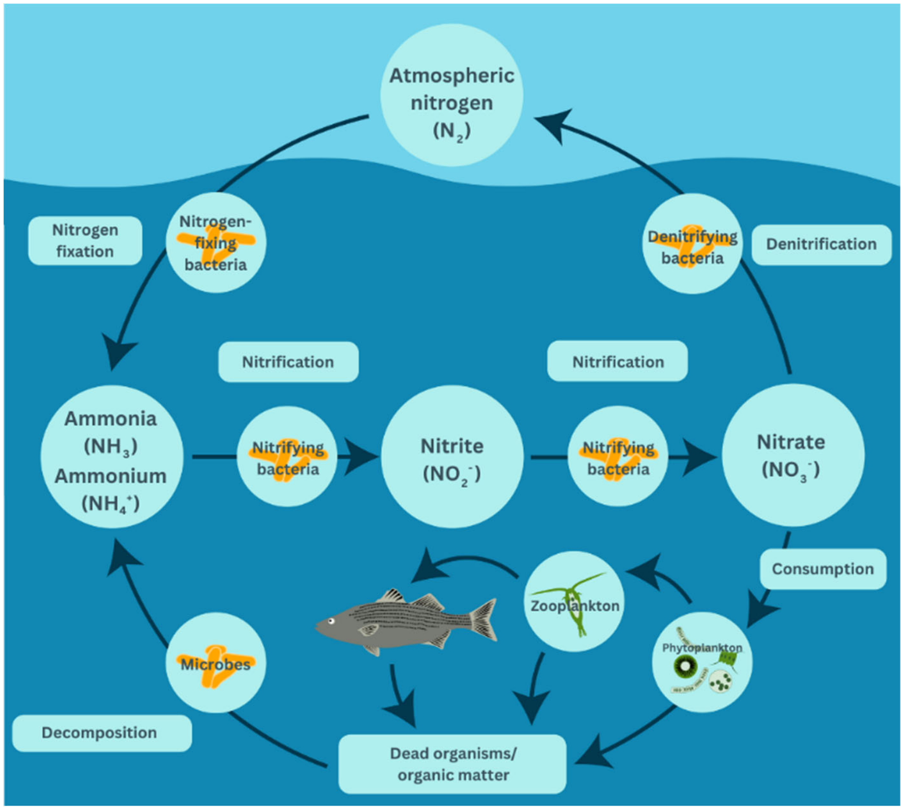
Nitrogen quantity and form are equally important factors regarding surface water quality. For example, ammonia can be present in the un-ionized form as free ammonia, NH_3, which is toxic to fish (both freshwater and marine), or in the ionized form as ammonium (NH_4+), which has little impact on fish in the marine environment. The relative concentrations of these forms are pH and temperature dependent (and to a small extent, the fraction of un-ionized ammonia is inversely related to salinity). Higher pH and temperature are associated with increased levels of the more toxic, free ammonia (NH_3). Ammonia can also be converted to nitrite in the presence of oxygen as part of the nitrification process, but as more oxygen is added, nitrite (which is highly unstable) quickly transforms to nitrate. When anoxic conditions form, certain bacteria convert nitrate into nitrogen gas (N_2), which is released to the atmosphere.

The presence of ammonia can indicate nutrient enrichment. Elevated ammonia levels in the harbor are associated with stormwater discharges but may also indicate the presence of large schools of fish, such as Atlantic menhaden. As stated previously, ammonia can also be detected when wastewater systems, including septic systems, cesspools, and publicly owned wastewater treatment plants, are malfunctioning and discharging to the harbor.

Wastewater treatment plants utilize microorganisms to rapidly decompose carbon-based waste and produce carbon dioxide; ammonia is converted into nitrate as a byproduct. Upgraded sewage treatment plants use an additional step, biological nutrient removal, to remove nitrogen from wastewater. For this process, oxygenated wastewater is directed into an anoxic chamber, where specialized bacteria remove oxygen from the nitrate compound (NO_2), releasing nitrogen gas and therefore removing much of the nitrogen from the wastewater. The Glen Cove sewage treatment plant has been upgraded to include biological nutrient reduction.

After years of studies and modeling around Long Island Sound, nitrogen loading limitations (i.e., total maximum daily loads, or TMDLs) were imposed on wastewater treatment plants. These were put in place to reduce harmful algal blooms along with frequency and duration of low dissolved oxygen levels throughout the sound. However, reducing stormwater inputs of nitrogen and other pollutants are more complicated because the sources are so diffuse.

Figure 13
Nitrogen in Marine Environments



3.7.2 Nitrogen Monitoring by CSHH

From 2004 to 2016, CSHH collected samples weekly at selected CSHH stations to test for inorganic forms of nitrogen—ammonia, nitrite, and nitrate. During this time, water samples were analyzed by Lockwood, Kessler & Bartlett, Inc.

Beginning in 2018, water samples were collected weekly at CSHH #1-3, #8, #13, #16, and #17 and, when tidal and weather conditions allowed, at CSHH #4-7, #14, and #15 and delivered to Pace Analytical Services, LLC for weekly analysis of ammonia, nitrite, and nitrate. Since 2019, water samples for nitrogen analyses, including total Kjeldahl nitrogen (TKN), are collected biweekly at 10 stations: #1, #3, #6-8, #12-13, #14A, #15A, and #16 (with access to #6 and #7 being tide dependent). The analyses performed by Pace include only undissolved forms of nitrogen. Total Kjeldahl nitrogen is the sum of organic nitrogen and ammonia. These various forms of nitrogen are reported in different ways, each with their own reporting limits based on lab protocols.

As of 2020, water samples are collected biweekly from November to April at CSHH #14A and #15A as part of the winter monitoring program. These samples are also delivered to Pace Analytical Services, LLC for analyses of organic nitrogen and inorganic nitrogen.

The protocol established by the Mid-Atlantic Tributary Assessment Coalitions (*EcoCheck. (2011). Sampling and data analysis protocols for Mid-Atlantic tidal tributary indicators. Wicks EC, Andreychek ML, Kelsey RH, Powell SL (eds). IAN Press, Cambridge, Maryland, USA)* identifies the following indicator thresholds, descriptors, and grades for total nitrogen levels in waters with salinity greater than 18 ppt:

≤ 0.4 mg/L (pristine condition, A)
> 0.4 ≤ 0.5 mg/L
> 0.5 ≤ 0.6 mg/L
> 0.6 ≤ 0.8 mg/L
> 0.8 ≤ 1.2 mg/L
>1.2 mg/L (impaired condition, F)

In 2023, average total nitrogen in Hempstead Harbor ranged from 0.96 mg/L at CSHH #6 to 5.3 mg/L at CSHH #14A, indicating impaired conditions. In comparison, average total nitrogen for 2022 (0.44 mg/L to 5.7 mg/L) and 2021 (0.72 mg/L to 5.3 mg/L) indicated a much wider range of conditions from good to impaired. Additionally, in 2023, seven of the ten stations tested had average TN levels above 1.2 mg/L. This was more than the number of stations in 2022 (six of ten) and 2021 (eight of ten). (See *Appendix D* for long-term total nitrogen graphs.)

In 2023, average total organic nitrogen ranged from 0.70 mg/L at CSHH #6 to 2.3 mg/L at CSHH #15A. Average total organic nitrogen at each station was higher during the 2023 monitoring season than in 2022, except for stations CSHH #7 and #8.

CSHH calculates total inorganic nitrogen (TIN) based on ammonia plus combined nitrate-nitrite testing results from Pace. In 2023, CSHH #14A had the highest average TIN (4.3

mg/L), this was also the case for every year since 2019. Stations CSHH #16, #3, and #1 had the lowest average TIN levels in 2023 (0.04 mg/L, 0.08 mg/L, and 0.08 mg/L, respectively).

CSHH monitors the outflow of the Glen Cove sewage treatment plant (CSHH #8). In 2023, average ammonia at CSHH #8 was 0.13 mg/L, lower than that in 2022 (0.19 mg/L) and 2021 (1.3 mg/L) when a broken pipe was leaking raw sewage into Glen Cove Creek. Average ammonia levels at other Glen Cove Creek monitoring stations (CSHH #12 and #13) were also low (0.07 mg/L and 0.10 mg/L, respectively). The highest average ammonia for the monitoring season was at CSHH #14A (0.46 mg/L) and the lowest at CSHH #3 and #16, where all samples were below the reporting limit of 0.10 mg/L throughout the monitoring season.

Nitrate and nitrite occur in later stages of the nitrogen cycle and are naturally present in the estuary. However, high concentrations indicate enrichment problems and can also be used to anticipate algal blooms and hypoxia.

Nitrite is frequently below the reporting limit of 0.050 mg/L as it quickly transforms into nitrate in the presence of oxygen. Values are consistently low across station samples when nitrite is detectable. In 2023, nitrite was detected in samples primarily from outfall stations (CSHH #8, #14A, and #15A) as well as CSHH #12.

In 2023, average nitrate levels ranged from 0.04 mg/L at CSHH #16 to 3.8 mg/L at CSHH #14A. Average nitrate at CSHH #14A was higher in 2022 (5.2 mg/L) but lower in 2021 (3.7 mg/L). The next highest average nitrate levels in 2023 were at CSHH #15A (2.3 mg/L) and CSHH #8 (1.1 mg/L).

As mentioned previously, CSHH collects samples biweekly for nitrogen analyses from locations CSHH #14A (outfall for Powerhouse Drain Subwatershed) and #15A (outfall for Scudder's Pond and Littleworth Lane). The consistently high levels of nitrogen indicators at CSHH #14A are expected, given that this station receives considerable stormwater runoff and groundwater discharge that could be contaminated by nutrient-heavy sources (e.g., fertilizer, pet waste, failing septic systems).

As part of the winter monitoring program, CSHH continues to collect water samples for nitrogen analysis at CSHH #14A and CSHH #15A from November to April. During the 2023-24 winter monitoring program, nitrogen results included the following:

- The most prominent form of nitrogen detected at stations CSHH #14A and #15A was inorganic nitrogen, specifically nitrate.
- Average nitrate was highest at CSHH #14A (6.2 mg/L); average nitrate at CSHH #15A was 4.8 mg/L. At both stations, nitrite was below the reporting limit for the majority of sampling dates, but when present, levels were very low. Average ammonia at CSHH #14A was 1.0 mg/L and values were above the reporting limit (0.10 mg/L) on all but one monitoring date. CSHH #15A samples were below the reporting limit for ammonia on all but one monitoring date.
- Average total organic nitrogen at CSHH #14A was 0.38 mg/L, but was below the reporting limit (0.10 mg/L) for seven out of 12 sampling days. At CSHH #15A, average total organic nitrogen was 0.54 mg/L, but it was below the reporting limit for all but four sampling days. Organic nitrogen results for these stations were higher

during the regular monitoring season, where CSHH #14A had a total organic nitrogen average of 1.1 mg/L and at #15A the average was 2.3 mg/L.

- Total nitrogen results ranged from 0.73 mg/L to 10.5 mg/L at CSHH #14A, with nearly every sample exceeding the 1.2 mg/L, "very poor," threshold. Average total nitrogen at CSHH #14A was 7.3 mg/L. At #15A, total nitrogen results exceeded 1.2 mg/L for every sample (ranging from 3.2 mg/L to 7.0 mg/L) and averaged 5.5 mg/L for the overall winter season.
- Since 2019, average total nitrogen and average total inorganic nitrogen values at outfall stations were greater during winter monitoring than during regular season monitoring.

3.8 Bacteria

Nassau County Department of Health (NCDH) and NYS Department of Environmental Conservation (DEC) are the agencies that have jurisdiction in Hempstead Harbor for opening or closing swimming beaches and shellfish beds, respectively. Both agencies use **fecal indicator bacteria** levels and other factors to judge water quality and determine whether beaches or shellfish beds require temporary or extended closures.

Enterococci and **fecal coliform** are the types of bacteria monitored by the agencies. These bacteria are commonly found in the intestines of warm-blooded animals (with enterococci most prevalent in the human digestive system) and therefore are indicators of the presence of fecal contamination and organisms that may have an adverse impact on human health. (**Total coliform bacteria** include both fecal coliform and enterococci and are widely present in the environment.)

Key Findings – Bacteria

- 2023 levels for fecal indicator bacteria followed the pattern for previous years – levels were lower at outer-harbor stations than at near-shore and outfall stations.
- The powerhouse drain outfall had bacteria exceedances for samples taken directly from the discharge but also when samples were mixed with harbor water during high tides.
- Results from both summer and winter monitoring at Scudder's Pond have shown lower bacteria levels for both fecal coliform and enterococci as compared with pre-restoration levels.
- Results from the Powerhouse Drain Outfall during winter monitoring showed a higher percentage of fecal coliform exceedances compared with the previous regular season and winter.
- The beach at Morgan Memorial Park was the only operational area beach closed due to high bacteria levels (for seven days) during the season.

3.8.1 Beach-Closure Standards

Beach-closure standards were revised in 2004 (as directed by EPA under The Beaches Environmental Assessment and Coastal Act of 2000 (BEACH Act) and enacted by New York State under NYCRR Title 10, Section 6-2.15).

The standards for marine waters included the following thresholds for fecal coliform and enterococci:

- Based on a single sample, the upper value for the density of bacteria shall be:
  a. 1,000 fecal coliform bacteria per 100 ml; or
  b. 104 enterococci per 100 ml.
- Based on the mean of the logarithms of the results of the total number of samples collected in a 30-day period, the upper value for the density of bacteria shall be:
  a. 2,400 total coliform bacteria per 100 ml; or
  b. 200 fecal coliform bacteria per 100 ml; or
  c. 35 enterococci per 100 ml.

In 2008, enterococcus (which is more closely correlated with human gastrointestinal illnesses) became the sole indicator organism recommended by the EPA. This change was incorporated into the New York State Sanitary Code for Bathing Beaches (Subpart 6-2) for evaluating the microbiological quality of saline recreational beach water.

On July 31, 2014, EPA issued an updated version of its National Beach Guidance and Required Performance Criteria for Grants. Key changes in the 2014 Beach Guidance include:

- Updating the science on pathogens, fecal indicator bacteria (FIB), and health concerns
- Updating the science on beach water-quality monitoring
- Providing guidance on when to issue or remove a notification
- Describing new beach notification and communication tools, such as social media, e-mail, and text messages
- Adding new performance criterion

The guidance was partially implemented in Nassau County, most notably with regard to communication and notification of precautionary administrative beach closures. In 2015, NCDH began issuing “advisories” to close beaches (rather than administrative or preemptive closures), generally following rainfall of a half inch or more in a 24-hour period (see more below).

3.8.2 Beach Monitoring for Bacteria Levels

Each beach season, samples for bacteria testing are collected twice a week by the Nassau County Department of Health at beaches around the harbor. These bacteria samples are analyzed at the NCDH laboratory in conformance with beach-closure standards that were implemented in 2004. (Although NCDH discontinued the analysis of fecal coliform for beach closures in 2008, it continued both fecal coliform and enterococci analyses for samples collected by CSHH to allow for more consistency in the comparison of data.)

During the 1980s, chronic raw sewage spills into Hempstead Harbor caused elevated levels of bacteria, affecting shellfish beds and recreational use of the harbor. Between 1986 and 1990, beaches around Hempstead Harbor were closed an average of eight days each beach season due to high coliform counts. Beach closures dropped off significantly during the early years of CSHH's monitoring program, and, for beach seasons 1994-1999, there were no beach closures caused by high bacteria levels.

However, in 2000, NCDH initiated a preemptive (or administrative) beach-closure program. NCDH used preemptive beach closures as a precautionary measure following rain events that exceeded a predetermined threshold level and duration of precipitation. Therefore, even though water quality had improved remarkably, beach closures increased because of the preemptive closures. The 2015 change to NCDH "advisories" (described above) leaves the actual closure of beaches to the local municipal jurisdictions; however, the result is the same—beach closures following a half inch or more of rain within 24 hours.
Note that in calculating the total number of beach-closure days for each season, NCDH totals the number of days that each beach is closed, even if several beaches around the harbor are closed for the same rain event. (Also note, the beach at the Village Club of Sands Point is considered "nonoperational," so it is not subject to closures.)

NCDH continues to monitor Crescent Beach in Glen Cove, which has been closed for swimming since 2009 due to a known source of high bacteria from the stream that runs alongside the beach and into the harbor. In 2018, additional tests, including DNA/source tracking, were conducted that pointed to wildlife and two ponds on private property as the sources of the bacteria. As part of the 2021 DEC-approved remediation plan, the structure for the helix water-filtration system was installed in the fall on private properties adjoining the stream and was completed in April 2022. Wetland plants and a bioswale were also installed to aid in natural filtration. Bacteria levels at Crescent Beach remain elevated. Additional work is planned for 2024.

3.8.2.1 Comparing Bacteria Data for Beaches

It is important to note that changes in government regulations, testing protocols, and methodologies for sample analysis make it difficult to compare water-quality conditions relating to bacteria levels over time. Additional data showing varying bacteria concentrations from individual beach samples are found in *Appendix C*.

In 2023, Hempstead Harbor beaches were closed on 11 dates throughout the summer beach season as a precautionary measure following half an inch or more of rain in a 24-hour period, compared with seven dates in 2022 (see *Appendix B* for 2023 precipitation data); in addition, Morgan Memorial Park was closed for seven consecutive days (July 1 through 7) due to high bacteria levels. By comparison, in 2022, Sea Cliff Beach was closed on two days as a precautionary measure following a sewage leak discharging into Glen Cove Creek, and Morgan Memorial Park was closed two days due to high bacteria levels.

Monthly average bacteria results for enterococci at Hempstead Harbor beaches in 2023 ranged from 0.10 CFU/100 ml, at Morgan Memorial Park in April, to 327.34 CFU/100 ml at

Crescent Beach in August. Crescent Beach remained closed all season and had the highest average fecal indicator bacteria levels of all area beaches for the season–117.89 CFU/100 ml, which was less than that in 2022 (260.25 CFU/100 ml) (see *Table 4* for monthly variation). (Note that the 2023 log average for Crescent Beach was below the threshold of 35 CFU/100 ml; see *Appendix C* beach-monitoring data.) North Hempstead Beach Park North had an average fecal indicator bacteria level of 24.62 CFU/100 ml for the season, the lowest among area beaches. See *Appendix C* for previous years' comparisons.

Table 4
2023 Monthly Average for Beach Enterococci Data in CFU/100 ml*

	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach	Pryibil Beach
April	3.30	0.58	72.08	10.64	1.48	0.10	0.20	2.73
May	9.03	8.03	3.14	4.47	2.04	1.30	32.85	5.53
June	13.50	41.90	16.14	27.00	34.50	81.83	38.34	4.12
July	108.80	23.24	16.23	24.12	36.12	153.00	87.20	27.26
August	81.89	37.89	156.90	61.78	43.57	119.08	327.34	148.47
September	—	—	—	—	9.00	—	12.71	12.07
Season Averages	50.25	24.62	54.46	27.06	25.34	87.40	117.89	48.40

**The New York State beach-closure standard sets the upper limits of enterococci at 104 colony forming units (CFU) per 100 milliliters of water for a single sample and 35 CFU for the 30-day logarithmic average. The units in the table above are calculated as an arithmetic average.*

3.8.3 Monitoring CSHH Stations for Bacteria Levels

CSHH collects samples for bacteria analysis at 21 monitoring stations in Hempstead Harbor (15 stations on a weekly basis and others depending on tidal conditions). Five stations (CSHH #9-13) were selected to test bacteria levels in Glen Cove Creek, particularly from discharge pipes around the sewage treatment plant (STP).

Other areas of concern that CSHH regularly monitors for bacteria levels are those draining Scudder's Pond (CSHH #15A and #15B) and the outfall at the bottom of Glenwood Road at Shore Road (CSHH #14A) that drains the area referred to as the Powerhouse Drain Subwatershed. These stations have been monitored since 2009 during the regular monitoring season and have been the focus of the winter monitoring program since 2013.

In 2015, three new stations (CSHH #16, #17, and #17A) were added to assess water quality in the certified shellfishing area located in the outer harbor as well as near and within the restricted area off of Crescent Beach. Results from bacteria samples taken at these stations supplement the samples collected by NYS DEC and NCDH.

In Glen Cove Creek, unusual and recurring discharges of brown flow from the outfall pipe at CSHH #9 and milky-white flow from the outfall pipe at CSHH #10 have been observed. (Both outfall pipes are near the Glen Cove STP outfall.) The unusual discharges have been noted since 2004 and reported to Glen Cove city officials, NCDH, HHPC, Nassau County Department of Public Works (NCDPW), and NYS DEC. Despite efforts to identify the source(s) of these discharges, the results of the investigations were inconclusive.

More recently, in 2021, additional instances of brown flow from CSHH #9 were observed. In response, Glen Cove DPW installed a filtration system in early June inside the manhole behind the STP that drains water through to that outfall pipe. There were still a few instances of discolored or brown flow; about half of the samples collected after the installation of the filtration system had exceedances in bacteria levels. In 2022, there were no instances of brown flow from CSHH #9; a white flow was observed from CSHH #10 on five occasions.

In 2023, although there were no instances of brown flow observed from CSHH #9, 64% of all samples taken exceeded bacteria thresholds. A white flow was observed from CSHH #10 on a total of seven monitoring surveys: May 24, June 7 and 21, August 23, September 6 and 20, and October 4. On June 21, a black flow was observed coming from the top of the pipe at CSHH #10.

(Note that construction of a new bulkhead along the Glen Cove STP occurred June-December 2021. During that time, a bypass was installed to divert the flow from the STP outfall, CSHH #8. CSHH continued to collect samples from the diverted flow at temporary station CSHH #8A. Once the work was completed at the western end of the STP, outfall pipes for both CSHH #8 and #9 were installed through the new bulkhead.)

3.8.3.1 Comparing Bacteria Data for CSHH Stations

The bar graphs in *Appendix B* show bacteria results for CSHH monitoring stations. Stations CSHH #2, #16, and #17 are located in the outer harbor and are thus less influenced by discharges from the watershed, such as from municipal stormwater systems, due to dilution. (Stormwater discharges have been identified as the most likely transport mechanism of fecal contamination into the harbor; see *USGS, Using Microbial Source Tracking To Identify Fecal Contamination Sources in an Embayment in Hempstead Harbor on Long Island, New York, Scientific Investigations Report 2021-5042.*) The outer-harbor stations typically have lower bacteria levels than those at mid- and lower-harbor stations; a pattern that held in 2023. (The bar graphs in *Appendix B* show bacteria results for CSHH monitoring stations.)

Many factors can influence bacteria levels during any given sampling event, making it difficult to see clear and consistent influences from rainfall. Although data from the 2023 season at some stations display a positive correlation between bacteria levels and rainfall, there is variability in the strength of the correlation at different stations for fecal coliform and enterococcus and for 24-hour and 48-hour rainfall. For 2023, the clearest correlation for high bacteria levels following 24-hour rainfall of half an inch or more was observed for water samples collected on July 19 and August 16, although bacteria exceedances were also observed on other sampling days with less than half an inch of rainfall within 24 or 48 hours. There were also exceedances on sampling days following no rain in a 24- or 48-hour period, making it difficult to definitively identify rainfall as the direct cause of bacteria exceedances in Hempstead Harbor, but it can be a contributing factor.

In 2021, **Glen Cove Creek stations** (CSHH #8-13) showed alarming bacteria levels. There were consistent exceedances in both fecal coliform and enterococci at the head of the creek (near Mill Pond) as early as July. CSHH continued weekly testing beyond the regular monitoring season through early December, adding new testing stations in order to locate the pollution source. The results from the samples collected enabled CSHH to track the source of the problem to the vicinity of Bridge Street. Shortly thereafter, it was confirmed that there was a broken sewer line at that location.

Glen Cove DPW, Nassau County DPW and Department of Health, and the Hempstead Harbor Protection Committee were informed of the data results. Suez (the operator of the Glen Cove STP) scheduled work on November 29 and installed a bypass. On December 1, CSHH collected water samples in Glen Cove Creek, and lab results showed a dramatic decrease in the bacteria levels, although the sample collected at the head of the creek still had a very high fecal coliform count. The sewer line repair was completed by the end of the day on December 2, and CSHH collected another round of water samples from Glen Cove Creek on December 8; lab results showed dramatically lower bacteria levels, well below thresholds that are used for beach closure standards.

While there were periodic exceedances of fecal coliform and enterococci thresholds at Glen Cove Creek stations (CSHH #8-13) in 2022, they were not at the high levels observed in 2021, indicating a recovery from the sewer line break. Conditions for the 2023 monitoring season generally were better than those in 2022, with the exception of outfall station CSHH #9 (there were 14 exceedances at CSHH #9 in 2023 as compared with 7 in 2022).

As previously stated, CSHH monitors water quality in the certified shellfish area in the outer harbor (CSHH #16) as well as around and within the restricted area off Crescent Beach (CSHH #17 and #17A). During the 2023 monitoring season, there was only one bacteria exceedance each at CSHH #17 and #17A on August 16 (there were no exceedances at station CSHH #16). This was following over an inch and a half of rainfall within a 48-hour period. By comparison, there had not been any bacteria exceedances at any of the three stations since 2019 (one exceedance at CSHH #17A).

The **winter monitoring program**, which originally focused on conditions around the Scudder's Pond restoration (CSHH #15A and #15B), currently focuses on the outfall pipe that drains most of the Powerhouse Drain Subwatershed (CSHH #14A). However, monthly bacteria and nitrogen checks continue for the Scudder's Pond area as well (monitoring bacteria only at CSHH #15B). This program now has 11 years of data for comparison of bacteria levels. See *Table 5* for comparisons with previous years' percentage exceedances. (The Hempstead Harbor monitoring program is one of the few programs, if not the only program, testing for bacteria in the winter.)

Initially, there was some expectation that bacteria levels would decrease in the colder temperatures, but there are factors that may contribute to the continued higher bacteria levels during the winter (e.g., lower temperatures and UV conditions during winter months may promote slower decay and longer survival rates of the bacteria species).

Table 5
Stations Exceeding Bacteria Standards[1]—Summer and Winter Monitoring

CSHH Stations	#15A[2]		#15B[3]		#14A[2]	
% of CFU[4] Exceedances	FC[5]	ENT[6]	FC	ENT	FC	ENT
5/5/13-11/13/13	17%	45%	29%	69%	32%	68%
11/18/13-5/14/14	13%	58%	13%	58%	50%	85%
Scudder's Pond Restoration Completed June 2014						
5/21/14-11/5/14	8%	36%	20%	28%	25%	100%
11/13/14-4/29/15	8%	33%	10%	30%	--[7]	--[7]
5/7/15-11/4/15	23%	31%	19%	23%	60%	64%
11/11/15-4/27/16	20%	15%	15%	10%	68%	89%
5/1/16-10/26/16	0%	29%	0%	24%	92%	69%
11/9/16-4/26/17	0%	23%	23%	15%	50%	75%
5/10/17-10/27/17	0%	26%	0%	17%	4%	67%
11/1/17-5/4/18	25%	38%	25%	25%	44%	59%
5/23/18-10/31/18	14%	26%	21%	25%	27%	65%
11/8/18-4/25/19	0%	0%	0%	0%	58%	17%
5/15/19-10/30/19	4%	29%	0%	33%	13%	58%
11/6/19-4/30/20	0%	38%	0%	38%	23%	46%
5/20/20-10/28/20	9%	26%	13%	25%	4%	74%
11/12/20-4/14/21	14%	29%	17%	33%	33%	67%
5/19/21-10/28/21	4%	38%	0%	33%	0%	57%
11/10/21-4/14/22	0%	0%	0%	0%	57%	79%
5/18/22-10/27/22	9%	30%	29%	57%	9%	48%
11/9/22-4/19/23	0%	17%	0%	20%	0%	42%
5/24/23-10/25/23	9%	43%	0%	29%	4%	52%
11/8/23-4/10/24	17%	17%	0%	20%	50%	50%

[1] *For purposes of comparison, beach-closure thresholds for fecal coliform and enterococci are used here.*
[2] *Percent of exceedances may not reflect the monitoring events when samples are collected during high tide and the discharge is mixed with harbor water and, thus, diluted.*
[3] *Starting in summer 2019 season, only monthly testing at CSHH #15B.*
[4] *CFU: colony-forming units.*
[5] *FC: fecal coliform.*
[6] *ENT: enterococci.*
[7] *Only one sample collected during this period.*

During 2023-24 winter monitoring, all three monitoring stations had bacteria exceedances. CSHH #14A had the highest percentage of exceedances over the course of monitoring (half of all sampling events had fecal coliform and enterococci exceedances), while CSHH #15A and #15B had fewer exceedance events. Stations CSHH #14A and #15A both had a greater percentage of fecal coliform exceedances during 2023-24 winter monitoring than during the regular monitoring season. This winter's results at CSHH #14A had more exceedances for both species of bacteria compared with the previous winter (when there were no fecal coliform exceedances). The high levels of bacteria from discharges at these outfalls as well as the surrounding subwatershed remain a concern for Hempstead Harbor.

Extended monitoring in Glenwood Landing included collecting water samples from the stream that runs north of Glenwood Road (l) and where it terminates at the culvert at the corner of Kissam Lane and Glenwood Road (r) (photos by Carol DiPaolo, 2/7/23)

Results from the 2021-2022 winter monitoring season showed elevated levels of fecal coliform at CSHH #14A (in Glenwood Landing). This prompted the development of an extended sampling schedule and investigation similar to that for Glen Cove Creek. The sampling in Glenwood Landing encompassed stations in and around the small stream that runs through the lower part of Glenwood Landing and into Hempstead Harbor through the powerhouse drain outfall. (The stream daylights at Betty Lane to the east and runs to a culvert at the corner of Kissam Lane and Glenwood Road.) With the assistance of staff from Nassau County DPW and the Town of Oyster Bay, CSHH collected water samples for bacteria analysis from selected manholes located on both sides of Glenwood Road and adjacent feeder roads.

On April 11, 2022, an infrared drone survey was commissioned by the Hempstead Harbor Protection Committee and conducted by Harkin Aerial and Walden Environmental Engineering to identify potential sources of pollution. Despite these efforts, the source of the bacteria remains inconclusive. CSHH sent a letter to Glenwood Landing residents on May 2, 2022, to inform them of the ongoing testing as well as actions they could undertake to help reduce bacteria loading into the harbor. One such action is the S.E.P.T.I.C. grant available to residents to help cover the costs of updating to state-of-the-art nitrogen-reducing septic systems. To date, there have been 21 complete installations and 16 applicants in various stages of the process for residents in the Glenwood Landing and Glen Head area (the majority of properties are around Glenwood Road).

3.8.4 Monitoring Bacteria Levels Near Shellfish Beds

Shellfish beds in most western Long Island Sound areas have been restricted or closed to harvesting for at least 50 years. In 2011, 2,500 acres of shellfish beds in the northern section of Hempstead Harbor were reopened because of water-quality improvements (see *Section 3.8.4.3*). However, a large area of the harbor remains restricted from shellfish harvesting. Pathogen contamination is the main concern with shellfish beds because of the risk to humans who consume shellfish contaminated by harmful bacteria or viruses present in the water. Fecal coliform is the indicator organism that is used to determine whether certain water bodies are safe for shellfish harvesting. It is associated with human and animal waste and is used to indicate the presence of other more harmful bacteria, similar to the processes used to measure water quality for beaches (see the Beach-Closure Standards in *Section 3.8* above).

3.8.4.1 Shellfish Pathogen TMDLs

In August 2007, DEC announced the release of a report on “Shellfish Pathogen TMDLs for 27 303(d)-listed Waters” (including Hempstead Harbor). Under Section 303(d) of the federal Clean Water Act, states are required to develop plans to decrease the total maximum daily loads (TMDLs) of all pollutants that cause violations of water-quality standards. In 2018, the DEC withdrew the pathogen TMDLs because data indicated that the assumptions made regarding Municipal Separate Storm Sewer Systems (MS4s) overestimated total contributions of MS4s toward water quality impairment. NYS DEC formed a pathogen TMDL workgroup (of which CSHH and HHPC are members) to discuss formulation of new TMDLs and prioritization of water bodies around the state; Hempstead Harbor is expected to be among the first waterbodies to have a new TMDL (see https://extapps.dec.ny.gov/docs/water_pdf/litmdlwithdrawal.pdf).

The DEC had listed 71 “Class SA” water bodies as being pathogen impaired. Class SA is applied to marine and estuarine waters that are considered to have ecological, social, scenic, economic, or recreational importance. These designated waters have the highest level of protection and must, by law, be suitable for recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, and as habitat for fish and other marine life. For Class SB, primary contact recreation is the highest best use of the water; the highest best use of Class SC waters is fishing. Hempstead Harbor overall is divided into three categories: Class SA, north of the sand spit at North Hempstead Beach Park; Class SB, south of the sand spit; and Class SC for Glen Cove Creek.

3.8.4.2 Monitoring Shellfish Growing Areas in Hempstead Harbor

In 2009, in an attempt to assess water quality and determine whether opening middle and lower sections of the harbor to shellfish harvesting should be pursued, CSHH partnered with DEC to collect water samples. Thirteen of the 19 stations sampled were the same stations established by DEC in 1988 for shellfish growing area (SGA) #50. The samples were delivered to the DEC lab in East Setauket, where they were analyzed for fecal coliform. The results showed that the sampling stations exceeded the single-sample standard (49 MPN/100 ml) 37% of the time, with station DEC #13 (outside of Glen Cove Marina in Glen Cove Creek) exceeding at the highest rate, 53%. Note that NYS DEC standard (fecal coliform measured in most probable number, MPN) for shellfish bed closures is different from the standard used by NCDH (enterococci measured in colony forming units, CFU) to inform beach closures.

Before this type of testing can be initiated once again, there would have to be some indication of additional water-quality improvements, e.g., from structural changes completed around the harbor to reduce runoff and bacteria loading.

3.8.4.3 Certifying Shellfish Beds in Outer Harbor

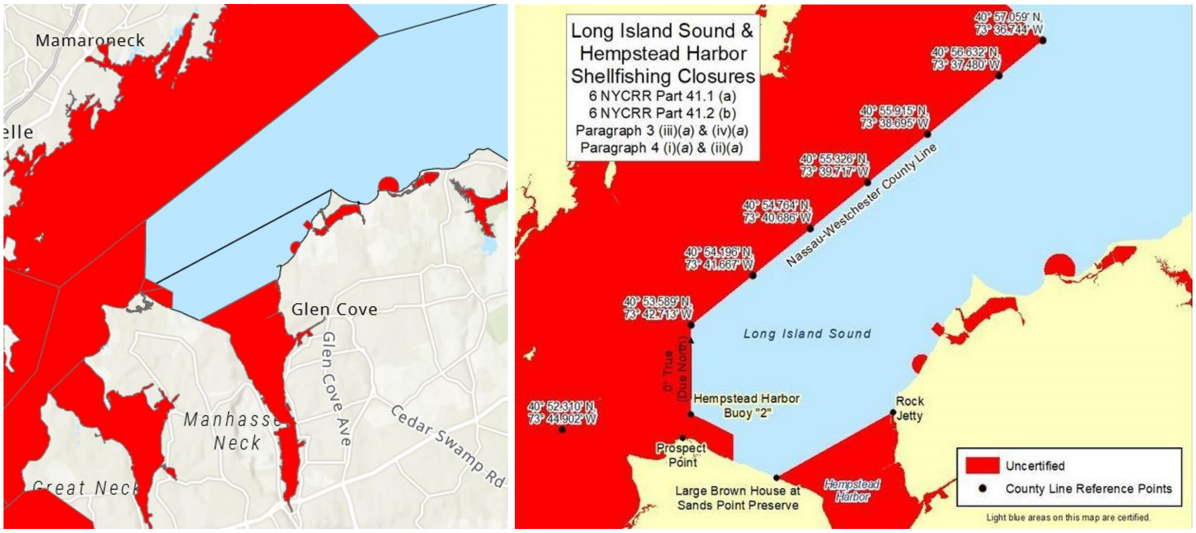
On June 1, 2011, following five years of rigorous water-quality monitoring and testing samples of hard-shell clams from the area, 2,500 acres of recertified shellfish beds were opened in the outer section of Hempstead Harbor. For the first time in more than 50 years, clams, oysters, mussels, and scallops could be taken from this area by both commercial and recreational clammers, consistent with the size and quantity limits set for state waters. The rest of the harbor and East Creek, West Pond, and Dosoris Pond, which empty into the outer harbor, remain closed to shellfishing. A small semicircular area around Crescent Beach is also closed to shellfishing. (Crescent Beach has been closed for swimming since 2009; see *Section 3.8.2*.) In May 2018, approximately eight acres outside the mouth of West Pond, on the eastern shoreline of outer Hempstead Harbor, were reclassified as uncertified (closed) for shellfish harvesting because of an increase in bacteria levels. On November 22, 2021, 134 acres of Hempstead Harbor adjacent to Prospect Point were downgraded from certified year-round to uncertified year-round. However, 6,150-acres of Long Island Sound east of Prospect Point and south of the Nassau-Westchester County Line were upgraded from uncertified year-round to certified year-round. See *Figure 14*.

NYS DEC posting near Sea Cliff Beach (photo by Michelle Lapinel McAllister, 8/5/22)

Signs have been posted along the shoreline in areas that remain uncertified. Three buoy markers delineate the 250-yard radius around Crescent Beach that remains closed to shellfishing.

The DEC continues to monitor the water quality of the reopened shellfish area and make necessary changes to the area's classification as conditions warrant. Similar to NCDH's protocol for closing beaches, DEC's protocol for temporarily closing certified shellfish beds uses a rainfall threshold amount (generally 3 inches) during a 24-hour period or an exceedance of 14 MPN/100 ml for fecal coliform, to protect against health risks associated with high bacteria levels caused by stormwater runoff. In 2023, there were two closures in Hempstead Harbor (September 29 to October 6 and December 11 to 15) due to rainfall events. By comparison, in 2022, there were no emergency closures of shellfish beds in Hempstead Harbor. Information about shellfish-bed closures is disseminated through a prerecorded phone message at 631-444-0480, the DEC website (https://dec.ny.gov/things-to-do/shellfishing/closures), and through press releases to local media outlets.

Figure 14
NYS DEC's Map of Hempstead Harbor and LIS Uncertified Shellfishing Areas
Areas in red (in maps below) designate uncertified areas.



3.8.5 Bacteria Source Tracking

Because water quality has greatly improved over the years, increasing numbers of water birds are now seen on and around the harbor. This raises a question as to whether the birds and other wildlife are a significant factor in bacterial levels in Hempstead Harbor. Bacteroides analysis, along with other types of monitoring, may help answer that question so appropriate strategies could be formulated.

In 2018, US EPA along with US Geological Survey and NYS DEC began using new methods of source tracking for several areas around Hempstead Harbor, including Crescent Beach (see *Section 3.8.2*).

From 2018 to 2019, USGS worked with NYS DEC and used microbial source tracking (MST) to assess potential sources of fecal contamination entering Hempstead Harbor. Water samples were collected in Glen Cove Creek (near CSHH #8), Tappen Beach (near CSHH #15A), at the powerhouse drain outfall (CSHH #14A), and an outfall and spillway in the lower harbor at the end of Skillman Street in Roslyn. MST was used to determine whether genetic material (from *Bacteroides* and *Heliobacter* bacteria) in samples collected for the study was consistent with that found in humans, dogs, ruminants (e.g., deer), or water fowl. The report concluded that (1) a substantial number of samples showed markers from humans, dogs, and water fowl, (2) stormwater from municipal stormwater systems was the most likely transport mechanism for fecal contamination to Hempstead Harbor, and (3) outfalls at the end of Glenwood Road and Skillman Street contributed a substantial amount of fecal contamination to Hempstead Harbor (see *USGS, Using Microbial Source Tracking to Identify Fecal Contamination Sources in an Embayment in Hempstead Harbor on Long Island, New York, Scientific Investigations Report 2021-5042*).

3.9 Precipitation

Precipitation affects Hempstead Harbor water quality directly on the harbor's surface and through stormwater runoff; both of these inputs can reduce the harbor's salinity. Direct precipitation tends to also dilute the quantity of pollutants within the harbor, although it can carry airborne pollutants. Stormwater runoff increases pollutant loads by washing bacteria, chemicals, and nutrients that have accumulated on the ground surface in the watershed into the harbor.

CSHH collects precipitation data using a rain gauge located in Sea Cliff. (See *Appendix B* for 2023 monthly precipitation and 1997-2023 monthly rainfall totals.) Total precipitation measured during June through October 2023 was 27.19 inches (690.63 mm). Total precipitation measured over the same period in 2022 was 21.15 inches (537.21 mm).

Washouts along the west shore (photo by Carol DiPaolo, 6/29/22)

Total precipitation for the 2023 summer season (June 21 to September 22) was 14.97 inches (380.24 mm). Throughout the regular monitoring season (May through October), there was a total of six rain events that resulted in over one inch of rain within a 24-hour period. On September 29, remnants of Hurricane Ophelia brought 4.94 inches of rain, flooding numerous roadways.

Links between precipitation and salinity are described above in *Section 3.3*.

4 Observations

The 2023 water-monitoring season for the Hempstead Harbor core program began on May 17 with shoreline sampling (in-harbor monitoring commenced one week later) and extended through October 25; winter monitoring of shoreline outfalls ran from November 8, 2023, through April 10, 2024.

During all monitoring surveys, wildlife observations are noted. These observations along with information from formal fish surveys and studies help fill out the picture of the health of the harbor's habitat. Local residents also play an important role in providing information on what they see throughout the year not only on the water, but also close to the harbor’s shores.

4.1 Biological Monitoring Report and Impact of Powerhouse Substation Removal

In 2015, the old brick powerhouse building (which had been part of the Glenwood Landing power plant operation since the early 1900s) was demolished, following the dismantling of the adjacent Substation 3 (in 2013). The substation operated at minimum capacity as a “peaking plant” and was the subject of a marine-life monitoring report–the Glenwood Power Station Entrainment and Impingement Monitoring Report (by ASA Analysis & Communication, Inc., September 2005). The power station monitoring report has been referenced in the Hempstead Harbor annual water-monitoring reports since 2005 because it provides a baseline of marine species that live in the harbor. Thirty-four types of fish and several other marine animals were found in the samples collected for that report.

In June 2012, LIPA and National Grid released the Environmental Impact Statement (EIS) for the demolition of the peaking plant (see http://www.hempsteadharbor.org/applications/DocumentLibraryManager/HHPCupload/Glenwood_EIA_Final%20June%202012%20.pdf).

CSHH #14A, powerhouse drain outfall (l) adjacent to the lot that was the site of the old brick powerhouse building; post-demolition of brick structure (r) on east side of the road (photos by Carol DiPaolo, 9/2/21, and Michelle Lapinel McAllister, 5/24/23, respectively)

The EIS projected that the demolition of the plant would provide water-quality improvements: elimination of the thermal discharge from the plant; preservation of 11 to 18.5 million gallons annually of freshwater that no longer had to be pumped from on-site wells and the municipal system; and an estimated 5,300 fish and 190 million fish eggs, larvae, and early juveniles would no longer be destroyed annually in the plant's intake system. This change may have contributed to the increase in fish populations noted over the last several years in Hempstead Harbor.

4.2 A Study of Striped Bass in NYS Marine District

Seine surveys for the NYS DEC's striped-bass study have been conducted in western Long Island bays since 1984 and in the Hudson River since 1979. Every year, the DEC prepares a report on the previous season's surveys entitled "A Study of the Striped Bass in the Marine District of New York State."

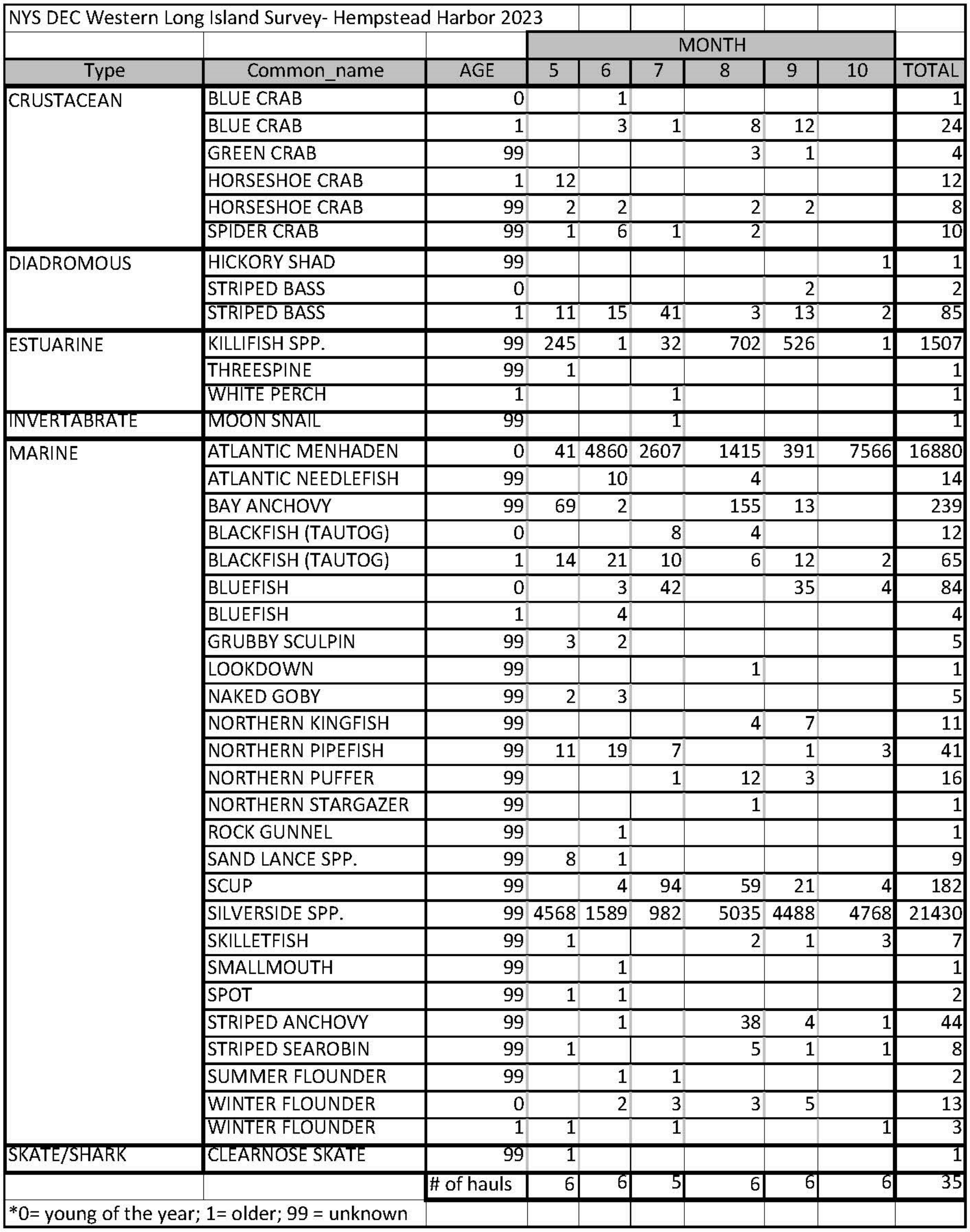
The study first found that striped bass spent their first year of life in the lower Hudson River, but over recent years the nursery for young-of-the-year striped bass has expanded to bays around western Long Island. Although the purpose of the study is to examine the striped bass that have migrated out of the Hudson River as one- and two-year-old fish, the report provides important information on other species as well.

Most of the seining for western Long Island occurs in Jamaica, Little Neck, and Manhasset Bays, but Hempstead Harbor, Cold Spring Harbor, and Oyster Bay are also surveyed. The crew seines at six stations in Hempstead Harbor monthly, May through October. The catch totals for the harbor included in *Table 6* were provided by Zachary Schuller, marine biologist at the NYS DEC Division of Marine Resources, Diadromous Fisheries Unit.

Significant seine catches in Hempstead Harbor for the 2023 season included silversides (21,430), Atlantic menhaden (bunker) (16,880), killifish (1,507), bay anchovy (239), and scup (aka porgies) (182). The number of striped bass counted in the 2023 seine survey (87) was more than double that of 2022 (42). Horseshoe crab numbers increased from 7 (2022 survey) to 20 (2023 survey). Another notable difference was the decrease in the number of bluefish: 88 in the 2023 survey, down from 421 counted in 2022.

The numbers for many of the fish caught in Hempstead Harbor seines have increased since 2013 (the year that the power plant substation that was located along the shore of the lower harbor was dismantled; see the previous section on the Glenwood power station monitoring report). Most significantly, the Atlantic menhaden (young of the year), which were not included in the 2013 seine catch, were up to a stunning count of 203,932 in 2015 and continued to be counted in subsequent years' seines.

Table 6
2023 NYS DEC Western Long Island Beach-Seine Survey for Hempstead Harbor



NYS DEC Western Long Island Survey- Hempstead Harbor 2023

			MONTH						
Type	Common_name	AGE	5	6	7	8	9	10	TOTAL
CRUSTACEAN	BLUE CRAB	0		1					1
	BLUE CRAB	1		3	1	8	12		24
	GREEN CRAB	99				3	1		4
	HORSESHOE CRAB	1	12						12
	HORSESHOE CRAB	99	2	2		2	2		8
	SPIDER CRAB	99	1	6	1	2			10
DIADROMOUS	HICKORY SHAD	99						1	1
	STRIPED BASS	0					2		2
	STRIPED BASS	1	11	15	41	3	13	2	85
ESTUARINE	KILLIFISH SPP.	99	245	1	32	702	526	1	1507
	THREESPINE	99	1						1
	WHITE PERCH	1			1				1
INVERTABRATE	MOON SNAIL	99			1				1
MARINE	ATLANTIC MENHADEN	0	41	4860	2607	1415	391	7566	16880
	ATLANTIC NEEDLEFISH	99		10		4			14
	BAY ANCHOVY	99	69	2		155	13		239
	BLACKFISH (TAUTOG)	0			8	4			12
	BLACKFISH (TAUTOG)	1	14	21	10	6	12	2	65
	BLUEFISH	0		3	42		35	4	84
	BLUEFISH	1		4					4
	GRUBBY SCULPIN	99	3	2					5
	LOOKDOWN	99				1			1
	NAKED GOBY	99	2	3					5
	NORTHERN KINGFISH	99				4	7		11
	NORTHERN PIPEFISH	99	11	19	7		1	3	41
	NORTHERN PUFFER	99			1	12	3		16
	NORTHERN STARGAZER	99				1			1
	ROCK GUNNEL	99		1					1
	SAND LANCE SPP.	99	8	1					9
	SCUP	99		4	94	59	21	4	182
	SILVERSIDE SPP.	99	4568	1589	982	5035	4488	4768	21430
	SKILLETFISH	99	1			2	1	3	7
	SMALLMOUTH	99		1					1
	SPOT	99	1	1					2
	STRIPED ANCHOVY	99		1		38	4	1	44
	STRIPED SEAROBIN	99	1			5	1	1	8
	SUMMER FLOUNDER	99		1	1				2
	WINTER FLOUNDER	0		2	3	3	5		13
	WINTER FLOUNDER	1	1		1			1	3
SKATE/SHARK	CLEARNOSE SKATE	99	1						1
		# of hauls	6	6	5	6	6	6	35

*0= young of the year; 1= older; 99 = unknown

4.3 Shellfish Beds Recertification, Surveys, and Reports

As mentioned in *Section 3.8.4.3,* June 1, 2011, marked the first time in over 40 years that the shellfish beds in the northern section of Hempstead Harbor were reopened for harvesting. The 2,500 acres of recertified shellfish beds extend in a wide strip from the east to west shore, near the mouth of the harbor. The recertification of the shellfish beds is the best indicator of the dramatic water-quality improvements that have been made in Hempstead Harbor and enhances the harbor's productivity through commercial and recreational shellfish harvesting.

Clammer off eastern shore in outer Hempstead Harbor (l) and sorted clams from the harbor on opening day of the shellfish area (r) (photos by Elaine Neice, 8/21/23, and Carol DiPaolo, 6/1/11, respectively)

The southern boundary of the recertified area extends from a rock jetty north of the Legend Yacht and Beach Club community (the site of the former Lowe estate) on the east shore to the large "brown house with chimneys" on the west shore (noted on navigational charts), which is Falaise, part of the Sands Point Preserve. (All areas south of this line remain closed to shellfishing.) The northern boundary of the recertified area runs from Matinecock Point on the east shore to Prospect Point on the west shore. However, Dosoris Pond, West Pond, and a semicircular area extending 250 yards off of Crescent Beach on the east shore remain closed to shellfishing. As of November 22, 2021, 134 acres of shellfish beds were closed in waters adjacent to Prospect Point, while 6,150 acres were opened for the first time just outside of Hempstead Harbor in the open waters of Long Island Sound. (See *Figure 12.*)

In the first few weeks after the 2011 opening of the shellfish beds in Hempstead Harbor, large numbers of clam boats could be seen daily, clustered in essentially the same northeast area of the recertified beds and loaded with large mesh bags of clams. CSHH began incorporating trips to the area during weekly monitoring surveys to record the number of boats harvesting clams throughout the season. (In 2015, station CSHH #17 was established at the boundary of the uncertified area of the harbor outside of Crescent Beach.) Most of the commercial clammers work the area near Matinecock Point, and fewer are near Crescent Beach. In 2023, we observed a high of 6 clammers in Hempstead Harbor on July 12, but we also observed a high of 11 clammers on July 19 within the newly recertified shellfishing area in Long Island Sound. The number of clammers in Hempstead Harbor varies with weather and water-quality conditions in other bays further east; e.g., if shellfish beds in eastern bays are closed, we notice more clammers in Hempstead Harbor.

Shellfishing is historically significant for Hempstead Harbor because it was an important commercial endeavor from about the first quarter of the nineteenth century into the first quarter of the twentieth century. Clams and oysters were shipped regularly from Hempstead Harbor to New York City until restrictions were imposed because of dwindling resources. By 1928, the lower portion of the harbor was closed to shellfishing because of increasing levels of bacteria in the water (as was the case for most bays in western Long Island Sound and other New York waters). For a time, clam dredgers were used to harvest clams in Hempstead Harbor; the clams were then transported to the Peconic Bay, where they were transplanted and remained for several weeks for purification so they could be sold commercially.

By the late 1990s, clams, oysters, and mussels were abundant throughout the harbor, and because of improved water quality, it seemed time to pursue one of our longstanding goals of reopening the harbor's shellfish beds. However, the long, complex process of recertifying shellfish beds required tremendous collaboration as well as adherence to strict protocols for water-quality testing and retesting.

In 1998, CSHH initiated the first step and worked with the Interstate Environmental Commission, DEC, Town of North Hempstead (TNH), and local baymen to conduct a **hard-clam density survey** to determine the extent and condition of the clam population; the survey showed a healthy population of hard clams. From 2004 through 2008, DEC collected water samples from Hempstead Harbor. Several samples of the shellfish from the harbor were collected and tested for chemical contamination, but the results from those analyses were not completed and released until 2010.

Falaise, "the brown house with chimneys," marks the western point of the southern boundary of the certified shellfish beds in Hempstead Harbor (photo by Carol DiPaolo, 6/29/22)

On September 28, 2009, DEC Bureau of Marine Resources (BMR) in conjunction with the US Food and Drug Administration (FDA) conducted a **hydrographic dye study** in Glen Cove Creek and Hempstead Harbor to test the dilution, dispersion, and travel time of the sewage effluent discharged by the Glen Cove STP. A shoreline survey of the harbor was completed in the autumn of 2010, and at that point everything was lined up for the reopening of the shellfish beds in Hempstead Harbor in 2011.

4.3.1 Shellfish Landings Reports

The NYS DEC publishes annual reports of shellfish landings by species and area in waters all around Long Island. (See https://www.dec.ny.gov/outdoor/103483.html for shellfish areas.) The reports are generated from tags filled out by shellfish "diggers." Records of the amounts of each type of shellfish and harvest location are kept by distributors and provided to the DEC. Once Hempstead Harbor was included in the landings reports, we began comparing annual landings from the harbor with those of other areas. One of the standout years for the harbor was 2014, when the hard-clam harvest totaled 17,424 bushels. That represented the second largest harvest of hard clams for that year out of all of the harvest areas around Long Island, with an economic value of over $1.36 million. For subsequent years, there have been fluctuations in the numbers of shellfish landings from Hempstead Harbor (as with neighboring bays), due to economic as well as environmental factors.

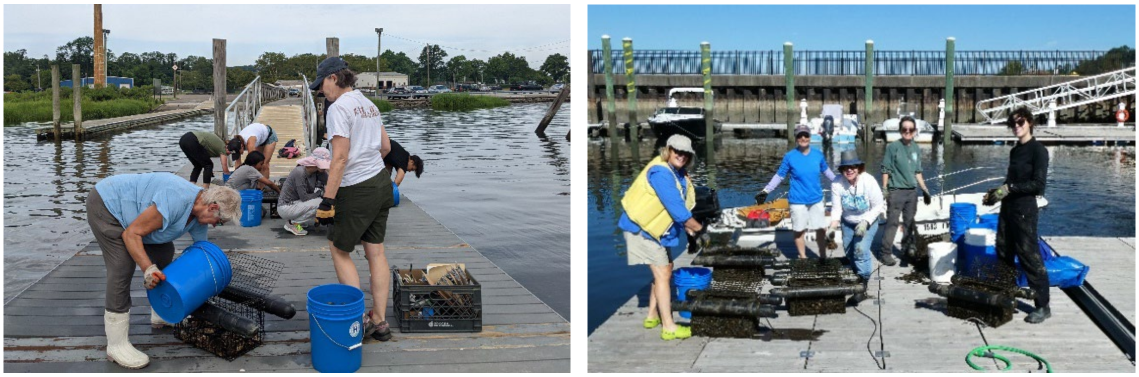
In 2023, the Hempstead Harbor shellfish landings report showed a steep decline in hard-clam and oyster hauls from the previous year. The hard-clam haul was 5,923 bushels (about half of what was reported in the preceding year), and the oyster haul declined from 657 bushels in 2022 to 0 bushels in 2023. No soft-shell-clam hauls have been reported since 2021. This decrease in shellfish landings could be attributed to shellfish diggers focusing efforts primarily in the recently opened Long Island Sound area rather than within the harbor, a shift noted during our monitoring surveys.

4.3.2 Shellfish Restoration and Seeding Projects

Harborwide shellfish habitat restoration projects were first considered as it became clear that Hempstead Harbor would once again have areas recertified for shellfish harvesting. The first project was the October 9, 2007, shellfish seeding that was conducted for theharbor. It was a joint initiative that included Nassau County, TNH, TOBAY, Cornell Cooperative Extension, Frank M. Flower & Sons Oyster Company, as well as HHPC and CSHH. The project was intended to add biomass–clams and oysters–to the harbor to help improve water quality and restore shellfish populations. An adult oyster can filter approximately 50 gallons of water per day, and an adult hard clam can filter about 24 gallons per day. More than 1.3 million seeds, consisting of two types of hard-shell clams (*Mercenaria* and *M. mercenaria notata*) and oysters were planted. (The *M. mercenaria notata* has markings that are different from the northern quahog stock normally found in Hempstead Harbor, which would later help in gauging the survival rate of the seeds.)

On October 15, 2009, Nassau County conducted the second shellfish seeding in Hempstead Harbor, which included 1.1 million clams and oysters. Funding for the 2009 shellfish-seeding operation was provided by the Long Island Sound Study, through the Long Island Sound Futures Fund.

Sustainability of the harbor's shellfish population remains a concern. The TOBAY Tappen Marina aquaculture project, along with other initiatives, may provide the stock of shellfish needed for seeding Hempstead Harbor in the future.



CSHH staff and volunteers at the North Hempstead Beach Park (l) and at Tappen Marina for transfer of oysters to conservation management area (photos by Martha Braun, 7/29/23, and local boater, 9/17/23)

For example, in 2022, CSHH initiated a community oyster gardening program. During that season, approximately 30,000 spat-on-shell oysters were raised in cages at three sites along the eastern shore of Hempstead Harbor, and approximately half of the oysters were planted in the newly established conservation management area in Hempstead Harbor. In 2023, a fourth oyster gardening site was added on the western shore of the harbor, and CSHH received approximately 60,000 spat-on-shell oysters to grow out in the expanded community oyster gardening program. At the end of the season, all 60,000 spat-on-shell oysters were planted in the conservation management area. Although the oysters from this project are not suitable for harvesting, they will eventually spawn and help to provide a growing community of oysters that will improve water quality and habitat for the harbor.

4.3.3 Surveys to Assess Survival of Seed Clams and Oysters

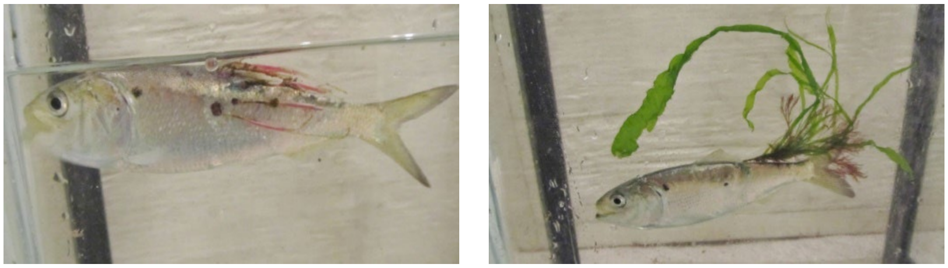
Surveys to assess shellfish populations help determine the health of existing shellfish species and the areas within a waterbody that are most hospitable for them to thrive. Knowing the composition of bottom sediments is an important element in understanding why different densities of shellfish are found in different areas of the harbor. Four large-scale shellfish population density and sediment surveys have been conducted for Hempstead Harbor—the first one in 2008 and the most recent in 2021.

In October 2021, HHPC contracted Cashin Associates to conduct a shellfish density survey for Hempstead Harbor (2021 Report on Shellfish Density Survey for Hempstead Harbor). The survey included 183 samples that were collected from stations throughout the harbor and were consistent with those used for earlier surveys that were conducted in 2013 and 2008 (both also conducted by Cashin Associates). The final survey report (issued on April 13, 2022) concluded that, overall, clam density had increased, with the highest number of clams per square meter in the lower harbor. The percent of seed clams was still very low compared with the 2008 finding, and the mean size of clams had also increased, overall indicating an older and therefore unstable clam population. No oysters were obtained in grab samples, although some were observed by divers who assessed the harbor bottom to create a sediment survey map. The conclusion from all three of the shellfish density surveys conducted for the harbor was that the harbor could benefit from seeding projects (see *Section 4.3.2*).

Other types of surveys conducted for the harbor included a Sediment Suitability Assessment of Hempstead Harbor for Nassau County's Shellfish Restoration Program (October 14, 2009). Cornell Cooperative Extension Marine Division staffers, Matthew Sclafani, Neal Stark, and Gregg Rivara, chose a scuba survey to evaluate the bottom and delineate the boundaries between mud and harder-type of bottom such as sand and sand-mud-shell mixes in the area off of Morgan Memorial Park. The assessment helped determine suitable sites to plant seed clams and oysters in preparation for 2009 shellfish seeding.

4.4 'Saladbacks'–A Local Phenomenon

"Saladbacks" is the term that local resident and aquatic conservation biologist John Waldman used to describe the unusual looking Atlantic menhaden (bunker) he first observed in December 2015. The mild autumn temperatures that year seemed to have kept the large population of bunker in the harbor much later than usual, and in mid-December John noted that many of the bunker he saw had parasitic copepods streaming off of them along with red algae and ulva that seemed to be directly attached to the parasites. He saw them again in the same area on December 24, despite the drop in temperature.



Peanut bunker with parasitic copepods (l) and a "saladback" bunker (r) with algae attached to the copepods (photos by John Waldman, 12/15/15)

On January 4, 2016, although most of the fish had left Glen Cove Creek, a large number of bunker swam between the bulkhead and the dock near the STP outfall. Large adult fish were swimming with juveniles that were about 5-6 inches long; the juveniles had red and green algae attached to them. Both groups also had parasitic copepods attached to them.

Photos and descriptions of the saladbacks were sent to a wide group of scientists, and the consensus was that this was a very unusual phenomenon. CSHH arranged to meet NYS DEC staffers at the dock on Glen Cove Creek on January 8, 2016, and they were able to collect a few fish with a drop net.

In 2023, saladbacks were not observed during the monitoring season. However, since the first observation of them in Hempstead Harbor in 2015, saladbacks were seen in Hempstead

Harbor every year, except for 2018 and 2023, but in smaller numbers. (See also, *Waldman, J., "A Novel Three-Way Interaction Among a Fish, Algae, and a Parasitic Copepod," Ecology, 98(12), 2017, pp. 3219–3220.*)

4.5 Monthly Field Observations and Recreational-Fishing Reports

Even before our regular monitoring season begins, we receive reports about observations around the harbor. On January 1, we received a report of seaweed ranging in color from orange to peachy rose washing up along the shore from Sea Cliff Beach to Tappen Beach. It was also growing alongside and on other types of macroalgae. This was a type of ephemeral red seaweed bloom that can occur year-round and with colors trending toward magenta.

In late January, a mature bald eagle was spotted in a pine tree on the corner of 15th and Prospect Avenues in Sea Cliff. On February 15, a mature bald eagle was seen by Kristie Werz on a semi-submerged boulder near Rum Point in Sea Cliff. On February 17, Elaine Neice saw a snowy owl take flight with a rabbit in its grasp near the Carpenter Cemetery in Sea Cliff. Other birds of prey, such as red-tailed hawks, were also seen in this area in late February.

Orange seaweed sample from Sea Cliff shoreline (l) and bald eagle in pine tree in Sea Cliff (photos by Carol DiPaolo, 1/1/23, and Sheila Wenger, 1/21/23, respectively)

As in winter 2021, numerous small depressions in the sand were seen near the Powerhouse Drain outfall; these were noted on shoreline monitoring days on February 19 and April 19.

Because of the unusually mild winter, it seemed that signs of spring began to appear a few weeks earlier than anticipated. In March, we received a report of a belted kingfisher diving for fish at the far end of Scudder's Pond as a bald eagle flew overhead. On March 9, three turkey vultures were seen flying over the southwestern end of the Roslyn viaduct; a turkey vulture was also seen on March 10 by Shore Road in Glenwood Landing. On March 17, a flock of brants was observed along the bulkhead north of Tappen Beach pool. On March 22, Sanjay Jain offered the following report from Roslyn Harbor:

Sand depressions by Glenwood Landing outfall (l) and red-tailed hawk near Sea Cliff School (photos by Michelle Lapinel McAllister, 2/19/23 and 2/22/23, respectively)

> *The bald eagles have been cushioning their nest. I have seen a few of the adolescents hanging around. The waterfowl have stayed longer in the harbor—they just seem to be lingering. There are buffleheads and scaups. The contingency of mallards seems to have increased. Geese are coming in slowly and the whole extended family has not shown up yet from what I can tell. The recent tides have been emptying out the harbor fairly significantly, so there is a lot of the harbor floor visible more [than usual]. Seagulls have been actively scavenging these exposed sand bars. The crocuses, daffodils, and Forbes' Glory of the snow are blossoming all around and peaking from underneath the leaves that were never raked up after they fell last fall. Overall, it is starting to feel like Spring.*

On March 24, we received the first report of the season of a returning osprey; Carole Berglie reported seeing the osprey on the platform nest at Shore Road in Glenwood Landing. On March 27, a pair of ospreys were seen at the platform mating. On March 29, a great egret was seen flying over the Sea Cliff boardwalk near Tilley’s steps.

On March 24, Karin Barnaby posted a photo from her home motion sensor cameras of a coyote, which she reported regularly traveled along Littleworth Lane and around Scudder’s Pond.

April 4 was unusually warm, with temperatures in the mid-70s (F). About a dozen brants were swimming off shore of Sea Cliff beach to Sea Isle. Also seen that day were two great egrets, one snowy egret, two ospreys, and one belted kingfisher. Orange seaweed lay along the strand line as well as beneath the water near the west end of Sea Cliff Beach. Wood ducks were seen at Scudder's Pond on April 6, while an osprey perched in a nearby tree. On April 10, a Canada goose nest was discovered near Sea Isle, and two angry geese parents returned to warn local dog Tillie to stay away. Brants remained throughout April in various parts of the harbor and were seen in high numbers (upwards of 70) from Sea Cliff Beach, Rum Point, and north of Tappen Beach.

A flock of brants off the harbor's eastern shore, north of Tappen Beach pool (l) and Canada goose nest and eggs (r) (photos Skip Dommin, 3/17/23, and Elaine Neice, 4/10/23, respectively)

On April 12, small lion's mane jellyfish (about the size of a quarter) were seen for the first time this season in Safe Harbor Marina. On April 13 and 14 air temperatures approached 90°F.

May

Weekly monitoring surveys for the core program began in May and were conducted on May 17, 24, and 31. However, boat monitoring was canceled for May 17 due to high winds and waves, so only shoreline sampling was conducted that day; boat surveys began on May 24. In mid-May, smoke from wildfires in Nova Scotia affected air quality on Long Island and gave the sky and sun an unusual orange glow. Pollen slicks were also visible on the surface of the harbor in several areas throughout the month. Water coloration varied from brown in the lower harbor to green in Glen Cove Creek, possibly due to localized blooms.

In early May, two great horned owls perched in a backyard in Sea Cliff, and a juvenile swan (last year's cygnet) was found wandering on the Roslyn viaduct and was safely returned to the harbor. About two-and-a-half-dozen brants were seen near the rocks north of the Tappen Beach pool on May 17.

During May, we saw many of the coastal birds we usually see around Hempstead Harbor during the monitoring season, including cormorants, mallard ducks, Canada geese, laughing gulls, swans, and terns. Many ducklings and goslings were seen throughout the harbor as well. A dozen great egrets, two snowy egrets, one blue heron, and two red-tailed hawks were also noted during our May water surveys. Ospreys were observed in several nests throughout the harbor. On May 31, we saw an adult bald eagle perched in a tree on the east shore during our monitoring survey of the lower harbor.

Most notable, however, was the absence of the Beacon 11 osprey nest, which had been one of the first nests observed in Hempstead Harbor at the inception of the CSHH water-monitoring program in 1992. (The osprey population has continued to rebound since the 1990s.) It seemed that the Beacon 11 nest had been removed prior to the ospreys' return in March. During the 2023 monitoring season, we counted up to 15 osprey nests that were visible along the harbor shoreline. Other osprey nests were observed a little farther in from, but still close to, the shoreline.

View of sunset over the Sands Point peninsula colored by smoke and haze from wildfires (photo by Karen Papasergiou, 5/22/23)

On May 17 (two days before the new moon), horseshoe crabs were observed mating in Dosoris Pond; some had ulva (sea lettuce) and slipper shells (*Crepidula fornicata)* attached to their shells. On May 24, evidence of horseshoe crab activity was noted along Tappen Beach, where there were shallow depressions in the sand and a few horseshoe crab mortalities as well. Baitfish were observed in the harbor on May 31. Comb jellies were seen during monitoring on both May 24 and May 31.

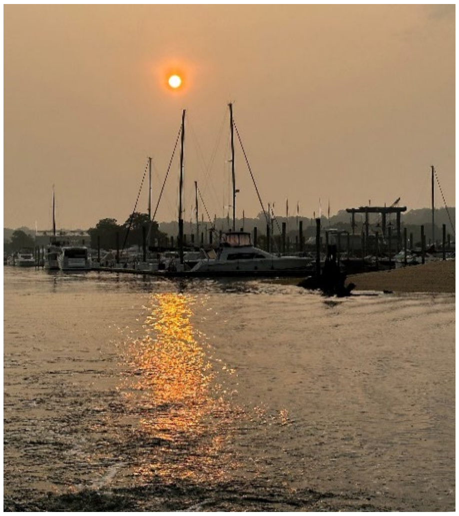
Horseshoe crabs mating (l), with attached ulva (c), and attached slipper shells (r) (photos by Carol DiPaolo and Evelyn Powers, 5/17/23)

On May 17, a flattened red-eared slider was found at the curb near Scudder's Pond. Bullfrogs could be heard making their calls around the pond in late May. On May 24, a healthy, 3-inch hard-shell clam was brought up to the surface on the anchor as we prepared to move to the next monitoring station.

June

On June 6, a pod of 30 dolphins was seen about 400 yards off of Morgan Memorial Park in Glen Cove.

Weekly monitoring surveys were conducted on June 7, 15, 21, and 28. On June 7, the smoke that traveled down the east coast from the Canadian wildfires had reached its peak and created a pronounced reddish haze over the sky and sun; the smell of smoke was evident. Impacts on air quality (as particulate matter) persisted throughout the month. On June 7, water color was brown and clarity was poor in the lower harbor, although the upper harbor was clearer and green. The preceding day's rain (following a period with no rainfall) seemed to cause more intense runoff. Despite the brown water, the Secchi disk reading at most monitoring stations was at 1.25 meters, and dissolved oxygen was at healthy levels. Pollen that had been deposited on the water surface began to decompose and turn brown. There were reports on June 8 of brown water also in Manhasset Bay and parts of Oyster Bay.



Haze from wildfire smoke (photo by Michelle Lapinel McAllister, 6/30/23)

On June 21, outfall station CSHH #10 by the Glen Cove sewage treatment plant had an unusual black/white flow coming from the top of the submerged pipe. The water around CSHH #8 up to the Garvies Point Brewery & Restaurant was black and turbid. Later, on June 28, the water in and around Tappen Marina and Glen Cove Creek appeared abnormally turbid and brown. On both June 21 and 28 monitoring days, outer harbor stations exhibited better water clarity. Our first hypoxic (low oxygen) reading occurred at CSHH #13 on June 21, about two weeks earlier in the season compared with the year before.

The usual birds that are observed during the monitoring season were also seen throughout June, including cormorants, mallard ducks with ducklings, ten great egrets (mostly in the lower harbor), two snowy egrets, Canada geese and goslings, laughing gulls, a blue heron, one belted kingfisher, ospreys, swans with one cygnet, and terns. On June 7, an osprey was chased by what appeared to be a dozen terns. In mid-June, black skimmers were spotted on the bar at the southern end of North Hempstead Beach Park and also at Tappen Beach.

Two black skimmers (l) and Canada geese with goslings (r) at North Hempstead Beach Park (photos by Martha Braun, 6/15/23)

Osprey platform at Safe Harbor Marina (photo by Elaine Neice, 6/9/23)

In addition to the osprey nests observed during the June monitoring dates, two new nests were seen: one on a large barge anchored in the harbor and the other on a boat lift in Safe Harbor Marina. On June 9, a platform was erected at Safe Harbor Marina so that the nest and two eggs could be transferred from the lift to the platform; on June 11, the osprey pair settled into the new nest location. On June 16, an adult bald eagle was spotted near the top of a tree along the shore of the lower harbor.

Large schools of adult bunker were observed at Tappen Marina on June 21; adult bunker were not observed on monitoring dates during the rest of the season. On June 28, a fisherman caught a striped bass near the entrance to Tappen Marina. Comb jellies, including sea walnuts and gooseberries, were observed on three June monitoring dates.

A groundhog was seen on Shore Road in Glenwood Landing, and bullfrogs continued their calls through the end of the month at Scudder's Pond.

July

Weekly monitoring occurred on July 5, 12, 19, and 26. At the start of monitoring on June 5, a dense fog obscured the view of the western shoreline. The water color in Tappen Marina was abnormally brown, as was the water color around monitoring stations CSHH #1 and #2. The water appeared a normal green at the outer-harbor stations but changed to a greenish brown in the area outside of Glen Cove Creek and then to dark brown within the creek. Hypoxic conditions were recorded at bottom depths each week in July for at least one station; three stations were affected by low dissolved oxygen levels on July 26, including one anoxic bottom depth reading at CSHH #2. (Tidal cycles prevented access to lower-harbor stations during the entire month.)

Great egret on east shore of harbor (photo by Skip Dommin, 7/1/23)

Comb jellies (sea walnuts and sea gooseberries) were observed on each monitoring date in July but were observed in the highest numbers on July 19 and 26.

On July 5, floating debris was observed between monitoring stations CSHH #1 and #2, which our boat captain Doug Brown said was consistent with conditions he observed that morning in the open sound and likely the result of a recent storm. Vegetative debris and pollen slicks persisted throughout the month. On July 12, logs and tree branches were observed in the water below Bay Avenue, Sea Cliff, as a result of a landslide that occurred at the northern portion of Bay Avenue. On July 19, more than the usual amounts of vegetative and other debris were noted in Glen Cove Creek.

Birds observed during July monitoring dates included cormorants, mallard ducks and ducklings, great egrets, one snowy egret, Canada geese, one blue heron, ospreys, swans, and terns; we also saw two killdeer, one belted kingfisher, and barn swallows. One juvenile bald eagle was spotted landing on the sand spit at Sea Isle in Glen Cove Creek.

On July 1, Kevin (Rusty) Roth had a strange encounter with a bald eagle in Hempstead Harbor. Paul Boehm relayed the story as it was told to him:

> *Kevin was out in HH fishing for stripers recently. His method was live-lining a bunker, which he had caught in the marina….The bunker was swimming maybe 50 ft from the boat when a bald eagle swooped down and grabbed the bunker and proceeded to fly away with Rusty's line. After fighting with eagle for a while, Rusty pulled the bait free and started to reel it in. Fifteen feet from the boat, the eagle came down … and grabbed the bunker again. Rusty said the eagle was mature, with white head and huge. He had never realized how big they are until the eagle attacked next to his boat….Rusty again pulled the bunker free, and the eagle left. Crazy stuff.*

On July 4, Paul Boehm reported on fishing in Hempstead Harbor:

> *[It's] been a great fishing season. A pit of big bass and now big blues have moved in (10-13 lbs). Lots of porgies…guys doing OK with fluke, although I have not fished for them. In last week, I have caught stripers of 39, 42, and 45 inches; the biggest was 37 lbs.*

The first blue-claw crab for the monitoring season was seen at Tappen Marina on July 5. Blue crabs were seen in small numbers at Tappen Marina on subsequent monitoring dates in July.

Juvenile bunker were observed in Tappen Marina on July 12, and large schools of peanut bunker and other baitfish were observed in Glen Cove Creek on that day. On July 19, a single epitoke-stage sandworm swam near the surface at CSHH #16.

When NYS DEC marine biologist Zachary Schuller provided preliminary data from DEC seinings in Hempstead Harbor (as part of the DEC's striped bass survey) for June and July, he described the haul on July 13. Zach said so many peanut bunker had been caught at the station by the Tappen Beach boat ramp that the crew had to scrap data collection to avoid the risk of killing thousands of fish; he said it was the most he had seen in a haul.

August

Weekly monitoring took place on August 2, 9, 16, and 23; monitoring was canceled on August 30 due to heavy rain and thunderstorms. On August 2, bottom DO levels were hypoxic (below 3.0 ppm) at all but one monitoring station (CSHH #8). (Because of tidal cycles, no lower-harbor stations were monitored in August.) A shift occurred on August 9, when bottom DO was at healthy levels (above 4.8 ppm) at four of six monitoring stations and hypoxic at only one station (CSHH #13), possibly due to mixing of the water column as a result of high wind and waves (which may also have been the cause of more than the usual amount of floatable debris observed in Glen Cove Creek). However, hypoxic levels occurred at bottom depths again on August 16 and 23. For much of August, Scudder's Pond was almost entirely covered with duckweed.

Least sandpipers north of Tappen Beach (photo by Michelle Lapinel McAllister, 8/7/23)

Birds observed during August monitoring surveys included cormorants (one seen eating a small eel in Glen Cove Creek), mallard ducks, great egrets, Canada geese (only on the August 9 survey), hooded gulls, ospreys, swans, and terns (in the dozens). On August 2, a red-tailed hawk was seen flying over Glen Cove Creek. Least sandpipers were seen on August 7 north of Tappen Beach pool. On August 9, an osprey couple was observed forming a new nest on the seawall at the entrance to Tappen Marina; the ospreys soon abandoned the structure. A belted kingfisher was seen on August 16 and August 23. On August 23, an adult bald eagle was seen flying overhead at station CSHH #16, and one black-crowned night heron was seen in Glen Cove Creek. Mark Ring reported seeing an adult bald eagle near Bryant Avenue on August 31.

On August 2, the epitoke stage of sandworms (also referred to as cinder worms) was observed near CSHH #2 (Bell 6). Comb jellies (both sea walnuts and sea gooseberries) were seen in high numbers on most monitoring dates. Large numbers of birds were observed on August 16 and 23 scanning for smaller fish as larger fish broke the surface of the water.

Bluefish catches, Sebastian Li (l) and Drew Neice (r) (photos by Matthew Nichols, 8/18/23, and Kenny Neice, 8/18/23, respectively)

Sebastian Li noted the bird activity as well and, on August 18, reported seeing a "feeding frenzy" of bluefish chasing smaller fish; he caught a 32-inch bluefish weighing 12-15 pounds. On August 23, juvenile bunker and baitfish were seen at the Glen Cove STP outfall. Blue-claw crabs were observed on monitoring dates along the bulkhead in Glen Cove Creek, albeit in low numbers.

On August 28, Sebastian Li reported:

> *I'm pretty sure I saw what was a couple of dolphin fins breaking the surface in front of the house just now. They were swimming slowly surrounded by baitfish. The bodies never broke the surface so hard to tell exactly what they were but definitely a very large fish of some kind….Snappers are running like mad, and the blues have been blitzing on a consistent basis. Lots of big schools of peanut bunker around.*

Following that report, Sebastian caught two more bluefish—31-32 inches and 12-15 pounds.

September
Weekly monitoring took place on September 6, 14, 20, and 27. The intense bluefish activity observed in August continued into September. On September 1, Sebastian Li reported that another bluefish blitz had occurred; he caught two bluefish that were about 32 inches long and 15 pounds each. On the morning of September 2, Anthony DiStefano saw hundreds of dolphins offshore of the Webb Institute; they were likely drawn to the same fish the bluefish were after. On September 2, an adult sea turtle washed up on the shore of Pryibil Beach.

Bluefish blitz (photo by Elaine Neice, 9/1/23)

On September 6, six of seven stations surveyed had bottom DO levels above 4.0 ppm. Hot, humid conditions associated with a three-day heat wave potentially led to hypoxic conditions on September 14 at three of the seven monitoring stations; on return to Tappen Marina, the water color had turned to a striking brown. DO conditions improved by September 20. On September 27, during a full-harbor survey, healthy bottom DO levels were recorded at all but one monitoring station.

The birds observed on September monitoring dates included cormorants, mallard ducks (one had a tumor on its head in Glen Cove Creek), Canada geese, great egrets, blue herons, belted kingfishers, swans, and terns. survey dates. On September 6, a black-crowned night heron was on the dock below the Cove Restaurant; on September 27, two peregrine falcons were seen during the monitoring survey. Fewer ospreys were observed during the last September

Mallard with tumor on its head seen in Glen Cove Creek (l) and egret fishing off a dock in the creek (photos by Carol DiPaolo, 9/20/23)

Comb jellies (both sea walnuts and sea gooseberries) were noted on all September monitoring dates. Also noted were peanut bunker, baitfish, as well as a few large blue-claw crabs. On September 27, a 400-pound roughtail stingray was caught in Long Island Sound during a Connecticut Department of Energy and Environmental Protection survey trawl.

Major flooding occurred after a storm on September 29 that brought about 5 inches of rain. Various parts of Shore Road were completely submerged in water.

October

Weekly monitoring took place on October 4, 11, 18, and 25. Dissolved oxygen levels improved compared with those during the previous month's monitoring, and water temperatures started to steadily decrease. Canadian wildfire smoke continued to sweep down the east coast and persisted into October. Although the smoke was not as severe as in late spring and early summer, it still created hazy conditions in the harbor. There was an unexpected pollen slick in the lower harbor during our second monitoring survey, which was likely from ragweed and grass pollen. On October 18, unusual cloud formations occurred with clouds spiraling into the atmosphere.

Birds observed on October monitoring dates included cormorants, mallard ducks, Canada geese, great and snowy egrets, blue herons, swans, and terns. One osprey remained a little longer than most and was seen flying overhead near the southern end of Tappen Marina during our monitoring survey on October 11. On October 18, a green heron was perched on a tree overlooking Scudder's Pond. An adult bald eagle was seen during our monitoring surveys in the lower harbor on October 11 and 25 in the same tree near a nest.

We watched many striped bass break the surface and fully jump out of the water as gulls and other birds tried to catch the smaller fish around them. Schools of baitfish and bunker were seen throughout the harbor. Comb jellies (sea walnuts and sea gooseberries), were also seen through the month in high numbers. No crabs were noted during October monitoring dates.

Following a major storm, there was a landslide/slump at Garvies Point Preserve involving what was referred to as a "chimney outfall."

Blue heron perched on seawall near the powerhouse drain outfall (photo by Carol DiPaolo, 10/25/23)

November – December

A little over two inches of rain fell between November 21 and 22. The rainfall caused Scudder's Pond to overflow with major flooding again on Shore Road.

On December 21, a harbor seal was spotted off of Sea Cliff Beach by Alex Greenberg and reported by Charlie Weinstein.

Flooding on Shore Road (l) and harbor seal seen near Sea Cliff Beach (r) (photo by Sarah Stromski, 11/22/23, and photo still from video by Alex Greenberg, 12/21/23)

4.6 Crustaceans

A variety of crustaceans can be seen around Hempstead Harbor. This group of marine organisms is characterized by, among other things, a segmented body, paired appendages, and a hard external skeleton that has to be shed to accommodate growth. Crabs, lobsters, shrimp, and barnacles are examples of this group of marine creatures.

Lady/calico crab (l), blue-claw crabs (c), and spider crab (r) (photos by Michelle Lapinel McAllister, 7/27/17, and Carol DiPaolo, 8/26/20, 7/24/19, respectively)

Here, we mention the type of crabs that are seen either during weekly sampling or caught during the DEC seining that is conducted around the harbor; the crabs include blue-claw, lady (or pink calico), green, spider, mud, fiddler, and the nonnative Asian shore crabs. Some are walking crabs, and others are swimmers, like the blue-claw crabs, which have back legs that are shaped like paddles.

Blue-claw crabs are present in Hempstead Harbor and other areas of Long Island Sound, but the numbers vary from year to year for both monitoring-date observations and NYS DEC seine hauls. Large numbers of blue crabs were observed in 2007 and 2010 in Hempstead Harbor, but in other years since 2007, numbers of blue crabs observed on monitoring dates have been sporadic. In August 2021, the largest number of blue-claw crabs observed on a single monitoring date was 18; in 2022, the highest number of blue-claw crabs observed was 8. In 2023, DEC seine haul recorded a total of 25 blue-claw crabs; whereas, during CSHH weekly monitoring surveys, a total of 14 blue-claw crabs were seen for the season, from July through September.

Although **horseshoe crabs** are included in the group of crustaceans seen around the harbor, they are not true crabs but are more closely related to spiders. They are noted mostly during the spring mating season and in the fall when the beaches are covered with molted shells. During the start of the 2023 monitoring season, horseshoe crabs were observed mating in May along the shores of Hempstead Harbor beaches.

The ubiquitous **acorn barnacle** is so plentiful that it is overlooked in weekly monitoring reports. These barnacles take up residence on rocks, bulkheads, pilings, docks, and boat bottoms all around the harbor.

A rarely seen crustacean along the shores of Hempstead Harbor and Long Island Sound is the **mantis shrimp**. That's because mantis shrimp hide at the bottom in rock formations or burrow several feet into the bottom of the harbor or sound. They have been nicknamed thumb-splitters because of their strong front claws, and they should be approached cautiously. Many years ago (1996) during a low DO event, mantis shrimp and other bottom-dwelling creatures were driven to the surface for air. They have also been seen in raked samples for Hempstead Harbor shellfish population density surveys (e.g., four small mantis shrimp in the 2008 survey and a large one in the November 2013 survey; none were reported in the October 2021 survey). Increasingly, mantis shrimp have been found in the bellies of striped bass caught by local fishermen.


Mantis shrimp found in a striped bass (photo by Peter Emmerich, 6/6/14)

On August 24, 2016, numerous tiny crabs (about 0.7 cm) were observed in the water column at one of the outer-harbor stations (CSHH #16). Samples were collected, and an attempt was made to preserve the crabs, which seemed to include two larval stages.

The crabs had prominent front claws that were very long compared with the rest of the body. We later identified the crabs as **long-claw porcelain crabs**, megalops stage; this was confirmed by a marine-invertebrates expert, David Lindeman. Although porcelain crabs are found along the Atlantic coast, this sighting in Hempstead Harbor was considered very unusual.

On July 8, 2020, a bloom of tiny shrimp occurred in Tappen Marina. They were later identified as **mysid shrimp** by John


Horseshoe crabs mating (photo by Joanna Greenspon, 6/14/22)

Waldman and Gillian Stewart. Mysid shrimp are a benefit to marine health as they are omnivorous filter feeders and will feed on algae and detritus.

The **Asian shore crab** is an invasive species that started showing up around Long Island Sound in the late 1990s. It can tolerate a wide range of salinity levels and is now commonly seen in bays around Long Island Sound. Another nonnative crab species—the **Chinese mitten crab**—has shown up in the Hudson River as well as the lower Housatonic River in Connecticut, but the last report of mitten crabs in our area was in 2019 in Oyster Bay. Invasive species can upset the ecosystem and drive out native species. Marine scientist Dick Harris reported that large numbers of mitten crabs can create havoc when they burrow into riverbanks and can cause the banks to collapse. Both CT DEEP and NYS DEC have requested that anyone who sees a mitten crab (distinctive looking with its six spider-like legs and two claws that look like hairy mittens with white tips) capture the crab and put it on ice, freeze it, or preserve it in alcohol, note the date and location of capture, and report it; for NYS DEC, report to isinfo@dec.ny.gov or 518-402-9425.

4.7 Jellies

Two types of **comb jellies** (which are classified separately from the stinging-celled jellyfish) are seen in Hempstead Harbor: the larger egg-shaped sea walnuts and the tiny, rounder sea gooseberries. The **sea walnuts** have lobes that are rimmed with short comb-like appendages that are phosphorescent. They can be seen at night glowing as the water is moved around them, as in the wake of a boat. **Sea gooseberries** have a pair of tail-like appendages that can be seen when they are up close to the surface. Comb jellies do not sting.

In 2023, comb jellies were observed in small numbers at the start of the monitoring season, but in July and August the numbers increased significantly. The highest numbers of comb jellies (both sea walnuts and sea gooseberries) were noted on July 19 and 26; however, high numbers of comb jellies were observed also throughout August and October. This is an increase compared with the 2022 monitoring season. During previous years, comb jellies had usually appeared in large numbers in Hempstead Harbor in late June and through mid-October. In 2015, no comb jellies were observed on monitoring dates; only a few were counted during 2016-2020. The decrease in comb jellies observed in Hempstead Harbor and

Early stages of lion's mane jellyfish (l) and (c) and fully developed (r) (photos by Joanna Keenan, 5/17/21, Carol DiPaolo, 5/19/21, and Kenny Neice, 4/13/21, respectively)

Long Island Sound seemed to correspond with the increased presence of Atlantic menhaden, which may have been feeding on young comb jellies.

Two types of tentacled jellyfish that may be seen in the harbor are the **lion's mane jellyfish**, with long tentacles that sting, and the round, bell-shaped **moon** jellyfish, which have short tentacles around their rim that do not produce a stinging sensation**.** Both types of jellyfish are usually observed in spring in Hempstead Harbor.

Moon jellies are easily identified by the four, whitish, horseshoe-shaped gonads on the top of the bell. There have been no reports of moon jellies in Hempstead Harbor since 2017.

Lion’s mane jellyfish were first observed during the 2023 season in Safe Harbor Marina (Glen Cove Creek) on April 12. This was later than the first report received in 2022 (March), but around the same time as in 2021 (April). Early stages of lion’s mane jellyfish (i.e., clear in color and without long tentacles) have been seen in Hempstead Harbor starting in 2021. Most of the lion’s mane jellyfish that are observed in Hempstead Harbor are relatively small and orange-colored, rather than purplish brown.

In 2013, mixed among the lion’s mane jellyfish and moon jellies in Hempstead Harbor, we observed hundreds of unfamiliar jellies that were later identified as **salps**.

In September 2021, we began seeing white sea anemones attached to docks in Safe Harbor Marina and along the bulkhead below the Cove Restaurant in Glen Cove Creek. We saw them along the bulkhead in September and October of 2022, but not in 2023.

Sea anemones (photo by Quentin Tyree, 9/28/21)

4.8 Diamondback Terrapins and Other Turtles

Diamondback terrapins are the only turtle found in estuarine waters and generally grow to about 10 inches long. In spring of 2005, diamondbacks were observed in large numbers in the lower harbor, near the Roslyn viaduct. Diamondbacks typically converge by the hundreds in one area in the spring and mate for several weeks. Information about their presence in Hempstead Harbor was used to support efforts to extend the harbor’s designation as a "significant coastal fish and wildlife habitat" to include the area south to the Roslyn viaduct.

In 2006, dramatic changes occurred in the area near the viaduct with the construction of the large buildings at Bryant Landing and the new viaduct (which was completed in 2011). Although no diamondback sightings have been reported for the lower harbor since 2006, they have been seen in other parts of the harbor since then, particularly around Safe Harbor Marina (formerly Brewer Yacht Yard) and the Sea Isle sand spit.

Diamondback terrapin hatchling (photo by Alex Drew, 9/20/22)

More recently, on September 20, 2022, a diamondback terrapin hatchling was seen swimming in Tappen Marina. Prior to that, the last report received of a sighting of a live diamondback terrapin in Hempstead Harbor had been at Safe Harbor Marina in Glen Cove on June 17, 2014 (at that time, the marina was known as Brewer Yacht Yard).

Earlier sightings of diamondback terrapins in Hempstead Harbor included:

Diamondback terrapin below the outfall north of Tappen Beach pool (photo by Carol DiPaolo, 6/27/12)

- The diamondback pictured at right was seen on June 27, 2012, north of the Tappen Beach pool and was more than a foot long.
- In 2010, a large (about a foot long) diamondback was seen swimming also in Brewer Yacht Yard (now Safe Harbor Marina), near the Sea Isle sandspit.
- On July 11 and August 19, 2009, a diamondback was seen in what was formerly Brewer Yacht Yard.
- In June 2008, the DEC seine crew caught an adult diamondback terrapin (255 mm across and 275 mm long–about 11 inches long–which is longer than the average size recorded) near the sandbar at the southern end of North Hempstead Beach Park.

Occasionally, large sea turtles have made their way into Long Island Sound and have been spotted in local bays. We received a report of an adult loggerhead turtle washed up on the shore of East Beach in September 2023, however, no others were reported to us throughout the year. In 2019, a dead Kemp's ridley sea turtle washed up on the beach near Tappen Marina. On August 13, 2015, a large sea turtle was seen in Long Island Sound near Hempstead Harbor. On October 24, 2011, Paul Boehm, who was fishing for black fish about a half a mile north of the Glen Cove breakwater, reported that he had seen a sea turtle, which he identified from photos as being a **Kemp’s ridley sea turtle.** On August 2, 2011, a large sea turtle was seen at the Shelter Bay Yacht Club in Manhasset Bay.

Snapping turtles (a fresh water species) have been observed in Scudder’s Pond and other ponds around the harbor. However, there were no snapping turtle sightings reported for 2020-2023. In June 2019, a Scudder’s Pond turtle chose to make a nest on nearby property. The homeowners were happy to protect the 36 turtle eggs that hatched on August 30; the tiny snapping turtles were then released to Scudder’s Pond.

4.9 Marine Mammals

Although long-time residents share stories of harbor porpoises visiting Hempstead Harbor and Long Island Sound during the mid-1900s, their appearance became less frequent, and for decades there were no reported sightings of these or other marine mammals in the harbor (see http://longislandsoundstudy.net/wp-content/uploads/2010/03/fall2009.pdf). Marine mammals are classified into four different taxonomic groups: **cetaceans** (whales, dolphins, and porpoises), **pinnipeds** (seals, sea lions, and walruses), **sirenians** (manatees and dugongs), and **marine fissipeds** (polar bears and sea otters). There are many species within each of the groups (see https://www.fisheries.noaa.gov/species-directory/marine-mammals). Some of the characteristics marine mammals share with other mammals include being warm blooded, having lungs to breathe air, giving birth to live young, and producing milk to feed their young.

Beginning in 2005, we received reports of seals in Hempstead Harbor followed by bottlenose dolphins in 2009 and whales in 2015. Sightings of these marine mammals were also increasing in other bays around Long Island Sound as well as along the south shore of Long Island.

Hundreds of dolphins by the Webb Institute (photo stills from video by Anthony DiStefano, 9/2/23)

Dolphins were observed in Hempstead Harbor on June 6, off of Morgan Memorial Park beach and on September 2, off shore of the Webb Institute. On August 28, there was an unconfirmed sighting of dolphins off of Bay Avenue, possibly preying on baitfish. On December 21, 2023, a harbor seal was spotted off of Sea Cliff Beach.

See *Table 7* below for a listing of marine mammal sightings for Hempstead Harbor, nearby bays, and western Long Island Sound that were reported to CSHH for years 2005 to present.

Table 7
Marine Mammal Sightings

Marine Mammal	Date	Description
Harbor seal	December 21, 2023	Spotted off of Sea Cliff Beach
Dolphins	September 2, 2023	Hundreds of dolphins seen off the shore near the Webb Institute
Dolphins	June 6, 2023	Pod of 30 dolphins seen about 400 yards off of the beach at Morgan Memorial Park
Dolphins	June 10-12, 2022	Large number of dolphins were seen throughout the Long Island Sound and in Hempstead Harbor
Dolphin	May 29, 2022	Dolphin was spotted near a buoy off of Hewlett Point in Manhasset Bay
Dolphins	March 20, 2022	Two or three dolphins were seen swimming between Port Washington and Sea Cliff; this was six days after a pair of dolphins was seen in Northport Harbor
Harbor seal	February 26, 2022	Dead harbor seal washed ashore on Stehli Beach
Atlantic right whale	November 23, 2021	Spotted near the Throgs Neck Bridge
Seal	October 23, 2021	Seen in the mooring field near the Hempstead Harbour Club
Dolphins	July 5-6, 2021	Dolphin reports in Oyster Bay; the next day a pod of 50 dolphins were seen in Hempstead Harbor near the Legend Yacht and Beach Club (former Loew estate)
Dolphin	March 30, 2021	Stranded and rescued from mud flats at low tide, Manhasset Bay
Seal	November 21, 2020	Seen off of Sea Cliff Beach
Minke whale	May 15, 2020	Found on private beach in Oyster Bay in poor health, had to be euthanized
Seal	February 2020	Seen in the lower harbor
Seal	February 2019	Seen on a jet ski float in Safe Harbor Marina in Glen Cove.
Seal	December 14, 2018	Seen surfacing in front of the Tilley stairs in Sea Cliff
Pilot whale	July 11, 2018	Seen in Oyster Bay
Whale and bottlenose dolphins	September 17, 2016	Seen off of Matinecock Point
Humpback whale	July 21, 2016	Seen breaching outside Hempstead Harbor, near Execution Rock lighthouse
Whales	May 5, 2016	2 whales, one large and one small, seen approximately one mile east of Prospect Point
Humpback whale	April 29, 2016	Seen mid-sound, between the outer section of Hempstead Harbor and the Rye/Westchester area
Dolphins	April 12, 2016	Seen in Oyster Bay

Marine Mammal	Date	Description
Humpback whale	December 7-9, 2015	Seen near red bell buoy off Sands Point, and again near Glen Cove Creek entrance
Humpback whales	October 5-6, 2015	Several reported to be in or near Hempstead Harbor
Humpback whales	September 18, 25, 28, 2015	2 seen at multiple locations across Long Island Sound and Hempstead Harbor over several days
Beluga whales	May 2015	Confirmed sightings of 3 young beluga whales in Manhasset Bay, Oyster Bay
Bottlenose dolphins	August 17, 2015	About two dozen seen near Glen Cove breakwater and Morgan Beach; another report received the next day of dolphins in the outer harbor
Bottlenose dolphins	August 9, 2015	About 100 seen over several hours in Long Island Sound, Hempstead Harbor near Morgan Beach, and outer harbor
Seals	November 16, 2013	Multiple seen at different locations—midharbor, Crescent Beach, and near Matinecock Point
Bottlenose dolphins	July 19, 2013	8 seen in Hempstead Harbor, near Sea Cliff Beach
Seals	April 27-29, 2013	Seen off the west shore of the upper Harbor and off the jetty at Morgan Park
Bottlenose dolphins	August 11, 2011	About 100 entered Hempstead Harbor, were seen near Morgan Park
Bottlenose dolphins	August 5, 2011	Seen in Long Island Sound
Bottlenose dolphins	June 27, 2009	Around 200 seen in western Long Island Sound, 100 near Tappen Beach
Seal	January 2008	Seen off of Sea Isle, near Tappen Marina, in Glen Cove Creek, and off of Centre Island
Seal	November 2005	Seen eating striped bass in Hempstead Harbor

4.10 Birds

Since the inception of the monitoring program, we have seen an increase in the variety of birds that have become residents or regular visitors to Hempstead Harbor. **Belted kingfishers, blue herons, Canada geese, cormorants, great** and **snowy egrets, gulls, mallards, ospreys, swans, terns,** and more recently, **turkey vultures** and **bald eagles** are generally observed throughout the season, along with the usual swallows, pigeons, crows, and other land-based birds that are frequently seen along the shores of the harbor but not counted or specifically noted on data sheets during monitoring. Increasingly, **red-winged blackbirds** are noticed around the edges of Scudder's Pond and grassy areas on top of the bulkhead near the head of Glen Cove Creek.

Each year we see new, young members of the harbor's duck, Canada goose, and mute swan populations. Although the adult Canada goose population remains high, we have seen fewer numbers of young birds over the last few years. In 2023, however, we observed a goose nest in April and goslings throughout May and June. This is an increase from the previous monitoring season, when we observed goslings during only two monitoring days in June.

A belted kingfisher, stunned after flying into a glass door (l), terns on a buoy (c), and a great egret fishing in Glen Cove Creek (r) (photos by Carol DiPaolo, 5/3/19, 6/26/19, and 9/20/23, respectively)

In 2023, we observed swans throughout the water monitoring season (May through October). We observed a juvenile swan, last year's cygnet, in early May and one cygnet in June. The observed mute swan population in Hempstead Harbor has varied from lower numbers observed in recent years to a high of 55 swans counted on a single monitoring date in August 2019.

Swans in Glen Cove Creek (l) and cormorants on a float in the mooring field in Hempstead Harbor (photos by Carol DiPaolo, 9/20/23 and 9/17/23, respectively)

Observed less frequently during monitoring surveys are **black-crowned night herons, brants, green herons, killdeer** and other **plover-type birds,** and **falcons** or **hawks**. Sightings of these are included on weekly data sheets and also noted in the monthly field observations at *Section 4.5*.

Late-staying osprey perched over Scudder's Pond (photo by Kathleen Haley, 11/5/22)

Osprey populations, once threatened because of the effects of widely used pesticides that were banned in the 1970s, have made a remarkable comeback to Hempstead Harbor and Long Island Sound. These beautiful "fish hawks" can be seen diving for prey in harbor waters. As the harbor's ecosystem improved, the ospreys and other water birds have been able to find plenty of food for them to thrive. The ospreys migrate long distances (as far as South America) in the fall and return in March–generally to the same nesting places they had been to previously.

Osprey nests have been visible from our monitoring stations in Hempstead Harbor since at least 1995. Over the years the osprey population continued to increase along with nesting sites around the harbor. Despite additions of nesting platforms around the harbor, ospreys have built nests on top of cell towers, other electrical equipment, and even construction cranes. We have also seen nests on top of duck blinds and abandoned boats. One of the oldest nesting sites in Hempstead Harbor was at Beacon 11, the navigational light between Tappen Beach Marina and Town of North Hempstead Beach Park; however, the nest at Beacon 11 was removed in 2023. In 2023, two new nests were discovered, one on a large barge anchored in the harbor and the other on a boat lift in Safe Harbor Marina. At the beginning of June, a new platform was constructed in Safe Harbor Marina, and the nest on the boat lift, along with the two eggs inside, was relocated to the platform. Currently, 15 osprey nests are within easy view from the water around the harbor's shoreline.

Since about 2004, **peregrine falcons**, a protected species, have been sighted near the Glenwood Landing power plant. In 2023, two peregrine falcons were seen during the September 27 monitoring survey. Before that, in 2022, two peregrine falcons were observed, one on the Gladsky Marine crane in September and another near Scudder's Pond in October.

Although **red-tailed hawks** are seen often in wooded areas around Hempstead Harbor, we see them only occasionally during water monitoring. In 2023, red-tailed hawks were seen in February and two were observed in May during our water-monitoring surveys.

Our first sighting of a **turkey vulture** near Hempstead Harbor occurred on a monitoring date in May 2008 as it was flying over Glen Cove Creek. Since then, turkey vultures have been seen frequently throughout the year near the eastern shore of the harbor, flying over East Hills, Greenvale, Roslyn Harbor, Mott's Cove, Sea Cliff, and Glen Cove. In 2023, turkey vultures were observed on two separate occasions: three were seen flying over the Roslyn viaduct on March 9, and one was seen by Shore Road in Glenwood Landing the following day, March 10.

Red-tailed hawk flying over Welwyn Preserve (l), osprey in flight (c), and turkey vulture (r) (photos by Ashley Pichon, 4/24/22, and Jim Moriarty, 9/11/10; turkey vulture photo retrieved from en.wikipedia.org/wiki/Turkey Vulture, 6/17/12)

Bald eagles have been moving toward western Long Island Sound over recent years, and we started receiving regular reports of them around Hempstead Harbor in 2015 during the monitoring season. In 2018, it was confirmed that there was a nesting pair of bald eagles in a large tree near the shoreline in Roslyn Harbor and at least one chick was in the nest on May 28, 2018.

Before the water monitoring season began in 2023, we received reports of bald eagles from January and February around different areas in Sea Cliff and in March near Scudder's Pond. During the water monitoring season, bald eagles were observed on monitoring dates in May through August, as well as in October. We saw both adults and juveniles during those months.

Two bald eagle fledglings (l) and adult with a fish (r) in the lower harbor (photos by Rich Boehm, 7/21/21)

In winter, many migratory waterfowl can be seen around Hempstead Harbor, including **brants**, **buffleheads**, **common goldeneyes**, **common loons**, **common mergansers**, **red-breasted mergansers**, **greater scaup**, and **lesser scaup.** During the winter of 2023, buffleheads and scaups stayed in the area until March and brants were observed through mid-May. In mid-February, a snowy owl, an elusive winter bird of prey, was seen in Sea Cliff. Also, wood ducks, which usually stay close to ponds rather than shoreline, were seen at Scudder's Pond in April 2023.

From left to right, brants, bufflehead, greater scaup, and red-breasted merganser (photos by Skip Dommin, over several days in January 2021)

There have been some unusual visitors over the years as well. In 2018, we received our first report of a **black vulture** (a southern variety) flying off of Sea Cliff Beach and two pairs of **long-tailed ducks** swimming near the same area in the harbor. In 2017, we saw **black skimmers** for the first time during a monitoring date, and then had a report of a skimmer doing some nighttime fishing in Tappen Marina in 2018. Black skimmers were seen also on June 15, 2023, at North Hempstead Beach Park and at Tappen Beach Marina. In 2011 (August 28), a **south polar skua** (a dark, gull-like bird), showed up on Sea Cliff Beach, brought in with the hurricane winds; in mid-December, a **brown pelican** was seen off of Sands Point at the Execution Rocks Lighthouse.

We have received reports of **northern gannets** diving into the harbor and Long Island Sound for food. On April 19, 2021, gannets were seen diving for bunker in eastern Long Island Sound. On April 14, 2019, a large number of gannets were seen diving for bunker in Hempstead Harbor.

4.11 Algal Blooms

The color and turbidity of water within Hempstead Harbor vary by season. Hempstead Harbor Secchi-disk depths (an indicator of light penetration into the water column and therefore water clarity) in the harbor most often range from 1.0 to 2.0 meters during the summer months, June through August. Lower Secchi-disk depths along with supersaturated DO levels (greater than 100 percent) are indicators of the presence of algal blooms, i.e., the accelerated growth and density of phytoplankton. Algae absorb light and give off oxygen in the growth phase. The dominant type of algae present in the harbor gives the water its color, which is typically brown or green.

During most seasons in Hempstead Harbor, we see the effects of algal blooms, such as unusual and dramatic water color and clarity changes, often followed by low DO levels as the algae decomposes and uses up oxygen in the process. An indicator of an algal bloom in process is a high reading for DO percent saturation, which we record during weekly monitoring using a multiparameter meter. Chlorophyll a (Chl a) readings are also used from the meter to help determine the presence of an algal bloom (see *Section 3.6*).

Although we observed abnormal coloration and varying DO levels (low and super saturated) at times throughout the harbor in 2023, potential algal blooms were more localized to specific monitoring stations and parts of the harbor and occurred over a shorter period than in 2022. Examples of suspected blooms were on June 28 in Glen Cove Creek and Tappen Marina and on July 5 in Tappen Marina and at monitoring stations CSHH #1 and #2; on both dates, the water was abnormally colored.

Pollen slick—not sludge (l) and stripe of pollen across outer harbor surface (r) (photos by Carol DiPaolo, 5/7/15, and Michelle Lapinel McAllister, 5/19/21, respectively)

In addition, pollen slicks, which are commonly seen on the harbor's surface in spring, can change the appearance of the water surface and color. The slicks are usually lighter in color when first formed and then, as the organic matter within the slick decays, turn a darker brown. A pollen slick may also be mixed with algal cells and form a thick coating over the water surface. A dramatic example of this occurred in May 2015, when the decaying pollen mixed with algae cells and created a mat on the water surface that covered a large area of the harbor as well as many areas around Long Island Sound. Many local residents were prompted to report the appearance of the slicks as the release of “sludge” or sewage spills. Water samples taken from the slick that spread across a section of Hempstead Harbor confirmed that no sewage was mixed in the mat of organic matter.

Duckweed at Scudder’s Pond (photo by Michelle Lapinel McAllister, 8/17/22)

A mix of algal cells with other vegetation at Scudder’s Pond often creates a mat at the surface that generally persists through the warmer months. Most often duckweed growth accelerates and covers the pond and moves from side to side as the wind direction changes.

Excess amounts of nitrogen released from failing septic systems, overfertilization of lawns and gardens, and other sources, have been implicated in causing more frequent and longer-lasting algal blooms in waters around Long Island and other areas. These blooms can affect other marine species through light reduction and oxygen depletion. Some types of algae contain biotoxins, and if the algal cells are present in high densities, these harmful algal blooms (HABs) may cause a risk to human health through consumption of shellfish taken from affected areas.

Excess nitrogen can also fuel the growth of macroalgae (also known as macrophytes, or, more commonly, seaweed). An overabundance of seaweed can further reduce light penetration, deplete oxygen, make it difficult for some species of marine life to thrive, and create aesthetic issues for beaches. In some bays, seaweeds can create deep mats on bay bottoms.

In Hempstead Harbor, the seaweed is generally present in smaller amounts, sparsely covering portions of the shoreline at low tide or collecting around rocks or jetties. Seaweed may be observed in greater amounts after high winds and rain storms both on the surface of the water and on the shoreline during a receding tide. Common seaweeds found around Hempstead Harbor and Long Island Sound include sea lettuce (*Ulva lactuca),* red wooly grass *(Agardhiella subulata*), rockweed (*Fucus distichus)*, and Irish moss (*Chondrus crispus*) and the similar looking Turkish washcloth (*Mastocarpus papillatus*).

Seaweeds commonly found around Hempstead Harbor include (from left to right) sea lettuce, red wooly grass, rockweed, and Turkish washcloth (photos by Sebastian Li, 7/6/21)

At the very end of 2022, Rob Rich, a local photographer, reported seeing a widespread growth of an orange algae off the end of the boardwalk at the bottom of Dock Hill/Sea Cliff Park that he had not seen before. On further investigation, we saw that what was being described looked like a ferny type of algae/seaweed that seemed to grow with other types, such as rockweed. The color ranged from orange to a peachy/rosy color. The seaweed was present from areas near Sea Cliff Beach all the way to the rocks near Tappen Beach pool. This continued into early 2023. This was a bloom of seaweed that can occur year-round, which we have seen previously with varying colors.

"Ephemeral" algal bloom along eastern shore of Hempstead Harbor
(photos by Rob Rich (l), 12/28/22, and Carol DiPaolo (r), 1/1/23)

When asked for a possible identification of the seaweed, Dr. Jamie Vaudrey, Research Coordinator for the Connecticut National Estuarine Research Reserve offered the following: "…without looking at it under a microscope…my guess would be *Antithamnion pectinatum* or *Antithamnion cruciatum* (a native) or possibly a *Callithamnion* species (*C. tetragonum* or *C. corymbosum* – or similar looking species). All are found year-round, with the *Antithamnion* cited as being open coast, subtidal, and often epiphytic on other algae…. The *Callithamnion* is found in lower intertidal and subtidal zones often growing on other algae or eelgrass – it is finer looking to me, than what I can see in your photos."

Appendix A

2023 CSHH Field-Monitoring Data

Red numbers indicate that the readings were unusually low or high but reflect station conditions.

Green lines indicate replicate surveys.

Highlighted numbers indicate possible equipment malfunction.

*Sonde surface levels are taken at a half meter below the surface.

**Bottom levels are read by the sonde depth sensor, which is 0.26 m off the harbor floor.

***Total depth accounts for the 0.26 m distance between the YSI EXO2S sonde depth sensor and the harbor floor.

Date	**Water Temp (°C)**		**Salinity (ppt)**		**DO (ppm)**		**pH**		**Air Temp**	**Secchi**	**Chl-a (ug/L)**		**Turbidity (NTU)**		**Depth(m)**	**Time**
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	**(°C)**	**(m)**	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #1–Beacon 11																
10/25/23	15.07	15.98	24.79	25.57	8.23	7.32	7.68	7.66	11.9	2.25	6.76	5.23	1.99	3.42	4.13	7:55
10/25/23	15.18	15.97	24.90	25.57	7.98	7.22	7.71	7.66	N/A	N/A	6.87	5.46	1.98	2.82	4.20	N/A
10/18/23	15.84	16.05	24.26	24.75	7.48	7.46	7.52	7.58	12.4	1.75	8.72	7.45	3.12	3.51	3.46	7:55
10/18/23	15.85	16.04	24.24	24.72	7.36	7.43	7.54	7.61	N/A	N/A	8.91	8.15	3.18	3.43	3.49	N/A
10/11/23	17.42	17.98	25.00	25.51	7.59	7.67	7.66	7.77	13.4	2.0	9.24	7.34	2.13	2.34	4.35	7:47
10/11/23	17.42	17.97	25.03	25.52	7.53	7.68	7.69	7.78	N/A	N/A	8.47	6.50	1.94	2.67	4.68	N/A
10/4/23	19.04	19.06	24.77	24.89	7.01	6.92	7.40	7.48	17.3	1.25	9.33	9.14	3.33	5.72	4.82	7:55
10/4/23	19.05	19.04	24.86	24.99	6.94	6.98	7.51	7.54	N/A	N/A	9.71	8.92	3.32	4.10	4.88	N/A
9/27/23	18.27	19.67	25.13	26.85	7.12	6.14	7.34	7.57	12.9	1.5	8.07	2.28	2.82	4.81	6.16	7:55
9/27/23	18.06	19.67	25.17	26.85	6.32	6.08	7.53	7.58	N/A	N/A	8.58	4.42	2.75	4.31	6.46	N/A
9/20/23	20.76	21.26	24.35	24.99	6.00	6.08	7.42	7.55	16.1	1.2	14.37	15.31	4.30	4.77	3.06	7:45
9/20/23	20.75	21.21	24.33	24.81	5.76	5.98	7.52	7.58	N/A	N/A	14.39	15.24	4.42	4.18	3.12	N/A

2023 CSHH Field-Monitoring Data

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #1–Beacon 11 (continued)																
9/14/23	24.01	24.09	25.71	25.78	5.12	4.26	7.30	7.33	20.4	1.2	30.75	16.47	3.15	3.59	3.61	7:38
9/14/23	24.00	23.95	25.72	25.76	4.55	4.45	7.38	7.39	N/A	N/A	35.37	13.40	3.12	4.44	3.64	N/A
9/6/23	24.47	24.24	25.79	26.08	6.05	5.50	7.49	7.50	25.2	1.25	19.13	21.26	3.63	4.34	4.20	7:45
9/6/23	24.49	24.17	25.75	26.14	6.04	5.39	7.55	7.51	N/A	N/A	19.04	19.42	3.81	4.73	4.23	N/A
8/30/23	Harbor-wide monitoring cancelled due to thunderstorms.															
8/23/23	23.87	23.87	25.51	25.52	6.91	6.80	7.60	7.66	19.7	1.0	21.34	22.12	4.15	4.38	3.43	7:55
8/23/23	23.89	24.00	25.53	25.65	6.84	6.69	7.68	7.69	N/A	N/A	21.57	20.84	4.20	5.05	3.39	N/A
8/16/23	24.10	22.89	25.49	26.99	5.09	1.49	7.37	7.16	22.4	1.0	28.02	4.12	3.28	3.37	3.68	8:13
8/16/23	24.12	22.77	25.41	27.07	5.37	1.30	7.51	7.16	N/A	N/A	27.84	3.56	3.39	1.93	3.71	N/A
8/9/23	22.55	22.68	26.63	26.73	6.16	5.40	7.45	7.49	22.2	1.25	20.27	23.10	2.95	6.05	4.64	7:45
8/9/23	22.52	22.67	26.62	26.73	5.97	5.47	7.56	7.51	N/A	N/A	19.50	21.14	3.05	4.73	4.52	N/A
8/2/23	23.98	23.24	26.37	27.21	5.80	2.94	7.54	7.36	17.3	1.0	22.98	8.22	4.92	10.01	3.83	7:13
8/2/23	24.01	22.78	26.34	27.45	5.73	1.81	7.64	7.27	N/A	N/A	22.80	7.33	4.71	7.36	3.42	N/A
7/26/23	23.66	23.57	25.94	26.10	4.66	3.79	7.39	7.38	22.7	1.3	25.53	15.54	2.07	2.14	3.27	7:45
7/26/23	23.56	23.57	25.87	26.00	4.59	3.95	7.46	7.42	N/A	N/A	22.24	15.28	2.22	2.42	3.31	N/A
7/19/23	23.32	23.32	25.63	25.95	3.50	3.09	7.27	7.29	23.2	1.25	21.58	19.42	3.14	4.22	3.18	8:57
7/19/23	23.33	23.34	25.66	25.93	3.26	3.13	7.28	7.30	N/A	N/A	23.77	23.77	3.22	3.54	3.12	N/A
7/12/23	24.29	23.32	23.32	26.40	8.15	5.19	7.74	7.56	27.1	1.0	39.54	18.98	3.00	5.61	5.31	8:00
7/12/23	24.21	23.18	25.81	26.45	7.74	4.55	7.77	7.53	N/A	N/A	44.52	20.71	3.67	5.51	5.30	N/A
7/5/23	22.09	21.88	25.37	25.58	5.69	5.41	7.50	7.55	22.6	0.75	47.89	38.91	7.44	5.30	2.40	7:50
7/5/23	22.14	21.84	25.31	25.62	5.79	5.34	7.58	7.59	N/A	N/A	51.05	35.68	4.42	4.32	2.55	N/A
6/28/23	20.12	19.03	25.56	26.09	7.65	4.56	7.84	7.55	21.6	0.75	28.61	8.47	4.00	4.52	5.32	7:50
6/28/23	20.05	19.06	25.59	26.09	7.67	4.64	7.97	7.58	N/A	N/A	45.77	8.82	3.92	3.73	5.32	N/A

2023 CSHH Field-Monitoring Data

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #1–Beacon 11 (continued)																
6/21/23	19.20	18.37	25.24	25.81	5.83	5.10	7.53	7.51	17.8	1.0	16.86	10.84	2.74	2.68	3.27	7:48
6/21/23	19.20	18.55	25.21	25.70	5.75	5.14	7.57	7.53	N/A	N/A	17.62	12.50	2.41	2.51	3.21	N/A
6/15/23	19.16	18.67	25.20	25.60	6.81	5.09	7.64	7.52	20.0	1.0	20.12	13.98	2.90	18.00	4.32	7:40
6/15/23	19.28	18.73	25.30	25.62	7.72	5.09	7.88	7.55	N/A	N/A	19.92	13.44	2.15	15.24	4.57	N/A
6/7/23	18.26	18.24	24.17	24.39	7.59	7.33	7.74	7.79	15.2	0.75	56.12	32.89	5.50	7.07	3.06	7:52
6/7/23	18.26	18.22	24.61	24.77	7.46	7.29	7.80	7.80	N/A	N/A	54.48	28.12	5.62	8.13	2.86	N/A
5/31/23	17.64	16.00	25.08	25.76	7.15	5.37	7.43	7.48	14.1	0.80	29.22	7.22	5.08	14.64	5.13	7:58
5/31/23	17.55	15.90	25.16	25.78	6.93	5.04	7.64	7.49	N/A	N/A	27.00	6.84	4.81	14.98	5.03	N/A
5/24/23	15.45	15.43	25.13	25.15	8.08	8.00	7.74	7.76	13.5	0.75	22.34	20.71	6.63	7.20	3.07	7:55
5/24/23	15.46	15.45	25.09	25.10	8.12	8.03	7.79	7.80	N/A	N/A	21.32	21.25	5.91	6.45	3.02	N/A
5/17/23	In-boat monitoring was canceled due to high wind and waves, shoreline sample collection only.															

2023 CSHH Field-Monitoring Data

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #2–Bell Marker 6																
10/25/23	15.37	16.60	25.17	26.16	8.63	6.98	7.85	7.73	16.4	3.25	3.39	2.24	1.77	3.13	10.30	10:15
10/18/23	16.30	16.94	25.70	26.20	8.01	7.36	7.82	7.75	14.4	2.25	9.25	4.75	2.05	3.13	8.63	8:25
10/11/23	18.04	17.95	25.52	25.54	8.21	7.87	7.87	7.83	18.1	3.0	3.53	6.93	1.14	1.32	10.35	10:01
10/4/23	19.06	18.79	25.15	25.70	9.05	6.70	7.84	7.59	18.7	1.75	11.72	3.33	1.82	2.74	6.11	8:30
9/27/23	No monitoring at this station due to high wind and waves.															
9/20/23	21.65	21.68	26.26	26.25	6.36	6.13	7.60	7.60	17.7	2.25	5.92	5.91	1.77	1.85	7.98	8:15
9/14/23	24.32	23.59	26.12	26.66	6.91	1.67	7.74	7.25	20.2	1.5	15.35	2.49	2.17	5.21	8.48	7:58
9/6/23	24.80	23.27	26.26	26.63	9.07	4.27	7.94	7.43	26.0	1.25	17.58	4.48	2.03	3.07	9.47	8:10
8/30/23	Harbor-wide monitoring cancelled due to thunderstorms.															
8/23/23	23.87	23.31	26.28	26.73	7.89	4.38	7.93	7.51	20.3	1.5	11.21	4.49	1.64	4.94	8.11	8:20
8/16/23	23.66	22.57	25.87	27.14	6.57	3.40	7.71	7.39	21.7	1.25	16.26	3.90	1.87	1.68	8.88	8:45
8/9/23	22.31	22.33	26.98	27.08	5.72	5.34	7.52	7.52	23.2	2.5	8.20	11.45	1.67	4.41	9.75	8:30
8/2/23	23.50	21.63	27.04	27.90	6.41	1.80	7.74	7.28	19.7	1.5	16.50	2.20	2.81	2.62	6.48	8:46
7/26/23	23.80	22.20	26.04	26.57	6.73	0.90	7.78	7.24	22.9	2.0	7.42	2.13	1.52	5.48	9.56	8:15
7/19/23	23.64	22.07	25.79	26.77	6.85	1.68	7.79	7.26	23.3	1.5	19.35	2.60	2.25	2.45	8.30	8:25
7/12/23	24.05	22.49	26.14	26.74	9.06	5.02	8.00	7.63	26.5	1.25	24.49	20.00	2.57	11.21	10.29	8:34
7/5/23	22.02	19.50	25.84	26.39	7.72	2.85	7.87	7.34	22.6	1.0	34.84	15.15	3.15	3.77	7.91	8:21
6/28/23	20.48	19.69	25.89	26.17	8.83	6.50	8.09	7.77	21.8	N/A	11.70	6.61	2.71	23.20	10.27	8:36
6/21/23	18.70	17.64	25.92	26.17	8.27	5.72	7.99	7.61	17.6	2.0	5.40	4.91	-0.76	2.05	7.50	8:15
6/15/23	19.24	18.13	25.58	25.81	8.41	4.85	8.03	7.56	19.9	1.5	18.87	8.19	1.44	2.56	9.01	8:20
6/7/23	17.78	17.72	25.62	25.66	7.43	6.40	7.87	7.75	16.0	1.25	13.78	17.01	3.64	8.26	8.17	8:23
5/31/23	17.08	16.58	25.65	25.82	8.39	7.87	7.88	7.84	15.4	1.75	5.85	7.00	2.92	5.89	8.54	9:55
5/24/23	14.91	13.55	25.68	26.10	9.25	6.67	8.07	7.70	14.4	0.75	5.99	8.01	1.95	10.20	8.26	8:26
5/17/23	In-boat monitoring was canceled due to high wind and waves, shoreline sample collection only.															

Coalition to Save Hempstead Harbor

2023 CSHH Field-Monitoring Data

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Surface*	Bottom**	Surface	Bottom	Surface
CSHH #16–Outer Harbor, Midway Between E/W Shore and N/S Boundary of Shellfish Harvesting Area																
10/25/23	15.80	16.79	25.52	26.56	8.53	6.92	7.85	7.75	17.4	3.25	3.74	1.69	1.58	3.47	10.63	10:35
10/18/23	16.31	17.18	25.59	26.37	8.36	7.51	7.86	7.78	14.6	2.0	9.91	4.60	2.06	3.55	9.08	8:47
10/11/23	17.90	18.34	25.45	25.89	8.16	7.41	7.85	7.81	17.1	3.25	3.99	3.60	1.46	2.10	11.00	10:18
10/4/23	19.47	18.74	25.11	26.10	9.71	6.22	7.94	7.56	19.3	1.75	16.85	2.72	1.74	3.21	8.81	8:50
9/27/23	No monitoring at this station due to high wind and waves.															
9/20/23	No monitoring at this station due to lost anchor.															
9/14/23	24.04	23.47	26.18	26.73	6.29	1.88	7.66	7.26	20.0	1.75	9.97	2.85	1.88	4.04	9.52	8:15
9/6/23	25.36	23.00	26.40	26.79	10.75	4.10	8.13	7.42	26.2	1.25	15.17	5.15	1.64	5.10	9.48	8:37
8/30/23	Harbor-wide monitoring cancelled due to thunderstorms.															
8/23/23	23.72	23.26	26.40	26.77	7.66	5.02	7.89	7.58	20.6	1.5	10.47	9.78	1.47	1.92	9.25	8:35
8/16/23	23.52	22.18	26.27	27.32	6.60	2.26	7.72	7.31	22.1	1.5	16.58	3.70	1.55	1.79	9.69	9:04
8/9/23	No monitoring at this station due to high wind and waves.															
8/2/23	23.19	21.49	27.24	28.01	6.70	2.55	7.83	7.34	20.4	2.0	7.87	4.14	2.49	1.92	8.46	9:05
7/26/23	23.99	21.72	26.11	27.02	6.89	1.48	7.82	7.29	23.0	1.75	9.78	1.09	1.56	1.92	9.86	8:35
7/19/23	23.51	21.29	25.82	26.98	8.40	1.24	7.97	7.22	23.7	1.25	31.98	3.91	2.31	6.22	8.82	8:45
7/12/23	24.51	21.29	26.44	26.93	10.78	2.41	8.21	7.33	26.9	1.5	14.91	8.54	1.82	5.24	10.40	8:54
7/5/23	22.31	19.16	25.99	26.46	9.31	3.14	8.07	7.38	23.0	1.25	21.54	5.81	2.58	14.00	8.35	8:46
6/28/23	20.84	18.79	25.98	26.25	8.71	4.93	8.07	7.64	22.1	2.25	6.94	4.64	1.51	6.54	10.53	9:02
6/21/23	No monitoring at this station due to high wind and waves.															
6/15/23	18.54	17.66	25.74	25.88	8.02	5.37	7.98	7.66	19.9	1.75	11.88	15.05	1.03	10.78	10.68	8:38
6/7/23	17.78	17.76	25.68	25.69	7.95	7.56	7.92	7.89	16.7	1.25	12.19	12.32	3.34	12.92	8.37	8:45
5/31/23	16.97	15.26	25.80	25.94	8.65	5.71	7.94	7.58	15.0	2.25	3.77	7.02	1.89	16.43	10.52	10:12
5/24/23	14.95	13.70	25.76	26.08	9.52	7.40	8.15	7.82	16.2	2.0	4.27	4.35	1.74	2.99	8.26	8:58
5/17/23	In-boat monitoring was canceled due to high wind and waves, shoreline sample collection only.															

2023 CSHH Field-Monitoring Data

Date	**Water Temp (°C)**		**Salinity (ppt)**		**DO (ppm)**		**pH**		**Air Temp**	**Secchi**	**Chl-a (ug/L)**		**Turbidity (NTU)**		**Depth(m)**	**Time**
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	**(°C)**	**(m)**	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #17–Outer Harbor, Outside Restricted Crescent Beach Boundary																
10/25/23	15.77	15.82	25.50	25.55	8.38	8.37	7.83	7.83	17.8	3.5	2.67	3.02	1.60	1.57	5.24	10:55
10/18/23	16.49	16.95	25.72	26.11	8.70	7.07	7.92	7.67	15.2	2.25	8.48	1.25	1.87	2.38	5.21	9:10
10/11/23	18.17	17.85	25.59	25.60	8.20	7.90	7.90	7.84	17.5	4.0	3.68	1.88	1.12	1.21	6.35	10:38
10/4/23	19.42	19.41	25.03	25.08	8.44	8.66	7.79	7.81	19.6	2.0	9.81	5.11	1.59	1.59	4.31	9:22
9/27/23	No monitoring at this station due to high wind and waves.															
9/20/23	No monitoring at this station due to lost anchor.															
9/14/23	23.91	23.98	26.24	26.28	5.90	5.57	7.62	7.61	20.2	1.75	7.05	6.02	2.44	2.15	5.84	8:35
9/6/23	25.25	23.67	26.38	26.66	10.29	6.00	8.09	7.54	26.6	1.25	13.50	4.77	1.96	1.82	5.48	9:02
8/30/23	Harbor-wide monitoring cancelled due to thunderstorms.															
8/23/23	23.53	23.41	26.56	26.81	6.80	5.09	7.76	7.58	20.8	1.75	8.54	4.17	1.88	4.14	5.60	8:55
8/16/23	23.34	23.13	26.39	26.96	6.30	3.94	7.70	7.43	22.4	1.5	13.94	2.90	2.33	1.38	6.25	9:30
8/9/23	22.36	22.36	27.05	27.05	5.55	5.33	7.52	7.50	24.0	2.0	8.35	6.88	2.38	2.31	4.84	9:00
8/2/23	22.58	22.02	27.59	27.79	5.02	2.31	7.60	7.32	20.4	2.0	6.15	2.47	1.91	1.65	4.61	8:36
7/26/23	23.79	23.61	26.16	26.25	6.16	4.78	7.74	7.59	22.8	3.0	9.28	4.22	1.56	1.60	4.61	8:55
7/19/23	23.74	23.68	26.04	26.14	9.04	6.45	8.05	7.75	24.4	1.25	35.38	7.80	2.29	2.36	5.01	9:07
7/12/23	25.01	22.36	26.57	26.84	10.01	4.66	8.19	7.57	26.8	1.75	7.86	2.09	1.76	3.54	6.07	9:21
7/5/23	21.81	19.90	26.09	26.38	8.22	4.62	7.98	7.53	24.5	1.5	12.30	3.58	2.24	3.59	4.59	9:10
6/28/23	20.91	19.11	26.00	26.14	8.77	5.25	8.08	7.68	22.4	2.5	4.52	1.68	1.15	3.52	5.85	9:28
6/21/23	17.77	17.61	26.16	26.17	7.09	6.62	7.85	7.79	17.4	2.0	4.32	3.54	-0.36	0.42	5.47	8:43
6/15/23	19.25	18.45	25.64	25.74	9.13	7.43	8.16	7.89	20.0	1.5	12.54	8.58	2.09	3.14	6.24	9:10
6/7/23	17.69	17.65	25.71	25.72	7.78	7.42	7.93	7.88	16.6	1.25	9.45	7.27	3.91	4.19	3.74	9:12
5/31/23	16.75	15.66	25.74	25.91	7.79	6.24	7.83	7.65	15.5	1.5	2.94	5.54	2.32	8.21	6.30	10:36
5/24/23	15.11	15.02	25.79	25.83	9.10	9.04	8.09	8.07	15.9	2.25	3.53	4.01	1.47	1.59	3.52	7:55
5/17/23	In-boat monitoring was canceled due to high wind and waves, shoreline sample collection only.															

2023 CSHH Field-Monitoring Data

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #3–Glen Cove Creek, Red Channel Marker																
10/25/23	15.54	15.84	24.77	25.53	8.68	7.94	7.84	7.78	19.0	2.75	3.24	3.24	1.78	2.91	5.02	11:12
10/18/23	15.95	16.57	24.72	25.39	8.50	8.09	7.85	7.83	16.3	2.0	8.98	5.17	2.16	1.96	4.13	9:26
10/11/23	17.92	18.10	25.30	25.55	9.33	7.84	7.97	7.82	18.5	2.0	10.16	4.92	1.85	1.79	5.68	10:55
9/27/23	No vertical profile, grab samples only.															
9/20/23	20.89	21.20	25.14	25.58	7.38	7.02	7.78	7.75	17.5	1.5	15.32	9.77	1.93	2.59	3.23	8:40
9/14/23	24.14	24.27	25.97	26.15	5.72	3.60	7.57	7.37	20.3	1.0	28.51	5.49	2.75	2.82	4.68	8:55
9/6/23	25.22	24.18	26.03	26.49	9.99	6.01	8.05	7.58	27.1	1.25	18.44	4.14	2.09	2.12	3.30	9:30
8/30/23	Harbor-wide monitoring cancelled due to thunderstorms.															
8/23/23	24.06	23.83	25.83	26.51	6.96	5.34	7.77	7.58	20.8	1.25	13.06	3.95	2.12	2.91	3.75	9:25
8/16/23	24.00	22.91	26.22	27.02	5.64	2.22	7.57	7.25	23.4	1.25	19.14	1.99	2.28	2.41	5.24	9:58
8/9/23	22.70	22.40	26.11	26.99	6.43	5.21	7.61	7.48	23.9	1.25	11.89	6.71	2.50	7.80	4.27	9:30
8/2/23	23.69	22.54	26.88	27.67	6.42	1.88	7.73	7.29	21.5	1.25	17.38	2.72	3.01	2.98	4.26	9:00
7/26/23	24.70	23.99	25.56	26.16	5.55	5.42	7.62	7.64	24.1	1.5	11.81	6.16	1.98	1.77	4.26	9:15
7/19/23	23.94	23.29	25.96	26.33	7.14	3.96	7.85	7.45	23.9	1.25	26.90	15.65	2.34	2.41	3.63	9:38
7/12/23	24.77	22.97	25.93	26.58	9.65	5.22	8.08	7.65	27.9	1.3	18.75	16.21	2.57	3.42	5.28	9:52
7/5/23	22.60	21.98	25.71	25.89	8.42	7.14	7.97	7.87	24.0	1.0	25.45	17.62	2.95	3.56	3.47	9:25
6/28/23	20.82	19.73	25.15	25.97	10.34	7.02	8.17	7.87	23.9	N/A	35.18	5.92	2.72	2.64	5.15	9:53
6/21/23	17.68	17.28	25.95	26.16	5.49	4.15	7.59	7.46	18.0	1.5	5.79	6.56	0.08	0.66	3.62	9:04
6/15/23	19.53	19.28	25.51	25.57	9.07	8.18	8.13	8.03	21.6	1.5	13.53	17.67	1.59	3.07	5.43	9:33
6/7/23	17.90	17.76	25.24	25.32	9.16	8.79	8.09	8.02	17.5	1.25	18.14	5.52	2.60	2.80	3.06	9:37
5/31/23	18.15	16.12	25.34	25.79	7.90	6.33	7.80	7.63	17.6	1.5	6.67	5.34	3.01	9.18	4.99	11:00
5/24/23	15.97	14.73	25.26	25.79	9.24	7.39	8.08	7.85	17.1	1.5	4.10	4.60	2.41	3.40	3.36	9:49
5/17/23	In-boat monitoring was canceled due to high wind and waves, shoreline sample collection only.															

2023 CSHH Field-Monitoring Data

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #8–Glen Cove Sewage Treatment Plant Outfall																
10/25/23	16.22	15.51	19.89	24.55	8.48	8.18	7.73	7.77	20.0	2.0	3.56	4.29	3.69	3.06	3.05	11:32
10/18/23	16.65	16.67	24.38	24.96	8.17	7.49	7.80	7.75	16.2	1.5	5.65	4.79	2.26	3.31	2.33	10:00
10/11/23	18.44	17.83	22.91	25.28	7.52	7.65	7.66	7.77	18.2	2.0	6.74	5.96	2.14	1.82	3.65	11:16
10/4/23	19.67	19.63	24.62	24.83	8.15	8.00	7.72	7.72	21.4	1.75bottom	7.51	5.31	2.42	2.46	1.48	10:16
9/27/23	19.19	19.23	24.00	26.23	6.62	5.92	7.55	7.57	15.4	1.75	2.34	2.91	2.66	2.78	4.18	10:35
9/20/23	21.59	21.80	22.27	25.50	5.55	4.83	7.46	7.52	16.9	1.5	6.15	4.98	2.34	3.29	1.87	9:05
9/14/23	24.65	24.51	24.32	25.83	5.17	4.60	7.48	7.48	19.5	1.2	15.62	8.82	5.21	4.08	3.14	8:17
8/30/23	Harbor-wide monitoring cancelled due to thunderstorms.															
8/23/23	24.47	24.48	25.67	25.95	6.34	6.27	7.69	7.72	20.8	1.25	12.46	11.30	2.67	4.78	1.97	9:50
8/16/23	23.82	23.79	23.71	26.37	4.81	3.46	7.41	7.36	23.5	1.0	8.18	6.32	2.91	4.55	3.56	10:20
8/9/23	23.34	22.87	15.08	26.14	6.14	4.90	7.37	7.46	24.1	1.5	6.73	12.00	3.60	3.57	2.39	9:53
8/2/23	23.58	23.46	18.99	27.03	5.97	3.30	7.52	7.43	28.8	1.0	9.23	7.62	3.33	6.13	2.57	9:21
7/26/23	24.51	24.19	23.58	25.97	3.62	3.23	7.32	7.40	24.1	1.3	10.23	7.05	4.09	4.83	2.46	9:35
7/19/23	24.39	23.87	23.84	25.91	5.95	3.53	7.63	7.42	24.2	1.0	22.42	6.38	2.92	5.71	2.56	10:06
7/12/23	24.55	24.10	23.27	26.08	7.70	5.90	7.84	7.64	27.9	1.5	7.51	6.99	4.15	6.52	3.25	10:15
7/5/23	22.49	22.16	24.68	25.63	6.44	4.62	7.71	7.56	26.6	1.0	11.19	5.54	4.11	6.02	2.12	10:00
6/28/23	20.27	20.06	24.90	25.82	4.80	5.97	7.49	7.76	24.4	1.5	4.43	4.64	4.68	5.14	3.18	10:13
6/21/23	18.86	18.57	23.94	25.63	4.51	3.93	7.48	7.46	18.4	0.5	4.82	4.56	15.57	26.74	1.55	9:24
6/15/23	19.87	19.56	21.01	24.98	7.07	7.04	7.74	7.87	21.4	1.0	11.96	13.55	3.58	12.25	3.92	10:00
6/7/23	18.46	18.21	23.68	24.95	8.38	7.02	7.90	7.79	18.0	1.0	9.05	6.25	4.14	6.04	1.66	10:00
5/31/23	17.73	17.23	24.35	25.43	7.33	6.04	7.71	7.59	18.7	1.25	10.43	8.22	3.78	9.88	3.25	11:20
5/24/23	16.70	16.12	23.12	25.35	8.19	7.29	7.92	7.79	16.4	1.25	4.59	2.42	3.68	9.52	1.50	10:16
5/17/23	In-boat monitoring was canceled due to high wind and waves, shoreline sample collection only.															

2023 CSHH Field-Monitoring Data

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #13 - 60' West of Mill Pond Weir																
10/25/23	16.02	16.08	22.21	24.13	8.32	6.72	7.69	7.52	20.9	1.75bottom	7.25	4.10	2.35	7.20	1.69	11:50
10/18/23	17.13	17.04	23.33	24.91	8.17	6.62	7.77	7.61	17.4	1.5bottom	9.19	5.84	2.71	3.32	1.68	10:20
10/11/23	17.97	18.18	23.42	25.15	6.35	6.02	7.46	7.53	20.1	2.0	3.15	4.47	2.54	2.95	2.98	11:37
10/4/23	19.48	19.31	24.09	24.54	5.86	4.14	7.37	7.24	21.3	1.25	7.32	3.12	3.38	9.44	1.85	10:33
9/27/23	19.93	20.10	25.57	26.36	5.27	3.80	7.42	7.36	15.9	1.3	1.39	1.94	3.72	4.99	3.11	11:00
9/20/23	21.85	22.01	24.40	25.57	3.42	2.74	7.24	7.29	17.9	1.25	3.52	3.18	4.94	7.01	2.04	9:25
9/14/23	24.84	24.94	24.62	25.56	3.49	1.57	7.27	7.18	21.3	1.25	23.80	7.27	3.75	5.27	2.48	9:35
8/30/23	Harbor-wide monitoring cancelled due to thunderstorms.															
8/23/23	24.52	24.46	25.36	25.80	3.51	2.06	7.30	7.21	22.1	1.2	15.39	6.62	5.11	5.88	1.23	10:05
8/16/23	23.77	23.98	23.80	26.28	4.44	2.64	7.32	7.25	24.4	1.0	20.91	3.55	4.04	3.41	2.59	10:40
8/9/23	23.23	23.62	24.88	25.96	2.31	2.24	7.18	7.21	25.2	1.0	6.54	7.35	6.71	11.13	1.68	10:20
8/2/23	24.30	24.11	25.23	26.95	4.33	2.54	7.46	7.37	22.0	1.25	12.59	3.90	3.23	6.61	3.24	9:37
7/26/23	24.62	24.51	25.08	25.58	1.89	1.53	7.23	7.20	24.7	1.0	19.48	12.92	7.61	9.19	1.37	9:55
7/19/23	23.81	24.26	22.64	24.89	6.47	3.69	7.55	7.34	24.8	1.0	27.59	7.83	3.89	7.97	1.66	10:24
7/12/23	24.27	24.07	24.25	25.83	8.92	4.31	7.80	7.36	31.6	1.25	26.55	12.53	3.79	8.64	2.36	10:35
7/5/23	22.28	22.08	22.75	25.58	9.84	3.94	7.97	7.42	28.2	0.6	45.28	9.46	3.33	4.92	1.43	10:18
6/28/23	20.06	19.93	24.81	25.52	3.29	1.60	7.30	7.22	24.5	1.0	14.78	1.52	4.72	5.09	1.93	10:38
6/21/23	18.88	18.81	25.63	25.71	3.75	2.77	7.40	7.32	20.6	1.4	5.28	8.89	0.74	2.31	1.45	9:49
6/15/23	20.07	20.06	22.86	24.71	6.42	4.56	7.60	7.37	21.5	1.0	11.27	9.41	2.29	5.83	2.54	10:20
6/7/23	18.32	18.22	24.77	24.91	6.08	5.04	7.59	7.48	19.0	1.25	15.94	14.22	5.06	6.71	1.37	10:19
5/31/23	17.91	17.38	25.08	25.27	7.24	4.95	7.74	7.43	19.9	1.3	28.25	32.08	5.71	5.63	1.94	11:43
5/24/23	16.75	15.70	23.19	25.24	7.39	4.19	7.70	7.40	20.4	1.25	7.62	4.79	5.62	15.21	2.07	10:41
5/17/23	In-boat monitoring was canceled due to high wind and waves, shoreline sample collection only.															

2023 CSHH Field-Monitoring Data

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #14–NW Corner of Former Power Plant, Approximately 50 yds from Powerhouse Drain																
10/25/23	15.25	15.61	24.92	25.10	7.98	7.39	7.72	7.65	12.8	2.0	7.61	4.48	2.39	2.40	2.43	8:34
10/11/23	17.94	17.95	25.39	25.42	7.61	7.56	7.75	7.75	15.1	1.75	7.07	7.00	2.37	2.31	2.56	8:22
9/27/23	18.33	18.33	25.29	25.29	6.34	6.26	7.54	7.53	14.5	1.25	6.83	6.77	3.14	3.04	4.08	8:30
6/15/23	19.47	19.17	25.00	25.25	6.90	5.80	7.72	7.61	24.9	1.0	18.28	13.36	3.22	5.52	2.36	11:30
5/31/23	17.70	16.88	25.11	25.57	6.90	6.14	7.64	7.61	14.3	0.6	20.22	8.78	7.54	7.92	2.34	8:29

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #15–50 yds from Scudder's Pond Outfall, North of Tappen Pool																
10/25/23	15.08	15.57	25.57	25.19	8.17	7.66	7.73	7.70	17.2	2.25	3.63	6.48	2.18	2.95	2.95	10:00
10/11/23	17.89	17.90	25.28	25.31	8.08	8.05	7.79	7.78	17.5	1.75	10.30	11.35	1.72	2.16	3.07	9:46
9/27/23	18.26	18.53	25.45	25.71	6.97	6.59	7.55	7.59	15.7	1.75	1.95	4.11	2.39	2.34	2.56	9:55
6/15/23	Ran out of time for survey.															
5/31/23	17.64	16.97	25.15	25.26	6.61	6.64	7.60	7.64	15.3	1.0	9.81	9.12	8.45	6.24	2.51	9:40

2023 CSHH Field-Monitoring Data

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #4 - Bar Beach Spit																
10/25/23	14.98	15.08	24.78	24.84	8.16	8.01	7.72	7.71	12.6	2.0	6.92	6.72	2.14	2.38	3.05	8:20
10/11/23	17.68	17.72	25.28	26.29	7.72	7.60	7.74	7.73	13.3	1.75	9.08	7.80	2.42	3.33	2.48	8:13
9/27/23	18.50	18.81	25.38	25.70	6.21	6.07	7.53	7.53	14.0	1.25	5.33	4.52	4.10	4.56	1.99	8:18
6/15/23	19.63	19.57	25.28	25.30	7.77	7.48	7.87	7.83	23.8	1.0	24.56	26.09	3.42	3.84	2.59	11:40
5/31/23	17.48	17.38	25.29	25.36	7.09	7.02	7.69	7.69	14.3	0.8	15.92	15.01	4.85	4.76	2.43	8:15

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #5 - Mott's Cove																
10/25/23	15.14	15.51	24.50	25.03	7.81	7.55	7.66	7.69	14.4	2.0bottom	6.98	4.23	2.68	2.53	2.21	8:50
10/11/23	17.59	17.74	24.93	25.06	7.37	7.31	7.65	7.69	15.0	1.75	7.51	7.75	2.19	2.29	2.27	8:39
9/27/23	18.53	18.48	25.00	25.18	5.85	5.93	7.46	7.49	14.6	1.25	5.92	4.90	4.11	4.48	2.54	8:50
6/15/23	19.53	19.28	24.48	24.82	6.94	6.51	7.62	7.62	24.8	N/A	11.82	15.23	3.87	6.94	2.19	11:16
5/31/23	17.36	16.82	25.06	25.39	6.13	5.77	7.55	7.54	14.4	0.6	15.03	11.37	6.12	9.21	2.04	8:49

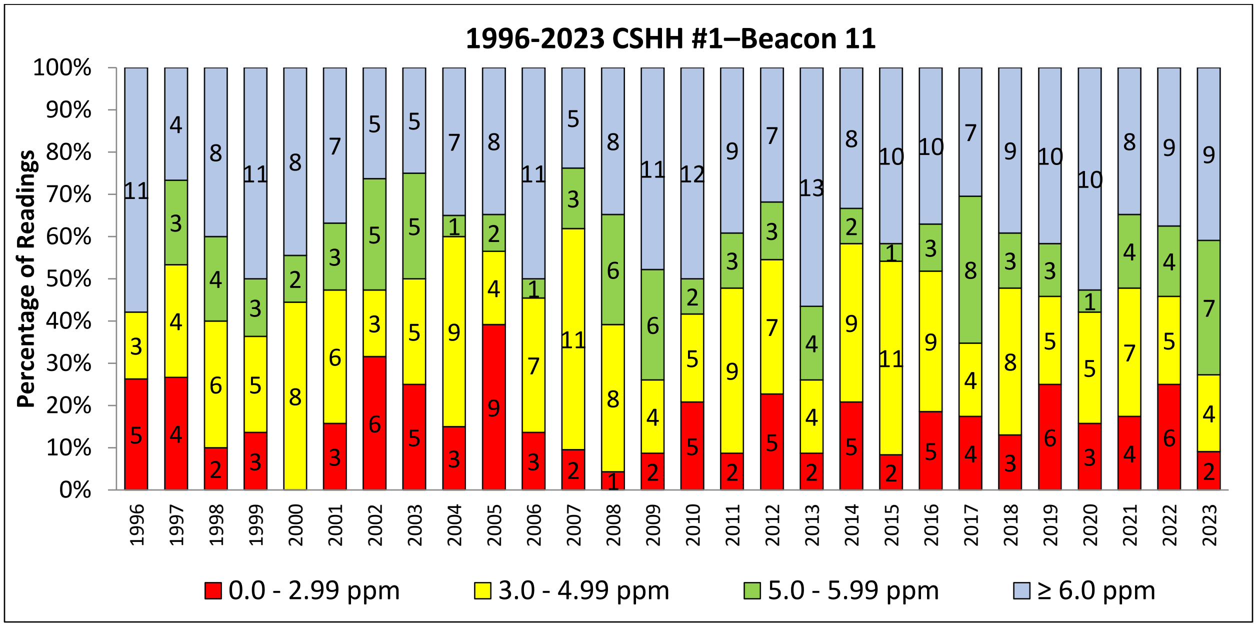
2023 CSHH Field-Monitoring Data

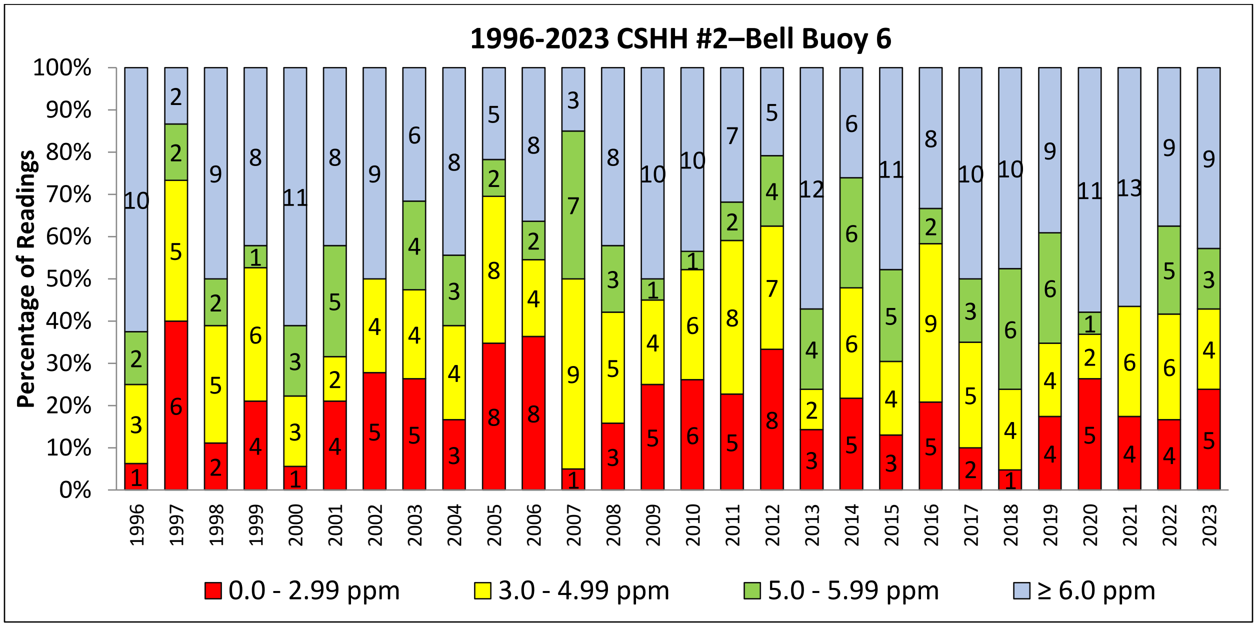
Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #6–East of Former Incinerator Site																
10/25/23	14.64	15.08	23.95	24.57	8.24	7.74	7.68	7.69	15.5	1.5	5.72	6.33	3.15	4.23	2.19	9:10
10/11/23	17.15	17.75	24.32	24.90	7.49	7.12	7.64	7.64	16.0	1.25	14.66	11.52	2.63	4.22	2.47	8:57
9/27/23	18.42	18.60	24.27	25.05	5.63	5.72	7.41	7.48	15.8	1.0	8.19	5.16	4.98	5.48	2.88	9:10
6/15/23	19.56	19.53	24.92	24.93	6.63	6.35	7.63	7.64	21.9	1.0	17.84	20.15	3.49	11.20	2.44	11:00
5/31/23	18.30	17.82	24.69	25.07	7.37	6.34	7.65	7.56	14.7	0.4	46.53	18.36	7.81	14.60	2.21	8:58

Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl-a (ug/L)		Turbidity (NTU)		Depth(m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	(Total)***	(AM)
CSHH #7–West of Bryant Landing (Former Site of Oil Dock)																
10/25/23	14.89	14.97	24.14	24.25	7.77	7.67	7.66	7.66	15.7	1.25	9.79	11.32	3.45	4.38	1.74	9:25
10/11/23	17.51	17.55	24.45	24.55	6.72	6.63	7.52	7.53	19.3	1.0	10.42	9.36	4.02	3.90	1.83	9:10
9/27/23	15.78	17.99	19.12	23.75	6.66	5.11	7.34	7.35	15.1	0.5	10.66	4.92	8.18	5.52	2.18	9:25
6/15/23	19.64	19.59	23.65	24.19	3.86	3.32	7.26	7.26	23.3	0.7	10.50	12.25	10.55	21.22	1.79	10:48
5/31/23	18.24	18.37	25.10	24.49	5.49	4.65	7.38	7.32	15.1	0.4	42.53	13.00	11.72	18.81	1.56	9:10

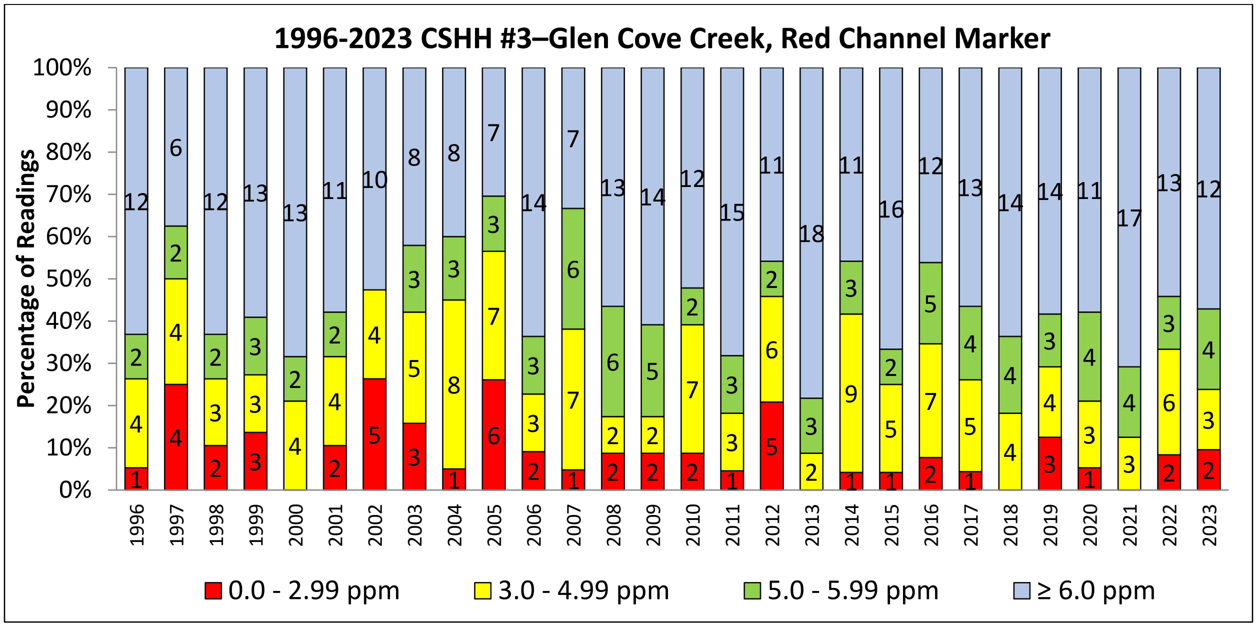
Long-Term Dissolved Oxygen Graphs

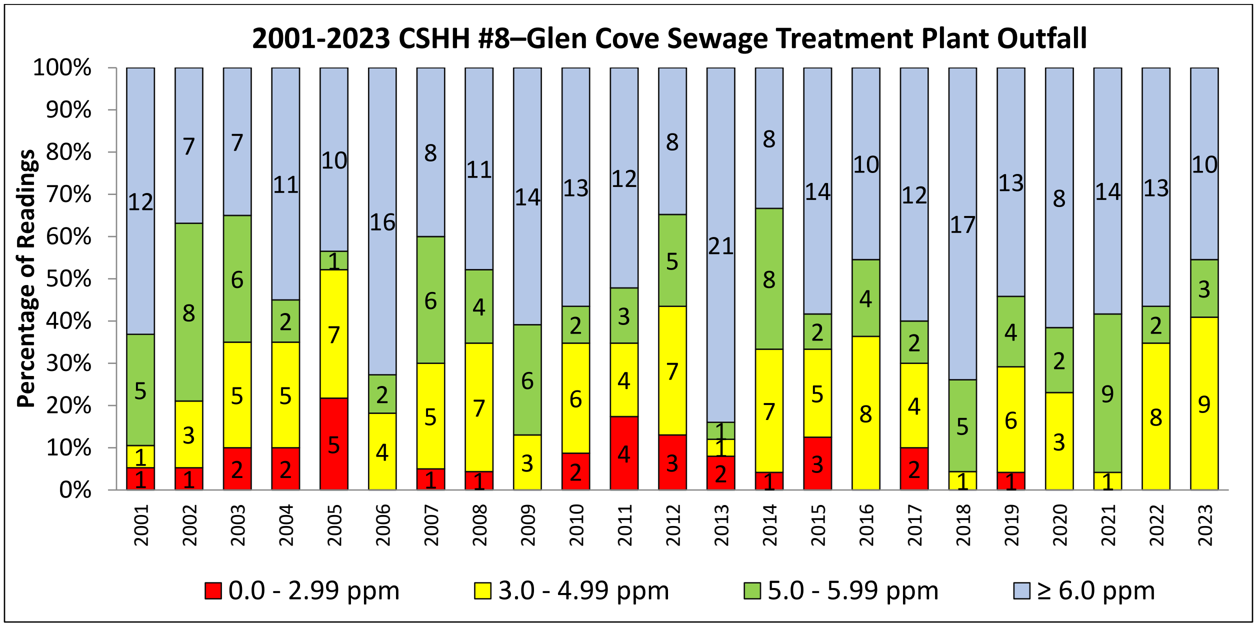
Each graph displays results from one of CSHH's monitoring sites. Each vertical bar represents the bottom readings taken during the indicated year and is divided into four categories. Red bars are representative of hypoxic conditions (DO below 3 ppm), yellow bars of DO between 3 and 5 ppm, green bars of 5 to 6 ppm, and blue of greater than 6 ppm. The number of readings falling into each category is indicated within the bars, and the percentage of readings is on the y-axis.



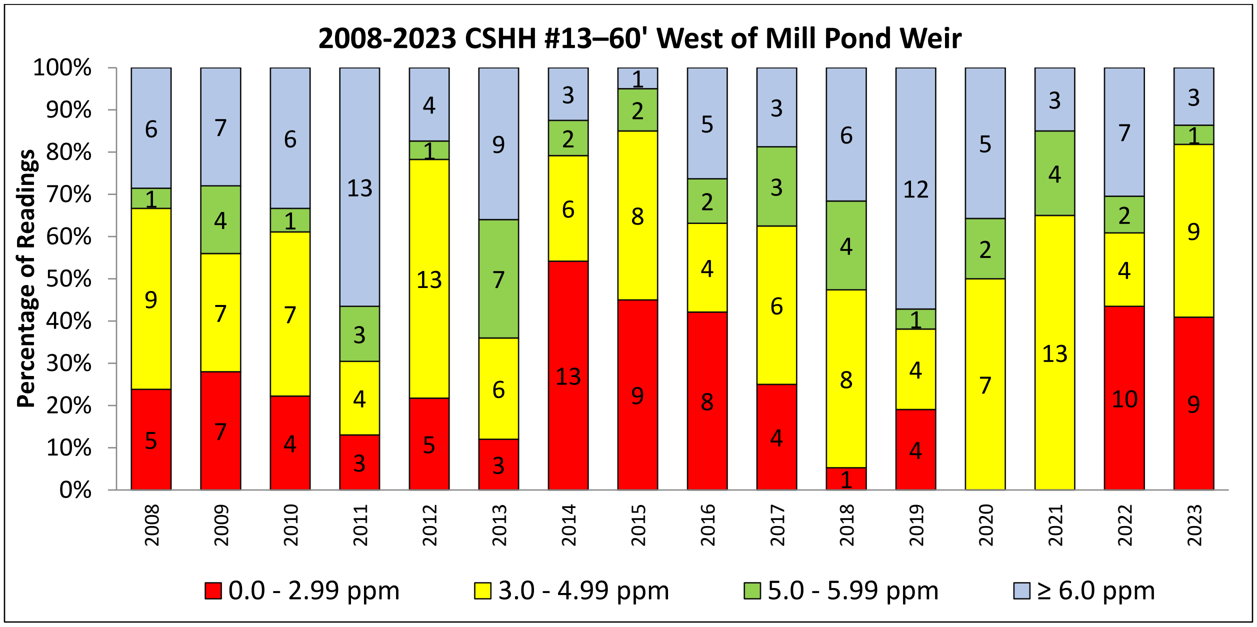


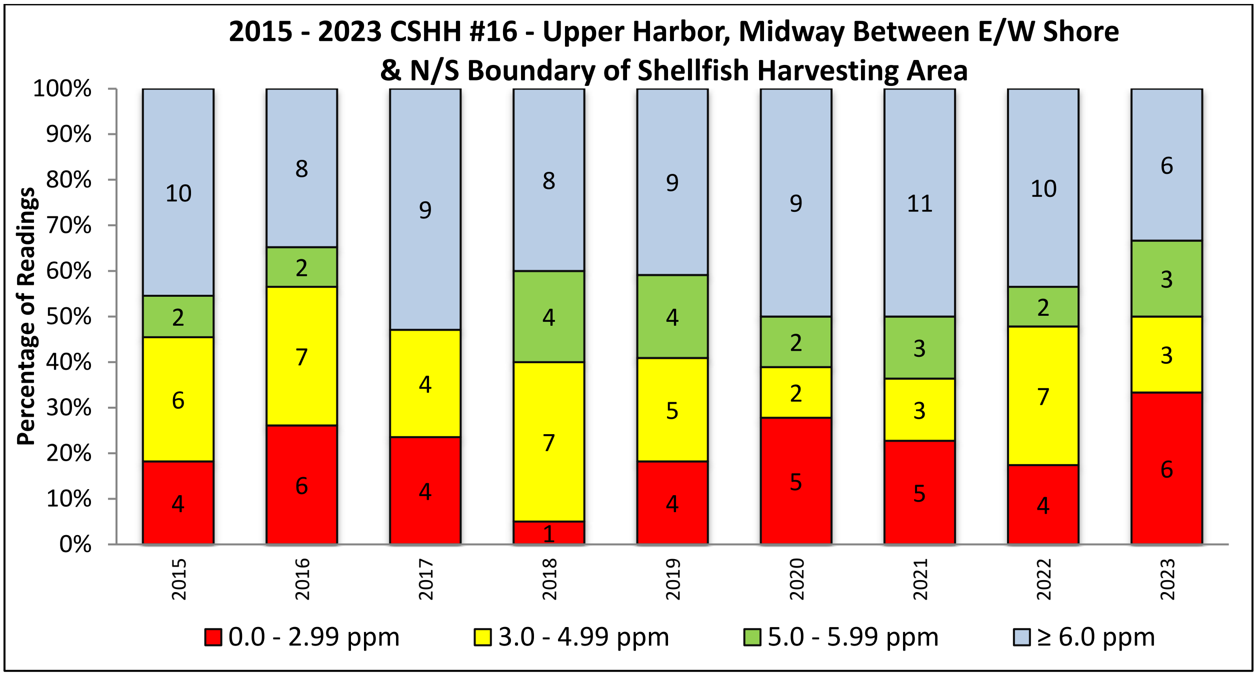
Long-Term Dissolved Oxygen Graphs


1996-2023 CSHH #3–Glen Cove Creek, Red Channel Marker

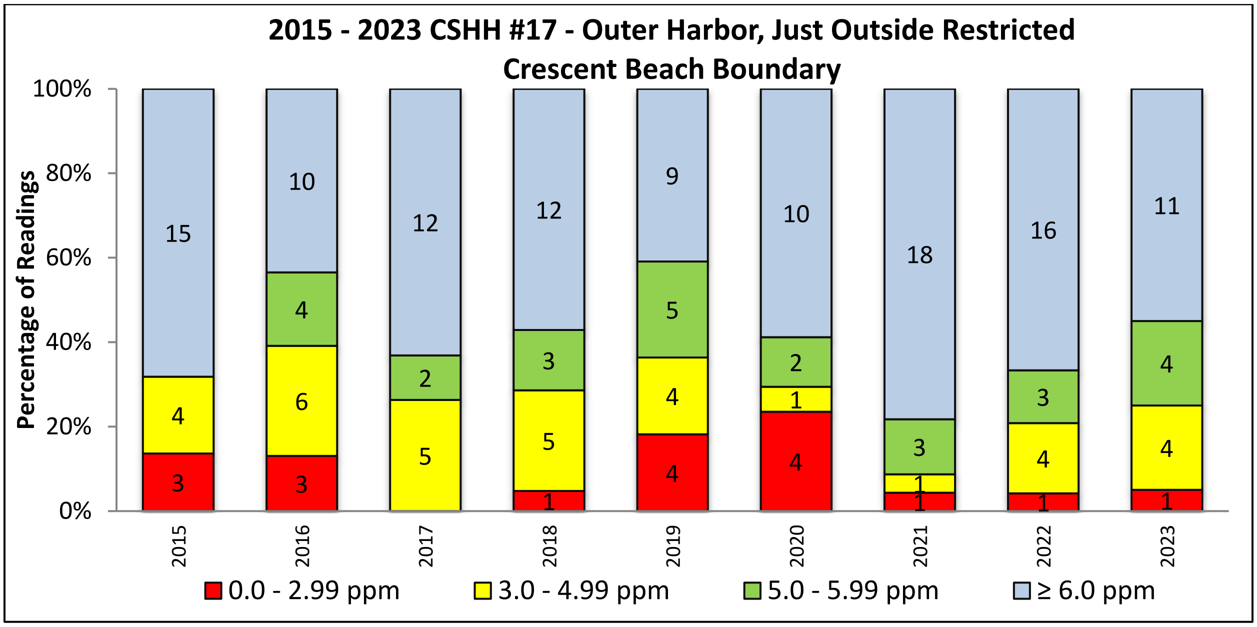

2001-2023 CSHH #8–Glen Cove Sewage Treatment Plant Outfall

Long-Term Dissolved Oxygen Graphs





Long-Term Dissolved Oxygen Graphs



Appendix B

2023 In-Harbor Bacteria Data

CSHH #1–Beacon 11

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/24/23	10.00	0.00	0.10	0.00
5/31/23	8.00	8.94	4.00	0.63
6/7/23	25.00	12.60	59.00	2.87
6/15/23	33.00	16.03	39.00	5.51
6/21/23	13.00	15.37	***140.00***	10.52
6/28/23	27.00	18.75	22.00	30.94
7/5/23	59.00	27.96	64.00	***53.87***
7/12/23	11.00	23.73	40.00	***49.84***
7/19/23	55.00	26.28	90.00	***58.91***
7/26/23	13.00	26.28	6.00	31.38
8/2/23	25.00	25.88	32.00	33.82
8/9/23	20.00	20.84	4.00	19.42
8/16/23	140.00	34.66	80.00	22.31
8/23/23	21.00	28.59	16.00	15.79
9/6/23	53.00	42.02	5.00	12.65
9/14/23	38.00	49.33	3.00	11.77
9/20/23	580.00	70.38	6.00	6.16
9/27/23	140.00	113.08	35.00	7.49
10/4/23	44.00	93.63	19.00	9.02
10/11/23	14.00	71.74	1.00	6.54
10/18/23	21.00	63.72	6.00	7.51
10/25/23	6.00	25.54	5.00	7.24

Note that CFU refers to the number of colony forming units, or the number of bacterial cells in the water sample. Log Avg (log average) refers to the running seasonal average of bacteria results at each location. Boldfaced, italicized values exceed the NYS beach-closure standards, 1,000 CFU/100 ml (200 Log Avg) for the formerly used fecal coliform standard and 104 CFU/100 ml (35 Log Avg) for the currently used enterococci standard.

2023 In-Harbor Bacteria Data

CSHH #2–Bell Marker 6

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/24/23	0.10	0.00	0.10	0.00
5/31/23	0.10	0.10	0.10	0.10
6/7/23	1.00	0.22	2.00	0.27
6/15/23	5.00	0.47	1.00	0.38
6/21/23	0.10	0.35	0.10	0.29
6/28/23	8.00	0.83	2.00	0.53
7/5/23	28.00	2.57	16.00	1.45
7/12/23	2.00	2.95	1.00	1.26
7/19/23	360.00	6.94	36.00	2.58
7/26/23	2.00	12.64	0.10	2.58
8/2/23	5.00	11.51	0.10	1.42
8/9/23	6.00	3.87	0.10	0.51
8/16/23	29.00	14.43	0.10	0.32
8/23/23	0.10	0.41	0.10	0.10
9/6/23	5.00	0.74	0.10	0.10
9/14/23	10.00	0.84	0.10	0.10
9/20/23	5.00	2.24	1.00	0.18
10/4/23	9.00	6.89	0.10	0.18
10/11/23	4.00	6.51	0.10	0.18
10/18/23	2.00	4.36	0.10	0.18
10/25/23	3.00	3.83	0.10	0.10

2023 In-Harbor Bacteria Data

CSHH #3–Glen Cove Creek, Red Channel Marker

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/24/23	3.00	0.00	0.10	0.00
5/31/23	5.00	3.87	0.10	0.10
6/7/23	12.00	5.65	5.00	0.37
6/15/23	14.00	7.09	0.10	0.27
6/21/23	10.00	7.59	1.00	0.35
6/28/23	33.00	12.26	12.00	0.57
7/5/23	28.00	17.31	5.00	1.25
7/12/23	12.00	17.31	0.10	0.57
7/19/23	170.00	28.51	6.00	1.29
7/26/23	750.00	34.64	19.00	3.69
8/2/23	6.00	24.63	5.00	3.10
8/9/23	28.00	24.63	6.00	3.21
8/16/23	80.00	36.00	***140.00***	13.68
8/23/23	11.00	40.64	0.10	6.03
9/6/23	0.10	7.05	0.10	1.70
9/14/23	29.00	7.11	0.10	0.61
9/20/23	43.00	6.09	1.00	0.18
9/27/23	59.00	9.26	12.00	0.59
10/4/23	11.00	9.59	0.10	0.41
10/11/23	0.10	9.59	1.00	0.65
10/18/23	12.00	8.03	0.10	0.65
10/25/23	4.00	5.00	0.10	0.41

2023 In-Harbor Bacteria Data

CSHH #4–Bar Beach Spit

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/31/23	3.00	0.00	10.00	0.00
6/15/23	34.00	10.10	5.00	7.07
9/27/23	160.00	0.00	27.00	0.00
10/11/23	4.00	25.30	0.10	1.64
10/25/23	5.00	14.74	1.00	1.39

CSHH #5–Mott's Cove

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/31/23	20.00	0.00	48.00	0.00
6/15/23	46.00	30.33	27.00	***36.00***
9/27/23	70.00	0.00	41.00	0.00
10/11/23	100.00	83.67	2.00	9.06
10/25/23	29.00	58.77	5.00	7.43

2023 In-Harbor Bacteria Data

CSHH #6–East of Former Incinerator Site

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/31/23	13.00	0.00	35.00	0.00
6/15/23	48.00	24.98	33.00	33.99
9/27/23	210.00	0.00	35.00	0.00
10/11/23	30.00	79.37	3.00	10.25
10/25/23	28.00	56.08	9.00	9.81

CSHH #7–West of Bryant Landing (Former Site of Oil Dock)

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/31/23	50.00	0.00	53.00	0.00
6/15/23	90.00	67.08	51.00	***51.99***
9/27/23	***1400.00***	0.00	***400.00***	0.00
10/11/23	130.00	***426.61***	12.00	***69.28***
10/18/23	37.00	188.84	7.00	32.27

2023 In-Harbor Bacteria Data

CSHH #8–Glen Cove Sewage Treatment Plant Outfall

	Fecal Coliform		**Enterococci**	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/24/23	10.00	0.00	0.10	0.00
5/31/23	11.00	10.49	6.00	0.77
6/7/23	132.00	24.40	79.00	3.62
6/15/23	300.00	45.68	59.00	7.27
6/21/23	13.00	35.53	2.00	5.62
6/28/23	44.00	47.79	32.00	17.81
7/5/23	100.00	74.31	28.00	24.23
7/12/23	56.00	62.60	20.00	18.41
7/19/23	520.00	69.87	60.00	18.47
7/26/23	450.00	141.96	36.00	32.93
8/2/23	41.00	139.97	9.00	25.55
8/9/23	160.00	153.77	36.00	26.87
8/16/23	260.00	***209.03***	***210.00***	***43.00***
8/23/23	330.00	190.86	37.00	***39.03***
9/6/23	51.00	162.67	26.00	***51.93***
9/14/23	58.00	126.22	1.00	21.20
9/20/23	22.00	68.07	0.10	3.13
9/27/23	120.00	52.86	15.00	2.50
10/4/23	18.00	42.62	3.00	2.59
10/11/23	12.00	31.91	1.00	1.35
10/18/23	8.00	21.47	1.00	1.35
10/25/23	11.00	18.69	2.00	2.46

2023 In-Harbor Bacteria Data

CSHH #9–First Pipe West of Sewage Treatment Plant Outfall

	Fecal Coliform		**Enterococci**	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/24/23	140.00	0.00	10.00	0.00
5/31/23	9.00	35.50	29.00	17.03
6/7/23	0.10	5.01	***176.00***	***37.09***
6/15/23	600.00	16.58	***360.00***	***65.47***
6/21/23	140.00	25.41	***530.00***	***99.47***
6/28/23	200.00	27.28	***480.00***	***215.75***
7/5/23	570.00	62.55	***1320.00***	***463.00***
7/12/23	59.00	***224.08***	***170.00***	***459.80***
7/19/23	***1040.00***	***250.14***	***170.00***	***395.73***
7/26/23	350.00	***300.45***	70.00	***263.97***
8/2/23	49.00	***226.78***	12.00	***126.23***
8/9/23	390.00	***210.20***	***330.00***	***95.66***
8/16/23	590.00	***333.15***	***590.00***	***122.69***
8/23/23	100.00	***208.56***	***220.00***	***129.19***
9/6/23	15.00	136.30	***170.00***	***292.12***
9/14/23	80.00	91.73	1.00	***68.54***
9/20/23	1000.00	104.66	***470.00***	***64.75***
9/27/23	90.00	101.94	33.00	***40.30***
10/4/23	***1040.00***	162.22	***570.00***	***68.45***
10/11/23	14.00	159.99	0.10	15.46
10/18/23	59.00	150.54	***140.00***	***41.55***
10/25/23	27.00	73.10	10.00	19.24

2023 In-Harbor Bacteria Data

CSHH #10–Pipe at Corner of Seawall, West of STP Outfall

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/24/23	12.00	0.00	0.10	0.00
5/31/23	6.00	8.49	3.00	0.55
6/7/23	0.10	1.93	***275.00***	4.35
6/15/23	590.00	8.07	***750.00***	15.77
6/21/23	560.00	18.85	***310.00***	28.61
6/28/23	70.00	26.82	***120.00***	***118.14***
7/5/23	110.00	47.99	41.00	***199.32***
7/12/23	29.00	149.14	23.00	***121.35***
7/19/23	700.00	154.32	100.00	***81.10***
7/26/23	200.00	125.60	46.00	***55.37***
8/2/23	27.00	103.81	7.00	31.37
8/9/23	310.00	127.72	***260.00***	***45.38***
8/16/23	***1320.00***	***274.09***	***1600.00***	***106.02***
8/23/23	340.00	***237.23***	***320.00***	***133.79***
9/6/23	27.00	***247.57***	5.00	***160.62***
9/14/23	180.00	***216.11***	2.00	***47.57***
9/20/23	590.00	176.70	0.10	4.23
9/27/23	180.00	150.73	20.00	2.11
10/4/23	14.00	93.71	1.00	1.82
10/11/23	9.00	75.22	3.00	1.64
10/18/23	11.00	43.01	1.00	1.43
10/25/23	9.00	18.63	6.00	3.25

2023 In-Harbor Bacteria Data

CSHH #11–50 yds East of STP Outfall

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/24/23	104.00	0.00	2.00	0.00
5/31/23	9.00	30.59	10.00	4.47
6/7/23	280.00	63.99	***160.00***	14.74
6/15/23	580.00	111.04	***640.00***	***37.83***
6/21/23	60.00	98.18	27.00	***35.36***
6/28/23	43.00	82.28	35.00	***62.68***
7/5/23	70.00	124.01	26.00	***75.88***
7/12/23	57.00	90.20	11.00	***44.42***
7/19/23	***1500.00***	109.08	***450.00***	***41.40***
7/26/23	***1500.00***	***207.65***	***110.00***	***54.83***
8/2/23	50.00	***214.01***	6.00	***38.53***
8/9/23	***1200.00***	***377.78***	54.00	***44.60***
8/16/23	***1200.00***	***694.87***	***3600.0***	***142.00***
8/23/23	18.00	***286.91***	15.00	***71.92***
9/6/23	59.00	197.75	7.00	***67.22***
9/14/23	540.00	161.97	2.00	29.49
9/20/23	280.00	112.57	23.00	8.34
9/27/23	440.00	***250.30***	23.00	9.28
10/4/23	360.00	***269.17***	11.00	9.60
10/11/23	34.00	***241.08***	6.00	9.31
10/18/23	47.00	147.94	13.00	13.53
10/25/23	20.00	87.27	16.00	12.59

2023 In-Harbor Bacteria Data

CSHH #12–East of STP Outfall, by Bend in Seawall

	Fecal Coliform		**Enterococci**	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/24/23	80.00	0.00	0.10	0.00
5/31/23	8.00	25.30	4.00	0.63
6/7/23	290.00	57.04	***128.00***	3.71
6/15/23	600.00	102.73	***660.00***	13.56
6/21/23	54.00	90.33	23.00	15.07
6/28/23	57.00	84.41	35.00	***48.63***
7/5/23	70.00	130.25	34.00	***74.61***
7/12/23	28.00	81.61	7.00	***41.72***
7/19/23	***1100.00***	92.13	***230.00***	33.79
7/26/23	***1600.00***	181.44	70.00	***42.22***
8/2/23	30.00	159.58	2.00	23.82
8/9/23	590.00	***244.42***	57.00	26.41
8/16/23	***1080.00***	***507.44***	***1660.00***	***78.84***
8/23/23	41.00	***262.82***	26.00	***50.98***
9/6/23	28.00	164.46	1.00	***39.60***
9/14/23	170.00	120.49	0.10	8.11
9/20/23	240.00	82.73	30.00	2.97
9/27/23	320.00	138.27	21.00	2.82
10/4/23	390.00	170.14	34.00	4.64
10/11/23	35.00	177.91	1.00	4.64
10/18/23	45.00	136.38	7.00	10.84
10/25/23	15.00	78.33	6.00	7.86

2023 In-Harbor Bacteria Data

CSHH #13–60' West of Mill Pond Weir

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/24/23	67.00	0.00	1.00	0.00
5/31/23	21.00	37.51	22.00	4.69
6/7/23	275.00	72.87	***120.00***	13.82
6/15/23	670.00	126.89	***520.00***	34.23
6/21/23	35.00	98.07	42.00	***35.66***
6/28/23	230.00	125.51	***290.00***	***110.83***
7/5/23	370.00	***222.78***	***260.00***	***181.62***
7/12/23	46.00	155.80	70.00	***163.06***
7/19/23	733.00	158.63	***340.00***	***149.78***
7/26/23	460.00	***265.53***	80.00	***170.38***
8/2/23	49.00	194.90	20.00	***99.80***
8/9/23	310.00	188.12	***150.00***	***89.40***
8/16/23	***3400.00***	***444.82***	***2700.00***	***185.61***
8/23/23	70.00	***278.09***	39.00	***120.37***
9/6/23	35.00	***225.42***	2.00	***74.97***
9/13/23	260.00	***215.73***	9.00	***37.10***
9/20/23	470.00	131.54	51.00	13.76
9/27/23	800.00	***241.86***	48.00	14.49
10/4/23	210.00	***235.12***	54.00	18.85
10/11/23	170.00	***322.53***	12.00	26.97
10/18/23	120.00	***276.32***	17.00	30.63
10/25/23	35.00	164.36	20.00	25.40

2023 In-Harbor Bacteria Data

CSHH #14–NW Corner of Former Power Plant, Approximately 50 yds from Powerhouse Drain

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/31/23	11.00	0.00	13.00	0.00
6/15/23	41.00	21.24	29.00	19.42
9/27/23	130.00	0.00	14.00	0.00
10/11/23	16.00	45.61	1.00	3.74
10/25/23	11.00	28.39	4.00	3.83

CSHH #15–50 yds from Scudder's Pond Outfall, North of Tappen Beach Pool

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/31/23	11.00	0.00	2.00	0.00
9/27/23	60.00	0.00	1.00	0.00
10/11/23	15.00	30.00	0.10	0.32
10/25/23	7.00	18.47	1.00	0.46

2023 In-Harbor Bacteria Data

CSHH #16–Outer Harbor, Midway Between E/W Shore and N/S Boundary of Shellfish Harvesting Area

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/24/23	3.00	0.00	0.10	0.00
5/31/23	0.10	0.55	0.10	0.10
6/7/23	0.10	0.31	0.10	0.10
6/15/23	0.10	0.23	0.10	0.10
6/28/23	1.00	0.18	0.10	0.10
7/5/23	15.00	0.62	2.00	0.21
7/12/23	0.10	0.62	0.10	0.21
7/19/23	60.00	3.08	4.00	0.53
7/26/23	1.00	2.46	2.00	0.69
8/2/23	1.00	2.46	0.10	0.69
8/16/23	16.00	5.57	10.00	1.68
8/23/23	0.10	1.12	0.10	0.67
9/6/23	1.00	1.17	0.10	0.46
9/14/23	26.00	2.54	0.10	0.32
10/4/23	11.00	6.59	0.10	0.10
10/11/23	7.00	12.60	0.10	0.10
10/18/23	5.00	7.27	0.10	0.10
10/25/23	1.00	4.43	0.10	0.10

2023 In-Harbor Bacteria Data

CSHH #17–Outer Harbor, Outside Restricted Crescent Beach Boundary

	Fecal Coliform		**Enterococci**	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/24/23	0.10	0.00	0.10	0.00
5/31/23	0.10	0.10	0.10	0.10
6/7/23	1.00	0.22	1.00	0.22
6/15/23	1.00	0.32	0.10	0.18
6/21/23	3.00	0.50	0.10	0.16
6/28/23	0.10	0.50	4.00	0.33
7/5/23	9.00	1.22	4.00	0.69
7/12/23	3.00	1.52	0.10	0.44
7/19/23	6.00	2.17	0.10	0.44
7/26/23	8.00	2.65	1.00	0.69
8/2/23	4.00	5.53	0.10	0.33
8/9/23	1.00	3.57	3.00	0.31
8/16/23	170.00	7.99	***150.00***	1.35
8/23/23	0.10	3.52	0.10	1.35
9/6/23	1.00	2.03	0.10	1.46
9/14/23	15.00	4.00	1.00	1.11
10/4/23	7.00	4.72	0.10	0.22
10/11/23	3.00	6.80	0.10	0.22
10/18/23	4.00	4.38	1.00	0.22
10/25/23	0.10	1.70	0.10	0.18

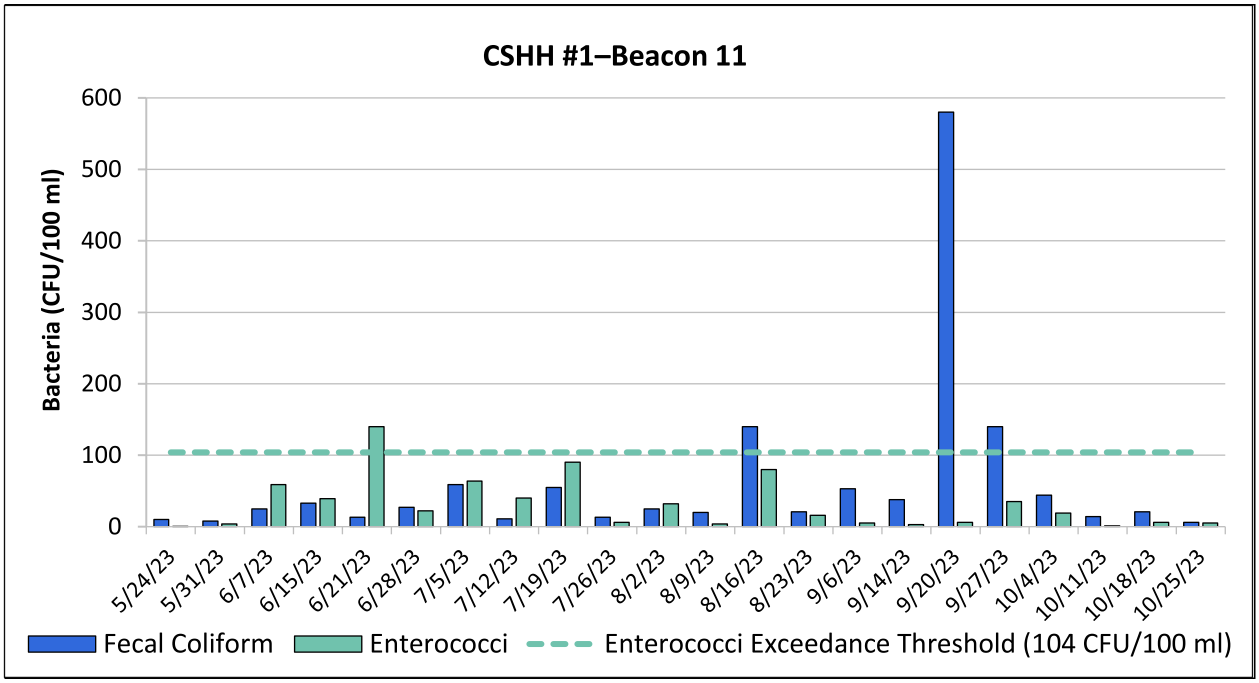
2023 In-Harbor Bacteria Data

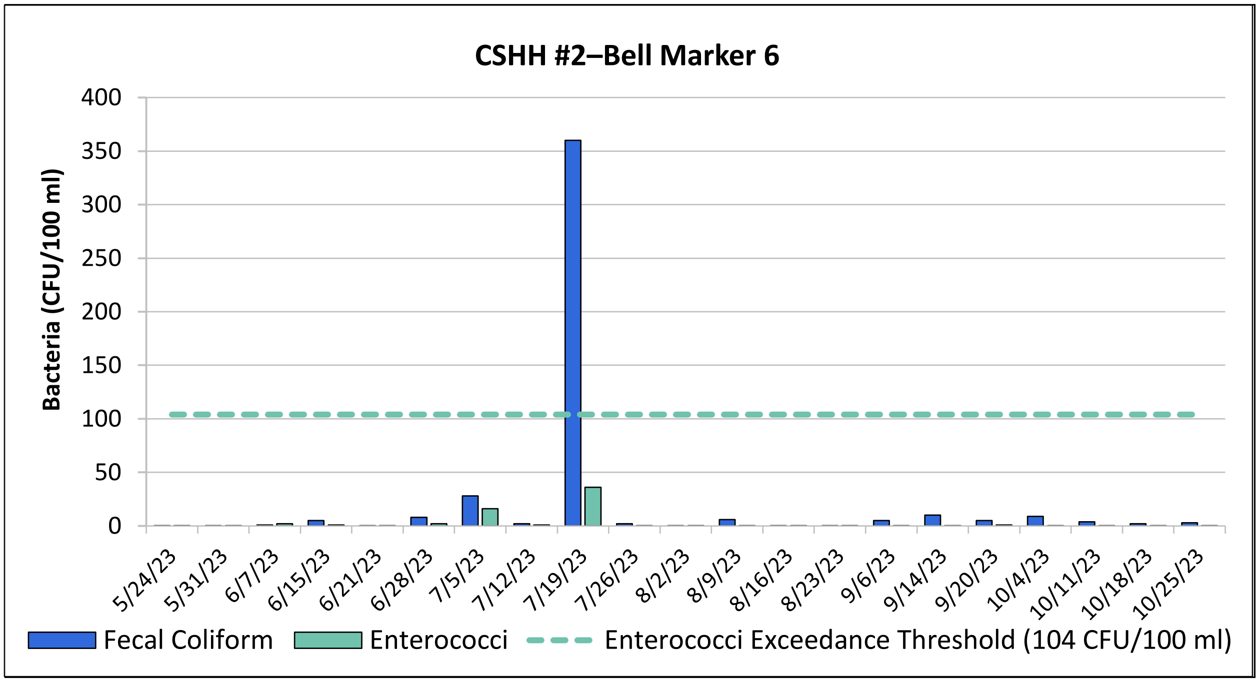
CSHH #17A–Within Restricted Shellfishing Area

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/24/23	0.10	0.00	0.10	0.00
6/7/23	7.00	0.84	12.00	1.10
6/28/23	2.00	31.62	0.10	11.36
7/5/23	10.00	21.54	0.10	2.35
7/12/23	0.10	1.26	0.10	0.10
7/19/23	4.00	1.68	2.00	0.21
7/26/23	11.00	5.92	0.10	0.56
8/2/23	7.00	7.60	2.00	1.02
8/16/23	140.00	43.43	***250.00***	12.88
8/23/23	1.00	10.19	0.10	1.50
9/6/23	28.00	15.77	0.10	1.36
9/14/23	41.00	20.02	8.00	2.11
10/4/23	14.00	25.24	1.00	0.93
10/18/23	2.00	5.29	0.10	0.32

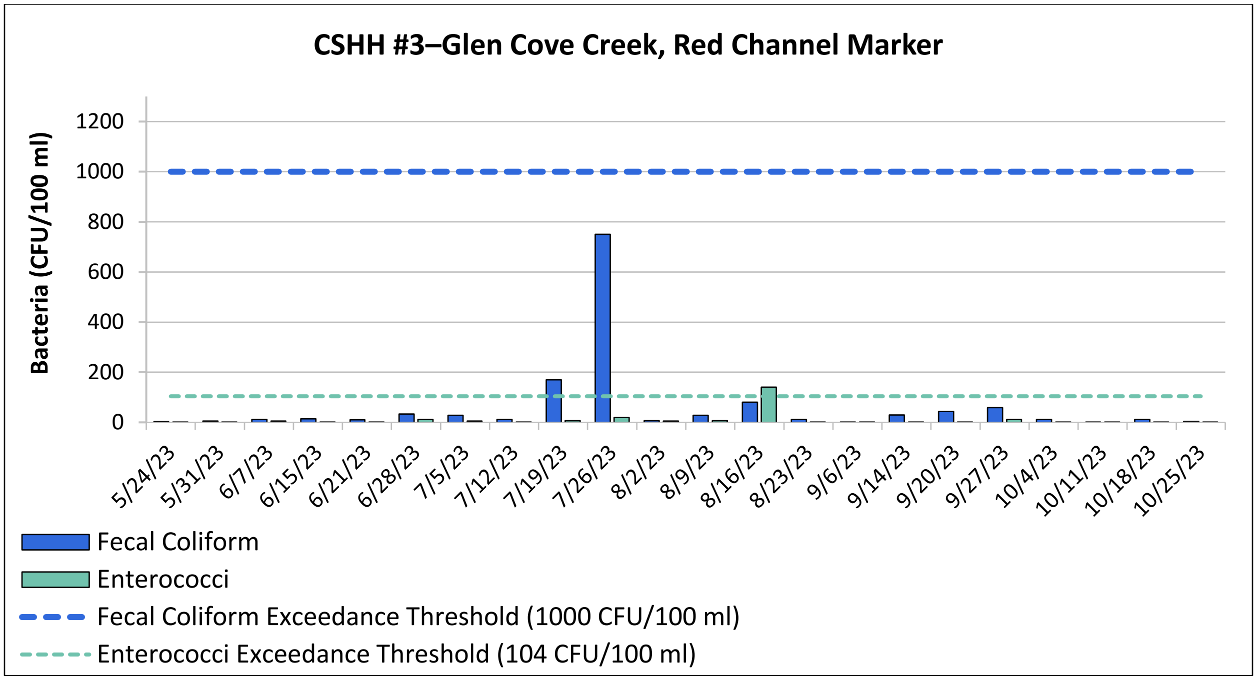
2023 In-Harbor Bacteria Graphs

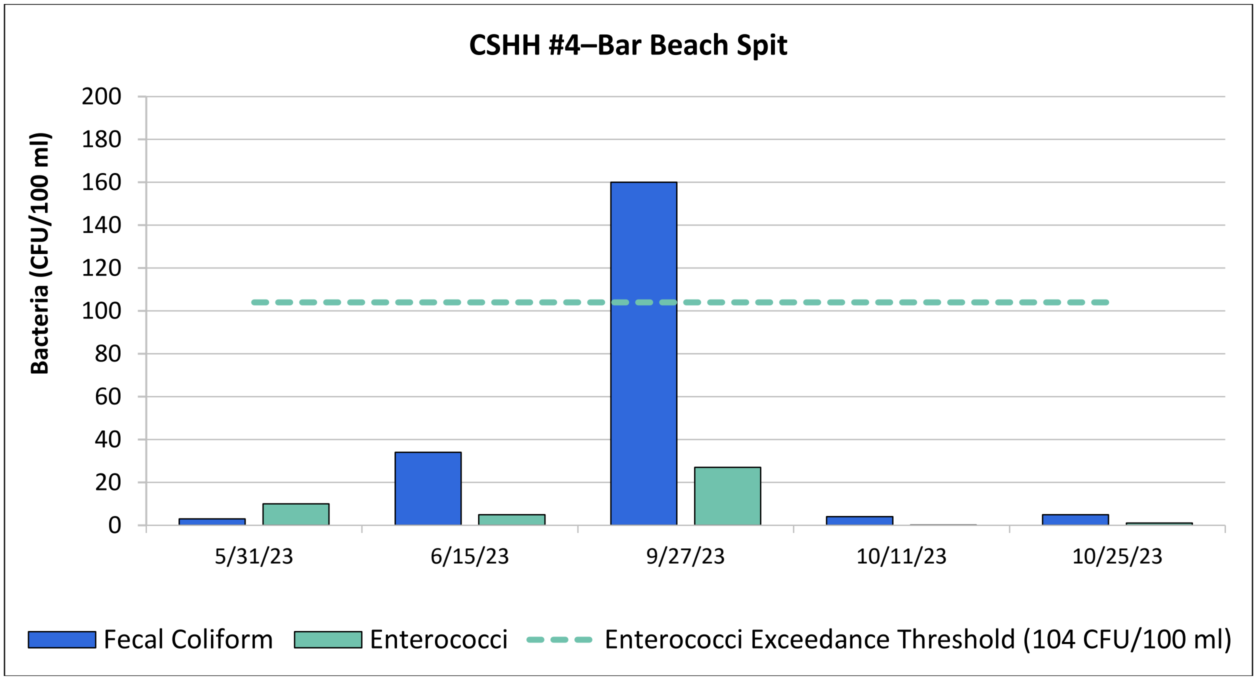
The following graphs display fecal coliform and enterococci data received from the Nassau County Department of Health. Lab results for fecal coliform greater than 6000 CFU/100 ml are represented at an absolute value of 6001 CFU/100 ml. Dashed lines show NYS beach-closure standards, 1,000 CFU/100 ml for the formerly used fecal coliform standard and 104 CFU/100 ml for the currently used enterococci standard. Beach-closure standards are used only as a frame-of-reference for in-harbor sample results. Note that the y-axes vary in order to accommodate a wide range of values.



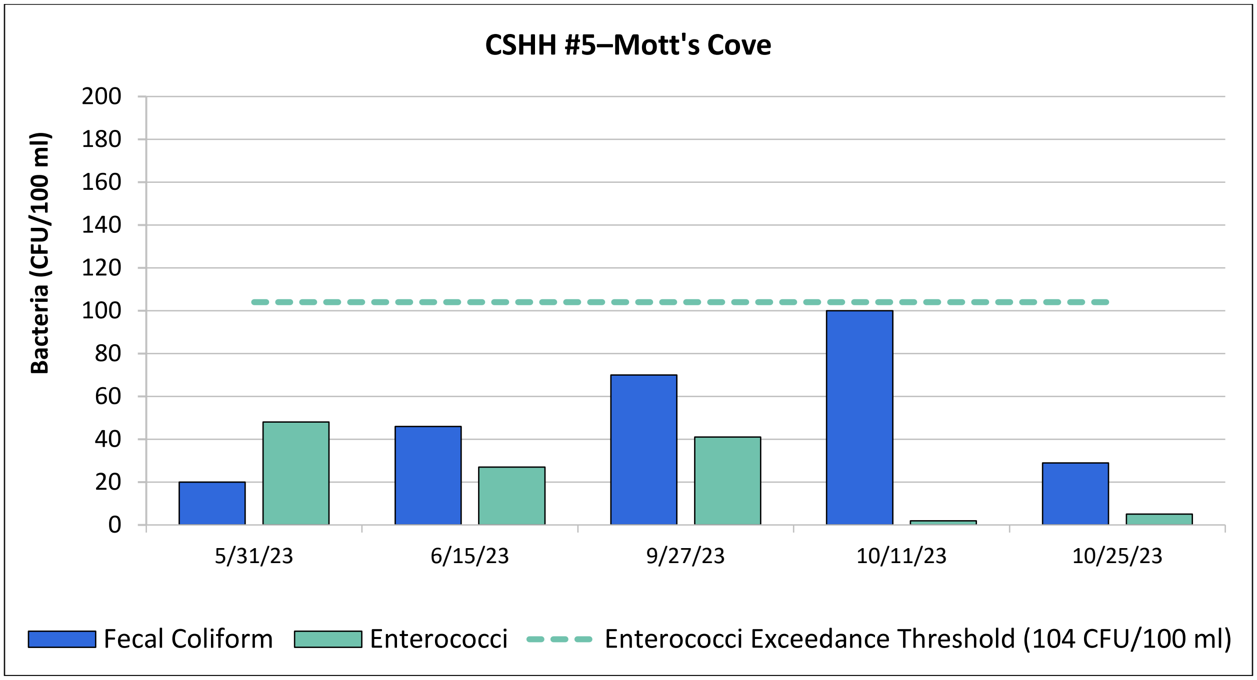


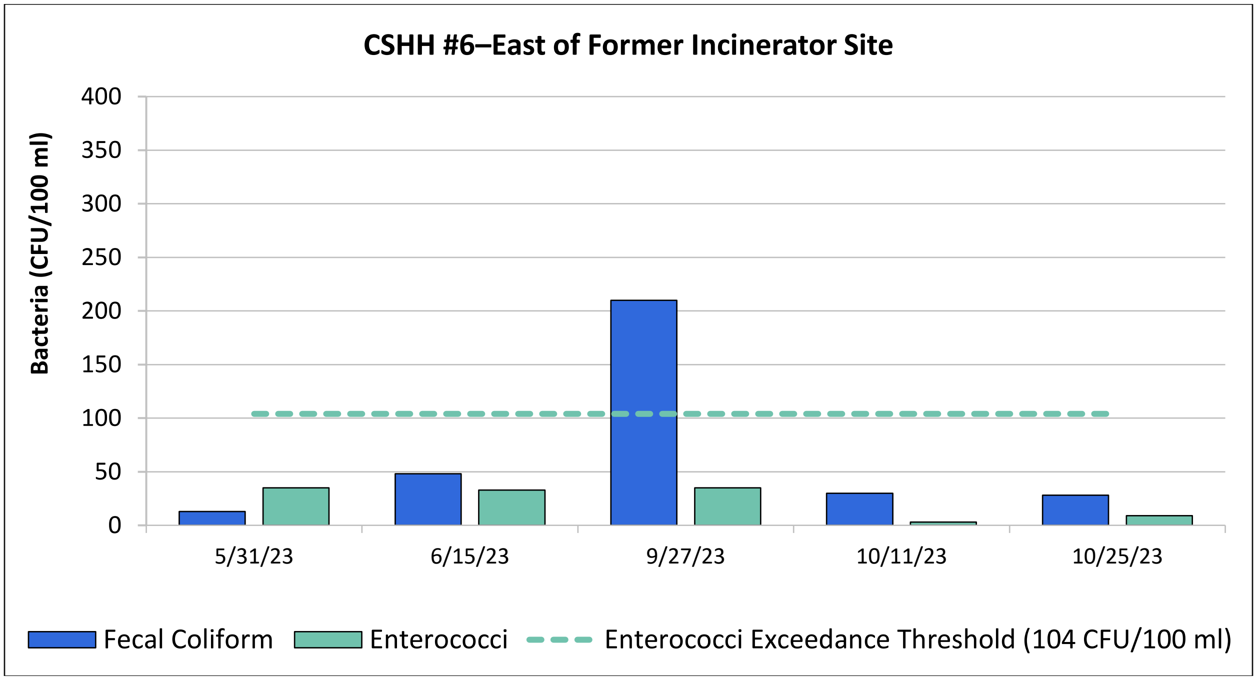
2023 In-Harbor Bacteria Graphs



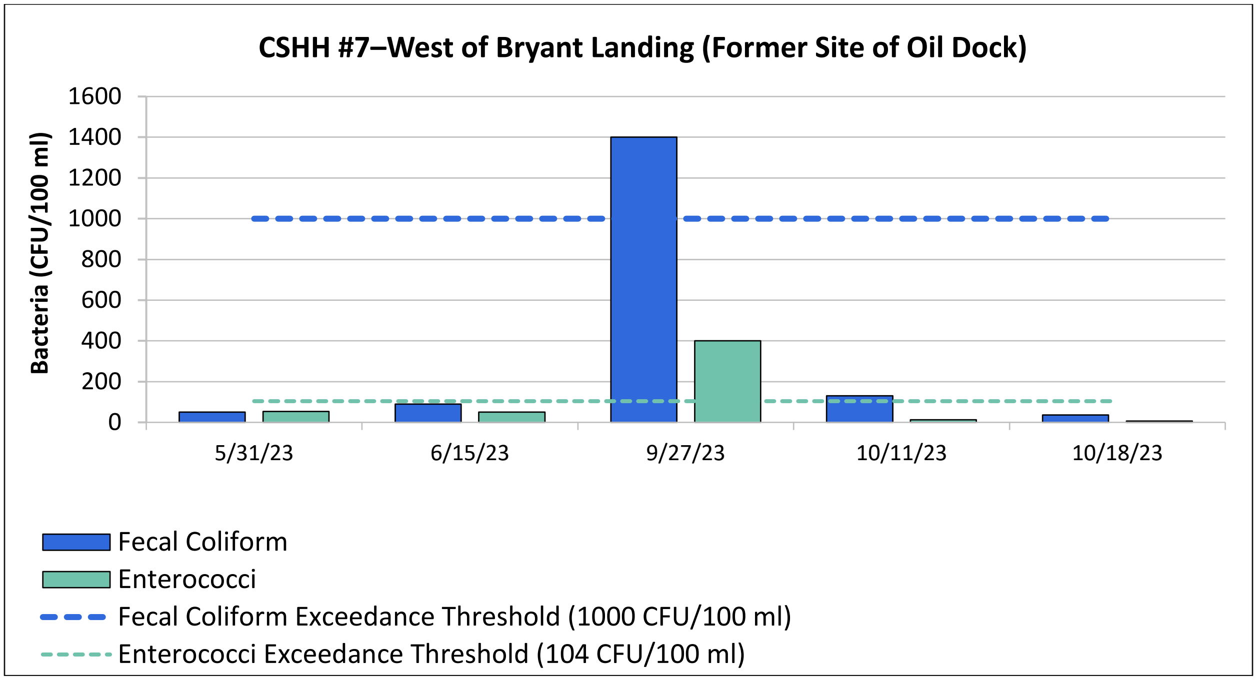


2023 In-Harbor Bacteria Graphs

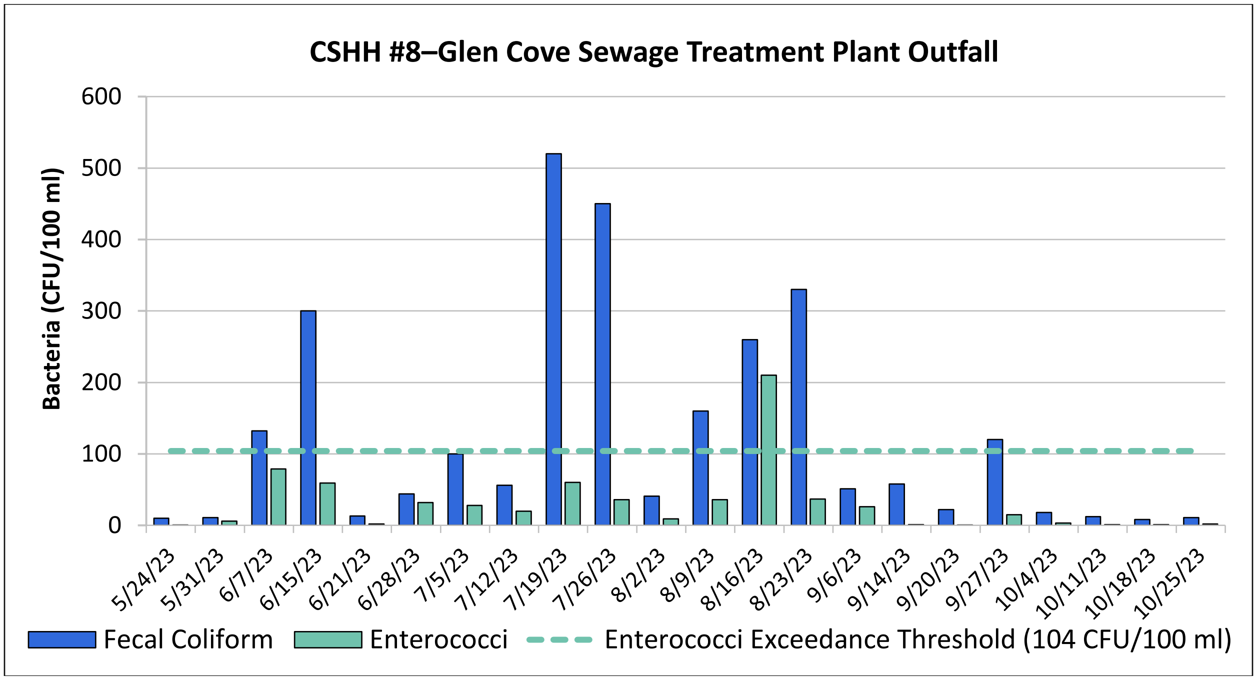




2023 In-Harbor Bacteria Graphs

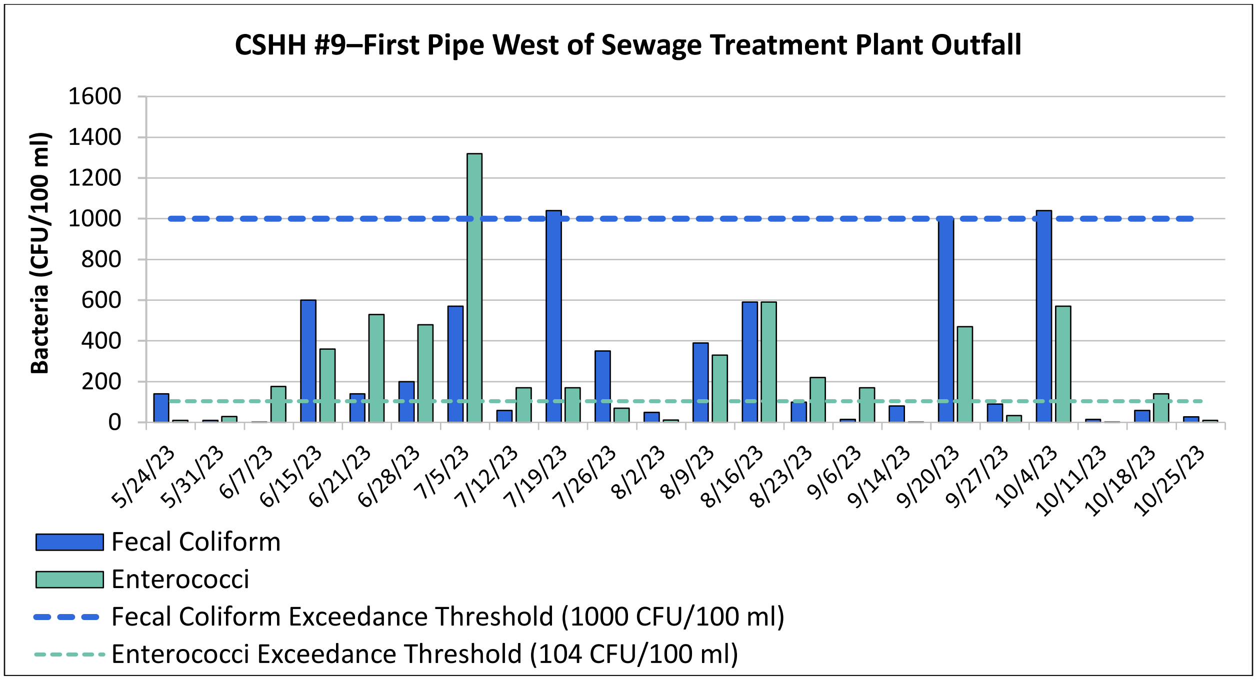


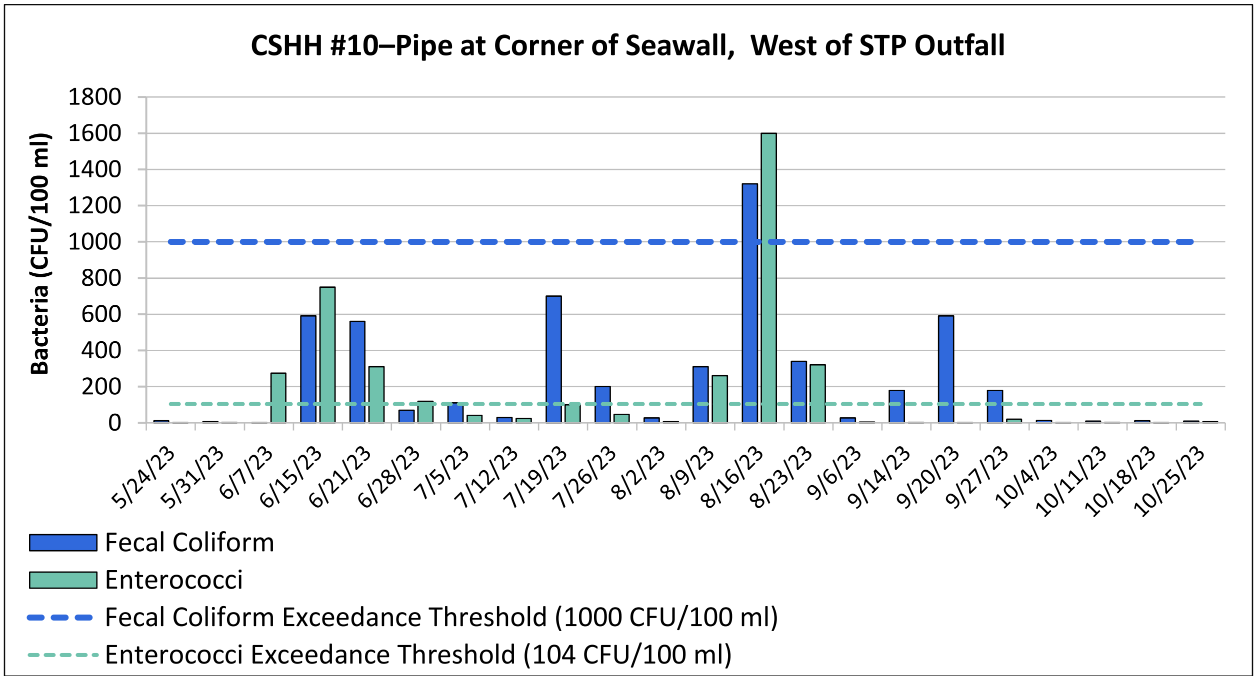
CSHH #7–West of Bryant Landing (Former Site of Oil Dock)



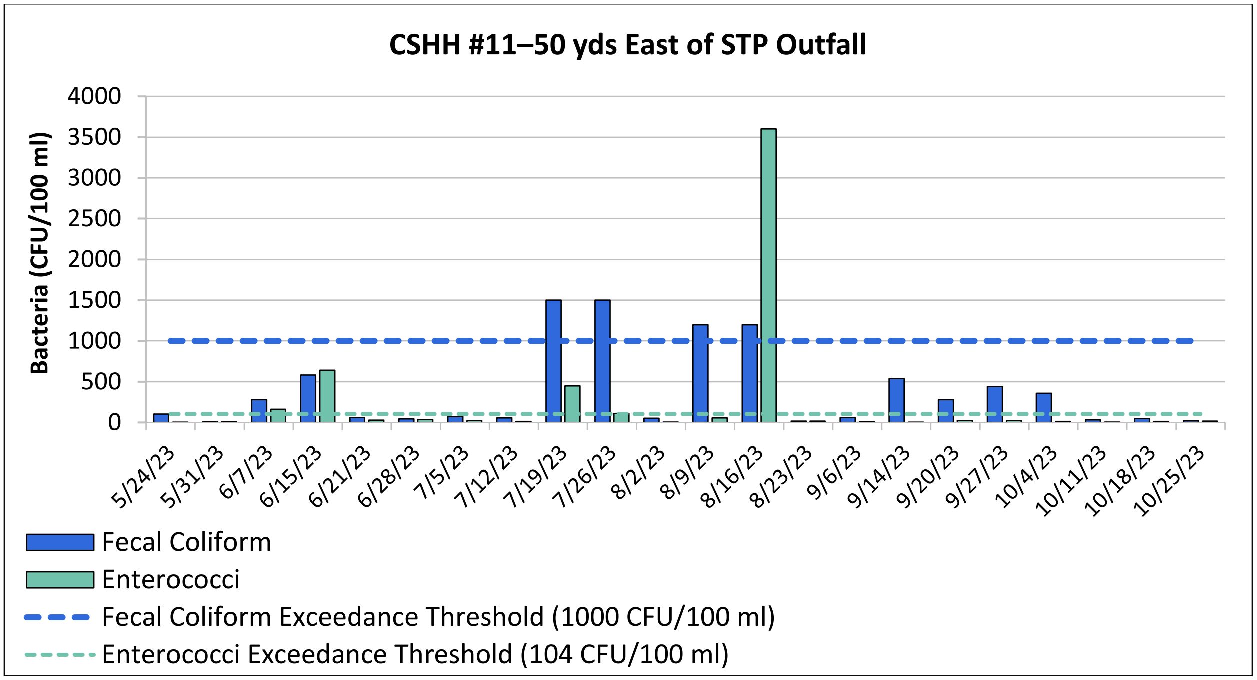
CSHH #8–Glen Cove Sewage Treatment Plant Outfall

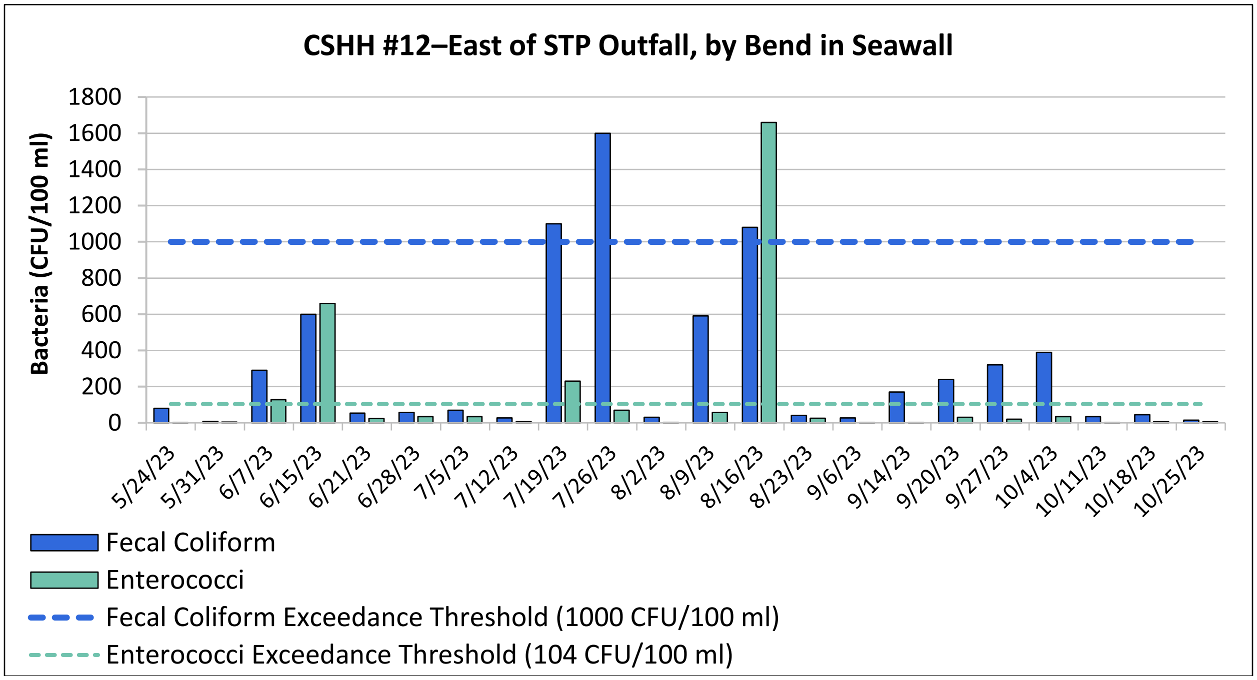
2023 In-Harbor Bacteria Graphs



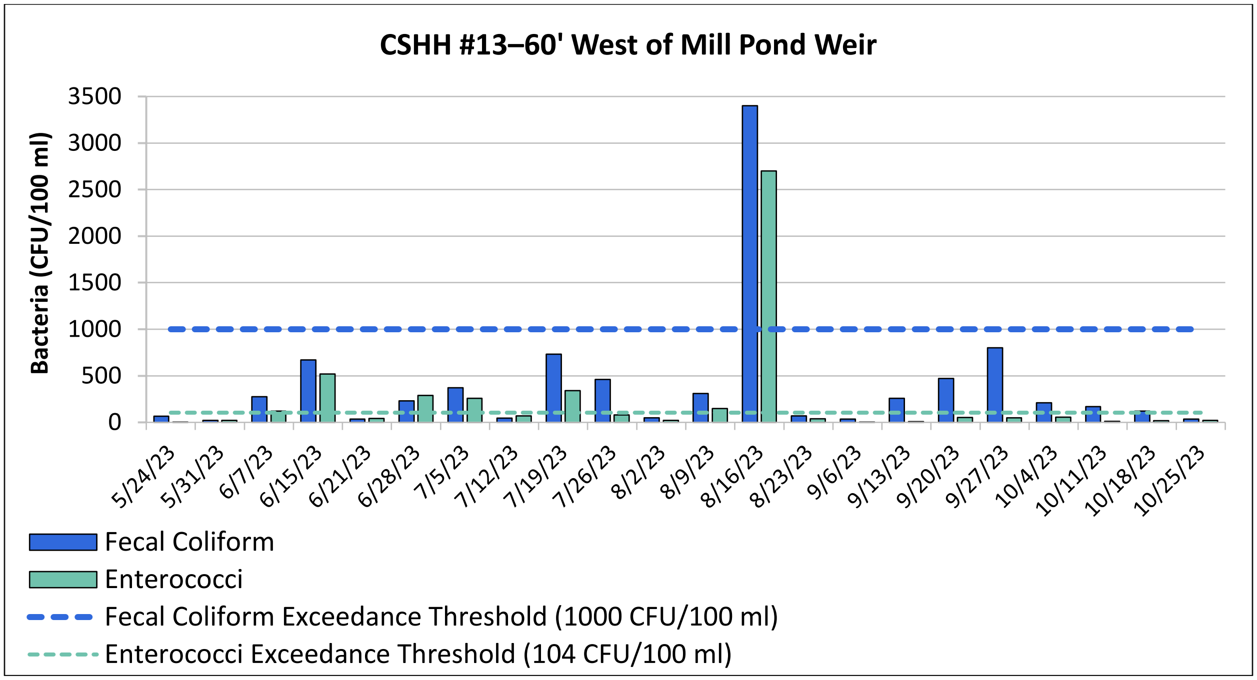


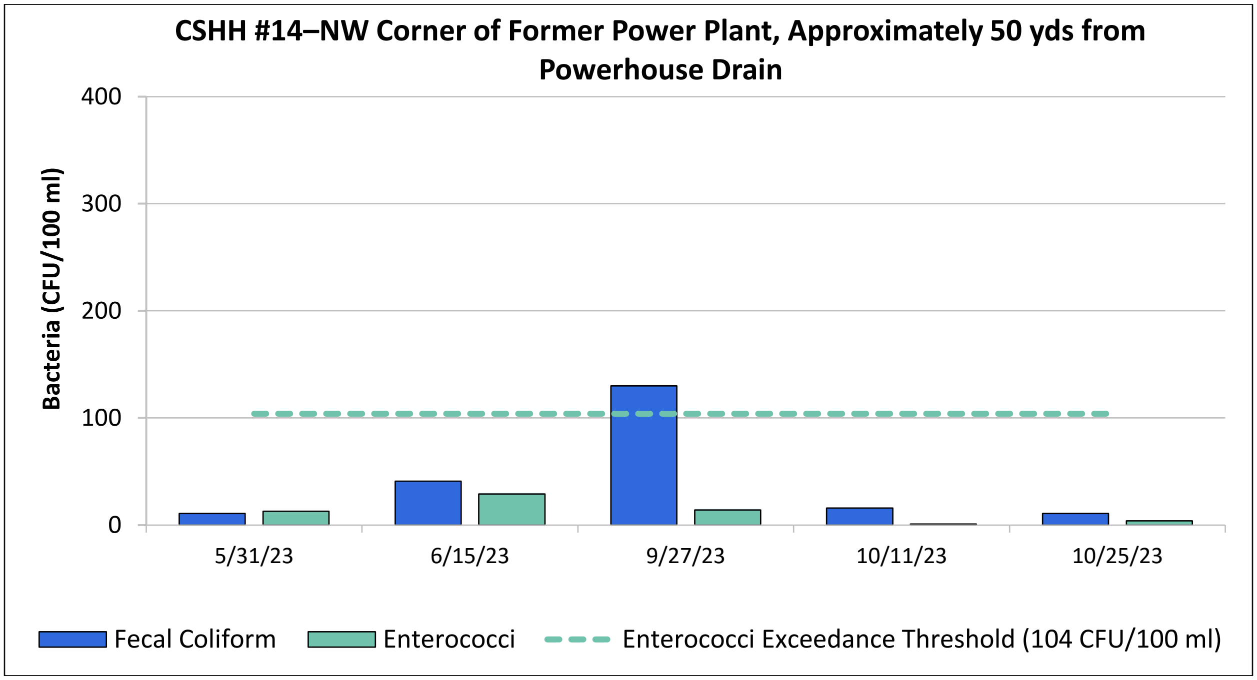
2023 In-Harbor Bacteria Graphs



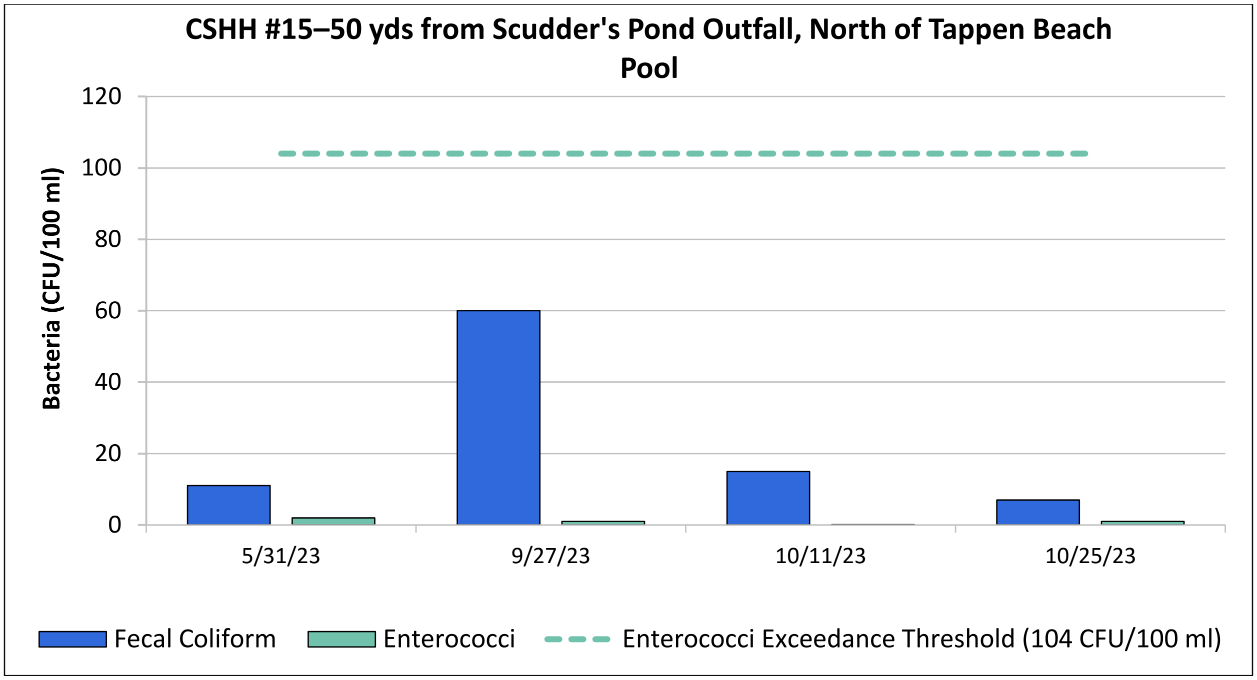


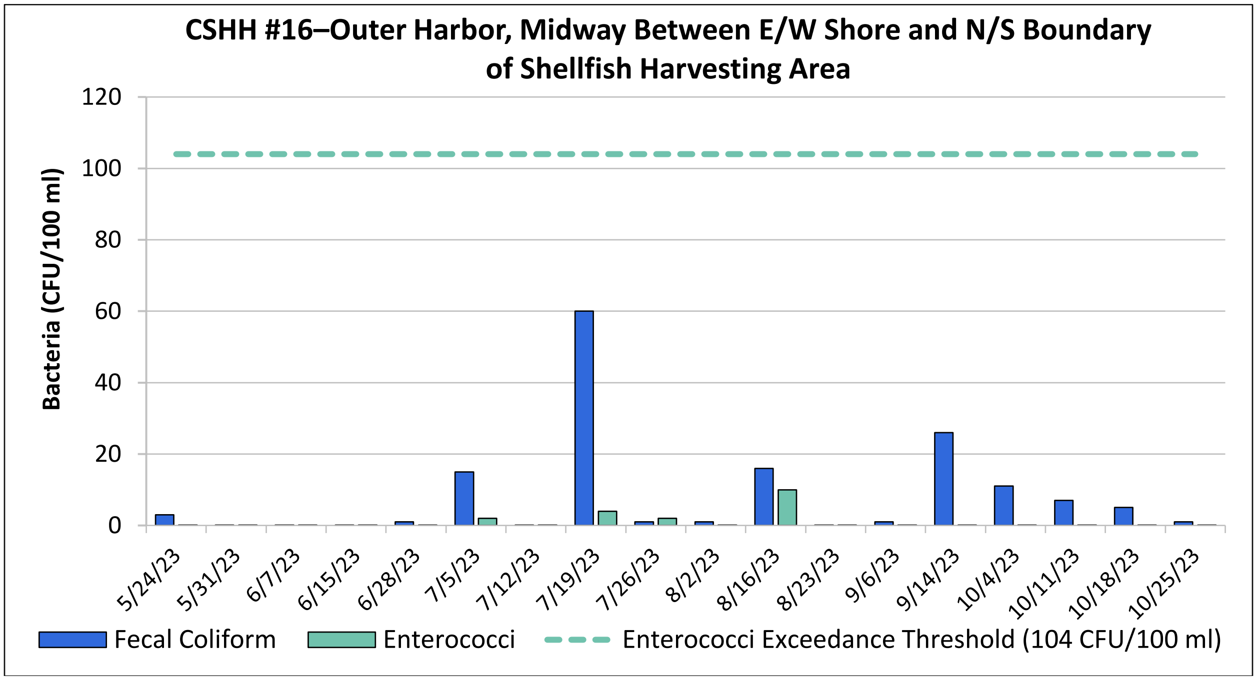
2023 In-Harbor Bacteria Graphs



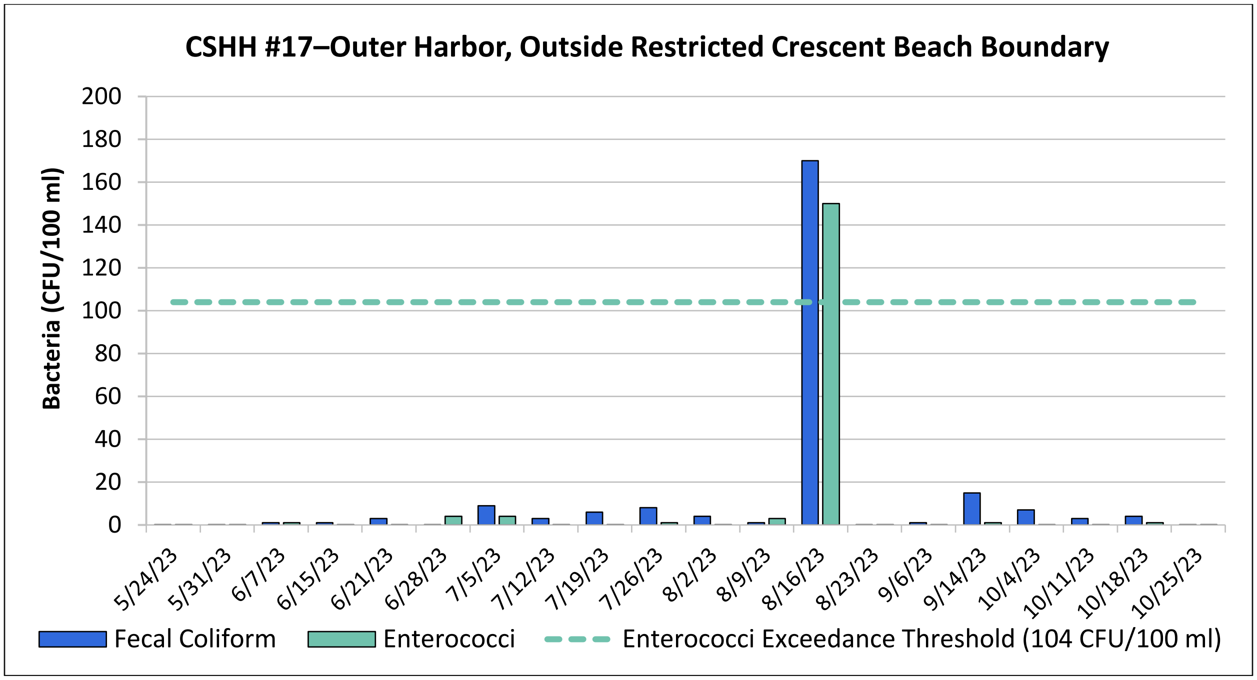


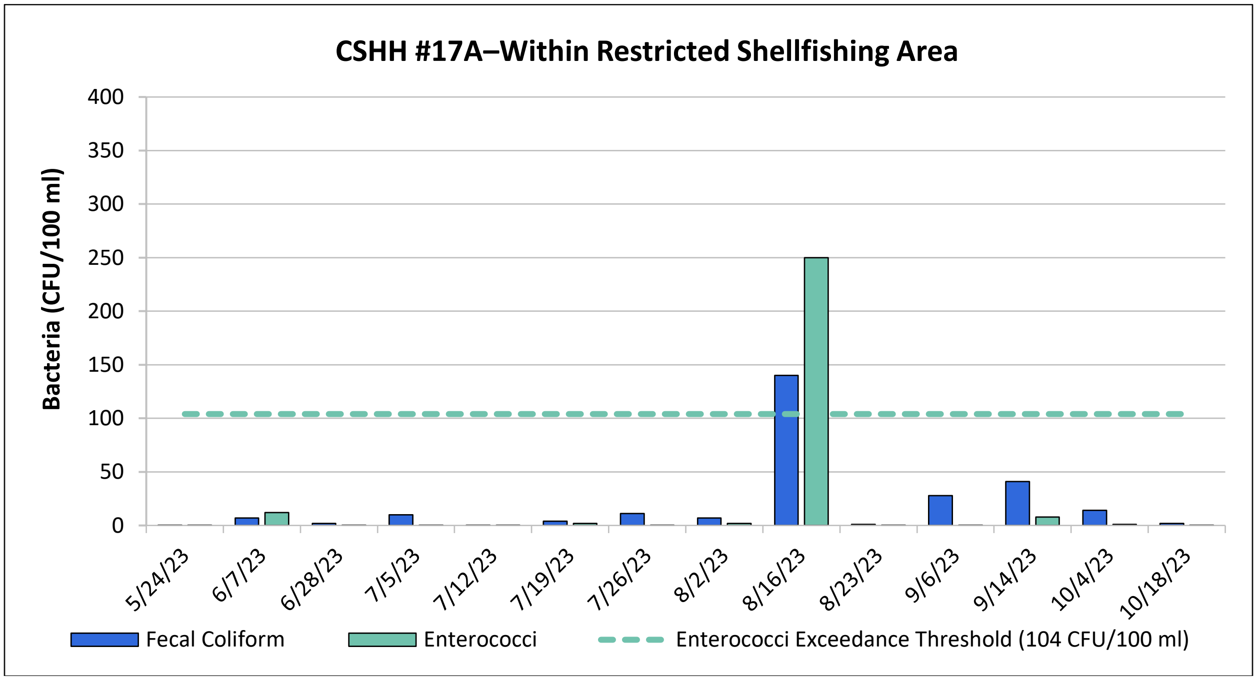
2023 In-Harbor Bacteria Graphs





2023 In-Harbor Bacteria Graphs





2023 Powerhouse Drain and Scudder's Pond Outfalls Regular Season Monitoring Bacteria Data

CSHH #14A–Powerhouse Drain Outfall

	Fecal Coliform		**Enterococci**	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/17/23	290.00	0.00	***280.00***	0.00
5/24/23	156.00	***212.70***	2.00	23.66
5/31/23	25.00	104.19	45.00	29.32
6/7/23	285.00	133.99	***400.00***	***56.35***
6/15/23	570.00	178.99	***480.00***	***86.48***
6/21/23	280.00	177.74	***260.00***	***85.21***
6/28/23	54.00	143.76	100.00	***186.34***
7/5/23	840.00	***290.34***	***1400.00***	***370.58***
7/12/23	40.00	196.04	***120.00***	***291.28***
7/19/23	540.00	193.94	***400.00***	***280.85***
7/26/23	54.00	139.54	70.00	***216.02***
8/2/23	140.00	168.83	39.00	***178.94***
8/9/23	170.00	122.65	***380.00***	***137.86***
8/16/23	***3500.00***	***299.98***	***3800.00***	***275.14***
8/23/23	800.00	***324.51***	***540.00***	***292.16***
9/6/23	1000.00	***830.62***	***380.00***	***737.80***
9/14/23	460.00	***1065.32***	27.00	***380.92***
9/20/23	300.00	***576.42***	16.00	***97.03***
9/27/23	390.00	***481.65***	100.00	***63.65***
10/4/23	140.00	***376.20***	***120.00***	***72.26***
10/11/23	250.00	***285.10***	20.00	***40.10***
10/18/23	320.00	***265.14***	70.00	***48.52***
10/25/23	34.00	171.53	34.00	***56.41***

Tan highlights indicate a direct sample from flow.

Note that CFU refers to the number of colony forming units, or the number of bacterial cells in the water sample. Log Avg (log average) refers to the running seasonal average of bacteria results at each location. Boldfaced, italicized values exceed the NYS beach-closure standards, 1,000 CFU/100 ml (200 Log Avg) for the formerly used fecal coliform standard and 104 CFU/100 ml (35 Log Avg) for the currently used enterococci standard.

2023 Powerhouse Drain and Scudder's Pond Outfalls Regular Season Monitoring Bacteria Data

CSHH #15A–Outfall North of Tappen Beach Pool

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/17/23	190.00	0.00	55.00	0.00
5/24/23	60.00	106.77	0.10	2.35
5/31/23	68.00	91.86	36.00	5.83
6/7/23	328.00	126.28	***1440.00***	23.11
6/15/23	530.00	168.23	***660.00***	***45.18***
6/21/23	51.00	129.32	***280.00***	***62.56***
6/28/23	110.00	145.99	***160.00***	***273.59***
7/5/23	540.00	***220.95***	***250.00***	***403.11***
7/12/23	200.00	***200.14***	***130.00***	***249.20***
7/19/23	***1550.00***	***248.05***	***1400.00***	***289.64***
7/26/23	330.00	***360.36***	70.00	***219.51***
8/2/23	56.00	***314.84***	70.00	***186.06***
8/9/23	150.00	***243.69***	***160.00***	***170.17***
8/16/23	***1200.00***	***348.71***	***2200.00***	***299.62***
8/23/23	100.00	***201.56***	70.00	***164.58***
9/6/23	47.00	170.55	2.00	***83.79***
9/14/23	130.00	164.55	54.00	***63.86***
9/20/23	200.00	105.14	15.00	18.35
9/27/23	250.00	132.21	***130.00***	21.42
10/4/23	56.00	111.34	59.00	26.23
10/11/23	59.00	116.52	7.00	33.70
10/18/23	53.00	97.38	10.00	24.05
10/25/23	48.00	73.20	58.00	31.53

Tan highlights indicate a direct sample from flow.

Note that CFU refers to the number of colony forming units, or the number of bacterial cells in the water sample. Log Avg (log average) refers to the running seasonal average of bacteria results at each location. Boldfaced, italicized values exceed the NYS beach-closure standards, 1,000 CFU/100 ml (200 Log Avg) for the formerly used fecal coliform standard and 104 CFU/100 ml (35 Log Avg) for the currently used enterococci standard.

2023 Powerhouse Drain and Scudder's Pond Outfalls Regular Season Monitoring Bacteria Data

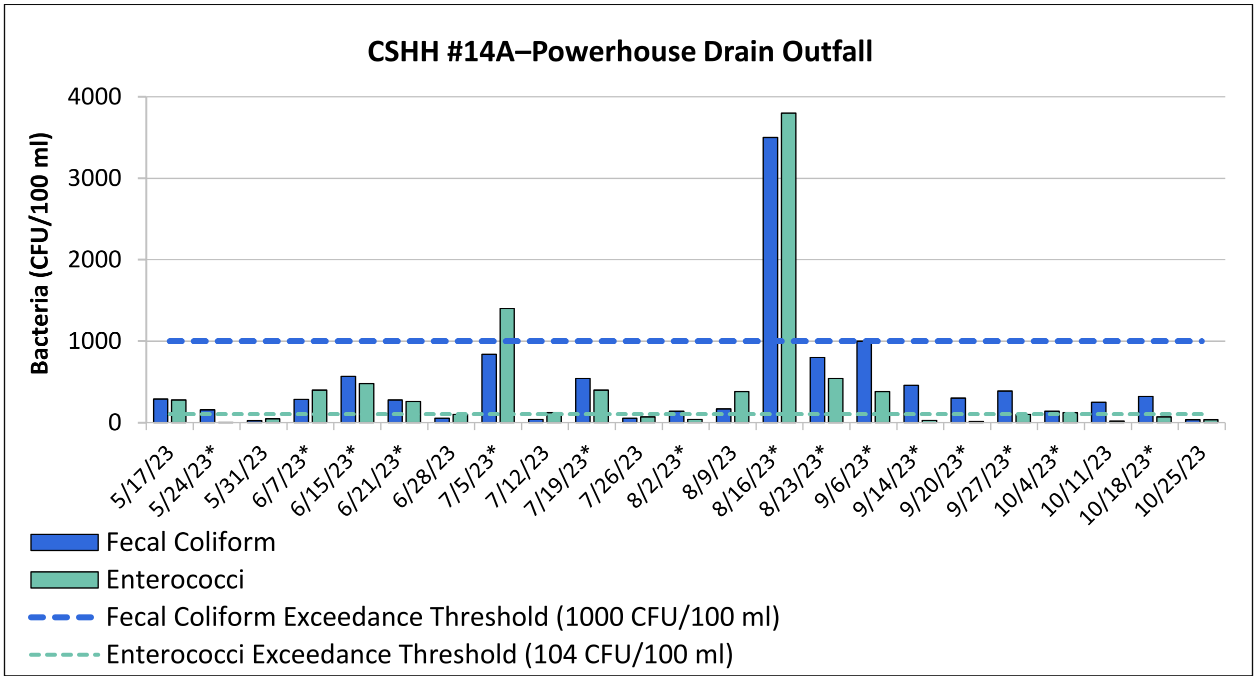
CSHH #15B–Scudder's Pond Weir on East Side of Shore Road

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/17/23	41.00	0.00	***590.00***	0.00
5/24/23	35.00	37.88	0.10	7.68
6/28/23	51.00	0.00	***590.00***	0.00
7/26/23	460.00	153.17	70.00	***203.22***
8/23/23	70.00	179.44	36.00	***50.20***
9/20/23	330.00	151.99	17.00	24.74
10/18/23	55.00	134.72	8.00	11.66

Note that CFU refers to the number of colony forming units, or the number of bacterial cells in the water sample. Log Avg (log average) refers to the running seasonal average of bacteria results at each location. Boldfaced, italicized values exceed the NYS beach-closure standards, 1,000 CFU/100 ml (200 Log Avg) for the formerly used fecal coliform standard and 104 CFU/100 ml (35 Log Avg) for the currently used enterococci standard.

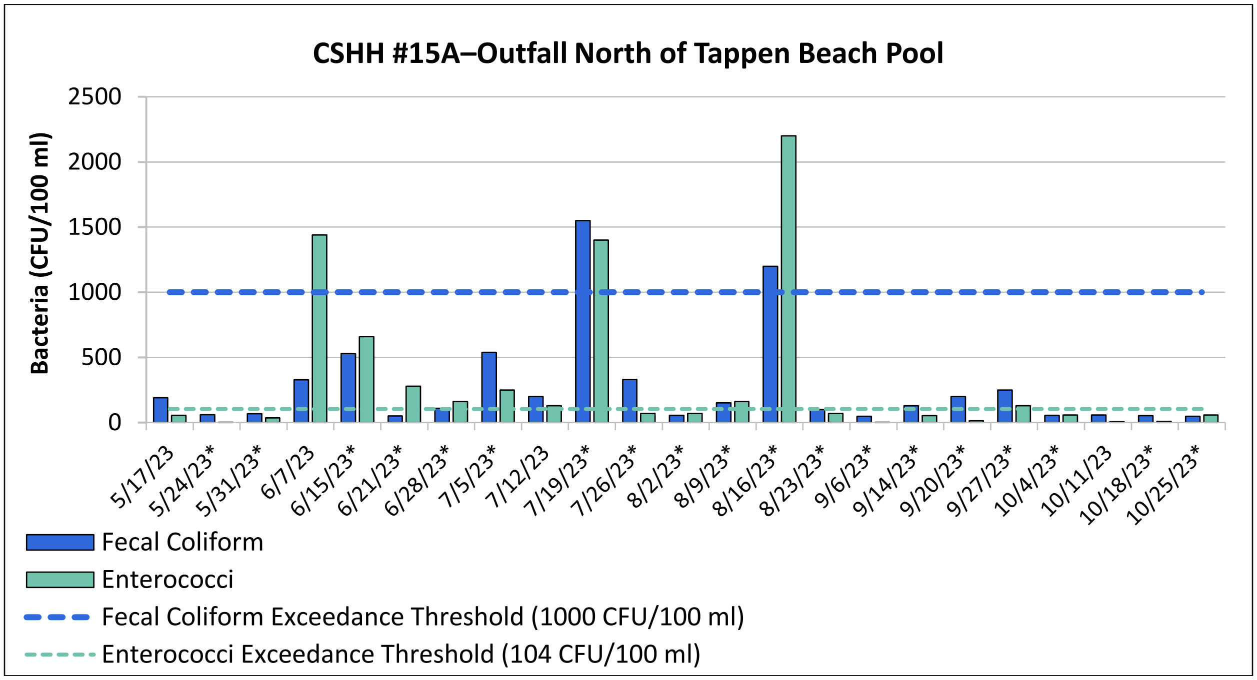
2023 Powerhouse Drain and Scudder's Pond Outfalls Regular Season Monitoring Bacteria Graphs

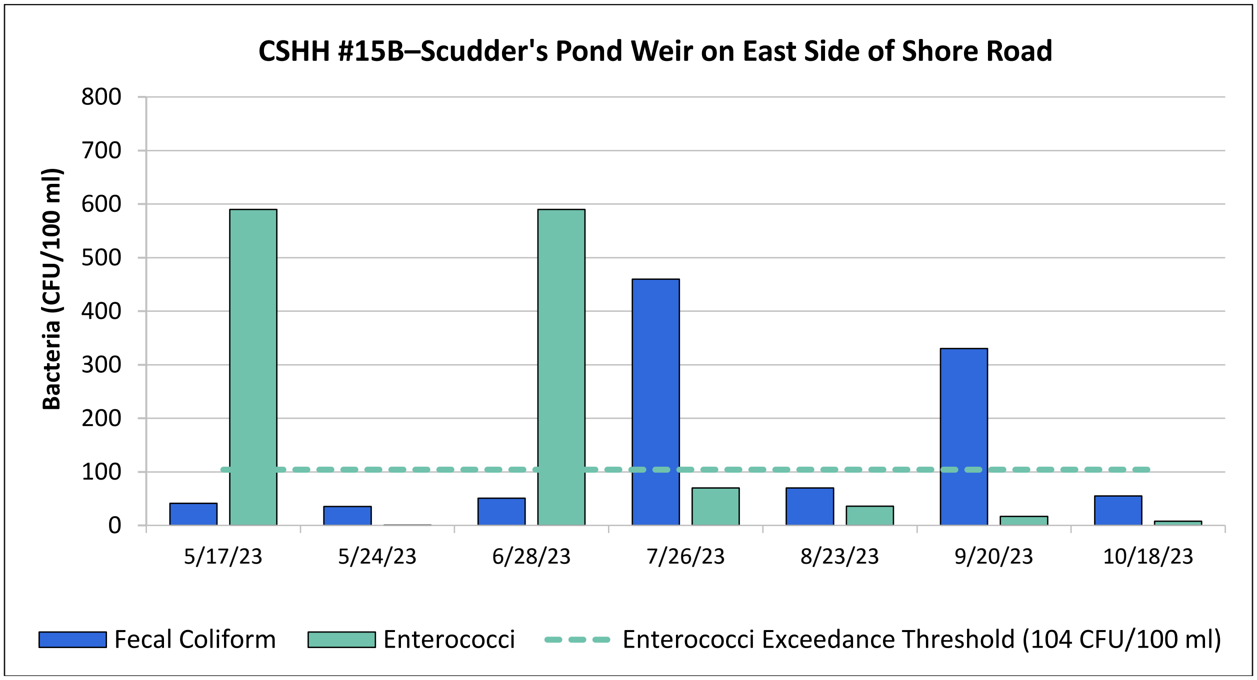
The following graphs display fecal coliform and enterococci data received from the Nassau County Department of Health. Lab results for fecal coliform greater than 6000 CFU/100 ml are represented at an absolute value of 6001 CFU/100 ml. Dashed lines show NYS beach-closure standards, 1,000 CFU/100 ml for the formerly used fecal coliform standard and 104 CFU/100 ml for the currently used enterococci standard. Beach-closure standards are used only as a frame-of-reference for in-harbor sample results. Note that the y-axes vary in order to accommodate a wide range of values.



*Direct sample from flow

2023 Powerhouse Drain and Scudder's Pond Outfalls
Regular Season Monitoring Bacteria Graphs





*Direct sample from flow

2023-24 Scudder's Pond and Powerhouse Drain Outfalls Winter-Monitoring Bacteria Data

CSHH #14A–Powerhouse Drain Outfall

	Fecal Coliform	**Enterococci**
Date	**CFU/100 ml**	**CFU/100 ml**
11/8/23	450.00	***480.00***
11/22/23	***1400.00***	***3200.00***
12/6/23	600.00	40.00
12/20/23	800.00	***580.00***
1/3/24	***2000.00***	60.00
1/17/24	***5500.00***	***180.00***
1/31/24	***2300.00***	***220.00***
2/15/24	370.00	52.00
2/29/24	480.00	70.00
3/13/24	***1800.00***	27.00
3/27/24	490.00	***380.00***
4/10/24	***3300.00***	15.00

Tan highlights indicate a direct sample from flow at CSHH #14A and #15A.

Note that CFU refers to the number of colony forming units, or the number of bacterial cells in the water sample. Under NYS beach-closure standards: the exceedance thresholds are 1,000 CFU/100 ml for the formerly used fecal coliform standard and 104 CFU/100 ml for the currently used enterococci standard.

2023-24 Scudder's Pond and Powerhouse Drain Outfalls Winter-Monitoring Bacteria Data

CSHH #15A–Outfall North of Tappen Beach Pool

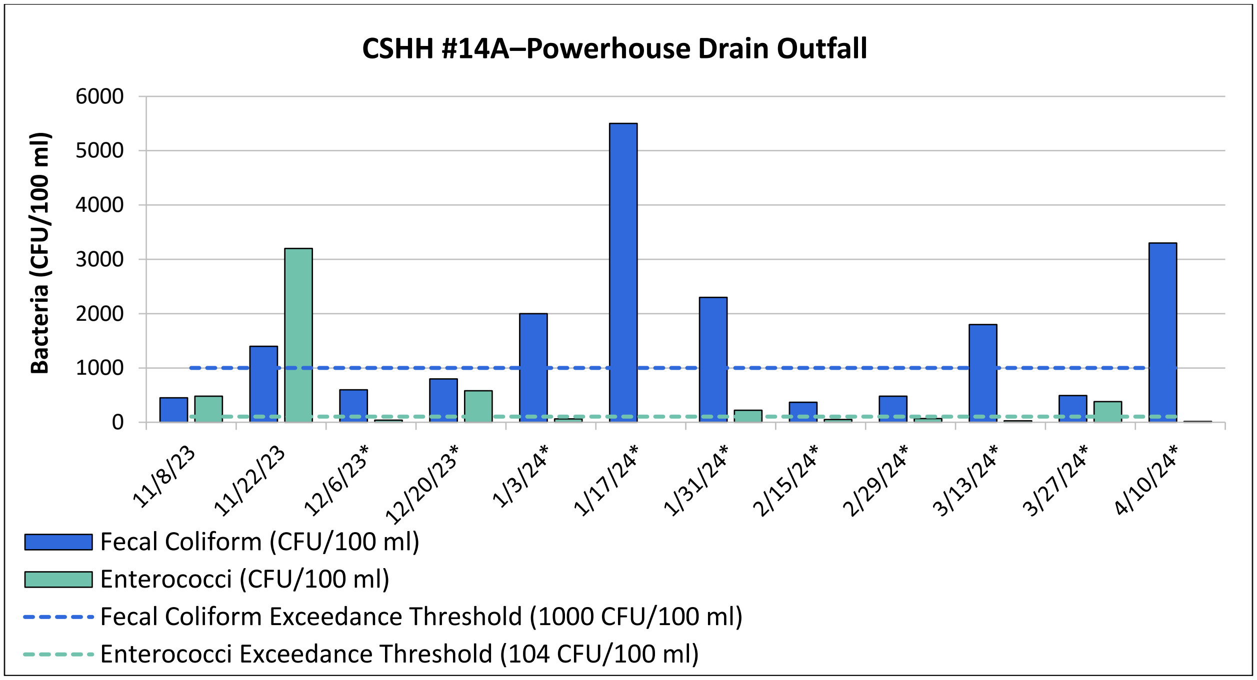
	Fecal Coliform	Enterococci
Date	**CFU/100 ml**	**CFU/100 ml**
11/8/23	70.00	100.00
11/22/23	***1100.00***	***3100.00***
12/6/23	43.00	80.00
12/20/23	73.00	***130.00***
1/3/24	25.00	23.00
1/17/24	73.00	70.00
1/31/24	6.00	80.00
2/15/24	2.00	2.00
2/29/24	46.00	4.00
3/13/24	14.00	4.00
3/27/24	18.00	10.00
4/10/24	***1300.00***	0.00

CSHH #15B–Scudder's Pond Weir on East Side of Shore Road

	Fecal Coliform	Enterococci
Date	**CFU/100 ml**	**CFU/100 ml**
11/8/23	118.00	55.00
11/22/23	470.00	***1600.00***
12/6/23	73.00	70.00
12/20/23	73.00	***130.00***
1/3/24	29.00	5.00
1/31/24	16.00	90.00
2/15/24	7.00	2.00
2/29/24	35.00	0.00
3/27/24	23.00	1.00
4/10/24	460.00	0.00

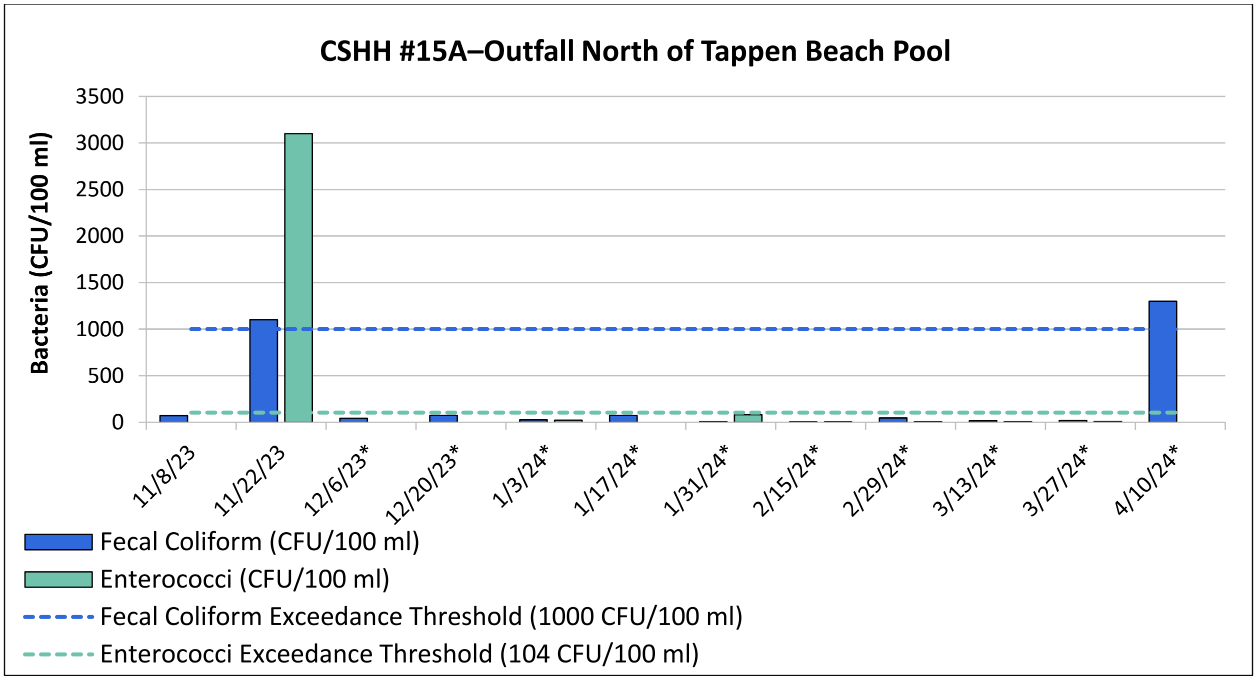
2023-24 Scudder's Pond and Powerhouse Drain Outfalls Winter-Monitoring Bacteria Graphs

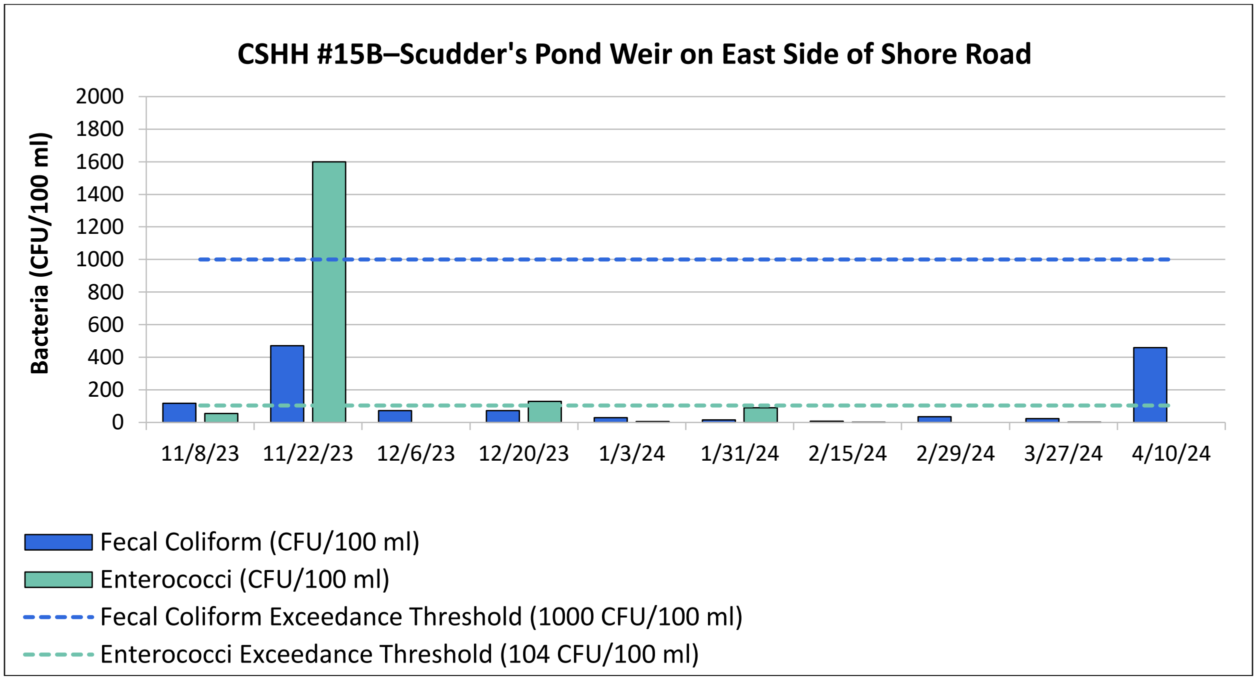
The following graphs display fecal coliform and enterococci data received from the Nassau County Department of Health. Lab results for fecal coliform greater than 6000 CFU/100 ml are represented at an absolute value of 6001 CFU/100 ml. Dashed lines show NYS beach-closure standards, 1,000 CFU/100 ml for the formerly used fecal coliform standard and 104 CFU/100 ml for the currently used enterococci standard. Beach-closure standards are used only as a frame-of-reference for in-harbor sample results. Note that the y-axes vary in order to accommodate a wide range of values.



*Direct sample from flow

2023-24 Scudder's Pond and Powerhouse Drain Outfalls Winter-Monitoring Bacteria Graphs





*Direct sample from flow

2023 Sea Cliff Precipitation Data

JAN	mm	in	MARCH	mm	in	MAY	mm	in	JULY	mm	in	SEPT	mm	in	NOV	mm	in
1T	0.00	0.00	2	0.51	0.02	2	3.81	0.15	2††	1.52	0.06	8	0.76	0.03	1	1.78	0.07
3	10.41	0.41	3	2.54	0.10	3	0.51	0.02	3††	1.02	0.04	9	1.02	0.04	7	2.79	0.11
4	0.76	0.03	4	30.99	1.22	4	2.54	0.10	4††	5.33	0.21	10	17.27	0.68	21	13.46	0.53
5	4.32	0.17	7**	0.76	0.03	7	1.02	0.04	8††	1.52	0.06	11	17.53	0.69	22	38.10	1.50
6	1.27	0.05	10-11	19.05	0.75	20	38.35	1.51	9	21.59	0.85	13	0.76	0.03	26	17.02	0.67
9	0.51	0.02	12-13	30.73	1.21	24	1.27	0.05	14	1.27	0.05	14T	0.00	0.00	28T**	0.00	0.00
12	10.92	0.43	13**	1.78	0.07				16†	42.67	1.68	18	35.31	1.39			
13	2.79	0.11	18	0.76	0.03				17†	0.25	0.01	23	22.86	0.90			
14T**	0.00	0.00	23	3.30	0.13				18†	27.69	1.09	24	17.27	0.68			
17T	0.00	0.00	25	6.35	0.25				19†	0.51	0.02	25	9.91	0.39			
19	21.84	0.86	27	4.57	0.18				21	5.84	0.23	26	5.33	0.21			
22-23	25.40	1.00	28	0.76	0.03				23T	0.00	0.00	28	6.60	0.26			
25*	44.96	1.77							25	5.84	0.23	29	125.48	4.94			
31*	2.79	0.11							27	10.16	0.40	30	6.35	0.25			
									29	3.05	0.12						
TOTAL	**125.98**	**4.96**	**TOTAL**	**102.1**	**4.02**	**TOTAL**	**47.50**	**1.87**	**TOTAL**	**128.27**	**5.05**	**TOTAL**	**266.45**	**10.49**	**TOTAL**	**73.15**	**2.88**
FEB	mm	in	APRIL	mm	in	JUNE	mm	in	AUG	mm	in	OCT	mm	in	DEC	mm	in
1**	1.02	0.04	1	11.18	0.44	2	0.25	0.01	1T	0.00	0.00	6	0.51	0.02	1	13.72	0.54
7	1.27	0.05	5	0.76	0.03	6*	5.59	0.22	7†	17.78	0.70	7	18.80	0.74	3	17.27	0.68
8	0.51	0.02	6T	0.00	0.00	11	0.76	0.03	8	1.78	0.07	8T	0.00	0.00	6T**	0.00	0.00
9T	0.00	0.00	15	0.51	0.02	12	4.06	0.16	10	9.40	0.37	10T	0.00	0.00	7T**	0.00	0.00
13	1.52	0.06	22-23	50.29	1.98	14	7.87	0.31	12	2.54	0.10	14	13.21	0.52	9	0.25	0.01
16	1.52	0.06	29*	63.75	2.51	16	6.35	0.25	13†	12.19	0.48	16	0.25	0.01	10	36.83	1.45
17	7.37	0.29	30	33.27	1.31	17	3.30	0.13	14†	27.94	1.10	20	16.26	0.64	11	24.38	0.96
21	8.64	0.34				22	1.52	0.06	16†	14.73	0.58	21	10.67	0.42	17-18	53.09	2.09
22*	2.54	0.10				23	1.02	0.04	18†	23.11	0.91	29	10.92	0.43	24	0.76	0.03
23	1.78	0.07				24	4.32	0.17	24	3.81	0.15	30	17.78	0.70	27-28	37.85	1.49
24	0.51	0.02				25	14.48	0.57	25	10.16	0.40				29	1.52	0.06
25T**	0.00	0.00				26	1.02	0.04	26†	23.88	0.94				30T	0.00	0.00
27**	10.16	0.40				27	4.57	0.18	30A	5.08	0.20						
28*	3.81	0.15															
TOTAL	**40.64**	**1.60**	**TOTAL**	**159.77**	**6.29**	**TOTAL**	**55.12**	**2.17**	**TOTAL**	**152.40**	**6.00**	**TOTAL**	**88.39**	**3.48**	**TOTAL**	**185.67**	**7.31**

Note: Precipitation recorded from midnight to midnight; snow recorded in inches, converted to approximate liquid equivalent (see below).

"A" designates that about 12.5 mm of rain fell between midnight and 8 AM; "B" designates that the first 12.5 mm of rain fell by 4 PM; "C" designates that the first 12.5 mm of rain fell later in the evening, by midnight (meaningful during beach season). T=trace amount of rain.

†Advisory/closure: Hempstead Harbor beaches were closed following half an inch or more of rain on 11 dates. Morgan Memorial Park, Sea Cliff Beach, North Hempstead Beach Park, Pryibil Beach, and Tappen Beach were closed for 11 dates: 7/10, 7/16, 7/17, 7/18, 7/19, 8/7, 8/13, 8/15, 8/16, 8/18, and 8/26.

Village Club at Sands Point and North Hempstead Beach Park (N) were not operational during this season. Crescent Beach remained closed all season.

††Elevated bacteria beach closures: Morgan Memorial Park was also closed for seven days due to elevated bacteria levels from 7/1 – 7/7.

*Sleet/rain mix or wet snow converted to approximate liquid equivalent in mm (5 in of wet snow approximately equal to 1 in liquid precipitate).

**Snow--powdery--converted to approximate liquid equivalent in mm (10 in of snow equal to approximately 1 in liquid precipitate).

2024 Partial Sea Cliff Precipitation Data

CSHH 2024 (JANUARY-APRIL) PRECIPITATION DATA FOR SEA CLIFF											
JAN	**mm**	**in**	**FEB**	**mm**	**in**	**MARCH**	**mm**	**in**	**APRIL**	**mm**	**in**
1	0.51	0.02	2	7.87	0.31	2	32.77	1.29	2	22.10	0.87
6*-7*	14.22	0.56	13*	1.27	0.05	5	9.40	0.37	3	33.78	1.33
9	37.59	1.48	17**	4.06	0.16	6-7	46.48	1.83	4	12.70	0.50
10	21.08	0.83	22	1.27	0.05	9	42.42	1.67	6	0.76	0.03
13	24.64	0.97	23	1.52	0.06	10	0.76	0.03	11	4.83	0.19
14T**	0.00	0.00	26	0.25	0.01	15	0.76	0.03	12	7.87	0.31
15**-16** *	11.68	0.46	27	14.73	0.58	20	1.27	0.05	14	1.52	0.06
18T**	0.00	0.00	28	6.60	0.26	23	95.00	3.74	15T	0.00	0.00
19**	2.29	0.09				27	1.27	0.05	17	1.27	0.05
23T	0.00	0.00				28	24.89	0.98	18	2.54	0.10
24-25	11.68	0.46				30	0.25	0.01	20	1.52	0.06
26	5.33	0.21					0.00		24	0.51	0.02
27	0.25	0.01					0.00		27T	0.00	0.00
28	25.40	1.00							28	5.33	0.21
29	4.83	0.19							30	2.03	0.08
30T**	0.00	0.00									
31T**	0.00	0.00									
TOTAL	**159.51**	**6.28**	**TOTAL**	**37.59**	**1.48**	**TOTAL**	**255.3**	**10.05**	**TOTAL**	**96.77**	**3.81**

Note: Precipitation recorded from midnight to midnight; snow recorded in inches, converted to approximate liquid equivalent (see below).

T=trace amount.

*Sleet/rain mix or wet snow converted to approximate liquid equivalent in mm (5 in of wet snow approximately equal to 1 in liquid precipitate).

**Snow--powdery--converted to approximate liquid equivalent in mm (10 in of snow equal to approximately 1 in liquid precipitate).

1997-2023 Monthly Rainfall Totals (mm)

	June	July	August	September	October	Total
2023	55.12	128.27	152.40	266.45	88.39	690.63
2022	96.77	96.52	50.80	151.13	141.99	537.21
2021	48.26	314.71	181.10	235.97	138.18	918.21
2020	46.48	141.99	116.33	114.05	175.77	594.62
2019	92.20	212.09	130.05	9.14	156.97	600.45
2018	75.95	103.89	147.32	158.75	112.27	598.18
2017	124.7	118.4	131.6	64.8	145.5	585.0
2016	36.6	134.1	141.9	75.9	147.1	535.6
2015	130.3	75.7	76.2	75.2	156.5	513.9
2014	81	78.5	93.5	59.5	112	424.5
2013	235	69	59	75.5	8.5	447
2012	175.5	140.5	140.5	117.5	92.5	666.5
2011	127.5	48.5	381.5	163	122	842.5
2010	50.5	103.5	61.5	97	146	458.5
2009	294	150.5	83	69	175	771.5
2008	79.5	91	205.5	177.5	118	671.5
2007	159.5	198.5	132.5	36.5	136	663
2006	262	148	89	105	166.5	770.5
2005	45	81	41	28.5	460.5	656
2004	95	214	91	310.5	40	750.5
2003	291.5	87	88	194.5	134	795
2002	180.5	22.5	175.5	116.5 (9/15-30)	180	675+
2001	167	70.5	165	94	19.5	516
2000	146	159	158	125	6	594
1999	31	21	135	323	92	602
1998	191	59	145	90	97	582
1997	47	232	141	84	27 (10/1-15)	531+

Appendix C

2023 Beach-Monitoring Bacteria Data

Village Club of Sands Point*

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
4/10/23	1.00	0.00
4/12/23	0.10	0.32
4/17/23	12.00	1.06
4/26/23	0.10	0.59
5/1/23	1.00	0.65
5/3/23	0.10	0.48
5/8/23	44.00	0.91
5/10/23	3.00	1.06
5/15/23	0.10	1.07
5/22/23	9.00	1.02
5/24/23	1.00	1.02
5/31/23	14.00	1.90
6/5/23	5.00	3.63
6/7/23	20.00	4.49
6/12/23	4.00	3.38
6/14/23	8.00	3.76
6/19/23	8.00	6.51
6/21/23	24.00	7.53
6/26/23	28.00	11.16
6/28/23	11.00	11.14
7/3/23	***601.00***	16.92
7/5/23	70.00	19.50
7/10/23	47.00	24.95
7/12/23	20.00	24.40
7/17/23	9.00	30.22
7/19/23	32.00	30.40
7/24/23	0.10	19.18
7/26/23	0.10	11.34
7/31/23	***200.00***	14.15
8/2/23	70.00	16.61
8/7/23	11.00	9.07
8/9/23	1.00	7.28
8/14/23	7.00	5.26
8/16/23	***300.00***	7.89
8/21/23	9.00	6.75
8/23/23	53.00	8.30
8/28/23	46.00	26.78
8/30/23	***240.00***	33.35

*Village Club at Sands Point is considered a "nonoperational" beach and is therefore not subject to preemptive or other closures. It is a historical testing site for the Nassau County Department of Health for which data continues to be collected.

Note for bacteria data for beaches: CFU refers to the number of colony forming units, or the number of bacterial cells in the water sample. Log Avg (log average for enterococci) refers to the running seasonal average of bacteria results at each location. Boldfaced, italicized values exceed the NYS beach closure standards of 104 CFU/100 ml for enterococci and 35 Log Avg.

2023 Beach-Monitoring Bacteria Data

North Hempstead Beach Park (N) (former Hempstead Harbor Beach)

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
04/10/23	0.10	0.00
04/12/23	0.10	0.10
04/17/23	0.10	0.10
04/26/23	2.00	0.21
05/01/23	1.00	0.29
05/03/23	0.10	0.24
05/08/23	32.00	0.49
05/10/23	6.00	0.67
05/15/23	0.10	0.87
05/17/23	5.00	1.08
05/22/23	27.00	2.18
05/24/23	1.00	2.00
05/31/23	0.10	1.44
06/05/23	***300.00***	4.09
06/07/23	15.00	4.72
06/12/23	0.10	2.23
06/14/23	5.00	2.44
06/19/24	0.10	2.23
06/21/23	6.00	2.49
06/26/23	2.00	2.01
06/28/23	7.00	2.31
07/03/23	31.00	4.37
07/05/23	59.00	5.67
07/10/23	27.00	3.90
07/12/23	5.00	4.00
07/17/23	24.00	7.17
07/19/23	22.00	8.02
07/24/23	0.10	8.28
07/26/23	0.10	5.32
07/31/23	41.00	7.22

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
08/02/23	14.00	7.72
08/07/23	7.00	5.22
08/09/23	2.00	4.74
08/14/23	18.00	4.50
08/16/23	***160.00***	6.44
08/21/23	10.00	5.10
08/23/23	4.00	4.97
08/28/23	74.00	15.99
08/30/23	52.00	18.00

2023 Beach-Monitoring Bacteria Data

North Hempstead Harbor Beach Park (S) (former Bar Beach)

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
4/10/23	0.10	0.00
4/12/23	0.10	0.10
4/17/23	***360.00***	1.53
4/24/23	0.10	0.77
4/26/23	0.10	0.51
5/1/23	0.10	0.39
5/3/23	0.10	0.32
5/8/23	7.00	0.47
5/10/23	1.00	0.51
5/15/23	7.00	1.07
5/17/23	4.00	1.24
5/22/23	7.00	0.80
5/24/23	2.00	0.88
5/31/23	0.10	1.12
6/5/23	81.00	3.49
6/7/23	17.00	4.17
6/12/23	0.10	2.93
6/14/23	3.00	2.94
6/19/23	9.00	2.91
6/21/23	2.00	2.80
6/26/23	3.00	2.62
6/28/23	14.00	3.16
7/3/23	9.00	5.21
7/5/23	27.00	6.14
7/10/23	25.00	4.81
7/12/23	10.00	5.18
7/17/23	7.00	8.82
7/19/23	21.00	9.61
7/24/23	2.00	9.69
7/26/23	0.10	6.13
7/31/23	45.00	7.56

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
8/2/23	3.00	6.89
8/7/23	6.00	5.66
8/9/23	43.00	6.93
8/14/23	41.00	7.03
8/16/23	90.00	9.07
8/21/23	15.00	9.00
8/23/23	39.00	10.42
8/28/23	10.00	20.87
8/30/23	***1320.00***	31.60
8/31/23	2.00	23.14

2023 Beach-Monitoring Bacteria Data

Tappen Beach

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
04/10/23	0.10	0.00
04/12/23	6.00	0.77
04/17/23	42.00	2.93
04/24/23	5.00	3.35
04/26/23	0.10	1.66
05/01/23	0.10	1.04
05/03/23	1.00	1.03
05/08/23	9.00	1.35
05/10/23	4.00	1.53
05/15/23	2.00	1.87
05/17/23	16.00	2.38
05/22/23	6.00	1.91
05/24/23	0.10	1.43
05/31/23	2.00	1.73
06/05/23	51.00	4.04
06/07/23	58.00	5.43
06/12/23	9.00	5.64
06/14/23	12.00	6.13
06/19/23	6.00	6.24
06/21/23	2.00	5.50
06/26/23	21.00	10.61
06/28/23	57.00	12.79
07/03/23	90.00	19.53
07/05/23	57.00	21.74
07/10/23	55.00	19.65
07/12/23	0.10	11.59
07/17/23	11.00	11.81
07/19/23	1.00	9.22
07/24/23	1.00	8.96
07/26/23	1.00	7.19
07/31/23	1.00	4.08

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
08/02/23	18.00	4.73
08/07/23	13.00	2.89
08/09/23	32.00	3.68
08/14/23	21.00	4.93
08/16/23	***430.00***	7.71
08/21/23	11.00	9.68
08/23/23	4.00	8.86
08/28/23	17.00	15.46
08/30/23	10.00	14.80

2023 Beach-Monitoring Bacteria Data

Sea Cliff Beach

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
04/10/23	0.10	0.00
04/12/23	0.10	0.10
04/17/23	7.00	0.41
04/24/23	0.10	0.29
04/26/23	0.10	0.23
05/01/23	0.10	0.20
05/03/23	0.10	0.18
05/08/23	1.00	0.23
05/10/23	1.00	0.27
05/15/23	0.10	0.30
05/17/23	3.00	0.39
05/22/23	11.00	0.41
05/24/23	2.00	0.48
05/31/23	0.10	0.57
06/05/23	72.00	1.62
06/07/23	95.00	2.55
06/12/23	15.00	4.02
06/14/23	1.00	3.44
06/19/23	4.00	5.55
06/21/23	16.00	6.24
06/26/23	55.00	8.80
06/28/23	18.00	9.53
07/03/23	58.00	19.33
07/05/23	***230.00***	24.76
07/06/23	11.00	20.52
07/10/23	48.00	19.17
07/12/23	0.10	11.89
07/17/23	5.00	13.64
07/19/23	3.00	11.89
07/24/23	0.10	7.98
07/26/23	3.00	7.30
07/31/23	3.00	4.99
08/02/23	3.00	4.76
08/07/23	100.00	3.00
08/09/23	39.00	3.87
08/14/23	4.00	4.41
08/16/23	***200.00***	6.46
08/21/23	13.00	7.82
08/23/23	0.10	5.06
08/28/23	23.00	9.81
08/30/23	10.00	9.83
09/13/23	9.00	8.03

2023 Beach-Monitoring Bacteria Data

Morgan Memorial Park

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
4/11/23	0.10	0.00
4/18/23	0.10	0.10
4/25/23	0.10	0.10
5/2/23	0.10	0.10
5/8/23	4.00	0.21
5/9/23	0.10	0.18
5/10/23	1.00	0.24
5/15/23	1.00	0.33
5/16/23	5.00	0.46
5/17/23	0.10	0.39
5/22/23	3.00	0.57
5/23/23	0.10	0.48
5/24/23	0.10	0.41
5/30/23	1.00	0.51
5/31/23	0.10	0.44
6/5/23	21.00	0.69
6/6/23	55.00	0.97
6/7/23	***290.00***	1.46
6/12/23	16.00	2.12
6/13/23	4.00	2.22
6/14/23	2.00	2.21
6/20/23	2.00	2.82
6/21/23	3.00	2.84
6/26/23	34.00	6.50
6/27/23	5.00	6.36
6/28/23	***310.00***	8.58
6/30/23	***240.00***	13.07
7/3/23	***1300.00***	27.09
7/5/23	***200.00***	31.25
7/6/23	8.00	29.17
7/7/23	26.00	27.65
7/10/23	62.00	24.76
7/11/23	14.00	23.84
7/12/23	10.00	22.58
7/17/23	***130.00***	***35.28***
7/18/23	***170.00***	***39.18***
7/19/23	47.00	***39.63***
7/24/23	1.00	***44.94***
7/25/23	3.00	***37.95***
7/26/23	1.00	30.64
7/31/23	***170.00***	28.63
8/1/23	7.00	26.06
8/2/23	18.00	25.47
8/7/23	13.00	16.65
8/8/23	14.00	16.44
8/9/23	26.00	16.95
8/14/23	23.00	16.60
8/15/23	***1400.00***	22.79
8/16/23	70.00	24.56
8/21/23	13.00	16.86
8/22/23	5.00	15.46
8/23/23	3.00	13.86
8/28/23	17.00	23.73
8/29/23	0.10	16.06
8/30/23	58.00	17.49

2023 Beach-Monitoring Bacteria Data

Crescent Beach

Fecal Coliform			
Date	**CFU/100 ml**	**Log Avg**	**Location**
4/11/23	0.10	0.00	CENTER
4/11/23	0.10	0.10	LEFT
4/11/23	0.10	0.10	RIGHT
4/18/23	0.10	0.10	CENTER
4/18/23	10.00	0.25	LEFT
4/18/23	3.00	0.38	RIGHT
4/25/23	0.10	0.31	CENTER
4/25/23	0.10	0.27	LEFT
4/25/23	0.10	0.24	RIGHT
5/2/23	16.00	0.37	CENTER
5/2/23	49.00	0.58	LEFT
5/2/23	0.10	0.50	RIGHT
5/8/23	5.00	0.60	CENTER
5/8/23	8.00	0.72	LEFT
5/8/23	42.00	0.94	RIGHT
5/9/23	8.00	1.07	CENTER
5/9/23	250.00	1.48	LEFT
5/9/23	4.00	1.56	RIGHT
5/10/23	3.00	1.62	CENTER
5/10/23	4.00	1.69	LEFT
5/10/23	17.00	1.89	RIGHT
5/15/23	21.00	3.41	CENTER
5/15/23	14.00	3.66	LEFT
5/15/23	19.00	3.96	RIGHT
5/16/23	12.00	4.17	CENTER
5/16/23	100.00	4.78	LEFT
5/16/23	6.00	4.83	RIGHT
5/17/23	5.00	4.84	CENTER
5/17/23	8.00	4.93	LEFT
5/17/23	7.00	5.00	RIGHT
5/22/23	1.00	5.44	CENTER
5/22/23	2.00	5.23	LEFT
5/22/23	2.00	5.05	RIGHT
5/23/23	0.10	4.39	CENTER
5/23/23	2.00	4.27	LEFT
5/23/23	0.10	3.77	RIGHT

Enterococci			
Date	**CFU/100 ml**	**Log Avg**	**Location**
4/11/23	0.10	0.00	CENTER
4/11/23	0.10	0.10	LEFT
4/11/23	0.10	0.10	RIGHT
4/18/23	0.10	0.10	CENTER
4/18/23	0.10	0.10	LEFT
4/18/23	1.00	0.15	RIGHT
4/25/23	0.10	0.14	CENTER
4/25/23	0.10	0.13	LEFT
4/25/23	0.10	0.13	RIGHT
5/2/23	0.10	0.13	CENTER
5/2/23	40.00	0.21	LEFT
5/2/23	0.10	0.20	RIGHT
5/8/23	4.00	0.25	CENTER
5/8/23	17.00	0.34	LEFT
5/8/23	68.00	0.48	RIGHT
5/9/23	4.00	0.55	CENTER
5/9/23	***420.00***	0.82	LEFT
5/9/23	0.10	0.73	RIGHT
5/10/23	12.00	0.84	CENTER
5/10/23	6.00	0.93	LEFT
5/10/23	24.00	1.08	RIGHT
5/15/23	14.00	1.81	CENTER
5/15/23	25.00	2.06	LEFT
5/15/23	18.00	2.28	RIGHT
5/16/23	3.00	2.31	CENTER
5/16/23	***330.00***	2.87	LEFT
5/16/23	18.00	3.10	RIGHT
5/17/23	0.10	2.70	CENTER
5/17/23	3.00	2.71	LEFT
5/17/23	1.00	2.61	RIGHT
5/22/23	4.00	3.58	CENTER
5/22/23	2.00	3.50	LEFT
5/22/23	2.00	3.43	RIGHT
5/23/23	4.00	3.45	CENTER
5/23/23	3.00	3.43	LEFT
5/23/23	4.00	3.45	RIGHT

2023 Beach-Monitoring Bacteria Data

Crescent Beach (cont.)

Fecal Coliform			
Date	CFU/100 ml	Log Avg	Location
5/24/23	28.00	4.02	CENTER
5/24/23	15.00	4.19	LEFT
5/24/23	20.00	4.39	RIGHT
5/30/23	3.00	6.26	CENTER
5/30/23	3.00	6.12	LEFT
5/30/23	15.00	6.28	RIGHT
5/31/23	21.00	6.51	CENTER
5/31/23	2.00	6.30	LEFT
5/31/23	10.00	6.38	RIGHT
6/5/23	210.00	7.32	CENTER
6/5/23	340.00	8.17	LEFT
6/5/23	120.00	8.80	RIGHT
6/6/23	210.00	9.59	CENTER
6/6/23	53.00	10.03	LEFT
6/6/23	110.00	10.67	RIGHT
6/7/23	56.00	11.12	CENTER
6/7/23	440.00	12.16	LEFT
6/7/23	57.00	12.62	RIGHT
6/12/23	5.00	12.67	CENTER
6/12/23	3.00	12.16	LEFT
6/12/23	11.00	12.13	RIGHT
6/13/23	28.00	12.41	CENTER
6/13/23	140.00	13.22	LEFT
6/13/23	27.00	13.47	RIGHT
6/14/23	6.00	13.20	CENTER
6/14/23	5.00	12.89	LEFT
6/14/23	20.00	13.03	RIGHT
6/20/23	1.00	12.06	CENTER
6/20/23	5.00	11.76	LEFT
6/20/23	22.00	11.97	RIGHT
6/21/23	5.00	11.69	CENTER
6/21/23	23.00	11.90	LEFT
6/21/23	20.00	12.06	RIGHT
6/26/23	8.00	19.88	CENTER
6/26/23	5.00	19.04	LEFT
6/26/23	2.00	17.78	RIGHT

Enterococci			
Date	CFU/100 ml	Log Avg	Location
5/24/23	46.00	3.75	CENTER
5/24/23	41.00	4.04	LEFT
5/24/23	20.00	4.24	RIGHT
5/30/23	1.00	5.82	CENTER
5/30/23	1.00	5.51	LEFT
5/30/23	11.00	5.63	RIGHT
5/31/23	26.00	5.89	CENTER
5/31/23	0.10	5.24	LEFT
5/31/23	10.00	5.33	RIGHT
6/5/23	33.00	6.70	CENTER
6/5/23	80.00	7.19	LEFT
6/5/23	58.00	7.62	RIGHT
6/6/23	***150.00***	8.26	CENTER
6/6/23	70.00	8.74	LEFT
6/6/23	60.00	9.18	RIGHT
6/7/23	34.00	9.49	CENTER
6/7/23	***440.00***	10.42	LEFT
6/7/23	58.00	10.85	RIGHT
6/12/23	10.00	10.97	CENTER
6/12/23	15.00	11.07	LEFT
6/12/23	43.00	11.49	RIGHT
6/13/23	5.00	11.24	CENTER
6/13/23	42.00	11.64	LEFT
6/13/23	5.00	11.39	RIGHT
6/14/23	0.10	10.12	CENTER
6/14/23	1.00	9.56	LEFT
6/14/23	18.00	9.71	RIGHT
6/20/23	1.00	9.95	CENTER
6/20/23	9.00	9.92	LEFT
6/20/23	6.00	9.78	RIGHT
6/21/23	5.00	9.61	CENTER
6/21/23	49.00	10.03	LEFT
6/21/23	26.00	10.28	RIGHT
6/26/23	1.00	10.77	CENTER
6/26/23	1.00	10.00	LEFT
6/26/23	3.00	9.64	RIGHT

2023 Beach-Monitoring Bacteria Data

Crescent Beach (cont.)

Fecal Coliform			
Date	**CFU/100 ml**	**Log Avg**	**Location**
6/27/23	1.00	16.34	CENTER
6/27/23	5.00	15.79	LEFT
6/27/23	4.00	15.20	RIGHT
6/28/23	1.00	14.12	CENTER
6/28/23	24.00	14.32	LEFT
6/28/23	57.00	14.84	RIGHT
7/3/23	230.00	18.76	CENTER
7/3/23	70.00	19.48	LEFT
7/3/23	80.00	20.26	RIGHT
7/5/23	70.00	20.95	CENTER
7/5/23	2.00	19.70	LEFT
7/5/23	37.00	20.02	RIGHT
7/10/23	136.00	12.24	CENTER
7/10/23	82.00	12.99	LEFT
7/10/23	47.00	13.51	RIGHT
7/11/23	5.00	13.12	CENTER
7/11/23	1.00	12.19	LEFT
7/11/23	25.00	12.43	RIGHT
7/12/23	60.00	12.97	CENTER
7/12/23	47.00	13.42	LEFT
7/12/23	52.00	13.89	RIGHT
7/17/23	310.00	15.66	CENTER
7/17/23	220.00	17.01	LEFT
7/17/23	360.00	18.66	RIGHT
7/18/23	33.00	18.98	CENTER
7/18/23	70.00	19.70	LEFT
7/18/23	39.00	20.07	RIGHT
7/19/23	120.00	21.07	CENTER
7/19/23	160.00	22.22	LEFT
7/19/23	90.00	23.03	RIGHT
7/24/23	11.00	27.19	CENTER
7/24/23	36.00	27.41	LEFT
7/24/23	6.00	26.28	RIGHT
7/25/23	5.00	25.13	CENTER
7/25/23	60.00	25.71	LEFT
7/25/23	8.00	24.95	RIGHT

Enterococci			
Date	**CFU/100 ml**	**Log Avg**	**Location**
6/27/23	1.00	9.02	CENTER
6/27/23	0.10	7.93	LEFT
6/27/23	0.10	7.02	RIGHT
6/28/23	1.00	6.66	CENTER
6/28/23	11.00	6.75	LEFT
6/28/23	29.00	7.01	RIGHT
7/3/23	***140.00***	9.14	CENTER
7/3/23	***310.00***	10.11	LEFT
7/3/23	***460.00***	11.24	RIGHT
7/5/23	***180.00***	12.11	CENTER
7/5/23	4.00	11.77	LEFT
7/5/23	12.00	11.77	RIGHT
7/10/23	76.00	7.28	CENTER
7/10/23	***130.00***	7.96	LEFT
7/10/23	37.00	8.34	RIGHT
7/11/23	3.00	8.10	CENTER
7/11/23	1.00	7.63	LEFT
7/11/23	26.00	7.89	RIGHT
7/12/23	70.00	8.37	CENTER
7/12/23	41.00	8.73	LEFT
7/12/23	29.00	9.00	RIGHT
7/17/23	***220.00***	11.16	CENTER
7/17/23	90.00	11.91	LEFT
7/17/23	***220.00***	13.01	RIGHT
7/18/23	16.00	13.09	CENTER
7/18/23	***180.00***	14.10	LEFT
7/18/23	44.00	14.56	RIGHT
7/19/23	90.00	15.29	CENTER
7/19/23	***410.00***	16.67	LEFT
7/19/23	34.00	16.98	RIGHT
7/24/23	0.10	16.54	CENTER
7/24/23	14.00	16.46	LEFT
7/24/23	1.00	15.23	RIGHT
7/25/23	1.00	14.15	CENTER
7/25/23	6.00	13.84	LEFT
7/25/23	1.00	12.93	RIGHT

2023 Beach-Monitoring Bacteria Data

Crescent Beach (cont.)

Fecal Coliform			
Date	**CFU/100 ml**	**Log Avg**	**Location**
7/26/23	160.00	26.14	CENTER
7/26/23	320.00	27.78	LEFT
7/26/23	320.00	29.45	RIGHT
7/31/23	28.00	46.86	CENTER
7/31/23	68.00	47.36	LEFT
7/31/23	72.00	47.91	RIGHT
8/1/23	15.00	46.43	CENTER
8/1/23	14.00	44.99	LEFT
8/1/23	29.00	44.49	RIGHT
8/2/23	6.00	42.31	CENTER
8/2/23	9.00	40.75	LEFT
8/2/23	55.00	41.04	RIGHT
8/7/23	950.00	44.27	CENTER
8/7/23	860.00	47.87	LEFT
8/7/23	***1940.00***	52.64	RIGHT
8/8/23	29.00	51.86	CENTER
8/8/23	41.00	51.56	LEFT
8/8/23	24.00	50.63	RIGHT
8/9/23	5.00	47.98	CENTER
8/9/23	7.00	45.92	LEFT
8/9/23	10.00	44.39	RIGHT
8/14/23	5.00	46.94	CENTER
8/14/23	8.00	44.80	LEFT
8/14/23	15.00	43.56	RIGHT
8/15/23	300.00	45.71	CENTER
8/15/23	750.00	48.94	LEFT
8/15/23	1000.00	52.59	RIGHT
8/16/23	127.00	53.68	CENTER
8/16/23	145.00	54.90	LEFT
8/16/23	136.00	56.02	RIGHT
8/21/23	11.00	44.90	CENTER
8/21/23	10.00	43.16	LEFT
8/21/23	130.00	44.40	RIGHT
8/22/23	14.00	43.14	CENTER
8/22/23	4.00	40.71	LEFT
8/22/23	10.00	39.37	RIGHT

Enterococci			
Date	**CFU/100 ml**	**Log Avg**	**Location**
7/26/23	28.00	13.19	CENTER
7/26/23	70.00	13.73	LEFT
7/26/23	16.00	13.78	RIGHT
7/31/23	23.00	26.22	CENTER
7/31/23	66.00	26.92	LEFT
7/31/23	90.00	27.84	RIGHT
8/1/23	2.00	25.93	CENTER
8/1/23	2.00	24.24	LEFT
8/1/23	11.00	23.75	RIGHT
8/2/23	0.10	20.72	CENTER
8/2/23	9.00	20.30	LEFT
8/2/23	6.00	19.72	RIGHT
8/7/23	***1940.00***	17.99	CENTER
8/7/23	***1120.00***	20.06	LEFT
8/7/23	***4100.00***	22.99	RIGHT
8/8/23	23.00	22.99	CENTER
8/8/23	29.00	23.12	LEFT
8/8/23	12.00	22.76	RIGHT
8/9/23	***430.00***	24.37	CENTER
8/9/23	100.00	25.16	LEFT
8/9/23	16.00	24.91	RIGHT
8/14/23	2.00	23.55	CENTER
8/14/23	4.00	22.48	LEFT
8/14/23	23.00	22.49	RIGHT
8/15/23	***1190.00***	24.84	CENTER
8/15/23	***1120.00***	27.25	LEFT
8/15/23	***1680.00***	30.06	RIGHT
8/16/23	***180.00***	31.34	CENTER
8/16/23	***240.00***	32.83	LEFT
8/16/23	***160.00***	34.00	RIGHT
8/21/23	23.00	26.14	CENTER
8/21/23	1.00	23.99	LEFT
8/21/23	70.00	24.65	RIGHT
8/22/23	11.00	24.16	CENTER
8/22/23	14.00	23.84	LEFT
8/22/23	5.00	22.97	RIGHT

2023 Beach-Monitoring Bacteria Data

Crescent Beach (cont.)

Fecal Coliform			
Date	**CFU/100 ml**	**Log Avg**	**Location**
8/23/23	3.00	37.08	CENTER
8/23/23	2.00	34.70	LEFT
8/23/23	9.00	33.68	RIGHT
8/28/23	11.00	32.22	CENTER
8/28/23	9.00	31.16	LEFT
8/28/23	32.00	31.18	RIGHT
8/29/23	45.00	31.46	CENTER
8/29/23	38.00	31.61	LEFT
8/29/23	30.00	31.57	RIGHT
8/30/23	31.00	31.56	CENTER
8/30/23	15.00	31.03	LEFT
8/30/23	530.00	33.05	RIGHT
9/6/23	12.00	34.82	CENTER
9/6/23	4.00	32.89	LEFT
9/6/23	10.00	31.90	RIGHT
9/13/23	182.00	27.68	CENTER
9/13/23	280.00	29.76	LEFT
9/13/23	191.00	31.48	RIGHT
9/20/23	0.10	17.23	CENTER
9/20/23	10.00	16.87	LEFT
9/20/23	7.00	16.33	RIGHT

Enterococci			
Date	**CFU/100 ml**	**Log Avg**	**Location**
8/23/23	0.10	20.24	CENTER
8/23/23	1.00	18.91	LEFT
8/23/23	0.10	16.83	RIGHT
8/28/23	9.00	23.46	CENTER
8/28/23	3.00	22.23	LEFT
8/28/23	25.00	22.29	RIGHT
8/29/23	1.00	20.63	CENTER
8/29/23	1.00	19.16	LEFT
8/29/23	0.10	16.91	RIGHT
8/30/23	51.00	17.35	CENTER
8/30/23	14.00	17.26	LEFT
8/30/23	***1120.00***	18.94	RIGHT
9/6/23	0.10	21.06	CENTER
9/6/23	0.10	18.30	LEFT
9/6/23	0.10	16.01	RIGHT
9/13/23	35.00	8.51	CENTER
9/13/23	33.00	8.88	LEFT
9/13/23	38.00	9.28	RIGHT
9/20/23	0.10	3.15	CENTER
9/20/23	7.00	3.25	LEFT
9/20/23	1.00	3.11	RIGHT

Note that "Left," "Right," and "Center" indicate sample locations on Crescent Beach (standing on Crescent Beach looking out toward Long Island Sound).
Left: closest to the stream
Center: moving northeast from "Left," between the stream and Webb Institute
Right: closest to Webb Institute

2023 Beach-Monitoring Bacteria Data

Pryibil Beach

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
4/11/23	0.10	0.00
4/18/23	8.00	0.89
4/25/23	0.10	0.43
5/2/23	0.10	0.30
5/8/23	15.00	0.65
5/9/23	14.00	1.09
5/10/23	1.00	1.08
5/15/23	11.00	2.11
5/16/23	0.10	1.44
5/17/23	14.00	1.85
5/22/23	1.00	1.47
5/23/23	1.00	1.42
5/24/23	0.10	1.11
5/30/23	6.00	1.61
5/31/23	3.00	1.70
6/5/23	14.00	2.57
6/6/23	1.00	2.39
6/7/23	0.10	1.90
6/12/23	1.00	1.36
6/13/23	0.10	1.11
6/14/23	0.10	0.93
6/20/23	3.00	0.81
6/21/23	6.00	0.94
6/26/23	10.00	1.41
6/27/23	2.00	1.46
6/28/23	8.00	1.66
7/3/23	3.00	1.49
7/5/23	8.00	1.70
7/10/23	1.00	1.81
7/11/23	2.00	1.83
7/12/23	2.00	1.84
7/17/23	1.00	3.12
7/18/23	10.00	3.44
7/19/23	9.00	3.71
7/24/23	80.00	4.68
7/25/23	1.00	4.16
7/26/23	0.10	3.19
7/31/23	***210.00***	3.95
8/1/23	12.00	4.30
8/2/23	20.00	4.80
8/7/23	2.00	4.48
8/8/23	1.00	4.02
8/9/23	0.10	3.14
8/14/23	30.00	4.38
8/15/23	***1280.00***	6.57
8/16/23	***180.00***	8.19
8/21/23	70.00	11.10
8/22/23	38.00	12.12
8/23/23	1.00	10.27
8/28/23	***340.00***	19.60
8/29/23	32.00	20.30
8/30/23	***220.00***	23.79
8/31/23	1.00	16.66
9/6/23	0.10	11.68
9/13/23	36.00	27.12
9/20/23	0.10	8.63

2001 – 2023 Average Indicator Bacteria Data for Beaches

The tables in this section display the average values for indicator bacteria for Hempstead Harbor Beaches from 2001-2023. The current year is displayed below, and the previous years follow.

2023

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Pryibil Beach	Crescent Beach
April	Enterococci	3.30	0.58	72.08	10.64	1.48	0.10	2.73	0.20
May	Enterococci	9.03	8.03	3.14	4.47	2.04	1.30	5.53	32.85
June	Enterococci	13.50	41.90	16.14	27.00	34.50	81.83	4.12	38.34
July	Enterococci	108.80	23.24	16.23	24.12	36.12	153.00	27.26	87.20
August	Enterococci	81.89	37.89	156.90	61.78	43.57	119.08	148.47	327.34
September	Enterococci	—	—	—	—	9.00	—	12.07	12.71
Season Averages	Enterococci	50.25	24.62	54.46	27.06	25.34	87.40	48.40	117.89

2001 – 2023 Average Indicator Bacteria Data for Beaches

2022

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	57.04	1.92	3.05	57.02	4.58	15.03	156.01
May	Enterococci	2.08	2.72	1.07	9.53	8.72	1.07	161.06
June	Enterococci	7.72	3.82	1.94	52.13	0.82	3.04	56.12
July	Enterococci	49.16	19.29	25.60	40.00	26.38	76.68	382.29
August	Enterococci	85.34	54.33	159.50	44.44	15.41	15.38	365.69
September	Enterococci	—	—	—	—	29.67	—	427.78
Season Averages	Enterococci	42.21	18.55	47.80	41.80	12.89	26.03	260.25

2021

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	14.42	24.02	9.02	19.33	1.88	0.40	10.69
May	Enterococci	5.71	4.75	13.13	9.14	7.16	14.93	96.31
June	Enterococci	20.22	4.33	3.57	46.01	9.34	36.36	85.53
July	Enterococci	152.38	67.89	77.78	72.56	117.56	77.29	279.42
August	Enterococci	165.78	69.67	46.44	163.40	107.50	56.73	178.76
September	Enterococci	—	—	—	—	7.70	1.00**	52.83
Season Averages	Enterococci	79.08	35.59	31.93	68.28	51.31	44.25	143.08

***Only one data point collected.*

2001 – 2023 Average Indicator Bacteria Data for Beaches

2020

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	—	—	—	—	—	—	—
May	Enterococci	0.10**	17.03	10.40	2.03	0.10	1.05	1.70
June	Enterococci	14.79	4.38	4.79	8.79	13.02	9.59	69.27
July	Enterococci	106.46	13.24	6.90	15.56	10.68	28.94	16.64
August	Enterococci	21.22	31.01	84.63	6.02	3.01	17.32	172.07
September	Enterococci	12.00**	19.00**	21.00	26.00**	96.28	1.55	10.35
Season Averages	Enterococci	48.38	15.89	27.19	9.85	18.41	16.15	71.87

2019

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	30.47	29.34	45.49	30.17	1.50	0.33	0.73
May	Enterococci	7.55	6.66	2.18	8.03	2.18	2.14	9.26
June	Enterococci	101.14	12.38	10.39	27.01	20.76	112.10	491.37
July	Enterococci	174.20	75.40	46.10	43.30	41.00	108.65	69.14
August	Enterococci	53.89	122.25	44.67	13.25	26.68	45.81	55.97
September	Enterococci	—	—	—	—	—	—	6.90
Season Averages	Enterococci	83.10	50.97	30.52	25.13	20.58	66.14	131.46

***Only one data point collected.*

2001 – 2023 Average Indicator Bacteria Data for Beaches

2018

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	3.64	27.47	4.20	39.76	27.64	1.37	0.73
May	Enterococci	8.31	8.93	1.94	2.68	5.04	1.58	8.36
June	Enterococci	4.93	12.64	25.29	19.16	10.51	25.90	45.84
July	Enterococci	51.91	51.63	7.76	12.65	14.03	37.43	426.19
August	Enterococci	42.17	124.67	14.36	11.79	19.89	13.75	97.82
September	Enterococci	—	—	—	—	—	—	55.09
Season Averages	Enterococci	22.20	45.07	10.71	17.21	15.42	16.00	105.67

2017

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	3.38	11.57	10.17	10.05	1.90	1.40	32.03
May	Enterococci	14.46	14.68	37.80	13.24	20.26	7.96	29.94
June	Enterococci	17.01	56.89	10.51	35.02	19.53	42.08	40.48
July	Enterococci	95.13	71.90	44.78	105.84	14.89	18.52	259.23
August	Enterococci	11.33	12.02	15.10	18.27	52.28	178.44	164.89
September	Enterococci	—	—	—	59.75	—	—	65.33
Season Averages	Enterococci	30.36	34.44	24.73	44.25	24.63	60.41	111.43

2001 – 2023 Average Indicator Bacteria Data for Beaches

2016

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	0.58	0.25	0.57	0.88	0.57	63.67	0.92
May	Enterococci	24.17	7.05	10.16	4.89	2.30	10.43	76.97
June	Enterococci	4.58	5.58	2.91	6.57	622.72**	16.37	614.04
July	Enterococci	12.71	9.30	6.86	3.44	6.31	7.28	79.28
August	Enterococci	113.31	34.42	36.48	32.22	29.46	69.47	50.57
September	Enterococci	—	—	—	—	—	—	10.70
Season Averages	Enterococci	36.82	12.94	13.66	11.25	157.55	32.54	172.69

**June monthly average is highly influenced by a single reading that may be an anomaly. Excluding this reading the average for June is 25.13 CFU/100ml and the season average is 15.03 CFU/100ml.

2015

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	0.26	1.28	1.66	24.46	10.62	1.26	2.79
May	Enterococci	27.44	8.00	19.03	23.87	22.47	24.29	12.76
June	Enterococci	680.51	257.39	60.24	68.33	26.67	80.87	86.57
July	Enterococci	20.90	17.69	34.81	18.01	15.34	21.37	28.41
August	Enterococci	12.13	7.46	7.92	4.76	26.44	36.17	15.92
September	Enterococci	4.00**	11.00**	8.00**	0.10**	4.00**	1.00**	6.47
Season Averages	Enterococci	152.28	60.48	27.10	28.33	20.76	38.05	32.65

**Only one data point collected in September.

2001 – 2023 Average Indicator Bacteria Data for Beaches

2014

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	20.83	16.05	7.20	8.85	7.55	14.84	224.55
May	Enterococci	223.16	39.91	34.31	37.41	10.33	14.57	9.43
June	Enterococci	103.79	221.71	91.92	74.00	395.65	78.67	470.85
July	Enterococci	8.02	13.68	17.22	24.44	31.44	865.13	78.19
August	Enterococci	139.26	83.51	74.58	96.75	125.79	41.32	461.83
September	Enterococci	—	—	—	—	—	—	15.02
Season Averages	Enterococci	97.63	84.60	50.49	50.89	140.11	263.23	238.04

2013

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	2.55	1.30	22.80	8.03	6.80	2.05	2.13
May	Enterococci	20.03	10.57	38.76	23.90	20.38	25.51	17.39
June	Enterococci	36.38	6.65	73.12	79.33	20.88	40.62	53.47
July	Enterococci	63.00	21.75	5.11	10.42	5.00	51.35	87.59
August	Enterococci	4.13	7.13	16.13	19.01	15.75	18.08	23.53
September	Enterococci	—	—	—	—	—	—	129.63
Season Averages	Enterococci	29.85	11.00	31.78	30.61	14.03	32.67	55.43

2001 – 2023 Average Indicator Bacteria Data for Beaches

2012

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	2.73	9.48	3.63	9.90	12.17	16.33	142.11
May	Enterococci	568.26	21.00	11.13	16.78	12.14	5.37	391.34
June	Enterococci	148.00	72.14	98.01	60.26	76.88	37.58	122.06
July	Enterococci	81.38	26.01	8.89	8.64	6.40	12.85	271.13
August	Enterococci	737.67	199.56	53.22	24.67	50.79	32.01	134.05
Season Averages	Enterococci	334.27	73.59	36.22	24.42	32.64	21.65	223.67

2011

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	6.50	20.75	92.50	31.60	14.20	2.67	12.89
May	Enterococci	410.40	40.88	89.63	325.63	48.51	49.50	458.09
June	Enterococci	22.60	24.11	72.30	10.46	29.11	103.07	209.16
July	Enterococci	74.50	113.90	63.30	13.44	19.59	54.24	50.28
August	Enterococci	21.22	49.23	28.41	7.52	19.81	63.44	199.22
Season Averages	Enterococci	122.96	52.14	64.93	77.60	27.14	65.64	223.31

2001 – 2023 Average Indicator Bacteria Data for Beaches

2010

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	6.82	9.42	12.44	22.60	2.24	0.10	24.22
May	Enterococci	17.88	14.50	8.14	30.89	23.65	42.01	338.19
June	Enterococci	94.37	12.48	17.02	14.01	56.85	87.34	78.69
July	Enterococci	65.00	19.22	14.11	88.23	54.55	76.10	286.52
August	Enterococci	104.34	89.23	77.12	44.13	159.64	86.84	113.02
September	Enterococci	—	7.00**	13.00**	1.00**	11.00**	0.10**	369.83
Season Averages	Enterococci	65.22	29.61	26.22	40.19	67.48	68.40	208.47

** Only one data point collected in September.

2009

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach
April	Enterococci	2.20	1.52	1.53	2.52	9.70	3.73	4.03
May	Enterococci	6.78	5.16	4.14	4.03	5.78	3.74	20.29
June	Enterococci	104.24	47.22	290.88	247.31	21.46	23.86	634.65
July	Enterococci	31.03	102.89	206.46	23.24	26.62	46.34	231.47
August	Enterococci	84.00	86.24	16.82	7.37	70.36	79.14	282.44
September	Enterococci	4.00**	120**	90.00**	0.10**	11.00**	3.00**	19.86
Season Averages*	Enterococci	48.69	54.70	109.23	65.02	29.97	40.35	290.61

*Average of monthly averages
**Only one data point collected in September.

2001 – 2023 Average Indicator Bacteria Data for Beaches

2008[1]

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach
April	Enterococci	0.42	3.53	14.70	3.52	1.72
May	Enterococci	26.04	5.15	33.75	18.65	68.13
June	Enterococci	8.42	77.31	23.81	29.80	54.40
July	Enterococci	85.59	13.41	23.61	47.60	97.41
August	Enterococci	161.00	11.88	427.56	28.51	65.88
Season Averages*	Enterococci	56.29	22.26	104.69	25.62	57.51

*Average of monthly averages

[1]First year in which enterococci was the only indicator bacteria monitored.

2007

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach
April	Enterococci	7.62	8.82	15.02	35.8	73.42
	Fecal Coliform	**8.82**	**14.22**	**12.42**	**89**	**5.64**
May	Enterococci	16.22	35.91	26.36	43.92	9.49
	Fecal Coliform	**29.36**	**157**	**84.68**	**49.89**	**17.8**
June	Enterococci	38.39	45.11	46.44	14.89	10.57
	Fecal Coliform	**27.38**	**438.56**	**219**	**130.67**	**73.33**
July	Enterococci	143.89	51.33	36.4	16.4	10.52
	Fecal Coliform	**890.25**	**877**	**581**	**519.6**	**193.70**
August	Enterococci	297	188.44	68.56	17.78	72.78
	Fecal Coliform	**166.11**	**1173**	**272.8**	**248.44**	**358.33**
Season Averages*	Enterococci	100.62	65.92	38.56	25.76	35.35
	Fecal Coliform	**224.38**	**531.96**	**233.9**	**207.52**	**129.76**

*Average of monthly averages

2001 – 2023 Average Indicator Bacteria Data for Beaches

2006

	Units in CFU/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach
April	Enterococci	0.1	0.1	0.1	2	0.1
	Fecal Coliform	**7**	**0.6**	**1**	**5**	**0.6**
May	Enterococci	7	16	35	333	73
	Fecal Coliform	**16**	**9**	**100**	**20**	**14**
June	Enterococci	6	27	30	33	12
	Fecal Coliform	**9**	**98**	**107**	**73**	**68**
July	Enterococci	68	46	40	35	47
	Fecal Coliform	**259**	**567**	**154**	**150**	**277**
August	Enterococci	120	46	76	11	65
	Fecal Coliform	**106**	**97**	**100**	**94**	**51**
Season Averages*	Enterococci	40	27	36	83	39
	Fecal Coliform	**79**	**151**	**92**	**69**	**82**

*Average of monthly averages

2005

	Units in MPN/100 mlS	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach
April	Enterococci	1	5	33	12	1
	Fecal Coliform	**12**	**60**	**289**	**19**	**43**
May	Enterococci	8	29	33	19	13
	Fecal Coliform	**15**	**89**	**120.23**	**21**	**18**
June	Enterococci	9	20	9	5	3
	Fecal Coliform	**77**	**330**	**118**	**87**	**86**
July	Enterococci	17	26	6	15	39
	Fecal Coliform	**176**	**561**	**159**	**472**	**596**
August	Enterococci	186	50	79	20	18
	Fecal Coliform	**265**	**166**	**256**	**346**	**239**
Season Averages*	Enterococci	44.2	26	32	14.2	14.8
	Fecal Coliform	**109**	**241**	**188**	**189**	**196**

*Average of monthly averages

2001 – 2023 Average Indicator Bacteria Data for Beaches

2004

	Units in MPN/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach
April	Total Coliform	57	76	36	265	161
	Fecal Coliform	**4**	**71**	**29**	**66**	**25**
May	Total Coliform	140	1137	1910	851	22029
	Fecal Coliform	**46**	**141**	**822**	**210**	**3859**
June	Total Coliform	168	1179	560	701	864
	Fecal Coliform	**44**	**615**	**167**	**557**	**298**
July	Total Coliform	146	2353	571	790	624
	Fecal Coliform	**43**	**460**	**341**	**301**	**222**
August	Total Coliform	634	993	445	414	727
	Fecal Coliform	**375**	**905**	**383**	**313**	**442**
September	Total Coliform	*700*	*22*	*17*	*80*	*230*
	Fecal Coliform	***500***	***17***	***11***	***80***	***130***
Season Averages*	Total Coliform	268	1582	701	682	3574
	Fecal Coliform	**126**	**505**	**359**	**337**	**761**

*Average of monthly averages

2003

	Units in MPN/100 ml	Village Club of Sands Point	North Hempstead Beach Park (N) (former Hempstead Harbor Beach)	North Hempstead Beach Park (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach
April	Total Coliform	13	140	159	155	19
	Fecal Coliform	**8**	**44**	**152**	**19**	**5**
May	Total Coliform	161	122	130	154	1277
	Fecal Coliform	**62**	**35**	**47**	**88**	**143**
June	Total Coliform	197	1747	478	724	915
	Fecal Coliform	**80**	**136**	**64**	**255**	**111**
July	Total Coliform	239	781	1237	517	1810
	Fecal Coliform	**65**	**539**	**874**	**203**	**304**
August	Total Coliform	347	678	804	2117	22364
	Fecal Coliform	**81**	**344**	**334**	**1904**	**3114**
September	Total Coliform	*6567*	*3500*	*1033*	*910*	*1820*
	Fecal Coliform	***977***	***1090***	***177***	***274***	***110***
Season Averages*	Total Coliform	632	949	816	1097	8735
	Fecal Coliform	**126**	**370**	**421**	**809**	**1222**

*Average of monthly averages

2001 – 2023 Average Indicator Bacteria Data for Beaches

2002

	Units in MPN/100 ml	**Village Club of Sands Point**	**North Hempstead Beach Park (N) (former Hempstead Harbor Beach)**	**North Hempstead Beach Park (S) (former Bar Beach)**	**Tappen Beach**	**Sea Cliff Beach**
April	Total Coliform	160	326	157	728	163
	Fecal Coliform	**44**	**39**	**11**	**658**	**53**
May	Total Coliform	130	145	127	282	194
	Fecal Coliform	**76**	**124**	**78**	**169**	**46**
June	Total Coliform	560	674	431	1604	750
	Fecal Coliform	**123**	**559**	**168**	**1016**	**154**
July	Total Coliform	613	1921	964	2770	4779
	Fecal Coliform	**246**	**810**	**831**	**1367**	**210**
August	Total Coliform	4773	3277	6202	1625	1832
	Fecal Coliform	**2593**	**2971**	**2130**	**1278**	**839**
Season Averages*	Total Coliform	1226	1969	3096	1463	1626
	Fecal Coliform	**605**	**1637**	**1133**	**1008**	**451**

*Average of monthly averages

2001

	Units in MPN/100 ml	**Village Club of Sands Point**	**North Hempstead Beach Park (N) (former Hempstead Harbor Beach)**	**North Hempstead Beach Park (S) (former Bar Beach)**	**Tappen Beach**	**Sea Cliff Beach**
April	Total Coliform	26	239	68	194	86
	Fecal Coliform	**9**	**85**	**36**	**103**	**43**
May	Total Coliform	559	486	364	944	1689
	Fecal Coliform	**21**	**83**	**106**	**555**	**274**
June	Total Coliform	2373	974	1091	1045	494
	Fecal Coliform	**157**	**488**	**451**	**365**	**60**
July	Total Coliform	242	6025	11526	1308	1501
	Fecal Coliform	**44**	**3458**	**11297**	**566**	**399**
August	Total Coliform	2183	3360	2594	12230	24148
	Fecal Coliform	**124**	**1000**	**1872**	**10285**	**1623**
September	Total Coliform	468	348	570	1500	1100
	Fecal Coliform	**53**	**110**	**116**	**1308**	**300**
Season Averages*	Total Coliform	**1143**	**2848**	**4187**	**4513**	**9080**
	Fecal Coliform	**75**	**1325**	**3754**	**3559**	**717**

*Average of monthly averages

Appendix D

2023 Nitrogen Data

TKN (mg/L)										
Date	**CSHH #1**	**CSHH #3**	**CSHH #6**	**CSHH #7**	**CSHH #8**	**CSHH #12**	**CSHH #13**	**CSHH #14A**	**CSHH #15A**	**CSHH #16**
10/25/23	0.62	<0.50	<0.50	<0.50	<0.50	0.55	0.53	<0.50	<0.50	<0.50
10/11/23	<0.50	0.58	<0.50	0.62	1.1	<0.50	1.1	2.5	2.1	<0.50
9/27/23	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.64	0.84	1.5	—
9/6/23	<0.50	<0.50	—	—	1.0	<0.50	0.89	<0.50	<0.50	0.94
8/23/23	1.8	3.8	—	—	5.9	6.6	7.8	2.3	3.8	2.9
8/9/23	2.2	1.6	—	—	2.0	2.8	1.1	1.6	2.9	—
7/26/23	<0.50	<0.50	—	—	1.9	4.4	2.2	2.2	3.7	<0.50
7/12/23	2.1	2.0	—	—	4.3	2.2	1.8	1.5	3.6	1.0
6/28/23	1.5	<0.50	—	—	<0.50	2.1	0.99	0.62	3.3	<0.50
6/15/23	3.4	2.3	2.3	2.1	1.9	1.7	1.8	2.0	3.6	3.2
5/31/23	1.1	<0.50	1.2	1.5	0.75	1.4	1.1	1.8	3.8	1.4
5/17/23	—	—	—	—	—	—	—	1.8	<0.10	—

Notes:

A value given with a less than symbol indicates that the results were below the detection limit.

CSHH #14A and #15A are outfalls; tan highlights indicate a direct sample from flow.

2023 Nitrogen Data

Total Organic N (mg/L)

Date	CSHH #1	CSHH #3	CSHH #6	CSHH #7	CSHH #8	CSHH #12	CSHH #13	CSHH #14A	CSHH #15A	CSHH #16
10/25/23	0.55	<0.10	0.21	<0.10	0.22	0.43	0.41	<0.10	0.12	<0.10
10/11/23	<0.10	0.56	<0.10	0.50	1.1	<0.10	0.96	1.4	2.1	<0.10
9/27/23	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.49	<0.10	1.1	—
9/6/23	<0.10	<0.10	—	—	0.90	<0.10	0.84	<0.10	<0.10	0.94
8/23/23	1.7	3.7	—	—	5.6	6.4	7.5	1.3	3.7	2.9
8/9/23	2.2	1.6	—	—	1.7	2.6	0.92	1.5	2.8	—
7/26/23	0.19	<0.10	—	—	1.7	4.3	2.0	2.0	3.6	0.32
7/12/23	2.0	1.9	—	—	4.2	2.2	1.7	1.3	3.4	1.0
6/28/23	1.5	<0.10	—	—	<0.10	2.1	0.91	0.62	3.2	<0.10
6/15/23	3.3	2.3	2.2	1.9	1.8	1.7	1.7	1.4	3.5	3.2
5/31/23	1.1	0.13	1.1	1.3	0.68	1.3	1.1	1.7	3.7	1.4
5/17/23	—	—	—	—	—	—	—	1.6	<0.10	—

Notes:

A value given with a less than symbol indicates that the results were below the detection limit.

CSHH #14A and #15A are outfalls; tan highlights indicate a direct sample from flow.

2023 Nitrogen Data

Ammonia as N (mg/L)										
Date	**CSHH #1**	**CSHH #3**	**CSHH #6**	**CSHH #7**	**CSHH #8**	**CSHH #12**	**CSHH #13**	**CSHH #14A**	**CSHH #15A**	**CSHH #16**
10/25/23	<0.10	<0.10	0.10	0.11	0.23	0.11	0.12	<0.10	<0.10	<0.10
10/11/23	<0.10	<0.10	<0.10	0.12	<0.10	0.10	0.13	1.1	<0.10	<0.10
9/27/23	0.17	<0.10	0.24	0.41	0.12	0.12	0.16	1.1	0.34	—
9/6/23	<0.10	<0.10	—	—	0.13	<0.10	<0.10	1.0	0.13	<0.10
8/23/23	<0.10	<0.10	—	—	0.22	0.17	0.31	1.0	0.12	<0.10
8/9/23	<0.10	<0.10	—	—	0.37	0.15	0.15	0.15	<0.10	—
7/26/23	<0.10	<0.10	—	—	0.22	0.12	0.20	0.10	<0.10	<0.10
7/12/23	<0.10	<0.10	—	—	0.11	<0.10	<0.10	0.19	0.17	<0.10
6/28/23	<0.10	<0.10	—	—	<0.10	<0.10	<0.10	<0.10	0.11	<0.10
6/15/23	<0.10	<0.10	<0.10	0.23	<0.10	<0.10	<0.10	0.58	<0.10	<0.10
5/31/23	<0.10	<0.10	<0.10	0.15	<0.10	<0.10	<0.10	0.15	0.10	<0.10
5/17/23	—	—	—	—	—	—	—	0.20	<0.10	—

Notes:

A value given with a less than symbol indicates that the results were below the detection limit.

CSHH #14A and #15A are outfalls; tan highlights indicate a direct sample from flow.

2023 Nitrogen Data

Nitrite as N (mg/L)

Date	CSHH #1	CSHH #3	CSHH #6	CSHH #7	CSHH #8	CSHH #12	CSHH #13	CSHH #14A	CSHH #15A	CSHH #16
10/25/23	<0.050	<0.050	<0.050	<0.050	0.11	<0.050	<0.050	<0.050	<0.050	<0.050
10/11/23	<0.050	<0.050	<0.050	<0.050	0.053	<0.050	<0.050	0.084	<0.050	<0.050
9/27/23	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.14	0.056	—
9/6/23	<0.050	<0.050	—	—	0.056	<0.050	<0.050	0.12	<0.050	<0.050
8/23/23	<0.050	<0.050	—	—	0.15	<0.050	<0.050	0.085	<0.050	<0.050
8/9/23	<0.050	<0.050	—	—	0.18	0.050	<0.050	<0.050	0.058	—
7/26/23	<0.050	<0.050	—	—	0.16	0.065	<0.050	<0.050	0.11	<0.050
7/12/23	<0.050	<0.050	—	—	<0.050	<0.050	<0.050	<0.050	0.061	<0.050
6/28/23	<0.050	<0.050	—	—	<0.050	<0.050	<0.050	<0.050	0.073	<0.050
6/15/23	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.093	0.060	<0.050
5/31/23	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.059	<0.050
5/17/23	—	—	—	—	—	—	—	<0.050	<0.050	—

Notes:

A value given with a less than symbol indicates that the results were below the detection limit.

CSHH #14A and #15A are outfalls; tan highlights indicate a direct sample from flow.

2023 Nitrogen Data

Nitrate as N (mg/L)

Date	CSHH #1	CSHH #3	CSHH #6	CSHH #7	CSHH #8	CSHH #12	CSHH #13	CSHH #14A	CSHH #15A	CSHH #16
10/25/23	0.19	0.20	0.31	0.36	1.5	0.63	1.1	0.31	0.30	0.15
10/11/23	0.20	0.14	0.28	0.35	1.1	0.51	2.0	6.7	3.1	0.17
9/27/23	0.20	0.14	0.24	0.71	0.79	0.29	0.31	6.8	2.6	—
9/6/23	<0.050	<0.050	—	—	1.1	0.50	0.31	8.5	3.4	<0.050
8/23/23	<0.050	<0.050	—	—	2.2	0.36	0.32	8.5	2.9	<0.050
8/9/23	<0.050	<0.050	—	—	0.81	1.8	1.3	1.3	2.9	—
7/26/23	<0.050	0.094	—	—	0.93	0.40	0.43	0.58	2.4	<0.050
7/12/23	<0.050	<0.050	—	—	0.87	1.6	0.40	1.3	2.8	<0.050
6/28/23	<0.050	<0.050	—	—	1.1	0.71	1.4	0.20	2.3	<0.050
6/15/23	<0.050	<0.050	0.065	0.25	0.59	1.1	2.0	8.5	2.5	<0.050
5/31/23	0.053	0.085	0.067	0.58	1.2	0.11	0.32	1.1	2.4	<0.050
5/17/23	—	—	—	—	—	—	—	1.8	0.20	—

Notes:

A value given with a less than symbol indicates that the results were below the detection limit.

CSHH #14A and #15A are outfalls; tan highlights indicate a direct sample from flow.

2023 Nitrogen Data

Total Inorganic Nitrogen Calculation (mg/L)

Date	CSHH #1	CSHH #3	CSHH #6	CSHH #7	CSHH #8	CSHH #12	CSHH #13	CSHH #14A	CSHH #15A	CSHH #16
10/25/23	0.22	0.24	0.45	0.52	1.8	0.78	1.3	0.35	0.33	0.19
10/11/23	0.24	0.17	0.32	0.50	1.2	0.66	2.1	7.9	3.2	0.21
9/27/23	0.41	0.17	0.52	1.15	0.95	0.44	0.51	8.0	3.0	—
9/6/23	0	0	—	—	1.3	0.51	0.32	9.6	3.5	0
8/23/23	0	0	—	—	2.5	0.55	0.65	9.5	3.0	0
8/9/23	0	0.06	—	—	1.4	2.0	1.6	1.5	2.9	—
7/26/23	0	0.12	—	—	1.3	0.58	0.65	0.71	2.5	0
7/12/23	0	0	—	—	0.99	1.6	0.41	1.5	3.1	0
6/28/23	0	0	—	—	1.1	0.74	1.4	0.23	2.4	0
6/15/23	0	0	0.09	0.51	0.62	1.1	2.1	9.2	2.6	0
5/31/23	0.06	0.10	0.08	0.75	1.3	0.11	0.33	1.3	2.6	0
5/17/23	—	—	—	—	—	—	—	2.0	0.21	—

Notes:

Total Inorganic Nitrogen = Ammonia + (Nitrate + Nitrite); lab methodology results in a combined nitrate/nitrite value, which is used here to calculate Total Inorganic Nitrogen.

Values that are reported below the detection limit are treated as "0" (see individual tables for detection limits).

CSHH #14A and #15A are outfalls; tan highlights indicate a direct sample from flow.

2023 Nitrogen Data

Total N (mg/L)										
Date	**CSHH #1**	**CSHH #3**	**CSHH #6**	**CSHH #7**	**CSHH #8**	**CSHH #12**	**CSHH #13**	**CSHH #14A**	**CSHH #15A**	**CSHH #16**
10/25/23	0.84	0.24	0.66	0.53	2.1	1.2	1.7	0.35	0.51	0.19
10/11/23	0.24	0.75	0.32	1.0	2.3	0.56	3.1	9.3	5.3	0.21
9/27/23	0.24	0.17	0.32	0.74	0.83	0.33	0.99	7.7	4.1	—
9/6/23	<0.10	<0.10	—	—	2.2	0.51	1.2	8.8	3.4	0.94
8/23/23	1.8	3.8	—	—	8.2	6.9	8.2	10.9	6.7	2.9
8/9/23	2.2	1.7	—	—	3.0	4.6	2.4	3.0	5.8	—
7/26/23	0.27	0.12	—	—	3.0	4.8	2.7	2.8	6.2	0.36
7/12/23	2.1	2.0	—	—	5.2	3.8	2.2	2.8	6.5	1.0
6/28/23	1.5	<0.10	—	—	1.1	2.8	2.4	0.86	5.6	<0.10
6/15/23	3.4	2.3	2.3	2.4	2.5	2.8	3.8	10.6	6.2	3.2
5/31/23	1.2	0.26	1.2	2.1	2.0	1.5	1.5	2.9	6.3	1.4
5/17/23	—	—	—	—	—	—	—	3.6	0.21	—

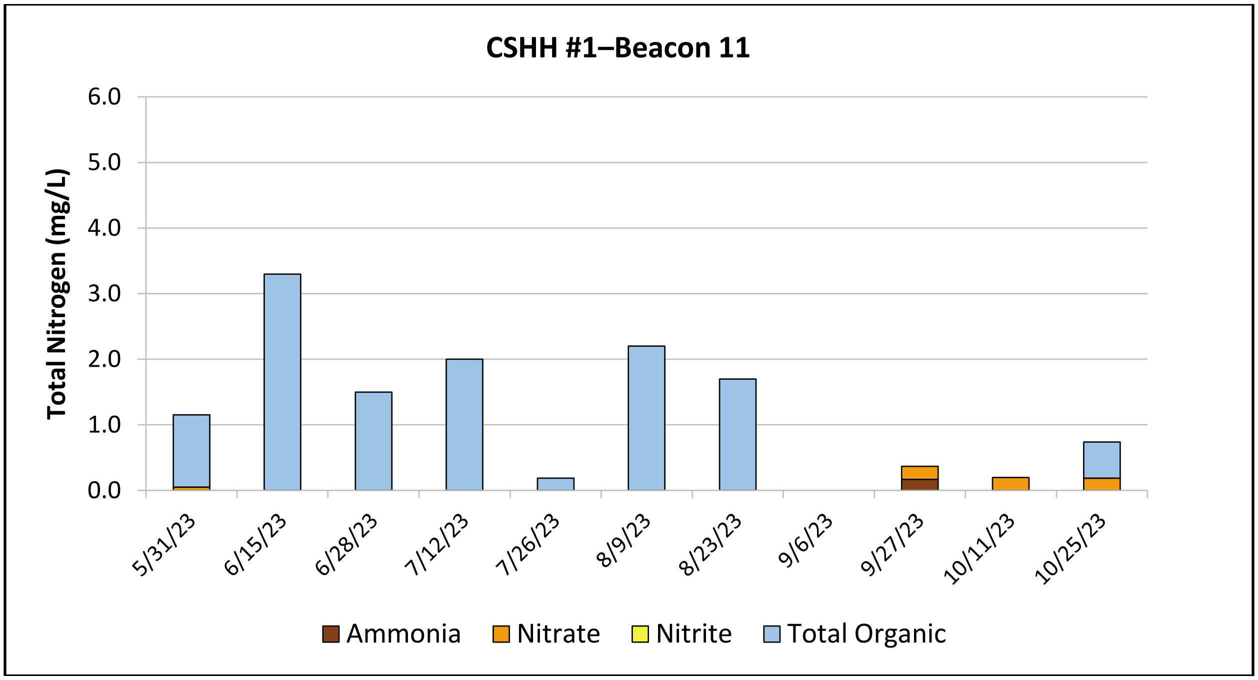
Notes:

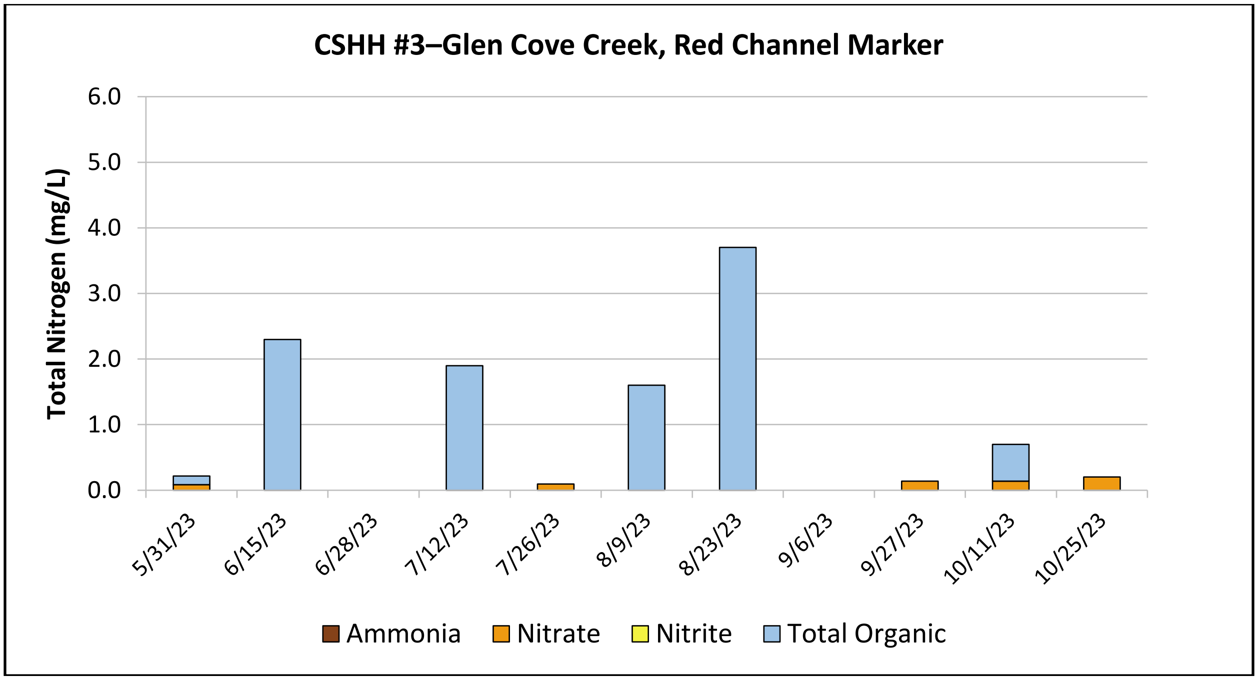
A value given with a less than symbol indicates that the results were below the detection limit.

CSHH #14A and #15A are outfalls; tan highlights indicate a direct sample from flow.

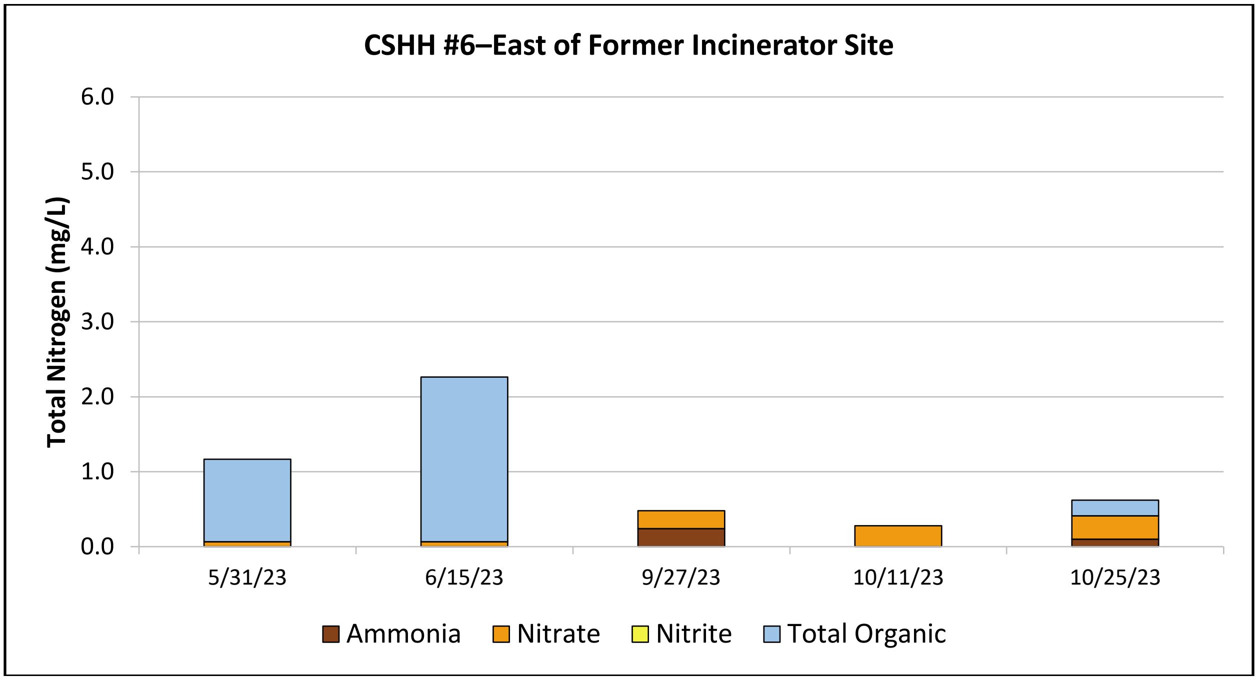
2023 Total Nitrogen Graphs

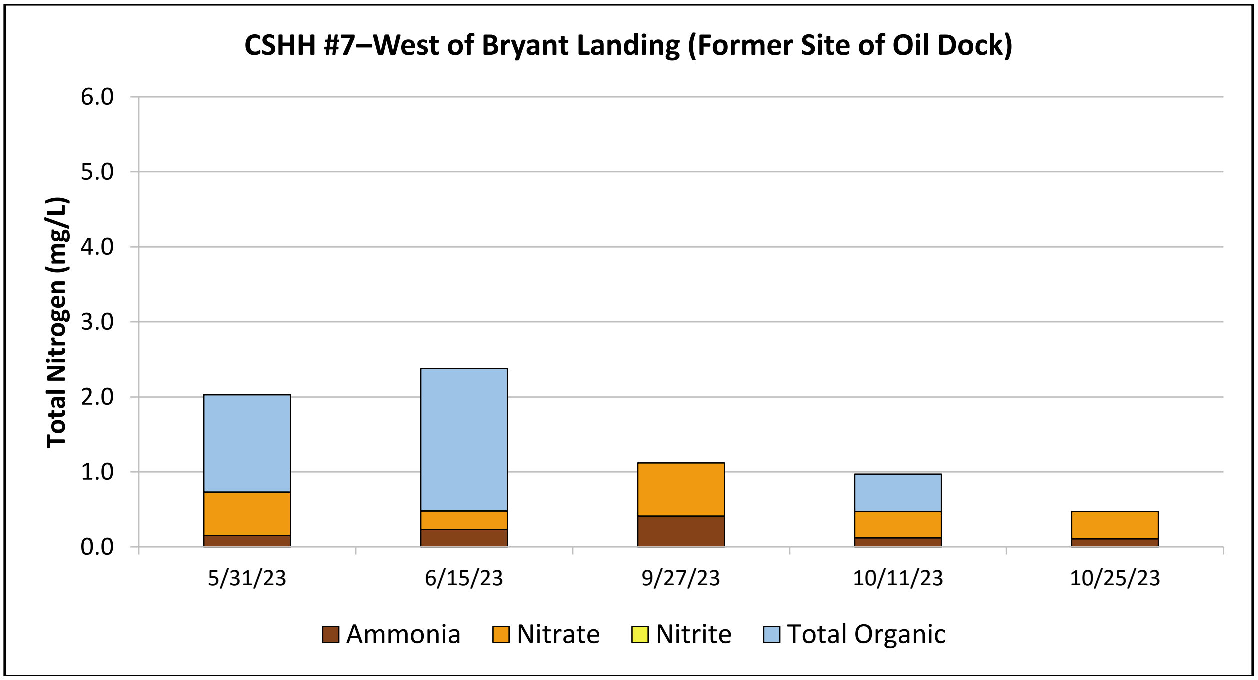
The graphs in this section display each station's total nitrogen throughout the 2023 season. The height of each vertical bar provides the total nitrogen recorded on the indicated date, but within each bar, total nitrogen is broken down into the subcategories of nitrogen it consists of. Total nitrogen comprises both organic nitrogen, shown in blue, and inorganic nitrogen—including ammonia, shown in brown, nitrate, shown in orange, and nitrite, shown in yellow. Note that total nitrogen exceeding 1.2 mg/L is considered a failing score. Note the y-axis for CSHH #8, #12, #13, #14A, and #15A extends to 12 mg/L to accommodate high values.





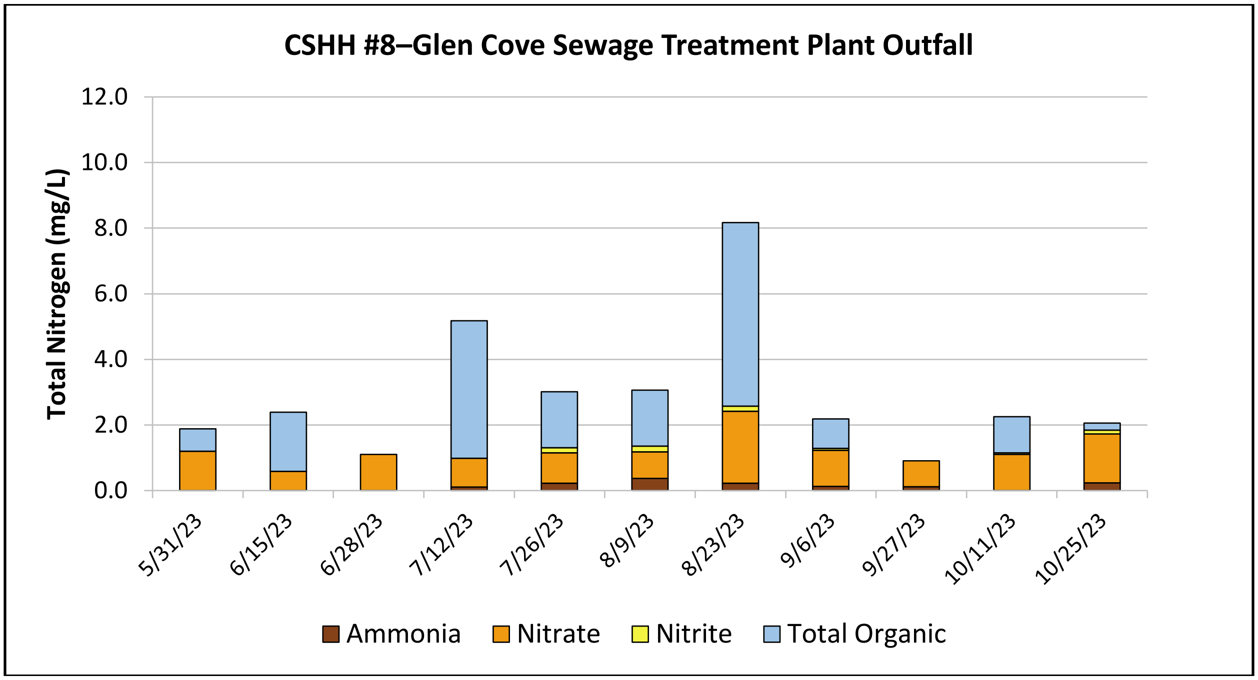
2023 Total Nitrogen Graphs

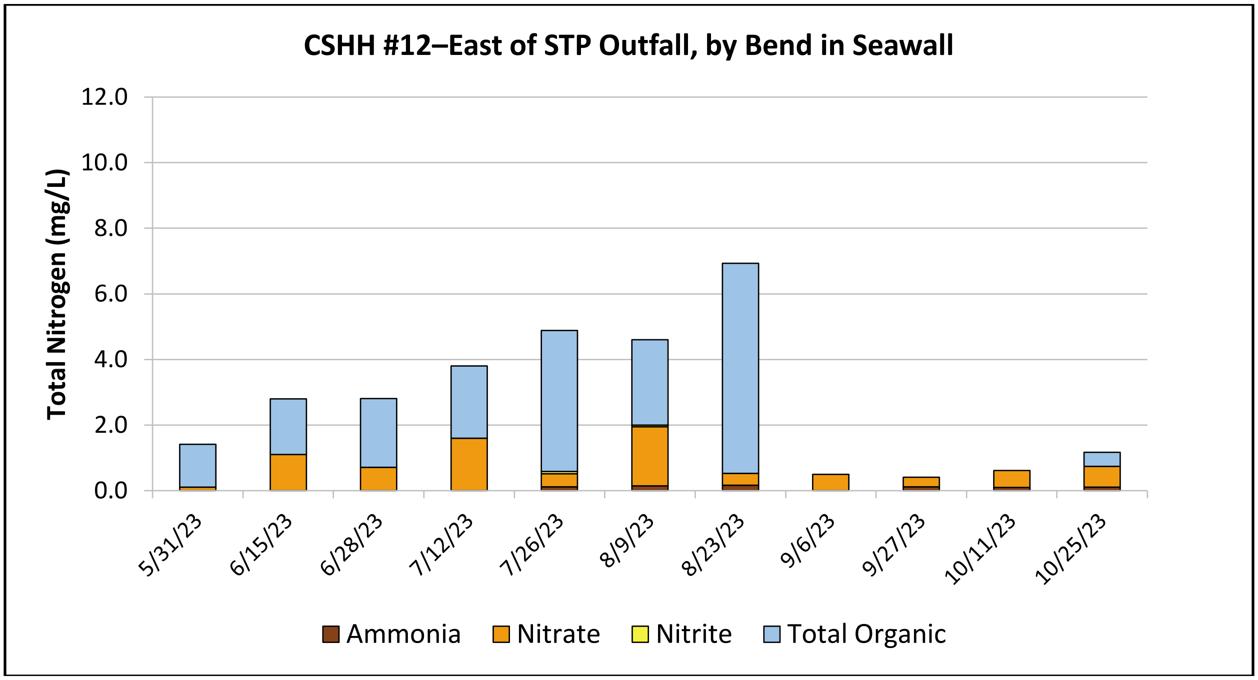




Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

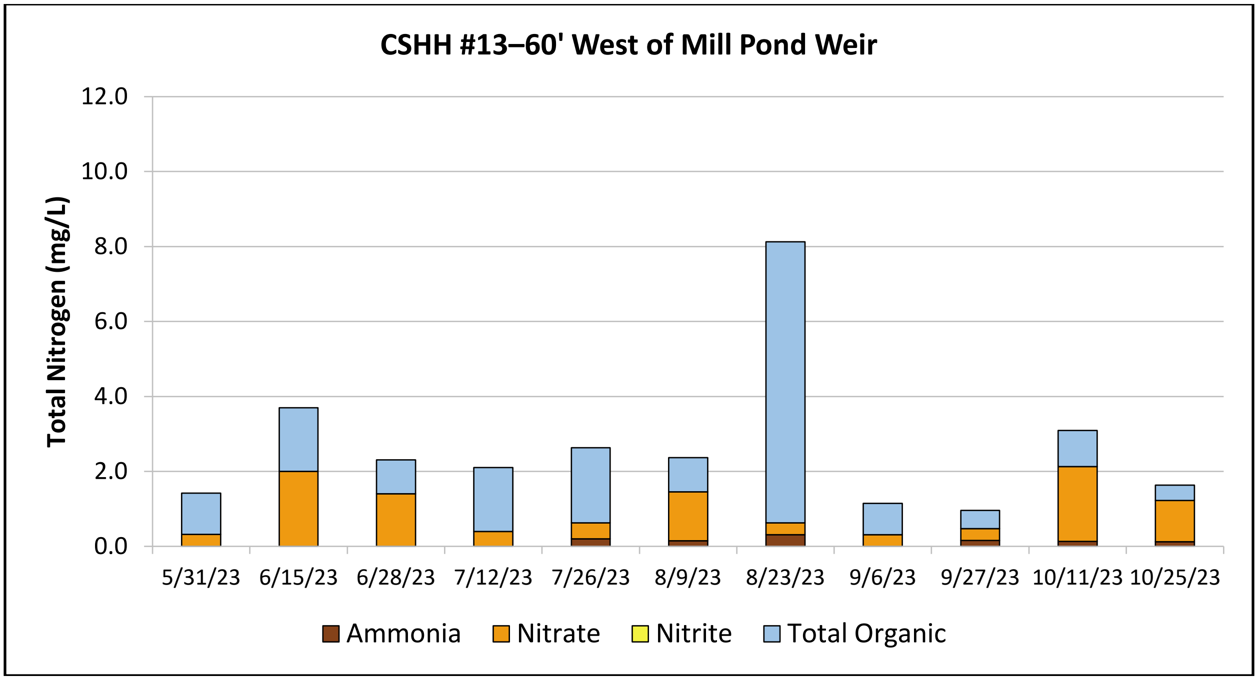
2023 Total Nitrogen Graphs

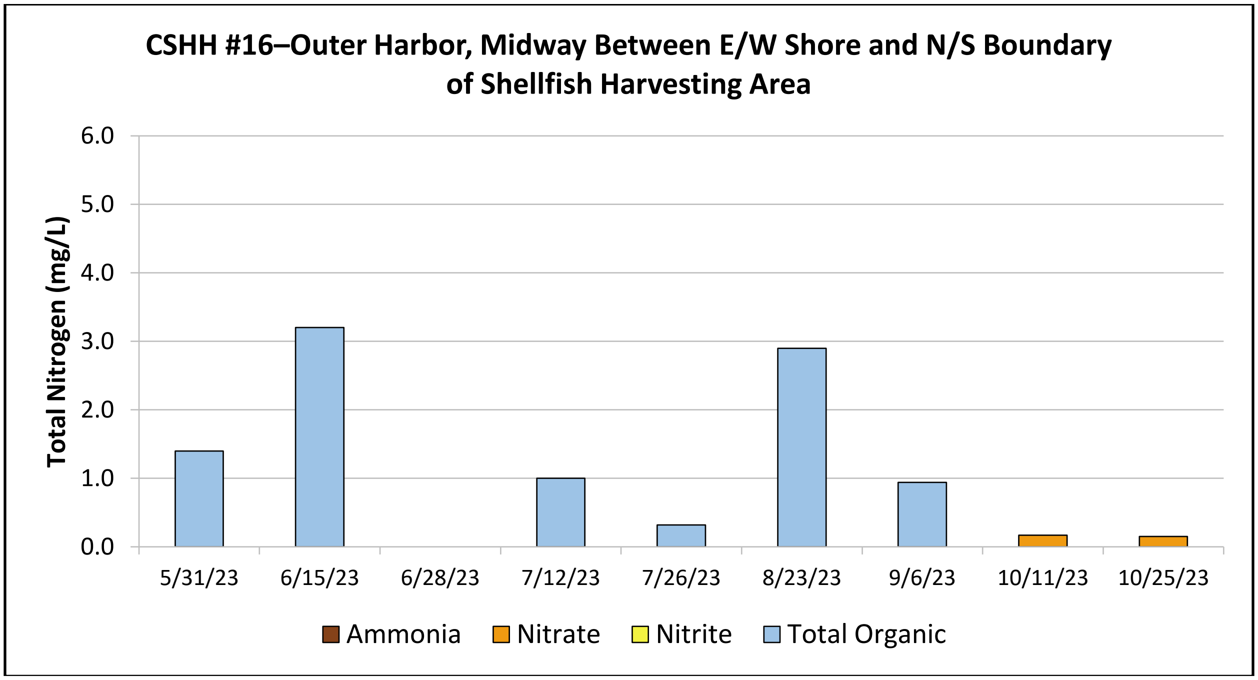




Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

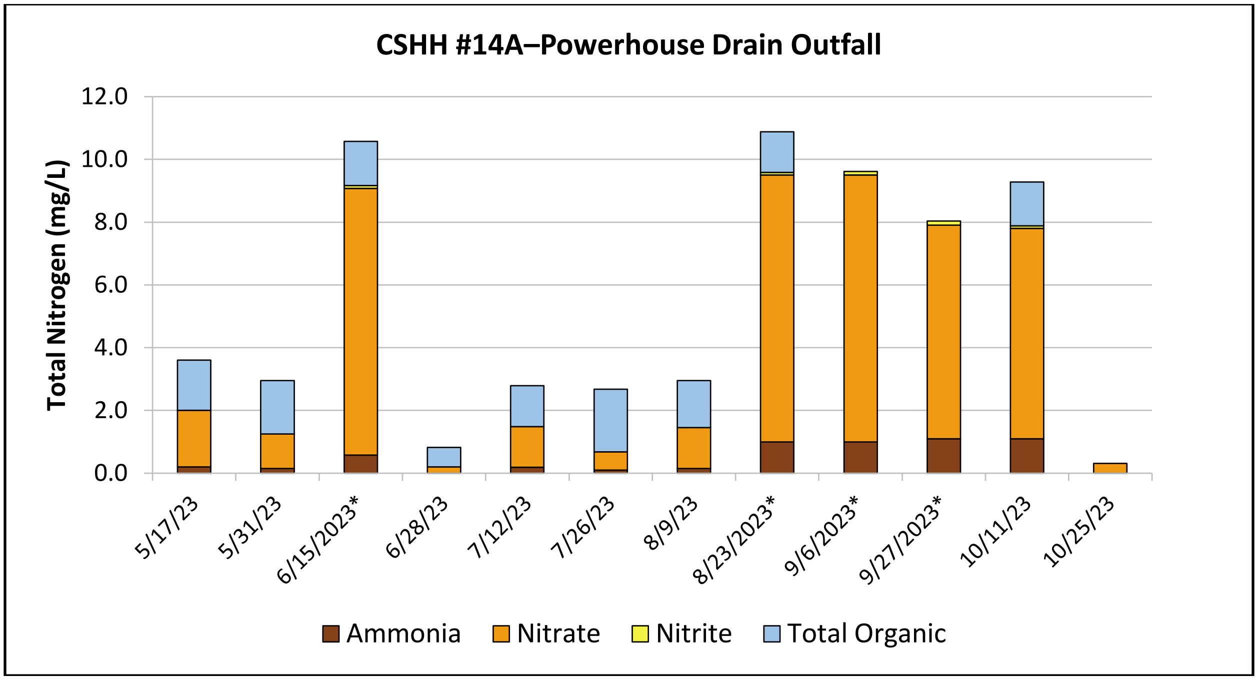
2023 Total Nitrogen Graphs

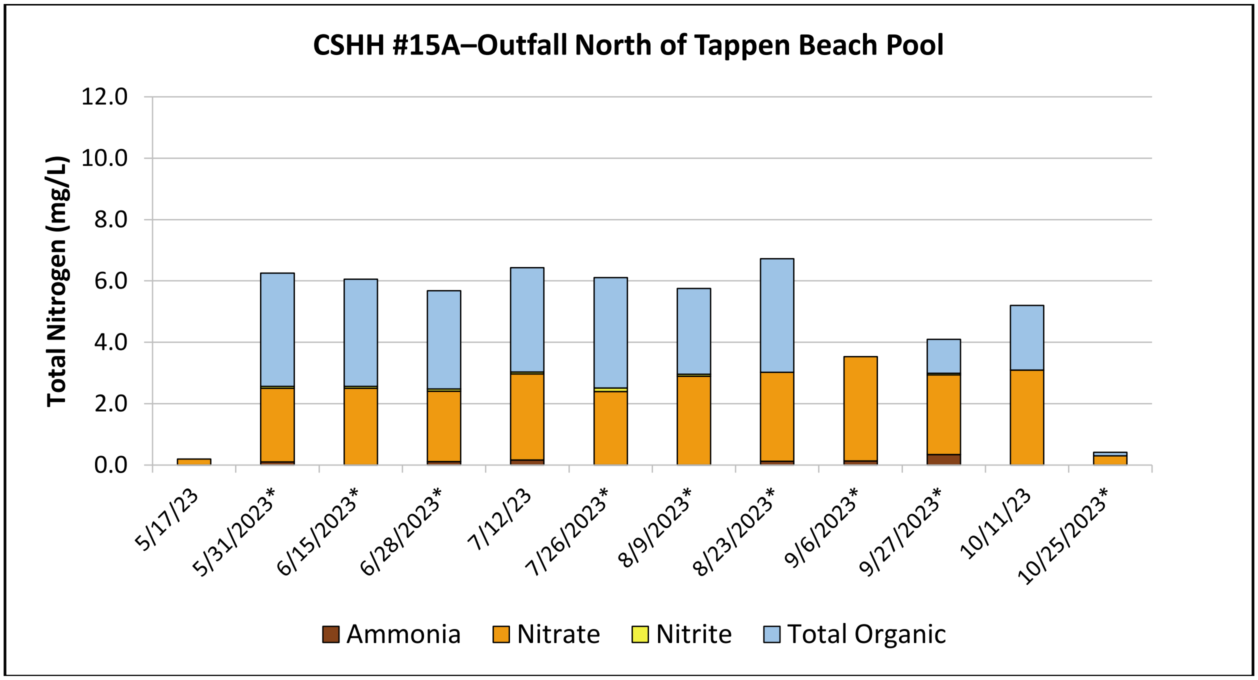




Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

2023 Total Nitrogen Graphs



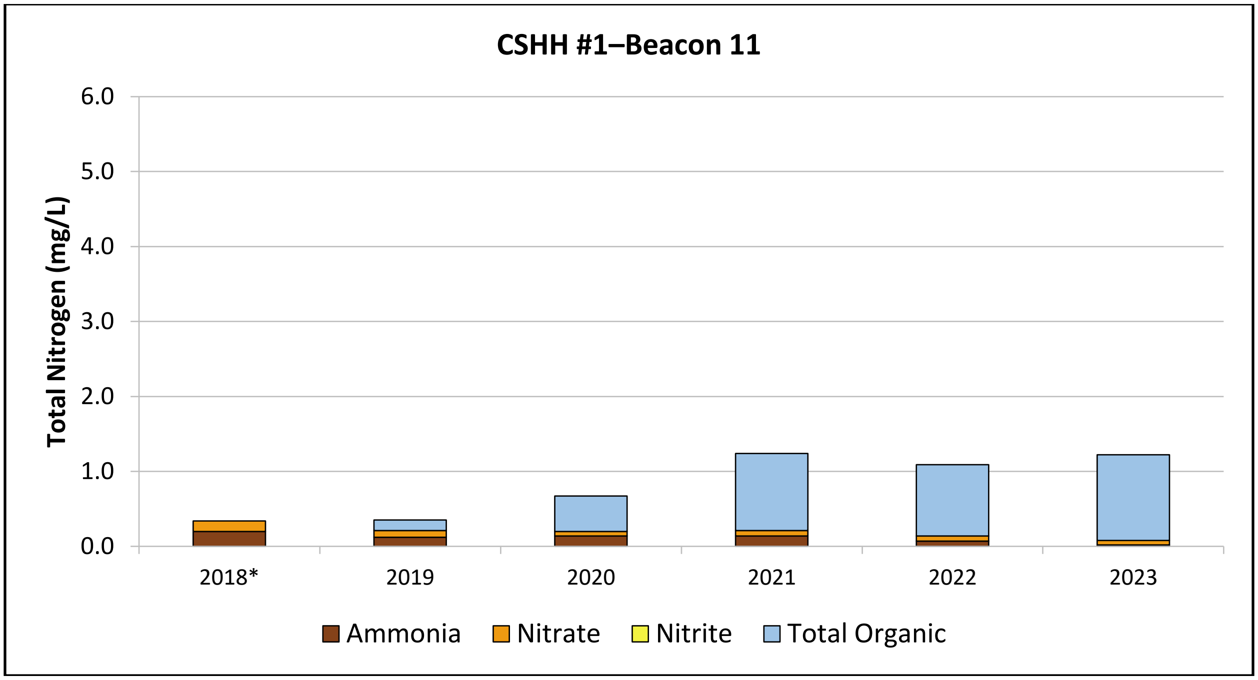


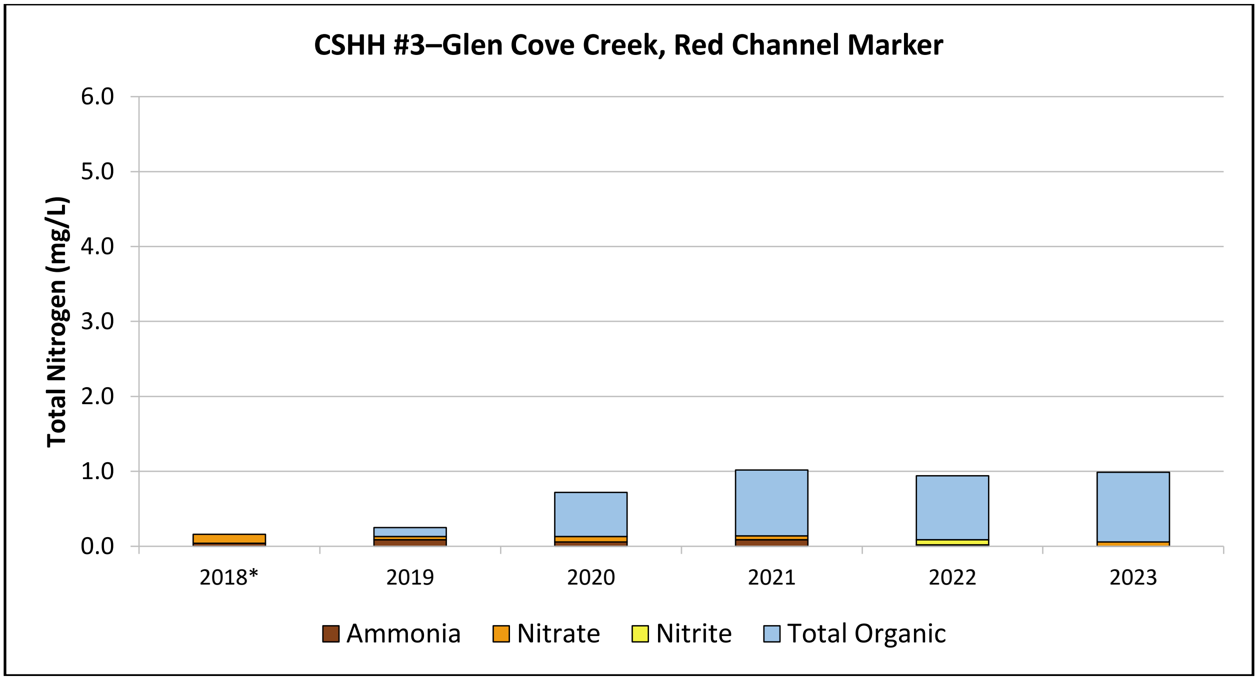
*Sample taken from direct flow.

Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

Long-Term Total Nitrogen Graphs

The graphs in this section display each station's long-term (2018-2023) total nitrogen graph during the regular monitoring season. See page D-11 for a full description of total nitrogen graphs.

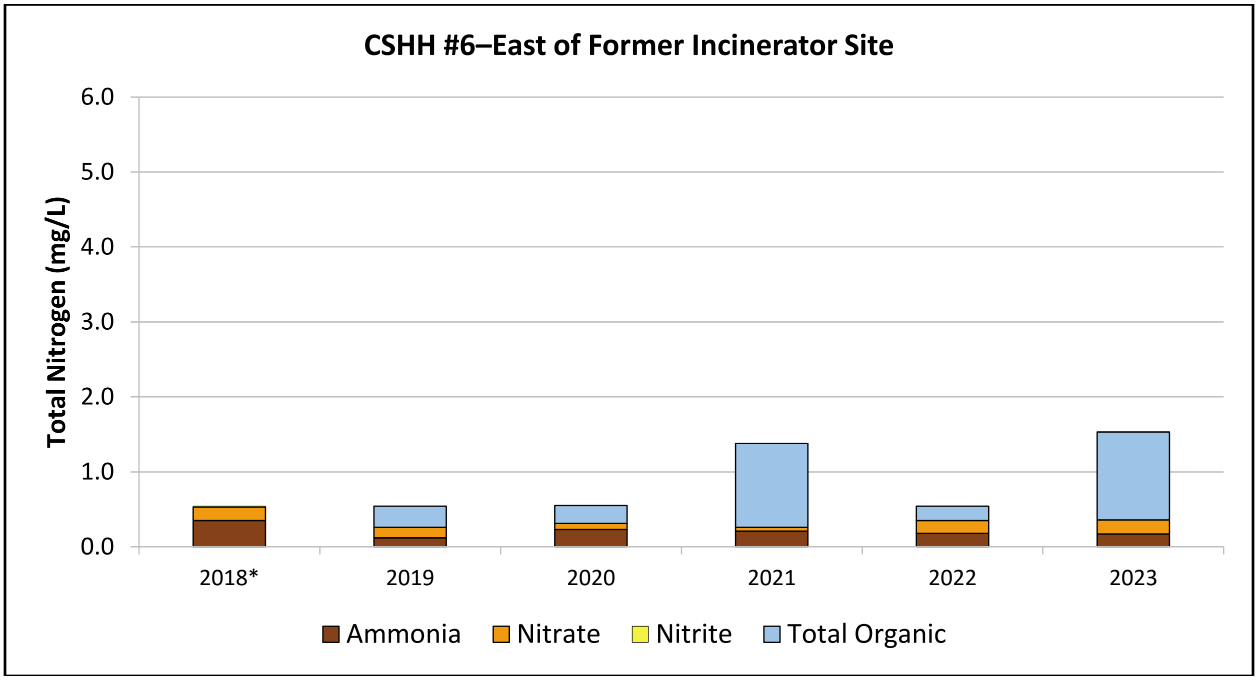


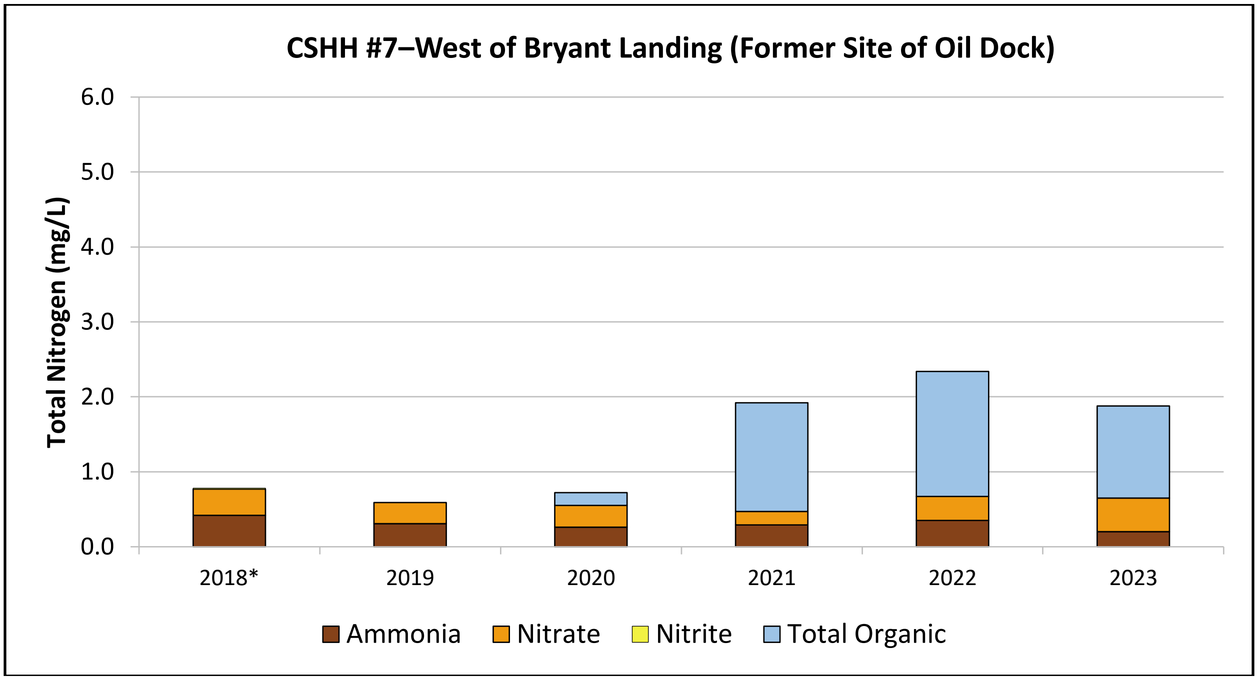


**Total Organic Nitrogen was not included in nitrogen analysis in 2018.*

Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

Long-Term Total Nitrogen Graphs

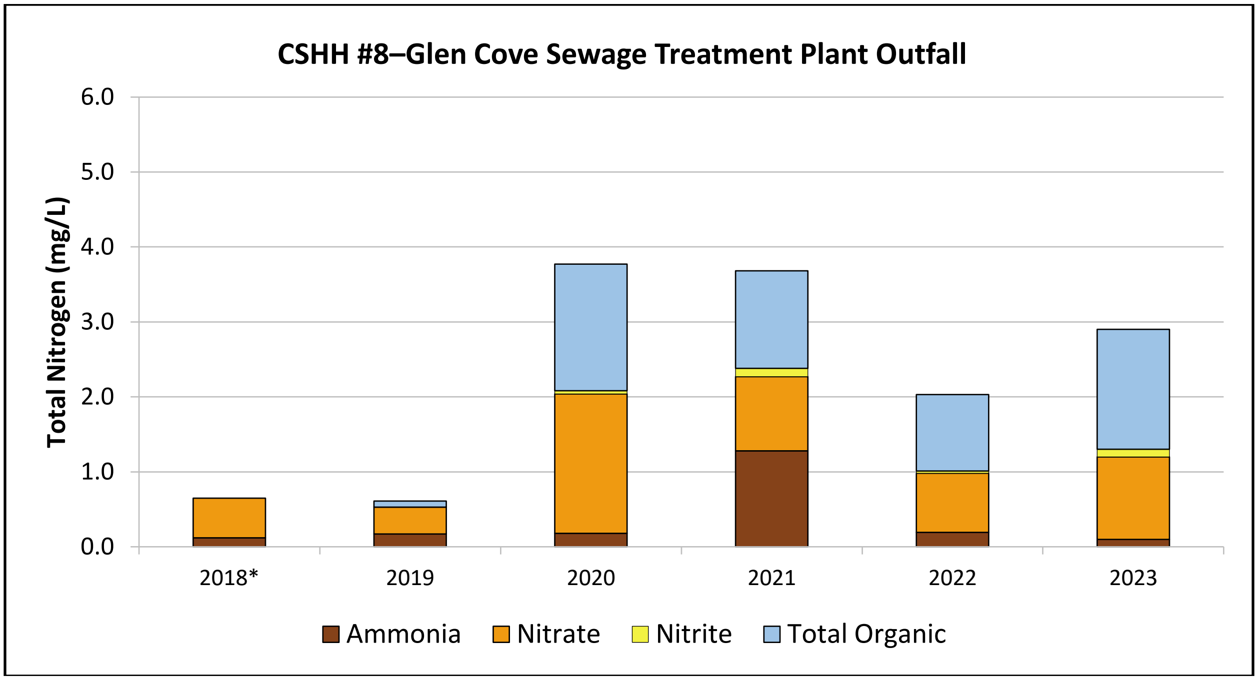


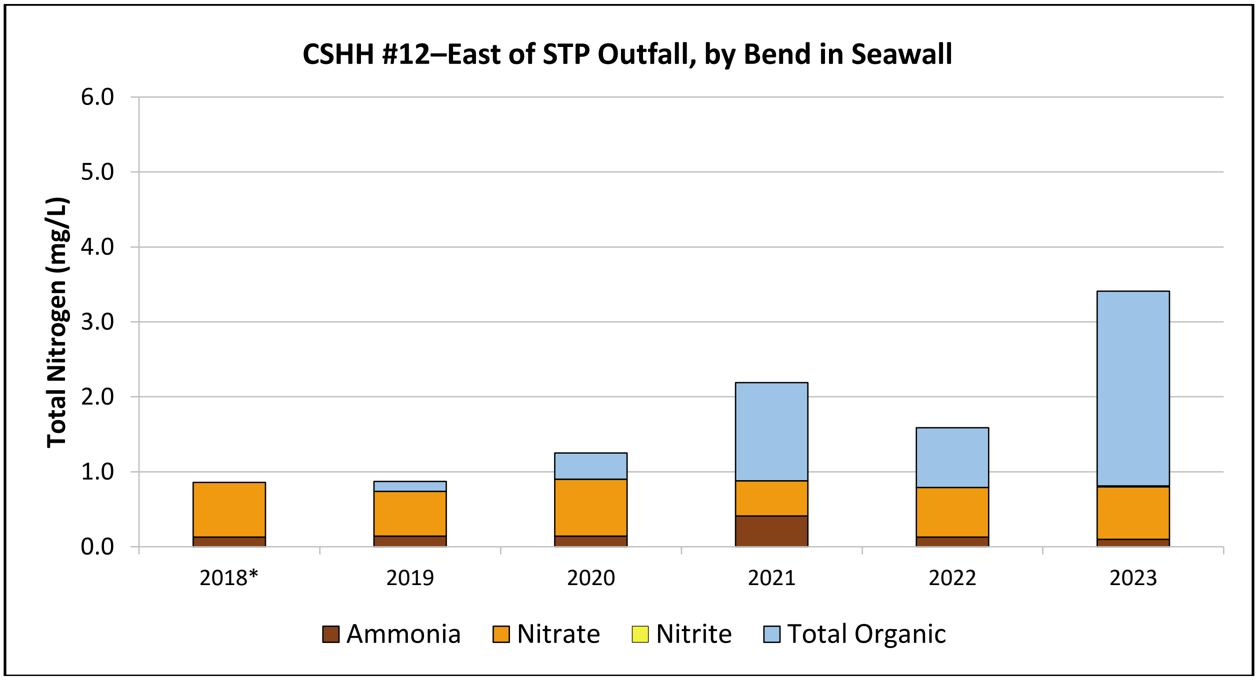


**Total Organic Nitrogen was not included in nitrogen analysis in 2018.*

Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

Long-Term Total Nitrogen Graphs

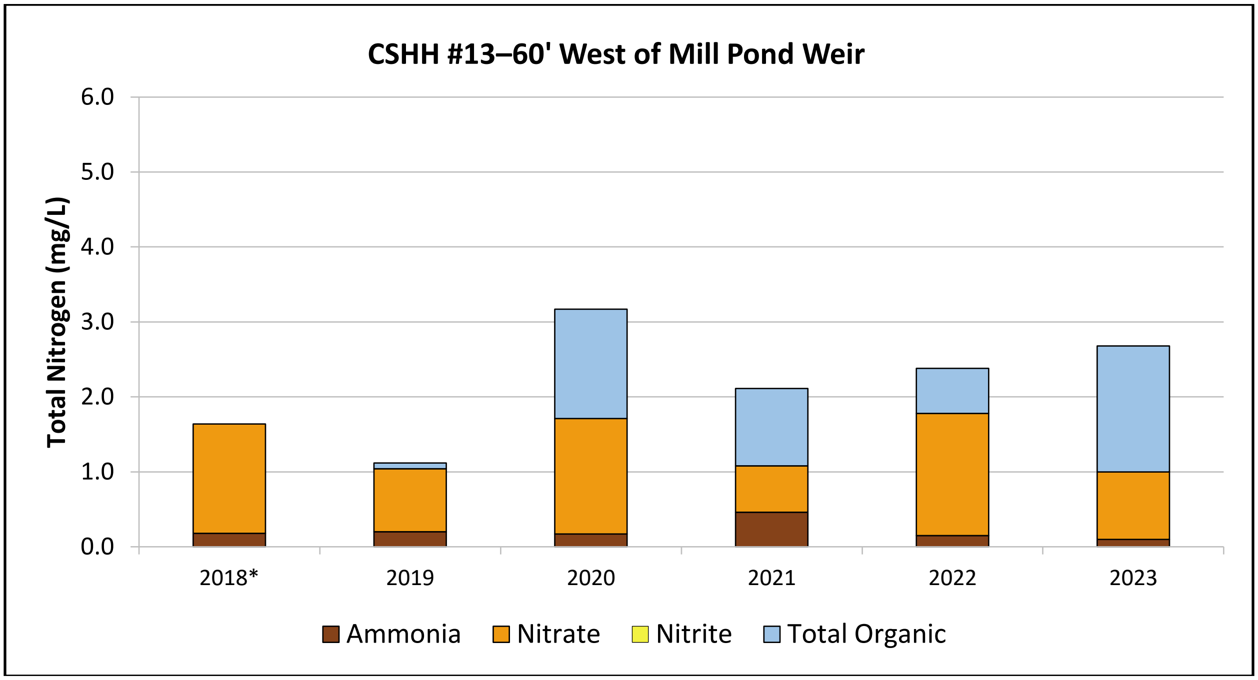


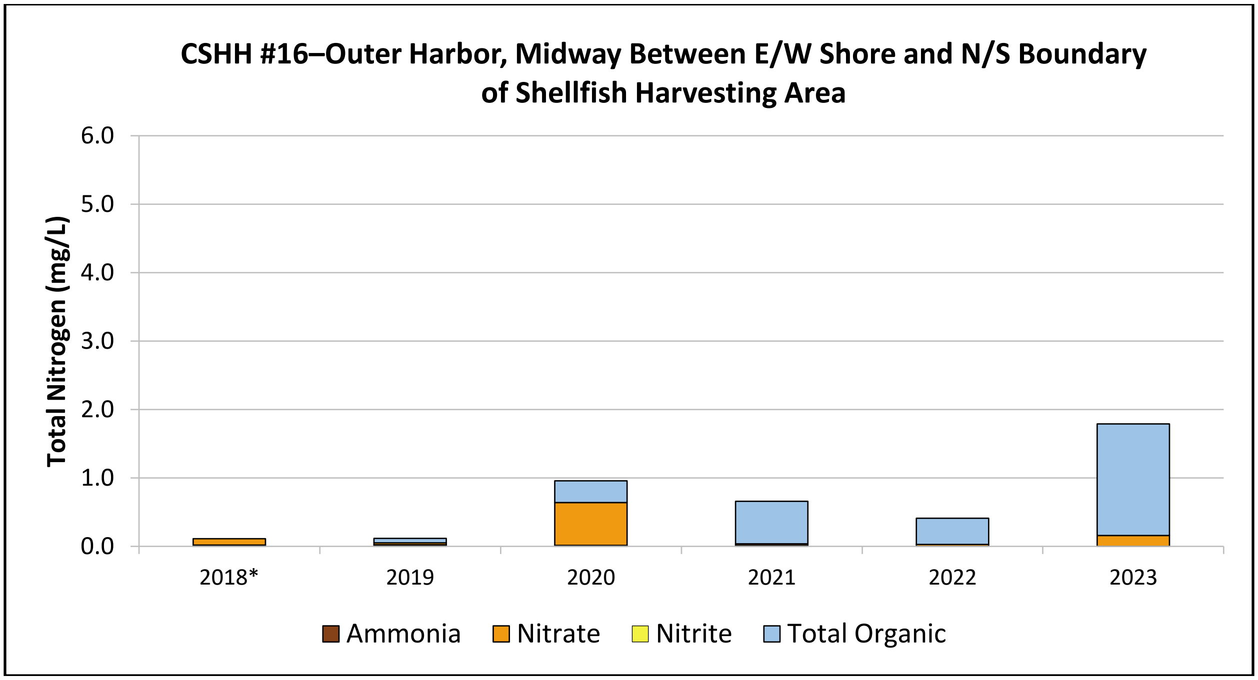


**Total Organic Nitrogen was not included in nitrogen analysis in 2018.*

Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

Long-Term Total Nitrogen Graphs

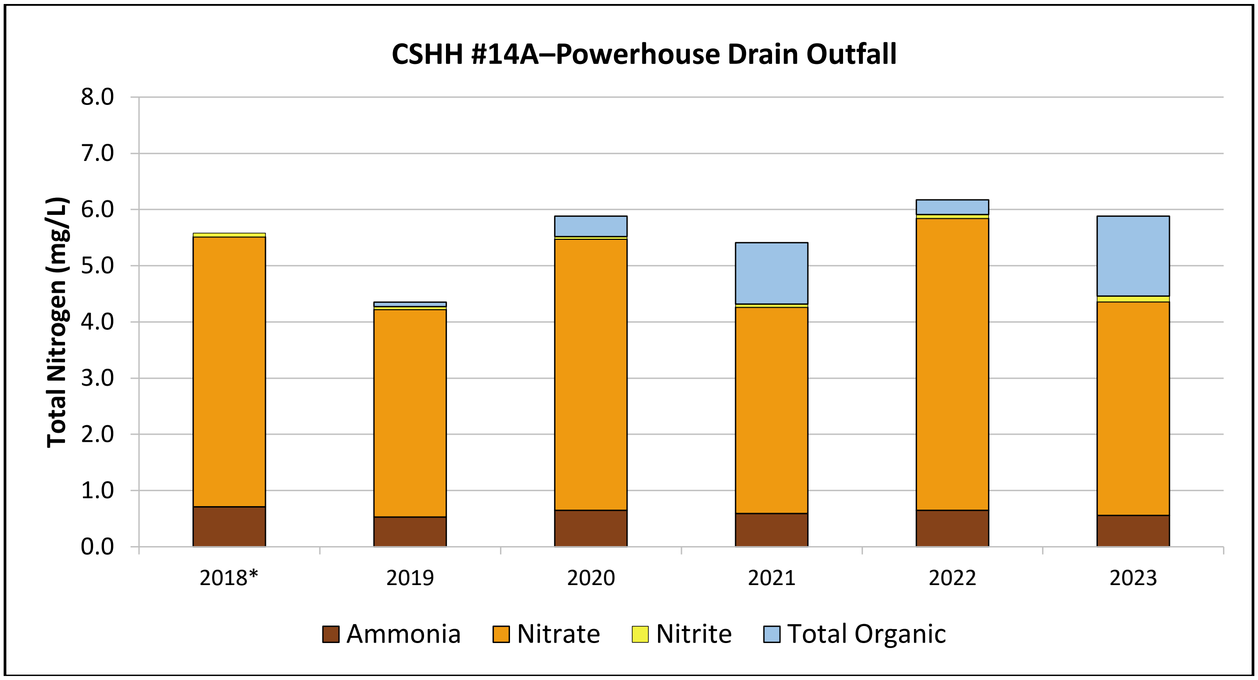




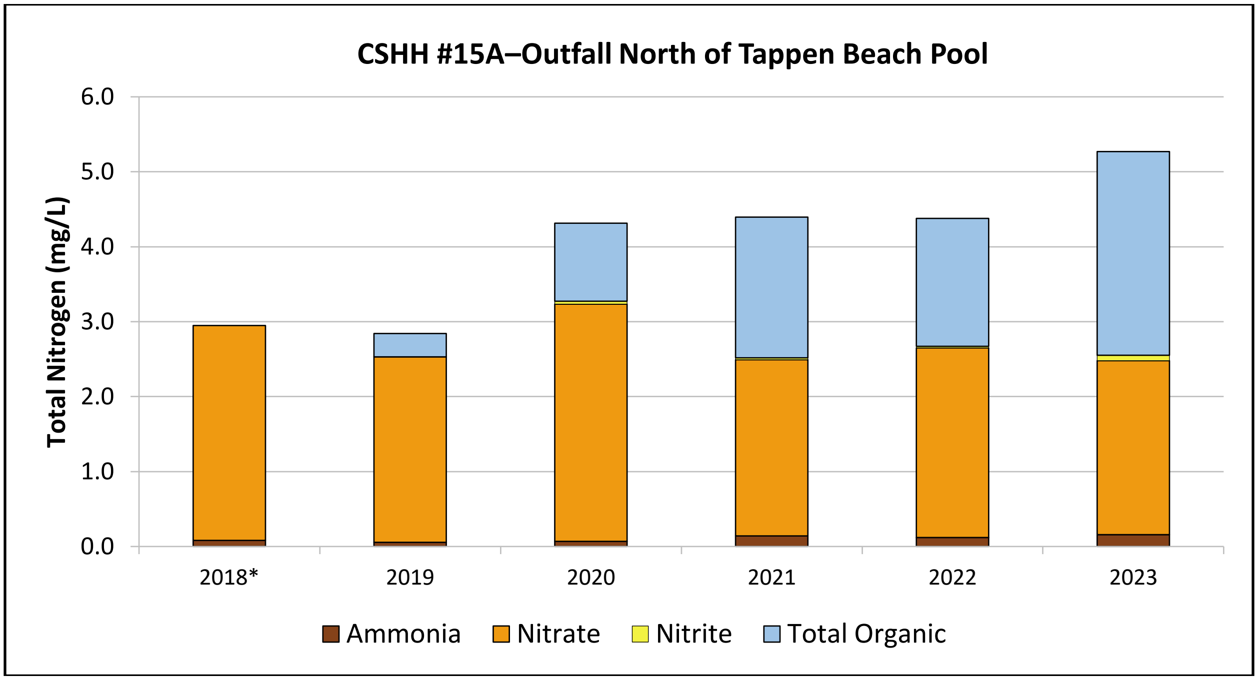
**Total Organic Nitrogen was not included in nitrogen analysis in 2018.*

Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

Long-Term Total Nitrogen Graphs



(Note that the y-axis extends to 8.0 mg/L to accommodate higher values.)



**Total Organic Nitrogen was not included in nitrogen analysis in 2018.*

Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

2023-24 Winter Nitrogen Data

TKN (mg/L)		
Date	**CSHH #14A**	**CSHH #15A**
4/10/24	1.0	0.37
3/27/24	0.72	2.3
3/13/24	1.3	<0.50
2/29/24	3.3	1.9
2/15/24	0.78	<0.50
1/31/24	<0.50	<0.50
1/17/24	2.2	<0.50
1/3/24	<0.50	<0.50
12/20/23	1.3	—
12/6/23	2.3	<0.50
11/22/23	<0.50	—
11/8/23	<0.50	1.1

Total Organic N (mg/L)		
Date	**CSHH #14A**	**CSHH #15A**
4/10/24	<0.10	0.33
3/27/24	<0.10	2.2
3/13/24	0.12	<0.10
2/29/24	2.2	1.8
2/15/24	<0.10	<0.10
1/31/24	<0.10	<0.10
1/17/24	0.97	<0.10
1/3/24	<0.10	<0.10
12/20/23	0.27	—
12/6/23	1.0	<0.10
11/22/23	<0.10	—
11/8/23	<0.10	1.1

Ammonia as N (mg/L)		
Date	**CSHH #14A**	**CSHH #15A**
4/10/24	1.1	<0.10
3/27/24	1.2	<0.10
3/13/24	1.2	<0.10
2/29/24	1.1	<0.10
2/15/24	1.1	<0.10
1/31/24	1.2	<0.10
1/17/24	1.2	0.16
1/3/24	1.2	<0.10
12/20/23	1.0	—
12/6/23	1.3	<0.10
11/22/23	<0.10	—
11/8/23	0.11	<0.10

Nitrite as N (mg/L)		
Date	**CSHH #14A**	**CSHH #15A**
4/10/24	<0.050	<0.050
3/27/24	<0.050	<0.050
3/13/24	<0.050	<0.050
2/29/24	0.058	<0.050
2/15/24	<0.050	<0.050
1/31/24	0.053	<0.050
1/17/24	<0.050	<0.050
1/3/24	0.071	<0.050
12/20/23	<0.050	—
12/6/23	0.087	<0.050
11/22/23	<0.050	—
11/8/23	<0.050	<0.050

Nitrate as N (mg/L)		
Date	**CSHH #14A**	**CSHH #15A**
4/10/24	7.3	2.8
3/27/24	7.2	4.7
3/13/24	7.0	4.5
2/29/24	7.2	4.8
2/15/24	8.6	5.1
1/31/24	7.4	6.3
1/17/24	7.3	5.3
1/3/24	8.5	5.9
12/20/23	4.7	—
12/6/23	7.4	4.7
11/22/23	0.68	—
11/8/23	1.1	4.2

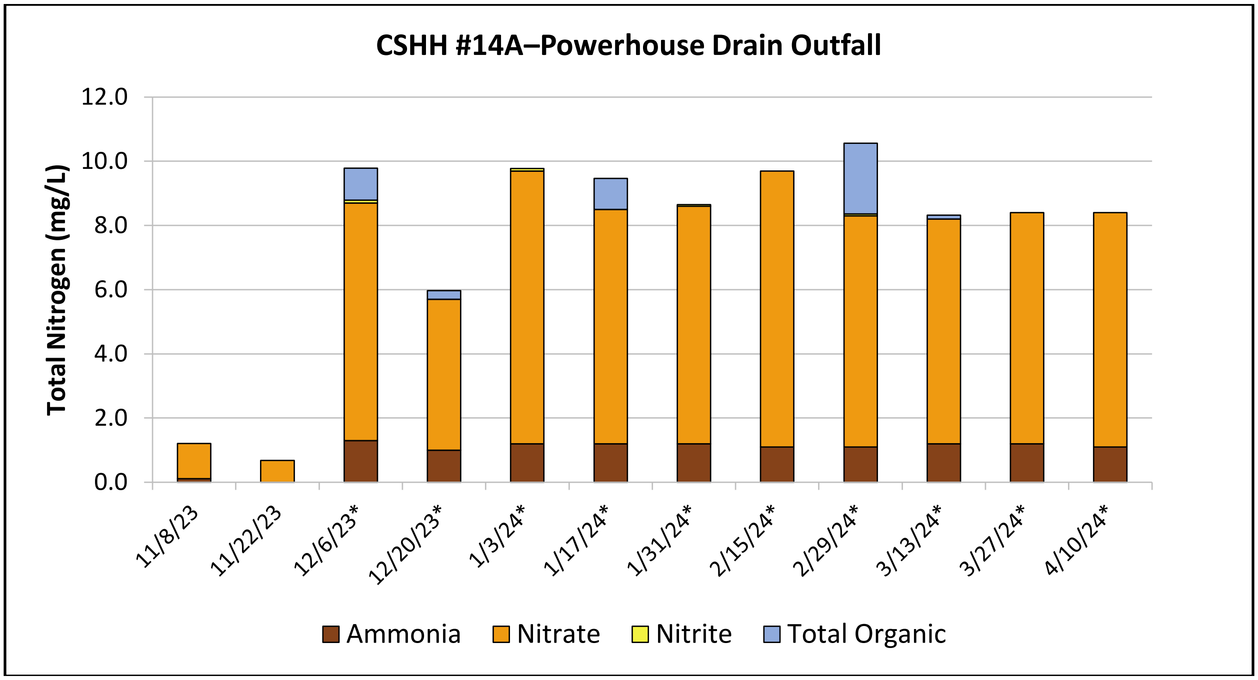
Total Inorganic Nitrogen Calculation (mg/L)		
Date	**CSHH #14A**	**CSHH #15A**
4/10/24	8.4	2.8
3/27/24	8.5	4.7
3/13/24	8.3	4.5
2/29/24	8.3	4.8
2/15/24	9.7	5.1
1/31/24	8.6	6.3
1/17/24	8.5	5.5
1/3/24	9.8	6.0
12/20/23	5.7	—
12/6/23	8.8	4.8
11/22/23	0.69	—
11/8/23	1.2	4.8

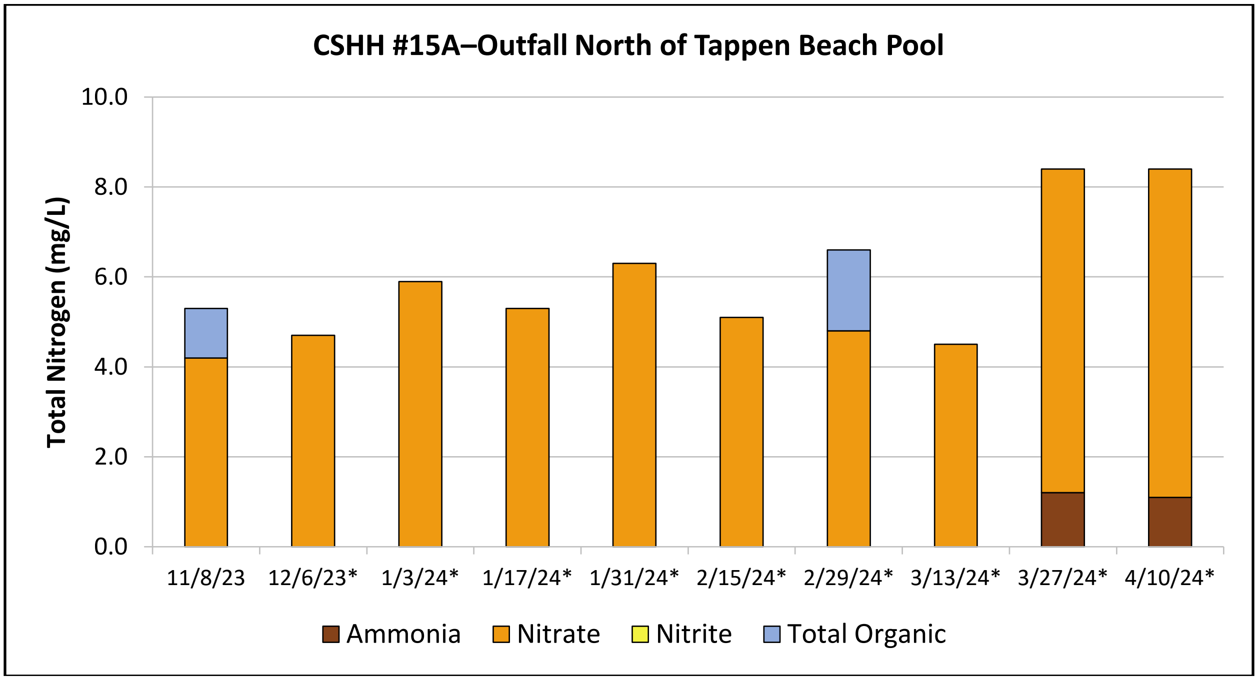
Total N (mg/L)		
Date	**CSHH #14A**	**CSHH #15A**
4/10/24	8.3	3.2
3/27/24	8.0	7.0
3/13/24	8.4	4.6
2/29/24	10.5	6.7
2/15/24	8.6	5.1
1/31/24	7.7	6.3
1/17/24	9.5	5.4
1/3/24	8.6	6.0
12/20/23	6.0	—
12/6/23	9.8	4.8
11/22/23	0.73	—
11/8/23	1.1	5.4

Notes:
A value given with a less than symbol indicates that the results were below the detection limit. CSHH #14A and #15A are outfalls; tan highlights indicate a direct sample from flow.

2023-24 Winter Total Nitrogen Graphs

The graphs in this section display each station's total nitrogen for the 2023-24 winter-monitoring program. See page D-11 for a full description of total nitrogen graphs.



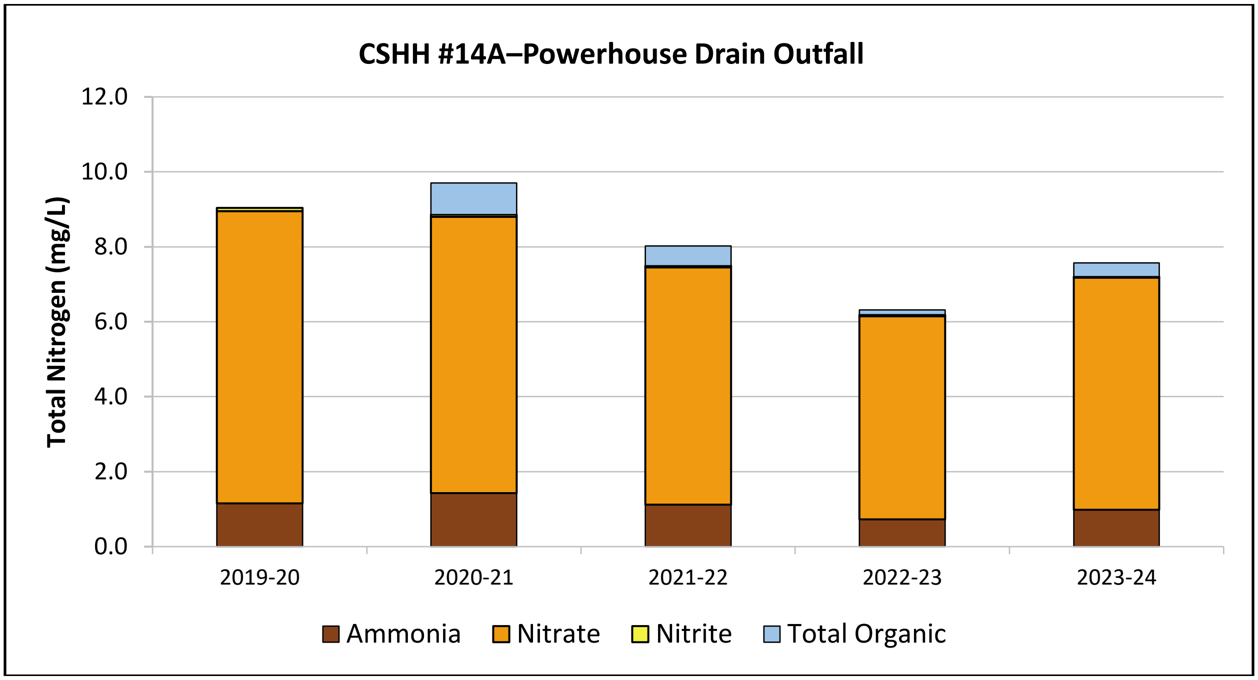


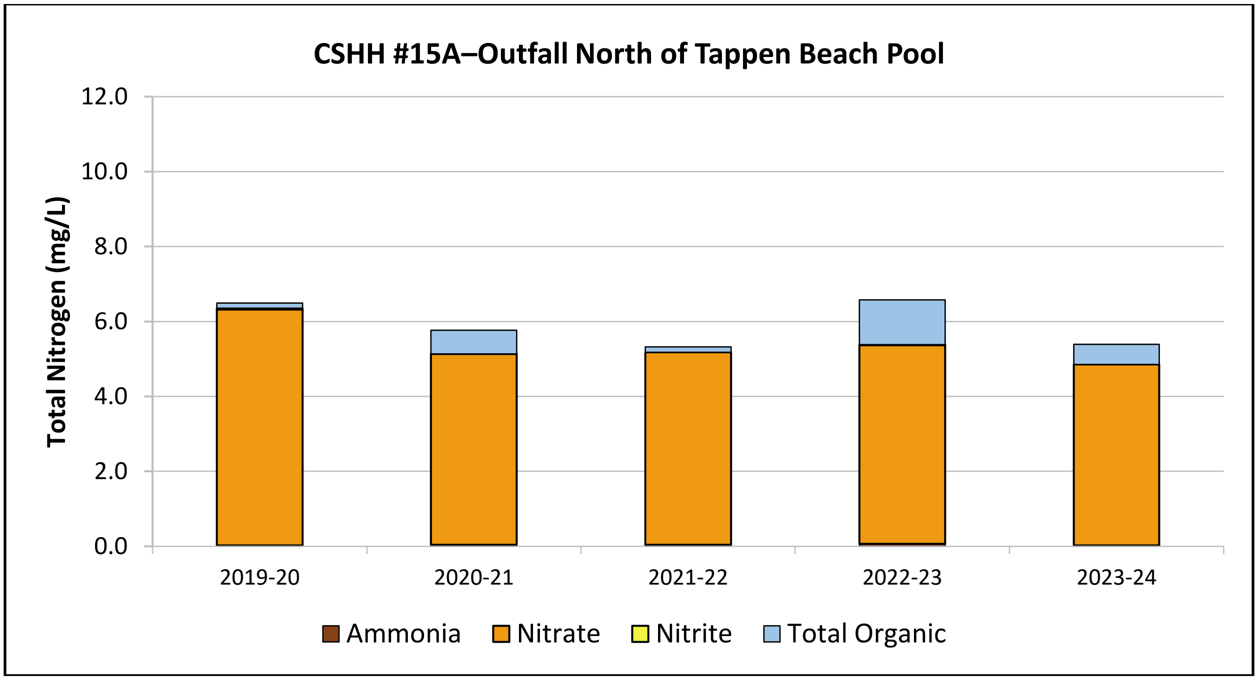
*Sample taken from direct flow.

Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

Long-Term Winter Total Nitrogen Graphs

The graphs in this section display each outfall station's long-term (2019-2024) total nitrogen graph during the winter monitoring season. See page D-11 for a full description of total nitrogen graphs.





Appendix E

Hempstead Harbor Water-Quality Monitoring
2023 Data Usability Assessment

1.1 Background

The Coalition to Save Hempstead Harbor (CSHH) conducts a routine water-monitoring program for 21 stations (including 10 in-harbor stations and 11 outfall stations) to document water-quality conditions and pollutant sources in Hempstead Harbor and its watershed. This monitoring program supports water resource management decisions at the local municipal, county, and state levels. In-harbor water-quality monitoring includes measuring parameters related to the ecological health of the harbor; outfall monitoring involves identifying critical areas of pollutant loading in the harbor. Sampling begins in May and continues until the end of October.

The monitoring data are used by the Coalition to Save Hempstead Harbor, Hempstead Harbor Protection Committee, Nassau County Department of Health, Nassau County Department of Public Works, the Interstate Environmental Commission, the New York State Department of Environmental Conservation, the Connecticut Department of Energy and Environmental Protection, Long Island Sound Study, other nongovernmental/environmental organizations, and the communities surrounding Hempstead Harbor.

The monitoring program helps assess the impact of watershed improvements on the harbor, collects data to supplement agency data for beach closure and shellfish monitoring, and tracks the impact of environmental policy in the watershed communities.
The data are used to produce an annual report for CSHH and local municipal members of the Hempstead Harbor Protection Committee to:

- Identify and study seasonal-scale trends in water quality
- Monitor aquatic habitats
- Identify potential causes for negative events (e.g., algal blooms and fish kills)
- Investigate long-term trends in water-quality parameter levels
- Guide local and regional environmental planning, policy, and compliance efforts (e.g., with NYS stormwater pollution prevention controls and TMDL development, the Long Island Nitrogen Action Plan, and the Long Island Sound Nitrogen Reduction Strategy)
- Measure progress towards meeting water-quality goals in the watershed
- Help determine whether the opening of additional shellfish-harvesting areas within the harbor is feasible
- Identify pollutant sources for targeting reduction efforts

1.2 Planning—Quality Assurance Project Plan

CSHH conducted water-quality monitoring under an EPA-approved (2023) Quality Assurance Project Plan (QAPP) for the 2023 water-quality monitoring season, which served as the main quality assurance planning project document. The QAPP and its appendices (equipment calibration procedures, standard operating procedures, etc.) were made available to all project personnel, including the Quality Assurance (QA) Manager, QA Officer, Project Manager/Field Team Leader, and Field Samplers. Copies of the QAPP and related quality assurance documentation are retained for recordkeeping and for future reference.

1.3 Sampling

Prospective Field Samplers (staff, volunteers, and/or municipal employees) met with the Program Manager/Field Team Leader regarding the monitoring program prior to the start of monitoring in the field. Individuals who conducted sampling received formal training, which included review and discussion of the QAPP and sampling Standard Operating Procedures (SOP) (sample collection procedures, sample handling and labeling, potential safety hazards, and equipment maintenance, inspection, and calibration) before collecting water-quality samples. These individuals adhered to the sampling design outlined in the sampling SOPs throughout the duration of sample collection. The Project Manager/Field Team Leader periodically monitored field activities, which included reviewing sampling procedures and field data sheets, to ensure compliance with sampling SOPs.

Any deviations from typical sampling (e.g., missed samples due to weather or tidal conditions) were recorded in field notes. Information from field data sheets was recorded electronically following sampling events. Data entry was conducted by two CSHH members, and the electronic copy of the data was immediately checked against the field data sheet. The QA Officer also compared field data forms with electronic records to ensure accuracy at least once per month. A field audit was conducted at least once per season by the Project Manager/Field Team Leader and consisted of overseeing sampling procedures. An equipment maintenance audit was conducted at least once over the monitoring season by the Project Manager/Field Team Leader and consisted of overseeing precheck, postcheck, and calibration procedures. Any deficiencies were reported to the QA Manager. Physical copies of the field data sheets are kept for at least five years in the annual logbook at the CSHH office. Equipment and instruments were calibrated within 24 hours before sampling based on user manual guidelines—calibration records for field equipment were also maintained and kept for future reference. Postchecks of equipment were also conducted immediately following sampling events.

Both vertical profiles and grab samples were collected. Vertical profiles were taken at up to 13 stations to measure the following field parameters: dissolved oxygen (DO), water temperature, salinity, pH, and turbidity, as well as chlorophyll a (for frame-of-reference purposes). Results were not confirmed by a fixed laboratory, but a LaMotte 5860-01 kit (Winkler Titration), a LaMotte 5858-01 kit, and a calibrated thermometer were used at one location per sampling event to confirm the validity of the multiparameter meter (YSI EXO2S) results for dissolved oxygen (bottom), pH (surface), and water temperature (bottom), respectively. Grab samples were collected at up to 21 stations weekly for bacteria analysis, for both fecal coliform and enterococci. Also, grab samples were collected at up to 10 stations biweekly for nitrogen analysis to measure total Kjeldahl nitrogen, ammonia, nitrite, and nitrate. Two NYS DOH ELAP-certified laboratories were used for sample analysis: the Nassau County Department of Health laboratory for bacteria analysis and the Pace Analytical Services, LLC, laboratory for nitrogen analysis.

1.4 Analysis

Analytical procedures were adhered to as outlined in the project planning documents. The Project Manager/Field Team Leader completed data review during or soon after monitoring events and unusual values were flagged (e.g., missing values or unexpectedly large or small values) in the data. The cause of any data deficiencies was determined and a decision was made on the data's usability, which was either accepted, marked as conditional, or discarded. The QA Officer then reviewed the data for usability according to data quality objectives. Additionally, laboratory deliverables were reviewed by the Project Manager/Field Team Leader and met the project requirements outlined in the QAPP.

1.5 Review of Data and Data Deliverables

The QAPP outlined data quality indicators including precision, bias/accuracy, representativeness, comparability, completeness, and sensitivity for each parameter measured. The results of data collection were reviewed at least once per month by the QA Officer to ensure accuracy. Laboratory data deliverables were reviewed by the Project Manager/Field Team Leader for adherence to the quality objectives outlined in the QAPP. Data were reviewed and validated as outlined in the QAPP. In lieu of data review or validation reports, notes on the validity of the data were included in comments in the data sheet (e.g., marking data as conditional or flagging seemingly high values that were still deemed accurate).

1.6 Project Oversight

Performance evaluation samples were not required for this project. A duplicate sample was taken for approximately one in every 10 samples to confirm the results of field and fixed laboratory analysis. The duplicate field samples were analyzed for the same parameters as the primary samples. As with other samples, proper sample handling and custody procedures were followed for delivery of samples to the lab. Laboratory-reported results for primary and field quality control (QC) samples were within project acceptance limits.

1.7 Data Usability Assessment

Tables 1-4 summarize acceptance criteria for accuracy, precision, and/or sensitivity of specific field and laboratory monitoring parameters.

Table 1

Acceptance Criteria for Field Monitoring Parameters

Parameter	Units	Accuracy	Precision (allowable RPD)	Approx. Expected Range	Sensitivity
Depth (calibrated line)	Meters (m)	± 0.1 m	20%	0 – 12 m	0.1 m
Depth (YSI EXO2S)	Meters (m)	0 to 10 m ± 0.004 m (± 0.04% of FS) 0 to 100 m ± 0.04 m (± 0.04% of FS) *FS = Full Scale*	20%	0 – 12 m	0.001 m
GPS coordinates (Garmin Montana 680t)	Decimal degrees (dec. deg.)	± 7.8 m https://www.gps.gov/systems/gps/performance/accuracy/	For reference point on land, within 10 m (e.g., =0.0001 dec. deg.)	N/A	1.02 m
Air/water temperature (digital thermometer)	Degrees Celsius (°C)	± 1 °C	10%	-15 – 36 °C	0.1 °C
Water temperature (YSI EXO2S)	Degrees Celsius (°C)	-5 to 35 °C ± 0.01 °C	10%	4 – 26 °C	0.001 °C
Specific conductivity* (YSI EXO2S)	MicroSiemens/ centimeter (µS/cm)	0 to 100 µS/cm: ± 0.5% of reading or 0.001 µS/cm, whichever is greater	10%	9,000 – 46,000 µS/cm	0.0001 µS/cm
Dissolved oxygen (LaMotte 5860-01, Winkler titration method)	Milligrams per liter (mg/L) = parts per million (ppm)	± 0.2 ppm	20%	0 – 14 ppm	0.2 ppm
Dissolved oxygen (YSI EXO2S)	Milligrams per liter (mg/L) = parts per million (ppm) percent saturation (% sat.)	0 – 20 mg/L: ± 1% of reading or 0.1 mg/L 0 – 200%: ± 1% of reading or ± 1% air sat., whichever is greater	20%	0 – 14 mg/L 0 – 120% sat.	0.01 mg/L 0.1% air sat.

Parameter	Units	Accuracy	Precision (Allowable RPD)	Approx. Expected Range	Sensitivity
Turbidity (YSI EXO2S)	Formazine nephelometric units (FNU)**	0 – 999 FNU: 0.3 FNU or ± 2% of reading, whichever is greater	20%	0 – 30 FNU	0.01 FNU
Water clarity (Secchi disk)	Meters (m)	± 0.1 m	10%	0 – 4 m	0.25 m
pH (LaMotte 5858-01 wide-range indicator)	N/A	5.0 – 10.5	(Color metric)	6.5 – 8.5	0.5
pH (YSI EXO2S)	N/A	± 0.1 pH units within ± 10 °C of calibration temperature; ± 0.2 pH units for the entire temperature range	5%	6.8 – 8.5	0.01

**Specific conductivity is the calibrated parameter to arrive at salinity (measured in parts per thousand, ppt), for which the approximate expected range is 5-30 ppt.*

***CSHH continues to collect data in nephelometric turbidity units (NTU), which according to YSI is considered interchangeable with FNU while using YSI instruments.*

Table 2

Acceptance Criteria for Laboratory Monitoring Parameters

Parameter	Method	Detection Limit	Accuracy	Precision
Fecal coliform	Membrane filter, SM 9222D-2006	1 CFU/100 ml	± 20	20%
Enterococci	Membrane filter, EPA 1600	1 CFU/100 ml	± 20	20%
Total Kjeldahl nitrogen	EPA 351.2, Rev. 2.0	0.10 mg/L*	± 20	20%
Ammonia	EPA 350.1, Rev. 2.0	0.10 mg/L	± 20	20%
Nitrate	EPA 353.2, Rev. 2.0	0.050 mg/L	± 20	20%
Nitrite	EPA 353.2, Rev. 2.0	0.050 mg/L	± 20	20%

**This is the detection limit for this method, however, CSHH sample results are frequently reported with a threshold of 0.50 mg/L due to dilution factors necessitated by brackish water samples.*

Precision

- Duplicate field measurements were taken for one station per sampling day at the first in-harbor station sampled (representing approximately 10% of all samples) for 24 sampling events.
- Relative percent difference (RPD), as outlined in **Table 1** and **Table 2**, was used as precision acceptance criteria. RPD was calculated as follows:

$$\text{RPD} = \frac{|\text{Conc(p)} - \text{Conc(d)}|}{(\frac{1}{2})(\text{Conc(p)} + \text{Conc(d)})} * 100$$

where:

Conc(p) = Primary Sample Concentration, the first sample collected at that location
Conc(d) = Duplicate Sample Concentration, the second sample collected at that location

- **Table 3** summarizes the results of the precision acceptance criteria for primary samples and their corresponding duplicate samples for parameters analyzed in the field. No additional measurements were recorded for Secchi-disk depth or air temperature for any of the duplicate samples. Laboratory QA/QC was reviewed by CSHH as lab results were received to ensure that all results fell within acceptable limits defined for precision criteria.

Table 3

Summary of Precision Acceptance Criteria Results for 2023 Season

Parameter	Precision as RPD	Number of Sampling Events Outside Precision Criteria	Dates on Which RPD Value is Exceeded
Water temperature (surface)	10%	0	N/A
Water temperature (bottom)	10%	0	N/A
Specific conductivity* (surface)	10%	1	7/12 (10%)
Specific conductivity* (bottom)	10%	0	N/A
Dissolved oxygen (surface)	20%	0	N/A
Dissolved oxygen (bottom)	20%	1	8/2 (48%)
pH (surface)	5%	0	N/A
pH (bottom)	5%	0	N/A
Turbidity (surface)	20%	3	6/15 (30%), 7/5 (51%), 7/12 (20%)
Turbidity (bottom)	20%	6	7/5 (20%), 8/2 (31%), 8/9 (24%), 8/16 (54%), 9/14 (21%), 10/4 (33%)
Depth	20%	0	N/A

**Specific conductivity is the calibrated parameter to arrive at salinity measurements.*

Accuracy

- Field-measurement accuracy was assessed by performing calibrations and postchecks of the field monitoring equipment the day prior to and the day of monitoring events, respectively. The YSI EXO2S was calibrated according to procedures outlined in the user manual. Each parameter was successfully calibrated as indicated by the instrument. Calibration records are logged and maintained by CSHH and are available upon request. Quality control checks of the equipment were performed at the first monitoring station visited, generally CSHH #1, by completing the following checks:
    - Comparing bottom DO results from the YSI EXO2S to a result obtained via Winkler titration.
    - Comparing surface pH results from the YSI EXO2S to a result obtained via LaMotte wide-range color-comparator.
    - Comparing bottom water temperature results from the YSI EXO2S to a result obtained via calibrated electronic thermometer.
- Laboratory accuracy was evaluated from laboratory control samples (trip blanks) and surrogate samples, published historical data, method validation studies, and experience with similar samples. No laboratory control samples were flagged for contamination or for being outside of standards.
- Parameter-specific acceptance criteria for accuracy are summarized in **Table 1** and **Table 2**. **Table 4** shows acceptable ranges during instrument calibration.

Table 4

Acceptable Calibration Ranges

Calibration Standard	Acceptable Range
DO% (100%)	97.0 – 103.0
Chl a (0 µg/L)	-0.30 – 0.30
Turbidity (0 NTU)	-3.00 – 3.00
Turbidity (124 NTU)	121.00 – 127.00
SpCond (50,000 µS/cm)	48,500 – 51,500
pH (7.00)	6.80 – 7.20
pH (10.00)	9.80 – 10.20
Depth (0 m)	-0.1 – 0.1

Representativeness

- Sampling sites were selected to be representative of the conditions for a specific area of the water body (or a specific pollution source).
- Outfall monitoring stations are not representative of estuarine water quality but are considered representative of conditions in areas in proximity to freshwater inflow and/or similar pollutant loadings.
- Sample-collection timing and frequency at in-harbor stations were chosen to capture data that were representative of a range of conditions (e.g., wet/dry weather, rising/ebb tide, and seasonal variability).

Comparability

Established field protocols were used for vertical profiles and sampling, and standard laboratory analytical methods were used for sample analysis, consistent with previous CSHH water-quality monitoring events. Vertical profiles were performed and samples were collected generally on the same day of the week and at the same time of day.

Completeness

Data were collected for 22 monitoring events for vertical profiles, 12 events for nitrogen grab samples, and 23 events for bacteria grab samples. The goal was to collect data for at least 80% of the anticipated vertical profiles and the anticipated number of grab samples (for in-harbor and outfall bacteria and nitrogen monitoring) for each monitoring event.

- Six stations (CSHH #4-7, #14, and #15) were difficult to consistently access due to tidal cycles. Failure to collect sampling data at these sites does not affect the completeness of the data. It was anticipated that the monitoring sites would be accessible a minimum of once every three to four weeks (an average of at least five times) over the 23-event monitoring season. This goal was met for stations CSHH #4-7 and #14, but not for CSHH #15 (sample data was collected four times).
- Data collection was evaluated for completeness for vertical profiles at stations CSHH #1-3, #8, #13, and #16-17 and included the following parameters: water temperature, salinity, dissolved oxygen, pH, water clarity, and turbidity. All sampling events except for 9/20 (71%) and 9/27 (43%) met or exceeded the 80% completeness criterion.
- Data collection was evaluated for completeness with respect to grab samples for bacteria and nitrogen sampling.
    - Data collection for stations CSHH #1-3, #8-13, #14A, #15A, #16-17, and #17A was evaluated for completeness for the following parameters: fecal coliform and enterococci. The 80% acceptance criterion was exceeded on all dates except 5/17 (14%), 9/20 (79%), and 9/27 (71%).
    - Data collection for stations CSHH #1, #3, #8, #12-13, #14A, #15A, and #16 was evaluated for completeness for the following parameters: total Kjeldahl nitrogen (TKN), ammonia, nitrate, and nitrite. The 80% acceptance criterion for sample collection was met or exceeded on all sampling days except for 5/17 (25%).

Sensitivity

- Sensitivity limits were determined by the laboratory analytical method or the field instrument (from published specifications). The sensitivity limits for each parameter measured in the field are outlined in **Table 1**.
- Laboratory analytical methods have preset limits of detection for fecal coliform, enterococci, ammonia, nitrate, nitrite, and total Kjeldahl nitrogen, as outlined in **Table 2**.

Conclusion: A majority of sampling events met the completeness goal outlined in the QAPP. Procedures were in place to ensure accuracy, precision, representativeness, and comparability of the data. Additionally, there are annotations in the data—color-coded notes indicating data where values appear low/high but have been validated for accuracy, as well as field notes indicating reasons for missing data—which provide additional detail on data quality for consideration when analyzing the data. Although deviations from the precision acceptance, accuracy, and completeness criteria should be noted and considered when analyzing the data, the data collected by the Coalition to Save Hempstead Harbor during the 2023 water-quality monitoring season can be considered appropriate for use for its intended purposes.

Appendix F

Water-Monitoring Data Sheet, Core Program

Collection Date: Wed. other _______________ ___/___ /2023 **Time:** _______________

GPS Land Reference: ____ **BP:** _________ **Depth:** ______

Monitor Name: Carol DiPaolo, Mark Ring, Michelle Lapinel McAllister________

Site Name: CSHH #1, Beacon 11_________________________________ **Location**: Hempstead Harbor

Weather: fog/haze drizzle intermittent rain rain snow clear partly cloudy

% Cloud Cover: 0% 25% 50% 75% 100% other __________

Wind Direction: N NE NW S SE SW E W Velocity: _______kt (mph)

			Date	Amount
Rainfall:	Previous 24 hrs accumulation	______in	_________	_________
	Previous 48 hrs accumulation	______in	_________	_________
	Previous week's accumulation	______in	_________	_________

Tidal Stage: ☐ incoming ☐ outgoing ☐ hours to high tide: _______ H:________ L:________

Water Surface: ☐ calm ☐ ripple ☐ waves ☐ whitecaps

Water Color: ☐ normal: ☐ brown ☐ green ☐ other ____________________________
☐ abnormal: ☐ brown ☐ green ☐ other ____________________________

Water Observations:

☐ jelly fish
☐ odors
☐ oil slick
☐ dead fish
☐ sea weed
☐ floatables
☐ dead crabs
☐ bubbles
☐ ice
☐ algal bloom
☐ foam
☐ turbidity (suspended particles)

Plankton count ________ type ________ sample taken: ☐ surface ☐ ______ below surface

Comments____
____
____
____
____
____
____
____
____
____
____
____
____

Water-Monitoring Data Sheet

Date: ___ /___ /2023

Station: CSHH #________ GPS: 40.______________° 73.______________° Time: __________ Grab Samples: N____ B____

	Sample Depth (m)	Temp (°C)	Salinity (ppt)	DO		pH	Secchi (m)	Chlorophyll (ug/L)	Turbidity (NTU)
				(%)	(ppm)				
Wind	Surface								
______	0.5								
	1								
	2								
Air °C	3								
______	4								
	5								
Repeat	0.5								
	1								
	2								
	3								
	4								
	5								

Station: CSHH #________ GPS: 40.______________° 73.______________° Time: __________ Grab Samples: N____ B____

	Sample Depth (m)	Temp (°C)	Salinity (ppt)	DO		pH	Secchi (m)	Chlorophyll (ug/L)	Turbidity (NTU)
				(%)	(ppm)				
Wind	Surface								
	0.5								
	1								
______	2								
	3								
	4								
Air °C	5								
	6								
______	7								
	8								
	9								
	10								
	11								

Station: CSHH #________ GPS: 40.______________° 73.______________° Time: __________ Grab Samples: N____ B____

	Sample Depth (m)	Temp (°C)	Salinity (ppt)	DO		pH	Secchi (m)	Chlorophyll (ug/L)	Turbidity (NTU)
				(%)	(ppm)				
Wind	Surface								
	0.5								
	1								
______	2								
	3								
	4								
Air °C	5								
	6								
______	7								
	8								
	9								
	10								
	11								

Note: Bottom depth of sampling represented here is not the total depth. Total depth includes an addition of 0.3 m, which is the distance from the depth sensor on the YSI EXO2S to the bottom of the platform. Total depth is reflected in the data entry Excel spreadsheet.

Water-Monitoring Data Sheet–Wildlife Observations

Date __________

Birds

Upper Harbor		Lower Harbor
☐ Bald Eagles	____________	____________
☐ Cormorants	____________	____________
☐ Ducks, Mallards	________ ducklings ________	________ ducklings ________
☐ Egrets, Great	____________	____________
☐ Snowy	____________	____________
☐ Geese, Canada	________ goslings ________	________ goslings ________
☐ Brandt	____________	____________
☐ Hooded Gulls	____________	____________
☐ Herons, Blue	____________	____________
☐ Black-Crowned Night	____________	____________
☐ Green	____________	____________
☐ Belted Kingfisher	____________	____________
☐ Ospreys	________ chicks ________	________ chicks ________
☐ Plover-type, Killdeer	____________	____________
☐ Swans, mute	________ cygnets ________	________ cygnets ________
☐ Terns	____________	____________
☐ Other	____________	____________

Jellyfish

☐ Comb, Sea Walnuts ____________________

☐ Sea Gooseberries ____________________

☐ Lion’s Mane ____________________

☐ Moon ____________________

Fish

☐ Baitfish ____________________

☐ Blue ____________________

☐ Bunker ____________________

☐ Striped Bass ____________________

☐ Small Shrimp ____________________

Crabs

☐ Asian shore ____________________

☐ Blue-claw ____________________

☐ Horseshoe ____________________

Other Wildlife

____

Human Activities

☐ Barges/tugs, Pt. W gravel op.________ Gladsky ________ Raison________ DiNapoli ________

Global Fuel ____________________

☐ Boats, power ________ sailboats ________ kayaks ________ crew ________

shellfishing________near Matinecock Pt.________ Webb Inst. ________ other ________

☐ Anglers, at beaches________ at piers ________

☐ Other ____________________

Floatables Observations (type, approximate number)

☐ Bottles, glass _______ plastic ________ ☐ cans _______ ☐ paper ________ ☐ plastic bags/pieces ________

☐ Styrofoam, cups _______ pieces _______ ☐ wood, boards _______ pieces ______ other ________

☐ Other____________________

Hempstead Harbor Core Program
Calibration Data Sheet YSI EXO2S

• Calibrations to be completed **DAY BEFORE** or **MORNING OF** Field Sampling Date •
• Post-Readings to be completed the **AFTERNOON OF** or **DAY AFTER** Field Sampling Date •

Calibrations • Person: ________________________ **Date:** __________________ **Time:** ________________

Post-Readings • Person: ________________________ **Date:** __________________ **Time:** ________________

Handheld S/N: 22D105429 **Sonde S/N:** 01640-18-08838

◊ COMPLETE **BEFORE** SAMPLING ◊

① Calibrate **DISSOLVED OXYGEN (ODO % sat)**

Barometric Pressure (mmHg) ....

Cal value =

Temperature ....

Pre-Cal Value **Post-Cal Value**

ODO Gain ....

② Calibrate **CHLOROPHYLL (µg/L) • 1-Point Calibration**

Pre-Cal Value **Post-Cal Value**

③ Calibrate **CHLOROPHYLL (RFU) • 1-Point Calibration**

Pre-Cal Value **Post-Cal Value**

④ Calibrate **TURBIDITY • 2-Point Calibration**

→1st Cal Value: 0 NTU (Reagent Grade Water)

Pre-Cal Value **Post-Cal Value**

Note: use "sensor value"

→2nd Cal Value: 124 NTU (Turbidity Standard)

Pre-Cal Value **Post-Cal Value**

⑤ Calibrate **Specific Conductance (50,000 µS/cm)**

Pre-Cal Value **Post-Cal Value** **Cell Constant** ....

⑥ Calibrate **pH • 2-Point Calibration**

→ 1st Cal Value: pH 7.00 (Buffer Solution)

Pre-Cal Value **Post-Cal Value**

→ 2nd Cal Value: pH 10.00 (Buffer Solution)

⑥ Calibrate **DEPTH (0 m)**

Pre-Cal Value **Post-Cal Value**

◊ COMPLETE **AFTER** SAMPLING ◊

① Post-reading for **DISSOLVED OXYGEN (% sat)**

② Post-reading for **CHLOROPHYLL (µg/L)**

③ Post-reading for **CHLOROPHYLL (RFU)**

④ Post-reading for **TURBIDITY (0 NTU)**

Post-reading for **TURBIDITY (124 NTU)**

⑤ Post-reading for **SP COND (50,000 µS/cm)**

⑥ Post-reading for **pH (7.00)**

Post-reading for **pH (10.00)**

⑦ Post-reading for **DEPTH (0 m)**

	Reagent Grade Water	**Turbidity Standard** 124 NTU	**Conductivity Standard** 50,000 µS/cm	**pH 7 Standard**	**pH 10 Standard**
Manufacturer	Ricca	YSI	YSI	YSI	YSI
Lot Number	2302C36	23B23050033	23A100570	23F4S	23F5T
Expiration	July 2024	February 2024	7.29.24	6.21.25	6.15.25

Accuracy Range Table	
DO% (100%)	97 – 103
Chl *a* (0 µg/L)	-0.30 – 0.30
Turbidity (0 NTU)	-3.00 – 3.00
Turbidity (124 NTU)	121.0 – 127.0
SpCond (50,000 µS/cm)	48,500 – 51,500
pH (7.00)	6.80 – 7.20
pH (10.00)	9.80 – 10.20
Depth (0 m)	-0.1 – 0.1

GPS of reference station: (circle one) [✓ **NAD-83**] **WGS-84**

• within 2 days of sampling day • in decimal degrees •

Lat.: **Long.:**

Nassau Co. DOH PHL 209 Main Street Hempstead, NY 11550	FORM NAME: COALITION TO SAVE HEMPSTEAD HARBOR ☐ QC ☐ Equip Maint ☐ Training ☐ Comp Doc ☑ Other	
LABORATORY SECTION ☐ Chemistry ☑ Environmental Microbiology ☐ Clinical Microbiology	Form. No.: Beach Monitoring Daily Sampling Log - 1	Rev: 3
	Date: 12/14/2021	Created By: CONNIE IANNUCCI

BEACH MONITORING DAILY SAMPLING LOG

COALITION TO SAVE HEMPSTEAD HARBOR

Elap ID
#10339

NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF PUBLIC HEALTH LABORATORIES
209 MAIN STREET, HEMPSTEAD, NY 11550
DAVID TAMAYEV, MD, MICROBIOLOGY TECHNICAL DIRECTOR
TELEPHONE (516) 572-1202 FAX (516) 572-1206

Michelle Lapinel McAllister
COLLECTOR'S NAME **DATE**

ALL SAMPLES SUBMITTED IN STERILE POLYSTYRENE VESSELS CONTAINING SODIUM THIOSULFATE (UNLESS OTHERWISE SPECIFIED)

Field Number		**Location**	**Time**	**Temperature**		**Wind**	**Weather**	**Wave Height**	**Laboratory Use Only**			
				Air	**Water**				**Lab Number**	**Fecal Coliforms CFU/100 mL**	**Enterococci CFU/100 mL**	**Comments**
CSHH-1		BEACON ELEVEN										
CSHH-1A												
CSHH-2		BELL BUOY 6										
CSHH-3		RED MARKER GLEN COVE CREEK										
CSHH-4		BAR BEACH SPIT										
CSHH-5		MOTT'S COVE										
CSHH-6		EAST OF FORMER TNH INCINERATOR										
CSHH-7		BRYANT LANDING										
CSHH-8		GLEN COVE STP										
CSHH-9		FIRST PIPE WEST OF STP OUTFALL										
CSHH-10		PIPE AT CORNER OF SEAWALL WEST OF STP OUTFALL										
CSHH-11		50 YARDS EAST OF STP OUTFALL										
CSHH-12		EAST OF STP OUTFALL BY BEND IN SEAWALL										
CSHH-13		60 FEET WEST OF MILL POND WEIR										

COMMENTS/REMARKS:

REPORT TO: **RECREATIONAL FACILITIES**
200 COUNTY SEAT DRIVE
MINEOLA, NY 11501

***ESTIMATED COUNT**
TNTC = "TOO NUMEROUS TO COUNT"

DATA ENTRY:

PROOFED:

TEST	**TECHNOLOGY**	**METHOD**
Fecal Coliform CFU/100 ml.	MF-QN	SM 9222D-2006
Enterococci CFU/100 ml	MF-QN	EPA 1600

TEMP CONTROL:

TIME RECEIVED:

DATE RECEIVED:

DATE ANALYZED:

SAMPLE ACCEPTABLE: YES ☐ NO ☐

ANALYSIS SUCCESSFUL: YES ☐ NO ☐

LABORATORY ACCREDITATION NOTICE:

The results provided on this report have been produced in compliance with "NELAC" (National Environmental Laboratory Accreditation Conference) standards and relate only to the identified sample. Any deviations from the accepted "NELAC" collection requirements for non-potable samples are appropriately noted. This report shall not be reproduced except in full without the written approval of the laboratory. Current New York State laboratory certification status is maintained under ELAP ID #10339.

VERIFICATION REVIEW

Name:

Title:

Date:

Comments:

Nassau Co. DOH PHL 209 Main Street Hempstead, NY 11550	FORM NAME: COALITION TO SAVE HEMPSTEAD HARBOR ☐ QC ☐ Equip Maint ☐ Training	☐ Comp Doc	☑ Other
LABORATORY SECTION ☐ Chemistry ☑ Environmental Microbiology ☐ Clinical Microbiology	Form. No.: Beach Monitoring Daily Sampling Log - 1 Date: 12/14/2021	Rev: 3 Created By: CONNIE IANNUCCI	

BEACH MONITORING DAILY SAMPLING LOG

COALITION TO SAVE HEMPSTEAD HARBOR

Elap ID
#10339

NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF PUBLIC HEALTH LABORATORIES
209 MAIN STREET, HEMPSTEAD, NY 11550
DAVID TAMAYEV, MD, MICROBIOLOGY TECHNICAL DIRECTOR
TELEPHONE (516) 572-1202 FAX (516) 572-1206

Michelle Lapinel McAllister
COLLECTOR'S NAME **DATE**

ALL SAMPLES SUBMITTED IN STERILE POLYSTYRENE VESSELS CONTAINING SODIUM THIOSULFATE (UNLESS OTHERWISE SPECIFIED)

Field Number		**Location**	**Time**	**Temperature**		**Wind**	**Weather**	**Wave Height**	**Laboratory Use Only**			
				Air	**Water**				**Lab Number**	**Fecal Coliforms CFU/100 mL**	**Enterococci CFU/100 mL**	**Comments**
CSHH-14		NW CORNER OF POWER PLANT ~ 50 YARDS FROM CEMENT OUTFALL										
CSHH-14A		CEMENT OUTFALL ADJACENT TO POWER PLANT										
CSHH-15		NW CORNER OF TAPPEN POOL										
CSHH-15A		SCUDDER'S POND OUTFALL @ SEAWALL N. OF TAPPEN POOL										
CSHH-15B		SCUDDER"S POND WEIR										
CSHH-16		UPPER HARBOR MIDWAY BETWEEN EAST/WEST SHORE										
CSHH-17		OUTSIDE RESTRICTED AREA OF CRESCENT BCH ACROSS FROM WHITE BLDG										
CSHH-17A		INSIDE RESTRICTED AREA OF CRESCENT BCH ACROSS FROM WHITE BLDG & STREAM										
TRIP BLANK												

COMMENTS/REMARKS:

REPORT TO: **RECREATIONAL FACILITIES**
200 COUNTY SEAT DRIVE
MINEOLA, NY 11501

Tide: High / Low **Time**: ______
Tide: High / Low **Time**: ______

14A: Mixed / Direct **15A**: Mixed / Direct

***ESTIMATED COUNT**
TNTC = "TOO NUMEROUS TO COUNT"

DATA ENTRY: PROOFED: RAIN 24 : RAIN 48: SOURCE: Sea Cliff rain gauge

TEST	**TECHNOLOGY**	**METHOD**
Fecal Coliform CFU/100 ml.	MF-QN	SM 9222D-2006
Enterococci CFU/100 ml	MF-QN	EPA 1600

TEMP CONTROL: TIME RECEIVED: DATE RECEIVED:

DATE ANALYZED:

SAMPLE ACCEPTABLE: YES ☐ NO ☐ ANALYSIS SUCCESSFUL: YES ☐ NO ☐

LABORATORY ACCREDITATION NOTICE:

The results provided on this report have been produced in compliance with "NELAC" (National Environmental Laboratory Accreditation Conference) standards and relate only to the identified sample. Any deviations from the accepted "NELAC" collection requirements for non-potable samples are appropriately noted. This report shall not be reproduced except in full without the written approval of the laboratory. Current New York State laboratory certification status is maintained under ELAP ID #10339.

VERIFICATION REVIEW

Name:	**Title:**	**Date:**
Comments:		

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 1 **Of** 1

Section A
Required Client Information:

Company: Coalition to Save Hempstead Harbor
Address: PO Box 159
Sea Cliff, NY 11579
Email: info@thecshh.org
Phone: (516) 801-6792 Fax
Requested Due Date:

Section B
Required Project Information:

Report To: Michelle Lapinel McAllister
Copy To: michelle@thecshh.org
Purchase Order #:
Project Name: HEMPSTEAD HARBOR MONITORING
Project #:

Section C
Invoice Information:

Attention:
Company Name:
Address:
Pace Quote:
Pace Project brianna.rivera@pacelabs.com
Pace Profile #: 7288

Regulatory Agency

State / Location
NY

Requested Analysis Filtered (Y/N)

MATRIX / CODE
Drinking Water DW
Water WT
Waste Water WW
Product P
Soil/Solid SL
Oil OL
Wipe WP
Air AR
Other OT
Tissue TS

ITEM #	SAMPLE ID One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique	MATRIX CODE (see valid codes to	SAMPLE TYPE (G=GRAB C=CO	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Y/N Analyses Test	No2/NO3,	NO2	NH3	TKN	Total Nitrogen	Total Organic Nitrogen							Residual Chlorine (Y/N	
1	CSHH #1	WT	G						2	1	1								X	X	X	X	X	X								
2	CSHH #3	WT	G						2	1	1								X	X	X	X	X	X								
3	CSHH #6	WT	G						2	1	1								X	X	X	X	X	X								
4	CSHH #7	WT	G						2	1	1								X	X	X	X	X	X								
5	CSHH #8	WT	G						2	1	1								X	X	X	X	X	X								
6	CSHH #12	WT	G						2	1	1								X	X	X	X	X	X								
7	CSHH #13	WT	G						2	1	1								X	X	X	X	X	X								
8	CSHH #14A	WT	G						2	1	1								X	X	X	X	X	X								
9	CSHH #15A	WT	G						2	1	1								X	X	X	X	X	X								
10	CSHH #16	WT	G						2	1	1								X	X	X	X	X	X								
11																																
12																																
13																																
14																																

SAMPLE CONDITIONS

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Michelle Lapinel McAllister

SIGNATURE of SAMPLER: **DATE Signed:**

prepared by

COALITION TO SAVE HEMPSTEAD HARBOR
EST. 1986

Report printed on recycled paper.