2024 Water-Quality Report Hempstead Harbor

(Full Report, Including Appendices)

Coalition to Save Hempstead Harbor
Est. 1986

Hempstead Harbor Protection Committee

Report printed on recycled paper.

prepared by

Coalition to Save Hempstead Harbor

July 7, 2025

Cover Photos

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Black-crowned night heron - Tom Peppe, 6/3/24
Birds gathering at Scudder's Pond - Kathleen Haley, 9/27/24
Spat-on-shell oysters - Michelle Lapinel McAllister, 6/25/24

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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), EPA Long Island Sound Study Office, National Fish and Wildlife Foundation, and Long Island Sound Futures Fund; NYS Department of Environmental Conservation (DEC); Interstate Environmental Commission (IEC); and Nassau County Soil and Water Conservation District (NCSWCD). We also appreciate the Towns of North Hempstead and Oyster Bay for providing their boats for the shellfish seeding of 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 Fuss & O'Neill.

Introduction

About 40 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 donations, 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 garnered 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, further enhancing the monitoring program's credibility and enabling 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 EPA and accepted by 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 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 grown, as has the network of partners that have supported it. The number of testing parameters and stations has also increased to better address watershed issues and improvements.

Great egrets fishing in Scudder's Pond (photo by Elaine Neice, 10/1/24)

In 2013, the program was expanded to include winter monitoring (November to May) of Scudder's Pond and powerhouse drain outfalls. As described in later sections of this report, Scudder's Pond had been identified as the major contributor of bacteria to Hempstead Harbor and the powerhouse drain outfall as the second largest contributor. Three new stations were established at these sites (in 2009) in anticipation of restoration work planned for Scudder's Pond, which was completed in June 2014. Although weekly winter monitoring for Scudder's Pond ended in April 2016, samples are collected periodically to check on conditions while winter sample collection is focused on the powerhouse drain outfall. See *Section 2.2.2* for details on station expansion within the program.

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 CAC members in Washington, DC, for Long Island Sound Day, 7/10/24 (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 and 2025 revisions and updates 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 the 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 on the EMPACT website 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 beginning in 2022 and continued through 2024. 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 2024, CSHH coordinated its annual Scudder's Pond cleanup and included water-monitoring and oyster-gardening demonstrations. In September 2024, CSHH coordinated local activities as part of the


Volunteers for the CSHH Scudder's Pond Cleanup and International Coastal Cleanup (photos by Lisa Cashman, 4/20/24, and 9/21/24, respectively)

International Coastal Cleanup, as it has for all but four years since 1992, however since 2022, the cleanup has been expanded to a harborwide cleanup covering four beaches. In 2020, in lieu of the International Coastal Cleanup (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.

Spat-on-shell oysters grown out and ready to be planted (photo by Carol DiPaolo, 9/12/24)

In 2022, CSHH launched the first **oyster gardening program** for Hempstead Harbor. Volunteers at three locations helped maintain cages of spat-on-shell oysters. At the end of the season, half of the 30,000 oysters raised were released to a DEC-approved spawner sanctuary in Cold Spring Harbor; the other half were released in the newly CSHH-established conservation management area in Hempstead Harbor. The program was expanded in 2023 to four locations, raising 60,000 spat-on-shell oysters, all of which were planted in Hempstead Harbor. In 2024, nearly 80,000 oysters were successfully raised and planted in Hempstead Harbor.

In response to increased 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.

Since 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. Dr. Santoferrara's students continue to join CSHH for a portion of the monitoring season to collect samples required for their research.

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 targeted conditions in Dosoris Pond, and in 2024 expanded sample collection to include West Pond.

In 2024, CSHH established a test site at Tappen Beach to monitor horseshoe crabs in Hempstead Harbor as part of the New York Horseshoe Crab Monitoring Network. Additionally, CSHH joined the Save the Horseshoe Crab Coalition, a network of organizations dedicated to advocating for policies that benefit horseshoe crabs.

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 revitalization plans for harbor communities (e.g., Long Island Open Space Regional Advisory Committee, 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 more than 40 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.

To assess the health of oyster habitat, HHPC has commissioned several shellfish population density and sediment surveys (most recently in 2021) and a hydrodynamic study (that began in 2024). HHPC also obtained a 2022 Community Project Grant to plant approximately two million spat-on-shell oysters in Hempstead Harbor (with a total of six million across the three north shore bays).

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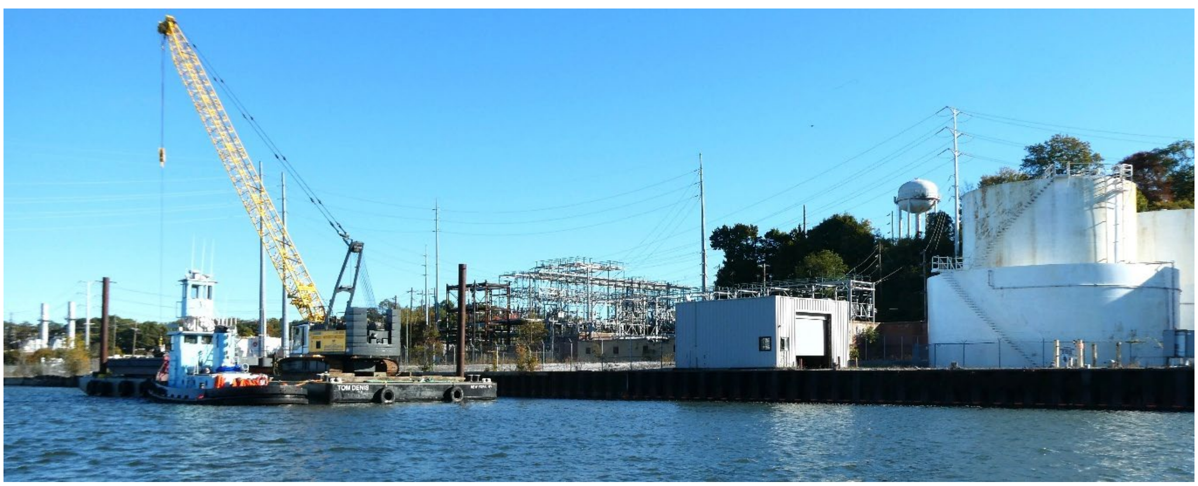
1 Harbor Overview

Hempstead Harbor is located 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 five 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. Efforts to restore the harbor resulted in the closure of a landfill, two incinerators, and a sewage treatment plant (STP); the remediation of numerous hazardous waste sites; and the decommissioning of the Glenwood Landing powerhouse building and adjacent substation. These dramatic changes have all helped to improve the harbor's water quality.

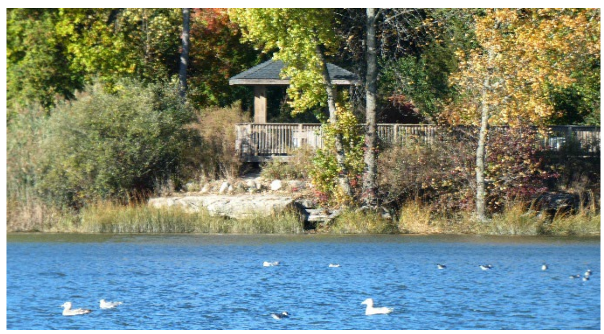


Work barges and tug boat along seawall of Glenwood Landing power plant
(photo by Carol DiPaolo, 10/16/24)

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 with gazebo, along the western shore (above l and r) (photos by Carol DiPaolo, 5/20/15 and 9/16/20, respectively); more recent view of gazebo (r) (photo by Carol DiPaolo, 10/16/24)

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 re-covered 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 more than 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), which 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 also (until very recently) 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.

Sands Point Village Beach Club (l) and The Beacon at Garvies Point, Glen Cove (r)
(photos by Carol DiPaolo, 8/28/24)

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 EPA and accepted by 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 2020-2024; 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. Note that the previously mentioned QAPP categorizes monitoring stations as part of either in-harbor monitoring (CSHH #1-7, #16-17, and #17A) or outfall monitoring (CSHH #8-12, #12A, #13-14, #14A, #15A, and #15B).

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 (CSHH #4-7 and #14) and one other station located midharbor but close to the shoreline (CSHH #15) 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 #12A, first outfall east of #12 on north bulkhead
- CSHH #13, about 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

- CSHH #15A, at the Scudder's Pond/Littleworth Lane outfall, north of the Tappen Beach pool
- 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 shellfish 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, in 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, at the powerhouse drain outfall

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

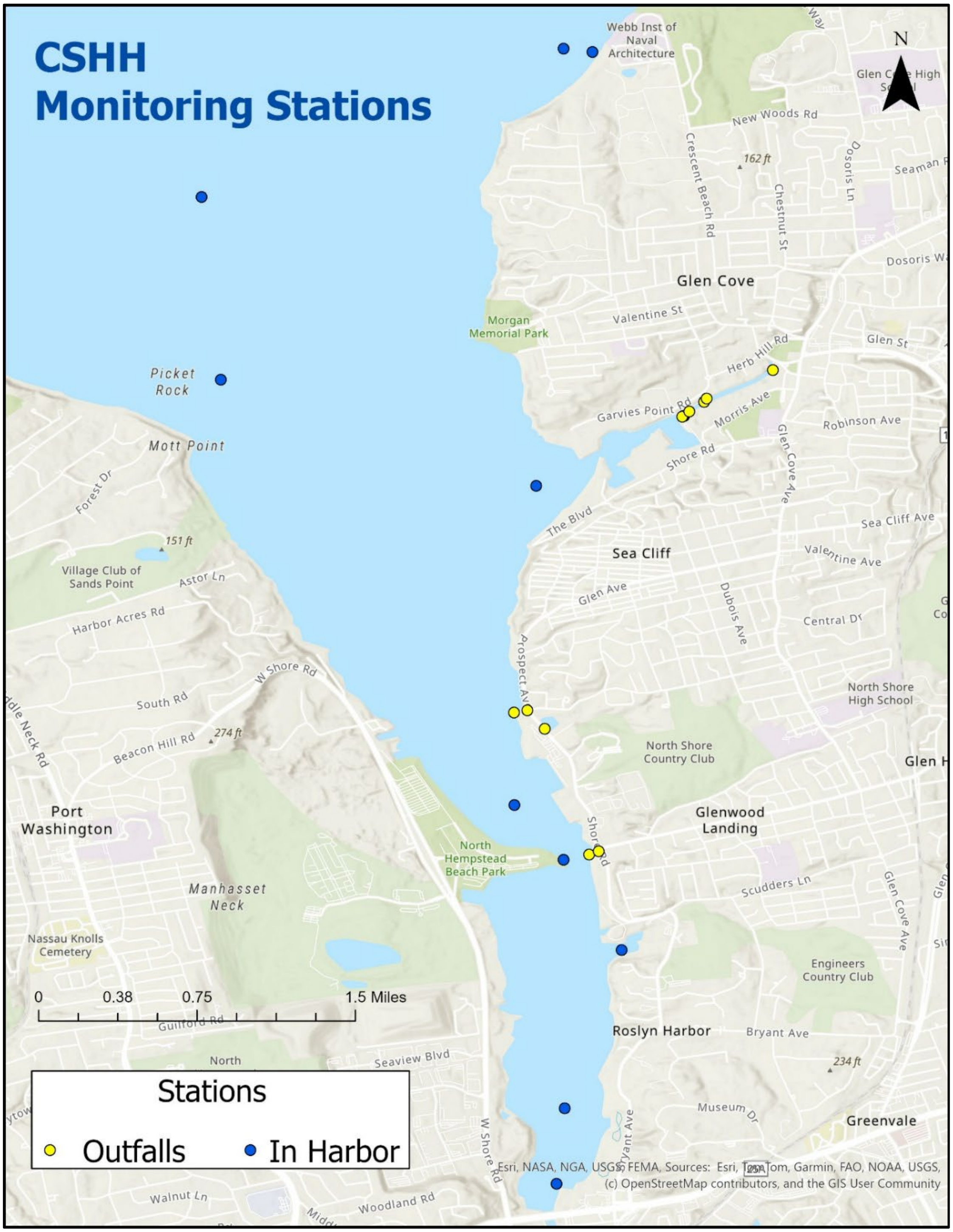


Figure 2
Station Locations for Harbor Sections and Glen Cove Creek

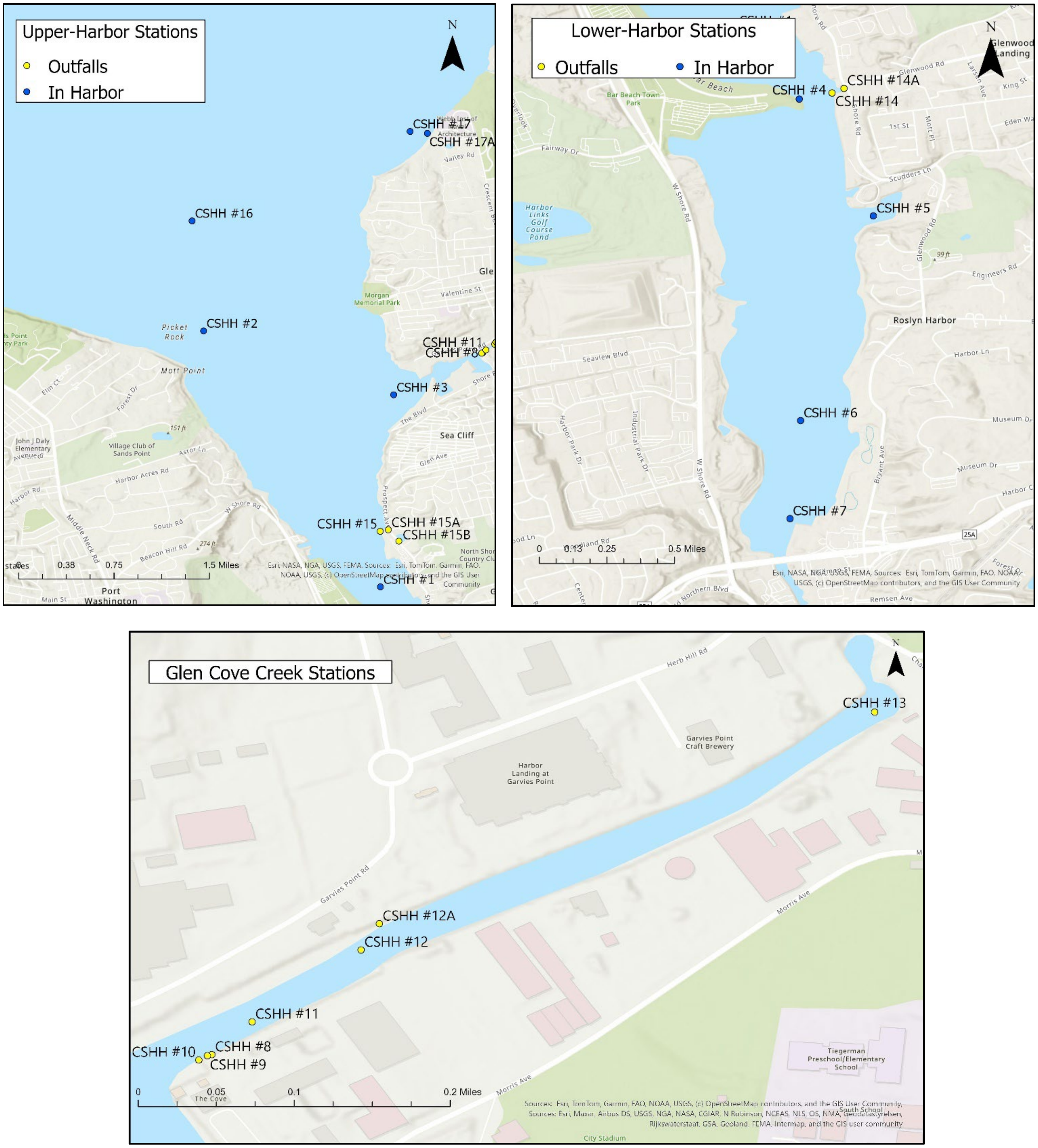


Table 1
Latitude/Longitude Points for Monitoring Stations (NAD 83 Datum)

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, at the Glen Cove 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 #12A, first outfall east of #12 on north bulkhead	40.85971	073.64037
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	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) 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. (In 2021, this data proved to be invaluable for tracking a sewer line break that occurred in downtown Glen Cove, east of Mill Pond, resulting in raw sewage being discharged into Glen Cove Creek.)

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, stations CSHH #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.

Between 2019 and 2022, stations were added and data collected to monitor water quality around aquaculture projects in Tappen Marina (summer shellfish raising and winter kelp growing). These stations (CSHH #18-22) are not currently monitored.

CSHH #12A, on the north seawall of Glen Cove Creek, on a day with unusual orange flow (photo by Carol DiPaolo, 9/25/24)

Station CSHH #12A is an outfall in Glen Cove Creek with continuous flow from an unknown source. Starting in 2021, samples were taken from the direct flow for bacteria analysis. In 2024, CSHH officially incorporated this station as part of the core monitoring program.

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.

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 22 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. Starting in 2018, samples were collected and delivered to Pace Analytical Services, LLC, for analysis of nitrite, nitrate, and ammonia. In 2019, ten stations were selected for biweekly nitrogen testing; total Kjeldahl nitrogen was added to the analyses of CSHH samples by Pace. 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, 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 these parameters, 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's regular season, the electronic meter is used starting at a half meter below the surface and followed by one-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 (photo by Michelle Lapinel McAllister, 5/22/24)

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*).

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). 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.) As of 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. Winter monitoring continues; since 2020, winter testing is conducted biweekly for bacteria and nitrogen. Water samples are delivered to Nassau County Department of Health for bacteria analysis (fecal coliform and enterococci) and Pace Analytical Services, LLC, for nitrogen analysis (nitrite, nitrate, ammonia, and total Kjeldahl nitrogen).

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; CSHH #12A, 14A, 15A, 15B	Calibrated digital thermometer	Field
Air temperature	CSHH #1-12, 12A, 13-14, 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
Chl *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 #1-12, 12A, 13-14, 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 #1-12, 12A, 13-14, 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.*
*** Chl a is not a core-program parameter, as data is not validated via a separate lab-tested chlorophyll filtration. However, the sonde is calibrated and readings are recorded as a frame of reference.*

2.3 Unified Water Study

The Coalition to Save Hempstead Harbor has participated in the Unified Water Study: Long Island Sound Embayment Research (UWS) 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 2024, 27 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).

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

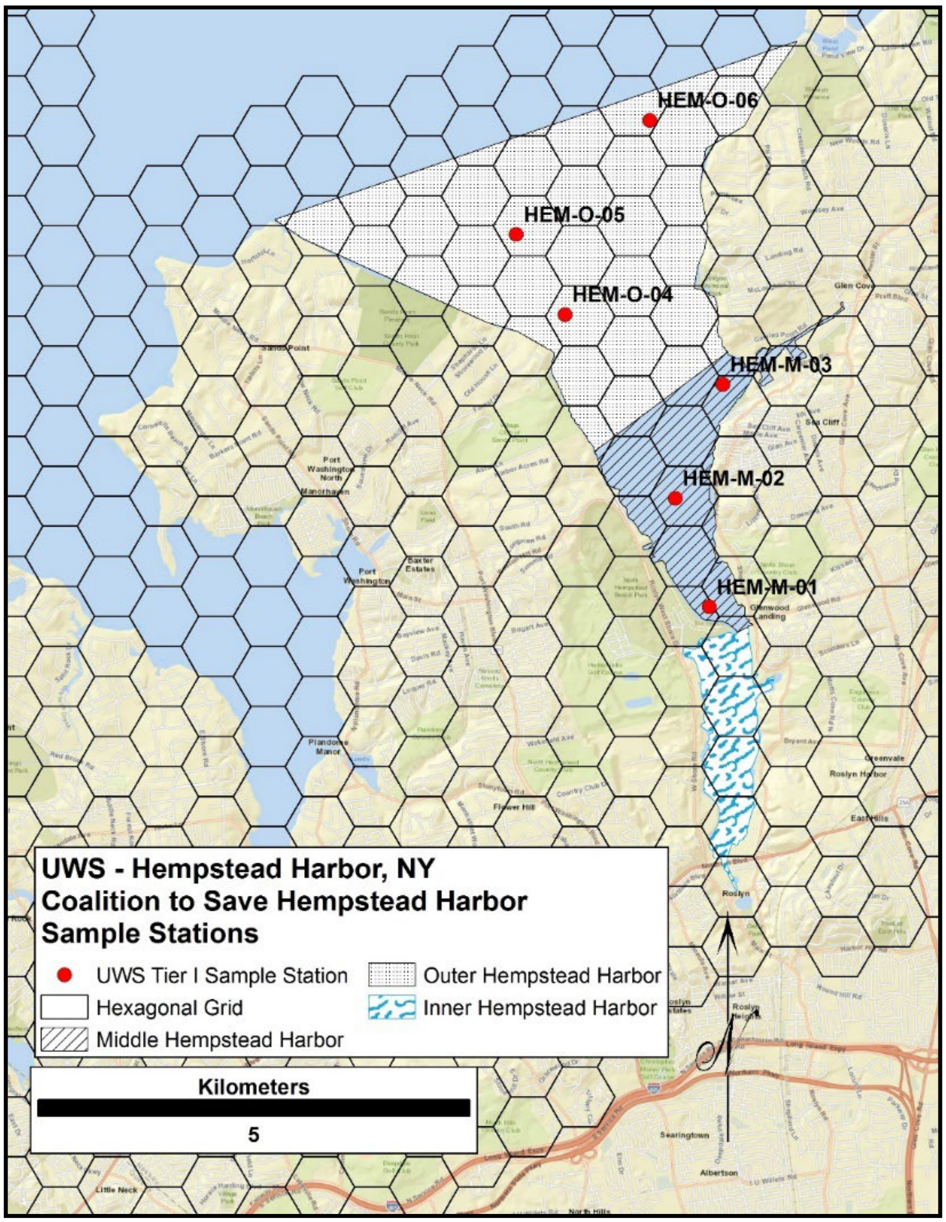
Bell 6 is CSHH #2 for the core program and HEM-O-04 for the UWS (photo by Michelle Lapinel McAllister, 5/22/24)

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.

Figure 3
Location of Hempstead Harbor UWS Stations



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

The program also includes a macrophyte (aquatic plant, or seaweed) assessment that must be conducted on three days (ideally a week apart) from July 15 to August 7. This involves a rake toss in three directions from a dock or by wading in to the water. A photo assessment was completed for each rake toss, and seaweed was categorized by quantity (none, some, or lots), color (green or non-green), and growth type (sheet, twig-like, or hair-like). CSHH selected three sites for this assessment: North Hempstead Beach Park, Tappen Marina boat launch, and Garvies Point Museum & Preserve. (Note that before 2024, CSHH performed a macrophyte "soft shoreline" photo assessment instead.)

Wading in at North Hempstead Beach Park (l) and close-up of green and red seaweed at Tappen boat launch (r) (photos by Michelle Lapinel McAllister, 7/31/24)

The results from the UWS monitoring season for all bays are included in a biannual report card, the most recent being the "2024 Long Island Sound Report Card" (encompassing data for the 2023 season). This was the third 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 connects to the Eastern Narrows segment of the sound (which was given an overall grade of "B"), whereas Hempstead Harbor was assigned a grade of "D+" for "Outer Hempstead Harbor" and a "D" for "Middle Hempstead Harbor." The "D" grades were attributed to low dissolved oxygen (which was scored "F") during summer months in the harbor. For the previous "2022 Long Island Sound Report Card," "Outer Hempstead Harbor" scored better with a "C+" whereas the "Middle Hempstead Harbor" grade was a "D." These results are surprising given the improvements in water quality observed in Hempstead Harbor over the past 35 years.

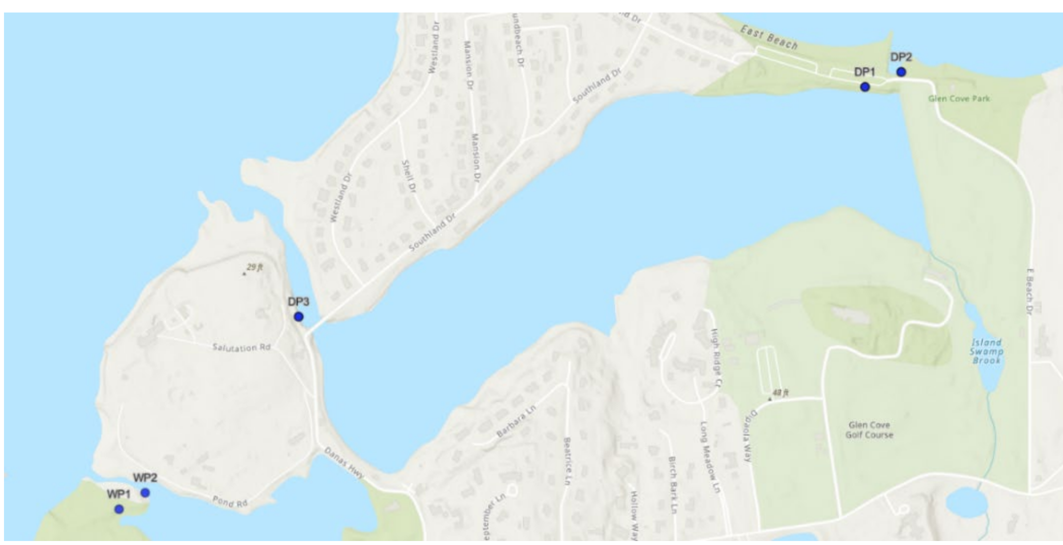
2.4 Long Island Sound Pathogen Monitoring Network

CSHH participated in the 2023 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."

Station "DP3" (l), near flow between tidal gates at west end of Dosoris Pond and Long Island Sound, and grabbing a water sample at station "WP1" (r) at channel between West Pond and Long Island Sound (photos by Carol DiPaolo, 4/5/24 and 4/10/24, respectively)

CSHH's first-year testing efforts focused on four stations located at Dosoris Pond. Dosoris Pond has been closed to shellfishing for many years due to suspected bacteria contamination from the watershed, despite a lack of recent testing. In 2024, there were three sampling stations at Dosoris Pond and sampling was expanded to include two stations at West Pond, which has also been closed to shellfishing due to suspected bacteria contamination. 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. With the current monitoring, it is hoped that problem areas can be identified and addressed, potentially leading to the recertification of shellfish beds in Dosoris Pond and West Pond, as well as adjacent areas connecting to Hempstead Harbor and Long Island Sound.

Figure 4
Location of Hempstead Harbor LIS Pathogen Monitoring Network Stations



2.5 Hydrodynamic/Suitability Model to Support Oyster Restoration

In 2024, Adelphi University professor Ryan Wallace conducted part one of a two-part hydrodynamic study in Hempstead Harbor (part two will be conducted in 2025). The first part of this study established four stations in Hempstead Harbor to collect data to set the parameters for a hydrodynamic/Lagrangian Particle Tracking (LPT) model. LPT is a computational method used to predict particle transport in fluids and can be used to project oyster larvae transport and settlement in specific areas within a water body. The information provided by the LPT model was combined with water-quality and sediment survey data to create oyster habitat suitability models for Hempstead Harbor. A similar study had previously been conducted for the Oyster Bay/Cold Spring Harbor complex.

2.5.1 Data Collection Methodology

The study was conducted from June 13 through October 10, 2024. Continuous water-quality meters were placed at two locations in Hempstead Harbor (HH-1, an area near Tappen Marina, and HH-2, an area south of the sandspit at the southern end of North Hempstead Beach Park) in two-week deployments, alternating deployments between each site. The meters collected data from bottom water for dissolved oxygen (DO), pH, and water temperature.

Pump used for measuring water-quality parameters for hydrodynamic study (l) and sensors for bottom-water measurements (r) (photos by Carol DiPaolo, 6/13/24)

Biweekly trips were made to the same two locations (HH-1 and HH-2) from mid-June to early October to collect surface-water data, including DO, pH, water temperature, conductivity, and chlorophyll *a*. Along with continuous monitoring of water-quality parameters at HH-1 and HH-2, Nortek Eco acoustic doppler current profilers (ADCP) were deployed biweekly, alternating between the two locations, to collect continuous data for tidal cycles, water current velocity, and water current direction.

Two other locations (HH-3, a central area of Hempstead Harbor, and HH-4, an area near Mott Point) were established for the purpose of additional chlorophyll-*a* analysis. At these two locations, filtered chlorophyll-*a* samples were collected biweekly and then analyzed at an Adelphi University lab.

2.5.2 Water-Quality Findings

At the start of the study in June, data collected included mean water temperature that was between 18-19°C and DO concentrations and pH levels that were generally high (greater than 8 mg/L and 7.8, respectively). In July, when air temperatures increased, water temperature increased as well and pH dropped and continued on that trend throughout the month. Toward the middle of July, DO concentrations dropped into hypoxic levels (DO less than 3.0 mg/L) and pH decreased (less than 7.7). By the end of July, some areas in the harbor became anoxic (DO less than 1.0 mg/L) and pH dropped to below 7.2. These findings are consistent with CSHH water-monitoring data.

The continuous water-monitoring buoy at HH-1 was removed in August by an unknown party, so water-quality data is missing for that month. It was assumed that there were the typical fluctuations over the 24-hour daily cycle in DO and pH due to algal blooms occurring in the area (i.e., higher DO and pH during the day due to photosynthesis; lower DO and lower pH at night). (The buoy was later recovered from Manhasset Bay.)

In September, DO concentrations were hypoxic, and pH dipped below 7.1. CSHH data for September varied slightly from the Wallace data; CSHH data showed higher pH and DO values for stations monitored during this time, with the exception of one station at the head of Glen Cove Creek, which has historically exhibited longer periods of low DO and pH.

By the end of the hydrodynamic study in October, the data collected indicated that water quality had improved as air and water temperatures became cooler. CSHH data supports this as well; DO and pH levels increased in October.

2.5.3 Tidal and Current Data Findings

Prior to development of the LPT model, the study examined local wind speed and direction, tidal data, and water current velocity and direction within Hempstead Harbor. The data collected from the three deployments of the Nortek Eco acoustic doppler current profiler from June through early August indicated that ebbing tides in Hempstead Harbor generally exhibited higher velocities, and mean currents flowed in a northerly direction. However, results from the final deployment of the Nortek Eco ADCP in September showed that the average current flowed in a south-southwest direction, and higher current velocities occurred during flood tides. The disparity in results is likely due to prevailing northwest winds in mid-September, but further analysis of local meteorological conditions is necessary.

2.5.4 Larval Transport and Habitat Suitability Models

Once the Hempstead Harbor hydrodynamic model was developed, three particle release points were set for the Lagrangian Particle Tracking model to simulate shellfish larval dispersion and settlement. The LPT model ran for a three-week period from July 17 through August 7, 2024, with results obtained in one-week intervals.

The hydrodynamic/LPT model results were combined with water-quality data and the results of the 2021 sediment survey (part of the Report on Shellfish Density Survey for Hempstead Harbor) conducted by Cashin Associates. The sediment survey identified areas in the harbor that have a suitable substrate (i.e., a sandy bottom) for oyster growth. This information helped create a habitat suitability model to identify areas that would have the greatest success for oyster larval growth and survival.

The habitat suitability model provided a range of habitats for oyster growth, from consistently "good" to "bad," during the period of June to October, with July exhibiting some of the lowest suitability values. However, oyster restoration efforts, specifically the CSHH's oyster gardening program initiated in 2022, have had proven success with spat-on-shell oysters that are raised in cages from July through September and planted in one of the areas in Hempstead Harbor that has a suitable substrate.

2.5.5 Recommendations

The hydrodynamic/suitability model study concluded that it will be important to quantify the spat-on-shell oyster growth during July at the most suitable habitat locations indicated by the model. In addition, adding multiple continuous-monitoring buoys at these locations will provide valuable information that will aid in the proper placement of oysters for future oyster restoration efforts.

Finally, consideration of spat recruitment will be an important component of future oyster restoration efforts. Part two of the hydrodynamic study, expected to begin in 2025, will include spat collectors and spat surveys to assess oyster settlement locations and whether these coincide with a suitable substrate for successful oyster growth.

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 the descriptions of the testing parameters and results that are presented in the following pages. Note that the following parameters are analyzed for surface and bottom measurements only, although vertical profiles of the water column are recorded at one-meter increments. See *Figures 1* and *2* for station locations.

3.1 Dissolved Oxygen

Dissolved oxygen (DO), the form of oxygen that marine life need 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.

Key Findings – Dissolved Oxygen

- Healthy DO levels (4.8 ppm and above) were observed in 63.6% of all bottom measurements taken in 2024, compared with 66.9% of all bottom measurements in 2023.
- Hypoxic conditions (less than 3.0 ppm) were observed in 15.5% of all bottom measurements taken in 2024, compared with 14.3% of all bottom measurements in 2023.
- One surface hypoxic reading was observed in 2024; this compares with two surface hypoxic readings in 2023.
- In 2024, there were no anoxic (less than 1.0 ppm) readings.
- CSHH #13 had the longest duration of bottom hypoxia and the lowest average bottom DO across all stations surveyed in 2024.
- Average harborwide bottom DO for 2024 was slightly lower than in 2023.

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 DO. Therefore, the lowest levels of DO 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).

Nitrogen accelerates the growth of algae (including phytoplankton). This can result in frequent or prolonged "blooms." When the cells in the blooms respirate and die off, these processes deplete DO 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. (See *Figure 6* for harborwide water temperature and DO as depicted for the 2024 monitoring season.) 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.

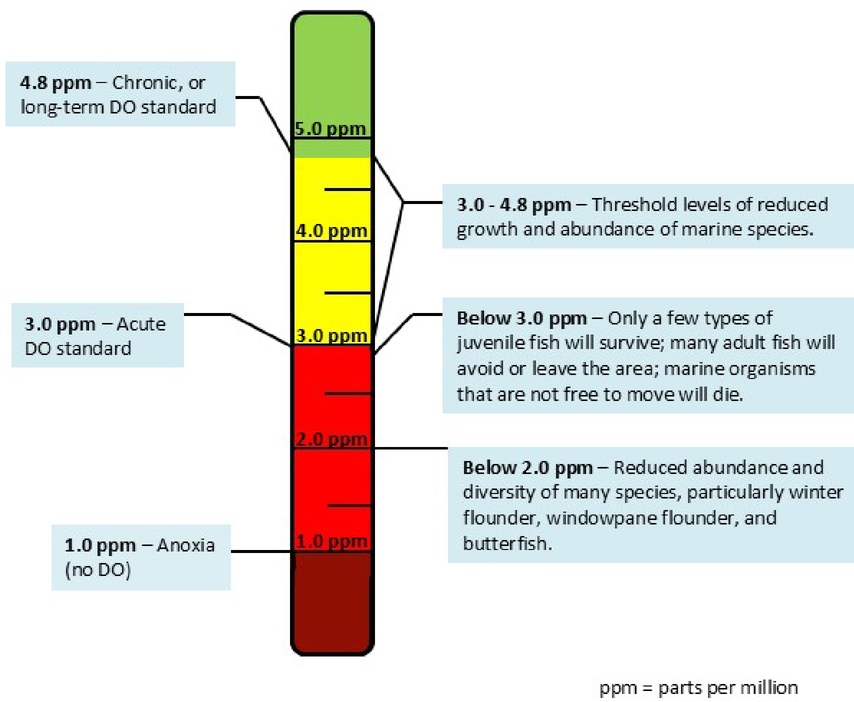
View of Hempstead Harbor looking northeast; high wind and waves can help mix the water column and prevent stratification (photo by Sebastian Li, 2/3/23)

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, although the severity of impacts, and threshold DO levels where impacts occur, are strongly species dependent. (Note that, prior to 2008, DO levels above 5.0 ppm were considered healthy.) The acute DO standard is 3.0 ppm; if DO concentrations fall below 3.0 ppm, conditions are considered hypoxic (below 1.0 ppm, conditions are considered anoxic). 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 5*). 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 DO 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 (see *Sections 3.2* and *3.3*). In a marine system such as Hempstead Harbor, which has abundant nutrients and organisms, DO levels near the surface can be supersaturated (greater than 100%) during the day due to 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 algal respiration, as well as organic material decomposition.

Figure 5
DO Standards and Effects of Depleted DO on Marine Life



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 2024 average bottom DO measurements.) Hypoxic and anoxic conditions 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
2023-2024	None reported	N/A	(Despite periods of hypoxia)
2022	Frequent but limited bunker kills with increased die-offs in August	Harborwide, soundwide	Large bunker population present
2021	Limited/scattered bunker kills	Harborwide	Large bunker population present
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	(Despite periods of hypoxia)
2015	Two limited bunker kills in October and November	Harborwide	(Corresponded with large bunker population that remained in the harbor through January 2016)
2007-2014	None reported	N/A	(Despite periods of hypoxia)
2006	Small, localized fish kill in August	Beach at Morgan Memorial Park	Hydrogen sulfide producing bacteria during hypoxia
2005	Clam kill	Near CSHH #5 (Mott's Cove)	Lunar/tidal effects exposing clam beds
2001-2004	None reported	N/A	(Despite periods of hypoxia)

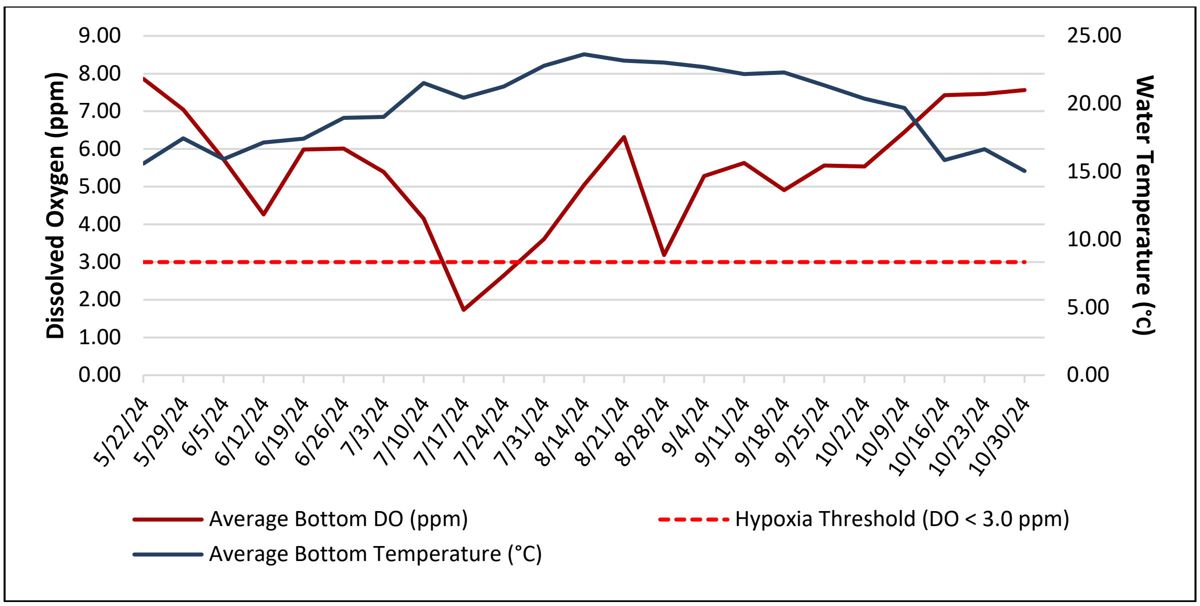
3.1.1 Seasonal Conditions

We observed the usual trend of decreasing DO that occurs during the summer season. However, the period over which hypoxic conditions were observed in 2024 started earlier than in 2023. The first incidence of hypoxia in 2024 was observed on May 29 at CSHH #13, where hypoxic values were recorded at the bottom. This occurred earlier than the first incidences of hypoxia in the preceding three years (i.e., June 21, 2023, July 6, 2022, and

July 21, 2021). Although hypoxia occurred earlier in 2024, there were no hypoxic readings during monitoring surveys between June 19 and July 3. Throughout the rest of July and August, however, hypoxic readings were observed at least once during each monitoring survey with the exception of August 21, when no hypoxic readings were observed (see *Appendix A*) (note that the August 7 survey was cancelled due to inclement weather). On July 17, every monitoring station exhibited hypoxia, with some stations exhibiting close to anoxic conditions (with the lowest reading of 1.00 ppm at bottom CSHH #15). The last hypoxic reading in 2024 was observed on September 11 at CSHH #13, but only at the bottom. This was the only station that was hypoxic on that date. (In the three preceding years, the last surveys with hypoxic readings were on September 20, 2023, September 28, 2022, and September 3, 2021.) However, because we were unable to access the lower harbor stations from August 7 through October 9 due to weather and tidal cycles, we were unable to determine the seasonal DO conditions in this area of the harbor.

Figure 6
2024 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. (Harborwide monitoring was cancelled on August 7 due to inclement weather; this date has been omitted from the graph.)



For the entire 2024 regular monitoring season, 15.5% of all bottom readings exhibited hypoxic conditions (DO < 3.0 ppm), 20.9% of bottom readings fell in the 3.0 to 4.8 ppm range, and 63.6% 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; 62.0% of bottom readings in 2024 were ≥ 5.0 ppm.) (See *Figure 7* and *Appendix A* for 2024 and long-term bottom DO graphs, respectively.)

For all core-program sampling dates in 2024, only one surface reading was hypoxic (recorded at station CSHH #5 on July 17, when every monitoring station exhibited hypoxia at bottom). Surface hypoxia was also observed in 2023, with two readings at CSHH #13.

In 2024, there were no anoxic (less than 1.0 ppm) readings observed. However, on July 17, all stations were hypoxic at bottom, and the majority of monitored stations had DO levels less than 2.0 ppm. One anoxic reading was observed in 2023 (at CSHH #2).

Dissolved oxygen conditions are influenced by a number of factors that are typical for Hempstead Harbor, but year-to-year comparisons remain valuable in assessing seasonal conditions. In 2024, there was a higher percentage of hypoxic bottom DO measurements (15.5%) than in 2023 (14.3%). Similarly, average bottom DO across all stations was lower for the 2024 monitoring season (5.36 ppm), compared with the 2023 average bottom DO (5.48 ppm).

A study using a 1994-2018 dataset noted that bottom DO 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) DO 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 2000-2024, specifically using bottom DO values for the month of August at CSHH #1. (CSHH #1 is considered representative of conditions in Hempstead Harbor. 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

The duration of hypoxic conditions typically varies spatially. Of the 13 monitoring stations where vertical profiles are conducted, every station had at least one hypoxic reading in 2024 (all stations exhibited hypoxia on July 17). In 2024, stations with limited tidal access were not sampled in August or September, when other stations were still exhibiting hypoxia. In contrast, in 2023, 6 of 13 stations had at least one hypoxic reading (stations with limited tidal access were not monitored at all when other stations were exhibiting hypoxia).

The impact of having fewer sampling dates on harborwide average bottom DO is difficult to determine because it seems to have less to do with fewer stations being sampled than it does with whether or not those stations were sampled during hypoxia. In 2024, harborwide average bottom DO showed little difference with or without limited tidal access stations reflected. Whereas in 2023, there was a greater difference, but none of the limited access stations were sampled during hypoxic conditions.

At the head of Glen Cove Creek, CSHH #13 had the most hypoxic readings of all monitoring stations for the season (seven readings at bottom). In 2024, average bottom DO for CSHH #13 was 4.00 ppm, compared with 3.75 ppm in 2023. Two other stations within the area of Glen Cove Creek (CSHH #3 and #8) had two bottom hypoxic readings each during the regular 2024 monitoring season.

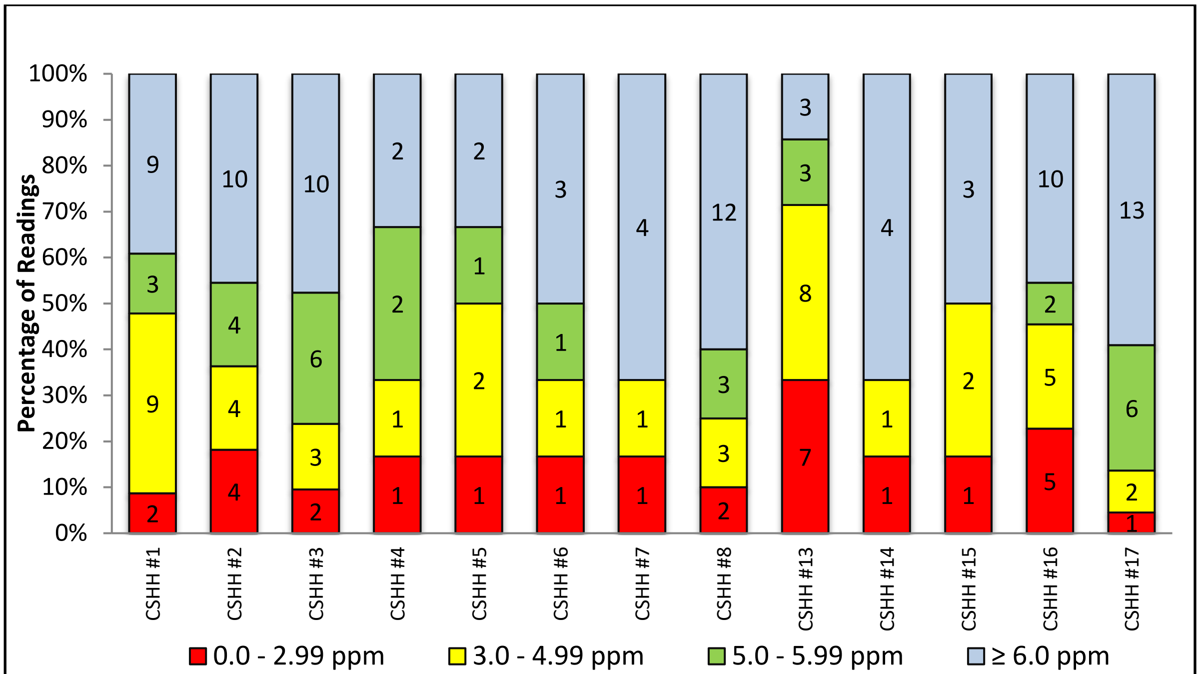
Glen Cove Creek experiences higher nutrient loading than other areas of the harbor. Multiple stormwater outfalls empty into the creek, and the Glen Cove sewage treatment plant outfall (CSHH #8) is located on the south side of the creek.

At upper harbor stations (CSHH #2, #16, and #17), hypoxic readings were observed between July 17 and August 28 at bottom. Monitoring station CSHH #17 exhibited hypoxia at bottom only on July 17.

Of all monitoring stations in 2024, CSHH #13 had the highest percentage of hypoxic readings (33.3%). In contrast, in 2023, 40.9% of samples at this station were hypoxic, the highest percentage among all monitoring stations during that monitoring season as well. The next highest percentages of hypoxic readings among stations in 2024 were at CSHH #16 (22.7%) and CSHH #2 (18.2%). (Note that in 2024, 12 out of 21 surveys at CSHH #13 were conducted west of the usual station because the head of the creek was inaccessible due to tides.)

Figure 7
2024 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 DO 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 only visited during 6 of 23 monitoring surveys. (Although 4.8 ppm is the standard that has been used since 2008, for the purpose of long-term comparisons, 5.0 ppm is used.)



3.2 Temperature

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.

Key Findings – Temperature

- Overall, average thermal stratification of the water column was greater in 2024 than in 2023, indicating less mixing of water in the harbor in 2024.
- Average bottom water temperature was 19.57°C and average surface water temperature was 20.36°C.
- Average air temperature across stations was the highest of the season on July 31.
- Average air temperature for the regular-season monitoring dates was warmer in 2024 than in 2023.

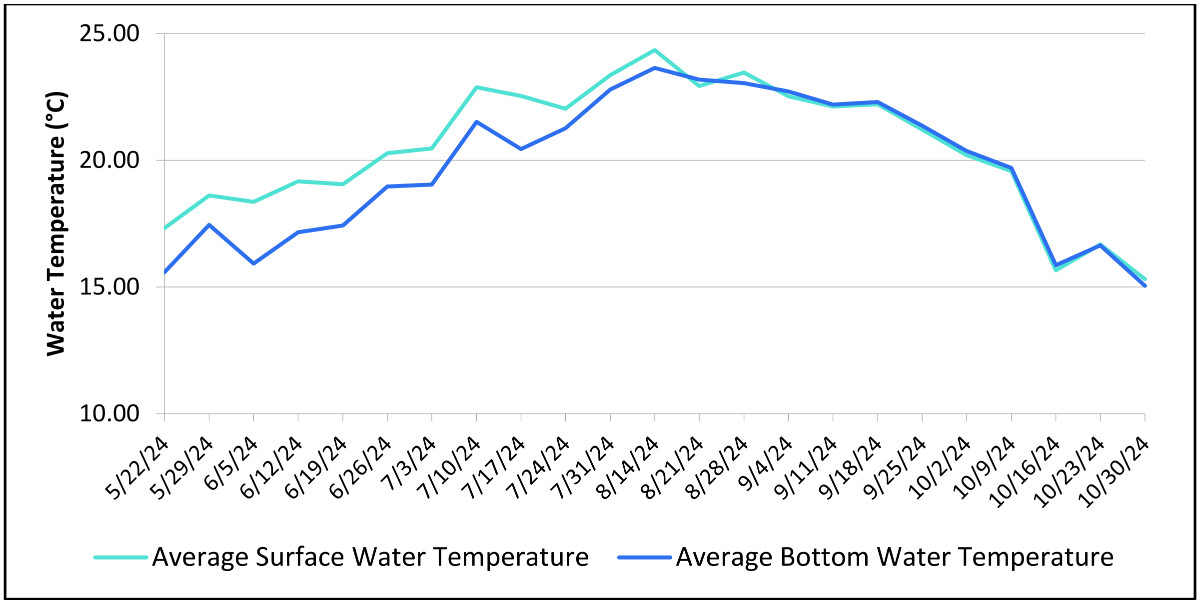
Additionally, monitoring temperature helps inform whether the water column is stratified or well mixed. Stratification is a naturally occurring condition whereby water at the surface is warmer while water at the bottom is cooler. Because the colder water is denser, it stays at the bottom and cannot mix 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 that is 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. However, in 2024, stratification of the water column was most apparent from May to mid-August (see *Figure 8*).

The average surface water temperature for the 2024 regular season was 20.36°C; the average bottom water temperature was 19.57°C (a difference of 0.79ºC). In the 2023 regular season, the average surface water temperature was 20.28°C; the average bottom water temperature was 19.89°C (a difference of 0.39ºC).

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 8
2024 Harborwide Average Water Temperature
Average surface and bottom water temperatures are represented below and illustrate the usual seasonal trend. In-harbor monitoring was not performed on August 7; this date is 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℃ 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 2024, specifically using bottom water temperature values for the month of August at CSHH #1. As was noted previously, CSHH #1 is considered representative of Hempstead Harbor monitoring stations 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.

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.

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 at a certain location. However, because monitoring events begin at similar times each season and have similar durations (i.e., May through October, recording air temperature between 7:30 AM and 11:30 AM), changes in air temperature averaged between sites during a season could be indicative of annual variability in weather conditions.

Sea Cliff Beach (photo by Carol DiPaolo, 8/28/24)

The average air temperature for the 2024 monitoring dates was 21.0°C. This represents all data points taken using a long-stem digital thermometer throughout Hempstead Harbor for every sampling date. The average air temperature for the 2024 summer monitoring dates was warmer than that of the 2023 summer monitoring dates of 2023 (19.9°C). On July 31, average harborwide air temperature was highest for the 2024 monitoring season (27.8°C).

According to the National Weather Service LaGuardia, New York climate station, there were a total of four heat waves between May and October 2024: June 18-23, July 5-8, July 14-16, July 31-August 3 (see https://www.weather.gov/wrh/climate?wfo=okx). (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.) (During 2023 monitoring season, there was only one heat wave, September 5-8.)

July and August 2024 were the warmest months on record, not only for New York, but for the entire globe; all of summer 2024 was the warmest on record for the northern hemisphere. (See https://www.noaa.gov/news/earth-just-had-its-warmest-july-on-record and https://www.noaa.gov/news/earth-had-its-hottest-august-in-175-year-record.)

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.

Key Findings – Salinity

- Average harborwide salinity for the 2024 monitoring season was higher at the surface but lower at the bottom than in 2023.
- Average harborwide salinity (surface and bottom) for August 2024 was less than that for August 2023, likely affected by the large amount of rainfall in August 2024.
- Average harborwide salinity (surface and bottom) in September and October 2024 was higher than that for the same months in 2023, likely affected by drought conditions in 2024.

Salinity also affects DO levels; DO saturation is lower in saltwater than in freshwater. For example, the 100% saturation level of DO at 25 ppt salinity is equal to approximately 85% of the saturation level of DO 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).

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 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 9*). 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 2024, the average surface salinity for Hempstead Harbor was 25.14 ppt, slightly higher than that in 2023 (25.03 ppt). The average bottom salinity for Hempstead Harbor in 2024 was 25.47 ppt, lower than that in 2023 (25.85 ppt). Overall, these results are comparable with typical harborwide salinity conditions.

We observed an expected increase in salinity levels as the 2024 monitoring season progressed. The high precipitation levels during the month of August (11.76 inches) likely contributed to a drop in salinity levels during that month through the beginning of September (see *Figure 9*). In August 2024, average surface and bottom salinity was 25.28 ppt and 25.66 ppt, respectively, compared with salinity levels for the same month in 2023 (26.46 ppt and 27.06 ppt, respectively). (In August 2023, total rainfall for the month equaled 6.00 inches.)

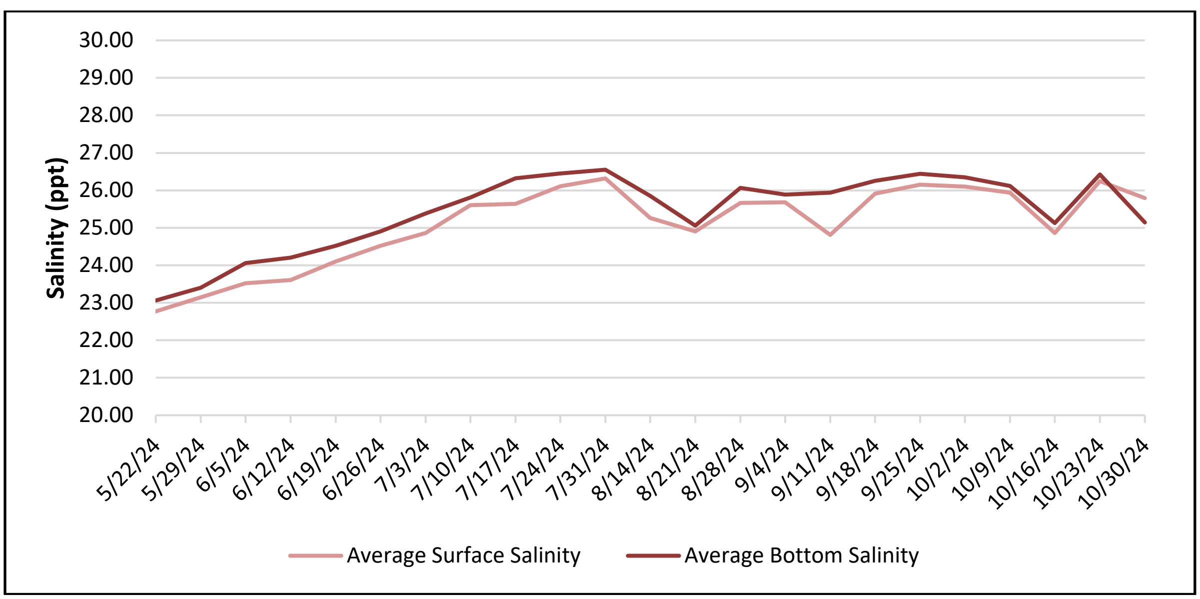
Average surface and bottom salinity levels for September through October 2024 were 25.68 ppt and 25.84 ppt, respectively, compared with 2023 levels of 25.15 ppt (surface) and 25.62 ppt (bottom).

Although there was heavy rainfall in August, the 2024 monitoring season had lower total precipitation than that for the 2023 monitoring season. A drought began at the end of September 2024 and continued through the end of the monitoring season and beyond (see *Section 3.9*). Despite the contrasts in precipitation amounts in August and September/October, it is difficult to see a direct correlation between salinity levels and precipitation amounts during the same period because of the other factors that can influence salinity.

Washout areas resulting from heavy rain along Sands Point shoreline (photo by Carol DiPaolo, 8/28/24)

Figure 9
2024 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 inputs and are not representative of harborwide conditions. Harborwide monitoring was cancelled on August 7 due to inclement weather, and the date has been omitted from the graph.



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 marine organisms, decomposition of organic material, 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 considers pH in the range of 6.5 to 9.0 to be at healthy levels for coastal and estuarine ecosystems; see https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table.)

Key Findings – pH

- Average harborwide surface and bottom pH levels for the harbor in 2024 (7.63 and 7.47, respectively) were slightly lower than long-term averages.
- Average harborwide pH was lowest on monitoring dates that also had the lowest average harborwide DO.
- CSHH #1 had the lowest average surface pH of the season (7.46); CSHH #13 had the lowest average bottom pH (7.31).
- CSHH #3 had the highest pH measurement (8.24 at surface) of the season on August 14; CSHH #1 had the lowest pH (6.96 at bottom) on July 17.

Due to failure of the pH sensor on the YSI EXO2S sonde, a LaMotte pH test kit was used on May 22 through June 12, 2024, to record pH data for surface and bottom at monitoring stations. Data from these dates are excluded from results described below and season averages, however, the data are included in *Figure 10*.

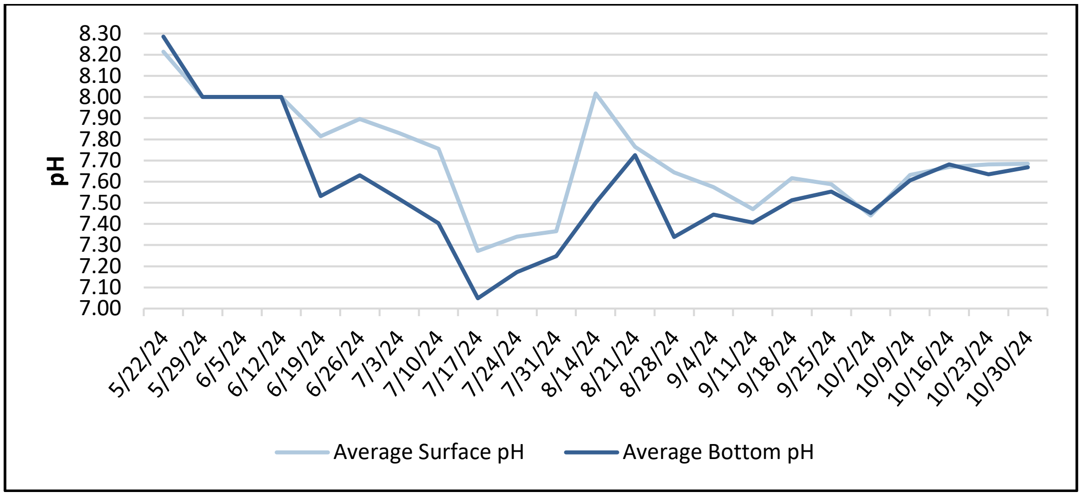
Although there are temporal and spatial variations, the pH levels within Hempstead Harbor generally fall between 7.0 and 8.5. The highest pH measurement in 2024 (8.24) was recorded at CSHH #3 on August 14 at the surface. The lowest pH measurement (6.96) was recorded at CSHH #1 at the bottom on July 17, a day that also yielded low pH values at the bottom for every other station surveyed that day (in 2023, the lowest pH measurement was 7.16, also at CSHH #1). DO levels were also very low on July 17—every station monitored had hypoxic, bordering anoxic, conditions (see *Section 3.1*). In these circumstances, some microbial activity at the bottom consumes oxygen and releases CO_2, thereby increasing acidification and lowering pH levels.

Research has linked the combination 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 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0083648.)

Average surface and bottom pH levels for Hempstead Harbor in 2024 were 7.63 and 7.47, respectively. These values are slightly lower than the previous monitoring season averages (7.71 and 7.57, respectively) and lower than long-term surface and bottom averages from

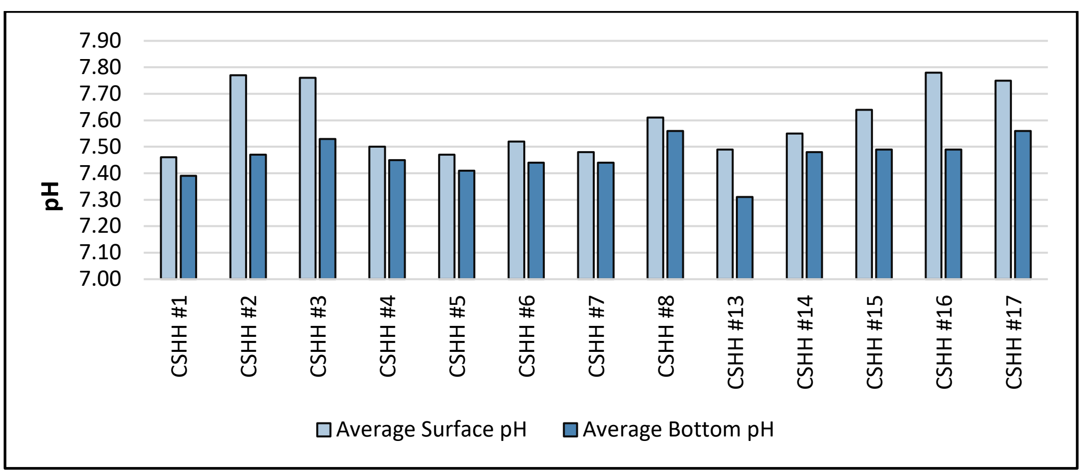
2005-2024 (7.76 and 7.61, respectively). (Note that 2022 pH data is excluded due to a pH sensor malfunction on our multiparameter meter.)

Figure 10
2024 Harborwide Average pH
Average surface and bottom pH for each monitoring survey throughout the regular water-monitoring season are depicted below. Note that from May 22 through June 12, a LaMotte pH test kit was used to measure pH at monitoring stations.



In 2024, CSHH #1 had the lowest average surface pH of the monitoring season (7.46), whereas CSHH #13 had the lowest average bottom pH (7.31). In 2023, CSHH #7 had the lowest average surface pH (7.43), and CSHH #13 had the lowest average bottom pH (7.35). 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 11
2024 Average Surface and Bottom pH by Station
Each set of bars represents average surface and bottom pH for each CSHH monitoring station throughout the regular monitoring season. (Note: Data from May 22 through June 12 are excluded.)



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 measurement for the 2024 season was smaller than the 2023 harborwide average.
- CSHH #7 had both the smallest average Secchi depth and the highest average surface and bottom turbidity readings, indicating worse water clarity at this station in 2024 compared with other stations.
- The highest Secchi-depth reading in 2024 was 4.0 m at CSHH #17 on October 30; the lowest reading was 0.5 m at multiple stations.
- Average harborwide surface turbidity in 2024 was higher than that from the previous six monitoring seasons but still considered "good."

3.5.1 Secchi-Disk Measurements

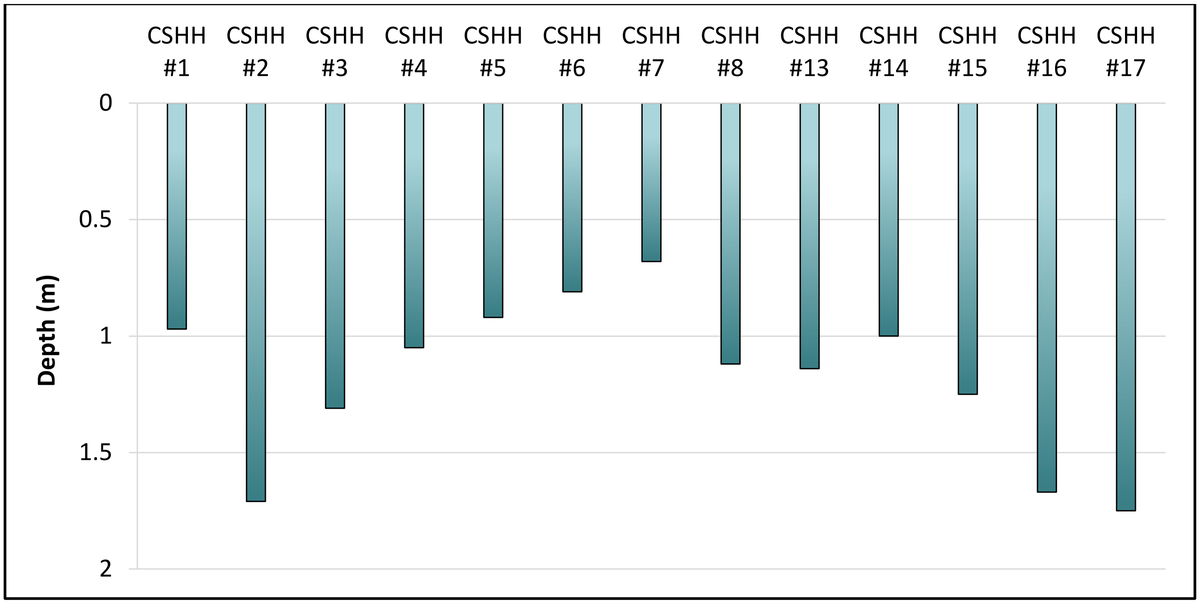
Water clarity is commonly monitored with a Secchi disk–a white (or white and black) plastic disk that is lowered into the water to determine the lowest depth at which ambient light can penetrate the water column. In most nutrient-rich waters, such as Hempstead Harbor and Long Island Sound, the depth 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 typically range from 1 to 2 meters but can range from 0.25 to 4 meters during the monitoring season.

In 2024, the shallowest Secchi depth recorded during the season was 0.5 m, occurring at multiple stations and dates: CSHH #1 on July 3 and September 4, at CSHH #6 on July 3, and at CSHH #7 on June 19, July 3 and 31, and October 16. The deepest Secchi depth was 4.0 m at CSHH #17 on October 30.

The 2024 harborwide average of all Secchi-disk measurements was 1.3 m, which was shallower than the depth in 2023 (1.5 m), but 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. This trend can be attributed in part to higher productivity in the harbor (i.e., microorganisms such as plankton becoming more abundant with increased water temperatures and sunlight).

Water clarity tends to vary spatially. On average, CSHH #6 and #7, both located in the lower harbor, had the lowest water clarity in 2024, while upper-harbor stations CSHH #2, #16, and #17 had the highest. Analysis of long-term data (2000-2024) for lower-, mid-, and upper-harbor stations, supports this pattern. Long-term Secchi-depth averages at CSHH #1, #6, and #16 are 1.1 m, 1.0 m, and 1.8 m, respectively (these stations are considered representative of conditions for mid-, lower-, and upper-harbor areas).

Figure 12
2024 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 better 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, whether in waters with low turbidity or high turbidity, 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 (NTU).

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

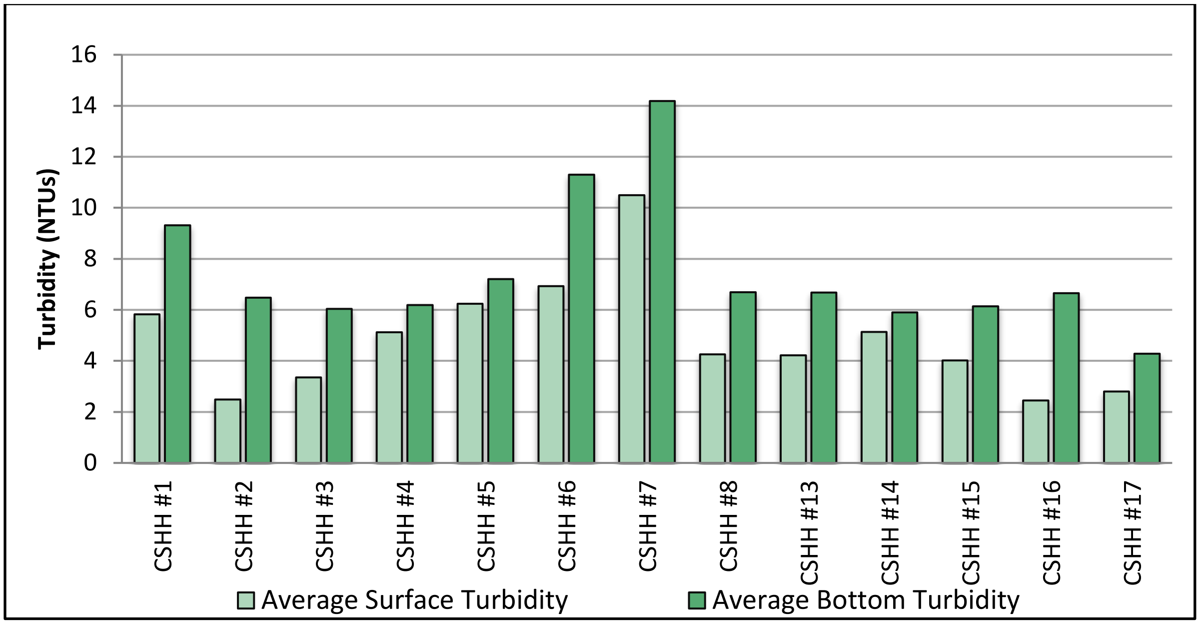
The "Unified Water Study Embayment Report Card Development," prepared by Save the Sound, provides water clarity reference cut-points for scoring embayments, derived from the National Coastal Condition Report (NCCR) IV. For purposes of the report card, standards for turbidity are informed by the water body's ability to "historically" support submerged aquatic vegetation (SAV). Because Hempstead Harbor does not currently and has not recently supported SAV, 7.90 NTU is the appropriate turbidity threshold for comparative purposes (i.e., "good" conditions are achieved when surface turbidity is less than 7.90 NTU at one-meter depth), and Secchi depth must be greater than 0.62 m.

Although the turbidity data in this report includes measurements at a half-meter depth (considered "surface" for purposes of this report), measurements in the field were also recorded at one-meter increments. In 2024, 93% of all half-meter observations were considered "good" (down from 97% of all half-meter observations in 2023). For purposes of comparing readings at one-meter depth, our 2024 turbidity measurements at one meter were considered "good" 91% of the time; in 2023, one-meter readings were "good" 97% of the time. Secchi depth was greater than 0.62 m for 95% of all observations in 2024 (compared with 96% in 2023).

The harborwide average surface turbidity for the 2024 regular-monitoring season was 4.15 NTU. This is elevated from that in 2023 (3.15 NTU) and is the highest average since 2017. However, the 2024 average is still within the range of "good" conditions as provided in the "UWS Embayment Report Card Development."

In comparing turbidity between stations, we look at surface turbidity primarily but use bottom turbidity averages as well (see *Figure 13)*. The station with the highest average turbidity readings for both surface and bottom turbidity was at lower-harbor station CSHH #7 (10.50 NTU and 14.19 NTU, respectively). The lowest average surface turbidity was at outer harbor station CSHH #16 (2.45 NTU) and the lowest average bottom turbidity was at CSHH #17 (4.28 NTU).

Figure 13
2024 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 DO 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 2024 monitoring season, water color around monitoring stations generally varied from the usual green to brown. Potential algal blooms were more localized but occurred over a longer timeframe than in the 2023 monitoring season.

Greenish-brown water in Tappen Marina (photo by Carol DiPaolo, 5/2/24)

Unusual brown coloration occurred in Tappen Marina and the lower harbor on July 3; in Glen Cove Creek on July 10; in the lower harbor again on July 17; at monitoring station CSHH #1 on September 4; and in Tappen Marina and at CSHH #1 on September 18. On those days with abnormal water coloration, Chl-*a* levels were elevated, in some cases greater than 50 ug/L. There is no universal threshold for high Chl-*a* levels in marine waters, since it varies by waterbody.

On July 3, an algal bloom was suspected to be in progress, so a water sample was collected to be analyzed at a Hofstra University lab. Those results showed nothing unusual, just the typical dinoflagellates expected during that time of year.

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 regular season 2024, average total nitrogen ranged from 0.34 mg/L at CSHH #16 to 6.6 mg/L at CSHH #14A, indicating pristine to impaired conditions.
- Average total nitrogen in 2024 regular season was highest at outfall stations CSHH #14A and #15A.
- For these same stations, the most prominent form of nitrogen present during regular- and winter-season monitoring was nitrate.
- Average total nitrogen and 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

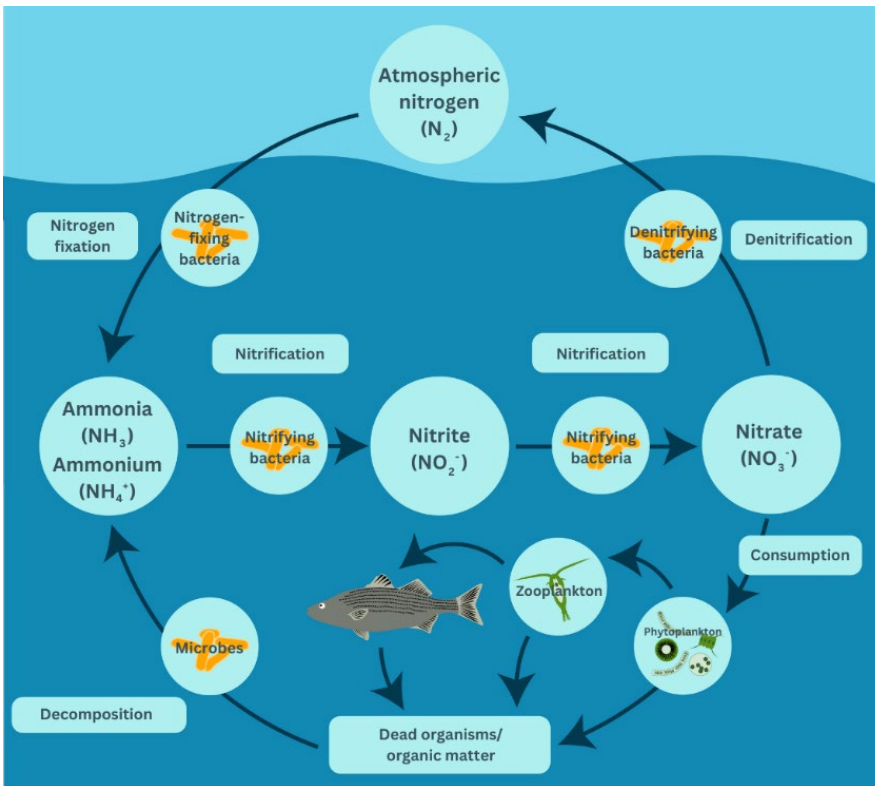
Nitrogen is made available to the marine environment through **fixation**, the transformation of nitrogen gas into ammonia by nitrogen-fixing bacteria. Nitrogen is also made available to the marine environment through inputs from the watershed via nonpoint sources (e.g., runoff containing fertilizer, animal wastes, and leachate from failing septic systems) or point sources (e.g., discharges from wastewater treatment plants). 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 14* presents a diagram of the nitrogen cycle in the marine environment.)

Too much nitrogen can have adverse impacts on water quality, such as causing the growth of algal cells to accelerate, leading to the formation of algal blooms. These harmful algal blooms (HABs) can block out light needed by other organisms to grow, use up oxygen as the cells die and decay, and some may release toxins that adversely affect fish, shellfish, or mammals. Toxic HABs may cause neurological or gastrointestinal damage to humans who consume contaminated shellfish or cause respiratory damage when airborne droplets are breathed in.

Excessive nitrogen can also contaminate groundwater and thereby pose further 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. 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.

Figure 14
Nitrogen in Marine Environments



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. 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.

Traditional 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, 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, nitrogen loading limitations (i.e., total maximum daily loads, or TMDLs) were imposed on wastewater treatment plants around Long Island Sound to reduce occurrences of harmful algal blooms and the frequency and duration of low DO levels throughout the sound. The 58.5% reduction target for wastewater treatment plants was met (and exceeded) in 2016. However, reducing stormwater inputs of nitrogen and other pollutants is more complicated because the sources are so diffuse.

3.7.2 Nitrogen Monitoring by CSHH

Since 2019, water samples for nitrogen analyses, including ammonia, nitrite, nitrate, and 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 are performed by Pace Analytical Services, LLC, and include only undissolved forms of nitrogen. Total Kjeldahl nitrogen is the sum of organic nitrogen and ammonia. These various forms of nitrogen have reporting limits based on lab protocols, and each compound reported reflects the concentration of only nitrogen within respective nitrogen-containing compounds (e.g., nitrate as N).

CSHH #14A, outfall beneath Shore Road at the Glenwood Landing power plant (photo by Carol DiPaolo, 5/2/24)

As of January 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 Mid-Atlantic Tributary Assessment Coalitions 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 (B)
> 0.5 ≤ 0.6 mg/L (C)
> 0.6 ≤ 0.8 mg/L (D)
> 0.8 ≤ 1.2 mg/L (E)
>1.2 mg/L (impaired condition, F)

(See *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*.)

In 2024, average **total nitrogen** in Hempstead Harbor ranged from 0.34 mg/L at CSHH #16 to 6.6 mg/L at CSHH #14A, indicating a wide range of conditions, from pristine to impaired. In comparison, average total nitrogen for 2023 ranged from 0.96 mg/L to 5.3 mg/L. Additionally, in 2024, seven of the ten stations tested (CSHH #1, #7-8, #12-13, #14A, and #15A) had average TN levels above 1.2 mg/L. (See *Appendix D* for long-term total nitrogen graphs.) Notably, average total nitrogen conditions for CSHH #16 improved from a grade E in 2023 to an A in 2024, but over the course of the last five years the average total nitrogen for this station has fluctuated.

In 2024, average **total organic nitrogen** ranged from 0.31 mg/L at CSHH #16 to 1.5 mg/L at CSHH #15A. Average total organic nitrogen at each station was lower during the 2024 monitoring season than in 2023, except for station CSHH #7.

CSHH calculates **total inorganic nitrogen** (TIN) based on ammonia plus combined nitrate-nitrite testing results from Pace Analytical Services. In 2024, CSHH #14A had the highest average TIN (6.5 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 2024 (0.06 mg/L, 0.13 mg/L, and 0.15 mg/L, respectively). Average TIN levels were higher in 2024 than in 2023 at all stations except CSHH #6 and #7.

Great egret fishing in Glen Cove Creek by the STP outfall (photo by Carol DiPaolo, 9/20/23)

CSHH monitors the outflow of the Glen Cove sewage treatment plant (CSHH #8). In 2024, average **ammonia** at CSHH #8 was 0.38 mg/L, higher than that in 2023 (0.13 mg/L). Average ammonia levels at other Glen Cove Creek monitoring stations in 2024 were much lower than that of CSHH #8: CSHH #12, 0.11 mg/L, and CSHH #13, 0.10 mg/L. The highest average ammonia for the monitoring season was at CSHH #14A (powerhouse drain outfall) (0.49 mg/L), and the lowest averages were at CSHH #1, #3, and #16, where the majority of samples were below the lab's 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 Pace Analytical Services lab's reporting limit of 0.050 mg/L, as it quickly transforms into nitrate in the presence of oxygen. For this reason, values are usually consistently low across station samples when nitrite is detectable. In 2024, nitrite was detected in samples primarily from outfall stations (CSHH #8, #14A, and #15A) as well as CSHH #7 and #12. CSHH #8 had the highest average nitrite (0.11 mg/L), and values were above the detection limit for every sample taken at this location during the 2024 season.

In 2024, average nitrate levels ranged from 0.03 mg/L at CSHH #16 to 6.0 mg/L at CSHH #14A. Average nitrate at CSHH #14A was higher in 2024 than in 2023 (3.8 mg/L). The next highest average nitrate levels in 2024 were at CSHH #15A (2.8 mg/L) and CSHH #13 (1.2 mg/L).

As mentioned previously, CSHH collects samples biweekly during the regular sampling season 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. However, note that in late September 2024 the weir at Scudder's Pond collapsed, allowing free flow of water between the pond and harbor. This could skew the pattern of results for nitrogen samples collected at CSHH #15A. Nevertheless, for the 2024-25 winter season, we observed the expected trend of higher total and inorganic nitrogen at CSHH #15A.

Other nitrogen results for the 2024-25 winter monitoring program include the following:

- The form of nitrogen detected at the highest concentration at CSHH #14A and #15A was nitrate (this was also the case for the regular season).
- Of the two outfalls **average nitrate** was highest at CSHH #14A (7.3 mg/L). Average nitrate at CSHH #15A was 4.5 mg/L. **Nitrite** levels were low or below the reporting limit for all CSHH #14A samples; all CSHH #15A results were below the reporting limit.
- **Average ammonia** at CSHH #14A was 0.99 mg/L and at CSHH #15A was 0.19 mg/L. All sample values for both stations exceeded the reporting limit of 0.10 mg/L.
- **Average total organic nitrogen** at CSHH #14A was 0.35 mg/L but was below the reporting limit (0.10 mg/L) for nine out of 12 samples. At CSHH #15A, average total organic nitrogen was 0.75 mg/L, and results exceeded the reporting limit for five out of ten samples. Organic nitrogen results for these stations were higher during the regular monitoring season; average total organic nitrogen during the regular season at CSHH #14A was 0.42 mg/L and at CSHH #15A was 1.5 mg/L.
- **Average total nitrogen** at CSHH #14A was 8.0 mg/L. Total nitrogen results at CSHH #14A ranged from 4.7 to 10.2 mg/L. At CSHH #15A, average total nitrogen was 5.4 mg/L; total nitrogen results ranged from 3.2 to 8.5 mg/L. All winter samples from both stations exceeded the 1.2 mg/L "impaired" threshold.
- 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

- 2024 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 (CSHH #14A) had bacteria exceedances for samples taken directly from the discharge and also when mixed with harbor water during high tides.
- Monitoring at the Scudder's Pond weir was limited following the weir collapse in late September 2024.
- The percentage of exceedances at Scudder's Pond stations (CSHH #15A and #15B) for both regular and winter monitoring of fecal coliform and enterococci was lower than that from pre-restoration levels.
- The percentage of exceedances for fecal coliform samples collected at the powerhouse drain outfall during winter monitoring was higher compared with that of the preceding regular- and winter-monitoring seasons.
- For 2024, all beach closures for Hempstead Harbor were preemptive following heavy rainfall.

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:

- 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 continues both fecal coliform and enterococci analyses for samples collected by CSHH to allow for more consistency in the comparison of long-term 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. In early 2024, Glen Cove replaced an old 18-inch culvert under Cobble Court by Crescent Beach with one that is 2 feet by 4 feet. This was expected to allow more tidal flushing of adjacent wetlands. Sampling conducted by NCDH during the summer season showed improvement in bacteria levels but not enough to allow for the opening of the beach. Sampling will continue to see whether over time bacteria levels continue to improve.

CSHH #17A is offshore of Crescent Beach and as close to the stream outlet as possible (photo by Carol DiPaolo, 10/9/24)

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.

In 2024, there were 12 preemptive closures for Hempstead Harbor beaches following half an inch or more of rain in a 24-hour period (see *Appendix B* for 2024 precipitation data), compared with 11 preemptive closures in 2023. August 2024 was a particularly rainy month, including two rain events of 4.89 inches and 3.26 inches, which contributed to bacteria exceedances at most area beaches following these rain events (when beaches were already closed preemptively). In 2024, there were no beach closures related to elevated bacteria levels that occurred for reasons other than rain events. In contrast, in 2023, Morgan Memorial Park was closed due to high bacteria levels for seven consecutive days (July 1 through 7).

Monthly average bacteria results for enterococci at Hempstead Harbor beaches in 2024 ranged from 0.10 CFU/100 ml at Pryibil Beach, Morgan Memorial Park, and Sea Cliff Beach in April, to 530.38 CFU/100 ml at Sea Cliff Beach in August. Although Crescent Beach remained closed all season, it had an average enterococci level of 12.60 CFU/100 ml for the season, the lowest among area beaches (compared with 117.89 CFU/100 ml for 2023, when it was the highest for the season among area beaches). Sea Cliff Beach had the highest average enterococci among area beaches for the season – 110.58 CFU/100 ml. (Note that the 2024 30-day log average for Sea Cliff Beach remained below the threshold of 35 CFU/100 ml for the entire season; see *Appendix C* beach-monitoring data.)

Additional data showing varying bacteria concentrations from individual beach samples as well as previous years' comparisons are found in *Appendix C*.

Table 4
2024 Monthly Average for Beach Enterococci Data in CFU/100 ml*

	Village Club of Sands Point	North Hempstead Beach Park (N) (formerly Hempstead Harbor Beach)	North Hempstead Beach Park (S) (formerly Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach	Pryibil Beach
April	0.93	0.80	2.20	33.64	0.10	0.10	2.33	0.10
May	11.55	2.80	2.18	21.90	23.29	7.61	8.77	0.87
June	3.93	0.21	0.34	7.79	4.80	2.95	1.72	0.54
July	132.90	14.71	8.81	5.60	6.53	34.08	30.75	34.43
August	169.29	129.00	118.03	28.50	530.38	70.18	9.64	67.92
Septem-ber	--	--	--	--	--	3.78	1.33	293.82
Season Averages	66.11	27.00	23.75	18.46	110.58	26.86	12.60	50.26

**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 values 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 for both fecal coliform (FC) and enterococci (ENT) at 22 monitoring stations in Hempstead Harbor (15 stations on a weekly basis and others depending on tidal conditions). Stations CSHH #9-13 (and most recently CSHH #12A, which was initially selected as a temporary testing site) were selected to test bacteria levels in Glen Cove Creek, particularly from discharge pipes near the sewage treatment plant outfall (CSHH #8). CSHH #3, located at the entrance of Glen Cove Creek, is also tested during the regular monitoring season. CSHH #1 and #15 are also tested for bacteria and are considered mid-harbor stations. Lower-harbor stations CSHH #4-7 and #14 are tested less frequently because of limited access related to tidal cycles.

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 winter monitoring since 2013.

In 2015, three 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. CSHH #2 and #16-17 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 and typically have lower bacteria levels than those at mid- and lower-harbor stations. 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*).

Many factors can influence bacteria levels during any given sampling event, making it difficult to see clear and consistent influences from rainfall. Although monitoring data from 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 enterococci and for 24-hour and 48-hour rainfall.

3.8.3.1 Comparing Bacteria Data for CSHH Stations

The data and bar graphs in *Appendix B* show bacteria results for CSHH monitoring stations.

As mentioned previously, there is variability in the relationship between rainfall and instances of high bacteria levels. For the 2024 regular monitoring season, there were bacteria exceedances in samples taken after less than one-tenth of an inch of rain, and in one case, following a trace amount within 24 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 2024, there were no bacteria exceedances for the six monitoring events of lower-harbor stations, as compared with one bacteria exceedance out of five monitoring events in 2023.

For mid-harbor stations (CSHH #1 and #15), there were no exceedances in 2024. In 2023, there was one exceedance at CSHH #1. (Note that CSHH #15 is tested less frequently due to tidal access.)

Shoreline stations located within close proximity to mid-harbor stations are CSHH #14A (powerhouse drain outfall) and CSHH #15A and #15B (Scudder's Pond outfall and weir). During the regular season in 2024, there were the following bacteria exceedances: two FC and six ENT at CSHH #14A, one FC and six ENT at CSHH #15A, and one ENT at CSHH #15B (tested monthly). In late September 2024, the weir at Scudder's Pond collapsed causing the pond to drain on an outgoing tide and refill on an incoming tide.

For outer-harbor stations during the 2024 monitoring season, there was only one bacteria exceedance—at CSHH #17A on July 24 (following rainfall of just over a quarter of an inch within a 48-hour period). There were no exceedances at stations CSHH #2, #16, and #17.

Because of the number of outfalls on both the north and south seawalls of Glen Cove Creek, the creek has historically experienced high bacteria levels and unusual discharges. In 2024, bacteria exceedances occurred at the following stations:

- CSHH #8, one ENT
- CSHH #9, two ENT
- CSHH #10, one FC
- CSHH #12, one FC
- CSHH #12A, one FC and four ENT
- CSHH #13, two ENT

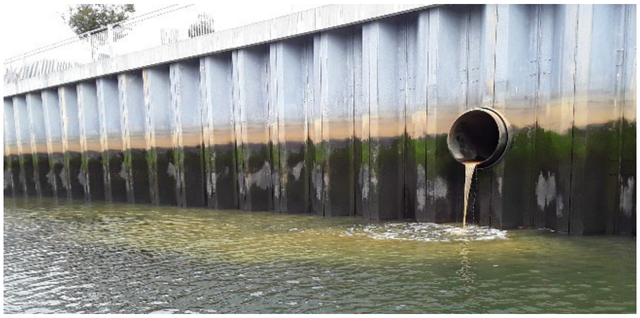
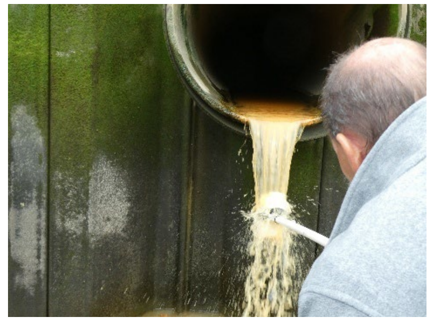
Unusual and recurring discharges of brown flow from the outfall pipe at CSHH #9 and milky-white flow from the outfall pipe at CSHH #10 have been observed. The unusual discharges have been noted since 2004 and reported to Glen Cove city officials, HHPC, NCDH, Nassau County Department of Public Works (NCDPW),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

In response to the brown-flow discharges, Glen Cove DPW installed a filtration system in early June 2021 inside the manhole behind the STP that drains water through to that outfall pipe (CSHH #9). Following the installation, there were still a few instances of discolored or brown flow in 2021; from 2022 to 2024, there were no instances of brown flow observed from CSHH #9.

Despite the installation of the filtration system at CSHH #9 in 2021, about half of the samples collected had exceedances in bacteria levels. In the 2024 season, samples exceeded bacteria thresholds on only two dates (July 10 and 24), compared with over half of samples taken in 2023 exceeding bacteria thresholds.

With respect to the white-flow observations from CSHH #10, these occurred in 2024 on a total of four monitoring surveys: May 29, June 12, September 11, and October 9. Bacteria levels were low on days where a white flow was observed. (Following reports in 2024 from residents living on the south side of Shore Road/The Boulevard, it is now suspected that the white flow is from clay deposits in the natural landscape entering the storm drain system and emptying through the CSHH #10 outfall.)

On September 25, an unusual orange discharge was noted at CSHH #12A and a sample was taken to be analyzed for bacteria content. Within a half an hour of taking that sample, the color of the discharge had deepened to a bright orange-yellow and a second sample was taken. Glen Cove DPW was alerted as the discharge was occurring, but no source could be identified. The samples taken showed little-to-no bacteria present.

Unusual orange flow from CSHH #12A, discharge pipe on north seawall in Glen Cove Creek (l) and taking a sample from the discharge (r) (photos by Carol DiPaolo, 9/25/24)

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. Soon after the sewer line repair was completed on December 2, 2021, the final round of testing showed that bacteria levels were well below the threshold that is used for beach closures. (Note that, also in 2021, construction of a new bulkhead along the Glen Cove STP occurred June through December. 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.)

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). Samples are still collected from the outfall draining Scudder's Pond and Littleworth Lane (CSHH #15A) biweekly and samples from Scudder's Pond (CSHH #15B) are collected monthly.

This program now has 12 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).

The 2024-25 winter-monitoring results were as follows:

- CSHH #14A, seven FC and four ENT
- CSHH #15A, one ENT
- CSHH #15B, no exceedances (sampled only three times because of low water levels following weir collapse)

CSHH #14A had a higher percentage of **fecal coliform** exceedances during 2024-25 winter monitoring than that of the preceding regular- and winter-season monitoring. CSHH #14A had a higher percentage of **enterococci** exceedances during 2024-25 winter monitoring than that of the preceding regular season, but was lower than the preceding winter (2023-24) monitoring season.

Table 5
Percentage of Samples Exceeding Bacteria Standards[1]—Summer and Winter Monitoring

Monitoring Season	CSHH #15A[2]		CSHH #15B[3]		CSHH #14A[2]	
	FC	ENT	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%	--[4]	--[4]
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%
5/15/24-10/30/24	5%	27%	0%	20%	9%	26%
11/13/24-4/16/25	0%	10%	0%	0%	58%	33%

[1]For purposes of comparison, beach-closure thresholds for fecal coliform (FC) and enterococci (ENT) are used here, measured in colony-forming units (CFU).
[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]Only one sample collected during this period.

The high levels of bacteria from discharges at the powerhouse drain outfall as well as the surrounding subwatershed remain a concern for Hempstead Harbor. Further investigation was prompted following results from the 2021-22 winter monitoring season showing consistently elevated levels of fecal coliform at CSHH #14A (in Glenwood Landing). We are still waiting for a resolution from Nassau County and Town of Oyster Bay regarding potential upgrades to stormwater infrastructure in this area.

Residents living within the Powerhouse Drain Subwatershed with septic systems have been encouraged to apply for grants (through Nassau County's SEPTIC program, i.e., Septic Environmental Program to Improve Cleanliness) to install innovative alternative septic technologies and replace outdated septic systems. The new technologies help to reduce both nitrogen and bacteria.

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 more than 40 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 was expected to be among the first waterbodies to have a new TMDL (see https://extapps.dec.ny.gov/docs/water_pdf/litmdlwithdrawal.pdf). In 2024, following the issuing of the new MS4 permit, DEC stated that it would revise the pathogen TMDLs.

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.

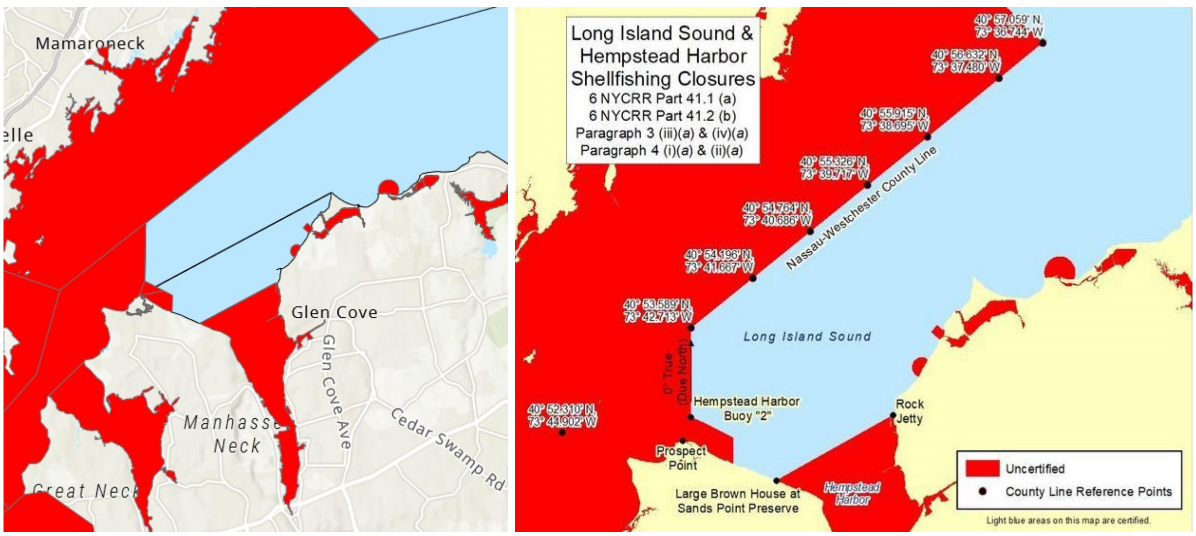
3.8.4.3 Certifying Shellfish Beds in Outer Harbor

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

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 shellfish beds were recertified in the outer section of Hempstead Harbor. For the first time in more than 40 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 semicircular area (250-yard radius) 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 in 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 15*.

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 2024, there were three closures in Hempstead Harbor (March 24 to 28, August 7 to 13, and August 19 to 27) due to rainfall events. 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 15
NYS DEC's Maps 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 bacteria levels in Hempstead Harbor. Bacteroides analysis, along with other types of monitoring, may help to provide ongoing insight into that question as part of the larger understanding of determining possible sources and appropriate strategies to address bacteria and other pathogen loading to the harbor.

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 2024 monthly precipitation and 1997-2024 monthly rainfall totals.) Total precipitation measured during June through October 2024 was 19.43 inches (493.52 mm). Total precipitation measured over the same period in 2023 was 27.19 inches (690.63 mm).

A severe rainstorm in 2017 caused a landslide below Bay Avenue, Sea Cliff (l); the cliff continued to deteriorate, the house was removed, and work is ongoing to shore up the area (photos by Carol DiPaolo, 8/24/17 and 9/12/24)

Note that total precipitation for the 2024 summer season (June 20 to September 22) was 17.36 inches (440.94 mm), which was greater than that of the 2023 summer season (14.97 inches, 380.24 mm).

Throughout the regular monitoring season (May through October), there was a total of five rain events that resulted in over one inch of rain within a 24-hour period. On August 6, a storm that preceded Tropical Storm Debby made its way up the east coast and brought 4.89 inches of rain, flooding many local areas. August 2024 was the wettest month (11.76 inches) during monitoring seasons since July 2021 (12.39 inches).

There was wide variation in precipitation amounts throughout the 2024 monitoring season. After large amounts of rainfall in August, only 1.51 inches of rain fell in September and only 0.01 inches of rain fell in October (the driest month on record for the last 130 years); precipitation was down 3.4 inches from the normal range expected for that month.

At the end of October, a moderate drought was declared for Long Island and a severe drought was declared on November 14. The last drought declared for Long Island was in September 2022, which, according to the U.S. Drought Monitor, is not unusual since New York State experiences a drought on average every two to three years (see https://www.drought.gov/ historical-information?dataset=0&selectedDateUSDM=20250304&state=New-York,New-York&countyFips=36059,36103). What is unusual, however, is the severity of the 2024 drought for this region.

Lack of rainfall increased the risk of brushfires. Between August 21 and November 21, a total of 376 brushfires were reported in Nassau and Suffolk counties. There was some relief from wildfire risk on November 21, when Long Island experienced its first significant rainfall in weeks (1.98 inches), but it was not enough to lift drought warnings. On December 1, the burn ban was lifted in New York State, however, Long Island was still considered to be in a severe drought.

Cormorants ignore a no-discharge sign posted near the entrance to Glen Cove Creek (photo by Carol DiPaolo, 9/12/24)

4 Observations

The 2024 water-monitoring season for the Hempstead Harbor core program began on May 15 with shoreline sampling only (in-harbor monitoring commenced one week later) and extended through October 30; winter monitoring of shoreline outfalls ran from November 13, 2024, through April 16, 2025.

During all monitoring surveys, wildlife observations are noted. 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. In addition to these observations, information from formal fish surveys and studies (such as those described immediately below) help fill out the picture of the health of the harbor’s habitat.

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.


CSHH #14A, powerhouse drain square outfall in cement seawall (l); post-demolition of brick facade on metal structure on east side of Shore Road (r) (photos by Carol DiPaolo, 10/16/24)

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). 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 2024 season included silversides (25,562), bay anchovy (2,251), Atlantic menhaden (bunker) (734), killifish (223), and blue fish (161). Although bunker were among the significant catches in 2024, the total number was drastically lower than that for 2023 (16,880), which is consistent with our observations during water monitoring surveys. Another notable difference was the increase in the number of winter flounder: 84 in the 2024 survey, up from 16 in 2023, with all winter flounder in 2024 considered "young of the year." The number of summer flounder increased in the 2024 seine catches as well, up to 15 from 0 catches in 2023. Horseshoe crab numbers remained about the same: 29 in 2024 as compared with 20 in 2023. In 2024, the number of blue crabs caught in seines increased to 37, up from 25 in 2023.

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
2024 NYS DEC Western Long Island Beach-Seine Survey for Hempstead Harbor

NYS DEC Western Long Island Survey- Hempstead Harbor 2024									
			MONTH						
Type	Common_name	AGE	5	6	7	8	9	10	TOTAL
CRUSTACEAN	BLUE CRAB	0	3						3
	BLUE CRAB	1		1	12	19	1	1	34
	GREEN CRAB	99		2					2
	HORSESHOE CRAB	99	5	6	6	12			29
	MUD CRAB	99			1				1
	SPIDER CRAB	99	6	4	53	1	3		67
DIADROMOUS	ATLANTIC TOMCOD	99	4	2					6
	STRIPED BASS	0			4	2	8	10	24
	STRIPED BASS	1	4	10	3	12	10	5	44
ESTUARINE	KILLIFISH SPP.	99	19	12	73	47	35	37	223
	SHEEPSHEAD MINNOW	99						1	1
INVERTABRATE	CHANNELED WHELK	99			2				2
MARINE	ATLANTIC HERRING	99		1	17				18
	ATLANTIC MENHADEN	0	5	699		5	6	1	716
	ATLANTIC MENHADEN	1		1	1	16			18
	BAY ANCHOVY	99	30	1042	29	426	598	126	2251
	BLACKFISH (TAUTOG)	0				7	3	1	11
	BLACKFISH (TAUTOG)	1	5	3	6	5	4		23
	BLUEFISH	0		1	56	10	91	3	161
	CREVALLE JACK	99					9		9
	FEATHER BLENNY	99		1					1
	GRUBBY SCULPIN	99	1	2	7				10
	NAKED GOBY	99			1		2	1	4
	NORTHERN KINGFISH	99				1			1
	NORTHERN PIPEFISH	99	10	20	9		1		40
	NORTHERN PUFFER	99			3	12	9		24
	NORTHERN SEAROBIN	99					1		1
	NORTHERN STARGAZER	99				2			2
	OYSTER TOADFISH	99	1						1
	SAND LANCE SPP.	99	1	3					4
	SCUP	99			3	24	7	1	35
	SILVERSIDE SPP.	99	1425	2733	8501	9479	1630	1794	25562
	SMALLMOUTH	99	1						1
	SPOT	99			31	8	6		45
	STRIPED ANCHOVY	99				23	3	1	27
	STRIPED MULLET	99						5	5
	STRIPED SEAROBIN	99			1		3		4
	SUMMER FLOUNDER	99	3	2	7	1	2		15
	WHITE MULLET	99					31	1	32
	WINDOWPANE	99			5				5
	WINTER FLOUNDER	0	2	22	36	13	9	2	84
	SKILLETFISH	99				1	1	3	5
SKATE/SHARK									
		# of hauls	6	6	6	6	6	6	36
*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 15.*)

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, 10/9/24)

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 and environmental factors, as well as the recent opening of additional shellfish harvest areas outside of Hempstead Harbor.

The 2024 shellfish landings report showed a decrease from the 2023 report in hauls of hard-shell clams from Hempstead Harbor; (the 2023 landings report also showed a steep decline for hard clams from the preceding year). The haul of hard-shell clams for 2024 was 4,699 bushels (about 1,200 fewer than in 2023). The soft-shell-clam haul rose for the first time in three years, from 0 to 0.6 bushels. No oyster hauls have been reported since 2022 for Hempstead Harbor. The hard-clam haul ranks fourth within the 16 north shore harvest areas. The economic value of hard-clams from Hempstead Harbor in 2024 decreased from the preceding year (from $471,371 to $351,671) not only because of fewer bushels of clams, but also because the clams taken from the harbor are a larger size and thus lower in economic value.

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 the harbor. 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, and other programs have been introduced to help bring attention to the importance of having a healthy shellfish population in all areas of Hempstead Harbor. 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.


Rick Geismar and Sarah Stromski prepare oysters for plantng from the CSHH oyster-gardening program (l); Congressman Suozzi (center), Carol DiPaolo, and Eric Swenson plant oysters directly to Hempstead Harbor (r) (photos by Carol DiPaolo, 9/12/24, and Cindy Rogers, 7/3/24, respectively)

In 2024, spat-on-shell oysters were provided through a 2022 Community Project Grant sponsored by Congressman Tom Suozzi and administered by the federal Environmental Protection Agency. The grant provides for up to 2 million spat-on-shell oysters to be planted over the course of three years in each of three north shore bays: Manhasset Bay, Hempstead Harbor, and Oyster Bay/Cold Spring Harbor. CSHH and HHPC have collaborated on managing the oyster planting for Hempstead Harbor, with CSHH expanding its state permit for oyster gardening to be able to plant oysters directly to the harbor. In 2024, over a million oysters were planted in Hempstead Harbor, and approximately 80,000 of these were raised in CSHH's oyster-gardening program (to increase oyster survivability) and planted in September 2024.

Both the oysters raised in the gardening program and those directly planted are in an uncertified area of Hempstead Harbor. Therefore, they are not suitable for harvesting; however, as they spawn, they will 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.

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.


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

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.

Since the first observation of saladbacks in Hempstead Harbor in 2015, they have been seen in the harbor nearly every year (except for 2018 and 2023), but in smaller numbers. In 2024, a few saladbacks were observed in Tappen Marina on October 9. (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. Just before the start of the new year, Steve Waldman photographed three adult bald eagles at the bottom of 12th Avenue, Sea Cliff, overlooking the harbor. Prior to this, we hadn't seen more than two adult bald eagles together in one area.

Three bald eagles in a tree along the Sea Cliff shoreline (photo by Steve Waldman, 12/30/23)

Throughout early and mid-January, the surface of Scudder's Pond was frozen. At the end of the month, air temperature warmed and dense fog covered the surface of the pond as well as Tappen Beach pool.

At the beginning of February, cackling geese, Canada geese, mallard ducks, and hundreds of brants were observed at Roslyn Pond.

From March 18-22 (and also on April 10), local residents reported seeing a survey boat, "Time and Tide," plying back and forth through

Hempstead Harbor and across Long Island Sound. The boat was conducting “non-invasive, geophysical survey work” on behalf of NY Transco for the Propel NY Energy project, which would entail laying submarine electrical cables through Hempstead Harbor and across Long Island Sound to New Rochelle. The purpose of the proposed project (which includes installation of subterranean cables as well through many Long Island and Westchester communities) is to upgrade the New York State electrical grid and allow for bidirectional flow of electricity between upstate New York and Long Island.

“Time and Tide” doing survey work in Hempstead Harbor (photo by Sebastian Li, 3/22/24)

During the week of March 18, Sebastian Li had reported seeing several ospreys working the harbor (our first report of the ospreys 2024 return to the harbor) and noticed turkey vultures in the area during that week and the preceding week as well. Sebastian also reported his first sighting of a bald eagle near Bay Avenue, Sea Cliff, on March 28.

On March 19, Stella Cashman saw a juvenile red-tailed hawk standing over some roadkill on a Sea Cliff street. Other birds of prey that were observed in the Sea Cliff area throughout March included a Cooper’s hawk in a tree at Carpenter Cemetery, and a juvenile great horned owl perched on lawn furniture in a Sea Cliff backyard.

Ashley Pichon saw an osprey chasing a mature bald eagle over the marsh at Welwyn Preserve on March 24, and on March 25 she saw four ospreys circling over the same area.

March raptors observed around Hempstead Harbor: juvenile red-tailed hawk (l), osprey (c), juvenile great horned owl (r) (photos by Stella Cashman, 3/19/24, Ashley Pichon, 3/24/24, and Maria Lisa Tramontana Ghersi, 3/24/24, respectively)

In March, there were also early reports of birds working the harbor for baitfish, large schools of bunker (on March 25), and large striped bass caught in the lower harbor.

Significant weather, geological, and astrological events occurred within the first two weeks of April. A strong wind and rain storm occurred on April 3 and resulted in damage to the tidal gates on the Morgan Island bridge. (This caused water to flow freely and quickly from Dosoris Pond into Long Island Sound, and vice versa.) The storm also deposited a large amount of sand over the sluiceway culvert on the eastern side of Pryibil Beach, prohibiting drainage of Dosoris Pond through the outfall. On April 5, a 4.8-magnitude earthquake was felt locally at 10:23 am. The epicenter was in Tewksbury, New Jersey, and damage was minimal. On April 8, there was a partial solar eclipse as seen locally, causing the sky to darken for a short period.

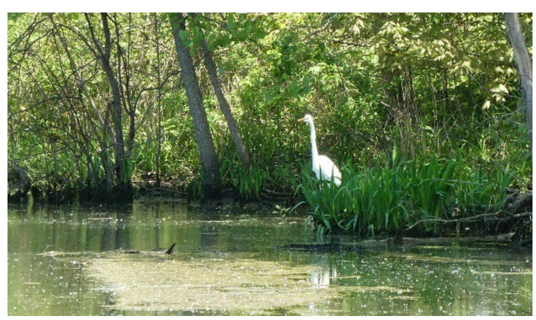
Other wildlife reports in April included Carol DiPaolo's sighting of a kingfisher in a tree along Dosoris Pond, Sara Jones's sighting of a harbor seal that hauled out on Tappen Beach, and an osprey sighted in a tree at Garvies Point holding a carp in its talons. On April 10, Karen Papasergiou reported seeing a large number of lion's mane jellyfish in Safe Harbor Marina.



A kingfisher at Dosoris Pond (l), osprey with a carp at Garvies Point (c), and lion's mane jellies at Safe Harbor Marina (r) (photos by Carol DiPaolo, 4/5/24, Nicole Lapinel, 4/20/24, and Karen Papasergiou, 4/10/24, respectively)

May

Weekly monitoring surveys for the core program began, as usual, in May. However, shoreline sampling only was conducted on May 15, and boat surveys were conducted on May 22 and 29.

Pollen slick in Glen Cove Creek and early growth of duckweed in Scudder's Pond (photos by Teri Moschetta, 5/9/24, and Carol DiPaolo, 5/2/24, respectively)

During the boat surveys, water coloration was normal and varied between green and brown. Pronounced pollen slicks were observed in Glen Cove Creek on May 8 and 9 and at Scudder's Pond on May 15 during shoreline sampling. Most of Scudder's Pond was also covered with duckweed starting in early May, and it remained for most of the season, to late

September. Also on May 29, a white opaque flow was observed from the submerged outfall pipe (CSHH #10) that is west of the Glen Cove sewage treatment plant outflow; this same white flow has been seen in previous monitoring seasons.

The first hypoxic (DO below 3.0 ppm) reading occurred at CSHH #13 in Glen Cove Creek on May 29, about one month earlier in the monitoring season compared with the year before. Other monitoring stations in the harbor on that day had healthy dissolved oxygen levels.

On May 10, a geomagnetic storm (the Gannon storm) occurred, caused by solar eruptions, creating a colorful display of the aurora borealis, or northern lights. Kathleen Haley captured photos of this from Pryibil Beach looking north-northeast.

View of the aurora borealis from Pryibil Beach (photo by Kathleen Haley, 5/10/24)

During the afternoon on May 7, three pairs of horseshoe crabs were observed at Tappen Beach. Peak horseshoe crab mating season typically occurs from the beginning of May to the end of June, so it is common during these months to see horseshoe crabs in the harbor shallows or along the shoreline trying to find a mate or to lay eggs.

To learn more about the presence of horseshoe crabs in Hempstead Harbor, CSHH conducted four horseshoe crab surveys as part of pilot monitoring to determine whether Hempstead Harbor would be a suitable location to include in the New York Horseshoe Crab Monitoring Network. This network is coordinated by Cornell Cooperative Extension of Suffolk County, DEC, and Stony Brook SOMAS. Through this program, individuals count and tag horseshoe crab populations at locations within New York's Marine District to aid in conservation efforts for this species. During the second pilot survey conducted for Hempstead Harbor on May 24 (night of the full moon), 590 horseshoe crabs were counted along the shoreline of Tappen Beach.

Horseshoe crabs seen off of Sea Cliff Beach during the day (l) and in large numbers off of Tappen Beach on the night of the full moon (r) (photos by Elaine Neice, 5/26/24, and Michelle Lapinel McAllister, 5/24/24)

Many sea walnuts were observed during both monitoring surveys in May; very large sea walnuts were noted in Tappen Marina on May 29. A school of juvenile bunker was observed breaking the surface near Beacon 11 and in Glen Cove Creek during the two monitoring surveys; adult bunker were not observed during any monitoring surveys this season.

Throughout the month, many of the coastal birds normally observed during monitoring surveys were present in May, including cormorants, mallard ducks, Canada geese, laughing gulls, swans, and terns. Some ducklings, goslings, and cygnets were seen throughout the harbor as well. Two great egrets, one belted kingfisher, and ten brants were also noted during monitoring surveys. On May 7, a large flock of brants was seen off of Tappen Beach. On May 26, an osprey was seen flying over Sea Cliff Beach carrying a fish and dropped it on the beach—the fish was a northern puffer and was returned safely to the water.

Northern puffer dropped by osprey (photo by Elaine Neice, 5/26/24)

Brants off of Tappen Beach (photo by Michelle Lapinel McAllister, 5/7/24)

Ospreys were observed in several nests throughout the harbor on both monitoring surveys. During the 2024 season, up to 17 osprey nests were visible along the harbor shoreline. Other osprey nests were observed a little farther in from, but still close to, the shoreline. Although no osprey nest was on Beacon 11, three new osprey nests were seen along the shoreline: on a platform at the Buchanan property on the west shore, on the barge with the gray container, and on the Safe Harbor Marina platform that was constructed in 2023.

June

Weekly monitoring surveys were conducted on June 5, 12, 19, and 26. Leading up to the June 26 monitoring survey, temperatures soared into the 90s, and the first heat wave of the 2024 season occurred from June 18 through 23.

Mats of vegetation and pollen were visible at the surface in various locations of the harbor at the beginning of the month. The harbor maintained its usual greenish-brown coloration throughout the month, but water clarity varied for each of the monitoring dates. Station CSHH #10 had a white flow coming from the submerged outfall pipe on June 12.

Dissolved oxygen was at healthy levels (above 4.8 ppm) for three of the four monitoring surveys. The exception occurred on June 12, when there was one hypoxic reading, in Glen Cove Creek at CSHH #13, and low (but not hypoxic) DO levels at outer harbor stations.

On June 5, a large school of juvenile bunker was observed at the surface near Beacon 11. Large numbers of sea walnuts were seen at the beginning of the month in Tappen Marina and near Beacon 11. On June 12, many sea walnuts sighted in Tappen Marina contained a wormlike form of the parasitic lined anemone. Fewer comb jellies were seen during surveys conducted later in the month.

The first blue-claw crab sighting of the season was on June 12; the crabs were seen on surveys throughout June and primarily on the bulkhead west of CSHH #8 (the discharge outfall for the Glen Cove sewage treatment plant). Additionally, two Asian shore crabs and one green crab were seen during the June 26 monitoring survey.

On June 21, Kenny Neice reported that a boater who had just returned to Safe Harbor Marina saw a sea turtle by Matinecock Point.

On June 25, Cornell Cooperative Extension, Suffolk, made the first delivery of spat-on-shell oysters for Hempstead Harbor. These oysters were part of the federal community grant that funded oyster seeding for three north shore bays (Manhasset Bay, Hempstead Harbor, and Oyster Bay-Cold Spring Harbor). CSHH assisted with the direct planting of these oysters.

Loading spat-on-shell oysters onto a barge for planting in Hempstead Harbor (photos by Michelle Lapinel McAllister, 6/25/24)

The usual birds that are observed during the monitoring season were seen throughout June, including cormorants, mallard ducks with ducklings, great egrets, two snowy egrets, Canada geese and goslings, laughing gulls, ospreys, swans with one cygnet, and terns. A red-winged blackbird and an adult bald eagle were seen in the lower harbor on June 19; this was the first bald eagle sighting during the 2024 monitoring surveys. On June 26, two plover-type birds were seen at the powerhouse drain outfall, and a great egret and a snowy egret were seen near the Tappen Beach pool.

A land-based observation was reported on June 22— a groundhog was seen on the east side of Scudder’s Lane across from the Glen Harbor Residences in Glenwood Landing.

July

Weekly monitoring occurred on July 3, 10, 17, 24, and 31. On July 3, the water was an abnormal brown color from Tappen Marina through the lower harbor, and chlorophyll values were higher, indicating a potential algal bloom. None of the stations tested on July 3 were hypoxic. However, on every other monitoring event in July, there was at least one station that had bottom hypoxia; on July 17, all 13 stations exhibited bottom hypoxia. During the July 10 monitoring survey, water clarity was good, especially at outer-harbor stations. On July 17, the lower harbor had abnormal coloration with foam patches on the surface; it was likely there was an algal bloom in progress.

Temperatures soared into the 90s, and a heat wave occurred from July 5 through July 8. Two other official heat waves occurred during the summer: July 14-16 and July 31-August 3.

On July 6, Sanjay Jain reported his observations from the lower harbor:

> *The bald eagle nest is still there, but I have not seen any babies (and I have not been looking either on a regular basis but typically they fly around by now and I have not seen such fledglings). I have seen adolescent eagles come around every once in a while. There are many swans, many ducks (mallards), and I have seen fewer goslings, but more ducklings this year. There have been a few white egrets and blue herons hanging around, but I see them less frequently at this time. The usual osprey sitings are there. It is just so hot and many days are hot, and I am assuming that is changing some of the habits of these creatures lately. There is not much else that is unusual except we are now noticing regular visits from deer to our area. They may be walking along the waterline between various areas of Roslyn Harbor. There were 2 baby deer (white spotted) accompanied by an adult that visited our property about 10 days ago or so. The ground hogs are still in full swing eating away our plantings. Raccoons are busy as usual. I have not seen any foxes lately.*

Observations during monitoring surveys included comb jellies (sea walnuts and sea gooseberries), but these were seen only toward the end of July, with the highest numbers on July 31 in the lower harbor.

Baitfish and juvenile bunker were seen throughout the month of July in the lower harbor and Glen Cove Creek, which drew large numbers of birds (particularly on July 3 and 17). One small winter flounder was seen swimming near the surface in the lower harbor on July 17, likely to avoid the low oxygen at the bottom.

About half of the 15 great egrets that were seen off of Tappen Beach at one time (photo by Elaine Neice, 7/18/24)

Birds observed during July monitoring surveys of the harbor included cormorants, mallard ducks and ducklings, great egrets, one snowy egret, Canada geese, blue herons, ospreys, swans, and terns. In addition, four killdeer, three Bonaparte gulls, and nine belted kingfishers were noted. A duck was seen in Glen Cove Creek with a tumor on its head, likely the same duck observed during the 2023 season. On the July 17 survey, a bald eagle was seen in the lower harbor, and eight egrets were seen on the rocks near Tappen Beach pool; on the following morning, Elaine Neice reported seeing 15 egrets between Rum Point and Tappen Beach. On July 25, ospreys were in the nest on the platform at Safe Harbor Marina with two fledglings.

On July 28, Cara Morsello Royal saw a loggerhead turtle heading toward Glen Cove Creek during an early-evening swim from Sea Cliff Beach to the Channel. She detailed her experience:

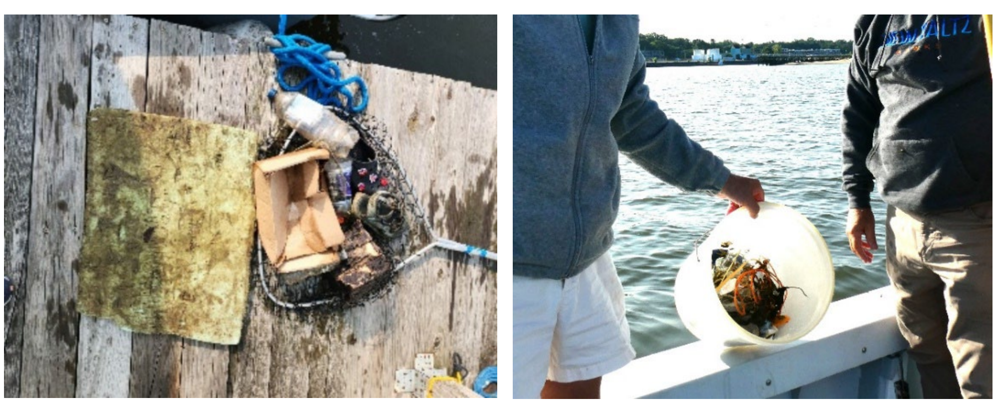
> *Spotted a loggerhead turtle yesterday… a little west of Sea Cliff beach, when me and Karen Buschfrers spotted the giant, coming up for a moment to take a breath, swimming in the direction of Glen Cove Creek. We just saw its head, briefly. It was nearly the size of our heads, so I got a good look at its markings… It looked positively prehistoric.*

Blue-claw crabs were seen on most monitoring dates in July in Glen Cove Creek and Tappen Marina, with a high of six seen near the Glen Cove STP and below The Cove restaurant.

August

Weekly monitoring took place on August 14, 21, and 28; monitoring was canceled on August 7 due to inclement weather. August had the highest precipitation of the monitoring season, totaling 11.76 inches.

Rain storms moved more than the usual amount of floatable debris into the harbor. Elaine Neice reported "a ridiculous amount of trash in the harbor by Tappen Beach" on August 15, including two shoes (a third shoe escaped her net), Styrofoam, plastic bottles, wood, and an empty box. On CSHH's August 21 survey, floatables were netted on trips between monitoring stations.



August rain storms resulted in more floatable debris in the harbor near Tappen Beach (l) and off of North Hempstead Beach Park (r) (photos by Elaine Neice, 8/15/24, and Carol DiPaolo, 8/21/24)

On August 14, bottom DO levels were hypoxic at two outer harbor stations, CSHH #2 and #16. (Because of tidal cycles, no lower-harbor stations were monitored in August.) A shift occurred on August 21, when bottom DO was at healthy levels at six of seven monitoring stations. However, hypoxic levels occurred at bottom depths again on August 28 for four out of seven monitoring stations.

Birds observed during August monitoring surveys included cormorants, mallard ducks, Canada geese, ospreys, swans, and terns. Three belted kingfishers, five great egrets, five killdeer, and four blue herons were also seen in August, mostly in Glen Cove Creek. A spotted sandpiper was seen near the jetty at the end of the boardwalk by Joanna Greenspon at the beginning of the month.

During the August 14 survey, a staff person at Safe Harbor Marina flagged the monitoring boat to ask for assistance in rescuing an osprey fledgling that was entangled in fishing line attached to a jet ski near the fuel dock of the marina. Bobby Horvath, a wildlife rehabilitator, was called; he was able to free the osprey, brought it back to his wildlife rehabilitation center, and, within a few days, was able to release the osprey near the nest at the marina.

One of two fledglings from the Safe Harbor Marina platform nest (l) became entangled in fishing line tied to a jet ski float (r) (photos by Elaine Neice, 8/8/24, and Carol DiPaolo, 8/14/24, respectively)

Comb jellies (sea walnuts and sea gooseberries) were observed in high numbers on all monitoring dates in August. Also noted were blue-claw crabs, baitfish, and snappers, all in Glen Cove Creek.

After months of work on the tidal gates at the Morgan Island bridge; by the end of August, they were repaired and functioning normally.

Alex Drew mentioned that on August 27, a fever of more than 50 cownose rays were seen in Oyster Bay.

September

Weekly monitoring took place on September 4, 11, 18, and 25. On September 4, the harbor was an abnormal brown color with foam patches near Beacon 11, but the color was a more normal green at all other stations. No station was hypoxic on this day, but it was suspected that an algal bloom was occurring in the lower harbor. The following week, on September 11, all but one station exhibited healthy DO levels; CSHH #13 was hypoxic. Water quality and clarity continued to fluctuate throughout the month, with abnormal brown coloration at Tappen Marina and Beacon 11 during the September 18 monitoring survey and normal coloration and DO levels on September 25.

During the September 4 and 11 monitoring surveys it was noted that the large Gladsky Marine crane had been moved from its usual mooring south of Beacon 11 (CSHH #1). The crane has been in the lower harbor for many years surrounded by old barges and other marine salvage and has rarely been moved. Peter Primont reported seeing the crane return to the harbor in the evening on September 11.

The large Gladsky Marine crane missing from its usual mooring in the lower harbor (l) was noticed on its return about a week later (r) (photos by Carol DiPaolo, 9/4/24, and Peter Primont, 9/11/24, respectively)

On September 21, during CSHH's activities for the International Coastal Cleanup, two smooth dogfish washed up onto the shore (one at the Tappen Marina boat ramp and one at Sea Cliff Beach). Also noted on this day was an extremely high tide due to the super moon.

On September 22, after a swim, members of the Polar/Solar Bears experienced a skin reaction known as seabathers eruption. This is a common occurrence in temperate and warm waters and is attributed to larval forms of jellyfish and sea anemone releasing stinging cells, or nematocysts, as a result of pressure or exposure to fresh water.

In early September, the weir at Scudder's Pond started to break apart, keeping the pond level low until the weir finally collapsed and the pond completely drained on a low tide on or about September 21. The result was that most of the duckweed that had covered the entire

Duckweed on surface of Scudder's Pond (l), green streak in harbor off of Tappen Beach (c) and Scudder's Pond with low water (r) (photos by Carol DiPaolo, 9/4/24, Courtney Citko, 9/21/24, Tom Powell, 9/24/24, respectively) surface of the pond drained out into the harbor. On September 21, we received a report of a bright green patch on the surface of the water off of Tappen Beach—likely the duckweed from Scudder's Pond. Following the collapse of the pond weir, the pond continued to fill on a rising tide from Hempstead Harbor and drain on a falling tide.

Various bird species took advantage of the fish that were stranded in shallow pools of the pond during low tide. The birds observed at the pond included black-crowned night herons, blue herons, snowy egrets, great egrets, cormorants, ospreys, belted kingfishers, and bald eagles, both juvenile and adult.

Great egrets (top row), black-crowned night heron, blue heron, belted kingfisher (center row), osprey and cormorants, ducks, and black-crowned night heron (bottom row) (photos by Kathleen Haley, 9/26/24)

On all monitoring surveys in September, large numbers of birds were noted throughout the harbor, including cormorants, mallard ducks, Canada geese, great egrets, blue herons, belted kingfishers, ospreys, swans, and terns. Plover-type birds, such as sanderlings, were seen


Great egret taking off from Safe Harbor Marina (l) and blue heron and cormorants on a float west of Sea Cliff Beach (photos by Thomas Peppe, 9/16/24, and Carol DiPaolo, 9/11/24)

during September monitoring surveys as well. One juvenile green heron was seen during the September 11 survey, and one bald eagle was seen during monitoring, north of the Legend Yacht & Beach Club on September 25. Fewer ospreys were observed in September; on the last survey of the month, no ospreys were seen.

During the September 25 monitoring survey, the outfall pipe in Glen Cove Creek, CSHH #12A, was discharging a slightly orange-colored liquid from the pipe; one sample was taken to be analyzed for bacteria content. About half an hour later, on the way out of the creek after the final monitoring station was completed, the liquid discharging from the pipe had deepened to a bright orange-yellow; a second sample was taken. The bright orange substance and source have not been identified, and the samples taken did not exceed bacteria standards.

Water sample collected from #12A discharge (photo by Carol DiPaolo, 9/25/24)

Sea walnuts and sea gooseberries were noted only in small numbers throughout September. In Glen Cove Creek, there were schools of baitfish, peanut bunker, bluefish, snappers, and a few blue claw crabs. On September 4, a spot croaker was caught by Alex Drew for a forthcoming Bay Day exhibit in Oyster Bay.


Blue-claw crabs (l) and a spot croaker (r) (photos by Carol DiPaolo, 9/4/24)

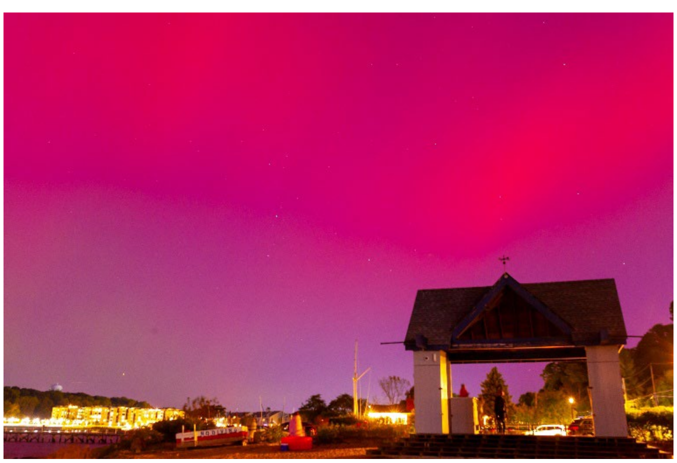
October
Weekly monitoring took place on October 2, 9, 16, 23, and 30. DO levels improved from the previous month's monitoring, and water temperatures steadily decreased. The deficit of precipitation that began in early September continued into October, and drought and brush fire warnings were issued for the area; only 0.01 inches of rain fell for the entire month of October.

Low water levels in Scudder's Pond prevented grabbing water samples on all but the final monitoring date, October 30. The weir at Scudder's Pond was still down, and water was flowing freely between the harbor and the pond. At low tide, the water was draining almost completely from the pond into the harbor, stranding fish and attracting birds.

During October 1-4, some of the birds that were seen around the pond included great egrets, juvenile green herons, a juvenile bald eagle, black-crowned night herons, a blue heron, belted kingfisher, red-winged blackbirds, ospreys, cormorants, and mallard ducks. On October 4, an osprey was on a tree branch nearby tearing apart a fish for its meal.

On October 3, Carol DiPaolo reported:

> *The scene at Scudder's Pond continues to amaze! The weir is still down, and water flows freely in and out of the pond--in from the harbor and upper pond. This has attracted an incredible variety of birds. Yesterday, along with all of the great egrets stalking their prey was a juvenile bald eagle perched on a high branch overlooking the pond. This morning, I went to the pond as the tide was going out in the harbor, and the pond once again was emptying. I saw 13 great egrets, three juvenile green herons, a black-crowned night heron, a blue heron, a kingfisher, a red-winged blackbird, an osprey, six cormorants, six mallards, and a school of velvety-black-colored fish, the largest of which had a large orange spot on its side—they could have been from someone's koi pond, but after being attacked by a great egret, they all were washed out of the pond through the open weir.*


Aurora borealis for the second time during the 2024 season (photo by Tom Lansdale, 10/10/24)

Another powerful geomagnetic storm (October 8-10) created spectacular showings of the northern lights over Hempstead Harbor.

On October 9, a few of the juvenile bunker observed in Tappen Marina had parasitic copepods attached, and some had green or red macroalgae. The last sighting of "saladbacks" was in 2022, also in small numbers.

On October 19, we received a report from Isabelle Sheridan of two dolphins swimming in Hempstead Harbor near Sea Cliff Beach.



Bunker with parasitic copepod attached (l), a small goby (c), and mummichog (r) found in Tappen Marina (photos by Carol DiPaolo, 10/9/24 and 10/2/4, respectively)

Birds observed during October monitoring surveys included cormorants, mallard ducks, Canada geese, great and snowy egrets, blue herons, swans, belted kingfishers, and terns. A few ospreys were noted during the first monitoring survey of the month. By the end of October, only one osprey remained a little longer than expected and would consistently perch on a tree branch overlooking Scudder's Pond; one juvenile bald eagle and one adult bald eagle also took turns perching on the same branch. On October 9, Michelle Lapinel McAllister reported seeing a bald eagle over Roslyn Park, and Elaine Neice saw great egrets and bald eagles around Scudder's Pond.


Bald eagles flying over Scudder's Pond (l) and cormorant in osprey nest in lower harbor (r) (photos by Kathleen Haley, 10/24/24, and Carol DiPaolo, 10/16/24, respectively)

On October 16, two red-tailed hawks circled overhead in Mott's Cove; they were soon joined by two bald eagles overhead as well. Bald eagles were observed on every monitoring date in October. There were three sightings of bald eagles on October 30, during the last monitoring survey of the season: over Mott's Cove, Crescent Beach, and Rum Point. On October 24, Kathleen Haley observed a pair of mature bald eagles flying in the area of Scudder's Pond.

Schools of baitfish and bunker were noted throughout the harbor during October and one bluefish was seen breaking the surface at Beacon 11 chasing the baitfish. Comb jellies (sea walnuts and sea gooseberries) were seen on only the first monitoring survey of the month and in large numbers. No crabs were noted during October monitoring dates.

November – December
On December 23, Sarah Stromski saw a blue heron in the pond at the Swan Club. Also on that day, Scudder's Pond was completely frozen over, and the surface of the lower harbor had frozen areas as well.

Lower harbor, view looking north (photo by Carol DiPaolo, 10/30/29)

4.6 Crustaceans

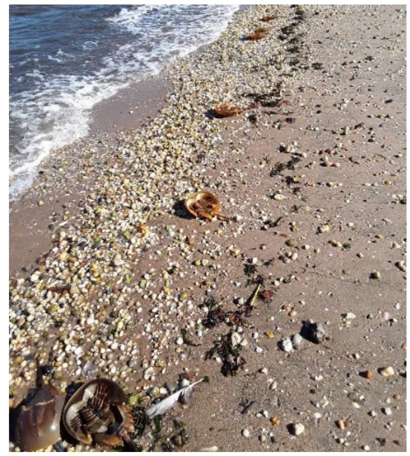
A variety of crustaceans can be seen around Hempstead Harbor. This group of marine organisms is characterized by, among other things, a segmented body, paired appendages, and a hard external skeleton that has to be shed to accommodate growth. Crabs, lobsters, shrimp, and barnacles are examples of this 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, 9/4/24, 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 2024, DEC seine haul recorded a total of 37 blue-claw crabs (three young-of-the-year, and 34 older). Similarly, during CSHH weekly monitoring surveys, a total of 35 blue-claw crabs were seen from June through September; in 2023 we only saw 14 during the monitoring season.

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 into late summer. During late summer and into autumn, the beaches are covered with horseshoe crab molted shells, and these are often mistakenly reported as dead horseshoe crabs.



Horseshoe crabs mating (l) and molts along the strand line near the Sea Cliff Yacht Club (photos by Michelle Lapinel McAllister, 5/7/24, and Carol DiPaolo, 9/4/24, respectively)

At the start of the 2024 monitoring season, horseshoe crabs were observed mating along the shores of Hempstead Harbor beaches. During their mating season, from May through June, horseshoe crabs are mostly seen in the shallows or along the shoreline at the nighttime high tides in search of a mate or a suitable location to lay eggs. They can also be seen in the same areas during the day, but in lower numbers. On the night of May 24, during a second survey for a pilot horseshoe crab monitoring program for Hempstead Harbor, 590 horseshoe crabs were counted off of Tappen Beach. See *Section 4.5* for monthly observations in May.

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

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**. 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.

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 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.

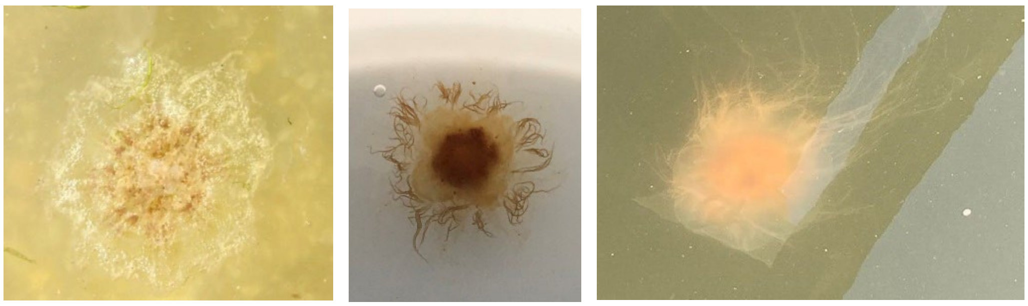
A number of invasive species of crab have been observed for years around Long Island Sound. Most notable of these are Asian shore crabs, green crabs, and Chinese mitten crabs. The **Asian shore crab** started showing up around Long Island Sound in the late 1990s. It can tolerate a wide range of salinity levels and is now commonly seen in bays around Long Island Sound. In 2024, we saw two Asian shore crabs during a monitoring survey in June. **Green crabs** are another species of crab listed under the New York State Invasive Species Regulation 6 NYCRR Part 575. During monitoring surveys in 2024, we saw one green crab. The **Chinese mitten crab** has shown up around Long Island Sound and in the Hudson River (with people reporting sightings to the DEC each year), as well as the lower Housatonic River in Connecticut. Invasive species can upset the ecosystem and drive out native species. Large numbers of mitten crabs can cause damage when they burrow into riverbanks, potentially leading to bank 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 2024, comb jellies were observed in large numbers at the beginning of the monitoring season, but by late June and July the numbers decreased significantly. Most of the comb jellies (both sea walnuts and sea gooseberries) observed on monitoring surveys were noted primarily near Beacon 11 and Tappen Marina, but they were seen in other parts of the harbor as well.

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



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)

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 not seen during 2024 monitoring surveys, but were observed on other days in the spring (March 31 and April 10) in Safe Harbor Marina. During the 2023 season, they were seen in Safe Harbor Marina on April 12. 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. The last time we saw them was along the bulkhead in Glen Cove Creek in September and October of 2022.

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 and the Sea Isle sand spit.

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

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:

- 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, near the Sea Isle sandspit.
- On July 11 and August 19, 2009, a diamondback was seen in 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) near the sandbar at the southern end of North Hempstead Beach Park.

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

Occasionally, large sea turtles have made their way into Long Island Sound and have been spotted in local bays. In 2024, we received a report of a sea turtle (species unknown) near Matinecock Point on June 21 and a report of an adult **loggerhead turtle** swimming toward Glen Cove Creek on July 28. In 2023, a dead loggerhead turtle washed up on the shore of East Beach. 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 2020-2024. 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.

In 2024, we received a report of a harbor seal that was hauled out on Tappen Beach on April 9. On October 19, a pair of dolphins was seen off of Sea Cliff Beach.

Harbor seal at Tappen Beach (photo by Sara Jones, 4/9/24)

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
Dolphins	October 19, 2024	Two dolphins off of Sea Cliff Beach
Harbor seal	April 9, 2024	Hauled out on Tappen Beach
Harbor seal	December 21, 2023	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	Seen 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	Near the Throgs Neck Bridge
Seal	October 23, 2021	In the mooring field near the Hempstead Harbour Club
Dolphins	July 5-6, 2021	Dolphin reports in Oyster Bay on July 5; the next day a pod of 50 dolphins was seen in Hempstead Harbor near the Legend Yacht and Beach Club
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	In the lower harbor
Seal	February 2019	On a jet ski float in Safe Harbor Marina in Glen Cove.
Seal	December 14, 2018	Seen surfacing in front of the Tilley steps 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	Breaching outside of 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

Marine Mammal	Date	Description
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
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	Two 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	Eight seen in Hempstead Harbor, near Sea Cliff Beach
Seals	April 27-29, 2013	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	In Long Island Sound
Bottlenose dolphins	June 27, 2009	Around 200 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

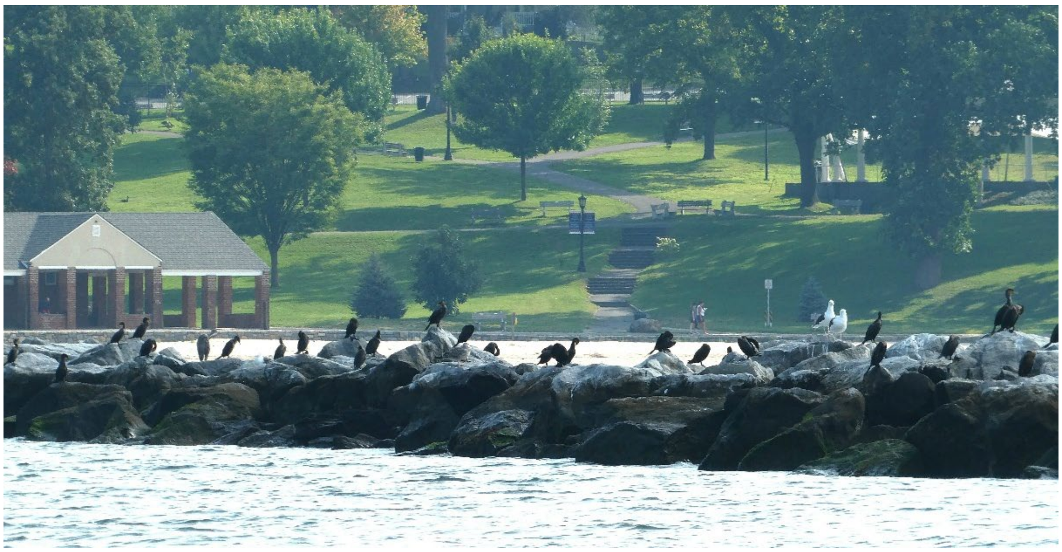
4.10 Birds

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, black-crowned night herons, blue herons, brants, Canada geese, cormorants, great** and **snowy egrets, green herons, 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. However, we observed a goose nest in April 2023 and goslings throughout May and June in 2023 and 2024. This is an increase from the preceding year, when we observed goslings during only two monitoring days in June 2022.

A belted kingfisher (l), terns on a buoy (c), and a great egret fishing in Scudder's Pond (r)
(photos by Carol DiPaolo, 4/5/24, 6/26/19, and 10/3/24, respectively)

In 2024, we observed swans throughout the regular monitoring season (May through October). During monitoring surveys, we observed cygnets from May through July, with a high of four cygnets in May. This is an increase from 2023, when we observed only one cygnet in June and one juvenile swan in May. 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.



Cormorants and gulls on the Glen Cove breakwater with Morgan Park in the background
(photo by Carol DiPaolo, 8/28/24)

Observed less frequently during monitoring surveys are **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*.

Osprey perched over Scudder's Pond (photo by Carol DiPaolo, 10/18/24)

Osprey populations, once threatened because of the effects of widely used pesticides that were banned in the 1970s, have made a remarkable comeback in 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 2023, 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 but the nest was abandoned. In 2024, three new nests were discovered along the harbor's shoreline: one on the Buchanan platform on the west shore in Port Washington, another on the barge with the gray container (this nest may be temporary as the barge is moved in and out of the harbor), and a nest on the platform erected in 2023 in Safe Harbor Marina. Currently, 17 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. During water-monitoring surveys in 2024, red-tail hawks were noted on one occasion: on October 16, two red-tailed hawks circling over Mott's Cove. A juvenile red-tailed hawk was also seen on March 19 standing over some roadkill. In 2023, red-tailed hawks were seen in February and May during 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. No turkey vultures were seen during 2024 water-monitoring surveys, but further inland they were seen in small numbers.

Left to right, red-tailed hawk flying over Welwyn Preserve, osprey, turkey vulture, bald eagle over Scudder's Pond (photos by Ashley Pichon, 4/24/22, Jim Moriarty, 9/11/10, turkey vulture photo retrieved from en.wikipedia.org/wiki/Turkey Vulture, 6/17/12, and Kathleen Haley, 10/24/24)

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.

We received a report on January 2, 2024, of three bald eagles in the area at one time. Previously, we had not seen more than two adults at a given time during water-monitoring surveys. During the water-monitoring season, adult and juvenile bald eagles were observed on monitoring dates in June through October, primarily on days where we monitored in the lower harbor and at Scudder's Pond. On the very last day of the monitoring season, October 30, we saw three bald eagles in three different areas around Hempstead Harbor; one flying overhead at Mott's Cove, one flying overhead at Crescent Beach, and a third flying over Rum Point. Adults and juveniles were seen on multiple occasions perched in a tree overlooking Scudder's Pond.

Two bald eagle fledglings in the lower harbor (l) and two mature bald eagles over Scudder's Pond (photos by Rich Boehm, 7/21/21, and Kathleen Haley, 10/24/24, respectively)

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.**

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. Shallower 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, the visible effects of algal blooms, such as unusual and dramatic water color and clarity changes, are 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*).

Abnormal coloration and varying DO levels (hypoxic and super-saturation) occurred at times throughout the harbor in 2024, but potential algal blooms were more localized to specific parts of the harbor and occurred over a longer period than in 2023. Examples of suspected blooms were on July 3 and 17 in Tappen Marina and the lower harbor, and September 4 and 18 at Tappen Marina and Beacon 11. On all four of these dates, these areas of the harbor were exhibiting abnormal coloration. Additionally, on September 21, there was an unusual green streak in the harbor, most likely duckweed that drained from Scudder's Pond. In 2023, algal blooms were suspected on only two dates during the monitoring season due to abnormal coloration.


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 Carol DiPaolo, 9/4/24)

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. Scudder's Pond was covered with duckweed at the surface for the majority of the monitoring season in 2024, up until the weir collapsed in late September.

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.

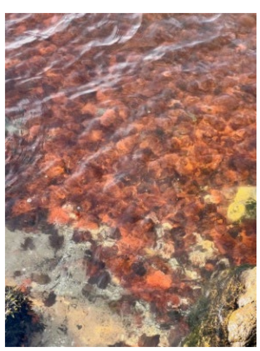
Excess nitrogen can also fuel the growth of macroalgae (also known as macrophytes, or, more commonly, seaweed). An overabundance of seaweed can reduce light penetration, deplete oxygen, make it difficult for some species of marine life to thrive, and create aesthetic issues for beaches. In some bays,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




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

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. This seaweed was observed along portions of the eastern shoreline of the harbor during the 2024 summer season.

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

Coalition to Save Hempstead Harbor

2024 CSHH Field-Monitoring Data

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

Green lines indicate replicate surveys.

Brown numbers indicate pH readings from a LaMotte 5858-01 test kit.

Blue lines indicate survey using YSI ProDSS. Depth between sensor and bottom reading to sea floor is 0.365 m

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

**Bottom levels are read by the sonde depth sensor, which is 0.3 m off the harbor floor.

***Total depth accounts for the 0.3 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																
10/30/24	15.21	15.73	25.59	26.51	7.90	7.28	7.55	7.55	13.1	1.75	11.93	5.29	2.39	5.17	3.69	7:43
10/30/24	15.22	15.74	25.68	26.54	7.81	7.33	7.55	7.55	N/A	N/A	12.44	5.30	2.47	5.12	3.85	N/A
10/23/24	16.28	16.29	25.93	25.96	7.37	7.24	7.50	7.55	14.2	1.25	11.62	11.97	4.48	5.36	3.92	7:48
10/23/24	16.25	16.30	25.96	25.97	7.28	7.20	7.56	7.57	N/A	N/A	11.95	12.01	4.39	4.97	3.82	N/A
10/16/24	15.78	16.30	25.09	25.38	7.78	7.37	7.57	7.67	7.6	1.0	10.75	9.91	7.09	9.31	4.21	7:40
10/16/24	15.93	16.37	25.29	25.48	7.60	7.40	7.69	7.69	N/A	N/A	11.05	10.75	7.94	9.82	4.21	N/A
10/9/24	18.91	19.61	25.08	25.79	6.95	6.32	7.59	7.56	14.3	1.0	14.12	10.31	6.25	7.63	4.01	7:45
10/9/24	19.05	19.62	25.25	25.83	6.81	6.25	7.59	7.56	N/A	N/A	13.61	11.07	6.09	9.92	3.98	N/A
10/2/24	20.25	20.63	25.46	26.23	4.74	4.75	7.16	7.27	16.6	0.75	10.95	5.61	6.22	19.62	4.00	7:45
10/2/24	20.26	20.63	25.49	26.22	4.61	4.70	7.20	7.29	N/A	N/A	10.44	5.55	6.70	19.64	4.09	N/A
9/25/24	21.24	21.52	25.88	26.36	5.64	5.53	7.46	7.55	16.8	1.0	15.35	9.45	5.64	9.28	5.02	7:53
9/25/24	21.31	21.48	25.91	26.34	5.40	5.63	7.49	7.57	N/A	N/A	15.68	8.47	5.23	10.23	5.00	N/A
9/18/24	22.49	22.34	25.22	26.09	6.52	3.36	7.46	7.31	19.5	0.75	52.09	10.87	7.61	18.11	3.43	7:40
9/18/24	22.60	22.40	25.32	25.97	6.34	3.71	7.58	7.36	N/A	N/A	64.26	12.64	7.85	19.08	3.50	N/A
9/11/24	21.47	22.20	24.94	25.72	5.85	5.79	7.28	7.33	15.1	1.0	22.70	17.29	5.87	4.71	4.51	7:55
9/11/24	21.34	22.19	24.86	25.72	6.06	5.69	7.33	7.34	N/A	N/A	14.21	16.89	5.98	5.49	4.60	N/A
9/4/24	21.93	22.12	24.76	25.19	7.91	6.43	7.59	7.47	15.6	0.5	52.23	28.41	9.37	14.92	3.06	7:50
9/4/24	21.99	22.05	24.80	25.17	7.77	6.50	7.61	7.50	N/A	N/A	65.42	22.40	9.64	16.93	3.13	N/A
8/28/24	23.16	22.64	25.52	26.04	4.39	1.47	7.42	7.16	24.9	1.25	23.07	5.29	4.77	7.31	4.91	8:00
8/28/24	23.16	22.64	25.53	26.04	4.56	1.42	7.45	7.17	N/A	N/A	28.50	5.49	4.97	6.52	4.74	N/A

Coalition to Save Hempstead Harbor

2024 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)																
8/21/24	22.41	22.61	23.65	24.01	7.11	6.65	7.65	7.63	16.0	0.75	31.16	16.96	11.12	13.33	2.76	7:40
8/21/24	22.24	22.59	23.64	24.03	7.30	6.34	7.72	7.67	N/A	N/A	36.30	14.84	10.29	14.28	2.71	N/A
8/14/24	24.18	23.92	24.61	25.40	9.73	5.83	7.87	7.59	22.6	0.8	30.99	17.55	5.95	10.84	4.78	7:55
8/14/24	24.16	23.91	24.60	25.42	9.66	5.82	7.94	7.62	N/A	N/A	33.16	17.76	6.01	11.41	4.52	N/A
8/7/24	Water monitoring cancelled due to weather.															
7/31/24	22.90	22.60	26.58	26.67	4.20	3.23	7.22	7.19	27.1	1.0	12.72	7.51	5.36	15.52	4.69	7:56
7/31/24	22.93	22.60	26.59	26.67	4.29	3.22	7.30	7.21	N/A	N/A	13.92	7.06	5.02	17.38	4.77	N/A
7/24/24	22.48	22.27	25.43	25.76	4.05	3.37	7.08	7.10	23.9	0.75	23.61	23.18	7.82	9.54	3.23	7:50
7/24/24	22.49	22.28	25.44	25.75	3.79	3.35	7.11	7.10	N/A	N/A	23.92	22.75	8.05	10.35	3.22	N/A
7/17/24	22.42	19.22	25.73	26.56	4.55	1.13	7.15	6.96	25.0	1.25	32.51	17.02	2.91	3.14	4.13	6:53
7/17/24	22.42	18.92	25.73	26.57	3.92	0.78	7.18	6.97	N/A	N/A	29.02	16.04	3.19	3.91	4.49	N/A
7/10/24	22.04	22.00	25.16	25.25	3.78	3.54	7.19	7.23	24.9	0.75	23.72	23.15	9.39	10.70	2.88	7:15
7/10/24	22.03	21.99	25.19	25.22	3.59	3.52	7.25	7.27	N/A	N/A	23.97	24.12	9.61	11.27	3.21	N/A
7/3/24	20.64	17.85	24.68	25.66	7.54	3.55	7.74	7.30	18.4	0.5	58.48	37.14	4.82	6.79	4.36	7:33
7/3/24	20.62	17.89	24.72	25.66	7.40	3.58	7.76	7.34	N/A	N/A	36.91	34.72	4.17	7.42	4.46	N/A
6/26/24	20.12	20.08	23.77	23.84	7.16	6.94	7.66	7.69	23.7	1.0	13.28	13.85	5.09	5.19	2.56	7:50
6/26/24	20.07	20.07	23.98	24.00	6.92	6.77	7.71	7.70	N/A	N/A	13.27	13.59	5.09	5.79	2.45	N/A
6/19/24	18.35	16.55	24.08	24.57	7.41	4.76	7.63	7.36	22.1	1.0	36.31	28.35	5.64	9.09	4.12	7:22
6/19/24	18.27	16.58	24.15	24.60	7.34	4.82	7.67	7.39	N/A	N/A	35.82	27.47	5.34	8.50	4.19	N/A

2024 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)																
6/12/24	19.2	17.0	22.88	23.97	4.99	4.16	8.0	8.0	17.9	1.5	3.64	6.35	3.28	4.77	3.78	7:55
6/12/24	19.2	17.3	22.82	23.83	4.98	4.12	N/A	N/A	N/A	N/A	3.28	5.42	3.17	4.58	3.74	N/A
6/5/24	18.5	15.1	23.25	23.95	6.35	3.98	8.0	8.0	20.2	0.75	20.68	12.74	5.64	9.32	3.91	7:55
6/5/24	17.9	15.2	23.28	23.94	5.55	4.06	N/A	N/A	N/A	N/A	22.14	14.44	3.37	7.99	3.98	N/A
5/29/24	17.96	17.95	22.75	22.76	7.47	7.34	8.0	8.0	17.3	N/A	16.17	13.36	2.90	5.07	3.87	8:00
5/29/24	17.94	17.94	22.72	22.85	7.47	7.31	N/A	N/A	N/A	N/A	15.17	14.69	3.47	5.63	3.69	N/A
5/22/24	16.40	15.54	22.51	22.88	8.13	7.48	8.0	8.0	21.1	1.0	2.36	2.22	4.36	9.55	3.44	7:53
5/22/24	16.40	15.54	22.57	22.93	8.15	7.43	N/A	N/A	N/A	N/A	2.24	2.32	4.25	8.81	3.54	N/A
5/15/24	Shoreline sample collection only.															

2024 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																
10/30/24	15.65	16.35	26.52	27.05	8.47	7.25	7.81	7.71	16.9	3.5	5.64	1.64	1.14	3.10	10.51	9:54
10/23/24	16.59	16.53	26.47	26.48	8.20	7.83	7.76	7.70	15.2	3.5	4.11	4.50	1.31	4.46	9.10	8:15
10/16/24	High wind and waves, unable to access station.															
10/9/24	19.74	19.74	26.27	26.27	6.91	6.78	7.66	7.65	15.5	1.0	6.14	8.16	4.04	7.69	9.09	8:10
10/2/24	20.18	20.22	26.27	26.30	6.52	6.31	7.55	7.54	16.1	1.0	5.64	3.95	4.13	5.70	5.85	8:18
9/25/24	20.98	21.45	26.27	26.51	7.18	6.02	7.72	7.62	17.4	1.5	9.65	6.83	3.45	11.73	9.84	8:25
9/18/24	22.21	22.30	26.01	26.30	7.60	5.35	7.81	7.58	20.3	1.5	15.40	4.75	3.17	9.51	6.91	8:15
9/11/24	22.42	22.30	25.97	26.03	7.54	5.65	7.62	7.37	16.6	1.5	13.56	5.12	2.77	5.75	8.20	8:31
9/4/24	22.48	22.51	25.99	26.07	6.60	5.58	7.58	7.48	19.1	1.0	14.95	6.98	5.01	12.09	7.38	8:20
8/28/24	23.28	22.62	25.65	26.07	5.98	2.65	7.65	7.28	25.5	1.6	12.61	3.02	3.43	6.14	10.25	8:40
8/21/24	23.35	22.99	25.23	25.43	7.62	7.00	7.91	7.92	16.1	1.0	18.41	13.19	5.20	5.48	8.26	8:30
8/14/24	24.43	22.49	25.48	26.17	11.25	2.54	8.14	7.23	22.1	1.5	24.98	3.34	3.37	10.41	9.99	8:30
8/7/24	Water monitoring cancelled due to weather.															
7/31/24	23.39	22.40	26.61	26.71	6.40	3.19	7.52	7.20	27.9	1.5	21.90	2.81	2.90	8.15	10.10	10:40
7/24/24	22.56	20.20	26.10	26.69	6.78	1.60	7.59	7.13	22.6	1.25	31.41	4.90	2.49	7.89	7.72	8:25
7/17/24	22.52	18.42	26.02	26.83	5.90	1.29	7.51	7.05	26.8	1.5	21.93	9.21	1.84	3.56	10.11	9:26
7/10/24	22.98	20.15	25.81	26.00	8.68	3.81	8.01	7.41	26.8	2.75	6.42	25.69	1.75	11.48	8.22	7:50
7/3/24	20.27	18.30	25.17	25.91	8.61	6.46	7.96	7.70	23.3	1.75	6.94	16.35	2.45	9.51	10.35	10:05
6/26/24	19.34	16.40	24.89	25.42	8.25	4.20	7.95	7.44	24.2	1.5	20.51	21.14	2.80	9.51	8.21	8:20
6/19/24	19.10	15.97	24.34	24.80	10.08	5.40	8.12	7.50	25.2	1.25	12.34	13.08	1.49	2.56	8.76	9:40
6/12/24	18.9	15.1	23.80	24.42	8.54	4.34	8.0	8.0	17.8	1.8	5.18	3.16	1.47	1.58	7.99	8:24
6/5/24	17.3	15.3	23.72	24.03	8.98	6.44	8.0	8.0	20.5	1.8	10.72	7.75	0.54	0.99	8.94	8:40
5/29/24	18.31	17.97	23.33	23.34	9.51	8.76	8.0	8.0	18.6	N/A	8.99	13.01	-1.26	-0.71	7.51	8:38
5/22/24	17.16	14.82	22.85	23.10	10.89	7.67	8.5	8.5	22.1	2.25	1.81	1.75	1.23	5.98	9.35	8:35
5/15/24	Shoreline sample collection only.															

2024 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 #16–Outer Harbor, Midway Between E/W Shore and N/S Boundary of Shellfish Harvesting Area																
10/30/24	15.62	10.68	26.49	16.40	8.46	7.49	7.81	7.74	16.9	3.5	5.36	4.91	1.23	4.23	10.81	10:15
10/23/24	16.70	16.68	26.42	26.55	8.64	7.72	7.81	7.71	15.8	3.25	6.64	3.86	1.50	3.02	9.40	8:40
10/16/24	High wind and waves, unable to access station.															
10/9/24	19.65	19.65	26.33	26.33	7.10	6.99	7.70	7.69	15.2	1.25	4.98	6.85	3.82	6.98	9.35	8:35
10/2/24	19.92	20.23	26.37	26.43	6.95	6.64	7.60	7.59	16.4	1.25	4.15	4.18	3.45	9.54	10.05	8:35
9/25/24	21.00	21.17	26.36	26.46	7.14	6.77	7.72	7.69	18.4	1.5	8.78	12.14	3.05	11.23	10.22	8:57
9/18/24	22.19	22.27	26.23	26.28	7.30	6.46	7.81	7.72	20.8	1.5	10.71	8.72	3.51	12.04	9.72	8:30
9/11/24	22.17	22.17	22.07	26.09	6.28	6.04	7.49	7.47	17.9	1.25	8.75	11.66	4.64	8.44	9.70	8:55
9/4/24	22.65	22.77	26.06	26.11	6.40	5.76	7.59	7.53	21.1	1.0	8.57	8.97	6.71	13.98	9.03	8:40
8/28/24	23.32	22.47	25.93	26.35	7.17	2.15	7.77	7.27	25.3	1.5	16.12	3.32	2.65	8.94	10.62	9:05
8/21/24	23.39	23.39	25.56	25.59	7.52	6.74	7.94	7.84	16.7	1.25	15.97	19.42	4.05	6.48	8.78	8:50
8/14/24	24.06	22.32	25.57	26.32	9.80	2.38	8.04	7.23	22.5	1.25	18.13	2.25	2.67	5.84	10.32	9:55
8/7/24	Water monitoring cancelled due to weather.															
7/31/24	23.36	21.59	26.64	27.06	6.36	2.79	7.55	7.23	28.1	1.5	23.32	3.21	3.23	4.41	10.33	11:07
7/24/24	22.10	20.47	26.36	26.84	6.44	2.61	7.61	7.25	23.1	1.5	22.24	6.67	1.99	8.59	8.61	8:45
7/17/24	22.18	17.87	26.05	27.00	5.70	1.25	7.48	7.11	27.7	1.5	16.42	7.52	1.82	3.37	10.70	9:50
7/10/24	22.74	19.42	25.86	26.25	8.14	3.15	7.97	7.35	24.8	2.25	6.13	28.21	1.69	6.98	8.90	8:22
7/3/24	20.29	17.70	25.40	26.02	8.98	4.93	8.04	7.55	23.3	1.75	5.45	59.37	1.96	10.42	10.82	10:30
6/26/24	19.71	15.57	24.80	25.68	8.52	4.02	8.00	7.44	24.4	1.5	18.39	21.01	2.59	4.93	8.70	8:40
6/19/24	19.39	14.11	24.32	25.17	10.42	3.60	8.16	7.36	25.8	1.5	9.16	3.98	1.37	4.69	10.72	10:00
6/12/24	18.6	14.4	23.94	24.54	9.17	4.06	8.0	8.0	19.2	2.0	5.98	4.58	1.28	3.78	9.10	8:52
6/5/24	18.1	14.5	23.59	24.25	9.15	5.98	8.0	8.0	20.7	1.4	14.17	8.88	0.77	2.66	10.55	9:02
5/29/24	18.52	13.76	23.36	24.25	9.77	6.11	8.0	8.0	18.6	N/A	9.55	7.17	-1.45	2.56	8.69	9:02
5/22/24	17.21	14.37	22.81	23.21	11.41	7.48	8.5	8.5	22.0	1.75	2.01	1.44	1.42	3.42	10.23	9:00
5/15/24	Shoreline sample collection only.															

2024 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 Shellfishing Area at Crescent Beach																
10/30/24	15.60	15.65	26.48	26.61	8.35	8.11	7.80	7.78	16.7	4.0	2.01	1.64	0.94	1.10	5.86	10:35
10/23/24	16.71	16.84	26.49	26.70	8.35	7.75	7.78	7.71	17.0	3.0	3.47	1.48	2.15	2.56	5.23	9:05
10/16/24	High wind and waves, unable to access station.															
10/9/24	19.48	19.46	26.24	26.24	7.15	6.92	7.70	7.67	16.4	1.25	4.15	3.31	4.24	3.41	3.94	9:00
10/2/24	20.15	20.17	26.45	26.45	6.67	6.42	7.58	7.56	16.2	1.0	3.24	3.22	3.94	4.86	6.32	8:58
9/25/24	21.11	21.10	26.51	26.52	6.18	6.00	7.62	7.60	18.5	1.25	3.54	3.05	4.58	5.02	5.29	9:23
9/18/24	22.12	22.09	26.32	26.36	6.06	5.74	7.65	7.61	20.4	1.5	4.68	5.27	5.29	6.92	6.34	8:53
9/11/24	22.20	22.14	26.04	26.06	7.09	6.49	7.60	7.52	18.0	1.2	8.85	5.77	4.11	4.98	4.53	9:17
9/4/24	22.80	22.65	26.10	26.16	6.59	5.55	7.62	7.49	20.8	1.0	8.58	4.38	5.21	5.63	4.61	9:02
8/28/24	23.64	23.14	25.85	26.01	7.62	4.13	7.86	7.42	25.5	1.5	14.44	4.65	3.02	6.35	6.53	9:32
8/21/24	23.40	23.32	25.37	25.40	7.28	6.81	7.88	7.80	17.4	1.25	13.84	9.12	5.42	4.89	4.38	9:15
8/14/24	24.05	23.53	25.60	25.77	8.71	5.71	7.92	7.52	24.9	1.5	15.48	4.48	2.77	4.04	5.37	9:20
8/7/24	Water monitoring cancelled due to weather.															
7/31/24	23.49	23.16	26.63	26.67	6.17	5.05	7.54	7.40	28.7	1.25	18.81	6.06	3.67	7.12	5.80	11:29
7/24/24	21.08	20.85	26.61	26.65	4.53	3.47	7.35	7.27	22.3	1.75	18.47	5.26	2.40	2.62	4.65	9:10
7/17/24	22.51	20.12	26.06	26.45	6.09	2.16	7.55	7.13	28.7	1.75	10.02	7.35	1.71	2.42	5.72	10:20
7/10/24	22.45	21.79	25.83	25.90	7.14	6.55	7.82	7.70	27.0	2.0	6.21	7.29	2.17	2.69	4.62	8:46
7/3/24	20.68	18.62	25.42	25.74	9.31	5.81	8.08	7.54	23.3	2.25	5.82	4.25	1.87	4.48	5.66	10:55
6/26/24	20.02	19.37	24.85	24.95	8.42	7.72	8.02	7.92	24.9	1.75	14.72	18.24	2.59	8.35	4.94	9:00
6/19/24	20.11	17.00	24.34	24.96	10.38	6.48	8.18	7.47	25.1	1.5	9.06	6.73	2.38	6.34	7.15	10:25
6/12/24	18.3	16.8	24.05	24.18	8.14	5.82	8.0	8.0	19.3	2.0	5.02	5.84	1.48	2.51	4.98	9:26
6/5/24	18.0	15.0	23.63	24.12	9.16	6.14	8.0	8.0	19.4	1.5	10.13	6.23	0.90	3.48	6.32	9:35
5/29/24	18.18	18.11	23.36	23.35	9.22	9.07	8.0	8.0	18.6	N/A	6.61	10.62	-0.98	-0.44	3.92	9:35
5/22/24	17.72	14.90	22.89	23.15	9.43	7.72	8.5	8.0	20.7	2.6	0.97	1.21	1.74	4.85	5.94	9:25
5/15/24	Shoreline sample collection only.															

Coalition to Save Hempstead Harbor

2024 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																
10/30/24	Boat engine malfunctioned, could not access station.															
10/23/24	16.83	16.70	25.90	26.43	8.38	7.71	7.74	7.68	17.6	2.0	8.61	3.21	2.48	4.84	3.98	9:30
10/16/24	16.67	16.74	26.22	26.25	8.04	7.79	7.77	7.76	11.4	1.5	4.64	5.77	3.05	3.04	5.75	10:45
10/9/24	19.64	19.63	25.75	25.94	7.66	7.70	7.75	7.75	15.6	1.0	8.42	6.24	3.55	4.01	3.93	9:45
10/2/24	20.09	20.44	25.96	26.33	6.14	5.51	7.50	7.47	17.3	0.75	5.10	3.46	4.15	14.23	5.76	9:26
9/25/24	21.19	21.28	25.75	26.35	6.21	5.82	7.60	7.59	18.8	1.0	8.12	4.56	4.57	7.91	4.71	10:00
9/18/24	22.45	22.28	25.77	26.22	6.85	4.97	7.69	7.54	20.5	1.5	15.14	7.71	3.91	19.50	5.51	9:15
9/11/24	22.19	22.24	25.04	25.78	8.15	6.22	7.69	7.47	18.5	1.25	17.98	8.39	3.57	5.32	4.28	9:48
9/4/24	22.53	22.79	25.51	25.92	8.15	5.26	7.78	7.46	21.0	1.25	31.54	5.28	4.97	6.53	4.45	9:20
8/28/24	23.98	22.95	25.37	25.88	8.04	3.29	7.89	7.34	26.4	1.25	14.21	3.99	3.44	5.22	4.84	10:04
8/21/24	22.92	22.87	24.72	24.88	7.91	7.40	7.91	7.85	20.8	1.25	15.98	12.26	3.97	5.47	4.09	9:43
8/14/24	25.20	23.88	25.05	25.60	12.12	5.08	8.24	7.51	23.1	1.0	26.65	7.01	5.27	8.76	4.81	9:52
8/7/24	Water monitoring cancelled due to weather.															
7/31/24	Ran out of time for survey.															
7/24/24	21.90	21.32	26.05	26.33	4.54	2.39	7.34	7.16	23.5	1.25	36.38	15.72	3.00	5.43	3.63	9:36
7/17/24	23.14	20.24	25.23	26.34	5.57	1.87	7.41	7.09	29.2	1.5	17.64	16.85	2.66	4.74	5.18	10:46
7/10/24	22.88	22.12	25.36	25.65	6.62	5.44	7.67	7.46	26.6	1.25	13.14	10.08	3.19	6.91	3.65	9:10
7/3/24	21.34	18.12	24.98	25.72	8.71	5.58	7.99	7.53	25.9	1.5	8.24	29.29	2.67	4.98	5.34	11:18
6/26/24	20.42	19.62	24.30	24.63	7.36	6.90	7.85	7.79	24.3	1.25	25.94	34.70	3.99	5.12	3.36	9:24
6/19/24	19.22	17.36	24.31	24.61	9.62	6.04	8.09	7.49	25.5	1.0	13.70	15.72	5.80	5.53	4.82	10:50
6/12/24	19.1	17.8	23.36	23.93	6.25	4.68	8.0	8.0	20.6	2.0	3.37	3.80	2.10	2.67	3.50	9:55
6/5/24	18.2	15.8	23.44	23.95	8.11	6.67	8.0	8.0	21.9	1.2	16.51	8.74	1.43	2.74	5.70	10:00
5/29/24	18.44	18.09	22.92	23.32	9.03	7.77	8.0	8.0	20.0	N/A	8.31	11.99	0.81	1.55	3.41	10:08
5/22/24	17.02	15.87	22.80	22.97	9.41	8.96	8.0	8.0	21.4	1.5	1.35	1.96	1.72	2.37	5.39	10:00
5/15/24	Shoreline sample collection only.															

Coalition to Save Hempstead Harbor

2024 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																
10/30/24	Boat engine malfunctioned, could not access station.															
10/23/24	16.86	16.77	25.34	25.81	7.80	7.72	7.64	7.66	18.1	1.75	6.50	6.34	4.84	4.42	1.91	9:45
10/16/24	16.54	15.90	20.11	25.89	8.05	7.53	7.67	7.74	9.6	1.25	5.65	5.02	4.98	5.87	4.04	10:03
10/9/24	20.04	19.94	25.22	25.77	7.07	6.46	7.65	7.59	16.6	1.25	12.78	5.62	3.33	4.87	2.09	10:07
10/2/24	20.27	20.28	22.61	25.98	6.21	5.40	7.44	7.45	17.2	0.75	4.35	4.92	5.51	12.29	3.78	9:50
9/25/24	21.35	21.36	24.71	26.03	6.03	5.59	7.53	7.53	19.7	1.0	9.39	8.55	4.24	6.21	2.35	10:25
9/18/24	22.30	22.44	20.52	25.74	6.80	5.49	7.58	7.55	20.7	1.2	9.18	9.65	7.96	12.96	3.71	9:35
9/11/24	22.27	22.21	24.75	25.22	6.33	6.55	7.49	7.54	20.1	1.25	10.22	12.82	3.45	4.95	2.13	10:15
9/4/24	22.89	23.01	19.62	25.68	6.45	4.84	7.53	7.41	22.0	1.0	10.24	7.52	5.48	7.42	2.70	9:54
8/28/24	23.91	23.75	24.74	25.48	6.59	6.08	7.62	7.68	27.9	1.2	18.12	13.74	6.98	5.96	2.78	10:29
8/21/24	22.95	23.32	21.40	24.48	7.12	6.04	7.69	7.70	18.6	1.25	9.66	12.15	2.43	9.53	2.47	10:04
8/14/24	24.88	24.83	23.94	25.20	10.05	8.77	8.10	7.96	24.0	1.0	23.61	16.87	4.51	6.61	2.72	10:20
8/7/24	Water monitoring cancelled due to weather.															
7/31/24	Ran out of time for survey.															
7/24/24	22.08	21.73	25.62	26.10	3.62	2.28	7.24	7.14	24.3	1.0	16.39	9.15	4.04	5.52	1.86	10:06
7/17/24	23.26	22.26	20.74	25.91	4.04	2.62	7.11	7.14	29.2	1.0	17.65	12.01	3.81	4.37	3.13	11:10
7/10/24	23.70	22.68	24.32	25.45	6.62	4.10	7.61	7.42	27.7	1.25	17.00	8.24	5.71	9.84	1.71	9:35
7/3/24	Ran out of time for survey.															
6/26/24	21.58	21.07	21.91	23.74	8.83	6.59	7.98	7.67	27.4	1.0	19.19	10.22	4.21	9.32	1.22	9:56
6/19/24	20.28	18.91	19.92	24.18	8.62	7.86	7.84	7.82	27.5	0.75	23.95	20.86	3.62	5.65	3.52	11:10
6/12/24	19.9	19.3	23.22	23.55	5.35	4.60	8.0	8.0	20.7	1.4	3.14	3.06	3.39	3.48	1.74	10:24
6/5/24	18.7	17.6	19.89	23.49	7.66	6.43	8.0	8.0	23.6	0.9	14.83	8.61	2.73	6.41	3.86	10:38
5/29/24	19.42	18.30	21.94	22.70	9.39	7.53	8.0	8.0	21.0	N/A	22.64	13.79	1.05	1.54	1.54	10:42
5/22/24	17.82	16.72	20.16	22.74	9.02	8.50	8.0	8.5	24.8	N/A	2.31	1.50	2.77	6.63	3.72	10:36
5/15/24	Shoreline sample collection only.															

2024 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 ft West of Mill Pond Weir																
10/30/24	Boat engine malfunctioned, could not access station.															
10/23/24	16.83	16.68	24.75	25.25	7.51	6.29	7.54	7.43	19.6	1.5	11.64	7.42	2.75	6.98	1.40	10:10
10/16/24	16.84	17.11	23.55	25.47	7.05	6.10	7.53	7.54	10.4	N/A	13.55	5.25	4.31	4.61	2.83	10:20
10/9/24	19.52	19.87	24.62	25.64	5.12	4.01	7.37	7.33	16.8	1.0	13.33	5.34	6.15	9.42	2.11	10:23
10/2/24	20.58	20.64	25.47	26.13	3.92	3.75	7.25	7.28	17.2	0.75	23.28	4.44	4.99	7.49	2.92	10:10
9/25/24	21.64	21.67	25.19	26.10	5.37	3.21	7.46	7.29	20.5	1.0	41.64	7.39	4.48	10.21	2.77	10:47
9/18/24	21.68	22.38	22.87	25.67	4.60	3.00	7.31	7.27	20.7	0.75	57.25	8.62	6.65	8.77	3.50	10:54
9/11/24	22.12	22.10	23.86	25.17	3.34	2.69	7.12	7.14	20.9	1.75	7.31	6.44	3.96	7.04	2.11	10:42
9/4/24	22.43	23.14	22.25	25.39	5.51	3.55	7.33	7.27	21.0	N/A	32.36	9.03	4.85	7.04	2.22	10:20
8/28/24	22.91	23.75	18.71	24.98	5.00	2.54	7.30	7.22	28.2	1.25	11.05	7.98	5.47	7.94	2.28	10:52
8/21/24	22.12	23.77	19.61	24.64	5.47	3.60	7.37	7.34	19.1	0.9	19.58	10.64	4.61	5.48	1.97	10:25
8/14/24	23.64	24.54	20.26	24.88	9.62	5.01	7.81	7.46	25.1	1.0	31.98	13.70	3.79	5.51	2.13	10:40
8/7/24	Water monitoring cancelled due to weather.															
7/31/24	Ran out of time for survey.															
7/24/24	22.06	21.97	24.94	25.73	3.31	2.79	7.17	7.16	25.7	1.5	19.75	13.62	2.42	3.05	1.92	10:29
7/17/24	24.23	22.98	23.32	25.44	8.31	2.81	7.55	7.07	29.6	1.0	32.17	11.47	3.39	5.12	2.21	11:31
7/10/24	23.36	22.48	24.02	25.36	8.31	2.51	8.02	7.25	30.4	1.25	38.17	7.45	4.98	12.82	1.97	10:00
7/3/24	20.74	20.40	23.53	24.82	8.18	4.09	7.98	7.33	27.2	1.25	26.04	11.41	3.79	6.11	2.51	11:43
6/26/24	20.78	20.65	22.52	23.79	7.86	5.71	7.81	7.46	27.7	1.25	23.93	12.71	4.84	7.94	1.83	10:17
6/19/24	20.29	19.51	22.71	23.91	6.65	5.70	7.47	7.47	27.4	1.0	10.25	12.71	4.98	4.82	2.70	11:30
6/12/24	20.2	19.7	22.34	23.41	4.30	2.18	8.0	8.0	21.6	1.0	2.32	2.95	4.36	4.47	1.45	11:02
6/5/24	19.7	18.2	22.74	23.31	7.09	4.40	8.0	8.0	24.3	1.25	10.37	8.60	2.20	5.52	2.97	11:15
5/29/24	19.47	17.96	21.12	22.68	6.08	2.74	8.0	8.0	21.6	N/A	14.81	7.35	2.52	3.94	1.55	11:21
5/22/24	17.92	16.84	21.54	22.47	8.57	7.22	8.0	8.5	25.1	N/A	1.98	3.29	3.16	5.91	2.91	11:00
5/15/24	Shoreline sample collection only.															

2024 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–About 50 yds West of Powerhouse Drain Outfall																
10/30/24	15.33	15.41	25.78	25.86	7.72	7.51	7.64	7.63	14.0	1.75	9.80	8.97	3.35	4.12	1.92	8:15
10/16/24	15.32	15.34	24.89	24.89	7.71	7.61	7.69	7.68	8.6	0.75	11.51	11.92	6.72	7.01	2.11	8:15
7/31/24	23.02	22.89	26.48	26.52	4.13	3.69	7.28	7.25	27.4	1.0	12.38	7.12	6.95	9.68	2.31	8:54
7/17/24	21.99	21.31	25.62	25.87	3.67	2.33	7.14	7.05	24.9	1.0	28.31	14.67	3.48	3.18	2.33	7:40
7/3/24	20.42	20.41	24.55	24.57	7.72	7.52	7.78	7.75	20.2	0.75	72.91	71.09	5.85	5.98	2.25	8:15
6/19/24	18.58	17.56	24.02	24.30	7.83	6.06	7.74	7.53	21.9	0.75	31.13	33.64	4.49	5.44	3.07	8:05

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																
10/30/24	15.27	15.42	25.83	26.08	8.11	8.09	7.71	7.73	16.7	2.5	5.21	5.10	1.77	2.11	3.30	9:35
10/16/24	15.48	15.75	25.48	25.68	8.16	7.98	7.79	7.78	10.4	1.25	6.62	8.39	3.99	4.08	3.60	9:40
7/31/24	23.44	22.66	26.38	26.68	4.98	3.46	7.37	7.25	27.9	1.0	18.60	4.89	6.41	10.65	3.05	10:15
7/17/24	22.91	20.13	25.46	26.34	5.34	1.00	7.34	7.00	25.9	1.0	39.23	18.77	2.85	2.74	3.02	9:10
7/3/23	20.41	18.92	24.80	25.46	7.31	4.71	7.77	7.46	24.0	1.0	28.24	34.31	4.51	4.52	3.27	9:45
6/19/24	19.11	18.19	23.95	24.37	8.72	7.07	7.86	7.70	23.6	0.75	27.48	35.63	4.58	12.71	2.38	9:25

2024 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																
10/30/24	15.44	15.46	26.12	26.16	7.81	7.72	7.67	7.68	13.6	1.75	14.22	12.91	3.31	3.94	2.70	8:00
10/16/24	15.71	15.82	25.04	25.08	7.85	7.49	7.72	7.69	8.5	0.75	14.61	14.30	7.84	7.15	4.19	8:05
7/31/24	23.29	22.87	26.44	26.57	4.65	3.90	7.33	7.26	28.2	1.0	12.78	6.40	6.14	11.11	3.29	8:37
7/17/24	21.80	19.53	25.66	26.42	3.77	1.22	7.14	7.02	24.9	1.0	56.58	15.32	3.97	2.69	3.66	7:22
7/3/24	19.01	18.65	25.34	25.48	5.89	5.32	7.58	7.54	20.0	1.0	33.29	29.34	4.55	5.71	4.07	8:00
6/19/24	17.23	17.07	24.47	24.51	6.10	5.79	7.55	7.53	21.7	0.8	22.96	26.22	4.90	6.51	6.05	8:46

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																
10/30/24	14.97	15.51	25.32	26.08	7.75	7.51	7.65	7.66	13.4	1.5bottom	13.81	6.68	4.44	4.72	1.72	8:31
10/16/24	15.18	15.36	24.65	24.76	7.74	7.54	7.68	7.66	8.6	0.75	13.18	11.33	7.94	7.37	2.02	8:35
7/31/24	23.27	23.02	25.86	26.22	4.64	3.74	7.28	7.23	27.8	0.75	28.55	6.44	9.10	15.62	2.12	9:13
7/17/24	20.42	19.75	25.74	26.20	1.75	1.10	6.99	6.98	26.4	1.0	7.35	16.93	2.98	3.67	1.94	8:00
7/3/24	19.36	18.59	24.75	25.32	6.01	4.62	7.63	7.38	20.4	0.75	41.65	23.86	7.39	6.06	2.01	8:38
6/19/24	18.09	17.32	23.82	24.35	6.70	5.91	7.57	7.52	24.0	0.75	27.81	28.21	5.61	5.79	1.47	8:20

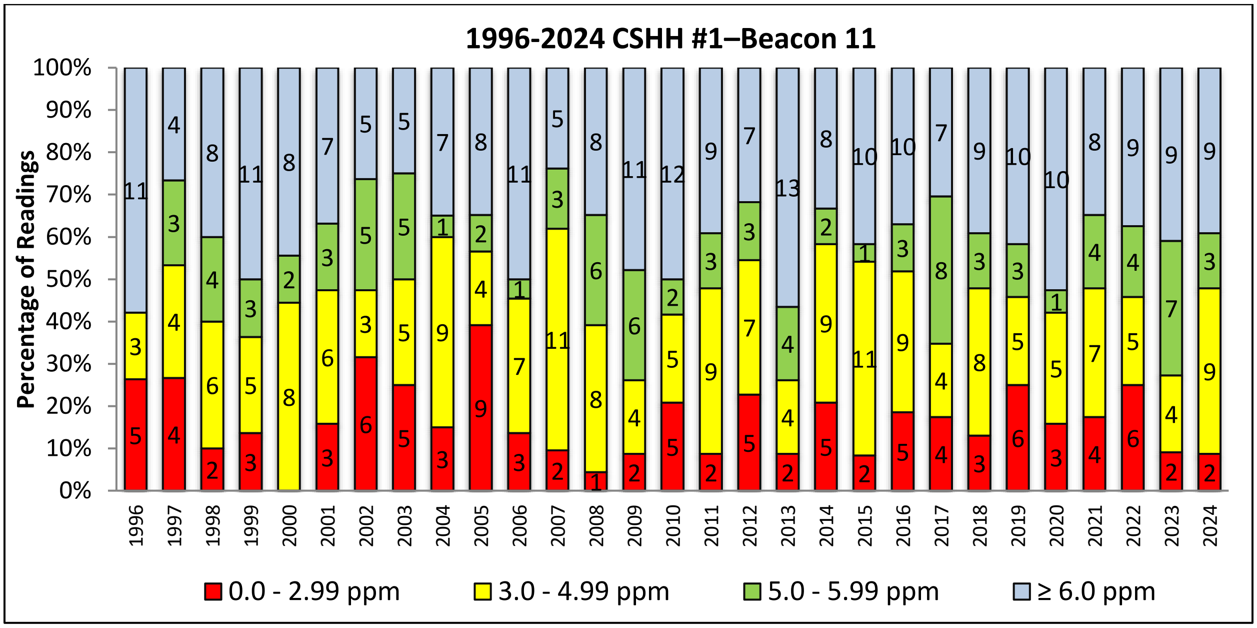
2024 CSHH Field-Monitoring Data

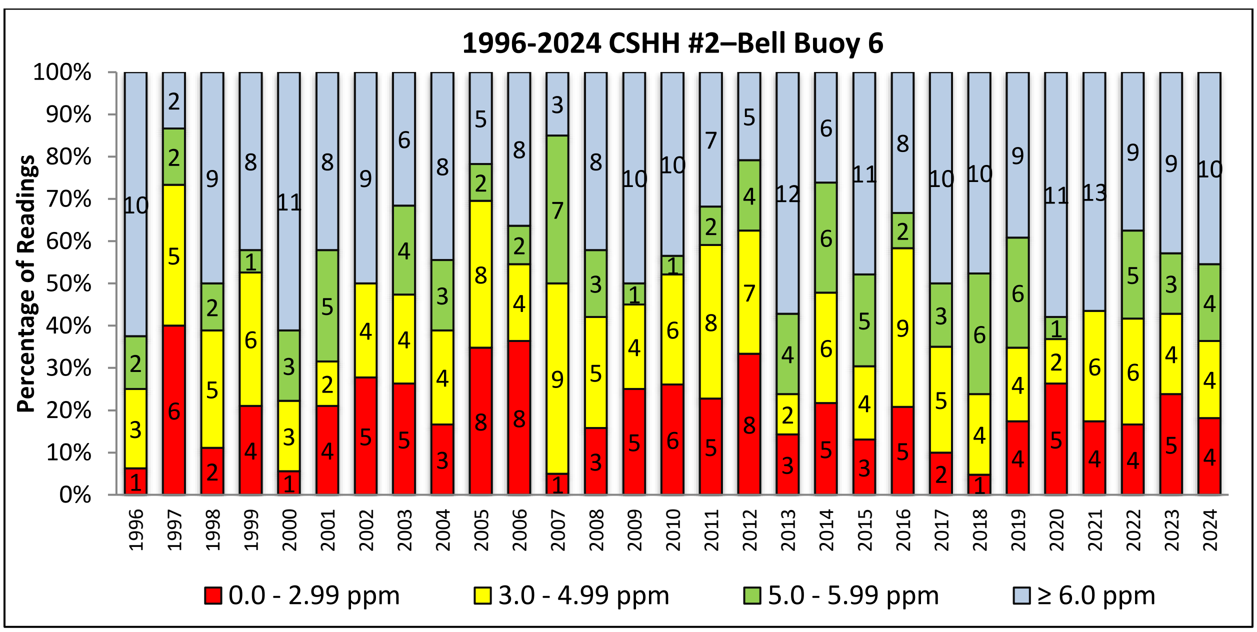
Date	Water Temp (°C)		Salinity (ppt)		DO (ppm)		pH		Air Temp	Secchi	Chl *a* (ug/L)		Turbidity (NTU)		Depth (m)	Time
	Surface*	Bottom**	Surface	Bottom	Surface	Bottom	Surface	Bottom	(°C)	(m)	Surface	Bottom	Surface	Bottom	Total***	AM
CSHH #6–East of Former Incinerator Site																
10/30/24	14.99	15.19	25.13	25.43	7.83	7.37	7.64	7.61	15.9	1.5	14.38	7.89	2.65	5.26	2.18	9:00
10/16/24	14.98	15.32	24.53	24.75	7.70	7.52	7.68	7.67	9.4	0.75	14.07	12.12	8.28	8.32	2.44	8:55
7/31/24	23.60	23.27	26.02	26.30	4.73	3.64	7.32	7.26	28.2	0.75	19.64	8.85	10.74	29.41	2.44	9:32
7/17/24	22.81	21.10	25.40	26.08	3.15	1.57	7.09	7.01	26.5	0.75	29.52	14.35	5.64	4.00	2.19	8:24
7/3/24	21.00	19.63	24.35	25.04	7.25	5.24	7.69	7.49	22.5	0.5	64.08	36.02	8.67	12.51	2.37	8:55
6/19/24	18.92	18.11	23.84	24.17	7.85	6.61	7.72	7.60	23.4	0.6	39.81	30.54	5.61	8.31	1.71	8:43

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)																
10/30/24	15.03	15.07	24.70	25.28	7.53	7.33	7.56	7.59	16.0	1.3	11.35	11.92	3.78	4.16	2.03	9:15
10/16/24	14.14	14.93	23.01	24.22	7.77	7.33	7.60	7.62	10.0	0.5	17.32	9.19	10.68	14.26	1.92	9:10
7/31/24	23.81	23.48	25.54	26.11	4.43	3.42	7.24	7.21	27.1	0.5	13.56	12.43	22.76	27.17	1.83	9:52
7/17/24	22.89	22.85	25.09	25.45	3.31	2.18	7.08	7.02	26.6	0.75	49.16	17.04	5.47	5.37	1.82	8:40
7/3/24	21.47	21.31	24.05	24.30	7.56	6.84	7.72	7.64	23.0	0.5	40.34	38.42	12.07	22.40	1.53	9:14
6/19/24	19.11	18.83	23.67	23.90	7.36	6.56	7.65	7.57	24.6	0.5	41.65	26.71	8.25	11.76	1.60	9:57

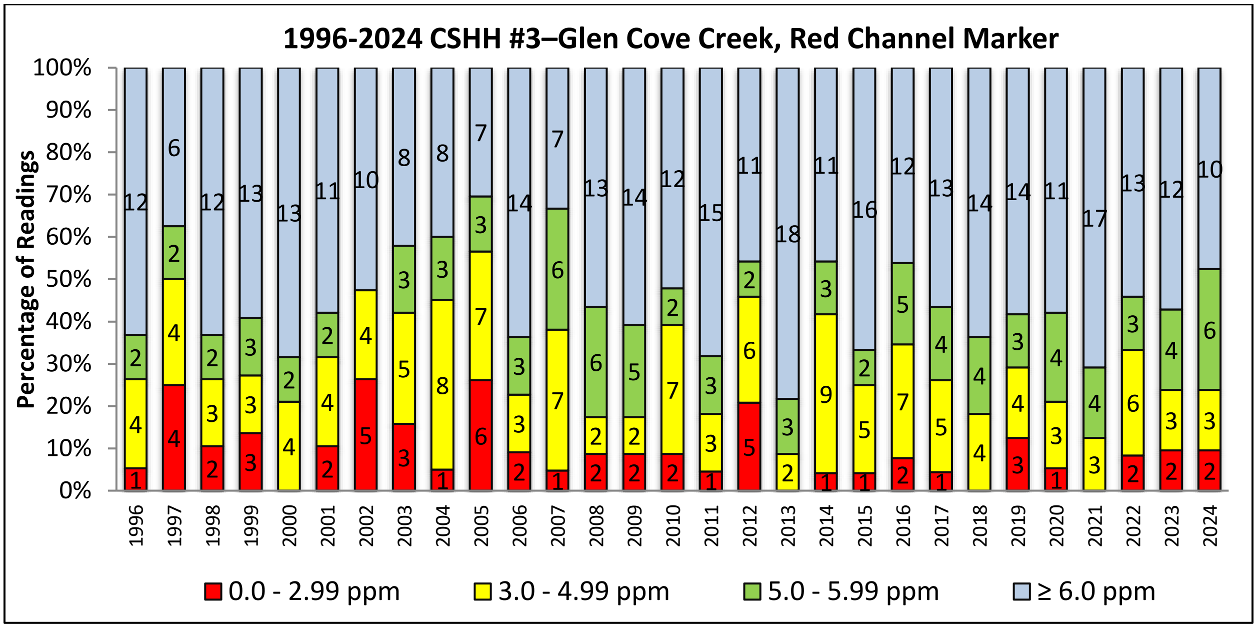
Long-Term Dissolved Oxygen Graphs

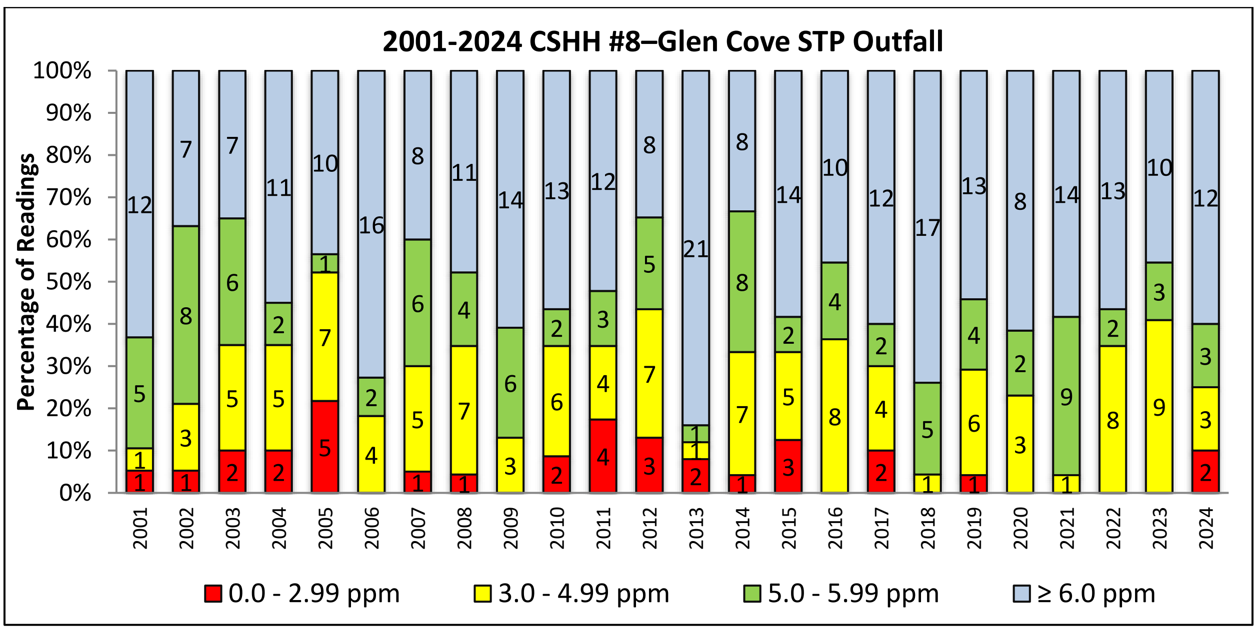
Each graph displays results from one of CSHH's monitoring sites. Each vertical bar represents the bottom readings taken during the indicated year and is divided into four categories. Red bars are representative of hypoxic conditions (DO below 3 ppm), yellow bars of DO between 3 and 5 ppm, green bars 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.



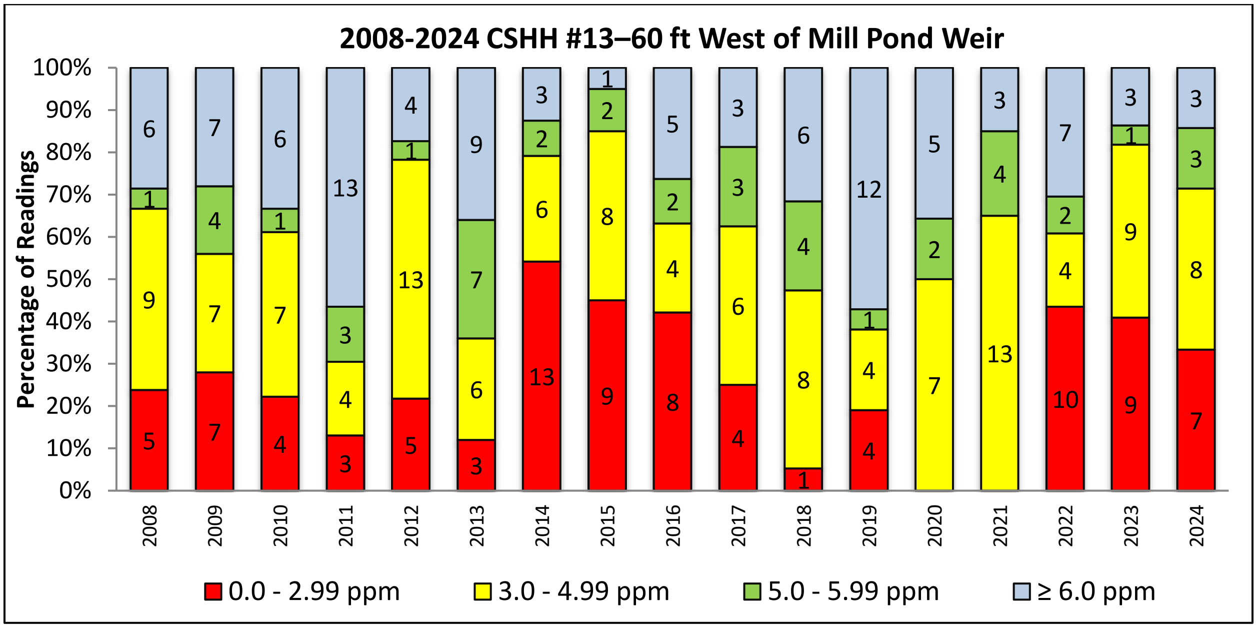


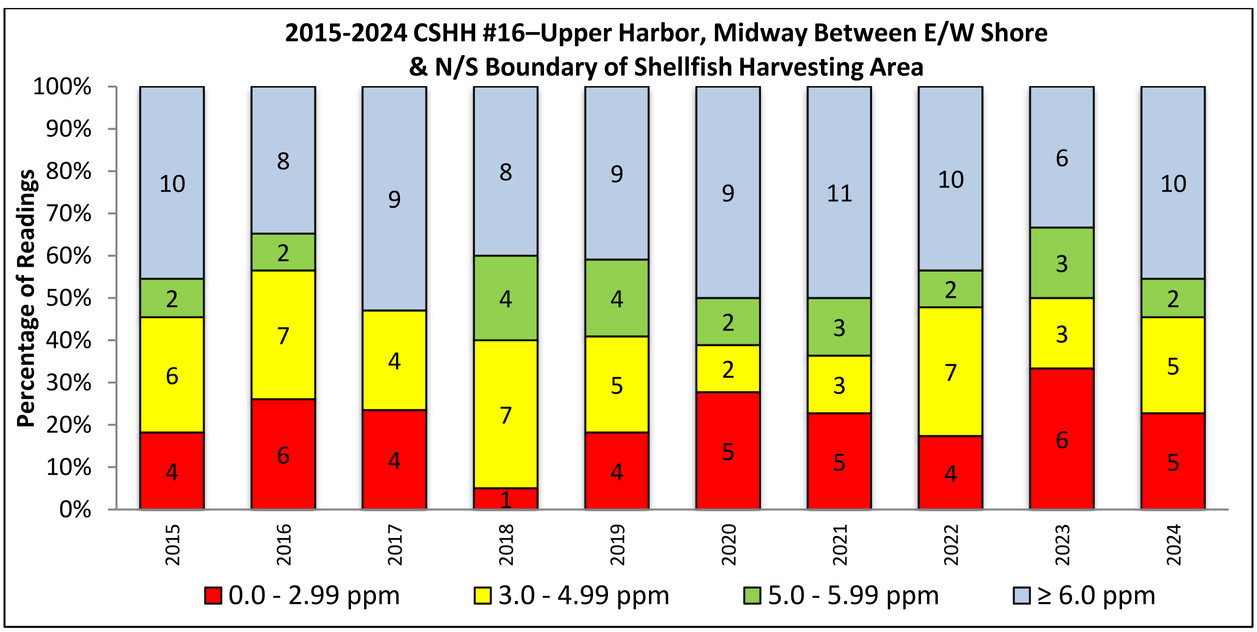
Long-Term Dissolved Oxygen Graphs



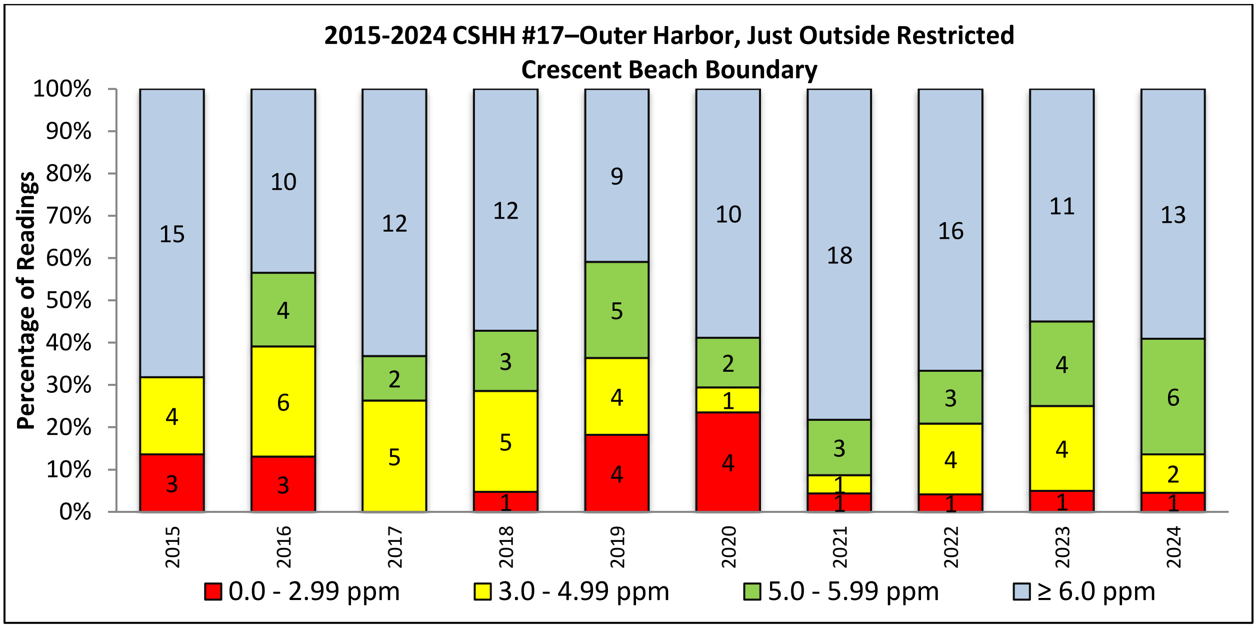


Long-Term Dissolved Oxygen Graphs





Long-Term Dissolved Oxygen Graphs



Appendix B

2024 In-Harbor Bacteria Data (Regular Season)

CSHH #1–Beacon 11

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/22/24	17.00	0.00	1.00	0.00
5/29/24	16.00	16.49	2.00	1.41
6/5/24	41.00	22.34	0.10	0.58
6/12/24	9.00	17.80	0.10	0.38
6/19/24	20.00	18.22	2.00	0.53
6/26/24	39.00	21.51	0.10	0.33
7/3/24	12.00	20.31	0.10	0.18
7/10/24	23.00	18.09	0.10	0.18
7/17/24	14.00	19.76	5.00	0.40
7/24/24	140.00	29.16	35.00	0.71
7/31/24	4.00	18.49	1.00	1.12
8/14/24	3.00	12.38	1.00	3.64
8/21/24	190.00	23.77	25.00	5.44
8/28/24	6.00	10.81	6.00	3.50
9/4/24	25.00	17.10	10.00	6.22
9/11/24	17.00	17.08	4.00	5.70
9/18/24	55.00	30.56	15.00	9.79
9/25/24	34.00	21.66	3.00	6.41
10/2/24	55.00	33.74	2.00	5.14
10/9/24	17.00	31.23	0.10	2.05
10/16/24	31.00	35.22	5.00	2.14
10/23/24	17.00	27.85	9.00	1.93
10/30/24	17.00	24.24	3.00	1.93

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

2024 In-Harbor Bacteria Data (Regular Season)

CSHH #2–Bell Marker 6

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/22/24	0.10	0.00	0.10	0.00
5/29/24	1.00	0.32	0.10	0.10
6/5/24	1.00	0.46	0.10	0.10
6/12/24	0.10	0.32	0.10	0.10
6/19/24	3.00	0.50	0.10	0.10
6/26/24	5.00	1.08	0.10	0.10
7/3/24	8.00	1.64	0.10	0.10
7/10/24	0.10	1.04	0.10	0.10
7/17/24	0.10	1.04	0.10	0.10
7/24/24	15.00	1.43	9.00	0.25
7/31/24	0.10	0.65	1.00	0.39
8/14/24	0.10	0.35	0.10	0.55
8/21/24	10.00	1.11	1.00	0.97
8/28/24	5.00	0.84	0.10	0.32
9/4/24	8.00	2.51	1.00	0.32
9/11/24	0.10	1.32	0.10	0.25
9/18/24	2.00	2.40	0.10	0.25
9/25/24	0.10	0.96	0.10	0.16
10/2/24	5.00	0.96	0.10	0.16
10/9/24	0.10	0.40	0.10	0.10
10/23/24	0.10	0.27	0.10	0.10
10/30/24	1.00	0.47	0.10	0.10

2024 In-Harbor Bacteria Data (Regular Season)

CSHH #3–Glen Cove Creek, Red Channel Marker

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/22/24	2.00	0.00	0.10	0.00
5/29/24	15.00	5.48	0.10	0.10
6/5/24	5.00	5.31	0.10	0.10
6/12/24	7.00	5.69	0.10	0.10
6/19/24	1.00	4.02	0.10	0.10
6/26/24	190.00	9.99	2.00	0.18
7/3/24	5.00	8.02	0.10	0.18
7/10/24	29.00	11.40	0.10	0.18
7/17/24	20.00	14.07	1.00	0.29
7/24/24	35.00	28.64	7.00	0.67
8/14/24	14.00	21.40	0.10	0.89
8/21/24	27.00	23.65	0.10	0.41
8/28/24	8.00	14.46	0.10	0.10
9/4/24	27.00	16.90	0.10	0.10
9/11/24	5.00	13.25	0.10	0.10
9/18/24	13.00	13.05	1.00	0.16
9/25/24	9.00	10.48	0.10	0.16
10/2/24	26.00	13.26	0.10	0.16
10/9/24	4.00	9.05	0.10	0.16
10/16/24	1.00	6.56	0.10	0.16
10/23/24	9.00	6.10	1.00	0.16

2024 In-Harbor Bacteria Data (Regular Season)

CSHH #4–Bar Beach Spit

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
6/19/24	5.00	0.00	1.00	0
7/3/24	23.00	10.72	1.00	1.00
7/17/24	17.00	12.50	11.00	2.22
7/31/24	22.00	20.49	10.00	4.79
10/16/24	18.00	0.00	1.00	0.00
10/30/24	7.00	11.22	0.10	0.32

CSHH #5–Mott's Cove

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
6/19/24	12.00	0.00	3.00	0.00
7/3/24	18.00	14.70	4.00	3.46
7/17/24	17.00	15.43	5.00	3.91
7/31/24	49.00	24.66	31.00	8.53
10/16/24	27.00	0.00	5.00	0.00
10/30/24	36.00	31.18	5.00	5.00

2024 In-Harbor Bacteria Data (Regular Season)

CSHH #6–East of Former Incinerator Site

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
6/19/24	16.00	0.00	1.00	0.00
7/3/24	38.00	24.66	0.10	0.32
7/17/24	35.00	27.71	12.00	1.06
7/31/24	50.00	40.51	16.00	2.68
10/16/24	49.00	0.00	3.00	0.00
10/30/24	27.00	36.37	2.00	2.45

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**
6/19/24	33.00	0.00	0.10	0.00
7/3/24	47.00	39.38	5.00	0.71
7/17/24	100.00	53.73	53.00	2.98
7/31/24	80.00	72.18	30.00	19.96
10/16/24	52.00	0.00	9.00	0.00
10/30/24	44.00	47.83	5.00	6.71

2024 In-Harbor Bacteria Data (Regular Season)

CSHH #8–Glen Cove Sewage Treatment Plant Outfall

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/22/24	15.00	0.00	3.00	0.00
5/29/24	23.00	18.57	***170.00***	22.58
6/5/24	31.00	22.03	2.00	10.07
6/12/24	17.00	20.65	0.10	3.18
6/19/24	25.00	21.45	0.10	1.59
6/26/24	160.00	34.44	1.00	1.28
7/10/24	140.00	55.55	28.00	0.73
7/17/24	48.00	72.00	38.00	3.21
7/24/24	70.00	93.14	33.00	13.69
8/14/24	17.00	38.51	15.00	26.59
8/21/24	140.00	55.02	21.00	21.82
8/28/24	12.00	30.57	11.00	15.13
9/4/24	70.00	37.60	40.00	19.29
9/11/24	12.00	29.92	12.00	17.55
9/18/24	24.00	32.06	3.00	12.72
9/25/24	18.00	21.27	3.00	8.62
10/2/24	32.00	25.88	1.00	5.33
10/9/24	28.00	21.55	0.10	1.61
10/16/24	10.00	20.78	0.10	0.62
10/23/24	25.00	20.95	5.00	0.68

2024 In-Harbor Bacteria Data (Regular Season)

CSHH #9–First Pipe West of STP Outfall

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/22/24	23.00	0.00	1.00	0.00
5/29/24	150.00	58.74	32.00	5.66
6/5/24	38.00	50.80	6.00	5.77
6/12/24	70.00	55.04	21.00	7.97
6/19/24	170.00	68.97	51.00	11.55
6/26/24	290.00	114.49	80.00	27.75
7/10/24	450.00	198.51	***140.00***	***58.85***
7/17/24	50.00	182.50	48.00	***72.36***
7/24/24	310.00	***212.07***	***1280.00***	***161.96***
8/14/24	70.00	102.76	15.00	***97.32***
8/21/24	560.00	***229.91***	43.00	***93.81***
8/28/24	34.00	110.05	26.00	25.60
9/4/24	70.00	98.28	24.00	25.19
9/11/24	47.00	84.80	44.00	28.16
9/18/24	34.00	73.40	5.00	22.61
9/25/24	26.00	39.72	0.10	6.72
10/2/24	51.00	43.08	3.00	4.36
10/9/24	21.00	33.86	0.10	1.46
10/16/24	38.00	32.45	3.00	0.85
10/23/24	27.00	30.99	5.00	0.85

2024 In-Harbor Bacteria Data (Regular Season)

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**
5/22/24	24.00	0.00	1.00	0.00
5/29/24	120.00	53.67	33.00	5.74
6/5/24	35.00	46.54	7.00	6.14
6/12/24	74.00	52.26	0.10	2.19
6/19/24	110.00	60.65	24.00	3.54
6/26/24	***1440.00***	137.55	16.00	6.16
7/10/24	460.00	***270.98***	100.00	7.87
7/17/24	41.00	***233.79***	60.00	***38.96***
7/24/24	100.00	***228.28***	24.00	***38.96***
8/14/24	260.00	102.15	13.00	26.55
8/21/24	590.00	***248.47***	70.00	27.95
8/28/24	28.00	162.55	15.00	23.90
9/4/24	80.00	136.15	24.00	23.92
9/11/24	240.00	152.50	7.00	18.71
9/18/24	21.00	92.19	1.00	11.20
9/25/24	21.00	47.31	0.10	3.02
10/2/24	42.00	51.31	0.10	1.11
10/9/24	10.00	33.85	0.10	0.37
10/16/24	39.00	23.54	6.00	0.36
10/23/24	22.00	23.76	2.00	0.41

2024 In-Harbor Bacteria Data (Regular Season)

CSHH #11–50 yd East of STP Outfall

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/22/24	84.00	0.00	22.00	0.00
5/29/24	140.00	108.44	2.00	6.63
6/5/24	410.00	168.94	5.00	6.04
6/12/24	16.00	93.72	0.10	2.17
6/19/24	72.00	88.91	5.00	2.56
6/26/24	720.00	136.63	2.00	1.58
7/10/24	570.00	147.46	7.00	1.63
7/17/24	80.00	***220.50***	28.00	6.65
7/24/24	190.00	***281.04***	35.00	10.82
8/14/24	47.00	89.40	15.00	24.50
8/21/24	620.00	176.91	70.00	33.25
8/28/24	55.00	117.03	5.00	17.38
9/4/24	80.00	106.41	31.0	20.09
9/11/24	70.00	97.86	5.00	15.21
9/18/24	210.00	132.02	44.00	18.86
9/25/24	70.00	85.34	0.10	5.09
10/2/24	60.00	86.84	2.00	4.24
10/9/24	45.00	77.40	0.10	1.34
10/16/24	180.00	93.50	7.00	1.44
10/23/24	32.00	64.18	4.00	0.89

2024 In-Harbor Bacteria Data (Regular Season)

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

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/22/24	116.00	0.00	0.10	0.00
5/29/24	150.00	131.91	8.00	0.89
6/5/24	390.00	189.32	2.00	1.17
6/12/24	47.00	133.64	0.10	0.63
6/19/24	180.00	141.84	0.10	0.44
6/26/24	770.00	***207.11***	0.10	0.44
7/10/24	640.00	***254.10***	20.00	0.38
7/17/24	59.00	***268.97***	22.00	1.45
7/24/24	52.00	197.19	25.00	5.76
8/14/24	100.00	67.45	8.00	16.39
8/21/24	***1600.00***	***202.63***	90.00	26.21
8/28/24	110.00	***260.12***	12.00	20.52
9/4/24	100.00	***204.82***	22.00	20.88
9/11/24	70.00	165.24	11.00	18.37
9/18/24	240.00	196.86	29.00	23.76
9/25/24	110.00	115.24	0.10	6.10
10/2/24	70.00	105.28	2.00	4.26
10/9/24	70.00	98.03	0.10	1.45
10/16/24	290.00	130.27	47.00	1.94
10/23/24	58.00	98.06	5.00	1.36

2024 In-Harbor Bacteria Data (Regular Season)

CSHH #12A–First Outfall at North Bulkhead, East of CSHH #12

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/29/24	40.00	0.00	23.00	0.00
6/12/24	59.00	48.58	2.00	6.78
7/24/24	80.00	0.00	***110.00***	0.00
8/14/24	140.00	105.83	***250.00***	***165.83***
8/21/24	160.00	121.46	***260.00***	***192.65***
8/28/24	50.00	103.85	10.00	***86.62***
9/4/24	***1800.00***	***211.90***	***601.00***	***140.59***
9/11/24	80.00	174.39	70.00	***122.29***
9/25/24	8.00	87.12	2.00	30.29
10/9/24	5.00	14.74	0.10	2.41
10/23/24	5.00	5.85	0.10	0.27

2024 In-Harbor Bacteria Data (Regular Season)

CSHH #13–60 ft West of Mill Pond Weir

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/22/24	120.00	0.00	19.00	0.00
5/29/24	410.00	***221.81***	43.00	28.58
6/5/24	230.00	***224.51***	7.00	17.88
6/12/24	70.00	167.76	3.00	11.44
6/19/24	160.00	166.18	100.00	17.66
6/26/24	800.00	***242.86***	4.00	12.93
7/3/24	44.00	155.42	5.00	8.41
7/10/24	80.00	125.83	42.00	12.03
7/17/24	160.00	148.45	18.00	17.22
7/24/24	140.00	144.54	47.00	14.80
8/14/24	70.00	116.18	6.00	17.19
8/21/24	800.00	198.66	***360.00***	***46.65***
8/28/24	240.00	***237.76***	47.00	***46.65***
9/4/24	210.00	***230.49***	***150.00***	***62.47***
9/11/24	70.00	181.61	18.00	***48.71***
9/18/24	330.00	***247.64***	50.00	***74.43***
9/25/24	200.00	187.68	11.00	***37.05***
10/2/24	110.00	160.56	11.00	27.71
10/9/24	160.00	152.07	0.10	6.42
10/16/24	220.00	191.20	3.00	4.49
10/23/24	150.00	163.31	13.00	3.43

2024 In-Harbor Bacteria Data (Regular Season)

CSHH #14–About 50 yd West of Powerhouse Drain Outfall

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
6/19/24	56.00	0.00	3.00	0.00
7/3/24	39.00	46.73	3.00	3.00
7/17/24	22.00	36.35	7.00	3.98
7/31/24	23.00	27.02	3.00	3.98
10/16/24	30.00	0.00	0.10	0.00
10/30/24	12.00	18.97	2.00	0.45

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

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
6/19/24	20.00	0.00	0.10	0.00
7/3/24	7.00	11.83	0.10	0.10
7/17/24	21.00	14.33	2.00	0.27
7/31/24	9.00	10.98	3.00	0.84
10/16/24	3.00	0.00	0.10	0.00

2024 In-Harbor Bacteria Data (Regular Season)

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**
5/22/24	0.10	0.00	0.10	0.00
5/29/24	0.10	0.10	0.10	0.10
6/5/24	2.00	0.27	0.10	0.10
6/12/24	0.10	0.21	0.10	0.10
6/19/24	0.10	0.18	0.10	0.10
6/26/24	4.00	0.38	0.10	0.10
7/3/24	0.10	0.38	0.10	0.10
7/10/24	1.00	0.33	0.10	0.10
7/17/24	1.00	0.53	0.10	0.10
7/24/24	4.00	1.10	0.10	0.10
7/31/24	0.10	0.53	0.10	0.10
8/14/24	1.00	0.80	0.10	0.10
8/21/24	1.00	0.80	0.10	0.10
8/28/24	0.10	0.32	0.10	0.10
9/4/24	5.00	0.84	0.10	0.10
9/11/24	0.10	0.55	2.00	0.18
9/18/24	0.10	0.35	0.10	0.18
9/25/24	1.00	0.35	0.10	0.18
10/2/24	2.00	0.63	0.10	0.18
10/9/24	0.10	0.29	0.10	0.18
10/23/24	0.10	0.38	0.10	0.10
10/30/24	1.00	0.38	0.10	0.10

2024 In-Harbor Bacteria Data (Regular Season)

CSHH #17–Outer Harbor, Outside Restricted Shellfishing Area at Crescent Beach

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/22/24	6.00	0.00	0.10	0.00
5/29/24	1.00	2.45	0.10	0.10
6/5/24	5.00	3.11	0.10	0.10
6/12/24	1.00	2.34	0.10	0.10
6/19/24	3.00	2.46	0.10	0.10
6/26/24	3.00	2.14	0.10	0.10
7/3/24	1.00	2.14	0.10	0.10
7/10/24	5.00	2.14	0.10	0.10
7/17/24	0.10	1.35	0.10	0.10
7/24/24	2.00	1.25	3.00	0.20
7/31/24	3.00	1.25	0.10	0.20
8/14/24	3.00	1.16	0.10	0.23
8/21/24	2.00	2.45	0.10	0.23
8/28/24	0.10	1.16	0.10	0.10
9/4/24	2.00	1.05	0.10	0.10
9/11/24	0.10	0.65	0.10	0.10
9/18/24	10.00	0.83	0.10	0.10
9/25/24	2.00	0.83	0.10	0.10
10/2/24	1.00	1.32	0.10	0.10
10/9/24	0.10	0.72	0.10	0.10
10/23/24	2.00	0.80	0.10	0.10
10/30/24	2.00	0.80	0.10	0.10

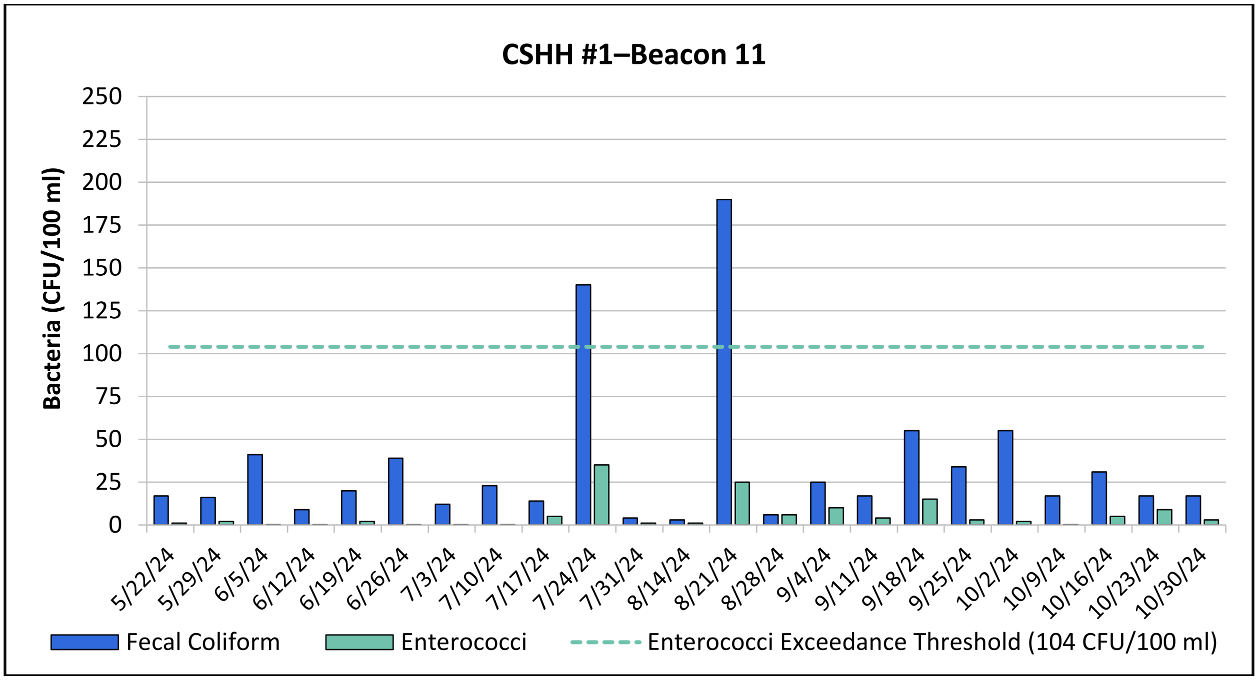
2024 In-Harbor Bacteria Data (Regular Season)

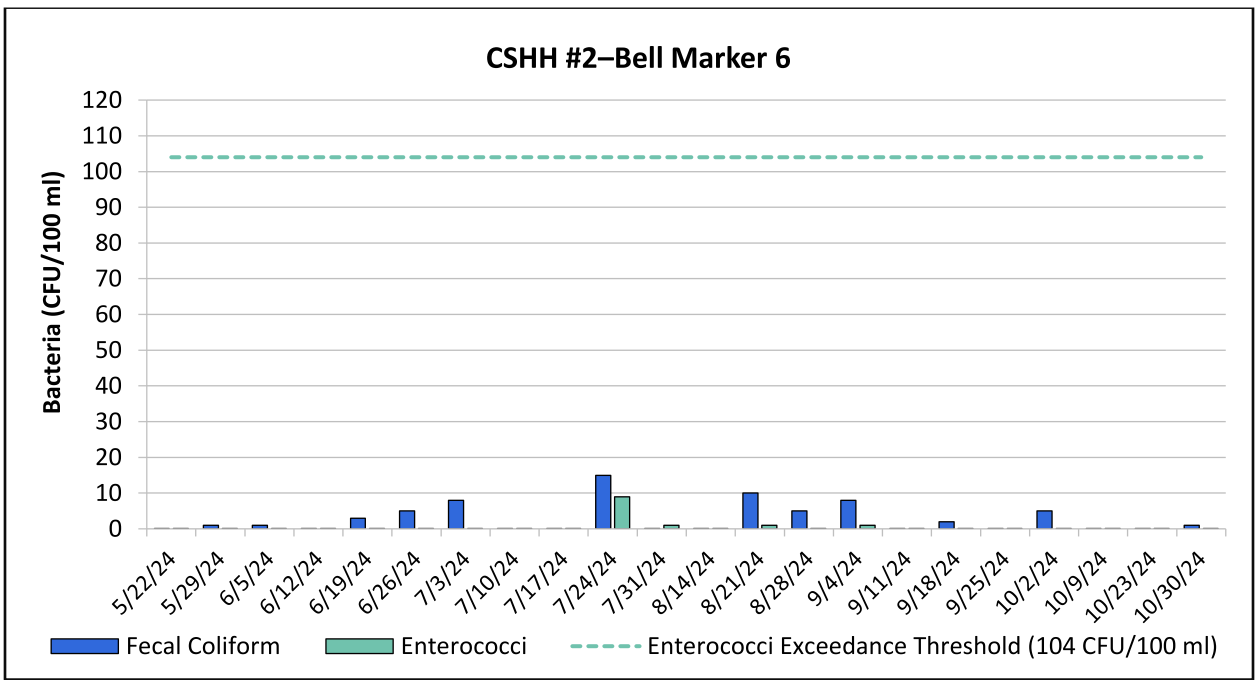
CSHH #17A–Within Restricted Shellfishing Area at Crescent Beach

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/22/24	4.00	0.00	0.10	0.00
5/29/24	2.00	2.83	0.10	0.10
6/12/24	17.00	5.14	0.10	0.10
6/26/24	13.00	7.62	0.10	0.10
7/10/24	5.00	10.34	0.10	0.10
7/24/24	21.00	11.09	***220.00***	1.30
8/14/24	3.00	7.94	4.00	29.66
8/21/24	5.00	6.80	0.10	4.45
8/28/24	1.00	2.47	1.00	0.74
9/4/24	0.10	1.11	0.10	0.45
9/11/24	5.00	1.50	0.10	0.33
9/18/24	35.00	2.45	9.00	0.39
9/25/24	30.00	3.50	0.10	0.39
10/2/24	40.00	7.32	0.10	0.25
10/9/24	1.00	11.60	0.10	0.25
10/23/24	21.00	12.60	0.10	0.10

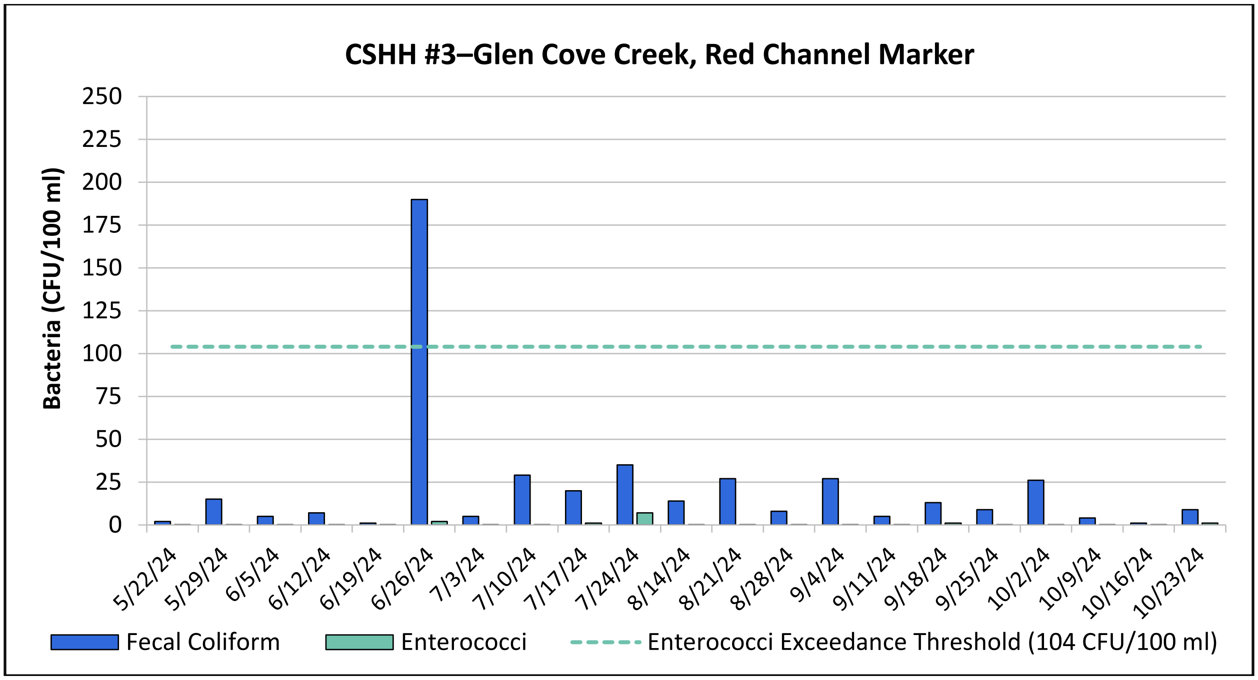
2024 In-Harbor Bacteria Graphs (Regular Season)

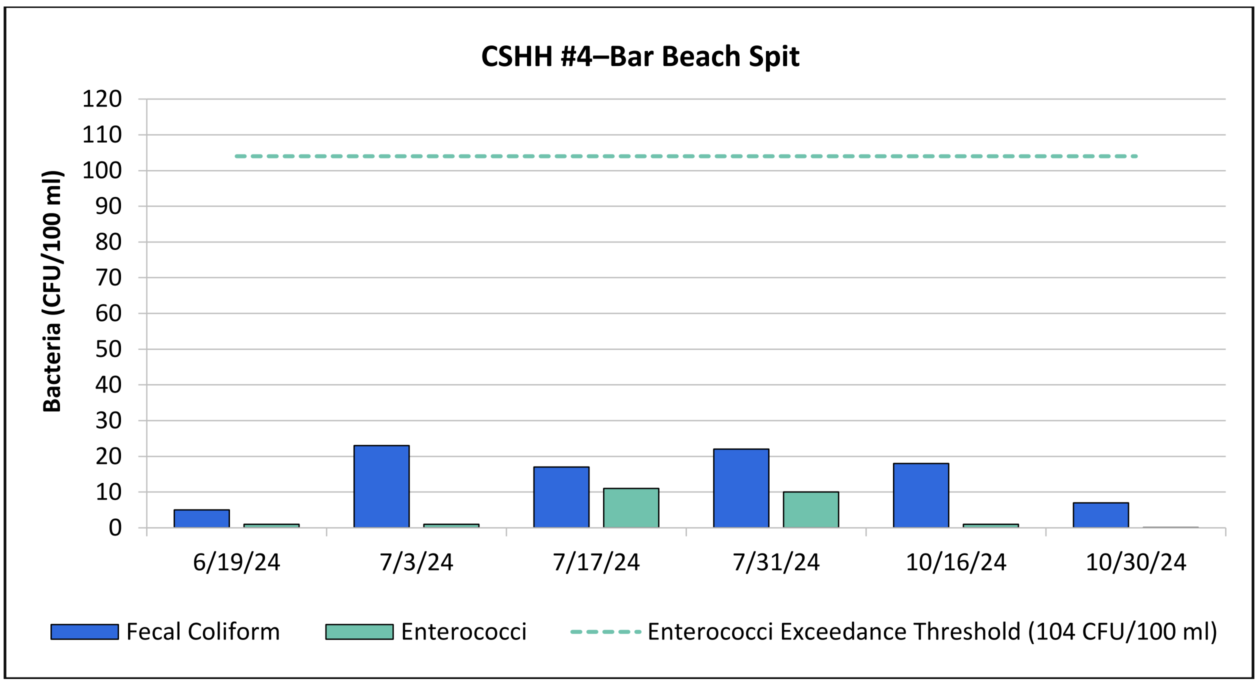
The following graphs display fecal coliform and enterococci data received from the Nassau County Department of Health. Dashed lines indicate thresholds for NYS beach-closure standards: 104 CFU/100 ml for the currently used enterococci standard and 1,000 CFU/100 ml for the formerly used fecal coliform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



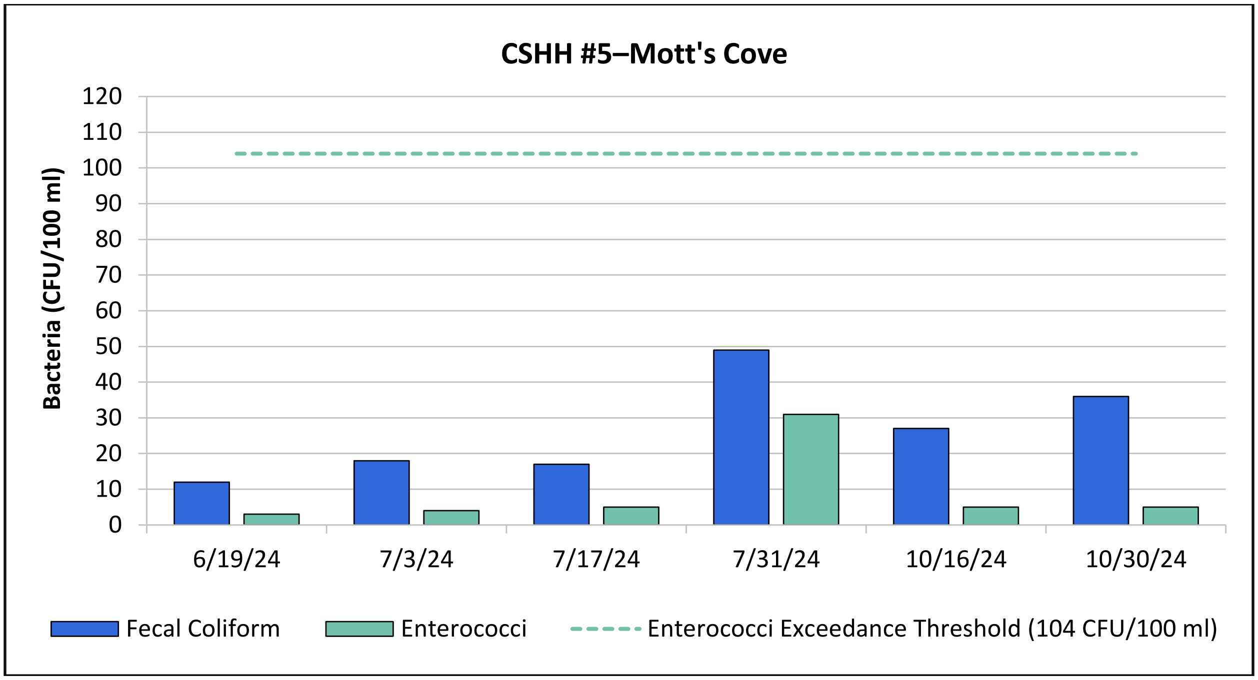


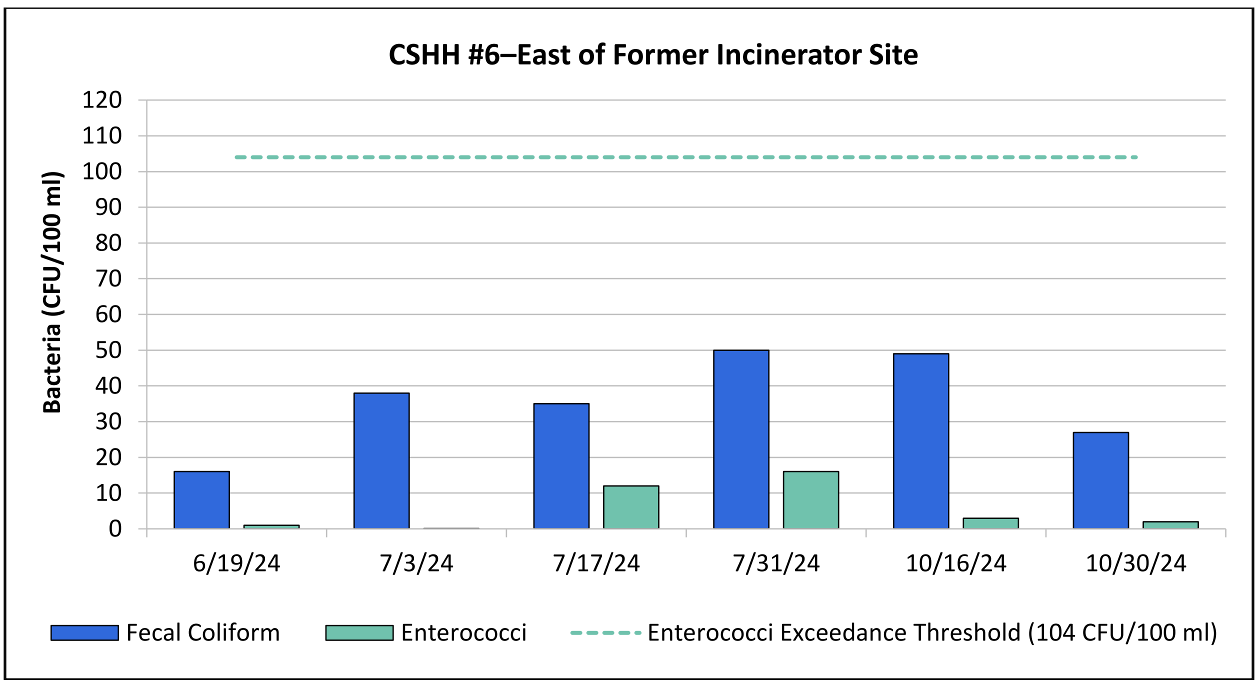
2024 In-Harbor Bacteria Graphs (Regular Season)



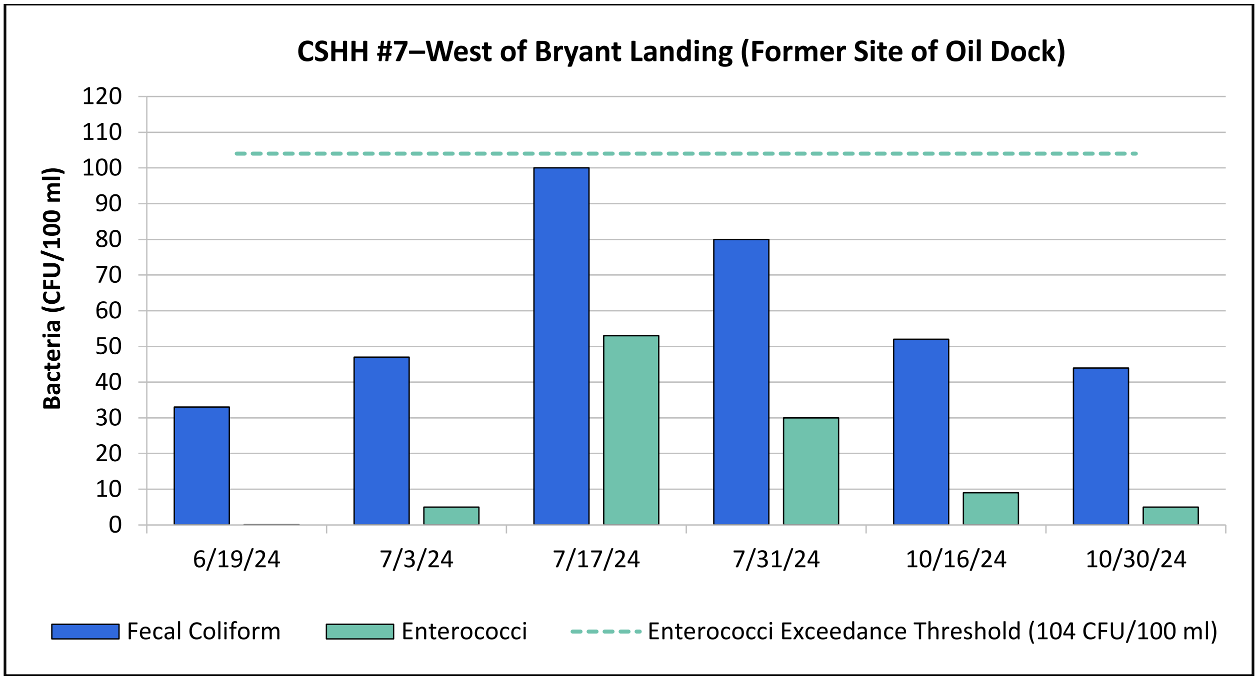


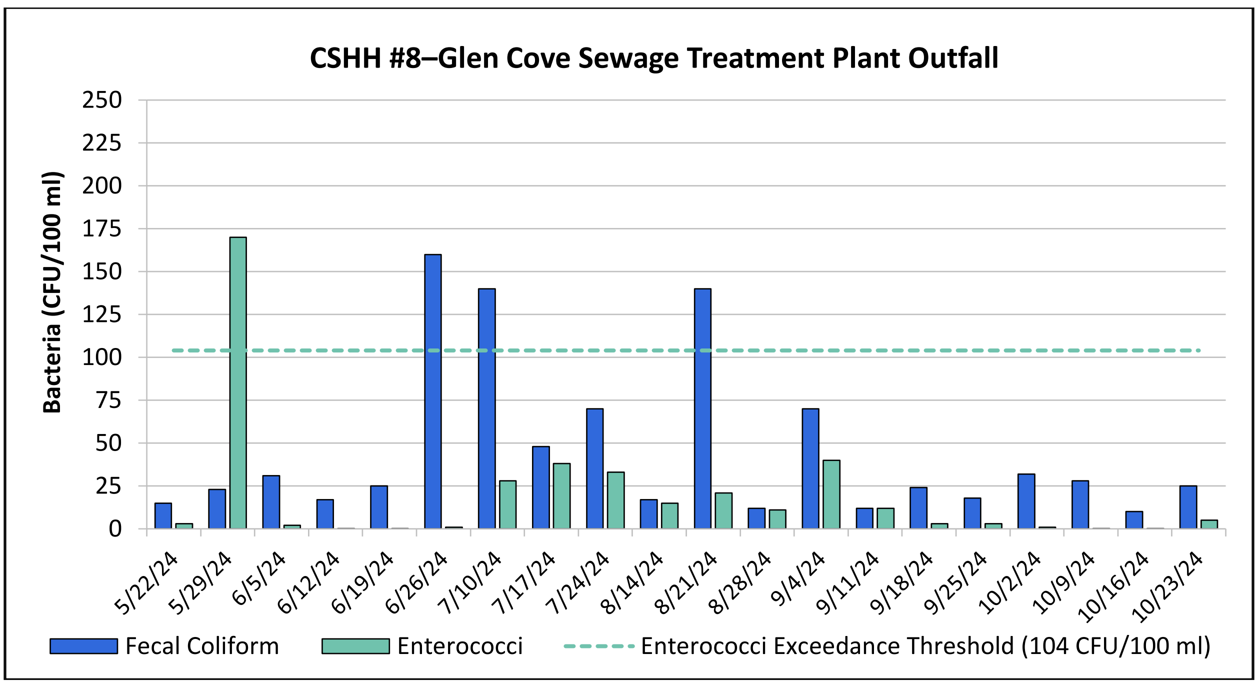
2024 In-Harbor Bacteria Graphs (Regular Season)



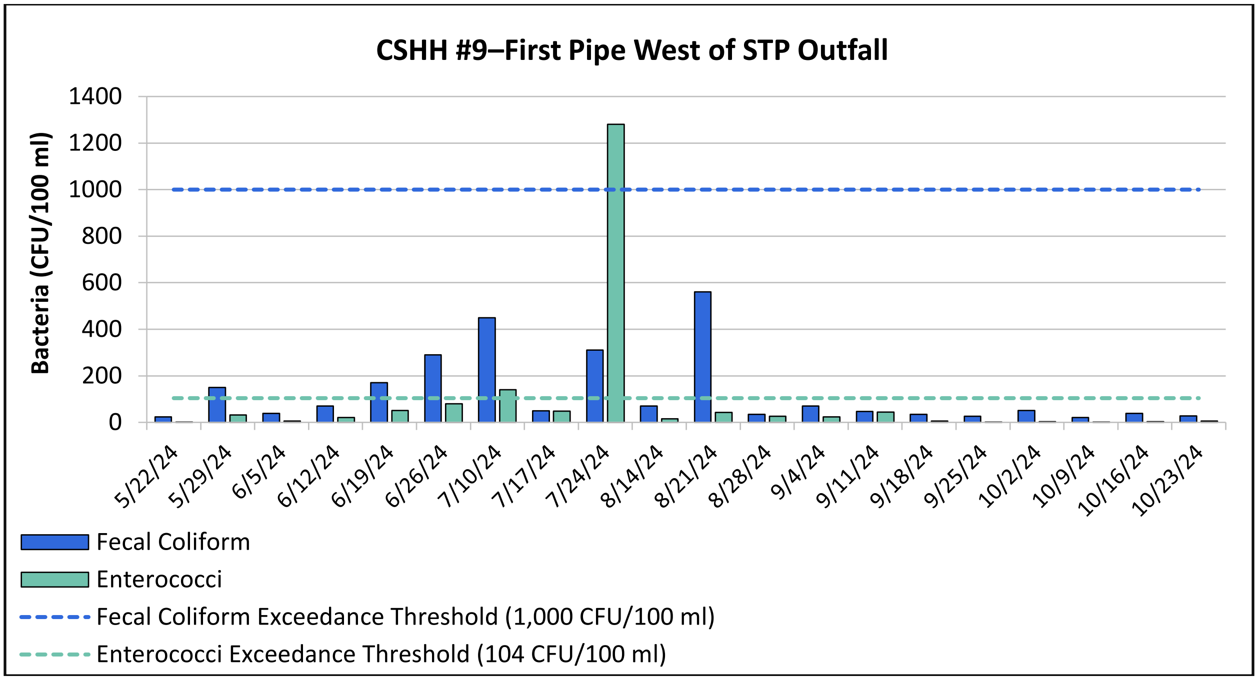


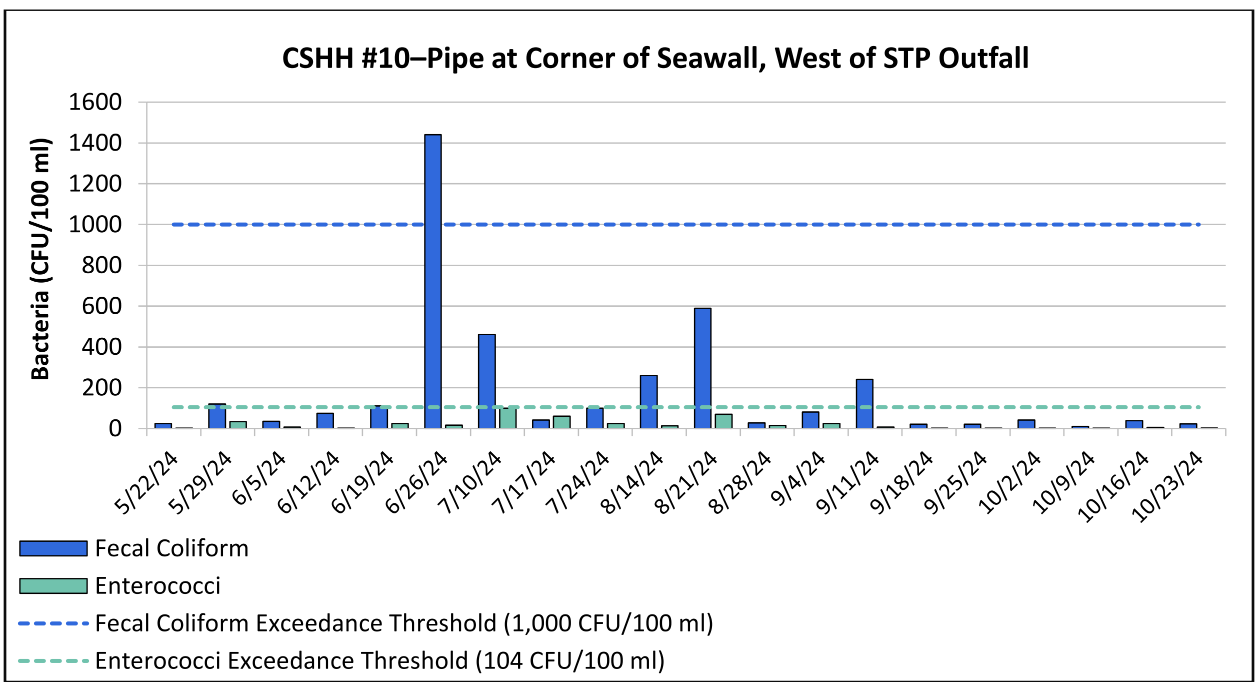
2024 In-Harbor Bacteria Graphs (Regular Season)



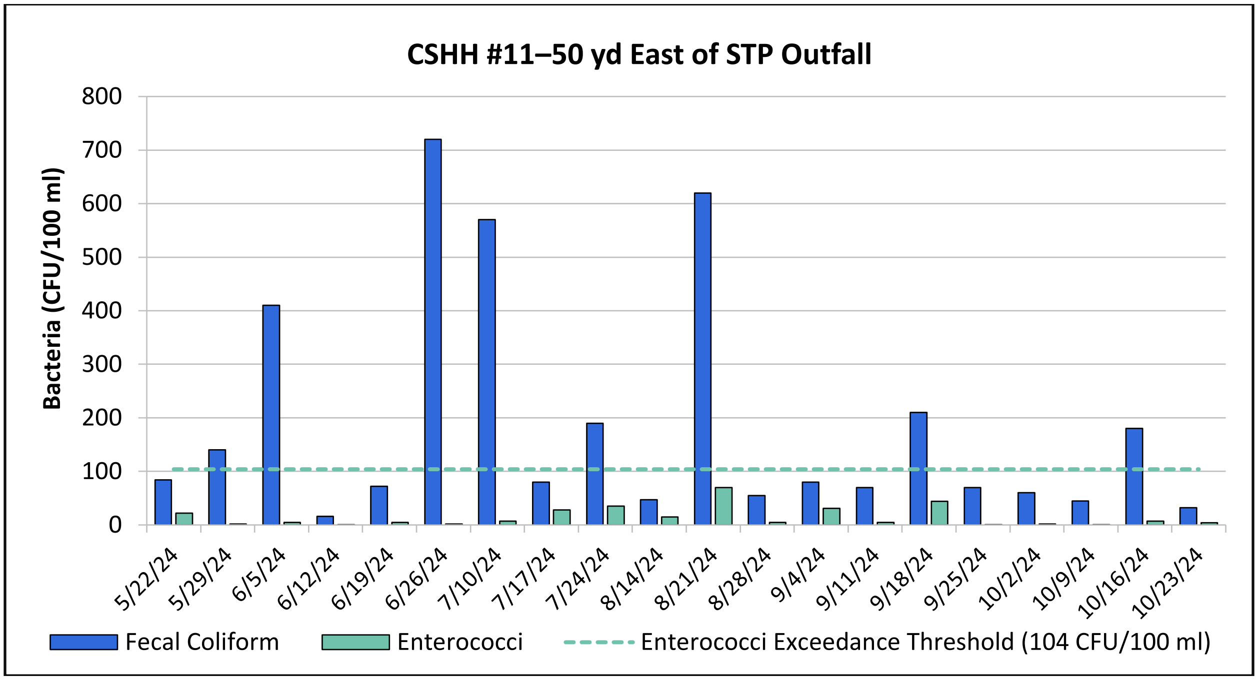


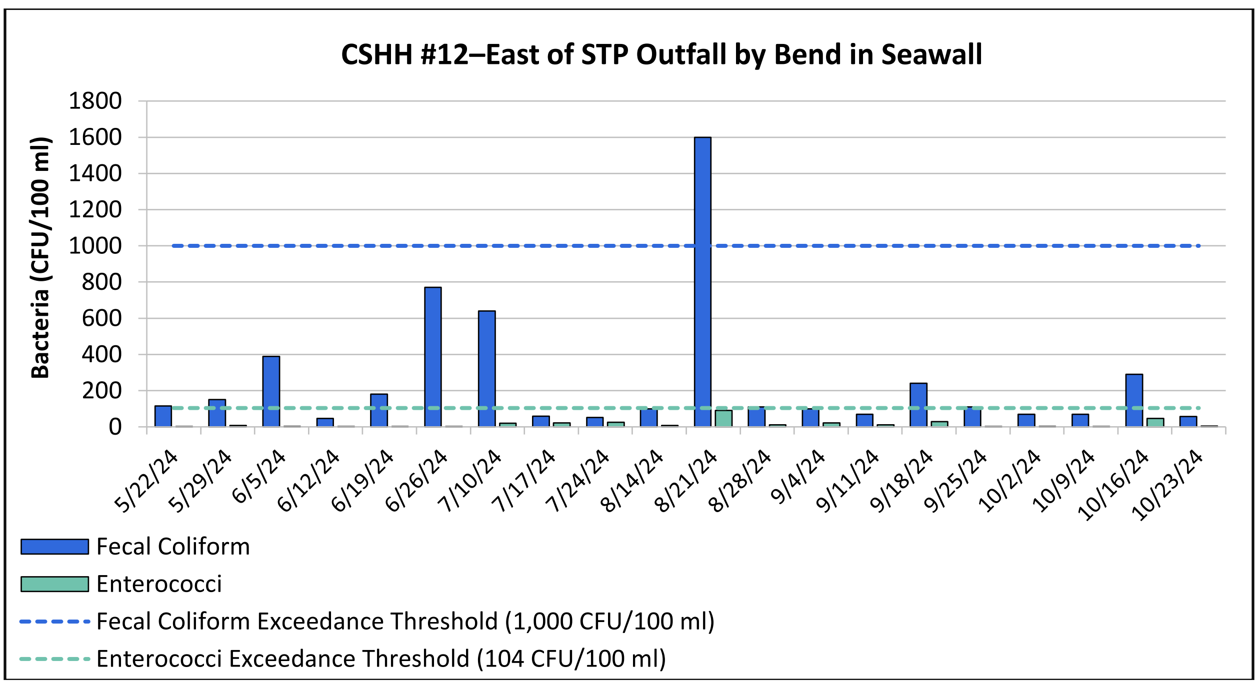
2024 In-Harbor Bacteria Graphs (Regular Season)



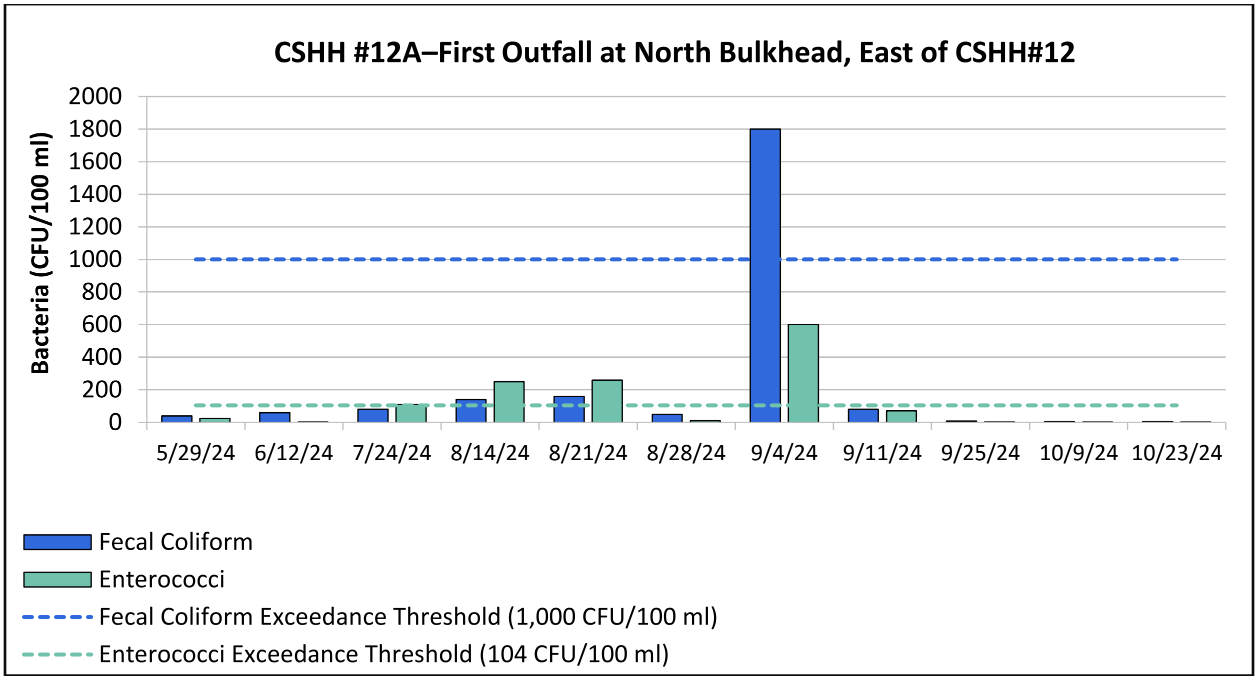


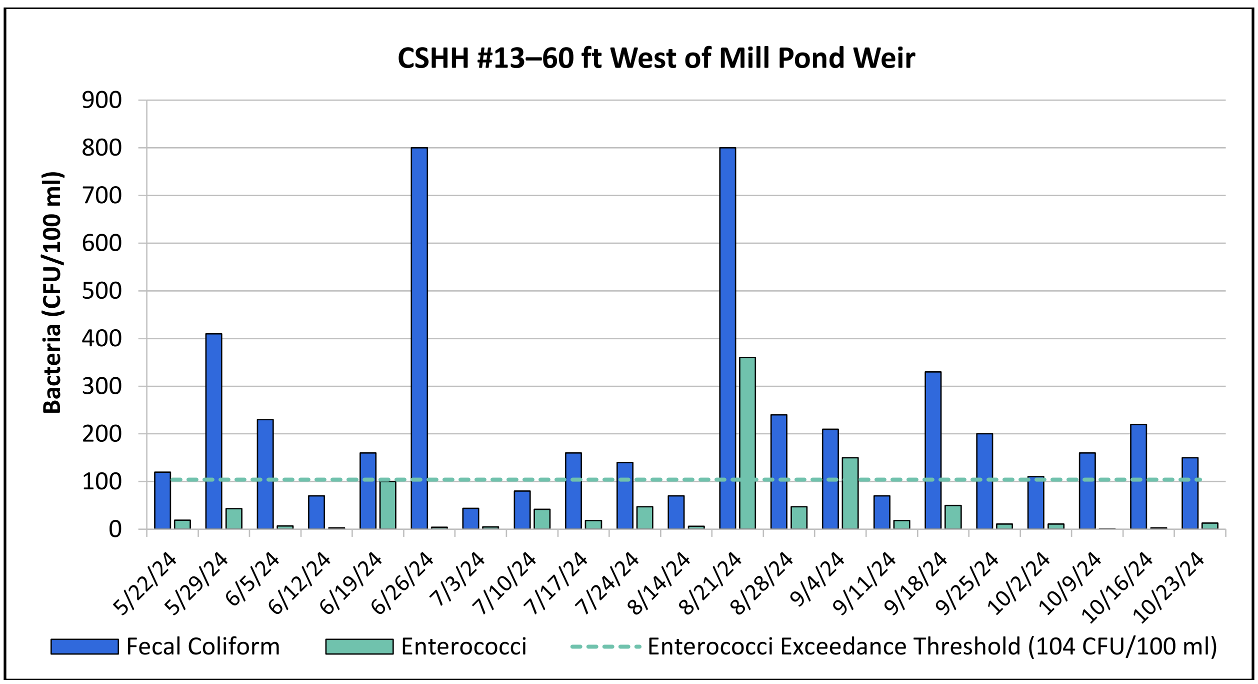
2024 In-Harbor Bacteria Graphs (Regular Season)



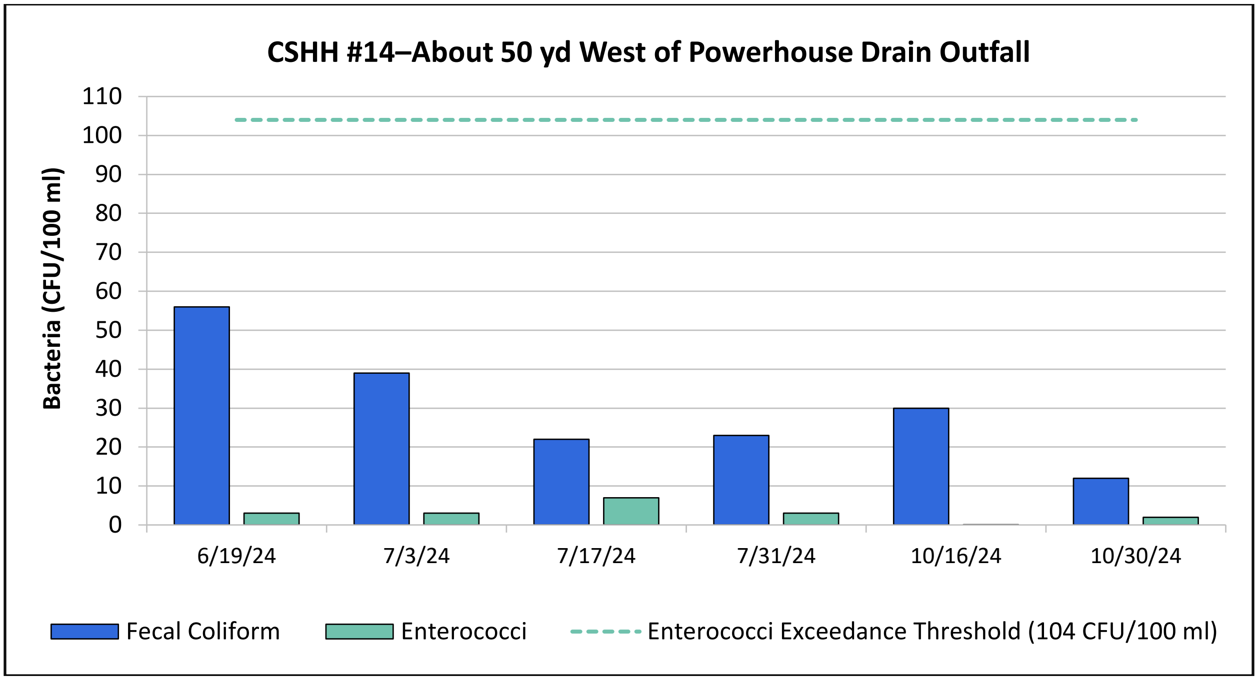


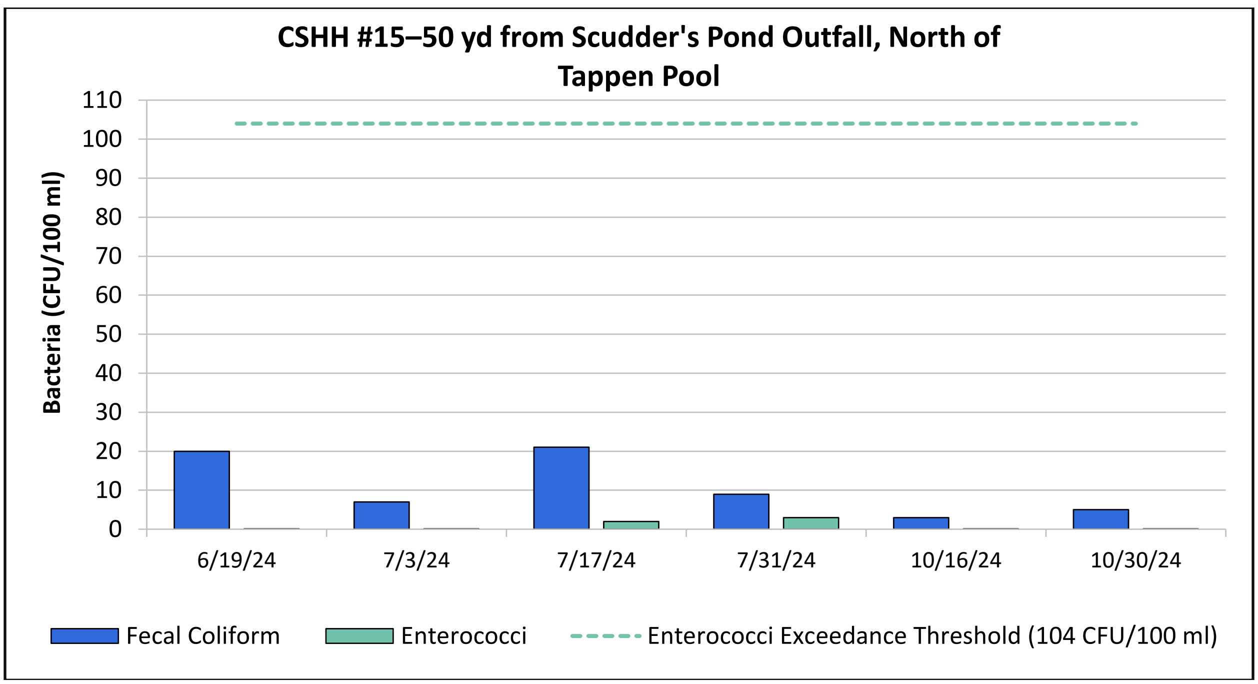
2024 In-Harbor Bacteria Graphs (Regular Season)



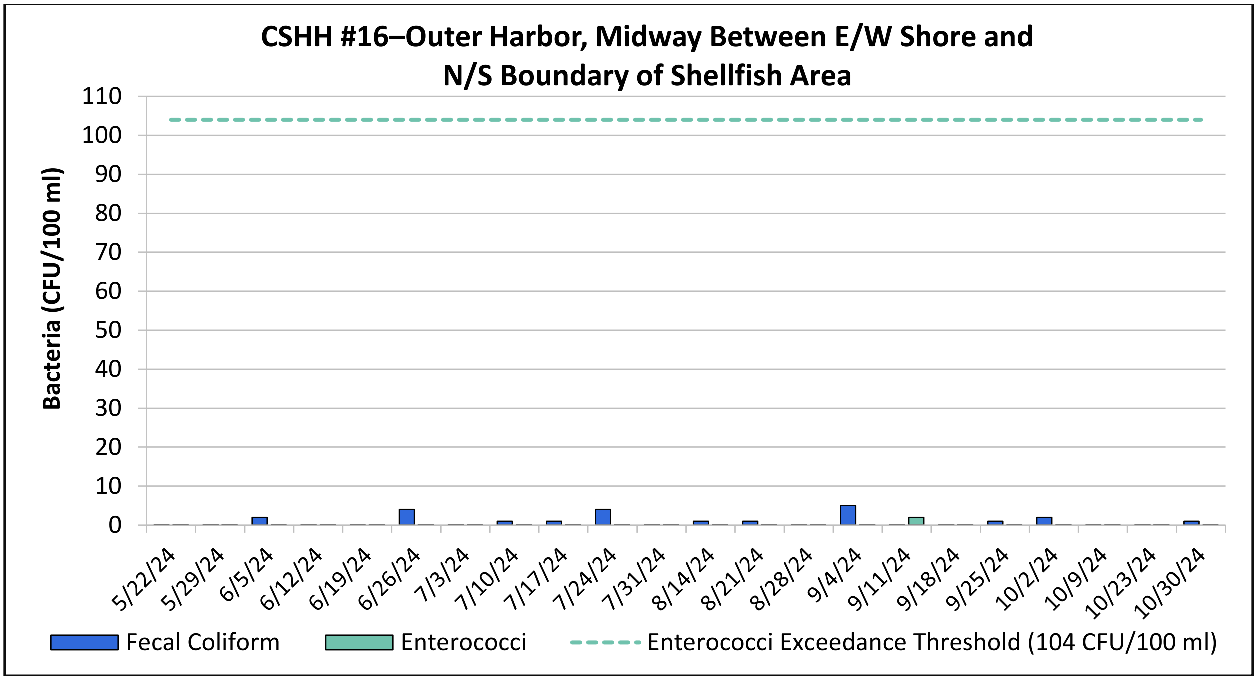


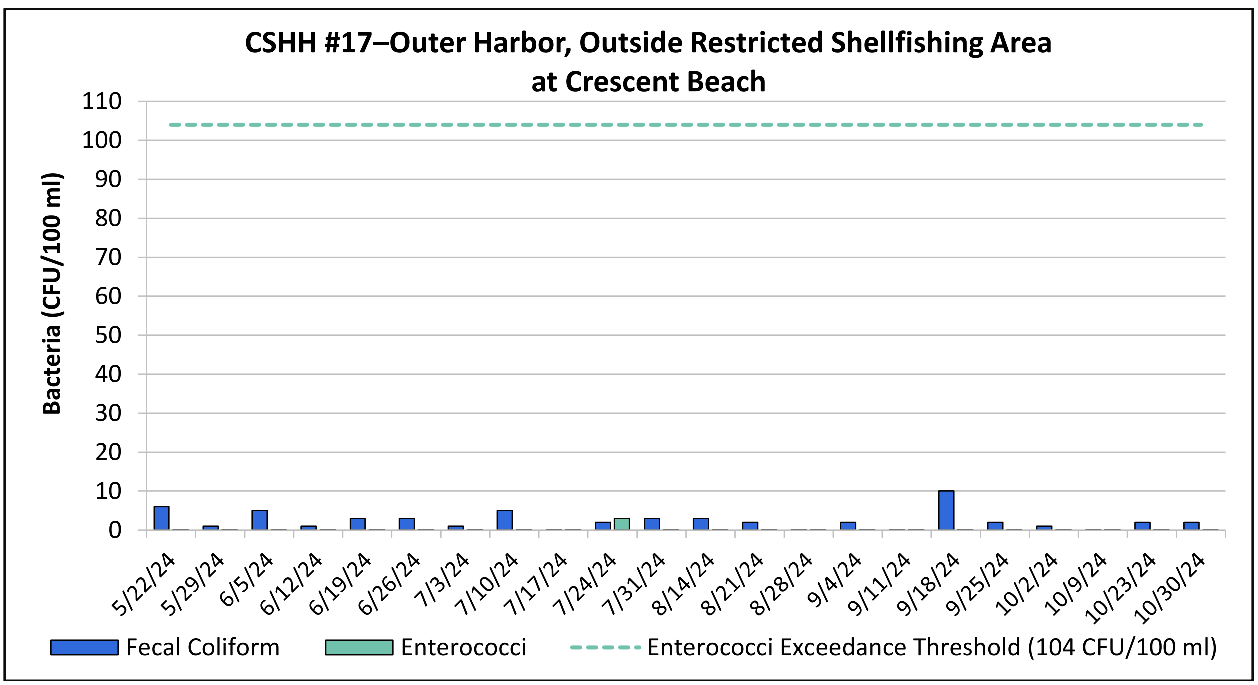
2024 In-Harbor Bacteria Graphs (Regular Season)



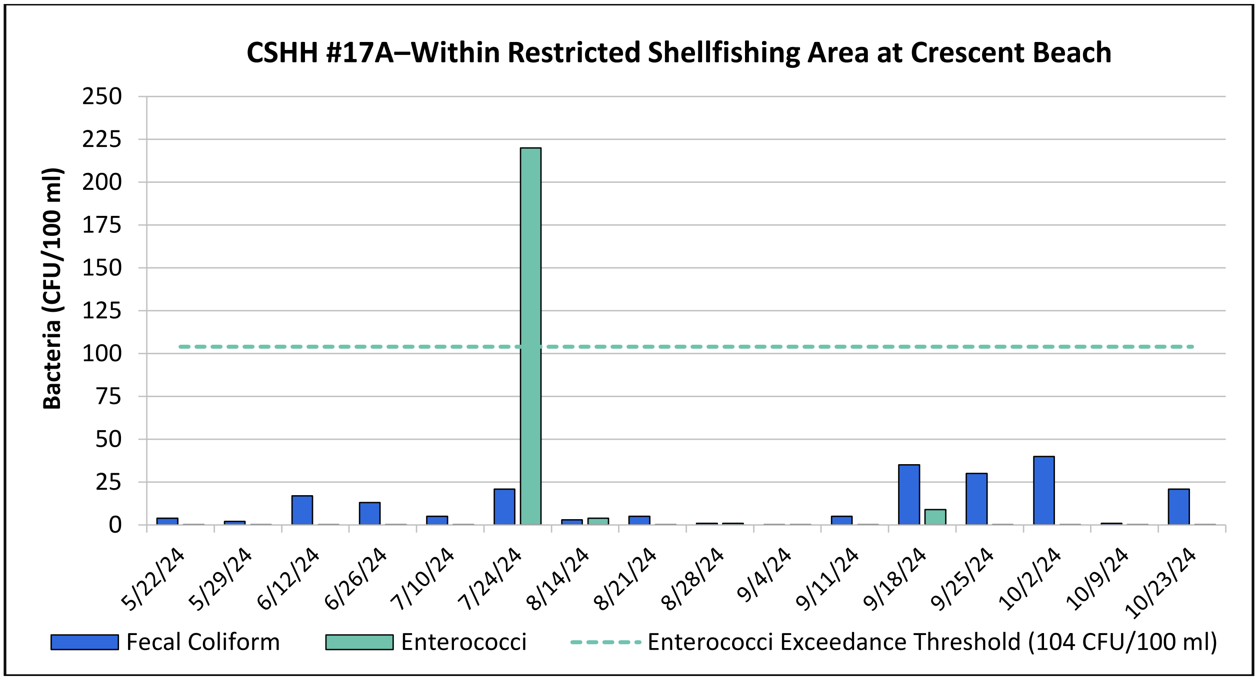


2024 In-Harbor Bacteria Graphs (Regular Season)





2024 In-Harbor Bacteria Graphs (Regular Season)



2024 Powerhouse Drain and Scudder's Pond Outfalls Bacteria Data (Regular Season)

CSHH #14A–Powerhouse Drain Outfall

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/15/24	***2800.00***	0.00	***2080.00***	0.00
5/22/24	164.00	***677.64***	75.00	***394.97***
5/29/24	190.00	***443.53***	70.00	***221.86***
6/5/24	250.00	***384.30***	32.00	***136.72***
6/12/24	590.00	***418.71***	7.00	***75.46***
6/19/24	310.00	***269.62***	29.00	32.10
6/26/24	780.00	***368.30***	34.00	27.41
7/3/24	210.00	***375.75***	74.00	27.71
7/10/24	540.00	***438.31***	***210.00***	***40.37***
7/17/24	230.00	***363.04***	49.00	***59.58***
7/24/24	***1100.00***	***467.70***	***390.00***	***100.19***
7/31/24	640.00	***449.55***	***330.00***	***157.85***
8/21/24	540.00	***724.42***	70.00	***208.08***
8/28/24	70.00	***289.22***	35.00	***93.16***
9/4/24	100.00	155.77	***120.00***	***66.49***
9/11/24	601.00	***218.32***	***280.00***	***95.25***
9/18/24	30.00	146.79	9.00	***59.42***
9/25/24	230.00	123.76	12.00	***41.76***
10/2/24	160.00	146.01	21.00	***37.70***
10/9/24	40.00	121.56	1.00	14.47
10/16/24	56.00	75.62	0.10	2.96
10/23/24	48.00	83.07	2.00	2.19
10/30/24	25.00	53.30	0.10	0.84

Tan highlights indicate samples taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

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

2024 Powerhouse Drain and Scudder's Pond Outfalls Bacteria Data (Regular Season)

CSHH #15A–Outfall North of Tappen Beach Pool

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/15/24	750.00	0.00	***1600.00***	0.00
5/22/24	96.00	***268.33***	9.00	***120.00***
5/29/24	700.00	***369.38***	23.00	***69.19***
6/5/24	80.00	***251.99***	4.00	33.93
6/12/24	***2040.00***	***382.85***	2.00	19.26
6/19/24	120.00	***265.37***	2.00	5.06
6/26/24	180.00	***300.92***	2.00	3.74
7/3/24	68.00	188.77	1.00	2.00
7/10/24	170.00	***219.49***	31.00	3.01
7/24/24	70.00	109.86	66.00	8.00
7/31/24	880.00	163.36	***170.00***	24.29
8/21/24	560.00	***325.53***	***210.00***	***133.07***
8/28/24	220.00	***476.83***	90.00	***147.56***
9/4/24	1000.00	***497.59***	***140.00***	***138.31***
9/11/24	190.00	***391.15***	70.00	***116.66***
9/18/24	420.00	***396.76***	***190.00***	***128.61***
9/25/24	460.00	***381.45***	10.00	***69.96***
10/2/24	530.00	***454.79***	28.00	***55.39***
10/9/24	520.00	***399.03***	***120.00***	***53.71***
10/16/24	400.00	***463.09***	10.00	***36.39***
10/23/24	290.00	***430.03***	0.10	8.04
10/30/24	20.00	***229.70***	1.00	5.07

Tan highlights indicate samples taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

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

2024 Powerhouse Drain and Scudder's Pond Outfalls Bacteria Data (Regular Season)

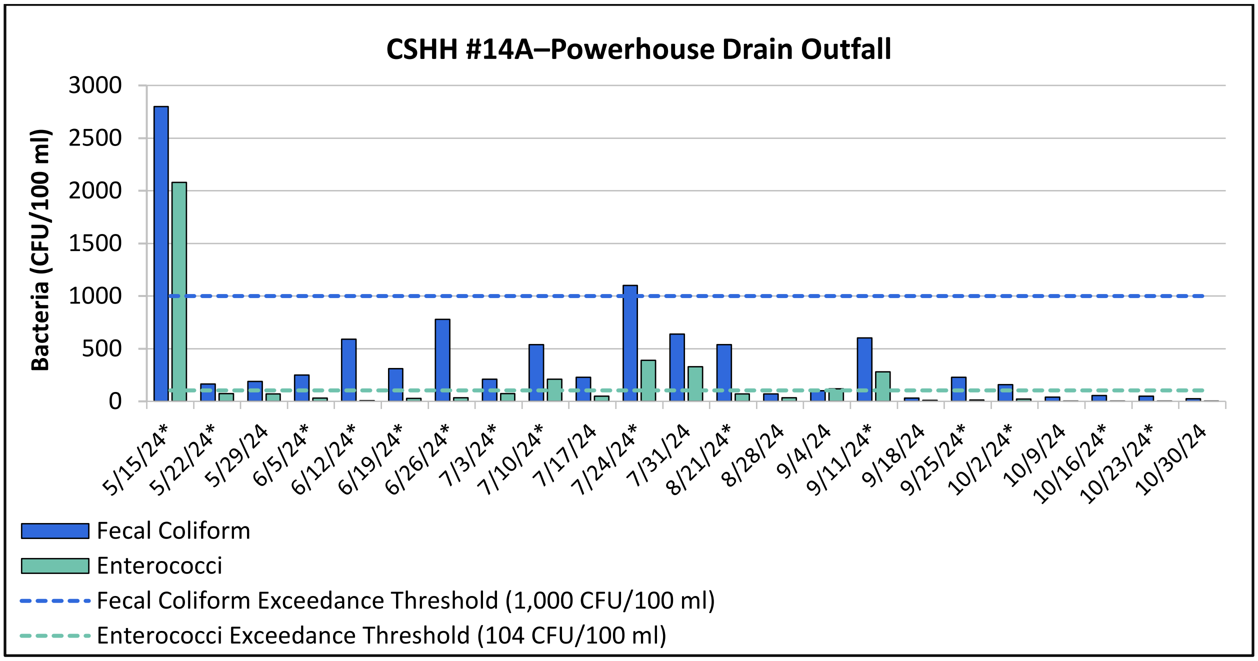
CSHH #15B–Scudder's Pond Weir on East Side of Shore Road

	Fecal Coliform		Enterococci	
Date	**CFU/100 ml**	**Log Avg**	**CFU/100 ml**	**Log Avg**
5/15/24	120.00	0.00	3.00	0.00
6/12/24	310.00	192.87	3.00	3.00
7/10/24	70.00	147.31	23.00	8.31
9/4/24	590.00	0.00	***260.00***	0.00
10/30/24	70.00	0.00	3.00	0.00

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

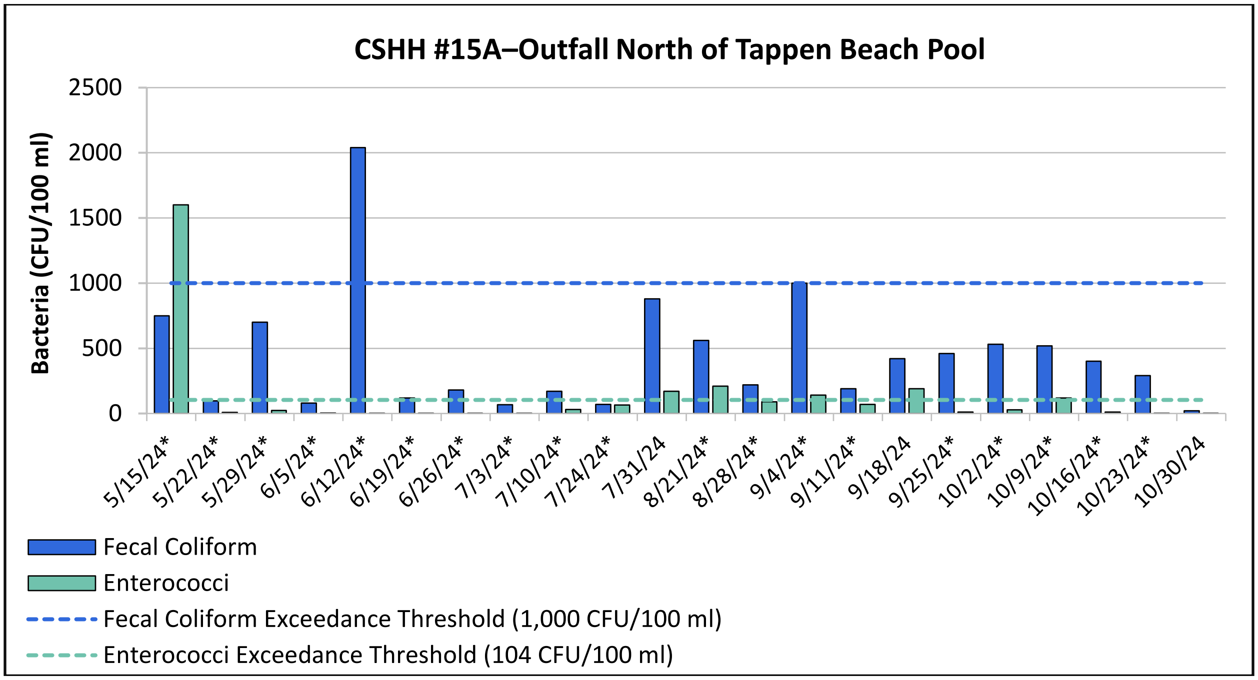
2024 Powerhouse Drain and Scudder's Pond Outfalls Bacteria Graphs (Regular Season)

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

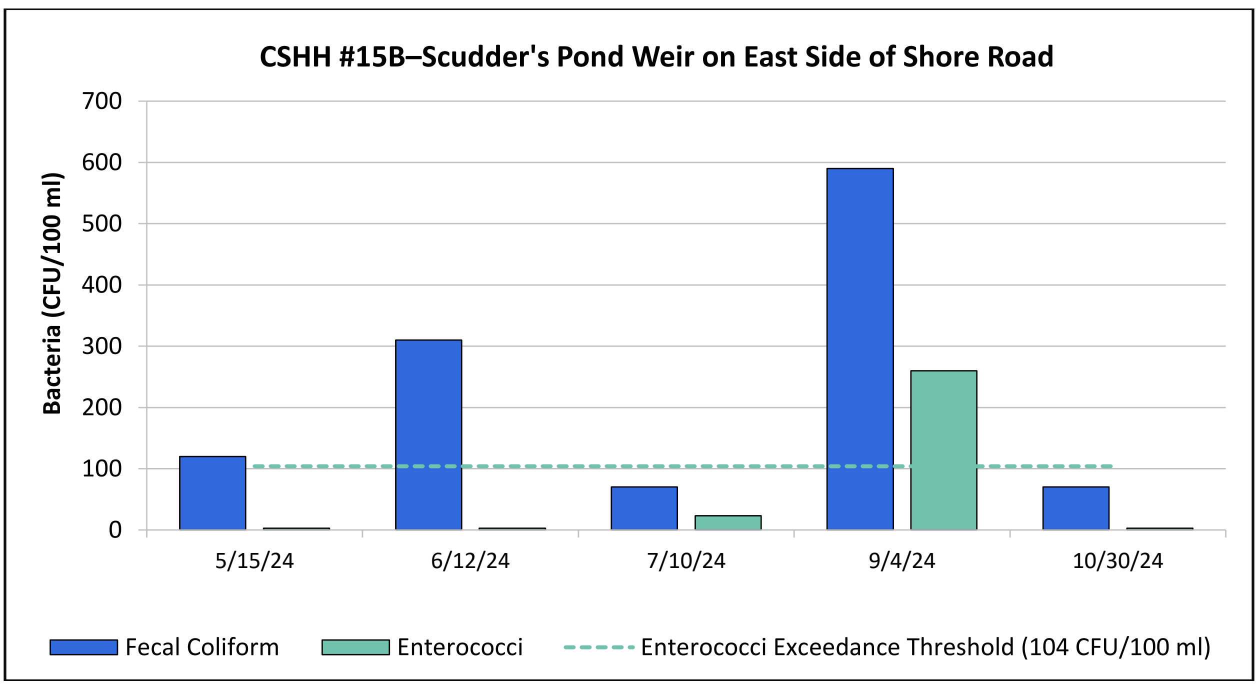


**Sample taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).*

2024 Powerhouse Drain and Scudder's Pond Outfalls Bacteria Graphs (Regular Season)



**Sample taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).*



2024-25 Powerhouse Drain and Scudder's Pond Outfalls Bacteria Data (Winter Season)

CSHH #14A–Powerhouse Drain Outfall

Date	Fecal Coliform CFU/100 ml	Enterococci CFU/100 ml
11/13/24	160.00	34.00
11/27/24	130.00	***180.00***
12/13/24	530.00	8.00
12/23/24	***1500.00***	24.00
1/8/25	***1500.00***	***160.00***
1/22/25	82.00	36.00
2/5/25	***2500.00***	13.00
2/19/25	***1900.00***	28.00
3/5/25	91.00	***410.00***
3/19/25	***>6000.00***	***360.00***
4/2/25	***1900.00***	60.00
4/16/25	***2900.00***	100.00

Tan highlights indicate samples taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

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.

2024-25 Powerhouse Drain and Scudder's Pond Outfalls Bacteria Data (Winter Season)

CSHH #15A–Outfall North of Tappen Beach Pool

	Fecal Coliform	Enterococci
Date	**CFU/100 ml**	**CFU/100 ml**
11/13/24	88.00	0.10
11/27/24	230.00	67.00
12/13/24	36.00	0.10
12/23/24	136.00	35.00
1/8/25	91.00	31.00
2/5/25	109.00	1.00
3/5/25	64.00	***3800.00***
3/19/25	182.00	60.00
4/2/25	24.00	20.00
4/16/25	91.00	21.00

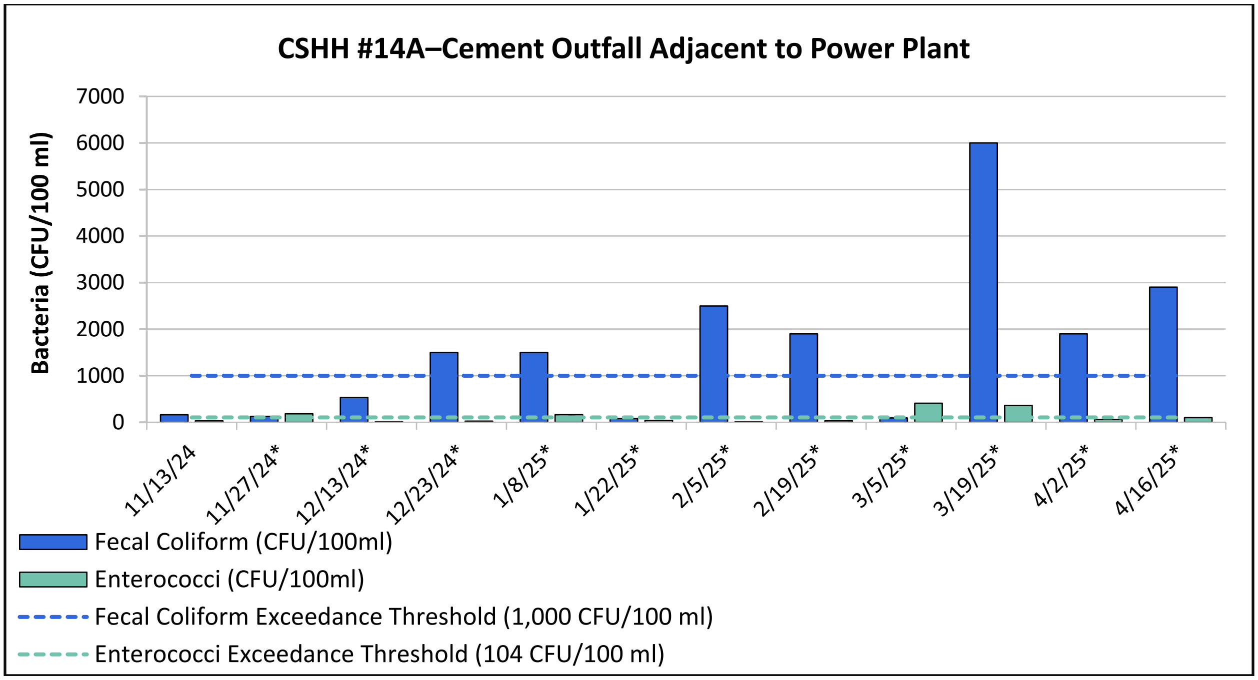
Tan highlights indicate samples taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

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

	Fecal Coliform	Enterococci
Date	**CFU/100 ml**	**CFU/100 ml**
11/13/24	140.00	0.10
4/2/25	30.00	30.00
4/16/25	55.00	44.00

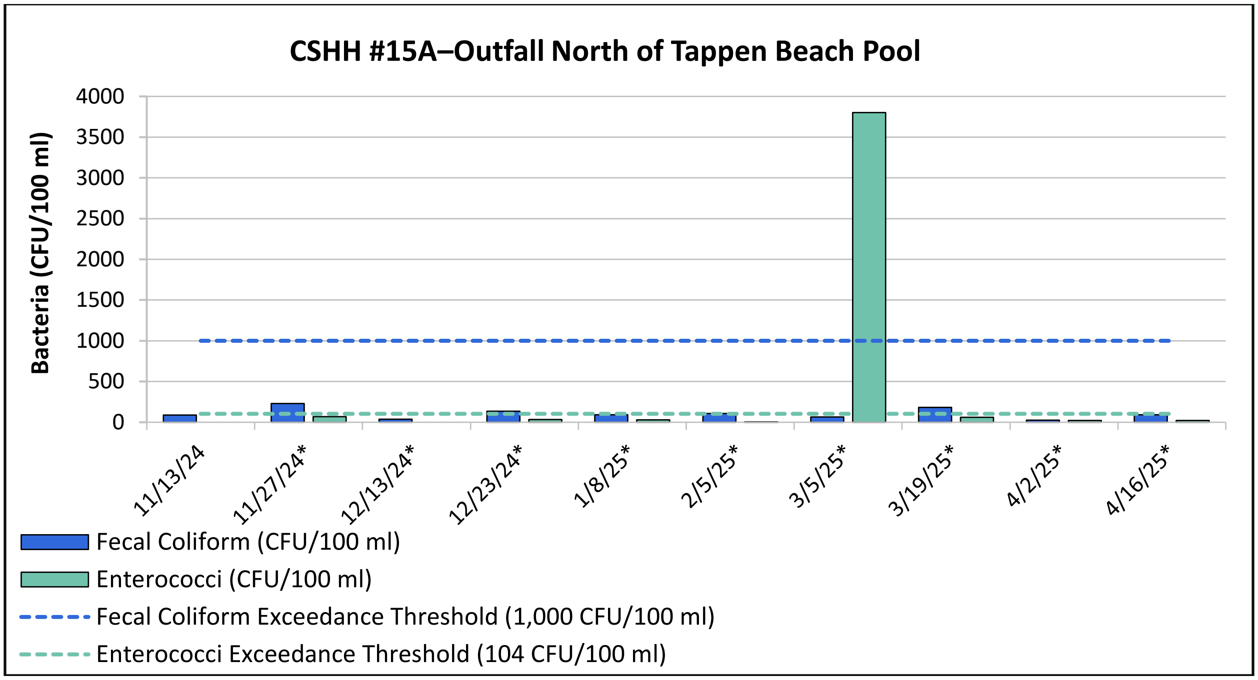
2024-25 Powerhouse Drain and Scudder's Pond Outfalls Bacteria Graphs (Winter Season)

The following graphs display fecal coliform and enterococci data received from the Nassau County Department of Health. Lab results for fecal coliform greater than 6,000 CFU/100 ml are represented at an absolute value of 6,001 CFU/100 ml. Dashed lines indicate thresholds for NYS beach-closure standards: 104 CFU/100 ml for the currently used enterococci standard and 1,000 CFU/100 ml for the formerly used fecal coliform standard. Note that the y-axes vary in order to accommodate a wide range of values. Beach-closure standards are used only as a frame-of-reference for in-harbor sample results.

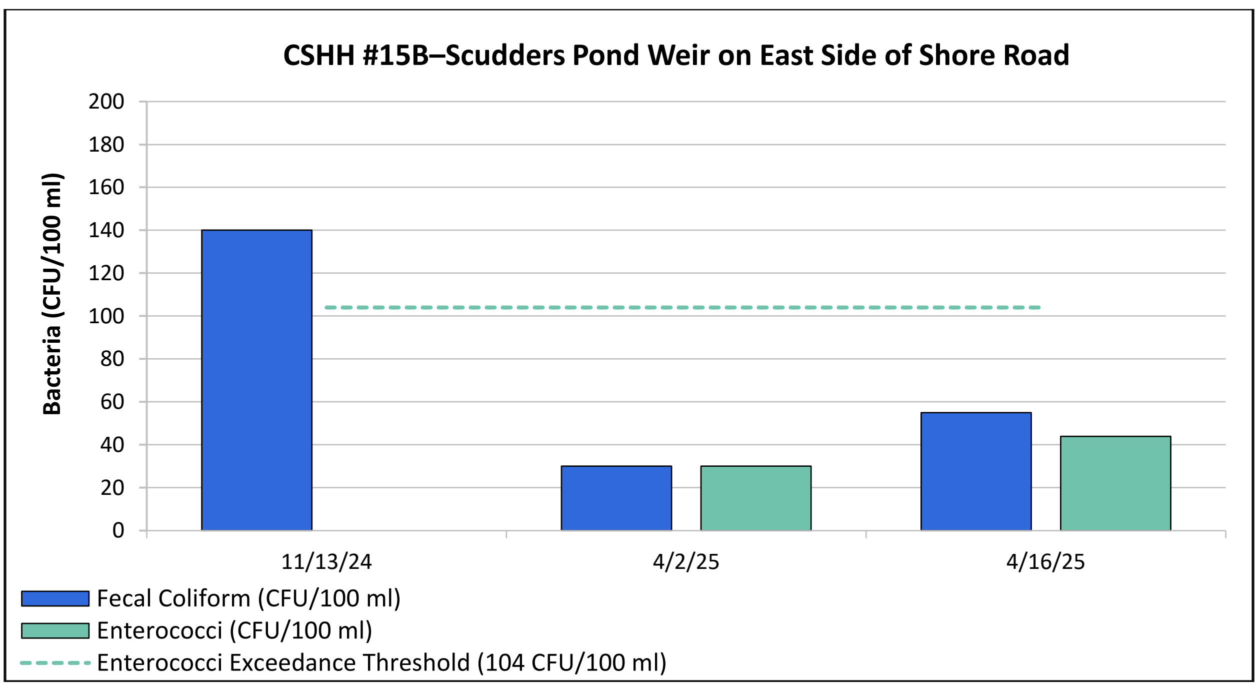


**Sample taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).*

2024-25 Powerhouse Drain and Scudder's Pond Outfalls Bacteria Graphs (Winter Season)



**Sample taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).*



2024 Sea Cliff Precipitation Data

JAN	mm	in	MARCH	mm	in	MAY	mm	in	JULY	mm	in	SEPT	mm	in	NOV	mm	in
1	0.51	0.02	2	32.77	1.29	5	12.19	0.48	5	1.02	0.04	1	14.99	0.59	1T	0.00	0.00
6*-7*	14.22	0.56	5	9.40	0.37	8	10.16	0.40	6	3.56	0.14	7	10.16	0.40	10	2.29	0.09
9	37.59	1.48	6-7	46.48	1.83	10	7.11	0.28	11	0.76	0.03	23T	0.00	0.00	11	2.29	0.09
10	21.08	0.83	9	42.42	1.67	12	1.52	0.06	12	2.54	0.10	24T	0.00	0.00	19	0.25	0.01
13	24.64	0.97	10	0.76	0.03	14	0.25	0.01	13†	32.26	1.27	25T	0.00	0.00	20	0.25	0.01
14T**	0.00	0.00	15	0.76	0.03	15	7.87	0.31	15	1.52	0.06	26-27	5.08	0.20	21	50.29	1.98
15**-16**	11.68	0.46	20	1.27	0.05	16	0.25	0.01	17†	26.67	1.05	28	7.62	0.30	22	9.91	0.39
18T**	0.00	0.00	23	95.00	3.74	18T	0.00	0.00	22T	0.00	0.00	29	0.51	0.02	23	11.43	0.45
19**	2.29	0.09	27	1.27	0.05	23	11.94	0.47	23†	6.86	0.27				25T	0.00	0.00
23T	0.00	0.00	28	24.89	0.98	26T	0.00	0.00	24	0.25	0.01				26	6.86	0.27
24-25	11.68	0.46	30	0.25	0.01	27†	18.29	0.72	29	1.27	0.05				28	23.88	0.94
26	5.33	0.21				29-30†	9.65	0.38	31	3.30	0.13				29T	0.00	0.00
27	0.25	0.01															
28	25.40	1.00															
29	4.83	0.19															
30T**	0.00	0.00															
31T**	0.00	0.00															
TOTAL	**159.51**	**6.28**	**TOTAL**	**255.27**	**10.05**	**TOTAL**	**79.25**	**3.12**	**TOTAL**	**80.01**	**3.15**	**TOTAL**	**38.35**	**1.51**	**TOTAL**	**107.44**	**4.23**

FEB	mm	in	APRIL	mm	in	JUNE	mm	in	AUG	mm	in	OCT	mm	in	DEC	mm	in
2	7.87	0.31	2	22.10	0.87	3	0.51	0.02	1	8.89	0.35	7	0.25	0.01	4T**	0.00	0
13*	1.27	0.05	3	33.78	1.33	6†	24.89	0.98	2	6.35	0.25	9T	0.00	0.00	5	4.83	0.19
17**	4.06	0.16	4	12.70	0.50	9	0.76	0.03	3†	42.67	1.68	29T	0.00	0.00	9	3.81	0.15
22	1.27	0.05	6	0.76	0.03	11T	0.00	0.00	4	5.84	0.23				10T	0.00	0.00
23	1.52	0.06	11	4.83	0.19	14†	12.95	0.51	6†	124.21	4.89				11	36.58	1.44
26	0.25	0.01	12	7.87	0.31	22	9.91	0.39	7	5.08	0.20				16-17	28.19	1.11
27	14.73	0.58	14	1.52	0.06	23T	0.00	0.00	8	5.08	0.20				18-19	9.14	0.36
28	6.60	0.26	15T	0.00	0.00	26†	23.62	0.93	9	3.56	0.14				20**-21**	5.84	0.23
			17	1.27	0.05	30	3.56	0.14	10	1.27	0.05				23**	1.02	0.04
			18	2.54	0.10				12	4.32	0.17				28-29	18.29	0.72
			20	1.52	0.06				14	0.25	0.01				29-30	11.18	0.44
			24	0.51	0.02				17	2.03	0.08				31	14.99	0.59
			27T	0.00	0.00				18†	82.80	3.26						
			28	5.33	0.21				19†	2.29	0.09						
			30	2.03	0.08				21T	0.00	0.00						
									30	4.06	0.16						
TOTAL	**37.59**	**1.48**	**TOTAL**	**96.77**	**3.81**	**TOTAL**	**76.20**	**3.00**	**TOTAL**	**298.70**	**11.76**	**TOTAL**	**0.25**	**0.01**	**TOTAL**	**133.86**	**5.27**

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 12 dates. North Hempstead Beach Park (S) was closed on dates 5/28, 5/30, 6/6, 6/15, 6/27, 7/13, 7/18, 7/23, 8/4, 8/7, 8/18-19. Tappen Beach, Sea Cliff Beach, Morgan Memorial Beach, and Pryibil Beach were closed for 9 dates same as above for 6/15 – 8/19.
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).

2025 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
1T	0.00	0.00	2**	3.56	0.14	4T	0.00	0.00	1	7.62	0.30
2T**	0.00	0.00	6*	8.13	0.32	5	31.75	1.25	2T	0.00	0.00
6**	0.76	0.03	8**, 9	10.16	0.40	6	17.02	0.67	3	2.29	0.09
11T**	0.00	0.00	11**, 12**, 13	9.65	0.38	15T	0.00	0	4	2.29	0.09
16T**	0.00	0.00	15**	2.54	0.10	16	2.54	0.10	5	3.56	0.14
18	5.08	0.20	16	30.48	1.20	17	23.11	0.91	6	17.02	0.67
19**	8.89	0.35	20**	0.25	0.01	20	0.51	0.02	7	4.57	0.18
28T**	0.00	0.00	27	0.25	0.01	21	8.64	0.34	8	0.25	0.01
31	4.83	0.19				22	0.51	0.02	10	0.76	0.03
						24	19.05	0.75	11	5.08	0.20
						26	0.51	0.02	12	11.18	0.44
						28	0.51	0.02	13	1.52	0.06
						29	1.02	0.04	15	1.52	0.06
						30	2.03	0.08	21T	0.00	0.00
						31	7.62	0.30	26	20.57	0.81
TOTAL	**19.56**	**0.77**	**TOTAL**	**65.02**	**2.56**	**TOTAL**	**114.8**	**4.52**	**TOTAL**	**57.66**	**3.08**

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).

1997–2024 Monthly Rainfall Totals (mm)

	June	July	August	September	October	Total
2024	76.20	80.01	298.70	38.35	0.25	493.52
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

2024 Beach-Monitoring Bacteria Data

Village Club of Sands Point*

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
4/8/24	0.10	0.00
4/10/24	0.10	0.10
4/15/24	1.00	0.22
4/17/24	5.00	0.47
4/22/24	0.10	0.35
4/24/24	0.10	0.28
4/29/24	0.10	0.24
5/1/24	77.00	0.50
5/6/24	3.00	0.61
5/8/24	0.10	0.51
5/13/24	0.10	0.61
5/15/24	6.00	0.77
5/20/24	6.00	0.76
5/22/24	0.10	0.62
5/29/24	0.10	0.76
6/3/24	4.00	0.68
6/5/24	19.00	0.98
6/10/24	5.00	1.39
6/12/24	0.10	1.04
6/17/24	0.10	0.83
6/19/24	0.10	0.66
6/24/24	3.00	0.76
6/26/24	0.10	0.61
7/1/24	9.00	1.00
7/3/24	7.00	1.22
7/8/24	***146.00***	1.34
7/10/24	***310.00***	2.31
7/15/24	1.00	2.73
7/17/24	13.00	3.20

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
7/22/24	***230.00***	11.10
7/24/24	***601.00***	16.55
7/29/24	11.00	33.72
7/31/24	1.00	23.72
8/5/24	43.00	32.32
8/7/24	***570.00***	***43.06***
8/12/24	35.00	29.51
8/14/24	3.00	23.48
8/19/24	***530.00***	***50.33***
8/21/24	3.00	***37.97***
8/26/24	1.00	15.27

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

2024 Beach-Monitoring Bacteria Data

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

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
4/8/24	0.10	0.00
4/10/24	0.10	0.10
4/15/24	0.10	0.10
4/17/24	5.00	0.27
4/22/24	0.10	0.22
4/24/24	0.10	0.19
4/29/24	0.10	0.17
5/1/24	0.10	0.16
5/6/24	1.00	0.20
5/8/24	11.00	0.30
5/13/24	0.10	0.34
5/15/24	2.00	0.40
5/20/24	8.00	0.49
5/22/24	0.10	0.42
5/29/24	0.10	0.49
6/3/24	0.10	0.60
6/5/24	0.10	0.49
6/10/24	0.10	0.25
6/12/24	0.10	0.23
6/17/24	0.10	0.17
6/19/24	0.10	0.16
6/24/24	1.00	0.13
6/26/24	0.10	0.13
7/1/24	18.00	0.23
7/3/24	3.00	0.30
7/8/24	27.00	0.63
7/10/24	0.10	0.52
7/15/24	2.00	0.87
7/17/24	3.00	0.99
7/22/24	56.00	2.57

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
7/24/24	22.00	3.19
7/29/24	13.00	6.22
7/31/24	3.00	5.79
8/5/24	1.00	4.51
8/7/24	***601.00***	7.36
8/12/24	8.00	10.37
8/14/24	1.00	8.21
8/19/24	***290.00***	15.95
8/21/24	1.00	12.09
8/26/24	1.00	7.24

2024 Beach-Monitoring Bacteria Data

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

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
4/8/24	0.10	0.00
4/10/24	7.00	0.84
4/15/24	4.00	1.41
4/17/24	4.00	1.83
4/22/24	0.10	1.02
4/24/24	0.10	0.69
4/29/24	0.10	0.53
5/1/24	6.00	0.71
5/6/24	4.00	0.86
5/13/24	5.00	1.03
5/15/24	0.10	0.83
5/20/24	0.10	0.67
5/22/24	0.10	0.37
5/29/24	2.00	0.43
6/3/24	0.10	0.51
6/5/24	0.10	0.38
6/10/24	2.00	0.45
6/12/24	0.10	0.21
6/17/24	0.10	0.19
6/19/24	0.10	0.21
6/24/24	0.10	0.19
6/26/24	0.10	0.15
7/1/24	0.10	0.14
7/3/24	8.00	0.23
7/8/24	1.00	0.26
7/10/24	4.00	0.32
7/15/24	5.00	0.42
7/17/24	4.00	0.74
7/22/24	2.00	0.81
7/24/24	10.00	1.71

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
7/29/24	0.10	3.44
7/31/24	1.00	3.04
8/5/24	8.00	3.44
8/7/24	***601.00***	5.77
8/12/24	6.00	6.13
8/14/24	0.10	4.06
8/19/24	***210.00***	6.82
8/21/24	1.00	5.63
8/26/24	0.10	2.63

2024 Beach-Monitoring Bacteria Data

Tappen Beach

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
4/8/24	0.10	0.00
4/10/24	55.00	2.35
4/15/24	***180.00***	9.97
4/17/24	0.10	3.15
4/22/24	0.10	1.58
4/24/24	0.10	1.00
4/29/24	0.10	0.72
5/1/24	***160.00***	1.41
5/6/24	4.00	1.59
5/8/24	5.00	1.78
5/13/24	1.00	1.57
5/15/24	0.10	1.19
5/20/24	1.00	0.88
5/22/24	4.00	1.02
5/29/24	0.10	1.33
6/3/24	0.10	0.73
6/5/24	38.00	1.13
6/10/24	1.00	0.79
6/12/24	0.10	0.63
6/17/24	3.00	0.91
6/19/24	4.00	1.07
6/24/24	16.00	1.28
6/26/24	0.10	0.97
7/1/24	2.00	1.35
7/6/24	2.00	1.29
7/8/24	1.00	1.25
7/10/24	3.00	1.37
7/15/24	16.00	2.49
7/17/24	1.00	2.27
7/22/24	10.00	2.44
7/24/24	6.00	2.67

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
7/29/24	4.00	3.30
7/31/24	11.00	3.72
8/5/24	9.00	4.32
8/7/24	***110.00***	6.45
8/12/24	5.00	8.40
8/14/24	1.00	6.79
8/19/24	48.00	9.49
8/21/24	1.00	7.58
8/26/24	2.00	6.51
8/28/24	52.00	8.01

2024 Beach-Monitoring Bacteria Data

Sea Cliff Beach

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
4/8/24	0.10	0.00
4/10/24	0.10	0.10
4/15/24	0.10	0.10
4/17/24	0.10	0.10
4/22/24	0.10	0.10
4/24/24	0.10	0.10
4/29/24	0.10	0.10
5/1/24	0.10	0.10
5/6/24	1.00	0.13
5/13/24	3.00	0.18
5/15/24	0.10	0.19
5/20/24	0.10	0.18
5/22/24	***180.00***	0.43
5/29/24	1.00	0.47
6/3/24	1.00	0.72
6/5/24	0.10	0.93
6/10/24	1.00	0.93
6/12/24	2.00	0.88
6/17/24	0.10	0.69
6/19/24	29.00	1.79
6/24/24	0.10	1.30
6/26/24	6.00	0.88
7/1/24	0.10	0.69
7/3/24	2.00	0.74
7/8/24	0.10	0.61
7/10/24	2.00	0.80
7/15/24	0.10	0.65
7/17/24	3.00	0.84
7/22/24	4.00	0.98
7/24/24	16.00	1.19
7/29/24	37.00	1.67

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
7/31/24	0.10	1.40
8/5/24	2.00	1.87
8/7/24	28.00	2.46
8/12/24	3.00	3.67
8/14/24	11.00	4.09
8/19/24	***4160.00***	9.16
8/21/24	3.00	8.19
8/26/24	35.00	7.56
8/28/24	1.00	6.18

2024 Beach-Monitoring Bacteria Data

Morgan Memorial Park

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
4/9/24	0.10	0.00
4/16/24	0.10	0.10
4/23/24	0.10	0.10
4/30/24	0.10	0.10
5/7/24	0.10	0.10
5/13/24	0.10	0.10
5/14/24	0.10	0.10
5/15/24	0.10	0.10
5/20/24	53.00	0.25
5/21/24	0.10	0.22
5/22/24	1.00	0.26
5/28/24	7.00	0.42
5/29/24	7.00	0.55
6/3/24	3.00	0.77
6/4/24	0.10	0.64
6/5/24	0.10	0.55
6/10/24	3.00	0.73
6/11/24	0.10	0.63
6/12/24	4.00	0.72
6/17/24	2.00	1.28
6/18/24	11.00	1.51
6/24/24	9.00	1.70
6/25/24	0.10	1.34
6/26/24	0.10	1.10
7/1/24	1.00	0.80
7/4/24	2.00	0.86
7/8/24	2.00	0.83
7/9/24	8.00	1.43
7/10/24	0.10	1.17
7/15/24	0.10	0.98

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
7/16/24	2.00	1.17
7/17/24	***150.00***	1.65
7/19/24	40.00	1.80
7/22/24	***300.00***	2.59
7/23/24	7.00	2.77
7/24/24	16.00	3.09
7/29/24	4.00	4.76
7/30/24	3.00	4.62
7/31/24	4.00	4.58
8/5/24	19.00	6.36
8/6/24	1.00	5.62
8/7/24	***590.00***	7.52
8/12/24	***150.00***	17.18
8/13/24	8.00	16.33
8/14/24	14.00	16.17
8/19/24	49.00	17.54
8/20/24	8.00	16.58
8/21/24	0.10	11.80
8/26/24	1.00	7.73
8/27/24	0.10	5.67
8/28/24	2.00	5.29
9/4/24	8.00	5.95
9/11/24	1.00	3.53
9/18/24	6.00	1.93
9/5/24	0.10	3.73

2024 Beach-Monitoring Bacteria Data

Crescent Beach

Fecal Coliform			
Date	**CFU/100 ml**	**Log Avg**	**Location**
4/9/24	0.10	0.00	CENTER
4/9/24	0.10	0.10	LEFT
4/9/24	0.10	0.10	RIGHT
4/16/24	21.00	0.38	CENTER
4/16/24	49.00	1.01	LEFT
4/16/24	0.10	0.68	RIGHT
4/23/24	0.10	0.52	CENTER
4/23/24	0.10	0.42	LEFT
4/23/24	0.10	0.36	RIGHT
4/30/24	164.00	0.66	CENTER
4/30/24	250.00	1.14	LEFT
4/30/24	3.00	1.24	RIGHT
5/7/24	9.00	1.44	CENTER
5/7/24	6.00	1.59	LEFT
5/7/24	24.00	1.91	RIGHT
5/13/24	25.00	4.60	CENTER
5/13/24	29.00	5.24	LEFT
5/13/24	38.00	5.98	RIGHT
5/14/24	22.00	6.49	CENTER
5/14/24	17.00	6.87	LEFT
5/14/24	180.00	8.24	RIGHT
5/15/24	8.00	8.22	CENTER
5/15/24	70.00	9.15	LEFT
5/15/24	23.00	9.56	RIGHT
5/20/24	10.00	10.73	CENTER
5/20/24	8.00	10.57	LEFT
5/20/24	9.00	10.49	RIGHT
5/21/24	39.00	11.14	CENTER
5/21/24	56.00	11.95	LEFT
5/21/24	22.00	12.26	RIGHT

Enterococci			
Date	**CFU/100 ml**	**Log Avg**	**Location**
4/9/24	0.10	0.00	CENTER
4/9/24	0.10	0.10	LEFT
4/9/24	0.10	0.10	RIGHT
4/16/24	4.00	0.25	CENTER
4/16/24	8.00	0.50	LEFT
4/16/24	0.10	0.38	RIGHT
4/23/24	0.10	0.32	CENTER
4/23/24	0.10	0.27	LEFT
4/23/24	0.10	0.25	RIGHT
4/30/24	0.10	0.22	CENTER
4/30/24	15.00	0.33	LEFT
4/30/24	0.10	0.30	RIGHT
5/7/24	0.10	0.27	CENTER
5/7/24	0.10	0.25	LEFT
5/7/24	0.10	0.24	RIGHT
5/13/24	14.00	0.40	CENTER
5/13/24	11.00	0.51	LEFT
5/13/24	3.00	0.57	RIGHT
5/14/24	0.10	0.51	CENTER
5/14/24	2.00	0.55	LEFT
5/14/24	9.00	0.65	RIGHT
5/15/24	6.00	0.73	CENTER
5/15/24	90.00	0.93	LEFT
5/15/24	41.00	1.11	RIGHT
5/20/24	1.00	1.05	CENTER
5/20/24	0.10	0.94	LEFT
5/20/24	1.00	0.94	RIGHT
5/21/24	1.00	0.94	CENTER
5/21/24	8.00	1.04	LEFT
5/21/24	1.00	1.03	RIGHT

Note that "Left," "Right," and "Center" indicate sample locations on Crescent Beach (looking out toward Long Island Sound). "Left" is closest to the stream; "Center" is northeast of "Left," between the stream and Webb Institute; and "Right" is closest to Webb Institute.
Boldfaced, italicized values exceed the thresholds for NYS beach-closure standards: 104 CFU/100 ml (35 Log Avg) for the currently used enterococci standard and 1,000 CFU/100 ml (200 Log Avg) for the formerly used fecal coliform standard.

2024 Beach-Monitoring Bacteria Data

Crescent Beach (cont.)

Fecal Coliform				Enterococci			
Date	**CFU/100 ml**	**Log Avg**	**Location**	**Date**	**CFU/100 ml**	**Log Avg**	**Location**
5/22/24	16.00	12.39	CENTER	**5/22/24**	1.00	1.03	CENTER
5/22/24	1.00	11.24	LEFT	**5/22/24**	3.00	1.08	LEFT
5/22/24	10.00	11.20	RIGHT	**5/22/24**	0.10	0.98	RIGHT
5/28/24	48.00	20.90	CENTER	**5/28/24**	0.10	1.18	CENTER
5/28/24	28.00	21.14	LEFT	**5/28/24**	1.00	1.18	LEFT
5/28/24	38.00	21.60	RIGHT	**5/28/24**	0.10	1.07	RIGHT
5/29/24	530.00	24.22	CENTER	**5/29/24**	24.00	1.20	CENTER
5/29/24	260.00	26.28	LEFT	**5/29/24**	13.00	1.30	LEFT
5/29/24	37.00	26.59	RIGHT	**5/29/24**	6.00	1.37	RIGHT
6/3/24	23.00	24.73	CENTER	**6/3/24**	9.00	1.62	CENTER
6/3/24	28.00	24.84	LEFT	**6/3/24**	1.00	1.59	LEFT
6/3/24	49.00	25.41	RIGHT	**6/3/24**	7.00	1.67	RIGHT
6/4/24	23.00	25.33	CENTER	**6/4/24**	0.10	1.53	CENTER
6/4/24	33.00	25.54	LEFT	**6/4/24**	0.10	1.40	LEFT
6/4/24	48.00	26.03	RIGHT	**6/4/24**	2.00	1.42	RIGHT
6/5/24	150.00	27.40	CENTER	**6/5/24**	1.00	1.40	CENTER
6/5/24	160.00	28.82	LEFT	**6/5/24**	0.10	1.30	LEFT
6/5/24	20.00	28.53	RIGHT	**6/5/24**	0.10	1.21	RIGHT
6/10/24	23.00	30.86	CENTER	**6/10/24**	10.00	1.61	CENTER
6/10/24	34.00	30.95	LEFT	**6/10/24**	0.10	1.49	LEFT
6/10/24	27.00	30.83	RIGHT	**6/10/24**	4.00	1.53	RIGHT
6/11/24	4.00	29.17	CENTER	**6/11/24**	0.10	1.42	CENTER
6/11/24	3.00	27.48	LEFT	**6/11/24**	0.10	1.32	LEFT
6/11/24	3.00	25.96	RIGHT	**6/11/24**	0.10	1.24	RIGHT
6/12/24	42.00	26.28	CENTER	**6/12/24**	0.10	1.16	CENTER
6/12/24	0.10	22.94	LEFT	**6/12/24**	0.10	1.10	LEFT
6/12/24	0.10	20.15	RIGHT	**6/12/24**	0.10	1.03	RIGHT
6/17/24	2.00	16.85	CENTER	**6/17/24**	0.10	0.60	CENTER
6/17/24	1.00	15.55	LEFT	**6/17/24**	1.00	0.60	LEFT
6/17/24	101.00	16.37	RIGHT	**6/17/24**	5.00	0.64	RIGHT
6/18/24	66.00	17.00	CENTER	**6/18/24**	3.00	0.67	CENTER
6/18/24	98.00	17.81	LEFT	**6/18/24**	2.00	0.69	LEFT
6/18/24	75.00	18.47	RIGHT	**6/18/24**	2.00	0.71	RIGHT
6/24/24	53.00	21.61	CENTER	**6/24/24**	0.10	0.63	CENTER
6/24/24	86.00	22.57	LEFT	**6/24/24**	4.00	0.67	LEFT
6/24/24	108.00	23.66	RIGHT	**6/24/24**	3.00	0.70	RIGHT

2024 Beach-Monitoring Bacteria Data

Crescent Beach (cont.)

Fecal Coliform			
Date	**CFU/100 ml**	**Log Avg**	**Location**
6/25/24	10.00	23.07	CENTER
6/25/24	7.00	22.30	LEFT
6/25/24	23.00	22.32	RIGHT
6/26/24	5.00	21.43	CENTER
6/26/24	5.00	20.63	LEFT
6/26/24	38.00	20.95	RIGHT
7/1/24	48.00	16.95	CENTER
7/1/24	55.00	17.53	LEFT
7/1/24	120.00	18.50	RIGHT
7/2/24	51.00	19.01	CENTER
7/2/24	35.00	19.32	LEFT
7/2/24	46.00	19.75	RIGHT
7/3/24	27.00	19.91	CENTER
7/3/24	42.00	20.27	LEFT
7/3/24	24.00	20.35	RIGHT
7/8/24	5.00	15.98	CENTER
7/8/24	23.00	16.15	LEFT
7/8/24	1.00	14.95	RIGHT
7/9/24	4.00	14.42	CENTER
7/9/24	2.00	13.69	LEFT
7/9/24	11.00	13.62	RIGHT
7/10/24	0.10	12.04	CENTER
7/10/24	4.00	11.72	LEFT
7/10/24	6.00	11.54	RIGHT
7/15/24	25.00	15.53	CENTER
7/15/24	13.00	15.45	LEFT
7/15/24	42.00	15.89	RIGHT
7/16/24	21.00	16.01	CENTER
7/16/24	37.00	16.37	LEFT
7/16/24	9.00	16.12	RIGHT
7/17/24	4.00	15.56	CENTER
7/17/24	10.00	15.40	LEFT
7/17/24	26.00	15.59	RIGHT
7/22/24	62.00	15.36	CENTER
7/22/24	55.00	15.89	LEFT
7/22/24	15.00	15.87	RIGHT

Enterococci			
Date	**CFU/100 ml**	**Log Avg**	**Location**
6/25/24	0.10	0.66	CENTER
6/25/24	0.10	0.62	LEFT
6/25/24	0.10	0.59	RIGHT
6/26/24	0.10	0.57	CENTER
6/26/24	0.10	0.54	LEFT
6/26/24	1.00	0.55	RIGHT
7/1/24	2.00	0.47	CENTER
7/1/24	3.00	0.50	LEFT
7/1/24	2.00	0.52	RIGHT
7/2/24	0.10	0.49	CENTER
7/2/24	0.10	0.47	LEFT
7/2/24	0.10	0.45	RIGHT
7/3/24	14.00	0.50	CENTER
7/3/24	12.00	0.54	LEFT
7/3/24	1.00	0.54	RIGHT
7/8/24	3.00	0.55	CENTER
7/8/24	18.00	0.61	LEFT
7/8/24	3.00	0.64	RIGHT
7/9/24	21.00	0.70	CENTER
7/9/24	1.00	0.71	LEFT
7/9/24	2.00	0.73	RIGHT
7/10/24	0.10	0.69	CENTER
7/10/24	0.10	0.66	LEFT
7/10/24	0.10	0.63	RIGHT
7/15/24	23.00	0.89	CENTER
7/15/24	***140.00***	1.03	LEFT
7/15/24	58.00	1.16	RIGHT
7/16/24	11.00	1.23	CENTER
7/16/24	35.00	1.34	LEFT
7/16/24	3.00	1.37	RIGHT
7/17/24	33.00	1.48	CENTER
7/17/24	45.00	1.61	LEFT
7/17/24	***130.00***	1.79	RIGHT
7/22/24	***240.00***	2.14	CENTER
7/22/24	43.00	2.31	LEFT
7/22/24	***170.00***	2.58	RIGHT

2024 Beach-Monitoring Bacteria Data

Crescent Beach (cont.)

Fecal Coliform			
Date	**CFU/100 ml**	**Log Avg**	**Location**
7/23/24	31.00	16.13	CENTER
7/23/24	32.00	16.41	LEFT
7/23/24	15.00	16.37	RIGHT
7/24/24	180.00	17.31	CENTER
7/24/24	7.00	16.96	LEFT
7/24/24	14.00	16.88	RIGHT
7/29/24	2.00	15.14	CENTER
7/29/24	12.00	15.04	LEFT
7/29/24	4.00	14.54	RIGHT
7/30/24	0.10	12.84	CENTER
7/30/24	13.00	12.84	LEFT
7/30/24	0.10	11.44	RIGHT
7/31/24	3.00	11.09	CENTER
7/31/24	0.10	9.97	LEFT
7/31/24	3.00	9.70	RIGHT
8/5/24	22.00	6.84	CENTER
8/5/24	28.00	7.10	LEFT
8/5/24	56.00	7.49	RIGHT
8/6/24	30.00	7.75	CENTER
8/6/24	140.00	8.32	LEFT
8/6/24	14.00	8.42	RIGHT
8/7/24	37.00	8.72	CENTER
8/7/24	52.00	9.08	LEFT
8/7/24	48.00	9.42	RIGHT
8/12/24	15.00	12.53	CENTER
8/12/24	5.00	12.23	LEFT
8/12/24	130.00	12.99	RIGHT
8/13/24	17.00	13.08	CENTER
8/13/24	5.00	12.78	LEFT
8/13/24	60.00	13.26	RIGHT
8/14/24	4.00	12.89	CENTER
8/14/24	2.00	12.36	LEFT
8/14/24	9.00	12.27	RIGHT
8/19/24	83.00	12.00	CENTER
8/19/24	106.00	12.70	LEFT
8/19/24	110.00	13.43	RIGHT

Enterococci			
Date	**CFU/100 ml**	**Log Avg**	**Location**
7/23/24	16.00	2.70	CENTER
7/23/24	22.00	2.85	LEFT
7/23/24	3.00	2.85	RIGHT
7/24/24	***220.00***	3.15	CENTER
7/24/24	11.00	3.24	LEFT
7/24/24	21.00	3.38	RIGHT
7/29/24	19.00	6.47	CENTER
7/29/24	15.00	6.62	LEFT
7/29/24	31.00	6.88	RIGHT
7/30/24	1.00	6.56	CENTER
7/30/24	5.00	6.52	LEFT
7/30/24	0.10	5.90	RIGHT
7/31/24	5.00	5.88	CENTER
7/31/24	1.00	5.65	LEFT
7/31/24	0.10	5.16	RIGHT
8/5/24	2.00	7.36	CENTER
8/5/24	1.00	6.98	LEFT
8/5/24	0.10	6.26	RIGHT
8/6/24	3.00	6.15	CENTER
8/6/24	30.00	6.39	LEFT
8/6/24	4.00	6.32	RIGHT
8/7/24	17.00	6.47	CENTER
8/7/24	34.00	6.71	LEFT
8/7/24	53.00	7.03	RIGHT
8/12/24	21.00	11.05	CENTER
8/12/24	9.00	10.99	LEFT
8/12/24	71.00	11.53	RIGHT
8/13/24	9.00	11.46	CENTER
8/13/24	6.00	11.28	LEFT
8/13/24	2.00	10.82	RIGHT
8/14/24	0.10	9.71	CENTER
8/14/24	1.00	9.22	LEFT
8/14/24	1.00	8.77	RIGHT
8/19/24	3.00	6.19	CENTER
8/19/24	12.00	6.30	LEFT
8/19/24	28.00	6.55	RIGHT

2024 Beach-Monitoring Bacteria Data

Crescent Beach (cont.)

Fecal Coliform			
Date	**CFU/100 ml**	**Log Avg**	**Location**
8/20/24	110.00	14.15	CENTER
8/20/24	90.00	14.80	LEFT
8/20/24	110.00	15.53	RIGHT
8/21/24	17.00	15.56	CENTER
8/21/24	8.00	15.33	LEFT
8/21/24	18.00	15.38	RIGHT
8/26/24	2.00	12.50	CENTER
8/26/24	1.00	11.70	LEFT
8/26/24	0.10	10.35	RIGHT
8/27/24	20.00	10.53	CENTER
8/27/24	80.00	11.06	LEFT
8/27/24	10.00	11.03	RIGHT
8/28/24	8.00	10.95	CENTER
8/28/24	14.00	11.01	LEFT
8/28/24	9.00	10.96	RIGHT
9/4/24	2.00	17.56	CENTER
9/4/24	2.00	16.58	LEFT
9/4/24	1.00	15.43	RIGHT
9/11/24	12.00	11.74	CENTER
9/11/24	8.00	11.60	LEFT
9/11/24	10.00	11.54	RIGHT
9/18/24	38.00	12.12	CENTER
9/18/24	23.00	12.42	RIGHT
9/25/24	21.00	6.27	CENTER
9/25/24	21.00	6.69	LEFT
9/25/24	18.00	7.03	RIGHT

Enterococci			
Date	**CFU/100 ml**	**Log Avg**	**Location**
8/20/24	10.00	6.62	CENTER
8/20/24	6.00	6.60	LEFT
8/20/24	9.00	6.65	RIGHT
8/21/24	0.10	6.03	CENTER
8/21/24	0.10	5.49	LEFT
8/21/24	13.00	5.60	RIGHT
8/26/24	0.10	3.20	CENTER
8/26/24	1.00	3.11	LEFT
8/26/24	0.10	2.84	RIGHT
8/27/24	0.10	2.61	CENTER
8/27/24	0.10	2.41	LEFT
8/27/24	0.10	2.24	RIGHT
8/28/24	0.10	2.08	CENTER
8/28/24	0.10	1.94	LEFT
8/28/24	0.10	1.82	RIGHT
9/4/24	0.10	1.58	CENTER
9/4/24	1.00	1.56	LEFT
9/4/24	0.10	1.46	RIGHT
9/11/24	2.00	1.02	CENTER
9/11/24	0.10	0.95	LEFT
9/11/24	0.10	0.89	RIGHT
9/18/24	6.00	0.57	CENTER
9/18/24	3.00	0.61	RIGHT
9/25/24	0.10	0.23	CENTER
9/25/24	0.10	0.22	LEFT
9/25/24	2.00	0.25	RIGHT

2024 Beach-Monitoring Bacteria Data

Pryibil Beach

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
4/9/24	0.10	0.00
4/16/24	0.10	0.10
4/23/24	0.10	0.10
4/30/24	0.10	0.10
5/7/24	0.10	0.10
5/13/24	0.10	0.10
5/14/24	0.10	0.10
5/15/24	7.00	0.18
5/20/24	0.10	0.18
5/21/24	0.10	0.17
5/22/24	0.10	0.16
5/28/24	0.10	0.16
5/29/24	0.10	0.15
6/3/24	0.10	0.15
6/4/24	1.00	0.18
6/5/24	0.10	0.17
6/10/24	0.10	0.17
6/11/24	0.10	0.17
6/12/24	0.10	0.16
6/17/24	0.10	0.12
6/18/24	0.10	0.12
6/24/24	4.00	0.17
6/25/24	0.10	0.16
6/26/24	0.10	0.16
7/1/24	0.10	0.16
7/2/24	0.10	0.16
7/3/24	2.00	0.19
7/8/24	8.00	0.25
7/9/24	1.00	0.28
7/10/24	1.00	0.31
7/15/24	12.00	0.55
7/16/24	16.00	0.71
7/17/24	2.00	0.77
7/22/24	***110.00***	1.54
7/23/24	70.00	2.02

Enterococci		
Date	**CFU/100 ml**	**Log Avg**
7/24/24	54.00	2.52
7/29/24	***240.00***	5.66
7/30/24	0.10	4.24
7/31/24	0.10	3.30
8/5/24	80.00	7.52
8/6/24	7.00	7.48
8/7/24	***601.00***	10.02
8/12/24	3.00	13.25
8/13/24	1.00	11.01
8/14/24	1.00	9.39
8/19/24	89.00	11.84
8/20/24	10.00	11.70
8/21/24	3.00	10.68
8/26/24	15.00	7.00
8/27/24	1.00	6.09
8/28/24	4.00	5.92
9/4/24	12.00	8.82
9/11/24	21.00	5.43
9/18/24	***1400.00***	15.66
9/20/24	36.00	14.79
9/25/24	0.10	9.67

2001–24 Average Indicator Bacteria Data for Beaches

The tables in this section display the average values for indicator bacteria for Hempstead Harbor Beaches from 2001-24.

2024

Enterococci (CFU/100 ml)								
	Village Club of Sands Point	North Hempstead Beach Park (N) (formerly Hempstead Harbor Beach)	North Hempstead Beach Park (S) (formerly Bar Beach)	Tappen Beach	Sea Cliff Beach	Morgan Memorial Park	Crescent Beach	Pryibil Beach
April	0.93	0.80	2.20	33.64	0.10	0.10	2.33	0.10
May	11.55	2.80	2.18	21.90	23.29	7.61	8.77	0.87
June	3.93	0.21	0.34	7.79	4.80	2.95	1.72	0.54
July	132.90	14.71	8.81	5.60	6.53	34.08	30.75	34.43
August	169.29	129.00	118.03	28.50	530.38	70.18	9.64	67.92
September	--	--	--	--	--	3.78	1.33	293.82
Season Averages	66.11	27.00	23.75	18.46	110.58	26.86	12.60	50.26

2023

Enterococci (CFU/100 ml)								
	Village Club of Sands Point	North Hempstead Beach Park (N) (formerly Hempstead Harbor Beach)	North Hempstead Beach Park (S) (formerly 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

2001–24 Average Indicator Bacteria Data for Beaches

2022

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

2021

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

**Only one data point collected.*

2001–24 Average Indicator Bacteria Data for Beaches

2020

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

**Only one data point collected.*

2019

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

2001–24 Average Indicator Bacteria Data for Beaches

2018

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

2017

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

2001–24 Average Indicator Bacteria Data for Beaches

2016

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

2015

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

**Only one data point collected in September.*

2001–24 Average Indicator Bacteria Data for Beaches

2014

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

2013

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

2001–24 Average Indicator Bacteria Data for Beaches

2012

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

2011

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

2001–24 Average Indicator Bacteria Data for Beaches

2010

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

**Only one data point collected in September.*

2009

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

2001–24 Average Indicator Bacteria Data for Beaches

2008[1]

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

[1]First year in which enterococci was the only indicator bacteria monitored.
**Average of monthly averages.*

2007

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

**Average of monthly averages.*

2001–24 Average Indicator Bacteria Data for Beaches

2006

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

Average of monthly averages.

2005

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

Average of monthly averages.

2001–24 Average Indicator Bacteria Data for Beaches

2004

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

Average of monthly averages.

2003

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

Average of monthly averages.

2001–24 Average Indicator Bacteria Data for Beaches

2002

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

**Average of monthly averages.*

2001

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

**Average of monthly averages.*

Appendix D

2024 Nitrogen Data (Regular Season)

Total Kjeldahl Nitrogen (mg/L)										
Date	**CSHH #1**	**CSHH #3**	**CSHH #6**	**CSHH #7**	**CSHH #8**	**CSHH #12**	**CSHH #13**	**CSHH #14A**	**CSHH #15A**	**CSHH #16**
10/30/24	1.7	2.0	<0.50	<0.50	--	--	--	<0.50	<0.50	<0.50
10/16/24	1.3	<0.50	<0.50	1.6	2.3	1.5	2.3	<0.50	1.5	--
9/25/24	1.7	1.9	--	--	1.0	1.9	1.6	2.7	4.1	1.5
9/11/24	1.2	1.6	--	--	<0.50	<0.50	<0.50	<0.50	3.2	--
8/28/24	<0.50	<0.50	--	--	<0.50	<0.50	0.58	1.5	0.91	<0.50
8/14/24	1.7	<0.50	--	--	1.3	1.1	2.7	--	--	<0.50
7/31/24	1.8	--	1.3	1.8	--	--	--	1.0	1.5	<0.50
7/17/24	0.62	0.53	1.4	1.2	1.7	<0.50	0.65	0.68	1.2	<0.50
7/3/24	<0.50	<0.50	0.61	1.0	--	--	<0.50	<0.50	1.1	<0.50
6/19/24	1.2	<0.50	0.72	<0.50	1.2	<0.50	2.9	<0.50	1.7	<0.50
6/5/24	1.1	0.67	--	--	1.8	<0.50	<0.50	<0.50	1.1	<0.50
5/22/24	1.7	1.6	--	--	2.5	2.1	2.0	<0.50	1.8	1.3

Notes:

A value preceded by a "<" symbol indicates that the results were below the detection limit.

CSHH #14A and #15A are outfalls; tan highlights indicate samples taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

2024 Nitrogen Data (Regular Season)

Total Organic Nitrogen (mg/L)										
Date	CSHH #1	CSHH #3	CSHH #6	CSHH #7	CSHH #8	CSHH #12	CSHH #13	CSHH #14A	CSHH #15A	CSHH #16
10/30/24	1.6	1.9	<0.10	<0.10	--	--	--	0.19	<0.10	<0.10
10/16/24	1.2	<0.10	<0.10	1.5	2.1	1.3	2.2	<0.10	1.2	--
9/25/24	1.6	1.8	--	--	0.84	1.7	1.5	1.8	3.2	1.5
9/11/24	1.1	1.5	--	--	<0.10	<0.10	<0.10	<0.10	3.0	--
8/28/24	<0.10	<0.10	--	--	<0.10	<0.10	0.42	1.3	0.78	<0.10
8/14/24	1.7	<0.10	--	--	1.2	1.1	2.6	--	--	<0.10
7/31/24	1.7	--	1.2	1.7	--	--	--	0.84	1.5	<0.10
7/17/24	0.60	0.51	1.3	0.88	0.88	<0.10	0.62	0.49	1.1	0.26
7/3/24	<0.10	<0.10	0.39	0.80	--	--	<0.10	<0.10	1.0	<0.10
6/19/24	1.2	<0.10	0.70	<0.10	1.0	<0.10	2.7	<0.10	1.5	<0.10
6/5/24	1.1	0.63	--	--	0.63	<0.10	<0.10	<0.10	1.0	<0.10
5/22/24	1.7	1.6	--	--	2.0	1.8	1.9	<0.10	1.7	1.3

Notes:

A value preceded by a "<" symbol indicates that the results were below the detection limit.

CSHH #14A and #15A are outfalls; tan highlights indicate samples taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

2024 Nitrogen Data (Regular Season)

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**
10/30/24	<0.10	<0.10	<0.10	<0.10	--	--	--	<0.10	<0.10	<0.10
10/16/24	<0.10	<0.10	0.13	0.19	0.14	0.14	0.11	0.73	0.32	--
9/25/24	0.12	<0.10	--	--	0.20	0.12	0.17	0.90	0.84	<0.10
9/11/24	0.16	0.11	--	--	0.21	0.15	0.25	0.51	0.25	--
8/28/24	<0.10	<0.10	--	--	<0.10	<0.10	0.16	0.20	0.13	<0.10
8/14/24	<0.10	<0.10	--	--	0.14	<0.10	<0.10	--	--	<0.10
7/31/24	<0.10	--	0.10	0.13	--	--	--	0.16	<0.10	<0.10
7/17/24	<0.10	<0.10	0.15	0.30	0.80	0.16	<0.10	0.19	0.15	<0.10
7/3/24	0.23	0.25	0.21	0.20	--	--	0.15	0.67	<0.10	0.25
6/19/24	<0.10	<0.10	<0.10	<0.10	0.21	0.16	0.14	0.69	0.18	<0.10
6/5/24	<0.10	<0.10	--	--	1.2	<0.10	<0.10	0.65	<0.10	<0.10
5/22/24	<0.10	<0.10	--	--	0.52	0.24	<0.10	0.67	0.14	<0.10

Notes:

A value preceded by a "<" symbol indicates that the results were below the detection limit.

CSHH #14A and #15A are outfalls; tan highlights indicate samples taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

2024 Nitrogen Data (Regular Season)

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**
10/30/24	<0.050	<0.050	<0.050	0.073	--	--	--	<0.050	<0.050	<0.050
10/16/24	<0.050	<0.050	<0.050	<0.050	0.094	<0.050	<0.050	0.13	<0.050	--
9/25/24	<0.050	<0.050	--	--	0.097	<0.050	<0.050	0.12	<0.050	<0.050
9/11/24	<0.050	<0.050	--	--	0.088	<0.050	<0.050	0.057	0.070	--
8/28/24	<0.050	<0.050	--	--	0.067	<0.050	<0.050	<0.050	0.061	<0.050
8/14/24	<0.050	<0.050	--	--	0.065	<0.050	<0.050	--	--	<0.050
7/31/24	<0.050	--	<0.050	<0.050	--	--	--	<0.050	0.065	<0.050
7/17/24	<0.050	<0.050	<0.050	<0.050	0.17	0.086	<0.050	<0.050	0.069	<0.050
7/3/24	<0.050	<0.050	<0.050	0.070	--	--	<0.050	0.074	0.071	<0.050
6/19/24	<0.050	<0.050	<0.050	<0.050	0.095	<0.050	<0.050	0.096	0.092	<0.050
6/5/24	<0.050	<0.050	--	--	0.18	<0.050	<0.050	0.087	0.090	<0.050
5/22/24	<0.050	<0.050	--	--	0.12	0.062	<0.050	0.077	0.066	<0.050

Notes:

A value preceded by a "<" symbol indicates that the results were below the detection limit.

CSHH #14A and #15A are outfalls; tan highlights indicate samples taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

2024 Nitrogen Data (Regular Season)

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**
10/30/24	0.32	0.35	0.44	0.53	--	--	--	0.88	0.32	0.22
10/16/24	0.31	0.20	0.38	0.61	0.74	1.9	2.9	9.0	4.0	--
9/25/24	0.17	0.19	--	--	0.66	0.47	0.78	7.5	2.7	0.073
9/11/24	0.19	0.18	--	--	0.68	0.53	0.59	6.9	4.5	--
8/28/24	0.057	<0.050	--	--	0.91	0.86	0.89	1.3	2.9	<0.050
8/14/24	<0.050	<0.050	--	--	1.1	0.85	0.67	--	--	<0.050
7/31/24	<0.050	--	<0.050	0.17	--	--	--	1.1	2.7	<0.050
7/17/24	0.061	<0.050	<0.050	0.41	1.0	1.4	1.2	1.5	2.3	<0.050
7/3/24	<0.050	<0.050	<0.050	0.19	--	--	0.97	9.6	2.1	<0.050
6/19/24	<0.050	<0.050	<0.050	0.080	0.87	0.48	0.66	9.5	2.2	<0.050
6/5/24	<0.050	<0.050	--	--	0.81	0.77	0.82	9.5	2.8	<0.050
5/22/24	<0.050	<0.050	--	--	0.87	0.72	2.2	8.9	4.3	<0.050

Notes:

A value preceded by a "<" symbol indicates that the results were below the detection limit.

CSHH #14A and #15A are outfalls; tan highlights indicate samples taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

2024 Nitrogen Data (Regular Season)

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
10/30/24	0.35	0.38	0.47	0.60	--	--	--	0.91	0.34	0.25
10/16/24	0.34	0.24	0.55	0.84	0.98	2.0	3.0	9.8	4.3	--
9/25/24	0.30	0.21	--	--	0.95	0.62	0.96	8.5	3.5	0.12
9/11/24	0.39	0.33	--	--	0.98	0.72	0.87	7.5	4.8	--
8/28/24	0.09	0	--	--	0.98	0.88	1.1	1.6	3.1	0
8/14/24	0	0	--	--	1.3	0.87	0.70	--	--	0
7/31/24	0	--	0.16	0.32	--	--	--	1.3	2.8	0
7/17/24	0.06	0	0.15	0.72	2.0	1.7	1.2	1.7	2.5	0
7/3/24	0.23	0.25	0.21	0.46	--	--	1.1	10.4	2.1	0.25
6/19/24	0	0	0	0.08	1.2	0.65	0.80	10.3	2.4	0
6/5/24	0	0	--	--	2.2	0.78	0.82	10.2	2.9	0
5/22/24	0	0	--	--	1.5	1.0	2.3	9.7	4.4	0

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 samples taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

2024 Nitrogen Data (Regular Season)

Total Nitrogen (mg/L)										
Date	**CSHH #1**	**CSHH #3**	**CSHH #6**	**CSHH #7**	**CSHH #8**	**CSHH #12**	**CSHH #13**	**CSHH #14A**	**CSHH #15A**	**CSHH #16**
10/30/24	2.0	2.3	0.47	0.60	--	--	--	1.2	0.35	0.25
10/16/24	1.6	0.24	0.42	2.3	3.1	3.4	5.2	9.1	5.6	--
9/25/24	1.9	2.1	--	--	1.8	2.4	2.4	10.3	6.8	1.6
9/11/24	1.5	1.8	--	--	0.77	0.57	0.62	7.0	7.7	--
8/28/24	<0.10	<0.10	--	--	0.98	0.88	1.5	2.9	3.9	<0.10
8/14/24	1.8	<0.10	--	--	2.5	1.9	3.4	--	--	<0.10
7/31/24	1.8	--	1.3	2.0	--	--	--	2.1	4.3	<0.10
7/17/24	0.68	0.54	1.4	1.6	2.9	1.6	1.9	2.2	3.6	0.26
7/3/24	<0.10	<0.10	0.61	1.3	--	--	0.97	9.9	3.2	<0.10
6/19/24	1.2	<0.10	0.72	<0.10	2.2	0.49	3.5	9.6	4.0	<0.10
6/5/24	1.1	0.67	--	--	2.8	0.78	0.82	9.5	4.0	<0.10
5/22/24	1.8	1.6	--	--	3.5	2.8	4.3	9.0	6.1	1.3

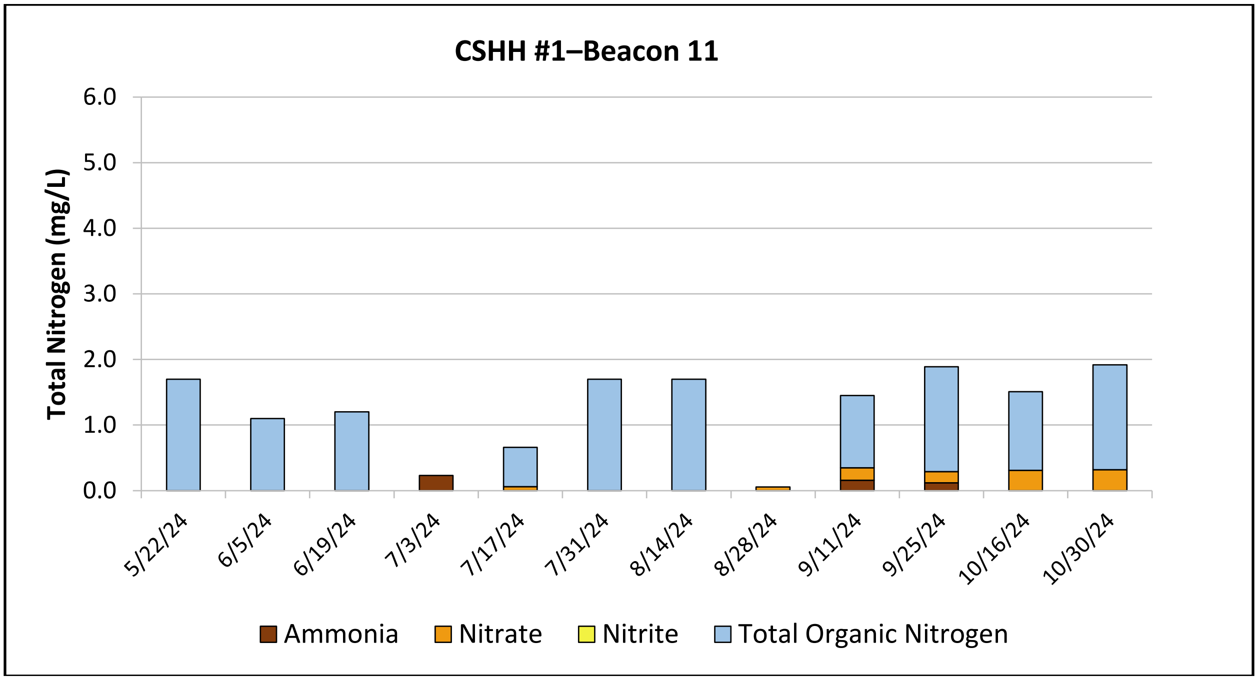
Notes:

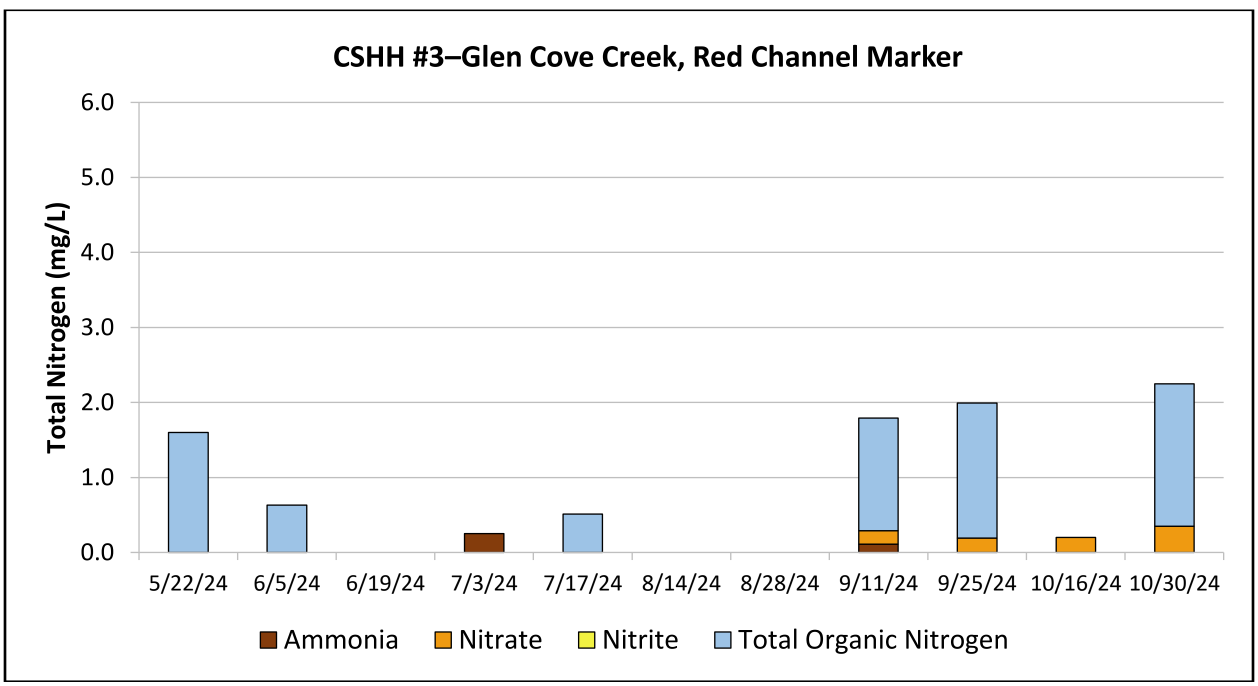
A value preceded by a “<” symbol indicates that the results were below the detection limit.

CSHH #14A and #15A are outfalls; tan highlights indicate samples taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

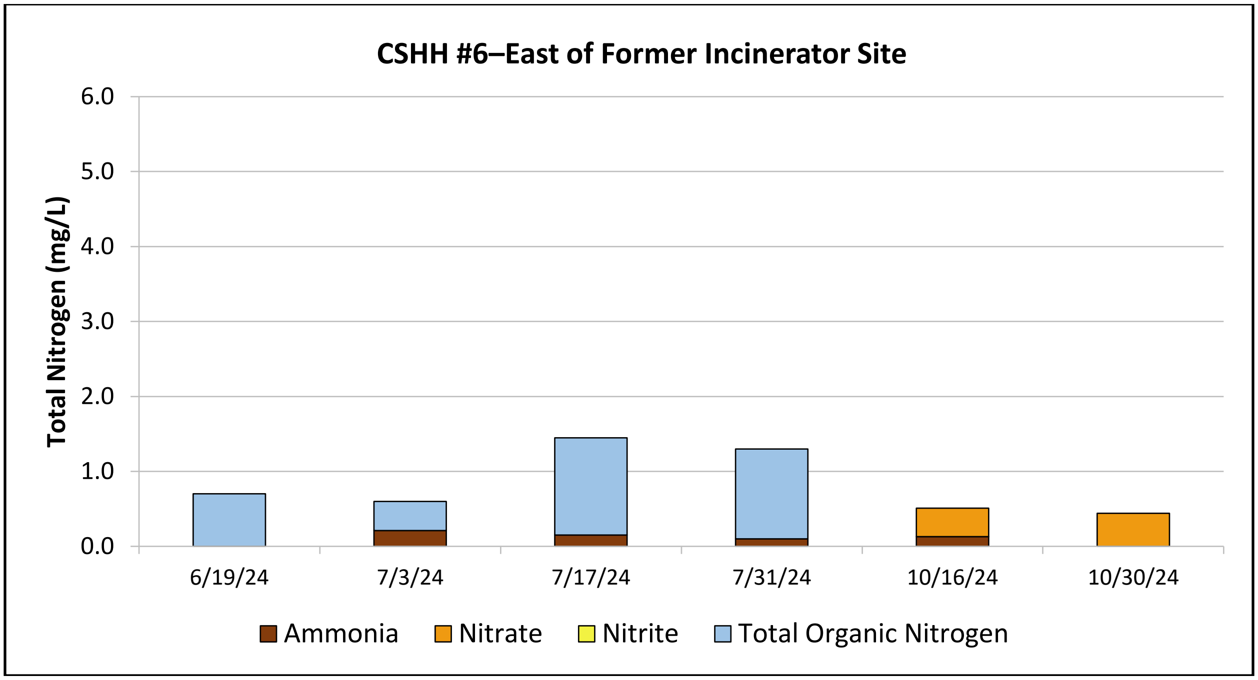
2024 Nitrogen Graphs (Regular Season)

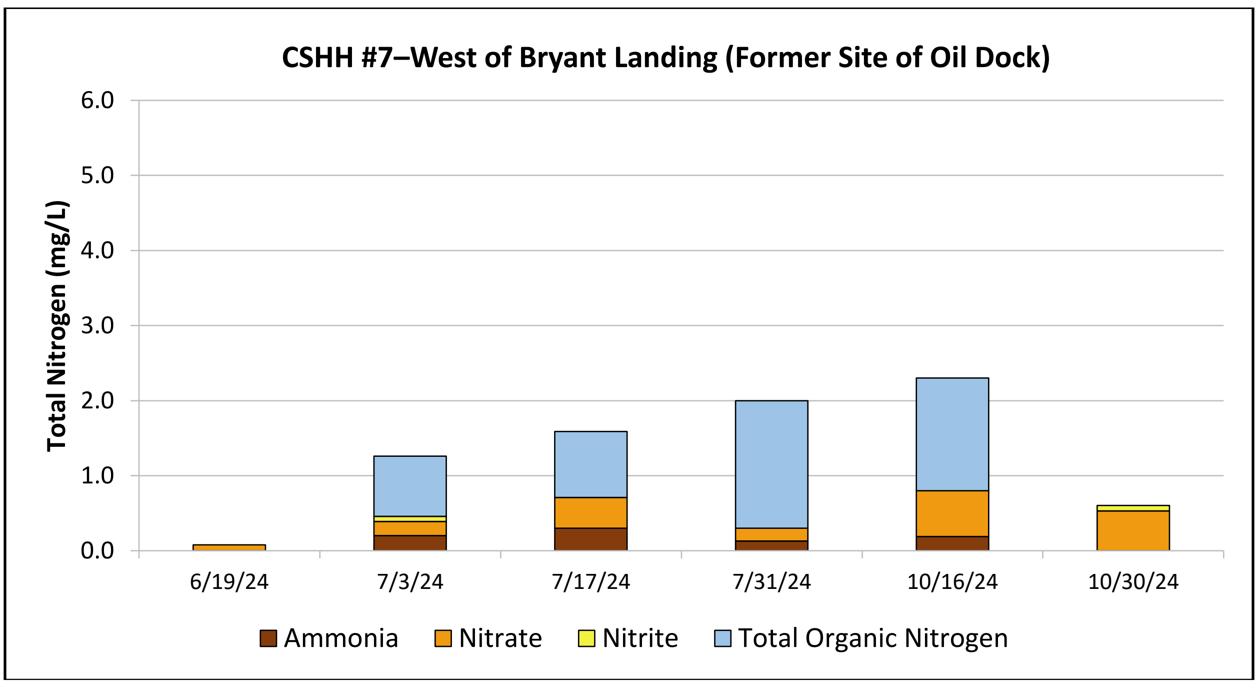
The graphs in this section display each station's total nitrogen throughout the 2024 season. The height of each vertical bar provides the total nitrogen recorded on the indicated date; within each bar, total nitrogen is broken down into the subcategories of nitrogen that are included. Total nitrogen comprises both organic nitrogen, shown in blue, and inorganic nitrogen—including ammonia, shown in brown, nitrate, shown in orange, and nitrite, shown in yellow. Although each species of inorganic nitrogen is reported to us as the portion of nitrogen (i.e., "as N") within each compound, for purposes of these graphs, the labels for nitrogen are simplified. Note that total nitrogen exceeding 1.2 mg/L is considered "impaired." Note the y-axis for CSHH #14A and #15A goes to 12 mg/L to accommodate high values.





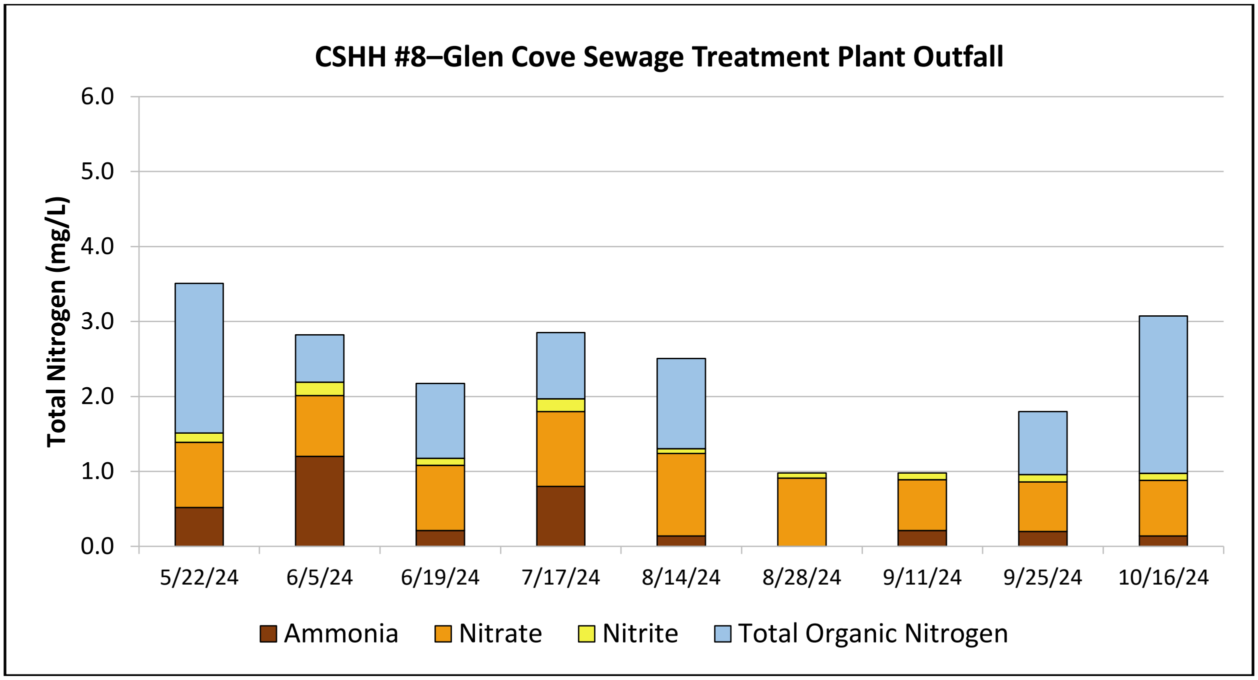
2024 Nitrogen Graphs (Regular Season)

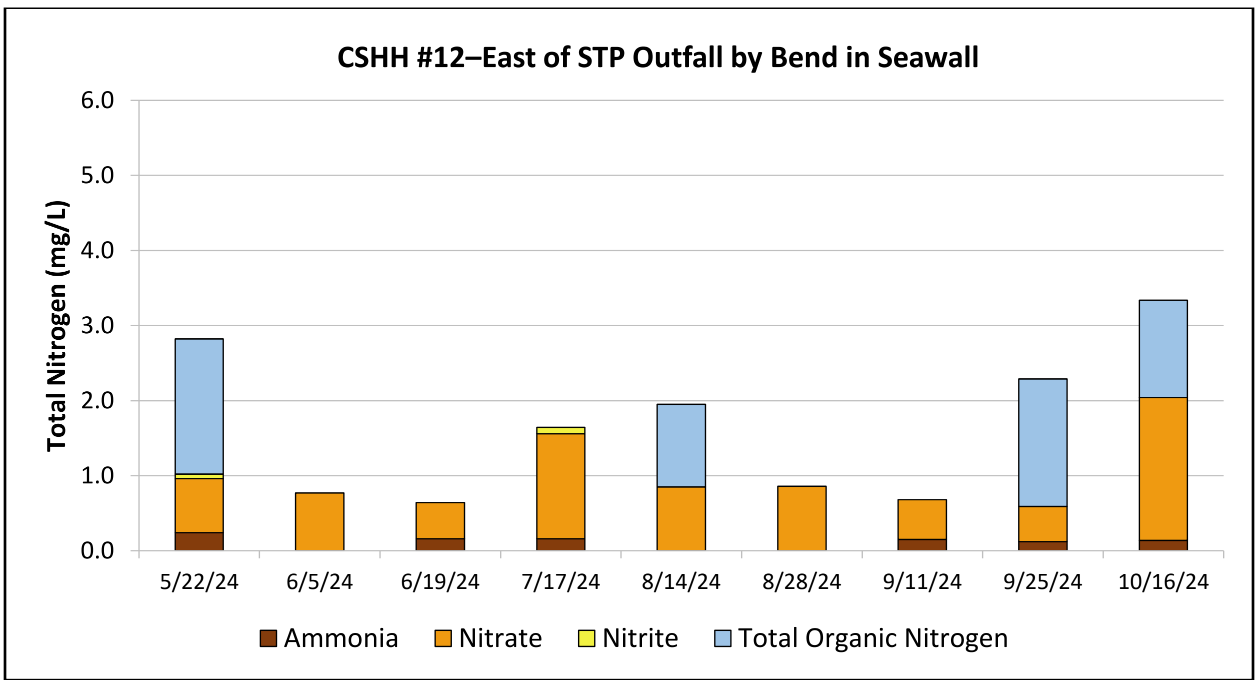




Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

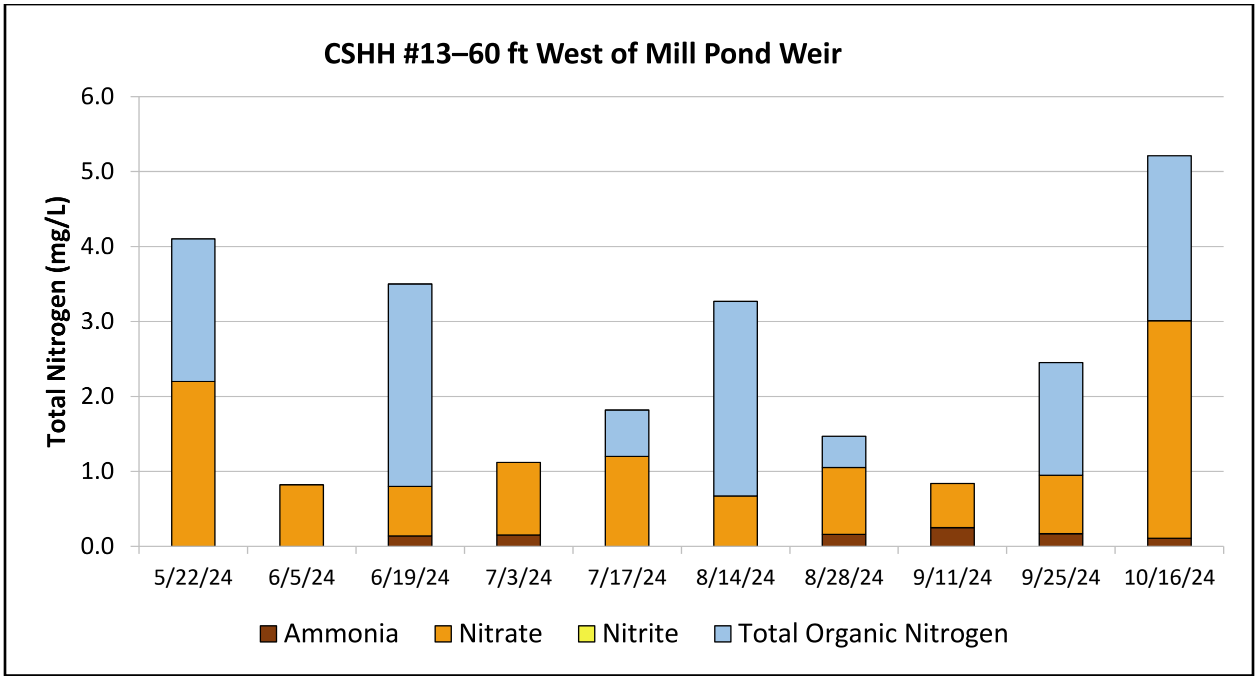
2024 Nitrogen Graphs (Regular Season)

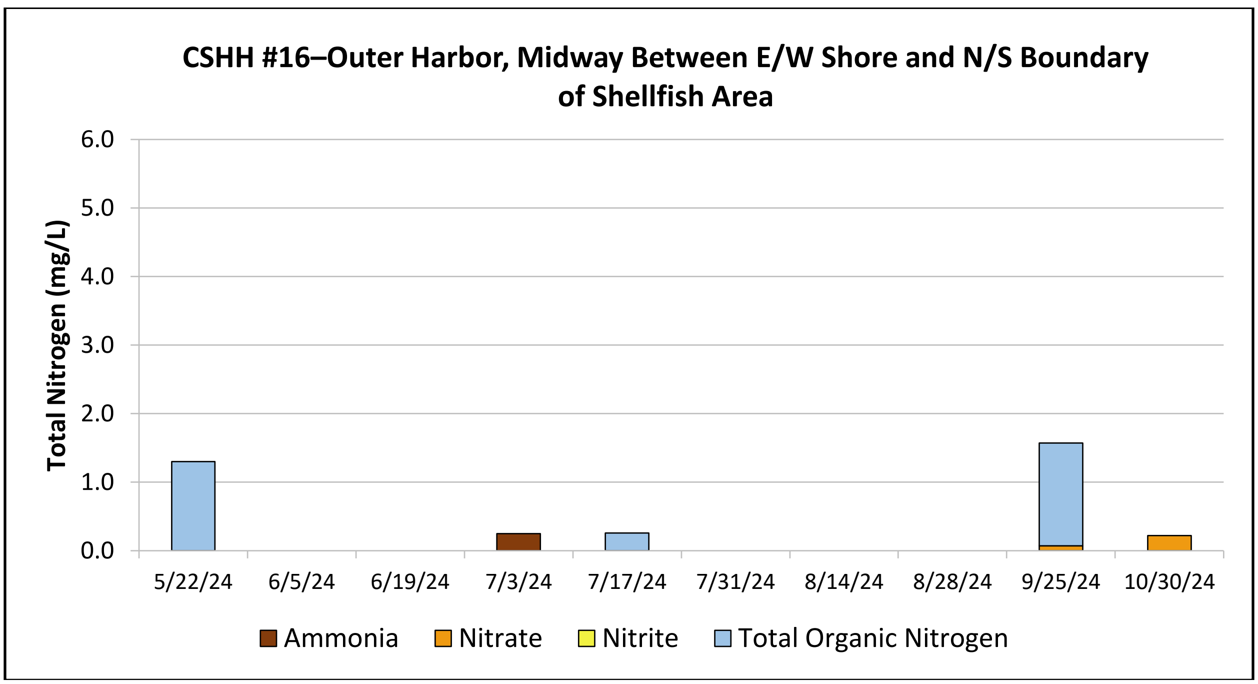




Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

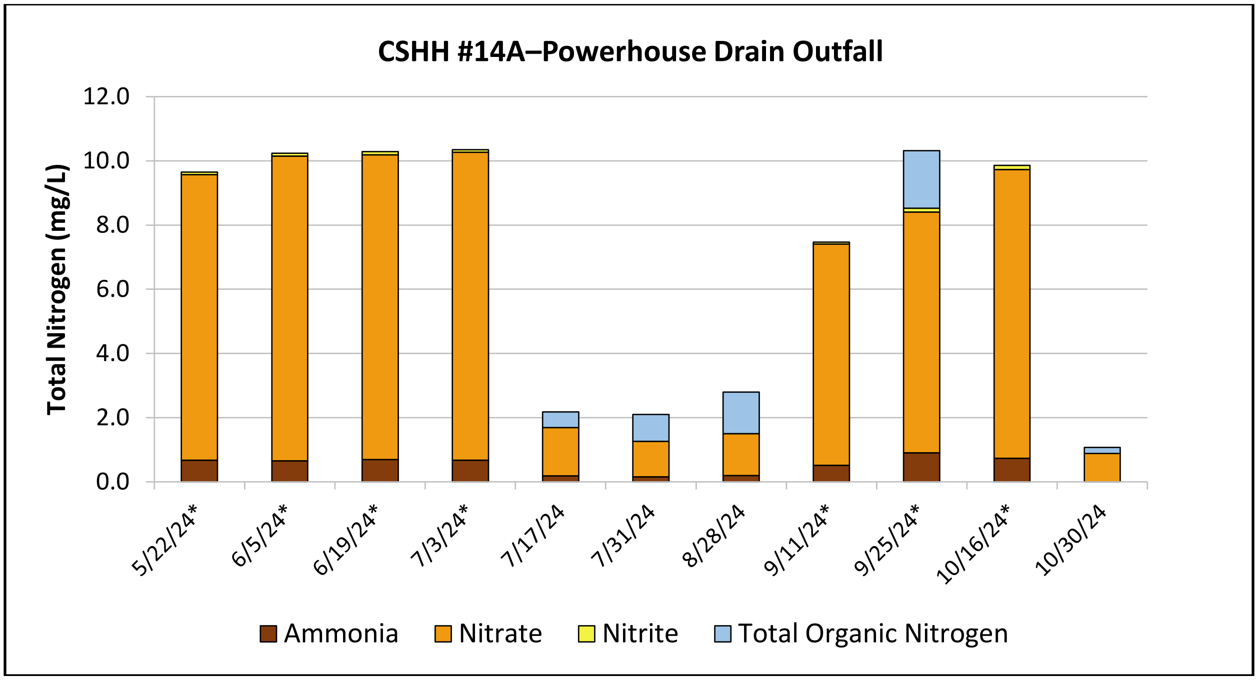
2024 Nitrogen Graphs (Regular Season)



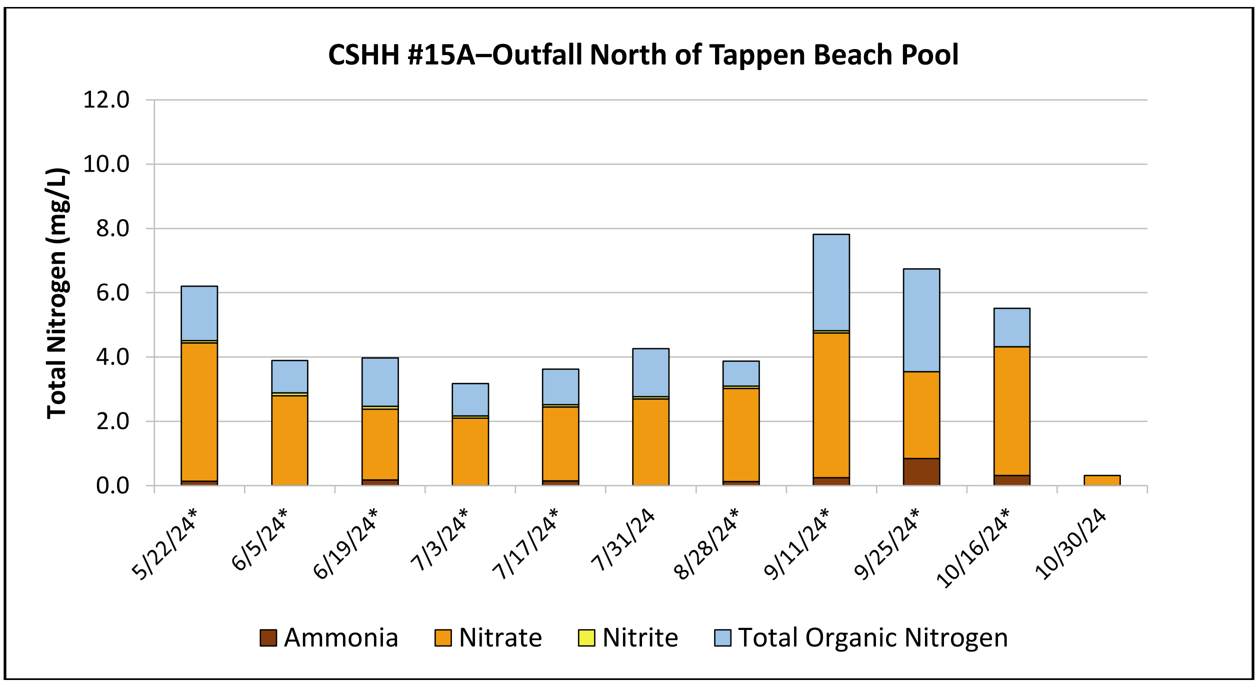


Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

2024 Nitrogen Graphs (Regular Season)



Sample taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

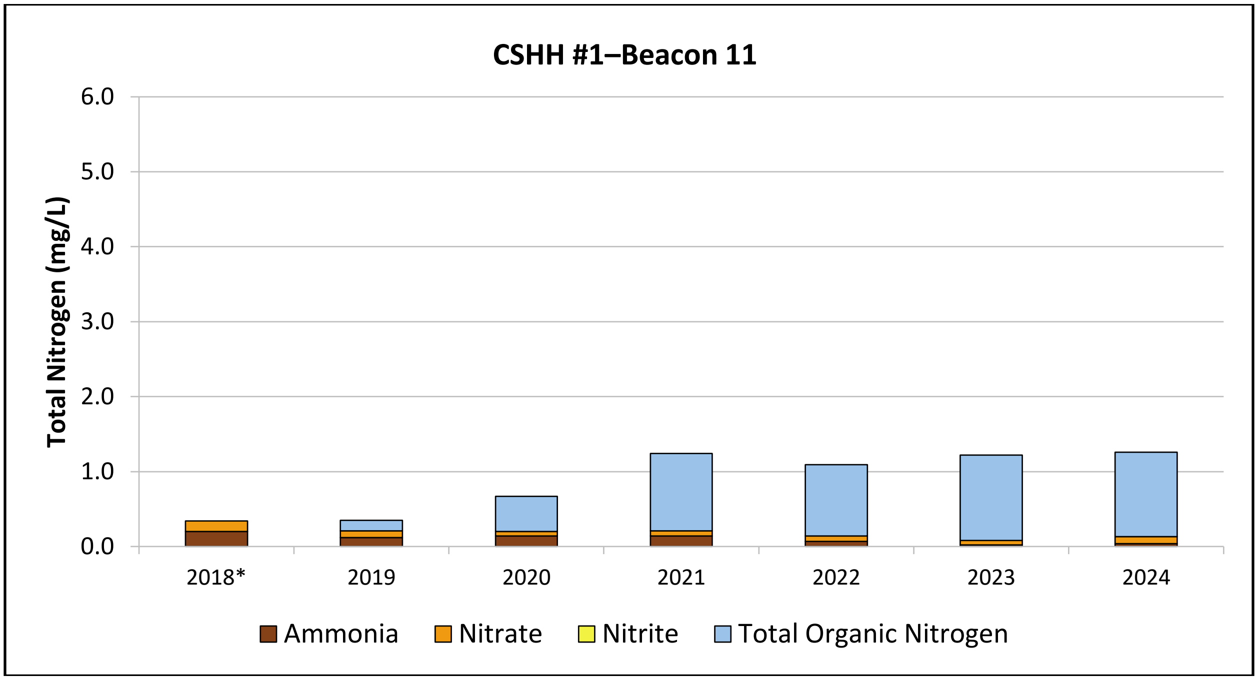


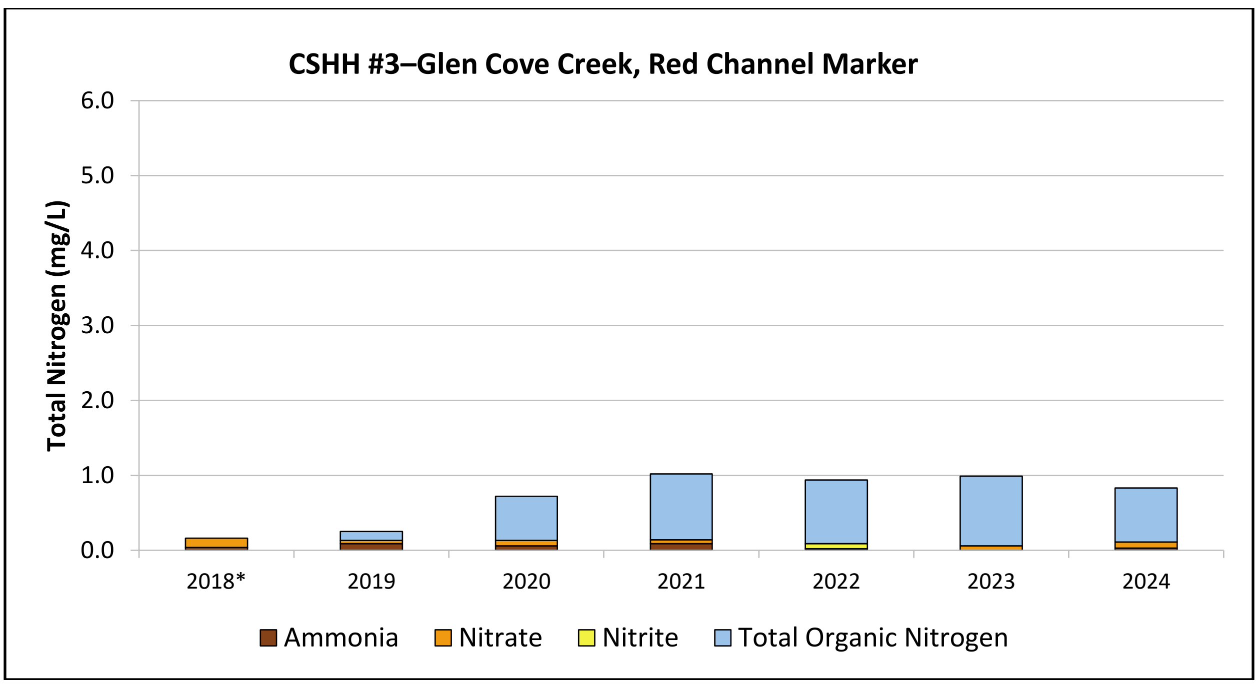
Sample taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).

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

Long-Term Nitrogen Graphs (Regular Season)

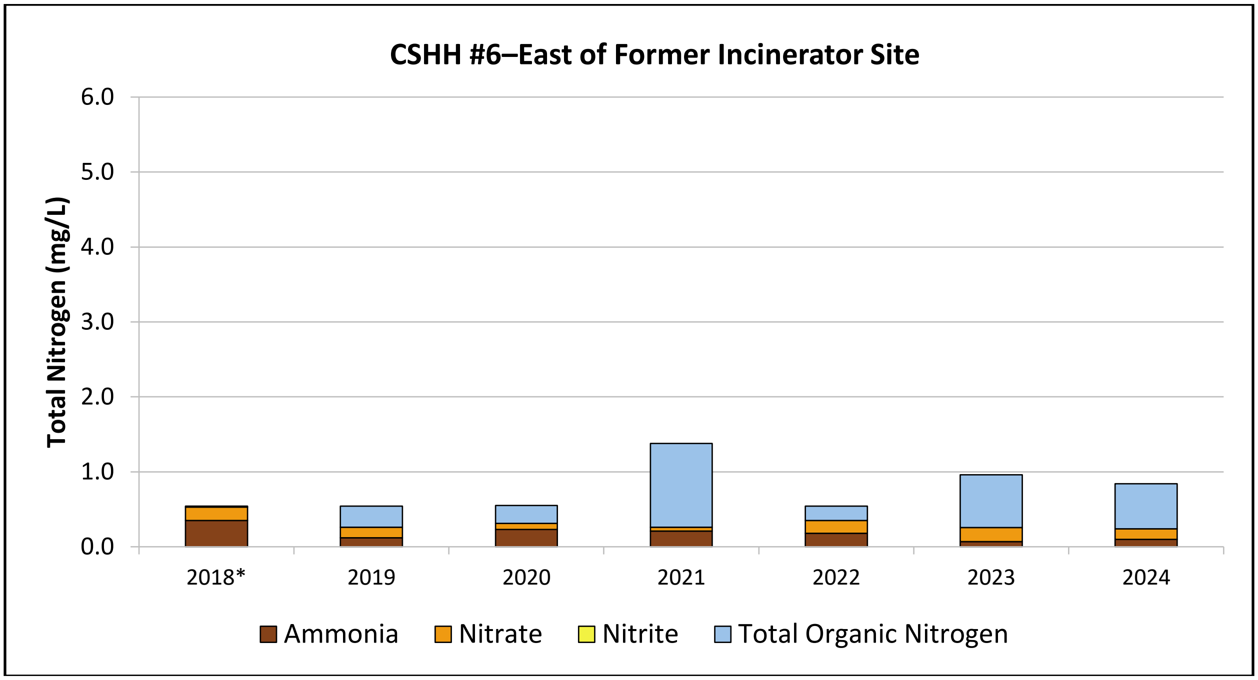
The graphs in this section display each station's long-term total nitrogen graph during the regular monitoring season (May – October) from 2018-2024. See page D-11 for a full description of total nitrogen graphs. Although each species of inorganic nitrogen is reported to us as the portion of nitrogen (i.e., "as N") within each compound, for purposes of these graphs, the labels for nitrogen are simplified.

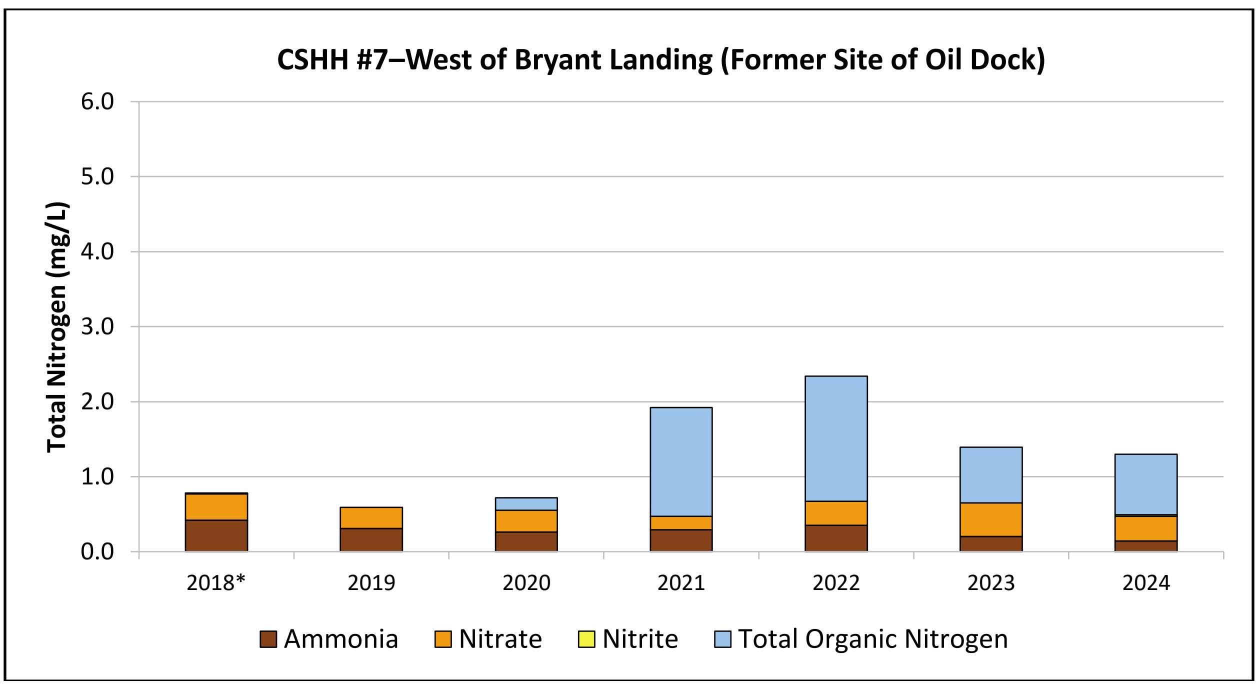




**Total Organic Nitrogen was not included in nitrogen analysis in 2018.*
Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

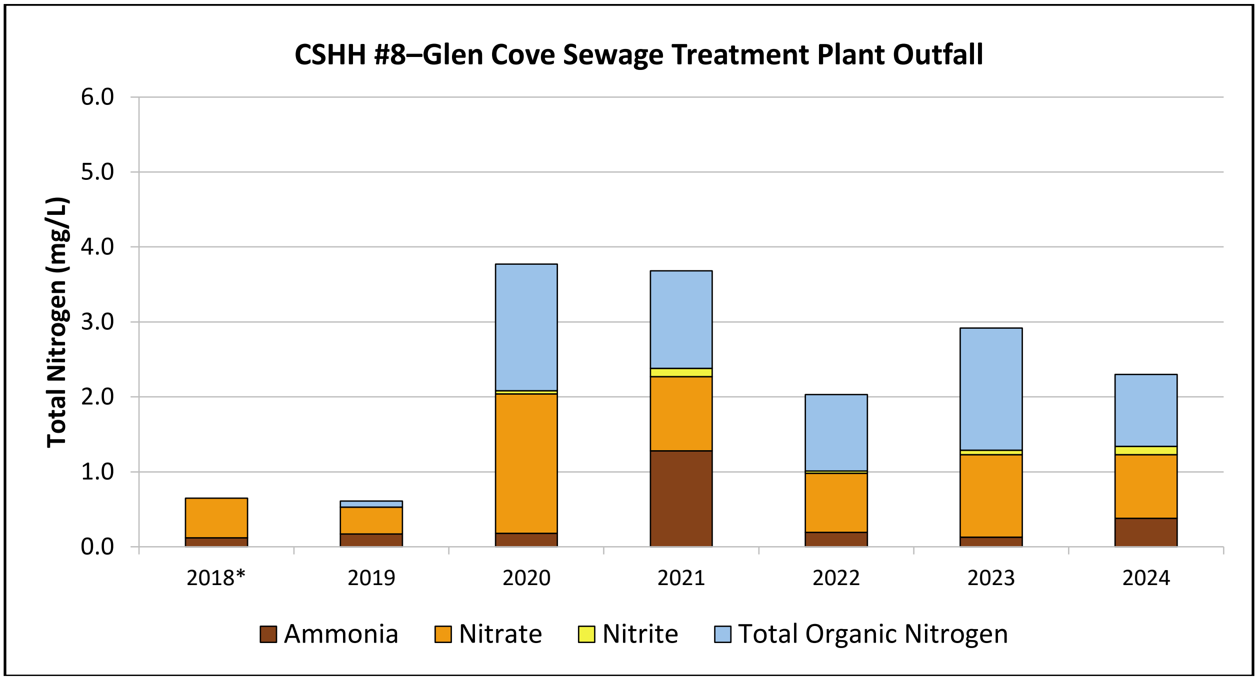
Long-Term Nitrogen Graphs (Regular Season)

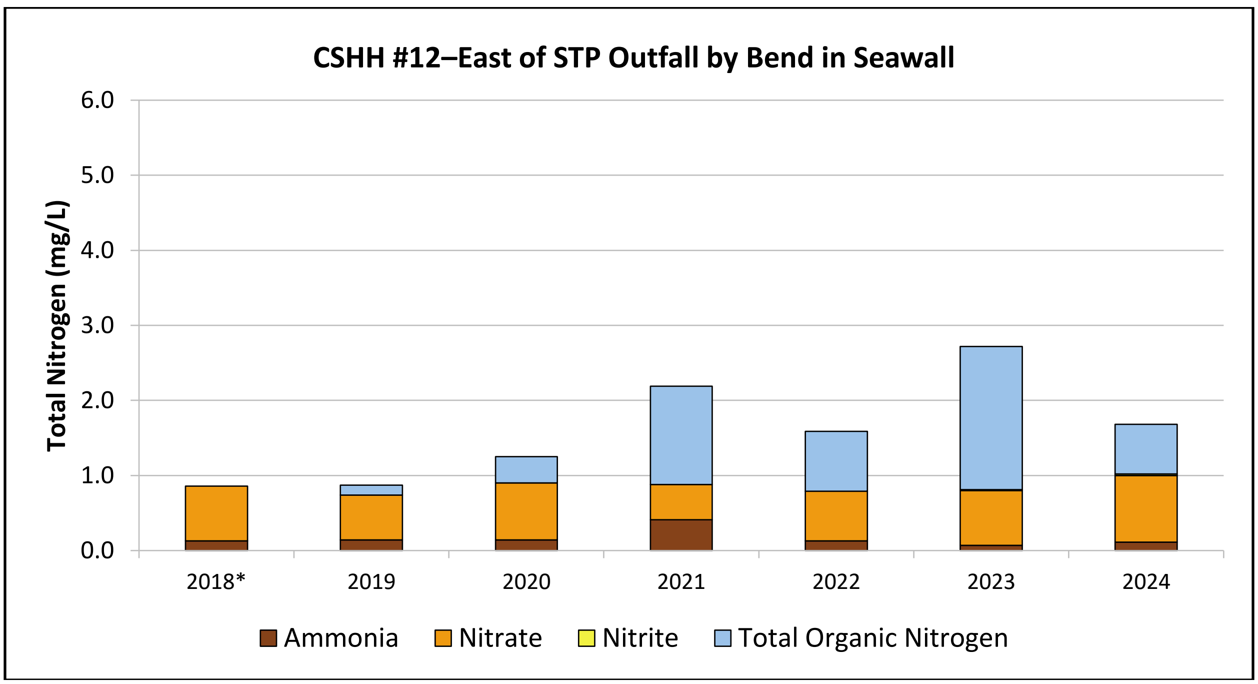




**Total Organic Nitrogen was not included in nitrogen analysis in 2018.*
Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

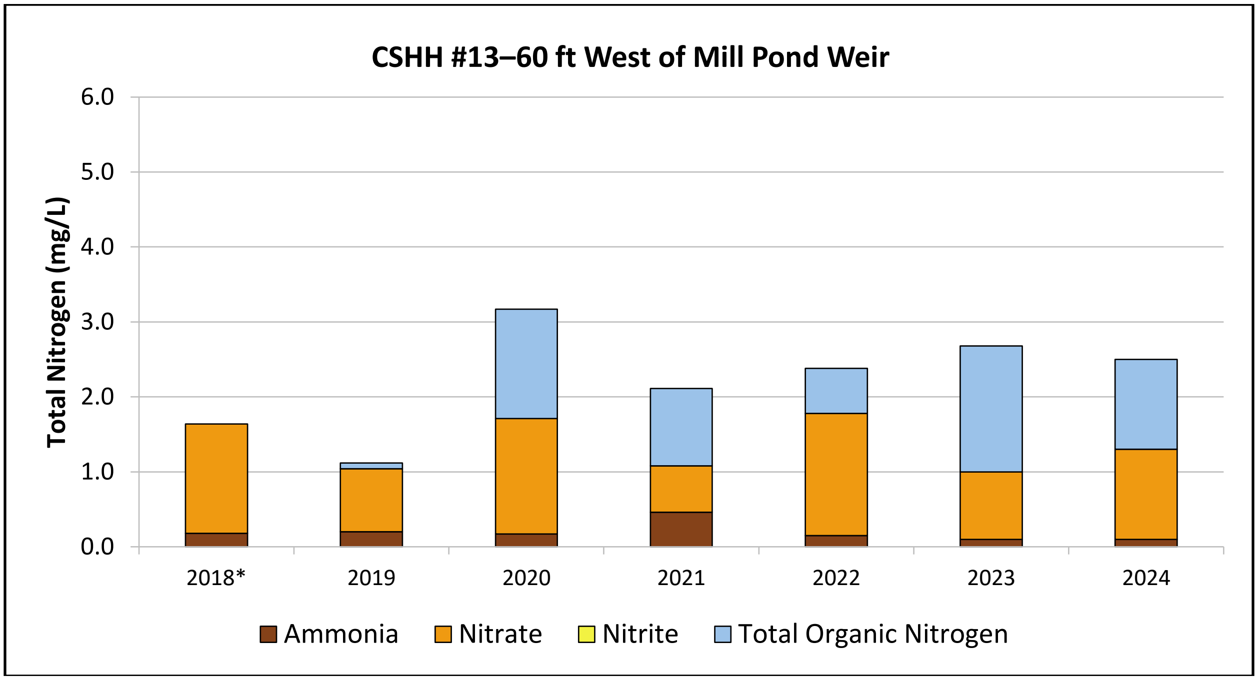
Long-Term Nitrogen Graphs (Regular Season)

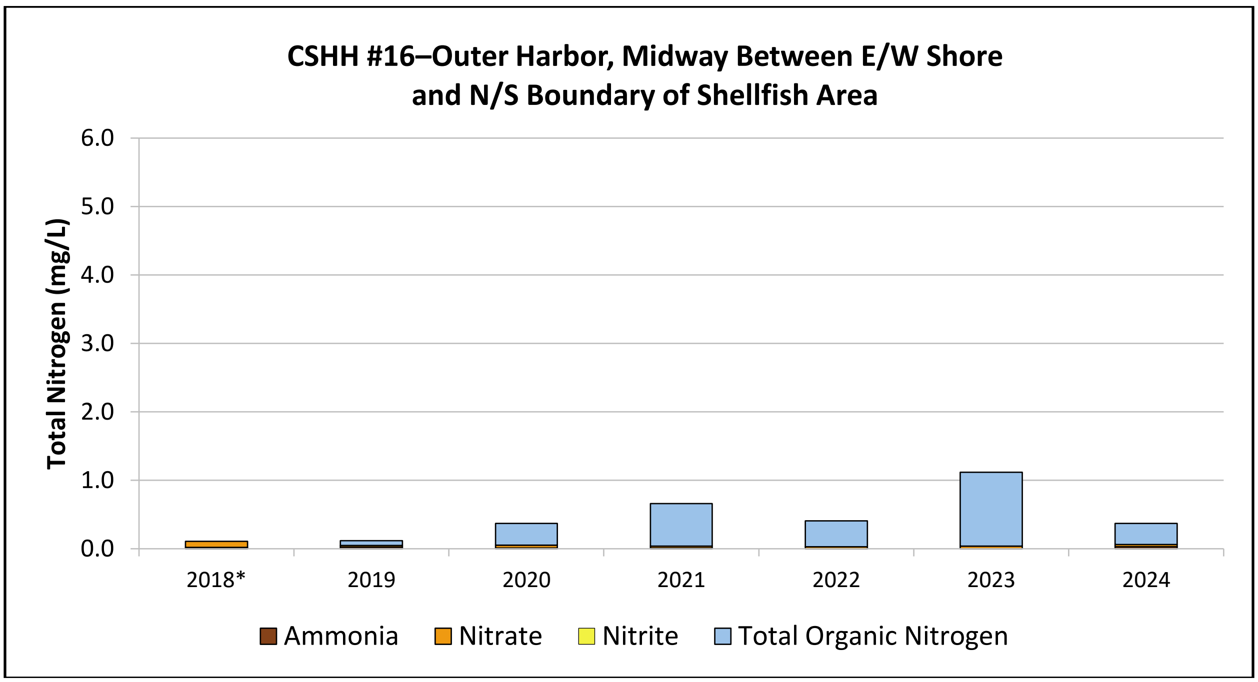




**Total Organic Nitrogen was not included in nitrogen analysis in 2018.*
Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

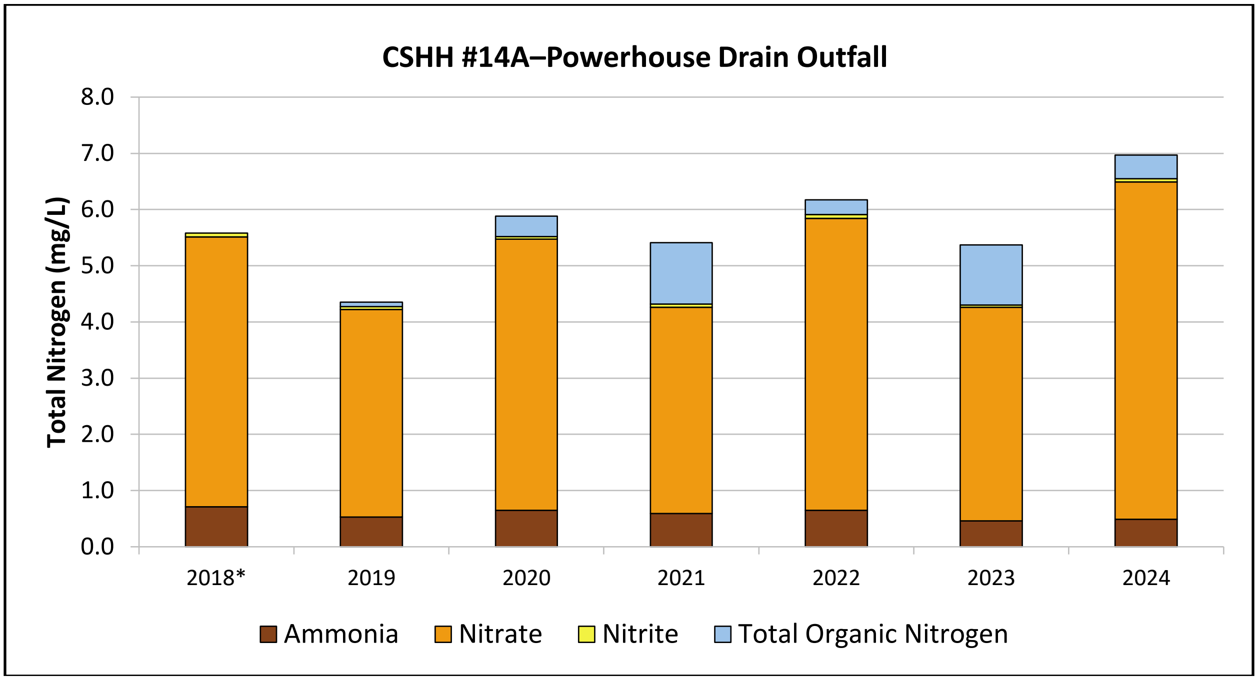
Long-Term Nitrogen Graphs (Regular Season)



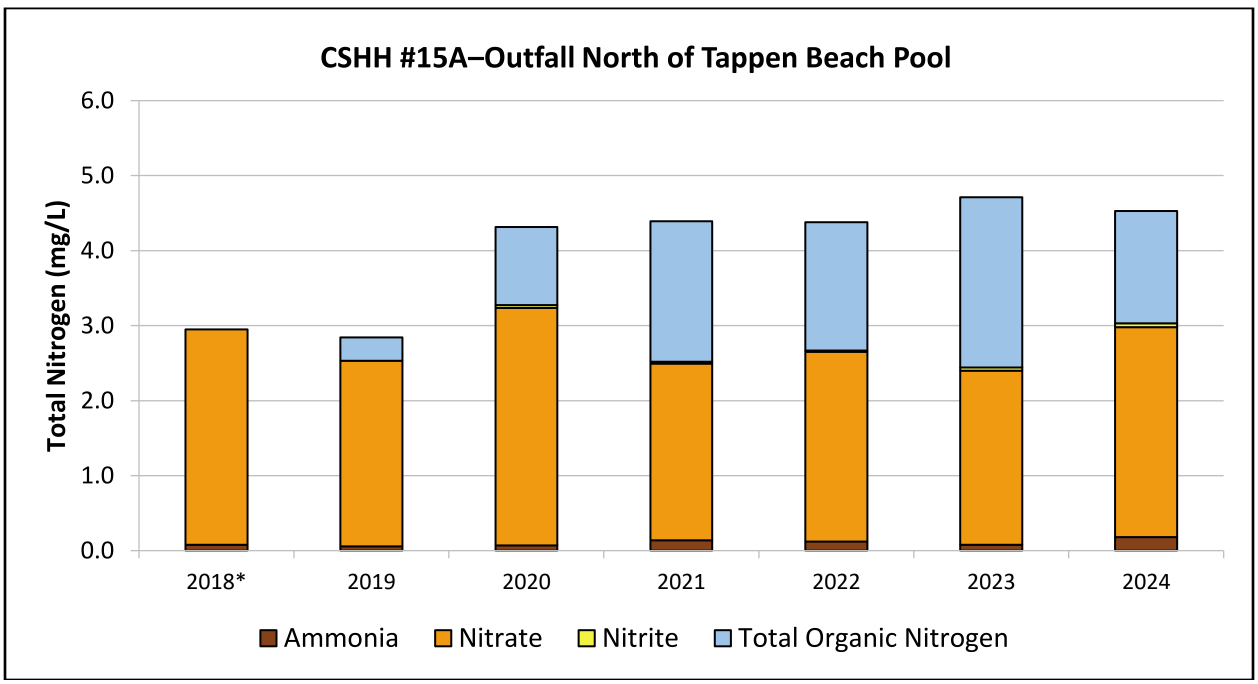


**Total Organic Nitrogen was not included in nitrogen analysis in 2018.*
Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

Long-Term Nitrogen Graphs (Regular Season)



Note that the above 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

2024-25 Nitrogen Data (Winter Season)

TKN (mg/L)		
Date	CSHH #14A	CSHH #15A
4/16/25	<2.5	<2.5
4/2/25	1.5	1.4
3/19/25	<0.50	<0.50
3/5/25	<0.50	0.54
2/19/25	<0.50	--
2/5/25	<0.50	<0.50
1/22/25	<0.50	--
1/8/25	<0.50	<0.50
12/23/24	<0.50	<0.50
12/13/24	<0.50	1.5
11/27/24	2.1	2.4
11/13/24	3.1	2.4

Total Organic N (mg/L)		
Date	CSHH #14A	CSHH #15A
4/16/25	<0.10	<0.10
4/2/25	0.33	1.3
3/19/25	<0.10	<0.10
3/5/25	<0.10	0.36
2/19/25	<0.10	--
2/5/25	<0.10	<0.10
1/22/25	<0.10	--
1/8/25	<0.10	<0.10
12/23/24	<0.10	<0.10
12/13/24	<0.10	1.3
11/27/24	0.96	2.2
11/13/24	2.9	2.3

Ammonia as N (mg/L)		
Date	CSHH #14A	CSHH #15A
4/16/25	1.3	0.16
4/2/25	1.2	0.14
3/19/25	1.0	0.18
3/5/25	1.1	0.18
2/19/25	1.4	--
2/5/25	1.2	0.16
1/22/25	0.94	--
1/8/25	1.2	0.30
12/23/24	1.1	0.17
12/13/24	0.16	0.23
11/27/24	1.1	0.21
11/13/24	0.17	0.13

Nitrite as N (mg/L)		
Date	CSHH #14A	CSHH #15A
4/16/25	0.078	<0.050
4/2/25	0.061	<0.050
3/19/25	<0.050	<0.050
3/5/25	<0.050	<0.050
2/19/25	<0.050	--
2/5/25	0.050	<0.050
1/22/25	0.058	--
1/8/25	<0.050	<0.050
12/23/24	0.080	<0.050
12/13/24	0.069	<0.050
11/27/24	0.085	<0.050
11/13/24	<0.050	<0.050

Nitrate as N (mg/L)		
Date	CSHH #14A	CSHH #15A
4/16/25	7.6	3.2
4/2/25	8.6	2.0
3/19/25	8.4	4.2
3/5/25	8.0	3.2
2/19/25	8.1	--
2/5/25	7.6	5.0
1/22/25	8.1	--
1/8/25	7.6	7.5
12/23/24	8.1	8.4
12/13/24	7.3	5.3
11/27/24	6.9	4.8
11/13/24	1.6	1.4

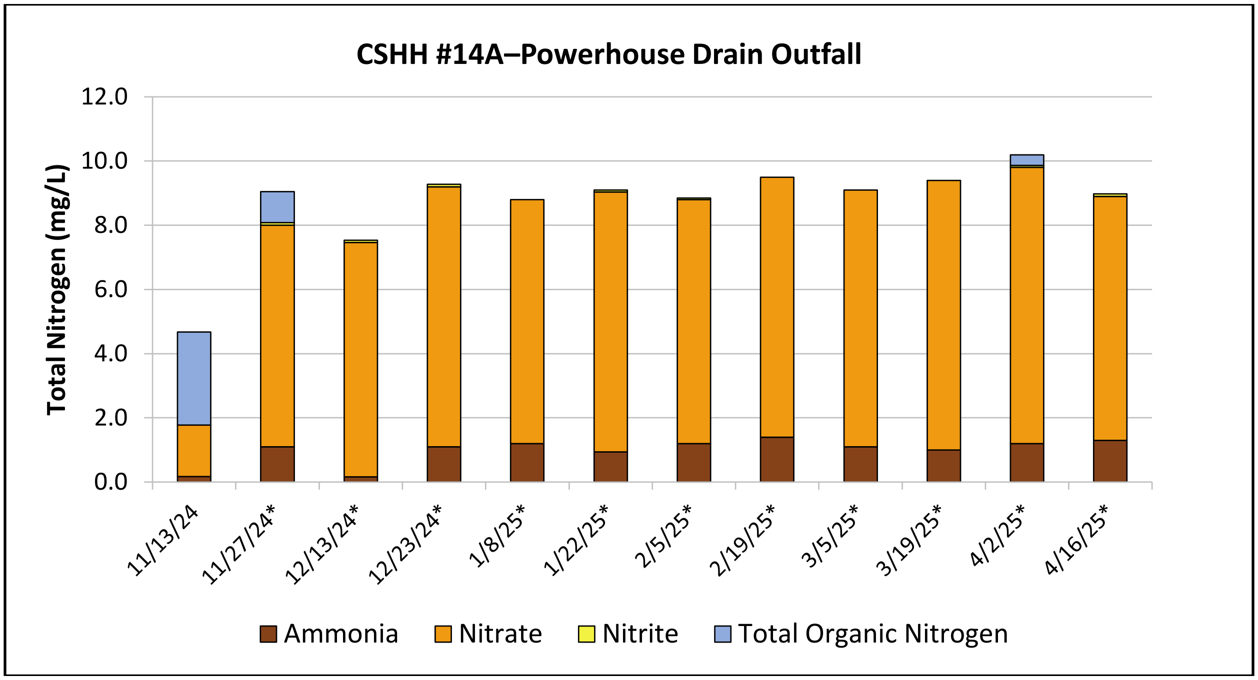
Total Inorganic Nitrogen Calculation (mg/L)		
Date	CSHH #14A	CSHH #15A
4/16/25	9.0	3.4
4/2/25	9.9	2.1
3/19/25	9.4	4.4
3/5/25	9.1	3.4
2/19/25	9.5	--
2/5/25	8.8	5.2
1/22/25	9.0	--
1/8/25	8.9	7.8
12/23/24	9.3	8.7
12/13/24	7.6	5.6
11/27/24	8.1	5.0
11/13/24	1.8	1.5

Total N (mg/L)		
Date	CSHH #14A	CSHH #15A
4/16/25	7.7	3.2
4/2/25	10.2	3.4
3/19/25	8.4	4.3
3/5/25	8.3	3.7
2/19/25	8.1	--
2/5/25	7.6	5.0
1/22/25	8.2	--
1/8/25	7.8	7.5
12/23/24	8.2	8.5
12/13/24	7.4	6.9
11/27/24	9.1	7.2
11/13/24	4.7	3.9

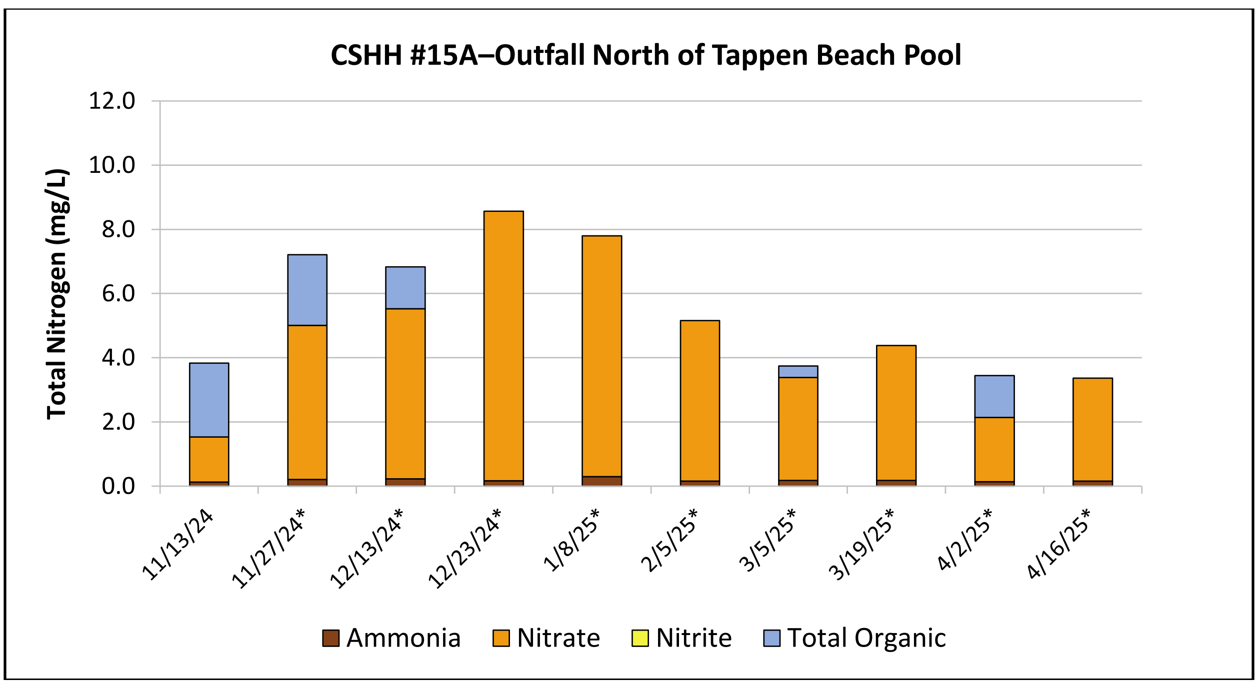
Notes:
A value given with a less than symbol indicates that the results were below the detection limit.
CSHH #14A and#15Aare outfalls; tan highlights indicate a direct sample from flow.

2024-25 Nitrogen Graphs (Winter Season)

The graphs in this section display each station's total nitrogen for the 2024-25 winter-monitoring program. See page D-11 for a full description of total nitrogen graphs. Although each species of inorganic nitrogen is reported to us as the portion of nitrogen (i.e., "as N") within each compound, for purposes of these graphs, the labels for nitrogen are simplified.



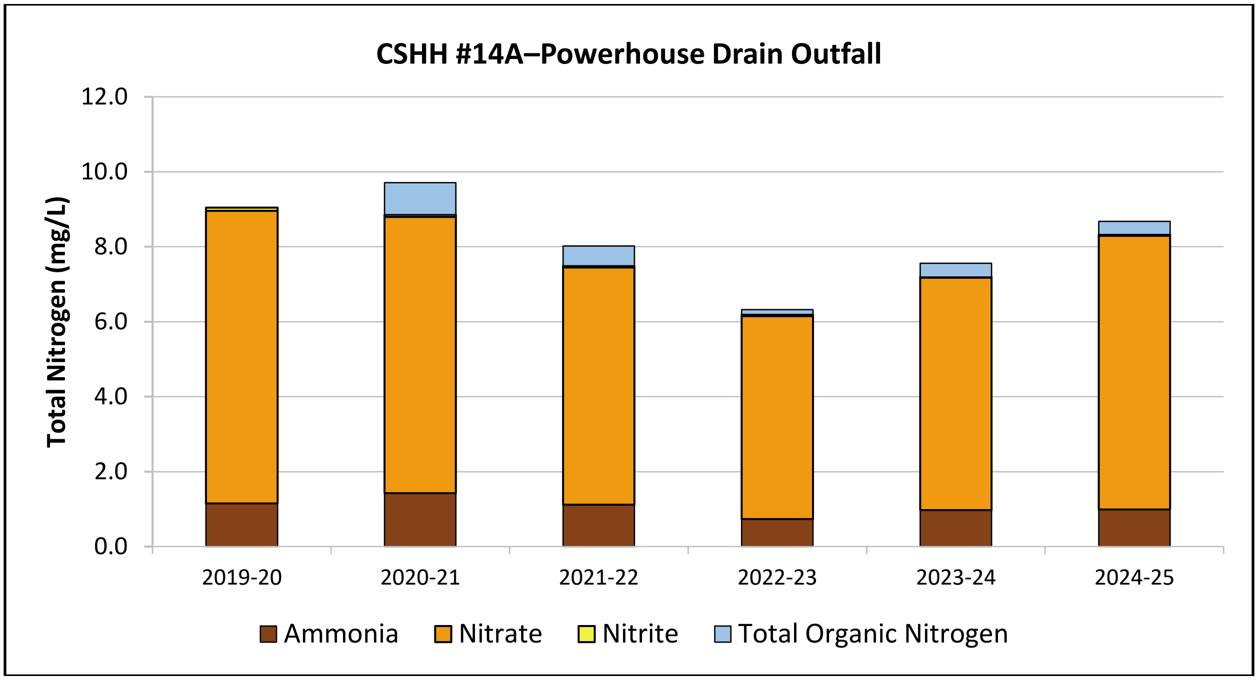
**Sample taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).*

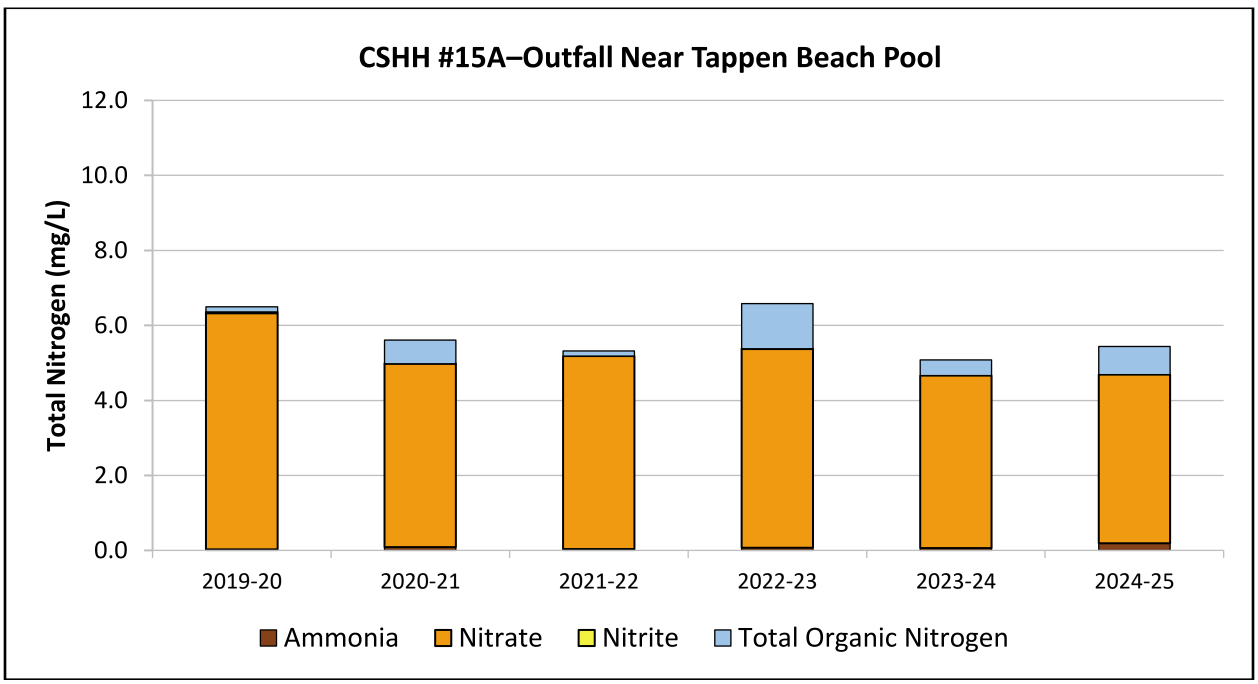


**Sample taken directly from outfall flow (during low tides) rather than from flow mixed with harbor water (during high tides).*
Total Nitrogen = Ammonia + Nitrate + Nitrite + Total Organic Nitrogen

Long-Term Nitrogen Graphs (Winter Season)

The graphs in this section display each outfall station's long-term (2019-24) total nitrogen for the winter-monitoring program. See page D-11 for a full description of total nitrogen graphs. Although each species of inorganic nitrogen is reported to us as the portion of nitrogen (i.e., "as N") within each compound, for purposes of these graphs, the labels for nitrogen are simplified.





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

Appendix E

2024 Data Usability Assessment Report (DUAR)

1.1 Background

The Coalition to Save Hempstead Harbor (CSHH) conducts a weekly water-monitoring program during the "regular" monitoring season (May through October). The program encompasses 21 stations (including 10 in-harbor stations and 11 outfall stations) and documents water-quality conditions and pollutant sources in Hempstead Harbor and its watershed. This monitoring program provides information that aids municipalities and agencies in making watershed management and other policy decisions. 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. CSHH also conducts a winter monitoring program, collecting samples for bacteria and nitrogen analysis at selected outfalls. For purposes of this DUAR, only the regular-season monitoring is reflected.

The monitoring data are used by the CSHH, Hempstead Harbor Protection Committee, Nassau County Department of Health, Nassau County Department of Public Works, Interstate Environmental Commission, New York State Department of Environmental Conservation, Connecticut Department of Energy and Environmental Protection, Long Island Sound Study, other nongovernmental/environmental organizations, and 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 2024 monitoring season. The 2023 QAPP 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 boat availability) 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 pH (surface), DO (bottom), 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 (TKN), ammonia, nitrite, and nitrate. Two NYS DOH ELAP-certified laboratories were used for sample analysis: Nassau County Department of Health laboratory for bacteria analysis and 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, accuracy, bias, 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 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 (YSI EXO2S)	Decimal degrees (°)	2.5 m CEP *CEP = Circular Error Probable*	For reference point on land, within 10 m (i.e., 0.0001°)	N/A	0.00001°
GPS coordinates (Garmin Montana 680t, used as backup to YSI EXO2S)	Decimal degrees (°)	± 3.65 m	For reference point on land, within 10 m (i.e., 0.0001°)	N/A	0.00001°
Water temperature (YSI EXO2S)	Degrees Celsius (°C)	-5 to 35 °C ± 0.01 °C	10%	4 – 26 °C	0.001 °C
Air/water temperature (digital thermometer)	Degrees Celsius (°C)	± 1 °C	10%	-15 – 36 °C	0.1 °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 (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.
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

**Allowable Relative Percent Difference (RPD) is calculated using a standard formula (see page E-6).*
***Approximate expected range refers to typical Hempstead Harbor water-quality conditions.*
****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.*

Parameter	Units	Accuracy	Precision (Allowable RPD)	Approx. Expected Range	Sensitivity
Turbidity (YSI EXO2S)	Formazin 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 (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
pH (LaMotte 5858-01 wide-range indicator)	N/A	5.0 – 10.5	(Color metric)	6.5 – 8.5	0.5

*****CSHH collects 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:

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

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 2024 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%	0	N/A
Specific conductivity (bottom)	10%	0	N/A
Dissolved oxygen (surface)	20%	0	N/A
Dissolved oxygen (bottom)	20%	1	7/17 (37%)
pH* (surface)	5%	0	N/A
pH* (bottom)	5%	0	N/A
Turbidity (surface)	20%	1	6/5 (50%)
Turbidity (bottom)	20%	2	7/17 (22%), 10/9 (26%)
Depth	20%	0	N/A

**pH measurements were taken only at surface and bottom for the primary sample from May 22 through June 12.*

Accuracy and Bias

- 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 "SmartQC Score" that appears on the handheld 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 surface pH results from the YSI EXO2S to a result obtained via LaMotte wide-range color-comparator.
    - Comparing bottom DO results from the YSI EXO2S to a result obtained via Winkler titration.
    - Comparing bottom water temperature results from the YSI EXO2S to a result obtained via calibrated electronic thermometer.
- Laboratory accuracy was evaluated from trip blanks, surrogate samples, published historical data, method validation studies, and experience with similar samples. No laboratory control samples were flagged for contamination.

- 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 and RFU)*	-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

**Chlorophyll a is not a core-program parameter as data is not validated via a separate lab-tested chlorophyll filtration, however the sonde is calibrated and readings are recorded as a frame of reference.*

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 23 monitoring events for vertical profiles (monitoring was cancelled on August 7 due to inclement weather), 12 events for nitrogen grab samples, and 24 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 24-event monitoring season. This goal was met for all lower-harbor stations, as every station was sampled at least five times.
- Data collection was evaluated for completeness for vertical profiles at seven stations, CSHH #1-3, #8, #13, and #16-17, and included water temperature, salinity, dissolved oxygen, pH, water clarity, and turbidity. All sampling events except for 7/31 (57%), 10/16 (57%), and 10/30 (57%) 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 fourteen stations, CSHH #1-3, #8-13, #14A, #15A, #16-17, and #17A, was evaluated for completeness for fecal coliform and enterococci samples. The 80% completeness criterion was met or exceeded on 18 out of 24 sample dates. The dates on which this was not met are: 7/3 (57%), 7/31 (43%), 10/16 (71%), and 10/30 (43%). (Note that on May 15, we collected only shoreline bacteria samples for continuity between winter shoreline sample collection and the start of the regular season.)
    - Data collection for eight stations, CSHH #1, #3, #8, #12-13, #14A, #15A, and #16, was evaluated for completeness for total Kjeldahl nitrogen, ammonia, nitrate, and nitrite. The 80% acceptance criterion for sample collection was met or exceeded on all but four sampling dates: 7/3 (75%), 7/31 (50%), 8/14 (75%), and 10/30 (63%).

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: All completeness goals, as outlined in the QAPP, were met for approximately 78% of sampling events. 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 2024 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 ______________ ___/___ /2024 **Time**: ______________

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

Monitor Name: Carol DiPaolo, Mark Ring, Michelle Lapinel McAllister, Sarah Stromski

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)

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

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

Comments____

____

____

____

____

____

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____

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____

Water-Monitoring Data Sheet

Date: ___ /___ /2024

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

	Sample Depth (m)	Temp (°C)	Salinity (ppt)	DO		pH	Secchi (m)	Chlorophyll *a* (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 *a* (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 *a* (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 __________

	Upper Harbor	Lower Harbor
Birds		
☐ Bald Eagles	______	______
☐ Cormorants	______	______
☐ Ducks, Mallards	______ ducklings ______	______ ducklings ______
☐ Egrets, Great	______	______
☐ Snowy	______	______
☐ Geese, Canada	______ goslings ______	______ goslings ______
☐ Brandt	______	______
☐ Hooded Gulls	______	______
☐ Herons, Blue	______ Black-Crowned ____ Green ____	Blue ______ Black-Crowned ____ Green ______
☐ Kingfisher, Belted	______	______
☐ Ospreys	______	______
	______	______
	______	______
	______	______
	______	______
☐ Plover-type, Killdeer	______	______
☐ Swans, mute	______ cygnets ______	______ cygnets ______
☐ Terns	______	______
☐ Other	______	______
Jellyfish		
☐ Comb, Sea Walnuts	______ Sea Gooseberries ______	Sea Walnuts ______ Sea Gooseberries ______
☐ Lion's Mane	______ Moon ______	Lion's Mane ______ Moon ______
Fish		
☐ Baitfish	______	______
☐ Blue	______	______
☐ Bunker	______	______
☐ Striped Bass	______	______
☐ Small Shrimp	______	______
Crabs		
☐ Asian shore	______	______
☐ Blue-claw	______	______

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					
Expiration					

Accuracy Range Table	
DO% (100%)	97 – 103
Chl *a* (0 µg/L and RFU)	-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 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-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 Air	Temperature Water	Wind	Weather	Wave Height	Laboratory Use Only: 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® Location Requested (City/State):
Pace Analytical Long Island NY
575 Broad Hollow Rd, Melville, NY 11747

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Workorder/Login Label Here

Scan QR Code for instructions

Company Name:	Coalition to Save Hempstead Harbor
Street Address:	PO Box 159, Sea Cliff, NY 11579
Customer Project #:	
Project Name:	CSHH Monitoring
Site Collection Info/Facility ID (as applicable):	
Contact/Report To:	Michelle Lapinel McAllister
Phone #:	(516)-801-6792
E-Mail:	info@thecshh.org
Cc E-Mail:	
Invoice To:	Michelle Lapinel McAllister
Invoice E-Mail:	info@thecshh.org
Purchase Order # (if applicable):	
Quote #:	
County / State origin of sample(s):	New York

Time Zone Collected: [ ] AK [ ] PT [ ] MT [ ] CT [ ] ET

Data Deliverables: [ ] Level II [ ] Level III [ ] Level IV [ ] EQUIS [ ] Other

Regulatory Program (DW, RCRA, etc.) as applicable: Reportable [ ] Yes [ ] No

Rush (Pre-approval required): [ ] Same Day [ ] 1 Day [ ] 2 Day [ ] 3 Day [ ] Other ______________

DW PWSID # or WW Permit # as applicable:

Date Results Requested:

Field Filtered (if applicable): [ ] Yes [ ] No

Analysis:

Specify Container Size **

**Container Size: (1) 1L, (2) 500mL, (3) 250mL, (4) 125mL, (5) 100mL, (6) 40mL vial, (7) EnCore, (8) TerraCore, (9) 90mL, (10) Other

Identify Container Preservative Type***

*** Preservative Types: (1) None, (2) HNO3, (3) H2SO4, (4) HCl, (5) NaOH, (6) Zn Acetate, (7) NaHSO4, (8) Sod. Thiosulfate, (9) Ascorbic Acid, (10) MeOH, (11) Other

Analysis Requested

Lab Use Only

Proj. Mgr:	**Brianna Rivera**
AcctNum / Client ID:	
Table #:	
Profile / Template:	**7288**
Prelog / Bottle Ord. ID:	**EZ 3141348**

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Waste Water (WW), Product (P), Soil/Solid (SS), Oil (OL), Wipe (WP), Tissue (TS), Bioassay (B), Vapor (V), Surface Water (SW),Sediment (SED), Sludge (SL), Caulk (CK), Leachate (LL), Biosolid (BS), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Composite Start Date	Composite Start Time	Collected or Composite End Date	Collected or Composite End Time	# Cont.	Res. Chlorine Results	Res. Chlorine Units	Nitrite (Unpreserved)	TKN, Nitrate-Nitrite, Ammonia	Total Organic Nitrogen Calc.	Total Nitrogen Calc.							Sample Comment	Preservation non-conformance identified for sample.
CSHH #1	SW	G					2			X	X	X	X								
CSHH #3	SW	G					2			X	X	X	X								
CSHH #6	SW	G					2			X	X	X	X								
CSHH #7	SW	G					2			X	X	X	X								
CSHH #8	SW	G					2			X	X	X	X								
CSHH #12	SW	G					2			X	X	X	X								
CSHH #13	SW	G					2			X	X	X	X								
CSHH #14A	SW	G					2			X	X	X	X								
CSHH #15A	SW	G					2			X	X	X	X								
CSHH #16	SW	G					2			X	X	X	X								

Additional Instructions from Pace®:

Collected By: (Printed Name)

Signature:

Customer Remarks / Special Conditions / Possible Hazards:

# Coolers:	Thermometer ID:	Correction Factor (°C):	Obs. Temp. (°C)	Corrected Temp. (°C)	On Ice:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

Tracking Number:

Delivered by: [ ] In- Person [ ] Courier [ ] FedEx [ ] UPS [ ] Other

prepared by

COALITION TO SAVE HEMPSTEAD HARBOR
EST. 1986

Report printed on recycled paper.