Hempstead Harbor Protection Committee

WATER-MONITORING PROGRAM
HEMPSTEAD HARBOR
Long Island, New York

2010 Water-Monitoring Report
(Full Report, including Appendices)

Prepared by

Coalition to Save Hempstead Harbor

and

FUSS & O'NEILL

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PROGRAM HISTORY

Twenty-five 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). CSHH established Hempstead Harbor's **Citizens Water-Monitoring Program** in 1992 and initially funded the program through membership support, grants from local foundations and businesses, and volunteer services. The program became widely recognized by other monitoring groups and agencies around Hempstead Harbor and Long Island Sound and quickly was able to garner support from local municipalities and government agencies.

As the program continued, positive changes were occurring not only on the landscape around the harbor, but also on the political landscape, as citizens and government learned to work collaboratively to achieve environmental goals. In 2006, the Hempstead Harbor Protection Committee (HHPC) (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), which further enhanced the credibility of the monitoring program and enabled the HHPC to obtain future federal funds for the program.

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

Program Initiation

By 1990, there had been a history of chronic sewage spills from the failing treatment plants that were sited along Hempstead Harbor. 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, as 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) – i.e., low dissolved oxygen (hypoxia), toxic-substance contamination, pathogen contamination, habitat degradation, and floatable debris – were the same priorities that also had to be addressed, perhaps to a different extent, for Hempstead Harbor. At the start, the Hempstead Harbor water-quality monitoring program therefore included dissolved oxygen as a critical monitoring parameter (among others). However, CSHH's 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 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 changing conditions around the harbor and notifying CSHH as well as appropriate municipal and environmental agencies of any unusual events affecting the harbor. Over the years, the scope of the program has expanded, as has the network of partners that have supported it.

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 inter-municipal organization, specifically 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 storm-water runoff as it developed a comprehensive *Hempstead Harbor Water-Quality Improvement Plan* (completed in 1998), for which CSHH implemented 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

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 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. (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.)

In 1996, CSHH initiated the creation of the **Water-Monitoring Work Group**, a soundwide network of environmental agencies and nonprofits connected with water-monitoring programs around Long Island Sound. The 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 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. The soundwide network established as a result of the work group remains an important resource to determine the location and extent of various water conditions around the sound.

In 1998, CSHH published ***Hempstead Harbor: Its History, Ecology, and Environmental Challenges***. The book supports the goals of the water-monitoring program in encouraging community members to learn about Hempstead Harbor as an important 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 (as well as the economy) of surrounding communities.

In 2000, CSHH became a partner in **EPA's Environmental Monitoring for Public Awareness and Community Tracking (EMPACT)** program. CSHH worked with the Marine Sciences Department of the University of Connecticut to maintain a telemetry link at the EMPACT Web site at www.MYSound.uconn.edu, so that water-quality data from Hempstead Harbor could be viewed on the Web. The Town of Oyster Bay became an important partner in this project, having contributed the stationary probe and use of a boat and staff to assist with probe maintenance. In 2005, logistical problems and lack of funding to purchase and maintain necessary new equipment prevented the continuation of this program.

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 U.S. EPA Long Island Sound Study Office to plan and coordinate a **Storm-Water Workshop** to help prepare Long Island communities to meet the requirements of the EPA Phase II Storm Water 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.

More recently, CSHH has served on review committees for restoration plan proposals such as the Scudder's Pond Restoration Program and Glenwood Road/Powerhouse Drain Stormwater Pollution Abatement Plan. In addition, in 2009, CSHH initiated a work group of local community organizations to focus on development of a townwide land-preservation plan. The work group considered various land-use planning vehicles along with a proposal to review the Town of Oyster Bay's Groundwater and Open Space Protection Plan (2006) in light of current local land-use and harbor preservation efforts. A first step toward a broader land-use preservation plan is 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 (due to be completed for the Hempstead Harbor Protection Committee in 2012) 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, which is charged with addressing climate change and ways to measure the impacts on Long Island Sound. (This is part of a bi-state—New York and Connecticut—approach to understanding climate-change indicators for Long Island Sound and selecting appropriate sites to measure them.)

In 2010, CSHH coordinated local activities as part of the International Coastal Cleanup, as it has for all but two years since 1992.

CSHH continues to work with other environmental groups and agencies around Hempstead Harbor and Long Island Sound. CSHH has participated on advisory committees that have been created around the harbor to develop various local revitalization plans, such as the Glen Cove Creek Reclamation Committee, Glenwood Landing Steering Committee, the Roslyn Waterfront Committee, the Glen Cove Waterfront Citizens' Planning Committee, and the Glen Cove Master Plan Task Force.

CSHH's programs and activities are supported by special fund-raising events, member contributions, and grants–including those awarded from the NYS Department of State, EPA's Long Island Sound Office, Long Island Sound Study, NY Sea Grant, the Rauch Foundation, the New York Community Trust, Long Island Community Foundation, and local businesses.

HHPC

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

In 1995, funds were sought and received from the NYS Department of State, and the HHPC (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 **Water Quality Improvement Plan**. Each of the nine municipalities signed an intermunicipal agreement to work cooperatively and to contribute financially on a pro-rata basis

HHPC's municipal members include County of Nassau, 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. This approach saves each municipality expenses and effort by cooperation, provides for a more coordinated approach to solving harbor problems, and provides year-round focus on harbor issues.

The HHPC prepared the **Scudder's Pond Subwatershed Plan** (2006) and has secured nearly $2.5 million toward the implementation of its recommendations. This subwatershed (located in

Sea Cliff) has been identified as one of the most significant contributors of bacteria-laden storm-water runoff to the harbor. The HHPC will soon complete a similar study for the **Powerhouse Drain subwatershed** in Glenwood Landing.

In 2007, HHPC applied for federal **No Discharge Zone (NDZ) designation** for Hempstead Harbor; the U.S. 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. The HHPC has also established a Web site (www.HempsteadHarbor.org) and a Facebook page as resources on the harbor. **Ongoing educational efforts** include 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; and the installation of pet-waste stations around the harbor.

New no-wake, no-discharge sign in Hempstead Harbor (7/1/09)
(photo by Carol DiPaolo)

The HHPC has also been instrumental in expanding the state's designation of the harbor as a Significant Coastal Fish and Wildlife Habitat Area to encompass the entire harbor; 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 the New York State Audubon Society's "Important Bird Areas of New York State." The Hempstead Harbor Protection Committee has been an unqualified success and has spawned the creation of two other intermunicipal efforts, the Manhasset Bay Protection Committee and the Oyster Bay/Cold Spring Harbor Protection Committee. The HHPC have also assisted with similar efforts in Northport Harbor and the Peconic Estuary.

Since 1995, the HHPC has received 22 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 contributions (dues) received from the nine member municipalities. These annual contributions total $82,500 for calendar year 2010.

For more information or to request another copy of this report contact:

Carol DiPaolo
CSHH Programs Director and
Water-Monitoring Program Coordinator
Coalition to Save Hempstead Harbor
P.O. Box 159, Sea Cliff, NY 11579
Phone: 516-801-6792
E-mail: cshh@optonline.net

Eric Swenson
HHPC Executive Director
Hempstead Harbor Protection Committee
150 Miller Place
Syosset, NY 11791
Phone: 516-677-5790; Fax: (516) 677-5875
E-mail: e.swenson@hempsteadharbor.org
www.HempsteadHarbor.org

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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 us to protect our local environment.

We offer special thanks to the National Fish and Wildlife Foundation for funding the 2006 development of the Quality Assurance Project Plan for the Hempstead Harbor Water-Monitoring Program and the 2007-2009 water-monitoring programs for Hempstead Harbor through the Long Island Sound Futures Fund.

We also acknowledge the special efforts of individuals who have helped us maintain our water-monitoring program, including CSHH volunteers and members of local fishing clubs, local beach and marina managers, boaters and sailors, and other members of the community who report on harbor conditions, especially Mark Ring and Peter Emmerich; the Town of Oyster Bay's Department of Environmental Resources for staff assistance and use of its boat; Nassau County Department of Health Bureau of Environmental Sanitation director, John Jacobs, and Andrew Wendolovske, Office of Recreational Facilities, Nassau County Department of Health; Nassau County Department of Public Works staff Tim Kelly, and Dan Fucci; former Interstate Environmental Commission engineer, Peter Sattler; and members of the Nassau County Marine Police and the Underwater Search and Recovery Team.

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- New York State Department of State
- New York State Department of Environmental Conservation
- New York Sea Grant/NEMO
- The Glenwood/Glen Head Civic Association
- U.S. Environmental Protection Agency, Long Island Sound Study Office
- The United Civic Council of Glen Head and Glenwood Landing







NYS DEC Commissioner Pete Grannis and Regional Director Peter Scully are joined by local public officials and members of environmental groups at Morgan Beach, Glen Cove, to celebrate improvements in Hempstead Harbor's water quality and the announcement that a portion of the harbor would soon be open for shellfish harvesting.

(Photos by Patrice Benneward and Lynda Schroeder, 4/18/10)

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STATE OF THE HARBOR 2010

1 HARBOR OVERVIEW

Hempstead Harbor is a deep, V-shaped harbor that lies along the north shore of Long Island, bordering the western portion of Long Island Sound, between Manhasset Bay to the west and Oyster Bay to the east. The harbor is about 5 miles long from mouth to head, and its shoreline extends 14 miles from Sands 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 spills, sewage spills, toxic contamination, storm-water runoff, air pollution, and industrial discharges. The worst of these effects were noted in the mid-1980s.

Dramatic changes around the harbor have resulted in improved water quality. For example, efforts to restore the harbor resulted in the closure of a landfill, two incinerators, and a sewage treatment plant. 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 disinfection system was installed. (In 2008, Nassau County purchased the plant from the City of Glen Cove.)

View of the William Cullen Bryant estate, Cedarmere, on east shore of Hempstead Harbor (photo by Jim Moriarty, 11/3/10)

The remediation of some hazardous waste sites has been completed, and remediation of others is still underway. Also, revitalization plans are being implemented for sections of the waterfront that suffered the most abuse, such as along Glen Cove Creek and the eastern shore in Glenwood Landing.

Wetland restoration planting at Bar Beach lagoon in 2003 (above) and in 2005 (right)(photos by Kevin Braun)

Wetlands 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 ownership of the county-owned 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.)

Despite the harbor's impaired condition during the 1980s, in 1987 New York State designated Hempstead Harbor a **Significant Coastal Fish and Wildlife Area**, extending from Mott Point on the west to the Glen Cove breakwater on the east at the northern section of the harbor south to the Roslyn viaduct. Over the last 20 years, however, 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 formerly referred to Bar Beach sand spit, 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 Area was updated and extended in October 2005 to include the portion of the harbor south of the Roslyn viaduct.

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

Today, Hempstead Harbor continues to support many diverse uses and activities. Fuel is transported to a Glenwood Landing oil terminal (Global Partners LP/ExxonMobil) that is adjacent to a power plant that has operated since the early 1900s. Further north, tugboats tow barges to and from a sand and gravel transfer station on the western shore of the harbor and into Glen Cove Creek, which flows from the harbor's eastern shore. In contrast to these commercial uses, the recreational uses continue to flourish and expand as the harbor's water quality improves. Marinas, yacht clubs, and fishing clubs, which are concentrated in the northern portion of the harbor, are thriving. Town, city, village, and small private beaches are also located along the harbor's shore. 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.

Beacon 11 with osprey nest at top; power plant and crane from marine salvage operation In background (photo by Carol DiPaolo, 6/2/10)

A challenge that must be met in planning for the future of Hempstead Harbor is to balance these diverse and often competing interests. 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." Specific environmental challenges and priorities that remain for Hempstead Harbor include storm-water-runoff abatement; continued improvements in water quality and reductions in bacteria levels; prevention of inappropriate land use and development, particularly along the shore; and continued remediation of contamination from former industrial activities.

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 the electronic portion of this report compare parameters (such as rainfall and bacteria levels) that show expected correlations but also noticeable variability. The data collected over the years are a critical resource as we look for trends that point to the health of the harbor.

The story of Hempstead Harbor and Long Island Sound is a complicated one. There are many variables. Some things we can control—such as nitrogen discharges and other pollution from both point and nonpoint sources; other things we can't control—such as rainfall and temperature. However, all of these factors have critical relationships that have an impact on ecological health and survival and human use of the waters, including swimming, fishing, and other recreational pursuits.

The data collected through the water-monitoring program help us learn about the interrelationships that occur in Hempstead Harbor. This information enables us to work with others on a harborwide and soundwide basis to discover causal effects of human activities, so that we can plan and implement best management practices to assure a healthy environment for the future.

Castle Gould, Sands Point Preserve, overlooking west shore of Hempstead Harbor (photo by Carol DiPaolo, 6/23/10)

2.1 Quality Assurance Project Plan

In 2006, a Quality Assurance Project Plan (QAPP) was prepared by the consulting engineering firm of Fuss & O'Neill, Inc., for the Hempstead Harbor Water-Monitoring Program, on behalf of the Coalition to Save Hempstead Harbor (CSHH) and the Hempstead Harbor Protection Committee. The QAPP documents the quality assurance and quality control (QA/QC) procedures implemented in the CSHH program. In 2010, work began to update the QAPP; the revision was completed and approved by EPA in July 2011.

Although the QAPP incorporated several new items into the water-monitoring program, the majority of the procedures in the QAPP have been implemented by the program for years. The approval of the QAPP by the U.S. Environmental Protection Agency, Region 2, broadens the use of the program's data by additional outside organizations, enables the program to receive federal funding for future monitoring efforts, reiterates the ongoing commitment of CSHH to provide high-quality monitoring data for Hempstead Harbor, and demonstrates the reliability of the data presented in this and previous, water-quality reports.

2.2 Location of Testing Stations

The principal CSHH stations that are sampled weekly during the monitoring season for all program parameters are located in the northern portion of the harbor, between the former Bar Beach sand spit (now part of the 36.2-acre North Hempstead Beach Park) and Long Island Sound, as well as stations in Glen Cove Creek. *Table 1* includes the latitude/longitude points for most of the monitoring stations.

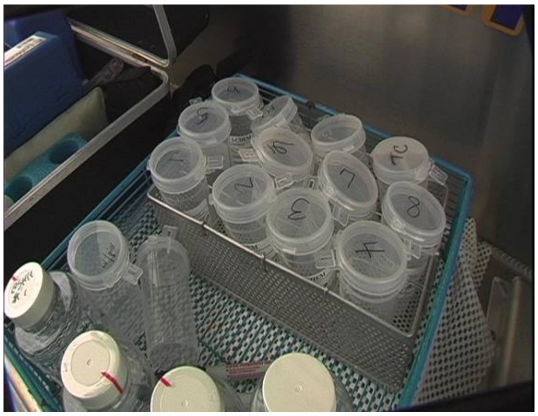
Map of Hempstead Harbor showing locations of CSHH stations along with DEC stations sampled in 2009

Table 1. Latitude/Longitude Points for Monitoring Stations

Station ID	Latitude N		Longitude W	
	Degrees	Minutes	Degrees	Minutes
Upper-Harbor Stations				
CSHH #1, Beacon 11	40	49.540	73	39.120
CSHH #2, Bell 6	40	51.647	73	40.428
CSHH #3, Red Channel Marker	40	51.213	73	39.123
CSHH #8, Adjacent to STP Outfall Pipe	40	51.514	73	38.515
CSHH #9, 10 ft West of #8				
CSHH #10, 20 ft West of #8				
CSHH #11, 50 ft East of #8				
CSHH #12, 100 ft East of #8	40	51.561	73	38.430
CSHH #13, 60 ft from Mill Pond Weir	40	51.706	73	38.139
CSHH #15, about 50 yds from Scudders Pond Outfall, North of Tappen Beach pool area	40	50.109	73	39.247
CSHH #15A, at Scudder's Pond outfall pipe, north of the Tappen Beach pool area				
CSHH #15B, CSHH #15B, at the Scudder's Pond weir on the east side of Shore Road				
Lower-Harbor Stations				
CSHH #4, East of North Hempstead Beach Park (formerly Bar Beach) Sand Spit	40	49.688	73	39.001
CSHH #5, Mott's Cove	40	49.317	73	38.770
CSHH #6, East of Pt. Washington transfer station	40	48.688	73	39.080
CSHH #7, West of Bryant Landing (formerly site of oil dock)	40	48.474	73	38.923
CSHH #14, about 50 yds from Powerhouse Drain outfall	40	49.706	73	38.916
CSHH #14A, at Powerhouse Drain outfall				

At the end of the 2004 monitoring season, 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 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 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, rather than moving within the distance of 60 feet from the weir, depending on the tide. Samples collected at CSHH #13 can help indicate whether the restoration of Mill Pond is curtailing bacteria inputs to Glen Cove Creek.

In 2009, the water-monitoring program was greatly expanded. CSHH and the NYS Department of Environmental Conservation worked together on a plan to survey mid- and lower portions of the harbor for bacteria levels relative to water-quality standards for shellfish harvesting. Thirteen of the stations that were set up in 1988 as DEC's shellfish growing area (SGA) #50 sampling points were reestablished for 2009; SGA stations 1-13 stretched from the lower harbor (below the bar of the former Bar Beach) to a line across the harbor that is roughly in line with Glen Cove Creek. Stations 1A, 15, and 14 were also added along with sampling points at the Scudder's Pond outfall (#15A) located north of the Tappen Beach Pool and the Scudder's Pond weir (#15B). CSHH collected samples once or twice a week (depending on tidal cycles) at these points from August to early November, and the samples were delivered to the DEC lab for analysis. This component of the program was added to determine whether the opening of these areas of the harbor for shellfish harvesting would be feasible in the near future. Unfortunately, the results of this intensive sampling showed that all but two of the stations failed DEC shellfish standards on a regular basis. These stations were not sampled in 2010; sampling of these stations will resume only if there is evidence that future efforts (e.g., upland structural changes) to improve water quality are successfully reducing the bacteria load to the harbor.



Different sample bottles and collection protocols for NCDH and NYSDEC; Tim Kelly and Dan Fucci (NCDPW) conducted a dye test to confirm flow from Scudder's Pond to outfall north of Tappen Pool (photos by Carol DiPaolo,11/12/09)

Samples from stations #14, 15, 15A, and 15B were also collected for analysis by the Nassau County Department of Health (using water-quality standards for bathing beaches) as an alternative way to monitor discharges from the Powerhouse Drain and Scudder's Pond. Powerhouse Drain and Scudder's Pond are known to be the largest contributors of bacteria to Hempstead Harbor through storm-water runoff, and remediation plans are currently being developed. The samples collected will establish a benchmark of bacteria levels before, during, and after remediation.

In 2010, CSHH station 14A was established as an additional sampling site for the Powerhouse Drain system. Samples from this station are taken directly from the large outfall adjacent to the National Grid building. Thanks to the efforts of Jack Tiernan, chief engineer at the plant, a gate was installed in the fencing over the outfall to accommodate the use of a sampling pole and jar to collect samples. The water samples are analyzed along with those mentioned above by the Nassau County Department of Health.

Gate installed for water sampling at new station CSHH #14A above Powerhouse Drain outfall (L); detergent suds flowing from Powerhouse Drain outfall (R) (photos by Carol DiPaolo, 8/4/10 and 7/19/10, respectively)

The locations of upper-harbor CSHH monitoring stations are as follows:

- 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 at 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 Harbor Club and Sea Cliff Beach
- CSHH #8, at the Glen Cove sewage treatment plant (STP) outfall pipe
- CSHH #9, about 10 feet west of CSHH #8
- CSHH #10, about 20 feet west of CSHH #8, at the end of the seawall
- CSHH #11, about 50 feet east of CSHH #8, at the end of the floating dock
- CSHH #12, about 100 feet east of CSHH #8, in the middle of the creek, north of the bend in the south seawall
- CSHH #13, 60 feet from the Mill Pond weir
- CSHH #15, about 50 yds from Scudders Pond Outfall, at northwest corner of the Tappen Beach pool area
- CSHH #15A, at the Scudder's Pond outfall pipe, north of the Tappen Beach pool area
- CSHH #15B, at the Scudder's Pond weir on the east side of Shore Road

Aerial view of Glen Cove Creek, Sea Cliff Beach (foreground), Sea Cliff Yacht Club and dock, Glen Cove marinas, and Glen Cove STP (7/08) (photo by Joel Ziev)

The five lower-harbor stations are often inaccessible during low tides and are monitored less frequently (monthly for full survey and as close to weekly, depending on the tide, for collection of samples for bacteria analysis). The locations of the lower-harbor stations are as follows:

- CSHH #4, at the North Hempstead Beach Park (formerly Bar Beach) sand spit
- CSHH #5, at Mott's Cove
- CSHH #6, at a point east of the site of the former Town of North Hempstead incinerator, now the waste-transfer station
- CSHH #7, the station farthest south in the harbor, on the east shore just before the walkway for the Sterling Glen and Horizon communities (totaling 208 senior rental units at Bryant Landing) 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 the Sterling Glen and Horizon buildings.)
- CSHH #14, about 50 yds from Powerhouse Drain outfall
- CSHH #14A, directly from the Powerhouse Drain outfall

Bar Beach Cove (L) and Mott's Cove (R) (photos by Carol DiPaolo, 5/20/10, and Jim Moriarty, 11/3/10)

The 19 DEC monitoring locations are as follows:

- DEC #1, same as CSHH #6
- DEC #1A, same as CSHH #7
- DEC #2, center of lower harbor
- DEC #3, pilings, near mouth of Mott's Cove and CSHH #5
- DEC #4, south of North Hempstead Beach Park (formerly Bar Beach) sand spit, near boat ramp
- DEC #5, same as CSHH #4
- DEC #6, northeast of Beacon 11, near CSHH #1
- DEC #7, near gravel pile, west shore
- DEC #8, near C-9 navigational marker
- DEC #9, south of Dock Hill/Sea Cliff Park and north of Tilley's boathouse
- DEC #10, west shore at end of private dock, in line with C-A navigational marker
- DEC #11, at C-A navigational marker
- DEC #12, same as CSHH #3, at red channel marker C-1
- DEC #13, outside of Glen Cove marina in Glen Cove Creek
- DEC #14, same as CSHH #14
- DEC #15, same as CSHH #15
- DEC #15A, same as CSHH #15A
- DEC #15B, same as CSHH #15B
- DEC STP, same as CSHH #8.

2.3 Frequency of Testing and Testing Parameters

Testing is conducted weekly, from May to November, at each station, generally on the same day of the week and at the same time (beginning at approximately 7 AM and typically continuing for 5 hours). CSHH collects samples and conducts water-quality tests with the assistance of Town of Oyster Bay staff for onboard testing and boat transportation to sampling sites.

Water samples are collected weekly (weather and tidal cycles permitting) from 18 testing stations for bacterial analysis by the Nassau County Department of Health. In addition, tests for dissolved oxygen (DO), salinity, water temperature, and pH are conducted weekly at CSHH #1, #2, #3, #8, and #13 and monthly to bimonthly at CSHH #4, #5, #6, #7, #14, and #15. Nitrite, nitrate, and ammonia samples are collected weekly at CSHH #1, #2, #3, #8, and #13 and monthly to bimonthly at CSHH #4, #5, #6, #7, #14, and #15. A summary of the samples collected 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, and pH are recorded with an electronic meter (YSI Model 600 sonde with an upgraded XLM circuit board and 650 MDS display unit) at 1-meter depth increments at every station. A sample of bottom water is also tested for DO using the Winkler titration method at the first station that is monitored for the day (generally CSHH #1) as a quality-assurance check of the electronic meter. A quality assurance test is also performed for pH using a LaMotte test kit– a wide-range indicator that uses a color comparator.

Table 2. CSHH Monitoring-Program Parameters

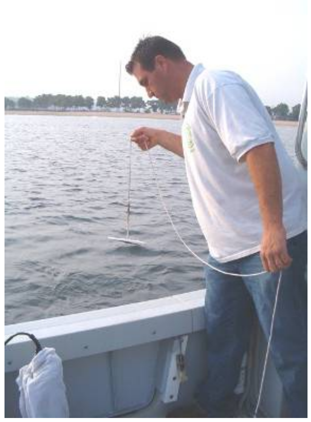
Parameter	Location	Analyzer or Method	Location of Analysis
Dissolved Oxygen	Vertical profiles at 1-meter intervals at CSHH #1-8, 13, 14, and 15	YSI 600	Field
Dissolved Oxygen	One location for electronic meter validation	LaMotte 7414	Field
Water Temperature	Vertical profiles at 1-meter intervals at CSHH #1-8, 13,14, and 15	YSI 600	Field
Water Temperature	One station for electronic meter validation	Calibrated Thermometer	Field
Air Temperature	One measurement at each station during monitoring	Calibrated Thermometer	Field
Salinity	Vertical profiles at 1-meter intervals at CSHH #1-8, 13, 14, and 15	YSI 600	Field
pH	Vertical profile at 1-meter intervals at CSHH #1-8, 13, 14, and 15	YSI 600	Field
pH	One station for electronic meter validation	LaMotte 2218 reagent	Field
Turbidity	Two vertical locations at 0.5 meter and Secchi depth at CSHH #1-8, and 13, 14, and 15	LaMotte 2020e (USEPA 180.1)	Field

Parameter	Location	Analyzer or Method	Location of Analysis
Clarity	CSHH #1-8, 13, 14, and 15	LaMotte Secchi Disk	Field
Ammonia	Grab sample at half-meter depth at CSHH #1, 7, and 8	LaMotte 4795 (Nessler Method)	Field
Ammonia	More refined method used at CSHH #1, 7, and 8, and other stations when the preceding tests detect ammonia	LaMotte 3304 (Salicylate Method)	Field
Nitrate	Grab sample at half-meter depth at CSHH #1- 8, 13, 14, and 15	Hach 8192	Oyster Bay Town Lab
Nitrite	Grab sample at half-meter depth at CSHH #1-8, 13, 14, and 15	Hach 8507	Oyster Bay Town Lab
Fecal Coliform Bacteria	Grab sample half-meter depth at CSHH #1-13, 14, and 15 and just below surface or from outfall flow at 14A, 15A, and 15B.	Membrane Filter	Nassau County Department of Health
Enterococci	Grab sample at half meter depth at CSHH #1-13, 14, and 15 and just below surface or from outfall flow at 14A,15A, and 15B.	Membrane Filter	Nassau County Department of Health
Precipitation	Village of Sea Cliff	Visually read rain gauge	Field

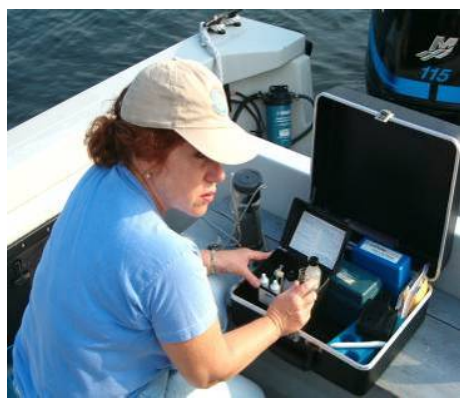
Turbidity is also recorded at stations CSHH #1-8, 13, 14, and 15 during full surveys with a LaMotte 2020e portable turbidity meter; additional samples are taken at other locations if unusual conditions are noted. Turbidity samples are taken at two depths – at a half-meter below the surface and at Secchi-disk depth.

LaMotte test kits are also used to measure ammonia. Technicians at the Town of Oyster Bay Laboratory use an electronic kit (Hach) for measurement of nitrite and nitrate levels. Periodically, samples are also collected for plankton analysis by the Nassau County Department of Health. The water samples for the test kits are collected within a half meter of the water surface.

Mark Ring with YSI 600



Tony Alfieri lowering Secchi disk



Carol DiPaolo doing Winkler titration for DO

3 MONITORING RESULTS

This section summarizes results of the CSHH sampling program. Where possible, historical data is used for comparison, including data from1995 through 2010. *Appendices A*, *B*, and *D* include graphs constructed with the data collected during this period.

3.1 Dissolved Oxygen

Dissolved oxygen, the form of oxygen that marine life needs to survive, is an important indicator of the health of our Long Island Sound estuary. Hypoxia (low oxygen) and anoxia (no oxygen) are common water-quality problems that occur during the summer in Hempstead Harbor and in other areas in and around Long Island Sound, particularly in the western sound. DO is indirectly affected by nutrient enrichment, particularly nitrogen, which can enter Hempstead Harbor through storm-water runoff, discharges from sewage treatment plants, or leaching from failing septic systems. Nitrogen accelerates the growth of phytoplankton or algae and increases the density of organisms that grow. The increased number and growth rate causes frequent or prolonged "blooms." When the cells in the plankton blooms die off, the decomposition process depletes dissolved oxygen that fish, shellfish, and other aquatic organisms need to survive. The larvae of these organisms are often especially sensitive to low DO concentrations. In addition to these direct effects of low DO levels, indirect effects can also occur. Low DO levels can cause some bacteria to produce hydrogen sulfide, which is a gas that can be toxic to fish.

Although many 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 more organic matter is decaying and rates of photosynthesis are declining. Therefore, productive aquatic ecosystems with larger nutrient loads are more prone to low DO levels. The impact of temperature and salinity on DO levels in these ecosystems is generally of secondary importance. Generally, as temperature and salinity increase, the dissolved oxygen concentration decreases. Since the majority of organic-matter decay occurs at the estuary bottom, DO levels tend to be higher at the surface and lower at the bottom of the water column. Density-dependent stratification, such as elevated salinity levels at the harbor bottom, inhibits mixing and exaggerates this affect.

Previously, DO levels above 5.0 ppm were considered healthy; DO levels below 5.0 ppm were considered to cause various adverse impacts (related to growth, reproduction, and survival of organisms). The severity of impacts, and threshold DO levels where impacts occur, are strongly species dependent. (For example, bottom-dwelling marine species would be more affected than species that can move more easily to higher oxygen areas.)

A **new dissolved oxygen standard** was implemented by the DEC on February 16, 2008. For estuarine waters such as Hempstead Harbor, the **chronic, or long-term, DO standard is 4.8 ppm**. This means that DO levels of 4.8 and above are considered to be protective of most marine aquatic species. The **acute DO standard is 3.0 ppm**, which means that if DO concentrations fall below 3.0 ppm, conditions are considered hypoxic; under hypoxic conditions, most juvenile fish will not be able to survive, many adult fish will avoid or leave the area, and species that cannot leave the area will 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. 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.

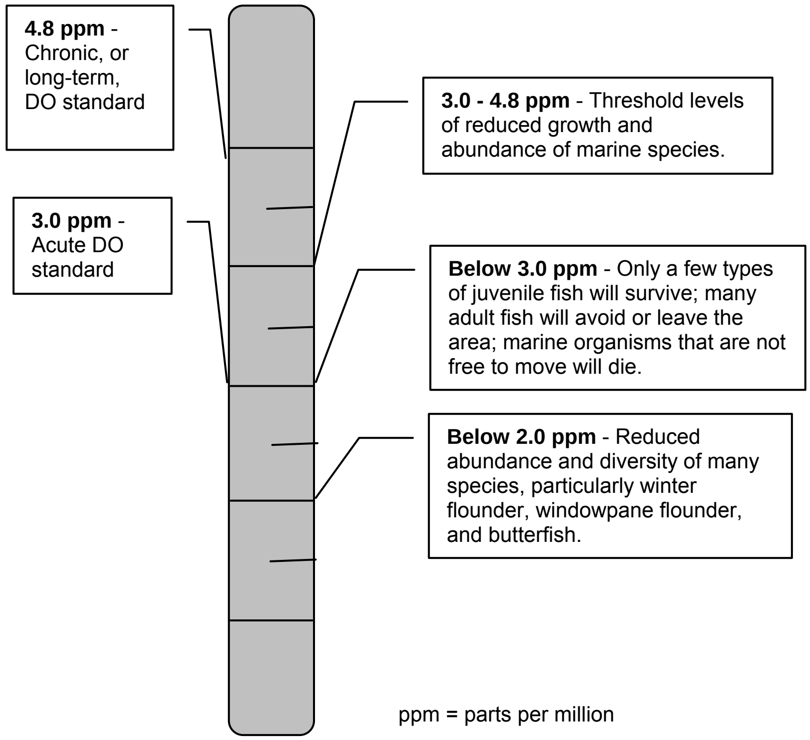


Figure 1. DO standards and effects of depleted DO on marine life

However, states often interpret effects of environmental conditions on marine life differently; for example, Connecticut's DO standard was 5.0 ppm through 2010 (it was changed to 4.8 ppm in 2011), and it specified maximum periods for which exposure to low DO is allowed. These standards are similar to the New York standards, although not completely consistent.

Percent saturation of dissolved oxygen is also monitored in Hempstead Harbor. Percent saturation is a measure of the amount of oxygen currently dissolved in water compared with the amount that can be dissolved in the water, and is influenced by variability in water temperature and salinity. In a marine system with abundant nutrients and organisms, such as Hempstead Harbor, dissolved oxygen levels near the surface can be oversaturated during the day (greater than 100%) due to photosynthesis by algae, and undersaturated at night (50% or lower) due to decay of dead organic matter (respiration).

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

Fortunately, there were no fish kills during 2001 through 2004 despite extended periods of hypoxia. A clam kill occurred in 2005 south of Bar Beach, near CSHH #5, but this kill reportedly resulted from lunar/tidal effects and not hypoxia. A small, localized fish kill occurred in 2006 from an unusual condition off of Morgan Beach. (In August 2006, a small area near the mouth of Glen Cove Creek turned bright blue and had a distinctive odor. Several dozen small fish were seen dead or dying in the area as a result of low DO and hydrogen sulfide produced by sulfur bacteria present in the decomposition of algal cells.) (See *Section 4.7* of this report.) No fish kills in Hempstead Harbor were observed or reported in 2007 through 2010.

Figure 2 presents average annual dissolved oxygen levels at CSHH #1, CSHH #2, and CSHH #3 for the period of record. The data are also summarized in *Table 3*, along with results for CSHH #8.

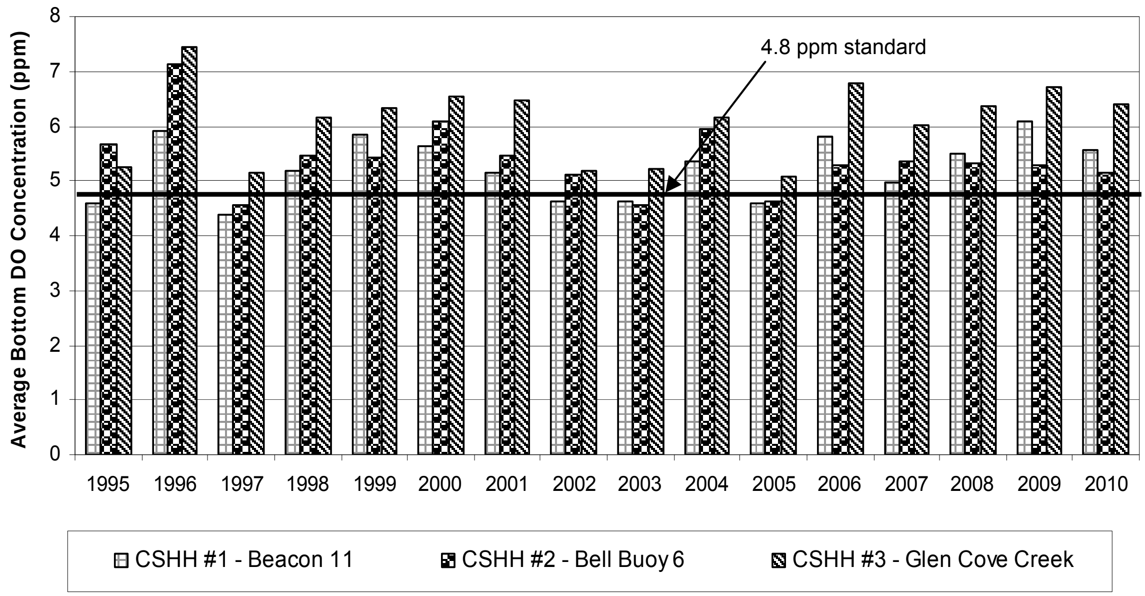


Figure 2. Measured average DO in Hempstead Harbor for 3 monitoring stations

Average DO levels at all locations (depicted in Figure 2) for the 2010 monitoring season were generally within the range of values for many previous years and below the average values of DO levels for the previous five years. The largest decreases were found at CSHH #2 and #3 (5.16 ppm and 6.41 ppm respectively), where the level dropped 2% from the average of the previous five years. CSHH #1 and CSHH #8 had only slight decreases (≤1%). These decreases are a reversal of the improvements witnessed in 2009.

The number of hypoxic measurements in 2010 was moderate. Hypoxic conditions were recorded on all four of the sampling days in July: July 7 at CSHH #2 (2.43 ppm), July 15 at CSHH #1 (2.71 ppm); July 21 at CSHH #1, CSHH #2, CSHH #3, and CSHH #8 (2.8 ppm, 1.0 ppm, 2.79 ppm, and 2.46 ppm, respectively); and July 28 at CSHH #1 and CSHH #3 (2.73 ppm and 2.1 ppm, respectively). Hypoxic conditions were recorded three days in August: on August 4 at CSHH #1 and CSHH #2 (2.6 ppm and 1.15 ppm, respectively); August 11 at CSHH #1 and CSHH #2 (2.24 ppm and 1.29 ppm, respectively); and August 26 at CSHH #8 (2.05 ppm). Hypoxic conditions were recorded on only one day in September: September 2 at CSHH #2 (2.53 ppm). One anoxic event, CSHH #2 on July 28 (0.58 pm), and a second borderline event, CSHH #2 on July 21 (1.0 ppm), were measured during the May 20 through November 3, 2010, sampling season.

Table 3. Average Monitoring-Season Dissolved Oxygen Levels in Hempstead Harbor

Average Bottom DO (ppm)	2010	2009	2008	2007	2006	2005	2004	2003
CSHH #1	5.55	6.09	5.50	4.99	5.76	4.59	5.36	4.63
CSHH #2	5.16	5.30	5.31	5.37	5.27	4.63	5.96	4.55
CSHH #3	6.41	6.72	6.35	6.02	6.80	5.09	6.17	5.21
CSHH #8	6.26	6.73	5.73	5.93	7.05	5.76	6.58	5.28

Average Bottom DO (ppm)	2001	2000	1999	1998	1997	1996	1995
CSHH #1	5.16	5.64	5.85	5.17	4.39	5.90	4.60
CSHH #2	5.46	6.10	5.44	5.45	4.54	7.11	5.67
CSHH #3	6.47	6.54	6.32	6.48	5.15	7.45	5.26
CSHH #8	6.82	7.35	7.14	N/A	N/A	N/A	N/A

The percentage of DO measurements in the high DO range decreased in 2010 in all stations except CSHH #1 compared with levels in 2009 (see *Table 4*). The percentage of DO measurements in the mid- to low-level ranges (3 to 5 ppm) in 2010 compared with the percentage in previous years increased in all locations. The percentage of DO measurements in the hypoxic range, however, increased in three of the four sampling locations (CSHH #1, CSHH #2, and CSHH #8) and showed no change in the remaining location (CSHH #3). It should be noted that these statistical changes resulted from only one and two additional hypoxic measurements at CSHH #2 and #8, respectively

The cause of low DO is difficult to discern. Anthropogenic factors that may be reducing DO levels at the bottom of Hempstead Harbor and Long Island Sound include nutrient enrichment from wastewater-treatment-plant discharges; overuse of fertilizers in agriculture, home gardening, and golf-course maintenance; and residual oxygen demand in bottom sediments from past industrial activities.

Better DO levels during other monitoring seasons could be the result of natural and human factors, such as mixing of the water column by wind, reduced nitrogen discharges from the sewage treatment plant, improved storm-water quality resulting from watershed initiatives, and others that are not known. Changes in air and water temperature and the physical nature and chemistry of the water can also influence DO levels, although typical effects are relatively minor. (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.

Table 4. DO Readings 1996-2010 Number and Percentage of Testing Dates at Which DO Tested at Specific Levels

	>6 ppm		5 to 6 ppm		3 to 5 ppm		<3 ppm	
CSHH #1–Beacon 11								
1996	11	58%	—	—%	3	16%	5	26%
1997	4	27	3	20	4	27	4	27
1998	8	40	4	20	6	30	2	10
1999	11	50	3	14	5	23	3	14
2000	8	44	2	11	8	44	0	0
2001	7	37	3	16	6	31	3	16
2002	5	26	5	26	3	16	6	32
2003	5	25	5	25	5	25	5	25
2004	7	35	1	5	9	45	3	15
2005	8	35	2	9	4	17	9	39
2006	11	50	1	5	7	32	3	14
2007	5	24	3	14	11	52	2	10
2008	8	35	6	26	8	35	1	4
2009	11	48	6	26	4	17	2	9
2010	12	50	2	8	5	21	5	21
CSHH #2–Bell Buoy 6								
1996	10	63%	2	13%	3	19%	1	6%
1997	2	13	2	13	5	33	6	40
1998	9	50	2	15	5	28	2	11
1999	8	42	1	5	6	32	4	21
2000	11	61	3	17	3	17	1	6
2001	8	42	5	26	2	10	4	21
2002	9	50	0	0	4	22	5	28
2003	6	32	4	21	4	21	5	26
2004	8	44	3	17	4	22	3	17
2005	5	22	2	9	8	35	8	35
2006	8	36	2	9	4	18	8	36
2007	3	15	7	35	9	45	1	5
2008	8	42	3	16	5	26	3	16
2009	10	50	1	5	4	20	5	25
2010	10	43	1	4	6	26	6	26
CSHH #3–Glen Cove Creek								
1996	12	63%	2	11%	4	21%	1	5%
1997	6	38	2	13	4	25	4	25
1998	12	63	2	11	3	16	2	11
1999	13	59	3	14	3	14	3	14
2000	13	68	2	11	4	21	0	0
2001	11	58	2	10	4	21	2	10
2002	10	53	0	0	4	21	5	26
2003	8	42	3	16	5	26	3	16
2004	8	40	3	15	8	40	1	5
2005	7	30	3	13	7	30	6	26
2006	14	64	3	14	3	14	2	9
2007	7	33	6	29	7	33	1	5
2008	13	57	6	26	2	9	2	9
2009	14	61	5	22	2	9	2	9
2010	12	52	2	9	7	30	2	9

	>6 ppm		5 to 6 ppm		3 to 5 ppm		<3 ppm	
CSHH #8–Glen Cove STP Outfall								
2001	12	63%	5	26%	1	5%	1	5%
2002	7	37	8	42	3	16	1	5
2003	7	35	6	30	5	25	2	10
2004	11	65	2	10	5	25	2	10
2005	10	43	1	4	7	30	5	22
2006	16	73	2	9	4	18	0	0
2007	8	40	6	30	5	25	1	5
2008	11	48	4	17	7	30	1	4
2009	14	61	6	26	3	13	0	0
2010	13	57	2	9	6	26	2	9

3.2 Temperature

Water temperature is monitored to record seasonal and annual changes of temperature 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. Although a warming trend has been observed in Long Island Sound (about 1-1.1ºC warmer over the last 15 years at bottom and surface, respectively), when temperatures are averaged throughout the sound, a difference is also observed between the western and eastern portion of the sound: the western portion, influenced most by fresh water inputs, is cooler than the eastern portion, influenced most by ocean water. The effects of climate change are not discernible in Hempstead Harbor probably because the shallower water and tidal flushing are affected most by the cooler water of western Long Island Sound.

Water temperature is also used to determine the percent saturation of DO within the harbor, as described earlier in this report. 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. 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 8.3 ppm.

Additionally, temperature monitoring determines whether the water column is stratified or well mixed. Stratification is the process through which water at the surface of the harbor can warm while water at the bottom stays cold. Since 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 the majority of oxygen transfer occurs, which prevents replacement of DO lost through consumption by organisms. Hempstead Harbor does not generally exhibit pronounced stratification; because the harbor is relatively shallow and strongly influenced by tides, vertical mixing continues through much of the season.

Figure 3 presents average annual water temperature for each monitoring location for the period of record. Many factors affect water temperature, but water temperature is more representative of conditions that occurred over several days and is not heavily influenced by daily variation in air temperature.

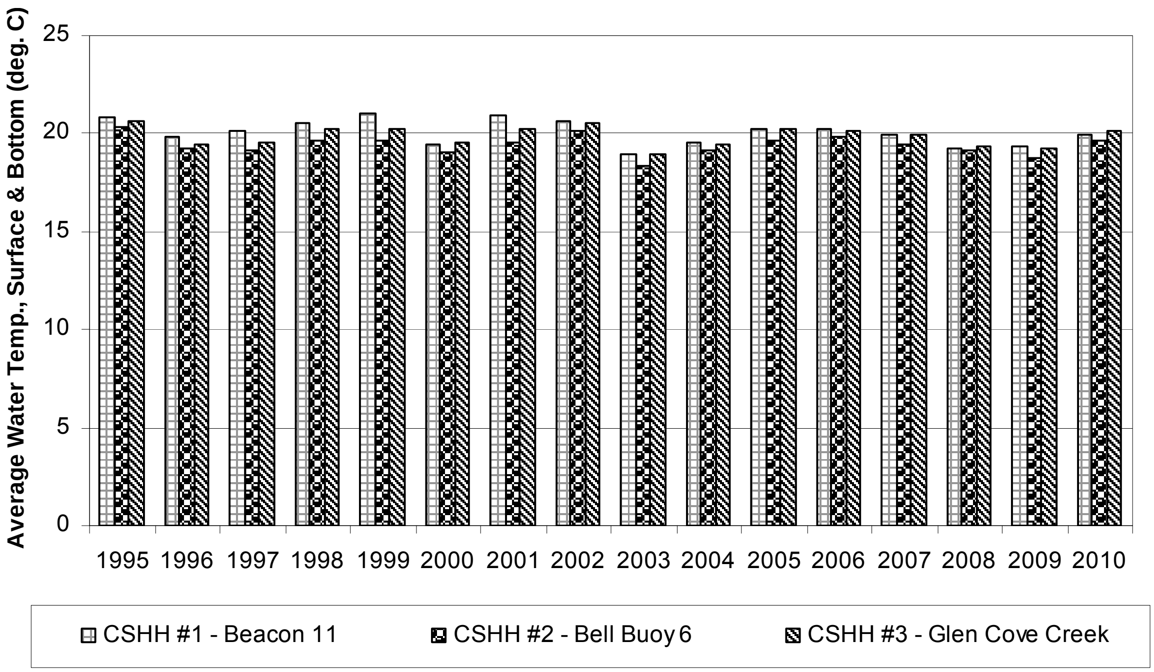


Figure 3. Average water temperature recorded during seasonal monitoring events

Measured water temperatures at CSHH #2 were slightly lower than at the other monitoring locations during each year, although the temperature difference is generally less than 1ºC. CSHH #2 is located at the mouth of the harbor and is more significantly influenced by the Long Island Sound's deeper, and thus cooler, water. In 2010, water temperature was slightly warmer than 2009 but typical to all locations in past years (average water temperatures for all years, 1995-2009, is 20.0ºC, 19.4ºC, and 19.8ºC respectively). See *Appendix A* for additional air and water temperature monitoring data.

Air temperature affects aquatic temperature, which affects both dissolved oxygen concentrations and biological activity within an aquatic system. However, since CSHH records temperature data only during monitoring events, temperature more strongly indicates the time of day that CSHH monitored a certain location. As a whole, however, monitoring events began at similar times each season and have similar durations. As such, changes in temperature averaged between sites during a season could be indicative of annual variability in weather conditions.

Figure 4 presents average monitoring-season air temperature recorded at CSHH #1 through CSHH #3 for each year since 1995. Average air temperatures recorded during the monitoring events vary by approximately 5 degrees during the period of record. On average, 2004 was the coolest monitoring season on record, with an average temperature of 19.5ºC recorded at the three stations, whereas average air temperatures for 1995 through 2003 and 2005 were 2ºC warmer. Average air temperatures recorded from 2005 through 2007 were more consistent with average air temperature recorded from 1995-2003. In 2010, the average air temperature was similar to that seen in 1995 through 2003 and 2005. The average temperature in 2010 was a full 2ºC higher than 2008 and 2009 (the second and third coolest monitoring season on record respectively).

Somewhat similar characteristics are apparent in the air temperature data as compared with the water temperature data collected by CSHH during the monitoring season.

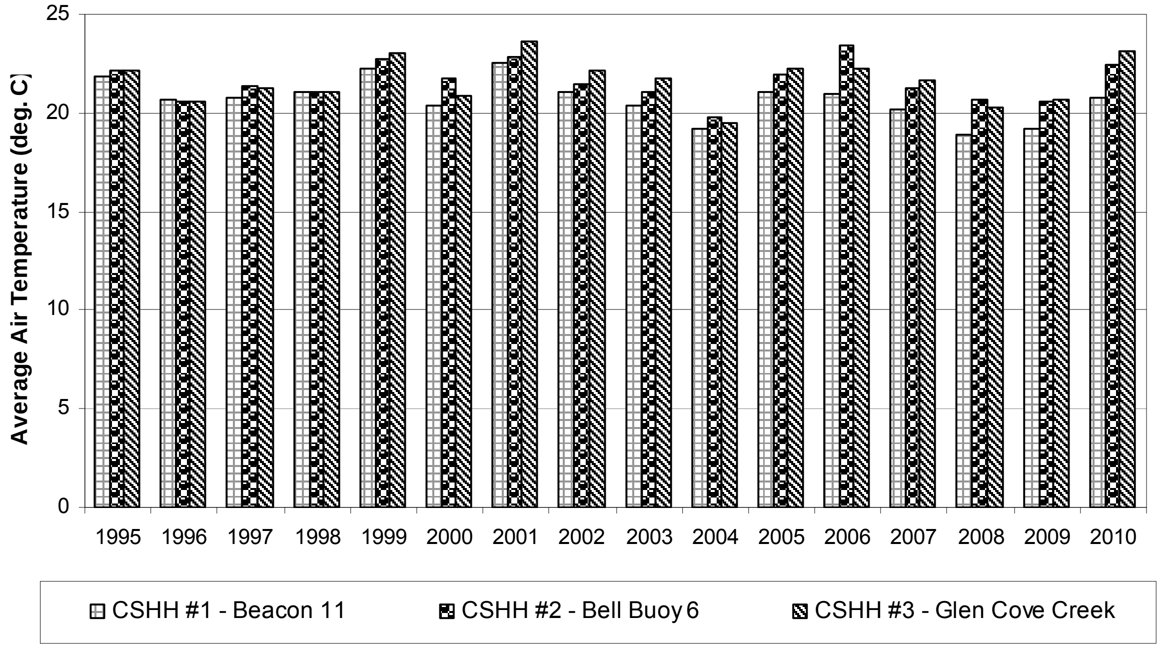


Figure 4. Average air temperature recorded during seasonal monitoring events

3.3 Salinity

Monitoring salinity assists in determining whether the harbor is being influenced by tidal water or, instead, by freshwater from the watershed (i.e., from streams, storm water, wastewater, or other discharges). Like temperature, salinity is an indicator of the water's oxygen-holding capacity and whether the water column is stratified.

Salinity can also affect dissolved oxygen levels; the saturation level of dissolved oxygen at 25 ppt salinity is equal to approximately 85% of the saturation level of dissolved oxygen for freshwater. In Long Island Sound, salinity generally ranges between 21 ppt and 28 ppt (as compared with the typical salinity level of 32 ppt in the open ocean). Salinity levels within an estuary are generally affected by proximity to freshwater inflows, such as rivers or sewage treatment plant discharges, and through direct precipitation and runoff.

Figure 5 presents average annual salinity levels at CSHH #1, #2, and #3 for the period of record. Salinity levels in Hempstead Harbor generally vary less than in the sound. During the testing season, salinity readings at these three stations within Hempstead Harbor usually range from 23 ppt to 28 ppt, with lower readings generally observed in the spring, and gradually increasing through the fall.

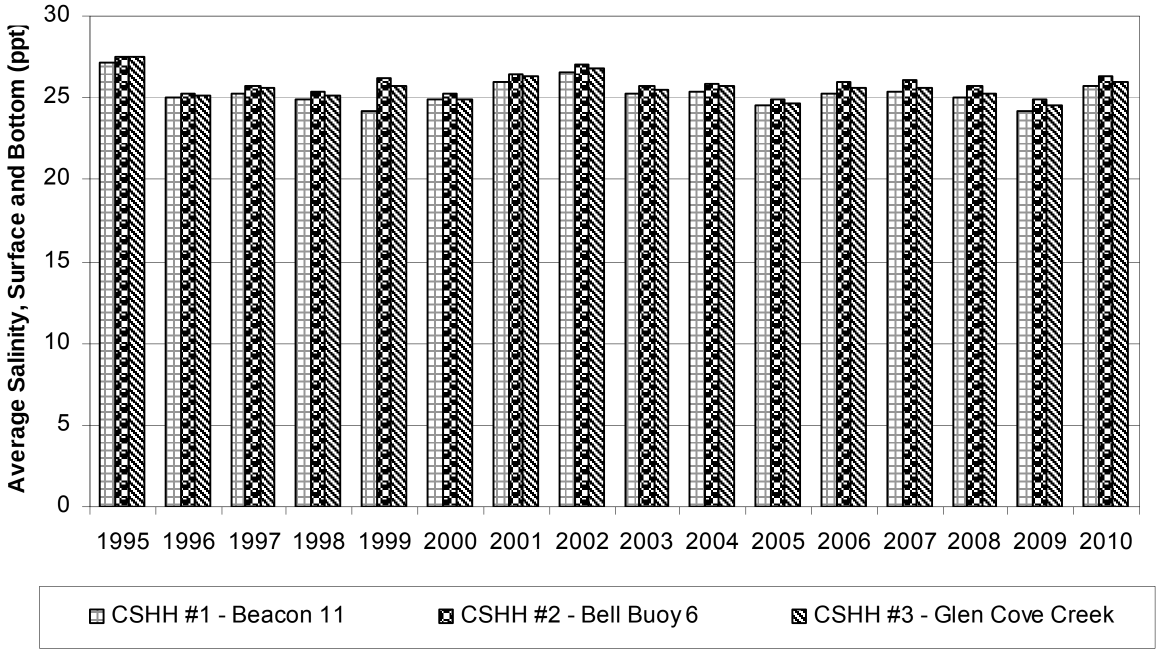


Figure 5. Measured average salinity in Hempstead Harbor during seasonal monitoring events

Additionally, salinity levels measured at the bottom of the harbor are generally higher than those near the surface, because high-salinity water is denser and tends to sink. Surface salinity levels are often approximately 1 ppt lower than those at the bottom, suggesting that slight stratification is occurring in the harbor.

In most years (1996 through 2000 and 2003 through 2010), average salinity levels within the harbor during the monitoring season were approximately 25 ppt (± 1 ppt), and the remaining years were characterized by slightly elevated levels, such as 1995 when average salinity during the monitoring season was above 27 ppt at each station. Average salinity levels in 2010 (26.03 ppt) were approximately equal to average levels from 2001 through 2002 and 2006 through 2008. Levels in 2005 were the lowest measured during the period of record. See *Appendix A* for additional salinity data results.

The monthly average (of surface and bottom readings) for salinity levels at each station (CSHH #1-3) in June ranged from 24.94 ppt to 25.51 ppt, whereas the monthly average in October for each station ranged from 26.47 ppt to 27.06 ppt.

3.4 pH

pH is monitored to follow trends in aquatic life and water chemistry. Carbon dioxide (CO_2) released by bacteria respiration and uptake via plant photosynthesis affect aquatic pH over short periods (hours to days), whereas the increase in atmospheric CO_2 may affect aquatic pH over decades. Measured average pH during the 2010 season was less than 2009 but still higher than that seen in the previous three monitoring seasons.

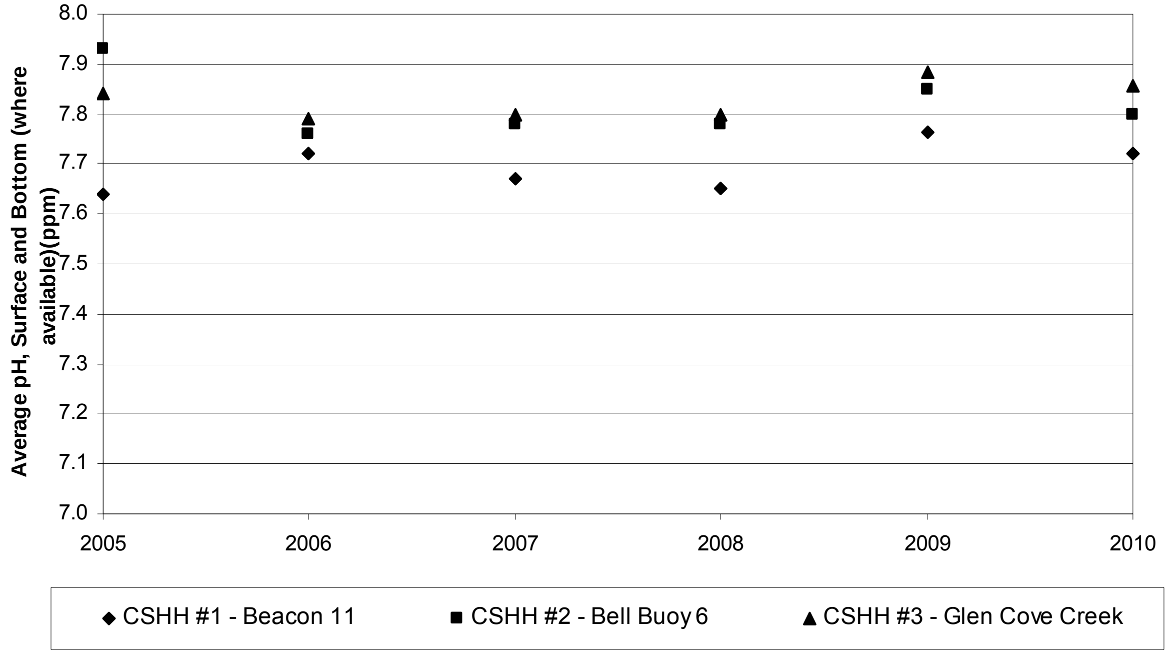


Figure 6. Measured average pH in Hempstead Harbor during seasonal monitoring events

3.5 Turbidity/Water Clarity

In general, turbidity represents the clarity of the water. It is caused by suspended solids, dissolved organic matter, and plankton and may vary due to natural events such as tidal flux, rainfall, seasonal algae blooms, and ice melt. Human activities that cause eutrophication (excess nutrients) and sediment loading (e.g., from uncontrolled construction-site runoff) also increase turbidity.

3.5.1 Secchi-Disk Measurements

Water clarity is commonly monitored through the use of a Secchi disk–a white 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 is limited by the amount of plankton, algae, or other suspended matter in the water, and so Secchi readings are typically 1 to 2 meters for Hempstead Harbor during the summer months but typically range from 0.25 to 3 meters during the monitoring season. For 2010, the range for the monitoring season was 0.8 to 3.0 meters (for CSHH #1-3). The large amount of plankton in the water also gives the harbor its usual green to brown color.

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 may cause harm to fish growth and survival as well as affect gill function in both naturally low and highly turbid waters.

The U.S. EPA's *Quality Criteria for Water* report (1986) stated that turbidity could affect both freshwater and marine species of fish in the following ways:

1. Kill the fish or reduce their growth rate, resistance to disease, etc.
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 (e.g., small increases in turbidity may afford some species 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 on water bodies depends on the determined "background" turbidity level of the water body (see, e.g., Johnson and Hines 1999; Meager 2005). (At this time the "background" turbidity level is unknown for Hempstead Harbor and Long Island Sound.)

In New York, the water quality standard for marine waters is that there shall be "no increase that will cause a substantial visible contrast to natural conditions." *Table 5* provides examples of West Coast jurisdictions that have established numeric standards measured in nephelometric turbidity units (NTUs).

Table 5. Review of Turbidity Criteria

State	Criteria	Reference
State of Washington	"Extraordinary and excellent quality" waters – Not to exceed: • 5 NTU above background levels when the background is 50 NTU or less • 0% increase if the background is greater than 50 NTU "Good and fair quality" waters – Not to exceed: • 10 NTU above the background levels when it is less than 50 NTU • 20% increase if the background is more than 50 NTU	WAC 173-201A-210(1)(e)
State of Oregon	Not to exceed a 10% increase from background levels	OAR 340-041-0036
British Columbia	• Change from background of 8 NTU at any one time for a duration of 24 h in all waters during clear flows or in clear waters • Change from background of 2 NTU at any one time for a duration of 30 d in all waters during clear flows or in clear waters • Change from background of 5 NTU at any time when background is 8 - 50 NTU during high flows or in turbid waters • Change from background of 10% when background is >50 NTU at any time during high flows or in turbid waters	www.env.gov.bc.ca/wat/wq/BCguidelines/turbidity/turbidity.html

Because of the previously cited significance of turbidity on the marine environment, turbidity sampling was initiated for Hempstead Harbor stations in July 2008. At each station monitored, turbidity is measured using a LaMotte 2020e meter at two depths—at a half meter below the surface and at Secchi-disk depth. (It should be noted that the results generated by the LaMotte 2020e (an EPA approved design) may be affected by color interferences from certain algal blooms.)

Given that the Secchi-disk depth decreases as the water sampled gets harder to see through, it follows that turbidity measurements should generally be inversely related and increase as the Secchi depth decreases (and vice versa). Although, based on a review of scientific literature, there is *no direct inverse relationship* between Secchi depth and turbidity measurements (i.e., Secchi Depth = N/Turbidity, where N is a variable coefficient) (Effler, 1988)), measures of conditions at Hempstead Harbor stations (except for CSHH #13 in 2010) clearly indicate an inverse relationship; that is, the greater the number for the depth at which the Secchi disk could be seen below the surface (the greater the transparency), the lower the number measured by the meter in NTUs (the lower the turbidity). In 2010, the turbidity ranged from 0.31 to 5.54 NTUs at the sampling depth of one-half meter (CSHH #1-#3). See *Appendix A* for additional turbidity data.

3.6 Nitrogen

Ammonia, nitrate, and nitrite are three nitrogen-based compounds that are commonly present in marine waters. CSHH collects data for each of these compounds. Others include organic nitrogen and nitrogen gas.

3.6.1 The Nitrogen Cycle

Nitrogen is generally made available to a marine ecosystem from the atmosphere (called fixation) and from the watershed. Nitrogen fixation is usually a smaller source of nitrogen than the watershed sources (i.e., overfertilization of gardens, lawns, and farmlands; failing septic systems; storm-water runoff; and old or failing wastewater treatment plants). Inputs of nitrogen from the watershed are in the form of ammonia, nitrite, or nitrate (*Figure 6* presents a diagram of the nitrogen cycle in the water environment.). Ammonia and nitrate generally originate from fertilizer, human or animal wastes from old or failing septic systems and wastewater treatment plants, and storm-water runoff. Nitrate is also a product of properly functioning treatment plants, which convert ammonia to nitrate.

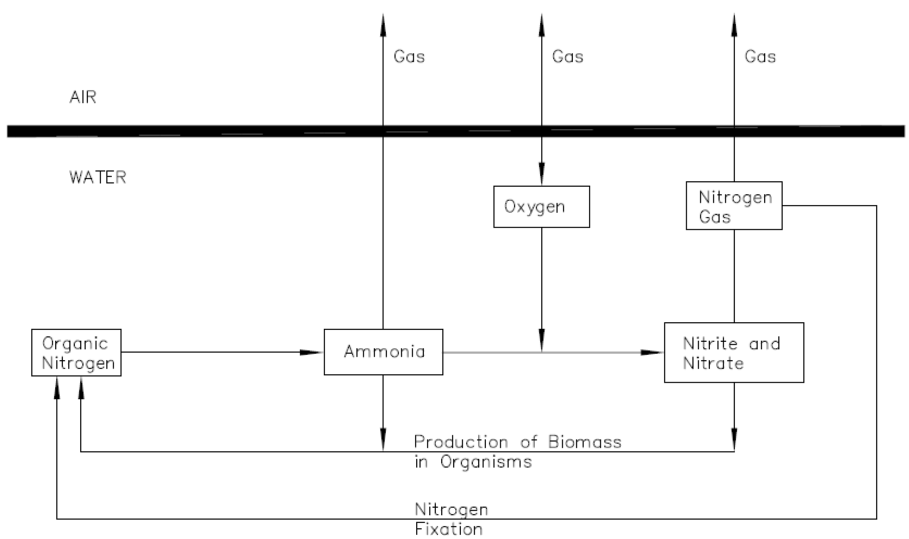


Figure 6. Nitrogen in marine environments
(Adapted from: Surface Water Quality Modeling, Steven Chapra, McGraw-Hill, 1997)

Ammonia and nitrate are important for organisms, which require nitrogen for growth and reproduction. Nitrogen forms amino acids, proteins, urea, and other compounds that are needed for life. These forms of nitrogen are referred to as organic nitrogen.

Many forms of organic nitrogen are quickly converted to ammonia in water. One form of ammonia can form a gas and be released into the atmosphere. Some forms are toxic to marine life in high concentrations.

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, which is released to the atmosphere

Sewage treatment plants can be upgraded to provide biological nutrient (nitrogen) removal. The Glen Cove treatment plant was upgraded to do so. Older wastewater treatment plants blow oxygen into the wastewater to promote the growth of microorganisms, which decay carbon-based waste rapidly and produce carbon dioxide. Ammonia is converted into nitrate as a byproduct. Treatment plants with nitrogen removal upgrades have an anoxic zone in the wastewater treatment tanks and circulate wastewater that has been treated with oxygen already. Highly specialized bacteria remove the oxygen from the nitrate, releasing nitrogen gas and removing the nitrogen from the wastewater stream.

3.6.2 Nitrogen Monitoring by CSHH

CSHH takes samples weekly at CSHH #1, #2, #3, #8, and #13 and, when tidal and weather conditions allow, at CSHH #4-7, 14, and 15 to test for ammonia, nitrite, and nitrate. In 2004-2006, the samples that were sent to the town lab for analysis produced results that indicated interferences with the ammonia testing techniques from possibly the saltwater, turbidity, or water color. In 2010 as in 2008-2009, nitrite and nitrate samples continued to be analyzed at the Town of Oyster Bay lab using an electronic Hach kit, but ammonia was measured on board at the different stations using LaMotte testing kits that employ either the Nessler or salicylate methods.

The presence of ***ammonia (NH_3)*** in the harbor can indicate nutrient enrichment. Ammonia is usually only detected when wastewater treatment systems, including septic tanks, cesspools, and publicly owned treatment works (POTWs), are malfunctioning and discharging to the harbor. However, elevated ammonia levels can also be present in the harbor from storm-water discharges or may even indicate a large presence of fish. Generally, ammonia is measured using the Nessler and salicylate methods at CSHH #1, #7, and #8. If ammonia is detectable at CSHH #1, a midpoint in the harbor, ammonia levels are then measured at the other locations using both the Nessler and salicylate methods to see whether either will pick up detectable amounts of ammonia at those stations. If ammonia is not detectable at CSHH #1, it is unlikely that ammonia will be detectable at other locations except CSHH #8 (due to the discharge from the Glen Cove STP).

Nitrate (NO_3) and ***nitrite (NO_2)*** occur in later stages of the nitrogen cycle and are normally present in the estuary. However, high concentrations indicate enrichment problems and can also be used to anticipate algal blooms and hypoxia.

Following years of studies and modeling around Long Island Sound, nitrogen discharge limitations were imposed on sewage treatment plants all around the sound to reduce nitrogen inputs, thereby reducing algal blooms and the frequency and duration of low oxygen levels throughout the sound. However, reducing storm-water inputs is more complicated because the sources of nitrogen and other pollutants are so diffuse.

3.7 Chlorine

Through 2008, CSHH's program included testing for total residual and free and available chlorine at CSHH #8 to monitor the amount of chlorine discharged from the STP into Glen Cove Creek. However, chlorine testing ceased in June 2009, after a backup generator was installed at the STP to make the ultraviolet (UV) light disinfection system fully operational; the chlorine vats at the STP were emptied at this time. (On March 1, 2008, Nassau County purchased the plant from Glen Cove but retained the operator, Severn Trent Environmental Services, Inc.)

The UV disinfection system, which was installed at the plant at the end of the 2006 monitoring season, uses UV light to disinfect the wastewater prior to discharge. UV disinfection leaves no chemical residual and will not affect the environment when water from the plant is discharged. However, while the plant did not have a back-up generator, the chlorination system ran in conjunction with the UV system to prevent untreated sewage from entering the harbor in the event of a power failure. During this time, the amount of chlorine residual in the STP discharge decreased to 0.5 ppm (the typical chlorine residual was 2 ppm before the UV system began operating). 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. However, in 2010, a power failure caused a series of system failures at the STP that resulted in a large discharge of sewage to the harbor (see S*ection 3.8.3*. below).

3.8 Bacteria

The Nassau County Department of Health and the New York State Department of Environmental Conservation use ***bacteria levels*** to open or close swimming beaches and shellfish beds. **Coliform** and **enterococci** bacteria are typically found in human and warm-blooded animals and are indicators of fecal contamination and the potential for the existence of other organisms that may have an adverse impact on human health.

Total coliform bacteria is widely present in the environment, whereas **fecal coliform** is most commonly found in the intestines of warm-blooded animals and birds, and enterococci is most prevalent in the human digestive system. Through 2005, NCDH measured and recorded the most probable number (MPN) of bacterial cells present in a sample and then calculated the logarithmic average or geometric mean of the results, which reduces the influence of large spikes on the average values. The resulting values are used to determine the likelihood that fecal contamination is present. In 2006, NCDH began using a filtration method of measuring fecal coliform and enterococci. This methodology is believed to be more precise and has the advantage of producing results in 24 hours, a shorter time frame than was required with the previous methodology. The filtration method produces results measured in colony forming units (CFUs).

The membrane-filter test is performed by pulling a sample of water through a sterile filter with a vacuum pump. The filter is then placed on an agar plate and incubated. Bacteria from the water that collected on the plate multiply during incubation, forming colonies that can be seen and counted without a microscope.

3.8.1 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 five beaches around the harbor. These bacteria samples are analyzed at the NCDH laboratory in conformance with beach-closure standards that were implemented in 2004 (see *Section 3.8.2*). (In 2008, NCDH discontinued the analysis of fecal coliform for beach closures but continued both fecal coliform and enterococci analyses for the midharbor samples collected by CSHH.)

Tappen Beach Park and marina at eastern shore of Hempstead Harbor (7/08) (photo by Joel Ziev)

During the 1980s, there were chronic raw sewage spills into Hempstead Harbor, which 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 due to high bacteria levels.

However, in 2000 NCDH initiated a preemptive beach-closure program; that is, in addition to beach closings based on bacteria sample results, NCDH instituted **administrative beach closings** following rain events that exceed a threshold level and duration of precipitation. That threshold is established at the beginning of each season based on previous sample results (typically, the threshold is ½ inch of rain or more). Therefore, even though water quality has improved remarkably, beach closures started to increase because of the preemptive-closure program. In 2010, the Sea Cliff Village and Tappen Beaches were closed preemptively for three days, related to three rain events. The beach closings occurred on 7/14, 7/26, and 8/23, based on a threshold of ½-inch of precipitation over a 24-hour period. North Hempstead Beach Park was closed for four; the additional day was a preemptive closure on 6/10, when other beaches around Hempstead Harbor had not yet opened.


View of lower harbor looking south to the Roslyn viaduct (photo by Jim Moriarty, 11/3/10)

3.8.2 Beach-Closure Standards

In October 2000, Congress enacted the Beaches Environmental Assessment and Coastal Act of 2000 (BEACH Act), which gave EPA the authority to set and impose water-quality standards for coastal beaches throughout the United States and compelled all states to adopt new criteria for determining beach closures by April 2004. The NCDH began doing parallel testing in 2002, using the state's then-current indicator—coliform (both total and fecal)—along with the proposed indicator—enterococcus. Both coliform and enterococcus are naturally present in the human intestine and, therefore, could indicate the presence of other potentially harmful organisms. (Both coliform and enterococci are present also in the intestines of warm-blooded animals and birds.) EPA considers the enterococcal standard to be more closely correlated with gastrointestinal illnesses and, therefore, more protective of human health. However, there have been only limited studies as to the effectiveness of using the enterococcal standard. A primary advantage in switching to the enterococcal standard was that it takes only 24 hours to obtain results, whereas it took 48 hours to obtain results using the coliform standard.

New York State instituted revised beach closure standards on June 23, 2004, presented in NYCRR Title 10, Section 6-2.15. The standards for marine water now include:

1. 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.
2. 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.

As of the 2008 season, enterococcus is the sole indicator organism recommended by the USEPA and required by the New York State Sanitary Code for Bathing Beaches (Subpart 6-2) for evaluating the microbiological quality of saline recreational beach water, and, therefore, NCDH discontinued analyzing beach water samples for fecal coliform.

3.8.3 Monitoring Mid-harbor Points and Glen Cove Creek for Bacterial Levels

CSHH collects samples for bacteria analysis at 20 CSHH monitoring stations in Hempstead Harbor (12 stations on a weekly basis and others depending on weather and tidal conditions). Five of these sites (CSHH #9-13) started as temporary sites but became part of the regular sampling program to test for the presence of bacteria from discharge pipes in Glen Cove Creek in the vicinity of the STP.

Unusual discharges from these pipes were noted in 2004-2006 and were brought to the attention of city officials in Glen Cove, the NCDH, and HHPC, NC Department of Public Works (DPW), and DEC. In 2006, a boat tour of Glen Cove Creek took place with representatives from Glen Cove, the city's consultants, and CSHH to view the discharge pipes along the creek. Also in 2006, the city received a grant from the New York Department of State to map and source the outfalls along both the north and south sides of the creek. As several water samples from the area continued to show high levels of fecal coliform and enterococci, further investigation was needed. In 2007, HHPC requested a meeting and follow-up with Glen Cove officials, consultants, as well as representatives from CSHH, DEC, NCDH, NCDPW, and NY Sea Grant (NEMO Program). As result, NCDPW and NCDH did further testing, but there were no definitive answers as to the source of the bacteria. In 2008, NCDPW further investigated the discharge pipes in question using a camera, and NCDH did dye testing at a possible source, but efforts by both county departments and the City of Glen Cove provided inconclusive results.

CSHH continues to monitor all of the stations in the creek and inform both NCDPW and NCDH of any unusual conditions. Occasionally, a white flow is observed from CSHH #10 and noted on both the NCDH data sheets for bacteria samples and the CSHH data sheets.

On June 26, 2010, a power failure caused a series of system failures within the STP, and as a result 900,000 gallons of untreated sewage was released from the plant. Approximately 300,000 gallons were recovered, but 600,000 gallons were discharged to Glen Cove Creek. Despite the fact that the release occurred on a busy weekend for area beaches, there were no reports about unusual conditions in the creek or harbor. Extra water samples were collected on June 28, following the spill, for DEC and NCDH analysis, and, fortunately, results showed low amounts of bacteria, probably due to a full moon and the related strong tidal flow.

3.8.4 Comparing Bacteria Data

Variability in bacteria concentrations from samples collected at an individual beach on a particular day is presented in the data contained in *Appendix B*. Although rainfall can increase bacteria in a water body, it is difficult to see clear and consistent influences from rainfall when rainfall dates are plotted against coliform counts, as presented in *Appendix B* as well. It is also 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. For example, the method used for enterococci analysis by the NCDH laboratory changed from the 2004 to 2005 monitoring seasons, making comparisons between data from the two years difficult.

In 2010, monthly average bacteria results for enterococci at the area beaches ranged from 2.24 CFU/100 ml at Sea Cliff Beach in April to 159.64 CFU/100 ml at the same location in August (September averages were not considered as there was only one sample during the month). Overall, Sea Cliff Beach witnesses the highest average bacteria levels, whereas North Hempstead Beach Park (south)(formerly Bar Beach) sees the lowest (see *Table 6*). It should be noted that this is a direct reversal of the average bacteria levels witnessed in 2009.

Table 6. Monthly Average for Beach Enterococci Data for 2010

	Units in CFU/100 ml*	Sands Point Golf Club	North Hempstead Beach (N) (former Hempstead Harbor Beach)	North Hempstead Beach (S) (former Bar Beach)	Tappen Beach	Sea Cliff Beach
April	**Enterococci**	**6.82**	**9.42**	**12.44**	**22.60**	**2.24**
May	**Enterococci**	**17.88**	**14.50**	**8.14**	**30.89**	**23.65**
June	**Enterococci**	**94.37**	**12.48**	**17.02**	**14.01**	**56.85**
July	**Enterococci**	**65.00**	**19.22**	**14.11**	**88.23**	**54.55**
August	**Enterococci**	**104.34**	**89.23**	**77.12**	**44.13**	**159.64**
September**	**Enterococci**	**na**	**7.00**	**13.00**	**1.00**	**11.00**
Season Average	**Enterococci**	**65.22**	**29.61**	**26.22**	**40.19**	**67.48**

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

In addition to the monthly average beach data, time series plots of bacteria monitoring results and precipitation are presented in *Appendix B*. As bacteria data are collected on a weekly basis, these plots show a "snapshot" of conditions at the time of sampling. Given the inherent variability in microbial water quality, these data are most useful to determine whether certain monitoring locations have consistently higher or lower bacteria concentrations or whether a monitoring location is particularly influenced by rainfall, wind, and currents. The time series plots in *Appendix B* indicate that elevated bacteria concentrations at CSHH #8, #9, #10, #11, and #12 typically occur following precipitation events, whereas elevated levels at the other monitoring locations do not appear to correlate as well to precipitation. There were only 5 samples collected in 2010 at CSHH #13A and #13B and only 10 to 12 samples at CSHH #4, #5, #6, #7, #14, and #15, which makes seasonal evaluation using time plots difficult.

In general, bacteria levels at CSHH #2 are lower than other locations. CSHH #2 is located at the mouth of the harbor and is thus less influenced by discharges to the watershed, which are likely the largest source of bacteria to the harbor.

3.8.5 Shellfish Pathogen TMDLs

Shellfish beds in Hempstead Harbor and most other areas around western Long Island Sound have been restricted or closed to harvesting for between 40 and 70 years. 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. This coliform bacteria 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 3.8.2* above).

In August 2007, DEC announced the release of a report on "Shellfish Pathogen TMDLs for 27 303(d)-listed Waters." Under Section 303(d) of the federal Clean Water Act, states are required to develop plans to decrease the total maximum daily loads of all pollutants that cause violations of water-quality standards. The DEC had listed 71 "Class SA" water bodies as being pathogen impaired, which therefore made them impaired for shellfishing; 25 of these water bodies were included in a 2006 TMDL report, and 27, including Hempstead Harbor, were described in the 2007 report. Class SA is the highest classification given to marine and estuarine waters and is applied to waters that are considered to have ecological, social, scenic, economic, or recreational importance. Class SA waters are offered 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.

On August 10, 2007, representatives of CSHH, HHPC, and NCDPW attended a DEC informational meeting on the TMDLs, which were developed based on available data and scientific modeling assumptions. Both CSHH and HHPC provided comments on the TMDLs for Hempstead Harbor and requested that the comment period for the report be extended to allow the report writers to gather additional information available from the Hempstead Harbor water-monitoring program and NCDC and NCDPW.

The TMDL report called for a 95% load reduction that contradicted DEC test results, which showed that a portion of the harbor's shellfish beds may be reopened. DEC's Bureau of Water Assessment and Management agreed to extend the report comment period and to examine data provided by CSHH, HHPC, and NCDH to help develop more realistic TMDL assumptions and reduction targets. EPA approved the TMDL report in September 2007.

At the urging of CSHH and HHPC, a follow-up meeting was held. On October 16, 2008, at DEC's East Setaucket office, representatives from CSHH, HHPC, and NCDPW met with Regional DEC shellfish staff and Central Office (Albany) officials from the Division of Water (via teleconference). The DEC stated that the ultimate objective of the TMDL is to open the harbor to shellfishing, and, therefore, in the event that the entire area of Hempstead Harbor's Class SA waters is opened, the TMDL would be satisfied and no additional remedial actions (other than monitoring) would be required. However, there may be a portion of the harbor's SA waters that will not be reopened – even in the long term – and the harbor may therefore require some percentage reduction in coliform. Discussion then focused on whether the HHPC and local municipalities would be given credit for the numerous efforts already undertaken to reduce pathogens. The DEC stated that it would be sufficient for municipalities to continue these efforts along with monitoring to see whether reductions occur. It was agreed that Nassau County's computer model, which can calculate coliform loadings in surface water from the surrounding land uses, would be a good tool to use in helping to monitor progress on pathogen reduction for Hempstead Harbor.

3.8.6 Monitoring Shellfish Growing Area #50

In 2009, in an attempt to assess shellfish water quality and determine whether opening mid- and lower sections of the harbor to shellfish harvesting should be pursued, CSHH partnered with DEC to collect samples in the area of the harbor just south of a line roughly from the entrance of Glen Cove Creek on the eastern side of the harbor stretching across to the western shore. Thirteen of the 19 stations sampled were the same stations established by DEC in 1988 for shellfish growing area (SGA) #50; six stations were new to SGA #50 and included areas intended to capture information for bacteria levels produced by storm water or other discharges from Scudder's Pond and the Powerhouse Drain outfall. The samples were delivered to the DEC lab in East Setauket, where they were analyzed for fecal coliform.

The bacteria data generated by these efforts are included in *Appendix D*. The results show that the sampling stations exceeded single-sample standards (49 FC/100ml) 37% of the time with DEC #13 (outside of Glen Cove Marina in Glen Cove Creek) exceeding at the highest rate, 53%. Seventeen of the 19 DEC sampling locations exceeded standards based on the geometric mean (the standard is 14 FC/100ml) and 90th percentile values (the standard is 49 FC/100ml).

There were no samples collected at these stations by CSHH in 2010. As mentioned previously, 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.

Blue heron in Glen Cove Creek at low tide (8/11/10)
(photos by Carol DiPaolo)

Osprey nest on pilings in lower harbor (5/13/10)

3.8.7 Bacteria Source Tracking

In March 2010, CSHH and HHPC developed a grant proposal (for funding under the Long Island Sound Futures Fund) to expand the water-monitoring program to include bacteria source tracking at midharbor stations as well as at specific outfalls that are suspected of contributing high levels of bacteria to Hempstead Harbor. The goal of the proposal was to determine whether most of the bacteria entering the harbor is primarily from human or nonhuman sources. The plan was to send water samples collected from Hempstead Harbor to a laboratory that does specialized genetic testing using a bacteroides marker.

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

The proposal also included assessing areas upland of the outfalls and then developing a work plan to address the outfalls that were found to be the largest contributors of bacteria loading in the harbor. At completion of this work, a request would be made to DEC to do another round of tests to check whether structural enhancements were successful in improving water quality so that broader areas of the harbor could be certified for shellfish harvesting in the future.

Unfortunately, the proposal for bacteria source tracking was not approved for funding under the LIS Futures Fund. The proposal cannot be implemented until funding sources are secured up front.

3.9 Precipitation

Precipitation affects Hempstead Harbor water quality through direct precipitation (precipitation that falls directly on the harbor surface) and through storm-water runoff. Although both of these inputs can reduce the harbor’s salinity, direct precipitation will tend to dilute the quantity of pollutants (although direct precipitation can carry airborne pollutants) in the harbor, whereas storm-water runoff will tend to increase 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 (note that 25.4 mm is equivalent to approximately 1 inch). *Table 7* presents monthly total precipitation for June through October, 1997 through 2010.

The total quantity of precipitation that fell in June through October 2010 was significantly lower than the quantity that fell in all previous years, and that accounted for the reduced number of beach closures in 2010 (see *Section 3.8.1*.). Typically, the distribution of precipitation varies from month to month. In 2010, June and August were was very dry, whereas October was the wettest month of the monitoring season.

Table 7. Monthly Rainfall Totals for the 1997-2010 Monitoring Seasons, in mm

	June	July	August	September	October	Total
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+**

4 OBSERVATIONS

Sampling for the 2010 water-monitoring season began on May 13 with a reconnaissance trip to check out the condition and accessibility of monitoring stations and to check out a report of a large barge (turned into a swimming pool) that was tied off north of Mott's Cove.

The Floating Pool Lady—a barge/swimming pool; tied off north of Mott's Cove (photos by Carol DiPaolo, 5/13/10)

4.1 Fish-Survey Reports

4.1.1 Glenwood Power Station Entrainment and Impingement Monitoring Report

The power station report (by ASA Analysis & Communication, Inc., September 2005) summarized the monitoring program conducted from January 14, 2004, to January 5, 2005, for KeySpan Generation LLC. KeySpan was required by its State Pollution Discharge Elimination System Permit (SPDES) to conduct a one-year study to estimate the numbers of fish and invertebrates that are drawn into the plant's water intake from Hempstead Harbor (harbor water is used in a "once-through cooling water system" to cool steam electric-generating units) and become either trapped in the system or impinged on the intake screen. Following the submission of the fish-monitoring report to DEC, KeySpan was required to determine the steps it could take to reduce the mortality of fish and other marine life that resulted from the power plant's operation.

In 2007, KeySpan (which was acquired by National Grid in 2008) provided a technology review for the Glenwood Landing plant. On October 15, 2008, the DEC released its review of the best technology available to address the problem. The DEC determined that the following, used in combination, represent the best technology available for "minimizing adverse environmental impacts from the cooling water intake structure" at the Glenwood Landing plant:

- Installation and operation of variable speed pumps;
- Continuous operation of the traveling screens and the existing fish-return system; and
- Aggressive pump shutdowns when one or both units are not operating.

The comment period was postponed until September 2009, and DEC's response was further postponed to mid-2010. The postponements seemed to be related to an anticipated new policy, which was released in March 2010. The draft policy establishes closed-cycle cooling as the "performance goal for all new, existing, and repowered industrial facilities in New York" for the purpose of reducing fish and other marine life mortality resulting from the operation of cooling intake structures. An exemption would be provided for facilities operating at less than 15% of capacity; this would therefore apply to the Glenwood Landing power plant. However, even power plants eligible for the exemption would still be required to reduce marine life mortality and entrainment. Whatever technology is decided on and installed at the power plant to reduce fish mortality will require another monitoring plan to determine the efficacy of the technology.

4.1.2 A Study of the Striped Bass in the Marine District of New York State

Seine surveys for the NYDEC'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," which encompasses the information from the western Long Island beach seine surveys and the Hudson River young-of-the-year striped bass surveys.

The DEC has found that striped bass generally spend their first year of life in the lower Hudson River, but over recent years the nursery for young-of-the-year striped bass has been expanding. In spring, yearling fish can be found not only in the Hudson River, but also in bays around western Long Island. And 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 information on other species as well.

NYSDEC seine crew for annual stripped bass survey, Tappen Beach (photo by Carol DiPaolo, 5/13/09)

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 seins at six stations in Hempstead Harbor; the 2010 seining dates and catch totals for the harbor are listed below.

May 5	A few shrimp and some jellies (mostly comb jellies) along with 17 Atlantic herring, 3 bay anchovies, 1 young-of-the-year (YOY) blue crab, 4 horse-shoe crabs (2 females and 2 males), 876 silversides, and 1 spider crab.
June 2	The crew temporarily worked with the DEC's Crustacean Unit on a blue-claw-crab pot survey in Hempstead Harbor but caught only spider crabs. Small amounts of grass shrimp were caught in each seine along with a few comb jellies. The seine catch also included 925 silversides, 9 killifish, 2 sandlances/sand eels, 1 pollock, 12 Atlantic tomcod, 2 naked goby, 1 summer flounder, 4 winter flounder, 1 tautog, 1 spotted hake, 29 northern pipefish, and assortment of crabs, including 1 Asian shore crab, 1 YOY blue crab, 5 green crabs, 5 horseshoe crabs, 2 lady/calico crabs, 6 mud crabs, 2 rock crabs, and 4 spider crabs.
July 30	Small amounts of grass shrimp and comb jellies were caught at most sites along with a large amount of algae at each site due to sampling near low tide. The catch had a good assortment of fish and crabs (all the bluefish, winter flounder, and tautog were young of the year; older and YOY striped bass were separated in the tally): 1 American eel, 1 Atlantic tomcod, 13 bay anchovy, 58 bluefish, 3 blueback herring, 2 grubby sculpin, 1 halfbeak, 234 killifish, 41 northern pipefish, 2 northern puffer, 1 scup, 4 striped bass, 9 YOY striped bass, 33 winter flounder, 1 tautog, 4,717 silversides, 1 Asian shore crab, 8 blue crabs, 7 calico crabs, 6 green crabs, 2 horseshoe crabs, 55 mud crabs, and 8 spider crabs.
August 17	Not much algae, shrimp, or jellies, but still large numbers of YOY striped Bass: 48 striped bass (YOY), 1 striped bass (old),152 bluefish (YOY), 1 alewife, 3 winter flounder (YOY), 1 tautog (YOY), 4 pipefish, 24,499 silversides (this is a best estimate because of the large numbers at some sites), 116 killifish, 2 green crabs, 1 blue crab (female), 1 calico crab, and 1 Asian shore crab.
September 14	Varying amounts of algae throughout the harbor and few jellies and shrimp, along with 12 striped bass (older), 6 striped bass (young of the year), 370 bluefish, 2 winter flounder, 1 four-spined stickleback, 4,038 silversides, 62 killifish, 1 northern pipefish, 1 female blue crab,3 green crabs, 1 mud crab, 1 calico crab, and 2 sea stars. (The winter flounder and bluefish were all young of the year.)
October 26	Amounts of grass shrimp, comb jellies, and algae declined. Catches declined as expected except for a large haul of young striped bass near the entrance of the harbor: 105 striped bass (just 1 station), 3 winter flounder, 1 bluefish, 8 alewife, 1,710 silversides, 296 killifish, 3 lady/calico crabs, 1 spider crab, and 2 rock crabs. (The winter flounder and bluefish were all young of the year. The striped bass were probably 1 and 2 years old and most were large enough to tag.)

4.2 Marine-Life Observations and Recreational-Fishing Reports

Fish observations are generally limited to what can be seen dockside at marinas, in shallow water near bulkheads, or just below the surface of the water at midharbor stations. Often, however, schools of fish can be seen also at a distance, breaking the surface in chase of smaller fish in the food chain or away from larger fish. To obtain more information about the fish and other marine life that inhabit Hempstead Harbor, we rely on written reports and studies such as those mentioned above, as well as reports from local residents who use the harbor for recreational fishing and other activities. The description below summarizes our monitoring observations and includes reports from local fishing enthusiasts who regularly fish in Hempstead Harbor and near neighboring bays.

May

We started the 2010 season with a reconnaissance run on May 13 to check sampling stations and a report that a large barge/swimming pool—The Floating Lady—had been towed into the lower harbor north of Mott's Cove. The pool was used at City Island and was towed back there in June.

May 20 was our first survey date. We covered only the upper harbor, and we were surprised to see comb jellies—large sea walnuts—in Tappen Marina; we usually don't notice them until June, although, in 2009, we didn't see them until the beginning of July. The DEC striped-bass survey team usually sees jellies in their seine catches earlier than we observe them; in 2010, they showed up in May, and in 2009, the team saw them in the June seine catch.

Pete Emmerich with 30-32 lb striped bass caught in Hempstead Harbor on May 24, 2010

On May 25, Pete Emmerich, a member of the Hempstead Harbor Anglers and one of the people who regularly provides us with local fishing news, reported the following on May 25:

> *Start of another year, and it is gangbusters. Bunker all over the harbor, bass are everywhere, blue fish also, seem early for blues? Fluke are close also, reached Bayville already, should be here in another week or two. Fishing out in the mouth of Hempstead in 45 to 60 feet of water, mammoth bunker schools being pushed by fish….*

When I asked Pete for more details on his catch and whether he has seen any evidence of a red tide that was reported near Hempstead Harbor he said that the bass he caught was about 30-32 pounds, and the largest caught that night was 42 inches long and about 35 pounds:

> *We had 6 bass like this last night, and they were caught in the middle of the harbor, this side of the shipping channel. I guess we can call that the mouth of the harbor, but it is certainly north of the line from Prospect to Matinnecock. There were bunker all the way to Bar Beach last night. I'm sure there are bass there as well.*

Have seen no red tide but have taken notice of the jelly fish— saw them Friday might about ¼ mile north of the Prospect buoy, and plenty last night as well.

June

During the five sampling dates in June (June 2, 9 16, 23, and 30), comb jellies were observed, oddly, only every other week, starting with their appearance on June 2. On June 2, the DEC striped-bass survey team had only a few comb jellies in their seine catch along with a lot of small fish and an assortment of crabs.

On June 28, Pete Emmerich reported what he saw on June 25-26:

Tons of bunker in the harbor Friday and Saturday night, but the fisherman had trouble finding bass. I think it was because of the full moon. Bluefish are starting to make a stronger appearance.

On June 28, 2009, about 200 bottlenose dolphins made a rare appearance in western Long Island Sound, and about 100 dolphins entered Hempstead Harbor; unfortunately, they didn't return in 2010.

July

Both types of comb jellies—sea walnuts and sea gooseberries—were observed on all four sampling dates in July (July 7, 15, 21, and 28). An unusually dense population formed thick clouds of jelly around the dock near the STP and the adjacent marina. Near this area, we also noted thick sets of blue mussels on the bulkhead by the STP. Two dead striped bass were seen floating in Glen Cove Creek on July 7—one was the discarded remains of a fillet and the other had a fishing hook and cut line attached to it. Half of a large dead eel was seen in the lower harbor on July 21. On July 28, large schools of baitfish were noted in Glen Cove Creek; this corresponded with the 4,717 silversides and 234 killifish that the DEC striped-bass survey team found in their seine catch in Hempstead Harbor on July 30.

August

Throughout August, comb jellies—both types, sea walnuts and sea gooseberries—were noted in large quantities on monitoring dates (August 4, 11,18, and 26). Large schools of baitfish were noted, particularly on August 11, 18, and 26 with large numbers of small shrimp. This corresponded with DEC striped-bass survey team's catch of 24,499 silversides and 116 killifish on August 17.

A welcome surprise came on August 4—**blue-claw crabs** returned and stayed throughout August. We hadn't seen them in large quantities in Hempstead Harbor since their population exploded in 2007.

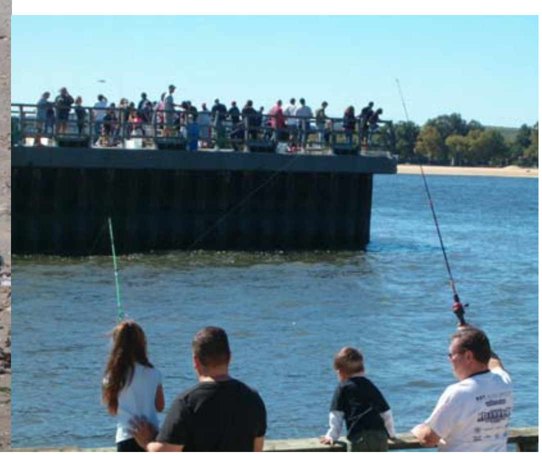
Blue-claw crabs netted from bulkhead beneath The Wharf at Steamboat Landing in Glen Cove Creek (photos by Carol DiPaolo, 8/18/10)

We received reports that blue-claw crabs had returned to Oyster Bay in large numbers as well.

Another surprise occurred on August 11: A **sandworm mating ritual** was taking place near Beacon 11—1-2-inch sandworms with bright-red tips were swirling around in the water. This usually occurs around a full or new moon (as was the case) and generally earlier in the season in Hempstead Harbor but can be seen as late as September. There was a report that this had also occurred in early July near Morgan Beach in Glen Cove. (Local fishermen refer to this phase of the sandworms as **cinder worms**.)

September

For sampling dates in September (September 2,8,15, 22, and 29), the numbers of comb jellies started to diminish, but large schools of baitfish were seen throughout the harbor along with

Seasonal scene of horseshoe-crab and mussel shells, Tappen Beach (photo by Carol DiPaolo, 9/11/10)

large numbers of small shrimp in Tappen Marina, around the gas dock and near the bulkhead. Blue-claw crabs were seen throughout September; one Hempstead Harbor angler reported catching 86 blue-claw crabs from Tappen Marina on September 10. In early September, Tappen Beach had the typical large numbers of horseshoe-crab shells from the seasonal molt mixed in with blue-mussel shells. On September 8, in the lower harbor, dozens of horseshoe-crab shells that were floating on the surface of the water were lifted by the wind so that the front edge of the shells pointed upward. For the September 11 Snapper Derby at Tappen Beach, it was reported that a payloader was used to remove the large number of horseshoe-crab shells from the boat ramp.

On September 15, fish (likely snappers) were breaking the surface in Glen Cove Creek. A snapper derby sponsored by the Hempstead Harbor Anglers at Tappen Beach on September 11 attracted a large number of participants--human and fish; it was estimated that 150 snappers were caught.

Prized catch at snapper derby at Tappen Beach
(photos by Carol DiPaolo, 9/11/10)

The DEC striped-bass survey for September 14 hauled in 370 young-of-the-year bluefish.

October
The numbers of comb jellies—both sea walnuts and sea gooseberries—noted during sampling dates continued to decline, with only three sea gooseberries noted on October 20 at CSHH #1. (In 2009, they were present throughout the month at most stations but in decreasing numbers.) Large schools of baitfish were noted on October 13 and 20, along with large numbers of small shrimp around the dock and bulkhead at Tappen Beach Marina. On October 13, we saw a huge school of what we thought were bluefish in the harbor with lots of birds working the water. When we approached one of the two fishing boats in the area, the fishermen told us they caught 8 blues (20-22 inches) in ten minutes. We saw one blue-claw crab in Glen Cove Creek.

4.2.1 Crustaceans

An assortment 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.

We mention seeing a variety of crabs during weekly sampling or through reports of the DEC seining that is conducted around the harbor; the crabs include blue-claw, lady (or pink calico), green, spider, mud, fiddler, and Asian shore crabs. Some are walking crabs, and some are swimmers, like the blue-claw crabs, which have back legs that are shaped like paddles. The Asian shore crab is an invasive species that started showing up around Long Island Sound in the late 1990s; it can tolerate a wide range of salinity and may be pushing out native species.

Although blue-claws have always been present in Hempstead Harbor, particularly in the lower harbor, they appeared in remarkable numbers in 2007. We didn't see blue crabs 2008 or 2009, and the 2009 DEC seines recorded only two blue crabs—one in July and one in October. Blue-claw crabs returned in large numbers in 2010, but the population did not match the quantity recorded in 2007.

Although horseshoe crabs are included in the group of crustaceans seen around the harbor, they are not true crabs but more closely related to spiders. They are noted most during the spring mating season and in the fall when the beaches are covered with molted shells.
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.

4.2.2 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 tail-like appendage that can be seen when they are up close to the surface. Comb jellies do not sting. They usually appear in large numbers in Hempstead Harbor in late June and through mid-October. In 2009, both types were noted from July through October water-sampling, and the DEC seine crew caught a few comb jellies in June. In 2010, they were noted during weekly sampling in June, and October 20 was the last sampling date they were seen for the season.

Two tentacled types of jellyfish that may be seen in the harbor are the purple-brown **lion's mane jellyfish**, with long tentacles that sting, and the round, bell-shaped moon jelly that has short tentacles around its rim that do not produce a stinging sensation. **Moon jellies** are easily identified by the four, whitish, horseshoe-shaped gonads on the top of the bell. It's been several years since we've seen either the lion's mane jellyfish or the moon jelly in large quantities in the harbor; in 2009, the DEC seine crew caught a few moon jellies in May in Hempstead Harbor. In July, we had reports of large quantities of both comb jellies and moon jellies in Oyster Bay. In 2010, we didn't see moon jellies or lion's mane jellyfish during weekly sampling in Hempstead Harbor, but the DEC seine crew had few in their spring catch.

4.3 Shellfish

Shellfishing was an important commercial activity in Hempstead Harbor from about the first quarter of the nineteenth century into the first quarter of the twentieth century, and clams and oysters were shipped regularly 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 could be seen in

Hempstead Harbor harvesting clams and then transporting them 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 the longstanding goals of reopening the harbor's shellfish beds. 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, but rigorous water sampling would have to be conducted by DEC to determine whether water quality had improved enough to reopen the shellfish beds.

In **2004, DEC began collecting water samples in the outer portion of Hempstead Harbor**, north of the Glen Cove breakwater, with good results. In 2007, DEC met with CSHH, HHPC, and Town of Oyster Bay (TOBAY) to discuss, among other things, water-sampling results and assistance with sampling from TOBAY staff. Water sampling was completed in 2008, and results were good. 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.

One of the remaining steps toward recertifying a portion of Hempstead Harbor for shellfish harvesting was a dye study by the Glen Cove sewage treatment plant. On September 28, 2009, DEC-Bureau of Marine Resources' (BMR) in conjunction with the U.S. Food and Drug Administration (FDA) **conducted a hydrographic dye study in Glen Cove Creek** (see below) and Hempstead Harbor. The dye study provided information on the movement (dilution, dispersion, and time of travel) of the sewage effluent discharged by the Glen Cove STP. FDA produced a final report on the findings of the dye study in 2010.

Hydrographic dye study in Glen Cove Creek (9/28/09) (photos by Carol DiPaolo)

As part of a state tour to celebrate improvements around Long Island Sound as well as the 40th anniversary of Earth Day, then-NYDEC Commissioner, Pete Grannis, held a press conference at Morgan Park, Glen Cove, On April 18, 2010, at which he announced that the state was close to reopening a portion of the shellfish beds in Hempstead Harbor. The announcement brought a welcomed focus on the harbor, but the official recertification for shellfish harvesting was more than a year away (in June 2011).

4.3.1 Shellfish-Seeding Projects

At the same time that DEC shellfish division was nearing completion of a series of water-quality tests that would determine whether a section of the upper harbor could be reopened for shellfish harvesting, Nassau County Executive Thomas Suozzi began exploring the possibility of seeding Hempstead Harbor with clams and oysters as part of the county's "Healthy Nassau" campaign. The first seeding project on October 9, 2007, was a joint initiative that included Nassau County, the TNH, TOBAY, Cornell Cooperative Extension, Frank M. Flower & Sons Oyster Company, as well as HHPC and CSHH, and was intended to add biomass to the harbor using a resource that could help improve water quality–each clam and oyster can filter 1 to 2.5 gallons of water per hour, with daily estimates (for oysters) of 30 to 60 gallons.

The shellfish stock for the seeding project came from Cornell Cooperative Extension and Frank M. Flower & Sons Oyster Company, and included more than 1.3 million seeds, consisting of two types of hard-shell clams (*Mercenaria mercenaria* and *M. mercenaria notata*) and oysters. (The *M. mercenaria notata* has markings that are different from the northern quahog stock normally found in Hempstead Harbor, which would help in gauging the survival rate of the seeds during later surveys.)

Because of space limitations, about 10 tubs of oysters were left behind. Each tub contained about 10,000 oysters that had been started in May 2007 (and were expected to reach maturity within 18 to 24 months). On October 10, 2007, following our scheduled water-quality sampling, we met Nassau County DPW staff at Tappen Marina to load the Environmental Resources boat with the oysters that remained from the day before. We went back to the seeding area and took GPS readings at eight sites as each tub of oysters was spread out over the harbor.

Two years later, on October 15, 2009, then-County Executive Tom Suozzi kicked off operations for 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.

Tony Alfieri and Councilwoman Elizabeth Faughnan (Town of Oyster Bay (L)); Kevin Braun (Town of North Hempstead Planning Department) (R) with tubs of oysters (photos Eric Swenson,10/15/09)

4.3.2 Surveys to Assess Survival of Seed Clams and Oysters

In late summer 2008, CSHH requested a permit from DEC to conduct a survey of shellfish in the area of the 2007 seeding project in Hempstead Harbor to gauge the survival rate of the seeds. We selected seven of the GPS points previously recorded for raking. The area seeded in 2007 included a transition from thick, muddy bottom to a harder, sandier bottom.

Two baymen–Bill Fetzer and Craig Oddo–volunteered to help us with the survey, using their boat, hand rake, and other equipment, in addition to the town's boat and our usual monitoring equipment. The baymen are members of the North Oyster Bay Baymen's Association and have worked previously with TOBAY to help with the town's clam and oyster seedings.

The areas we selected to rake also approximated stations 24-26 of the shellfish-density survey for Hempstead Harbor that was conducted by Cashin Associates, P.C., for the Town of Oyster Bay and for the Hempstead Harbor Protection Committee in August 2008.

We were surprised at how deep and thick the black mud was in the deeper-water stations. At these stations, we did not find hard-shelled clams and oysters; we did find an abundance of the very small surf clams referred to as "duck feed." The bottom transitioned to sand as we moved closer to shore—starting first as a very hard bottom and then into softer sand. Although we found a few seed clams of both types of clams used in the seeding project—*Mercenaria mercenaria* and *M. mercenaria notata*—they seemed to be naturally occurring because they were too small to have been from the 2007 seeding project.

Surf clams ("duck feed") found in black mud *Close-up of duck feed in foreground*
(photos by Carol DiPaolo,10/10/08)

In areas with the sandier bottom, we found a variety of clam sizes, from littlenecks to chowder, and the largest number in one raking included 10 clams. We also found a variety of other clams, some crabs, 4 small mantis shrimp, small snails, oyster drills, and broken shells of oysters, clams, and crepidula (slipper shells).

We did not find clams or oysters that appeared to be from the 2007 seeding project, and that may be due to any of the following:

- The normal survival rate for seeded clams and oysters is 10-20 percent, and we may have simply missed the survivors.
- We (and/or the clams and oysters) may have drifted from the waypoints taken in 2007.
- Many of the seeds may have ended up in the thick muddy bottom and did not survive.
- Most of the seeds may have been destroyed by predators (such as the blue-claw crabs, which were abundant in 2007).

Part of the contents of one raking
(photo by Carol DiPaolo, 10/10/08)

It had been suggested to us that a diver scanning the bottom might be able to provide a more precise picture of the clam population and seed survival, and we passed this information along to county officials.

In preparation for Nassau County's second shellfish seeding in Hempstead Harbor, Cornell Cooperative Extension, Marine Division, staffers Matthew Sclafani, Neal Stark, and Gregg Rivara completed a **draft Sediment Suitability Assessment of Hempstead Harbor for Nassau County's Shellfish Restoration Program** (October 14, 2009). The goal of the survey was to determine suitable sites to plant seed clams and oysters in the area off of Morgan Park. The team chose a scuba survey to evaluate the bottom, and visual and "hand-grab" assessments were made to delineate the boundaries between mud and harder-type bottoms such as sand and sand-mud-shell mixes. This assessment was intended to help avoid placing the seed clams and oysters in the muddy bottoms that are not considered suitable habitats for their survival.

During the sediment assessment, a natural population of predominately hard clams (*Mercenaria mercenaria*) was observed in the central and southern area of the survey. They were also present in the northern survey area but not as frequently. The report stated that these observations validate the effort to enhance shellfish in this area because the area currently supports shellfish.

Also during the survey, the team observed and collected clam shells of the *notata* variety, which they felt were most likely from the 2007 seed plantings and originated from Frank M. Flower's and Son shellfish stock. *Notata* clams are not common in the area (typically < 1% frequency) and are easy to distinguish from the white clam variety by the dark zig-zag striped patterns on the shell. However, as mentioned above, we also found *notata* clams during our 2008 fall survey and felt that they were too small to be a part of the 2007 seeding project. The average size of the 10 *notata* shells the Cornell team found was 27 mm. (The *notata* were between 8-12 mm at the time of the 2007 planting.)

4.4 Birds

As has been the case over the last 15 years or so, during 2010 we saw a variety of birds that have become regular visitors to Hempstead Harbor. **Belted kingfishers, black ducks, blue herons, gulls, mallards, Canada geese, cormorants, snowy and great egrets, ospreys, swans,** and **terns** were 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. The duck, Canada goose, and swan populations continue to expand in the harbor, and each year we see many new ducklings, goslings, and cygnets.

Observed less frequently during monitoring are **green herons, black-crowned herons, plover-type birds,** and **hawks** or **falcons**.

Large numbers of Canada geese were seen throughout the 2010 season, with over 14 dozen noted on May 26 on beaches around the harbor and near Glen Cove Creek; on November 3, approximately 23 dozen geese were counted around the harbor. Similarly, large numbers of swans were seen around the harbor—approximately 30 were noted plus 11 cygnets on August

18 and 55 swans in the lower harbor on October 20. One family of swans seen around Glen Cove Creek was unusual because one of the six cygnets was white and stood out from its siblings.

Swan family with one white cygnet among its darker siblings (photos by Carol DiPaolo, 7/7/10 and 8/11/10)

Blue heron and ducks and Glen Cove Creek

There are six easily visible osprey nests in the harbor that have been established over the last 15 years. Over the last eight years or so, a blue sailboat has been moored in the lower harbor and has been used only by nesting ospreys. However, the sailboat broke its mooring early in 2010 and was removed. The returning ospreys had to find an alternative nesting site chose a duck blind off the western shore of the lower harbor. They seemed to have some trouble making a suitable nest on the duck blind; we saw eggs in the nest a little later than usual in the season. However, the eggs hatched, and, on July 23, we saw three thriving chicks; on August 11, we saw the three fledglings fly off the nest as we approached it. (The sailboat/former osprey nesting place was returned to its usual mooring site, but no ospreys claimed it.)

Osprey nest on duck blind and three osprey chicks in nest (photo by Carol DiPaolo 6/23/10)

A second duck blind, which was in its usual position in Mott's Cove, had a goose nest on it, but it seemed to have been raided—1 egg had rolled off to the side of it.

Over the last few years, a pair of **peregrine falcons** have been sighted at the Glenwood Landing power plant. On October 28, 2009, we saw a pair of the falcons flying to and from a high ledge at the power plant. We did not see the falcons in 2010.

Osprey nests in Hempstead Harbor (photos by Carol DiPaolo, 5/13/10)

Although **red-tailed hawks** are often seen is wooded areas around the harbor, we don't usually see them during water sampling. However, on November 3, our last sampling date for 2010, three red-tailed hawks with striking coloration circled over the head of Glen Cove Creek. We received a report that on July 8, 2010, a red-tailed hawk was seen flying over a house in the Greenvale-Mott's Cove area chasing a turkey vulture.

Red-tailed hawk flying over Glen Cove Creek (11/3/10) (L) and osprey in flight (9/11/10) (photos by Jim Moriarty)

Swallows are so common and in such large numbers around the shore and marina bulkheads that we don't report sightings of them. At the beginning of the 2010 season, however, they caught our attention as they built nests under beams in the bulkhead at Tappen Marina. There seemed to be more nests than usual, and we were able to see the tiny chicks inside.

Barn swallows on bow of boat and on nest in Tappen marina (photos by Carol DiPaolo, 6/23/11)

There have been some unusual visitors over the years as well, such as the young (about 1 year old) **great horned owl** that was rescued from the water at the Glen Cove Marina in Glen Cove Creek on August 9, 2009, and the young bald eagle that was seen over Glen Cove and then landed on Tappen Beach in August of 2004.

In May 2008, we had our first sighting of a **turkey vulture** flying over Glen Cove Creek (and we had been told that turkey vultures were also seen near Manhasset Bay). And although we didn't see any turkey vultures during our 2009 water-sampling tours, we received reports that they had been seen from February through April in the East Hills area. In 2010, we had frequent reports of turkey vultures in the same Greenvale-East Hills area, including the one above with the red-tailed hawk. We saw three turkey vultures circling over Roslyn at the head of the harbor on September 8, 2010.

4.5 Diamondback Terrapins

Female diamondback turtle (Source: NOAA photo library; see http://www.photolib.noaa.gov/coastline/images/big/line2365.j

Diamondback terrapins are the only turtle found in estuarine waters and generally grow up 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, and information about their presence in Hempstead Harbor was used to support efforts to extend Hempstead Harbor's designation as a "significant coastal fish and wildlife habitat" to include the area south of the Roslyn viaduct.

In 2006, dramatic changes occurred in the area near the viaduct with the construction of the Sterling Glen and Horizon senior communities at Bryant Landing and the start of construction for the new viaduct.

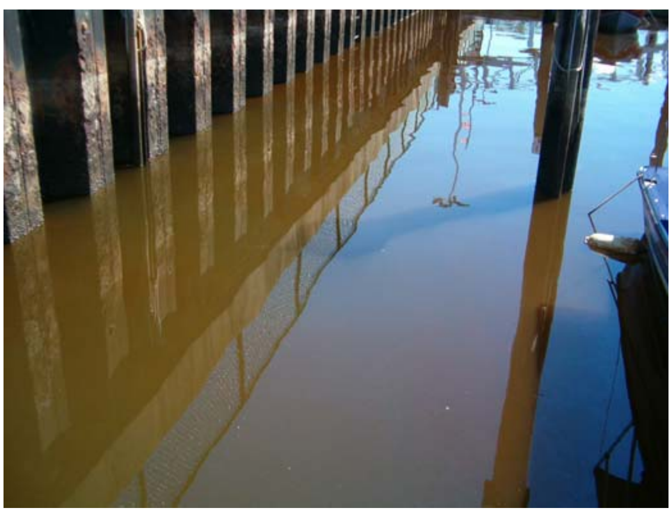
Construction of the viaduct continued in 2010. It is not known whether or to what extent this activity has had an impact on the diamondbacks.

Although there were no diamondback sightings reported for the lower harbor since 2006, they have been seen in other parts of the harbor since then, particularly around Brewer's Marina and the Sea Isle sand spit. In June 2008, the DEC seine crew caught an adult diamondback terrapin (255 mm across 275 mm long–about 11 inches–long; this is longer than the average size recorded) near the bar at the southern end of the North Hempstead Beach Park.)

In 2009, a small diamondback was reported seen in Brewer's Marina on July 11, and a large diamondback (about 10 inches) was seen on August 19 in the same area. In 2010, we received a report that someone had seen a large (about a foot long) diamondback swimming in Brewer's Marina near Sea Isle.

4.6 Algal Blooms

Color and turbidity of water within the harbor in 2010 was, for the most part, typical of conditions generally observed during the monitoring period. During most monitoring seasons, Hempstead Harbor Secchi-disk depths (an indicator of light penetration into the water column) generally consistently range from 0.75 m to 2.5 m. In 2008, the lowest Secchi-depth reading was 0.25 m and the highest was 2.5 m; in 2009, the lowest Secchi reading was 0.5 m and the highest was 3.5 m. In 2010, the lowest Secchi reading was 0.5 m and the highest was 3.0 m. Secchi-disk depths are a strong indicator of the presence of algal blooms because algae absorbs more light and is present in greater quantities than other particulate material. The dominant type of algae present in the harbor gives the water its color, which is typically brown or green.



Water in Tappen Marina turned reddish brown to red in some areas (photo by Carol DiPaolo, 8/31/10)

In 2009 and 2010 we were on the lookout for the start of a red tide, generally caused by the presence Alexandrium cells, some forms of which can be toxic, producing paralytic shellfish poisoning. Chris Gobler, associate professor at the School of Marine and Atmospheric Sciences at Stony Brook University, had detected some Alexandrium cells in Hempstead Harbor; larger quantities had been found in Northport and the western Peconic Bay.

On June 3, 2009, we started to notice signs of a red tide while water sampling near CSHH #2, where a thick brown to reddish brown color was noted in the water. Sechhi depth was only 0.5 m (which is very unusual for this station), and DO levels just below the surface were as high as 12.8 ppm at both CSHH #2 and #3, indicating a growth phase of an algal bloom. On June 4, patches of a red tide were seen at the mouth of the harbor into the sound; by the barges of the Port Washington gravel operation, the water was the same brown we had seen the day before. The following week, things were back to normal—a normal dark green at all stations.

In 2010, unusual water color was observed on three occasions. On June 16, water color was judged to be an abnormal red-brown to olive green in sections of the harbor. On August 31, the water in Tappen Marina had turned red in parts; a water sample we collected was analyzed by the NCDH and found to contain a mix of dinoflagellates, some that could cause red coloration along with other types of algae, none of which were toxin producers. The most dominant species was *Prorocentrum micans*, followed by *Prorocentrum triestinum*, *Gyrodinium sp.*, and *Scripsiella trochoidea*. Also, on September 2, water color in the harbor was judged to be an abnormal brown. The last two events corresponded with reports of red tide in parts of the sound and ocean (*prorocentrum triestinum* was reportedly found in ocean water samples).

Blank Data Reporting Sheets

Water-Monitoring Data Sheet

Collection Date : ______________________ **Time :** ______________________
Monitor Name : ____
Site Name : CSHH #1, Beacon 11 **Location :** Hempstead Harbor

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

% Clo_d Cover : ☐ 0% ☐ 25% ☐ 50% ☐ 75% ☐ 100% other ________

Wind Direction : ☐ N ☐ NE ☐ NW ☐ S ☐ SE ☐ SW ☐ E ☐ W **Velocity :** ______ kt (mph)

		Date	Amount
Rainfall : Previous 24 hrs accumulation	_____._ mm	________	________
Previous 48 hrs accumulation	_____._ mm	________	________
Previous week's accumulation	_____._ mm	________	________

Tidal Stage : ☐ incoming ☐ outgoing hours to high tide : ____________

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
☐ submerged aquatic vegetation (SAV) ☐ turbidity (suspended particles)

Comments ____

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

Human Activities

☐ Barges/tugs, Pt. W. gravel op.__________ Gladsky__________ Raison__________
DiNapoli__________ Global/fuel__________ other__________
☐ Boats, power__________ sailboats__________ kayaks__________ crew__________
☐ 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__________

Water Monitoring Data Sheet

Cal. Constants ____________

Air Temperature : ________ °C

Station :

Time : ______________ Date: ____________

Depth (meters)	Temp °C	Salinity (ppt)	DO (ppm)	pH	Secchi (meters)	Nitrogen (ppm) NO_2	NO_3	NH_3
Surface								
0.5								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Wind ______

Air °C ______

DO cal. ck.

______% sat.

Station :

Time : ______________

Depth (meters)	Temp °C	Salinity (ppt)	DO (ppm)	pH	Secchi (meters)	Nitrogen (ppm) NO_2	NO_3	NH_3
Surface								
0.5								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Wind ______

Air °C ______

DO cal. ck.

______% sat.

Station :

Time : ______________

Depth (meters)	Temp °C	Salinity (ppt)	DO (ppm)	pH	Secchi (meters)	Nitrogen (ppm) NO_2	NO_3	NH_3
Surface								
0.5								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Wind ______

Air °C ______

DO cal. ck.

______% sat.

Water-Monitoring Data Sheet

Wildlife Observations

Date ____________

BIRDS

	Upper Harbor	Lower Harbor
☐ Cormorants	______	______
☐ Ducks, mallards	______ ducklings ______	______ ducklings ______
☐ Egrets, great	______	______
snowy	______	______
☐ Geese, Canada	______ goslings ______	______ goslings ______
brandts	______	______
☐ Gulls, hooded	______	______
☐ Herons, blue	______	______
night, green	______	______
☐ Kingfisher, belted	______	______
☐ Ospreys	______	______ chicks ______
☐ Plover-type, killdeer	______	______
☐ Swans, mute	______ cygnets ______	______ cygnets ______
☐ Other	______	______

JELLIES/JELLYFISH

☐ Comb, sea walnuts: CSHH stations ☐#1_____ ☐#2_____ ☐#3_____ ☐#4_____ ☐#5_____ ☐#6____ ☐#7_____

☐#8-10_____ ☐#11____ ☐#12___ ☐#13__________

sea gooseberries: CSHH stations ☐#1_____ ☐#2_____ ☐#3_____ ☐#4_____ ☐#5_____ ☐#6____ ☐#7_____

☐#8-10_____ ☐#11____ ☐#12____ ☐#13__________

☐ Lion's mane: CSHH stations ☐#1_____ ☐#2_____ ☐#3_____ ☐#4_____ ☐#5_____ ☐#6____ ☐#7__________

☐ Moon: CSHH stations ☐#1_____ ☐#2_____ ☐#3_____ ☐#4_____ ☐#5_____ ☐#6____ ☐#7__________

FISH

- ☐ Baitfish __________
- ☐ Blue __________
- ☐ Bunker __________
- ☐ Striped bass __________
- ☐ Small shrimp __________

CRABS

- ☐ Asian shore __________
- ☐ Blue-claw __________
- ☐ Horseshoe __________

OTHER __________

____

____

Nassau Co. DOH PHL 209 Main Street Hempstead, NY 11550	FORM NAME: □ QC □ Equip Maint □ Training □ Comp Doc □ Other	
LABORATORY SECTION □ Chemistry □ Environmental Microbiology □ Clinical Microbiology	Form. No.:	Rev: 0
	Date:	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
RODGER P. SILLETTI Ph.D., D (ABMM), DIRECTOR TELEPHONE (516) 572-1202 FAX (516) 572-1206

COLLECTOR'S NAME DATE

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

Field No.	Area No.	Point No.	Sample Type	Location	Time	Temperature		Wind	Weather	Wave Height	Laboratory Use Only			
						Air	Water				Lab Number	Fecal Coliforms	Enterococci	Comments
CSHH-1	10		5	BEACON ELEVEN										
CSHH-2	10		5	BELL BUOY 6										
CSHH-3	10		5	RED MARKER GLEN COVER CREEK										
CSHH-4	10		5	BAR BEACH SPIT										
CSHH-5	10		5	MOTT'S COVE										
CSHH-6	10		5	EAST OF FORMER TNH INCINERATOR										
CSHH-7	10		5	BRYANT LANDING										
CSHH-8	10		5	GLEN COVE STP										
CSHH-9			5	FIRST PIPE WEST OF STP OUTFALL										
CSHH-10			5	PIPE AT CORNER OF SEAWALL WEST OF STP OUTFALL										
CSHH-11			5	50 YARDS EAST OF STP OUTFALL										
CSHH-12			5	EAST OF STP OUTFALL BY BEND IN SEAWALL										
CSHH-13			5	60 FEET WEST OF MILL POND WEIR										

COMMENTS/REMARKS

*ESTIMATED COUNTES: ALL COUNTS ARE ABOVE UPPER ACCEPTANCE LIMIT (20-60), OR NO COUNTS WITHIN ACCEPTANCE LIMIT (20-60)
TNTC = "TOO NUMEROUS TO COUNT"

DATA ENTRY PROOFED

TEST	METHOD	CODE
Fecal Coliform/100 ml.	Membrane Filtration	SM-18-20 9222 D
Enterococci/100 ml	Membrane Filtration	EPA Method 1600

TEMP CONTROL: TIME RECEIVED: DATE ANALYZED:

DATE RECEIVED:

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 rpeort shall not be reproced 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: □ QC □ Equip Maint □ Training □ Comp Doc □ Other	
LABORATORY SECTION □ Chemistry □ Environmental Microbiology □ Clinical Microbiology	Form. No.:	Rev: 0
	Date:	Created By: CONNIE IANNUCCI

Beach Monitoring Daily Sampling Log

COALITION TO SAVE HEMPSTEAD HARBOR

Elap ID #10339

NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF PLBLIC HEALTH LABORATORIES
209 MAIN STREET, HEMPSTEAD, NY 11550
RODGER P. SILLETTI Ph.D., D (ABMM), DIRECTOR TELEPHONE (516) 572-1202 FAX (516) 572-1206

COLLECTOR'S NAME **DATE**

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

Field No.	Area No.	Point No.	Sample Type	Location	Time	Temperature		Wind	Weather	Wave Height	Laboratory Use Only			
						Air	Water				Lab Number	Fecal Coliforms	Enterococci	Comments
CSHH-13A	10		5	HEAD OF GLEN COVE CREEK-COUNTY PIPE										
CSHH-13B	10		5	DOG LEG @ HEAD OF GLEN COVE CREEK										
CSHH-14	10		5	NW CORNER OF POWER PLANT ~ 50 YARDS FROM CEMENT OUTFALL										
CSHH-14A	10		5	CEMENT OUTFALL ADJACENT TO POWER PLANT										
CSHH-15	10		5	NW CORNER OF TAPPEN POOL										
CSHH-15A	10		5	SCUDDER'S POND OUTFALL @ SEAWALL N. OF TAPPEN POOL										
CSHH-15B	10		5	SCUDDER'S POND WEIR										

COMMENTS/REMARKS

*ESTIMATED COUNTES: ALL COUNTS ARE ABOVE UPPER ACCEPTANCE LIMIT (20-60), OR NO COUNTS WITHIN ACCEPTANCE LIMIT (20-60)

TNTC = "TOO NUMEROUS TO COUNT"

24hr rain: **48hr rain:**

DATA ENTRY PROOFED

TEST	METHOD	CODE
Fecal Coliform/100 ml.	Membrane Filtration	SM-18-20 9222 D
Enterococci/100 ml	Membrane Filtration	EPA Method 1600

TEMP CONTROL: TIME RECEIVED: DATE ANALYZED:

DATE RECEIVED:

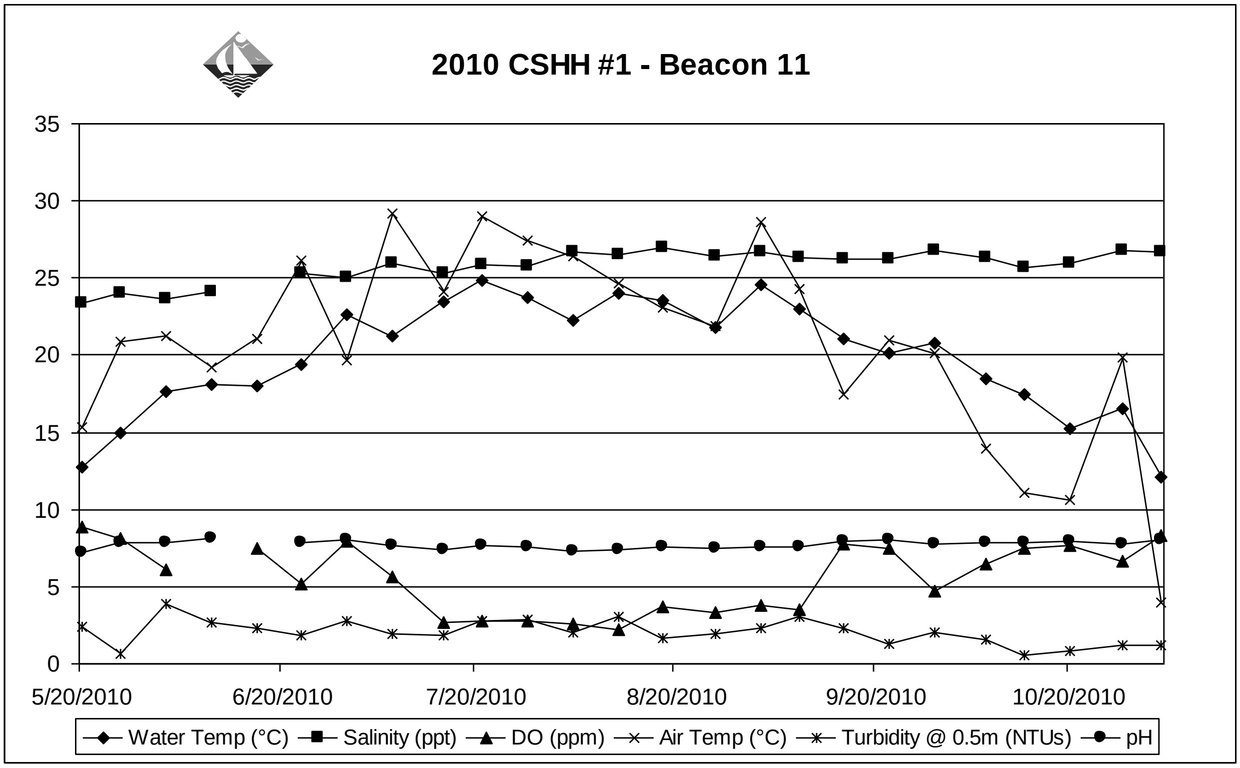
SAMPLE ACCEPTABLE: YES ☐ NO ☐ ANALYSIS SUCCESSFUL: YES ☐ NO ☐

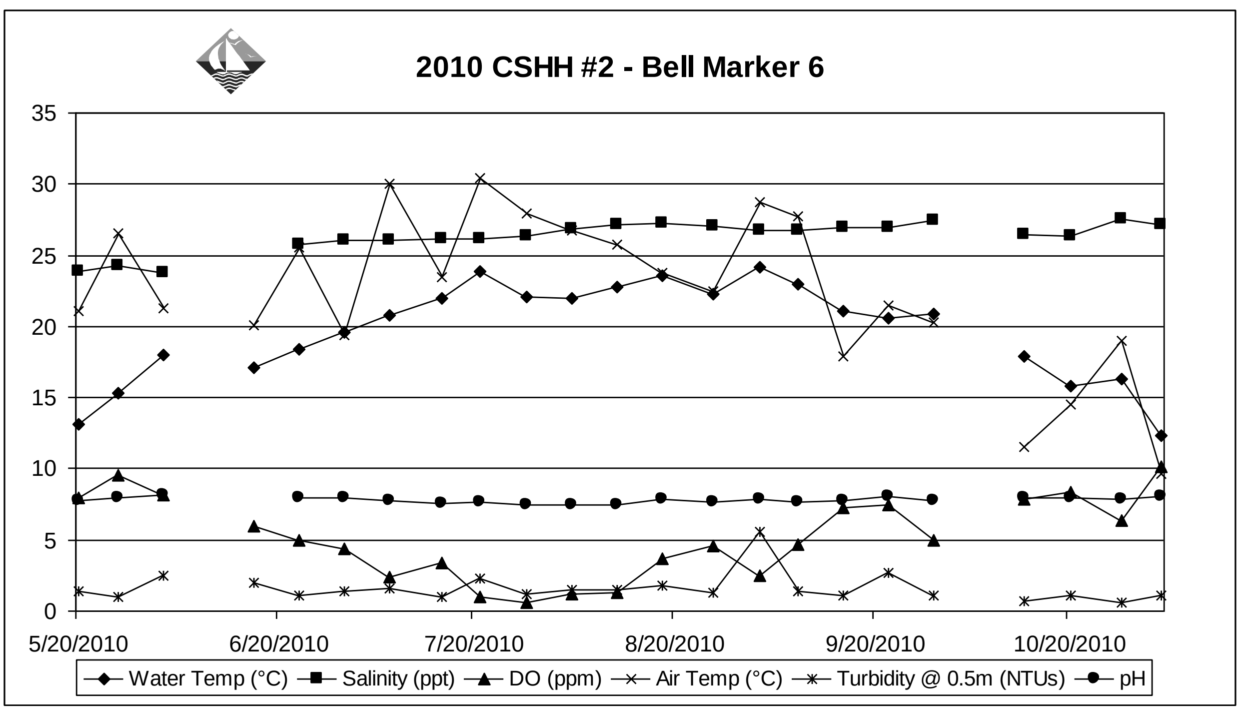
LABORATORY ACCREDITATION NOTICE:
The results provided on this report have been produced in compliance with "NELAC" (National Environmental Laboratory Accreditation Conference) standards and relate only to the identified sample. Any deviations from the accepted "NELAC" collection requirements for non-potable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

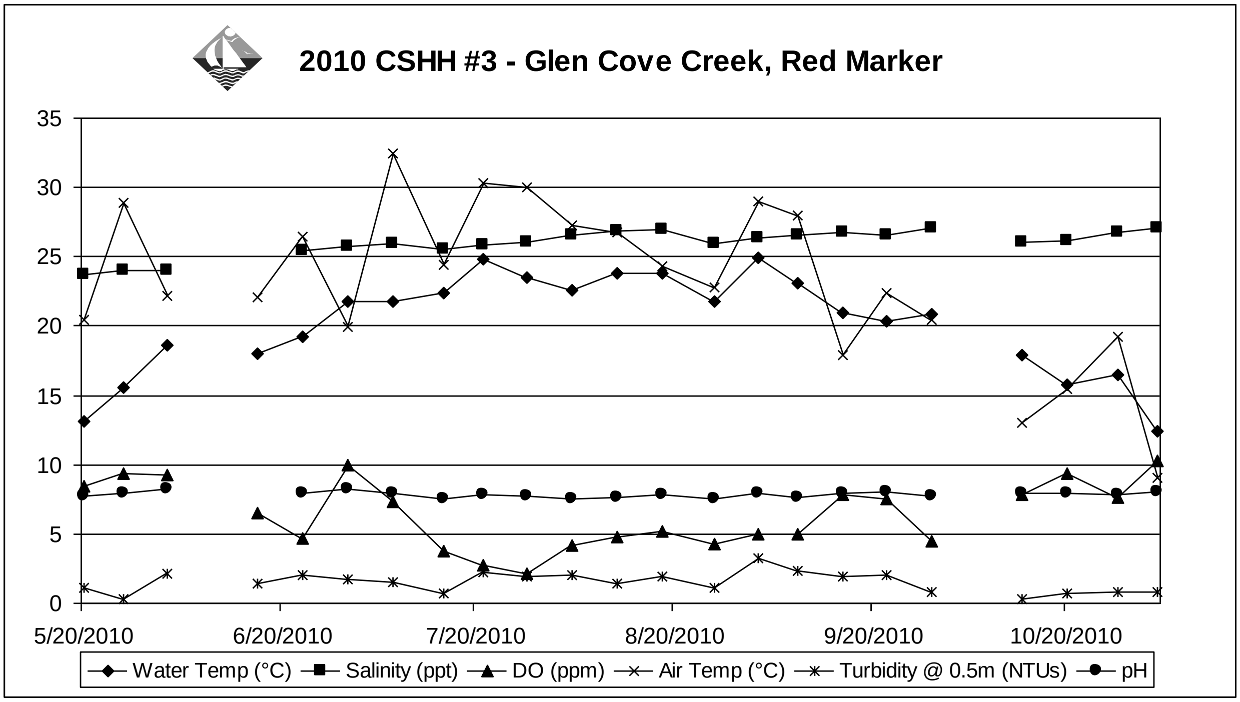
VERIFICATION REVIEW		
Name:	**Title:**	**Date:**
Comments:		

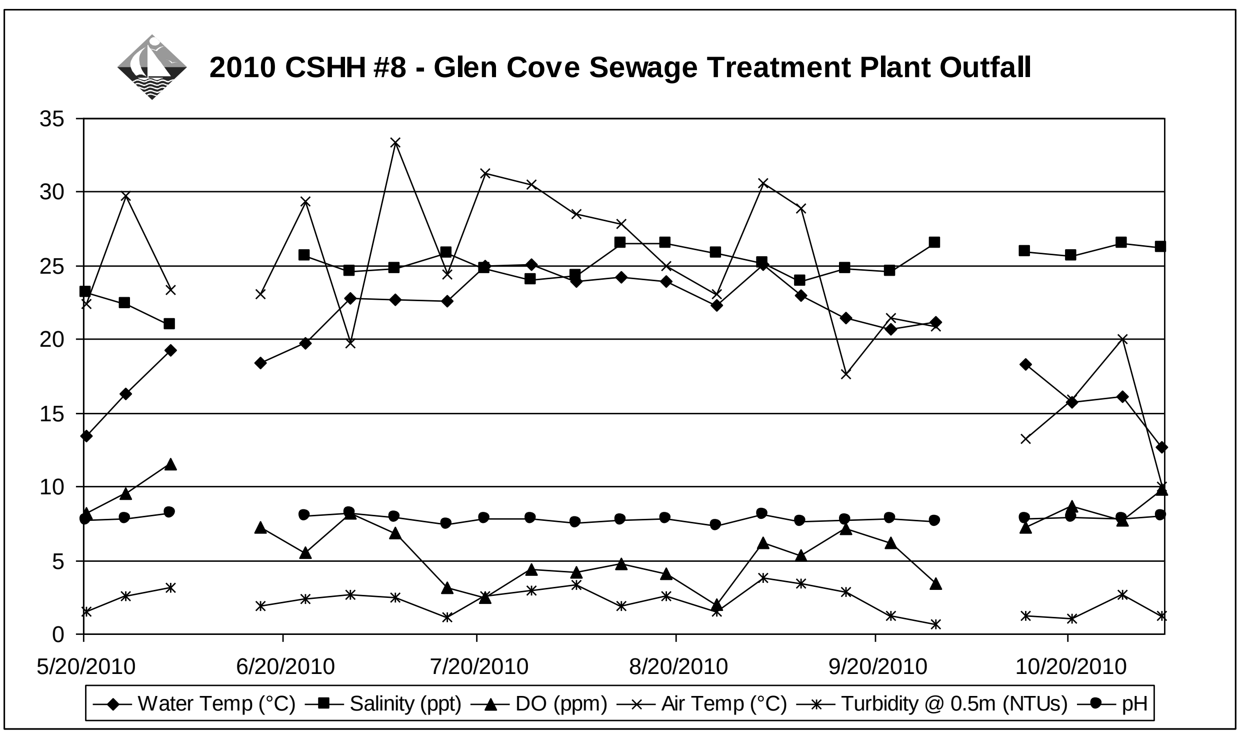
Appendix A

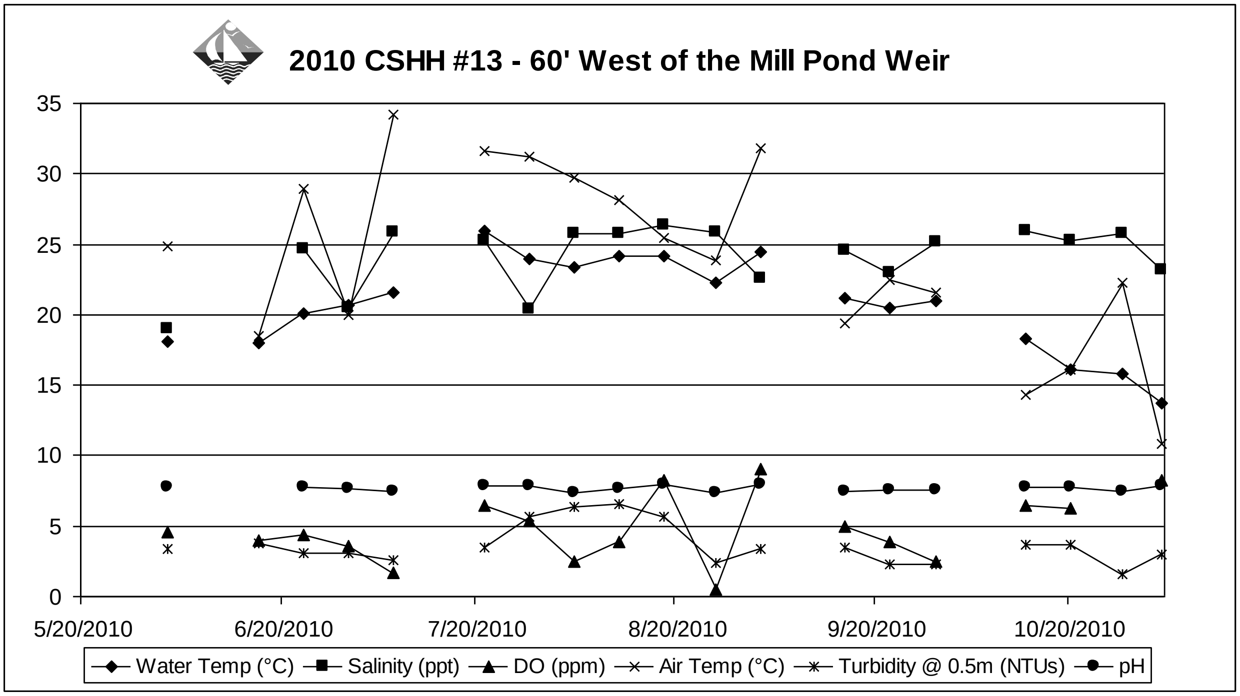
2010 Field Monitoring Results


2010 CSHH #1 - Beacon 11
35
30
25
20
15
10
5
0
5/20/2010
6/20/2010
7/20/2010
8/20/2010
9/20/2010
10/20/2010
Water Temp (°C)
Salinity (ppt)
DO (ppm)
Air Temp (°C)
Turbidity @ 0.5m (NTUs)
pH


2010 CSHH #2 - Bell Marker 6
35
30
25
20
15
10
5
0
5/20/2010
6/20/2010
7/20/2010
8/20/2010
9/20/2010
10/20/2010
Water Temp (°C)
Salinity (ppt)
DO (ppm)
Air Temp (°C)
Turbidity @ 0.5m (NTUs)
pH

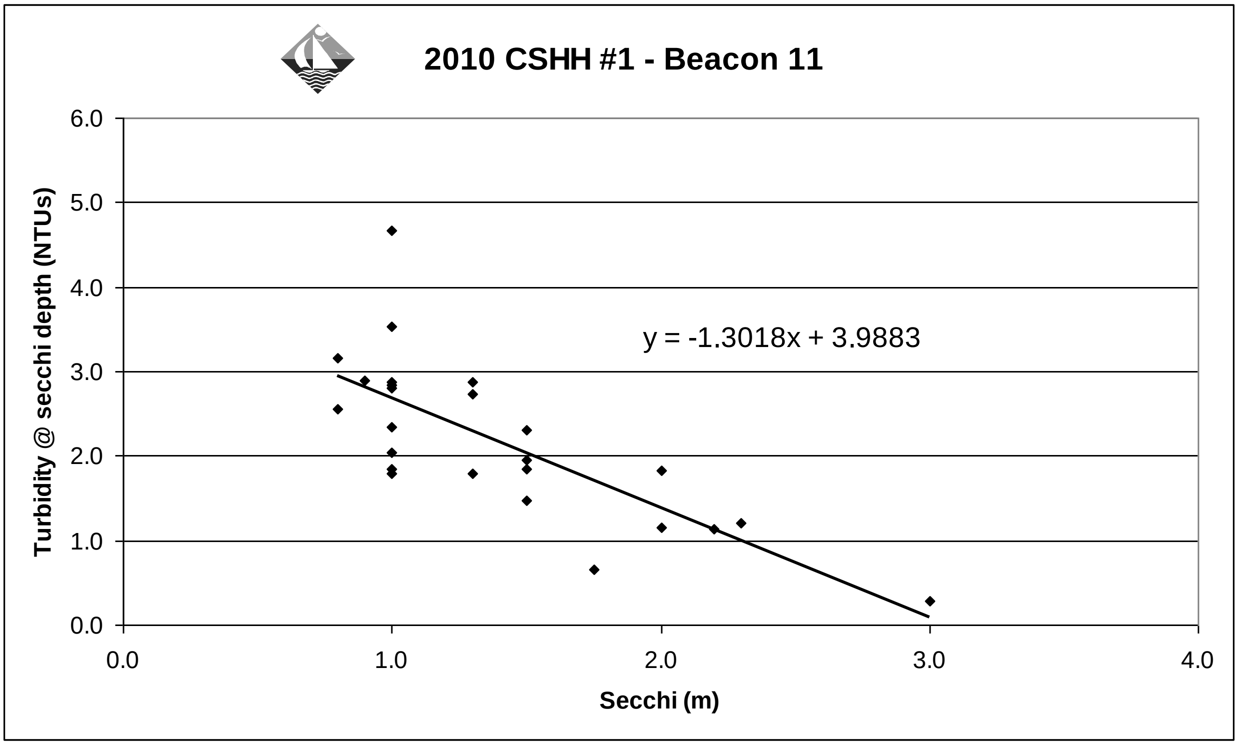

2010 CSHH #3 - Glen Cove Creek, Red Marker
35
30
25
20
15
10
5
0
5/20/2010
6/20/2010
7/20/2010
8/20/2010
9/20/2010
10/20/2010
Water Temp (°C)
Salinity (ppt)
DO (ppm)
Air Temp (°C)
Turbidity @ 0.5m (NTUs)
pH

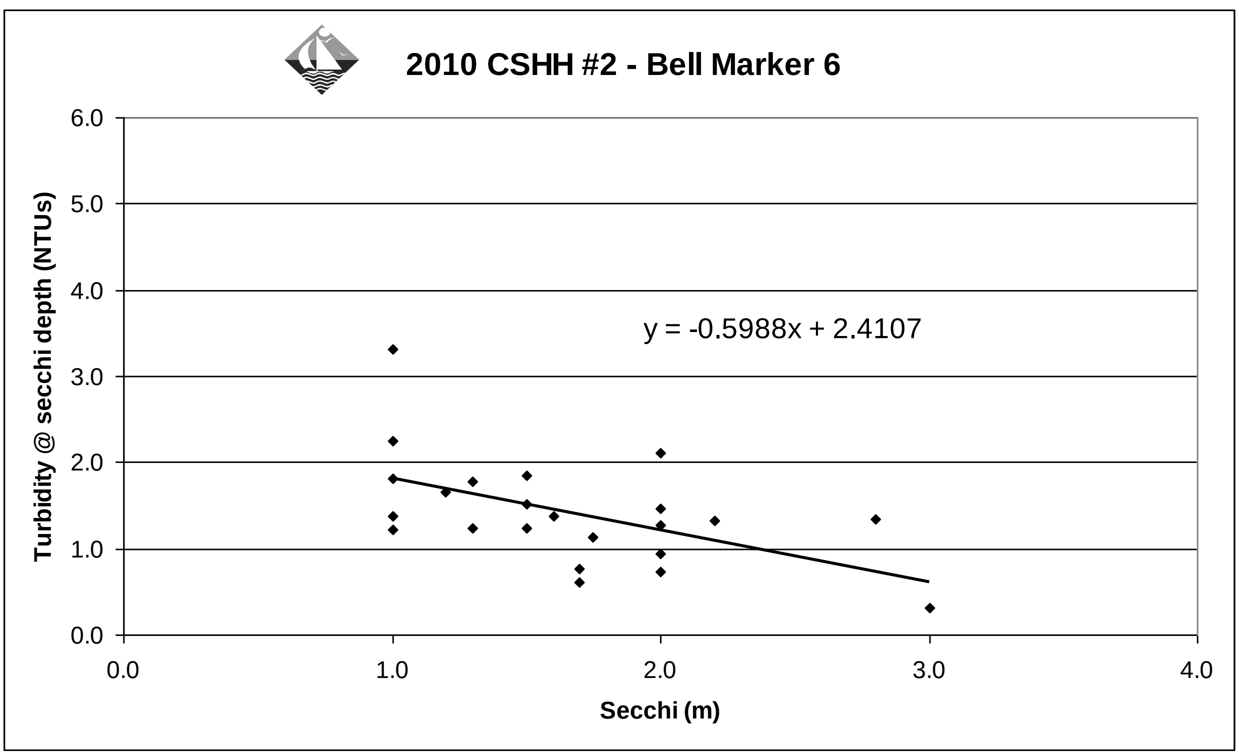

2010 CSHH #8 - Glen Cove Sewage Treatment Plant Outfall
35
30
25
20
15
10
5
0
5/20/2010
6/20/2010
7/20/2010
8/20/2010
9/20/2010
10/20/2010
Water Temp (°C)
Salinity (ppt)
DO (ppm)
Air Temp (°C)
Turbidity @ 0.5m (NTUs)
pH

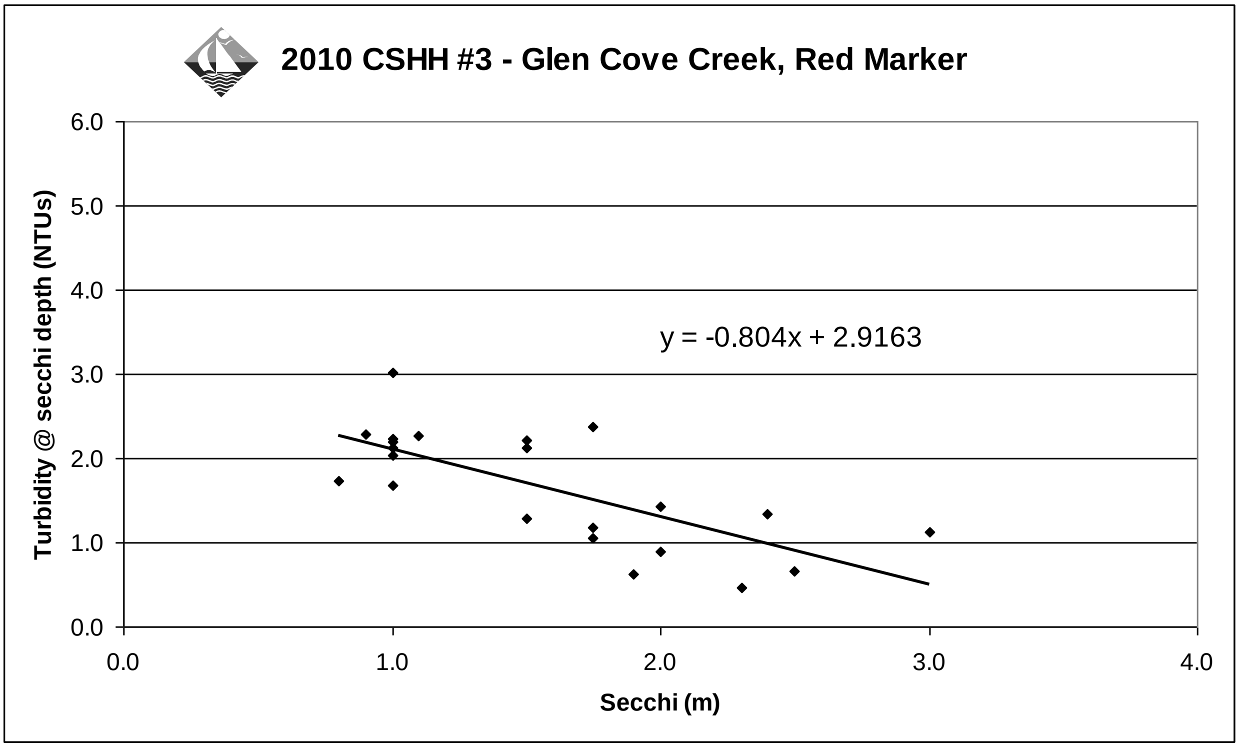

2010 CSHH #13 - 60' West of the Mill Pond Weir
35
30
25
20
15
10
5
0
5/20/2010
6/20/2010
7/20/2010
8/20/2010
9/20/2010
10/20/2010
Water Temp (°C)
Salinity (ppt)
DO (ppm)
Air Temp (°C)
Turbidity @ 0.5m (NTUs)
pH

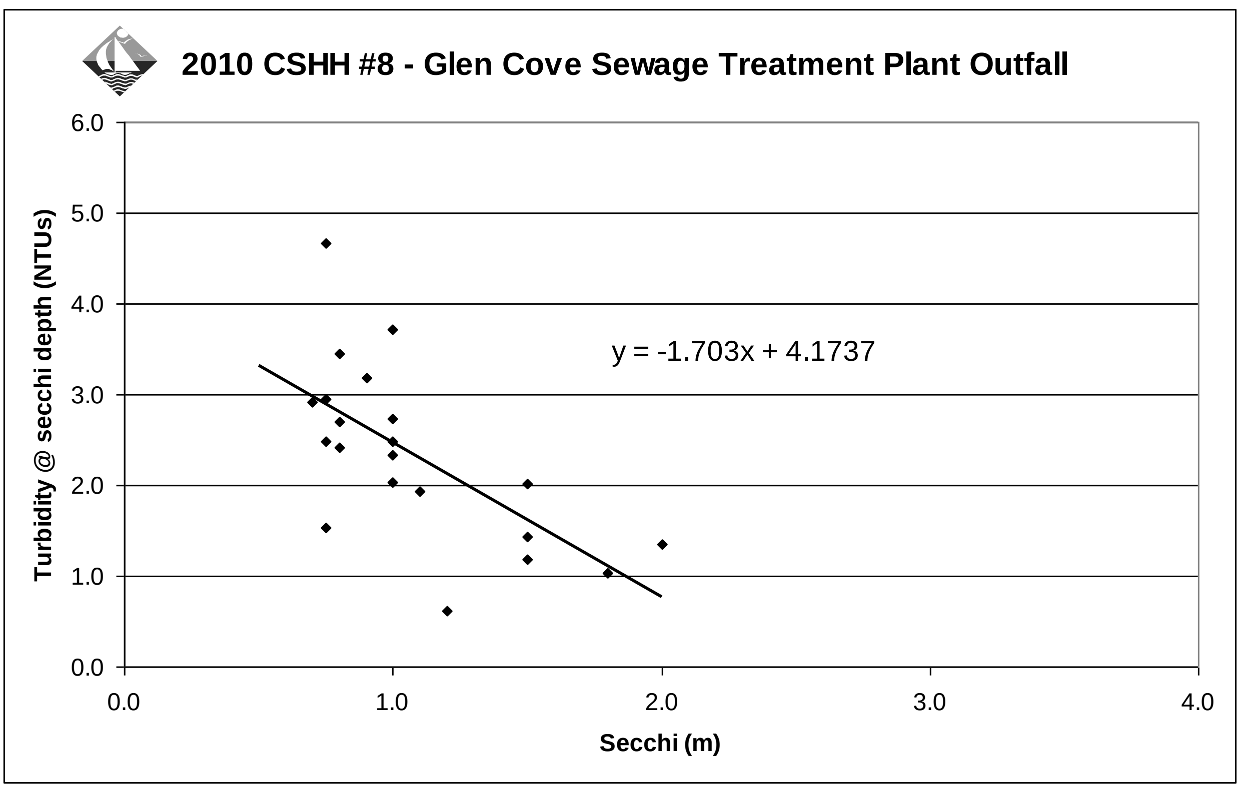
Appendix A – 2010 Turbidity and Secchi Disk Transparency Graphs

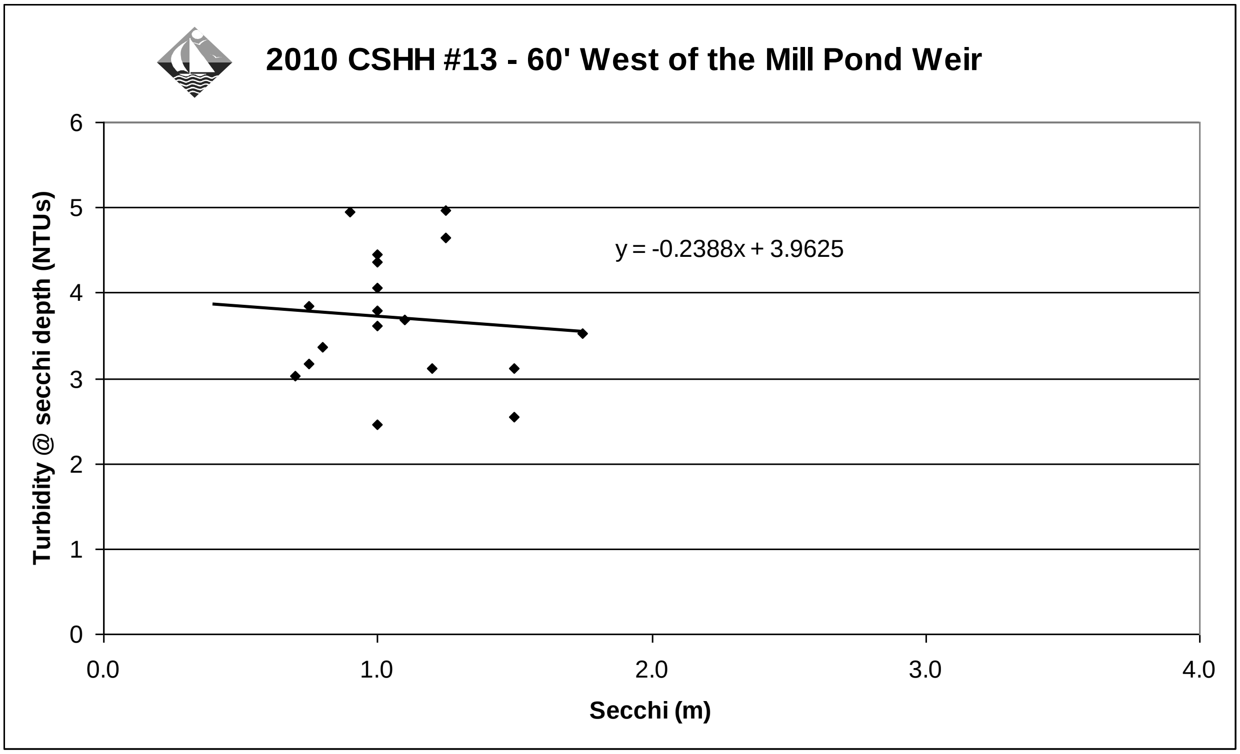
Note: A linear relationship line and its formula are shown for each graph as generated by Microsoft Excel. This line depicts the inverse relationship between the Secchi-disk depth and turbidly at Secchi-disk depth (as the turbidity increases, the Secchi-disk depth decreases). The inverse relationship is further shown in the negative slope of the formula (y = mx +b where, m is the slope of the line [negative = inverse trend, positive = direct trend]).






2010 CSHH #3 - Glen Cove Creek, Red Marker
Turbidity @ secchi depth (NTUs)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
y = -0.804x + 2.9163
0.0
1.0
2.0
3.0
4.0
Secchi (m)


2010 CSHH #8 - Glen Cove Sewage Treatment Plant Outfall
Turbidity @ secchi depth (NTUs)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
y = -1.703x + 4.1737
0.0
1.0
2.0
3.0
4.0
Secchi (m)


2010 CSHH #13 - 60' West of the Mill Pond Weir
y = -0.2388x + 3.9625
Turbidity @ secchi depth (NTUs)
Secchi (m)
0
1
2
3
4
5
6
0.0
1.0
2.0
3.0
4.0

CSHH Water-Monitoring Program 2010

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp	Secchi	Turbidity @ 0.5m	Turbidity @ secchi	Depth (m)	Time
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	Bottom	(AM)
CSHH #1 - Beacon 11																	
11/3/10	11.29	12.83	12.06	26.13	27.25	26.69	8.47	8.33	8.0	8.0	8.0	4.0	2.3	1.17	1.2	5.7	8:15
10/28/10	16.5	16.48	16.49	26.61	27.01	26.81	6.57	6.64	7.8	7.8	7.8	19.9	2.0	1.16	1.16	3.5	8:19
10/20/10	14.75	15.76	15.26	25.43	26.46	25.95	7.75	7.65	7.9	8.0	7.9	10.6	2.2	0.84	1.13	5.0	8:20
10/13/10	17.43	17.45	17.44	25.63	25.74	25.69	7.45	7.44	7.8	7.9	7.9	11.1	3.0	0.59	0.28	3.8	8:15
10/7/10	18.12	18.86	18.49	25.91	26.67	26.29	7.32	6.47	7.9	7.8	7.8	13.9	2.0	1.55	1.83	3.7	8:00
9/29/10	20.77	20.87	20.82	26.53	26.94	26.74	4.48	4.74	7.8	7.7	7.8	20.1	1.3	2.03	2.87	3.5	8:35
9/22/10	19.91	20.33	20.12	25.83	26.58	26.21	7.83	7.47	8.0	8.0	8.0	21.0	1.5	1.29	1.96	3.4	7:50
9/15/10	21.03	21.03	21.03	26.19	26.19	26.19	7.81	7.74	8.0	7.9	7.9	17.5	0.9	2.34	2.9	4.3	8:07
9/8/10	23.05	23.02	23.04	26.17	26.54	26.36	4.26	3.48	7.6	7.5	7.5	24.3	1.0	3.02	2.81	3.9	8:20
9/2/10	25.36	23.8	24.58	26.37	26.98	26.68	6.59	3.83	7.8	7.5	7.6	28.6	1.0	2.29	4.66	4.8	8:45
8/26/10	21.67	21.98	21.83	25.7	27.1	26.40	4.76	3.35	7.6	7.4	7.5	21.9	1.3	1.97	2.73	3.3	8:05
8/18/10	23.87	23.19	23.53	26.63	27.22	26.93	6.34	3.65	7.6	7.4	7.5	23.1	1.0	1.67	2.04	5.0	8:00
8/11/10	24.69	23.24	23.97	26.28	26.82	26.55	3.7	2.24	7.4	7.4	7.4	24.7	0.8	3.08	3.16	2.7	8:01
8/4/10	22.57	21.91	22.24	26.56	26.85	26.71	4.16	2.6	7.1	7.4	7.3	26.4	1.3	2.03	1.79	4.2	8:20
7/28/10	24.78	22.69	23.74	25.36	26.26	25.81	4.01	2.73	7.7	7.5	7.6	27.4	1.0	2.84	2.84	2.9	8:40
7/21/10	26.39	23.25	24.82	25.42	26.29	25.86	8.01	2.8	7.9	7.5	7.7	29.0	0.8	2.79	2.56	5.1	8:14
7/15/10	23.78	23.09	23.44	25.11	25.45	25.28	2.76	2.71	7.4	7.4	7.4	24.1	1.5	1.87	1.48	3.2	8:26
7/7/10	23.07	19.5	21.29	25.75	26.23	25.99	8.27	5.67	7.8	7.5	7.7	29.2	1.5	1.91	1.85	5.0	8:32
6/30/10	22.7	22.5	22.60	24.88	25.2	25.04	7.54	7.91	8.0	8.0	8.0	19.7	1.0	2.77	2.87	3.0	8:43
6/23/10	21.98	16.81	19.40	24.72	25.84	25.28	9.93	5.21	8.1	7.7	7.9	26.1	1.0	1.89	1.79	5.0	8:30
6/16/10	17.9	18.1	18.00	No electronic meter.			--	7.5	--	--	--	21.1	1.0	2.3	1.85	4.0	9:00
6/9/10	19.67	16.46	18.07	23.32	24.81	24.07	DO probe malfunction.		8.4	8.0	8.2	19.2	1.0	2.65	2.34	5.5	8:40
6/2/10	18.03	17.16	17.60	23.45	23.9	23.68	4.93	6.09	7.9	7.9	7.9	21.2	1.0	3.88	3.54	4.3	8:55
5/26/10	16	13.83	14.92	23.67	24.26	23.97	8.94	8.16	7.9	7.8	7.9	20.9	1.8	0.63	0.65	5.1	8:50
5/20/10	13.36	12.21	12.79	22.69	23.95	23.32	9.23	8.84	7.7	6.7	7.2	15.3	1.5	2.36	2.31	5.3	9:25
Average			*19.90*			*25.77*		*5.55*			*7.7*	*20.8*					

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp	Secchi	Turbidity @ 0.5m	Turbidity @ secchi	Depth (m)	Time
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	Bottom	(AM)
CSHH #2 - Bell Marker 6																	
11/3/10	11.92	12.66	12.29	26.83	27.43	27.13	10.52	10.14	8.0	8.0	8.0	9.6	2.8	1.05	1.34	9.1	10:40
10/28/10	16.4	16.2	16.30	27.35	27.75	27.55	7.99	6.4	8.0	7.8	7.9	19.0	3.0	0.56	0.32	8.0	8:45
10/20/10	15.2	16.4	15.80	25.69	26.99	26.34	10.92	8.38	8.1	7.9	8.0	14.5	1.7	1.08	0.77	10.0	11:40
10/13/10	17.87	17.87	17.87	26.43	26.44	26.44	7.87	7.83	8.0	8.0	8.0	11.5	2.0	0.69	1.47	6.7	8:44
10/7/10	No data collected at this station--platform detached from sonde.																
9/29/10	20.89	20.9	20.90	27.36	27.54	27.45	6.15	4.96	7.8	7.7	7.8	20.3	1.5	1.08	1.51	8.1	9:00
9/22/10	20.44	20.76	20.60	26.85	27.13	26.99	8.62	7.48	8.1	8.0	8.1	21.5	1.8	2.64	1.14	9.0	8:25
9/15/10	21.26	20.9	21.08	27.01	26.91	26.96	6.95	7.26	7.8	7.8	7.8	17.9	2.0	1.14	2.11	9.1	8:38
9/8/10	23.12	22.77	22.95	26.61	26.86	26.74	6.85	4.7	7.7	7.6	7.6	27.7	2.2	1.43	1.32	10.6	11:00
9/2/10	25.12	23.14	24.13	26.55	26.89	26.72	11.2	2.53	8.2	7.4	7.8	28.7	1.0	5.54	3.32	8.7	9:25
8/26/10	22.37	22.17	22.27	27	27.14	27.07	5.67	4.56	7.7	7.6	7.6	22.5	2.0	1.34	0.95	8.4	8:45
8/18/10	24.12	22.97	23.55	27.16	27.39	27.28	10.33	3.65	8.2	7.5	7.8	23.8	1.0	1.8	2.25	8.6	9:15
8/11/10	23.49	21.96	22.73	26.92	27.29	27.11	4.81	1.29	7.6	7.3	7.4	25.8	1.0	1.51	1.38	8.1	8:30
8/4/10	22.75	21.25	22.00	26.6	27	26.80	6.23	1.15	7.7	7.3	7.5	26.7	1.5	1.51	1.23	9.3	8:48
7/28/10	23.48	20.65	22.07	25.93	26.8	26.37	5.86	0.58	7.7	7.3	7.5	27.9	1.3	1.23	1.24	8.3	9:45
7/21/10	26.62	21.18	23.90	25.83	26.56	26.20	8.8	1	8.1	7.3	7.7	30.4	1.0	2.32	1.81	9.6	10:14
7/15/10	22.6	21.39	22.00	25.91	26.47	26.19	6.01	3.36	7.7	7.5	7.6	23.5	1.7	0.97	0.61	5.7	9:50
7/7/10	23.91	17.63	20.77	25.65	26.52	26.09	10.35	2.43	8.2	7.3	7.8	30.0	1.5	1.63	1.85	8.3	9:27
6/30/10	21.36	17.91	19.64	25.86	26.2	26.03	9.39	4.36	8.3	7.5	7.9	19.4	1.2	1.42	1.65	8.0	9:08
6/23/10	20.44	16.27	18.36	25.59	26	25.80	10.45	5.01	8.2	7.6	7.9	25.6	1.0	1.14	1.22	9.2	10:30
6/16/10	17.5	16.8	17.15	No electronic equipment.				6	--	--	--	20.1	1.6	2.03	1.38	7.0	9:25
6/9/10	Trouble with electronic meters--DO probe malfunction. No sampling at this station.																
6/2/10	19.47	16.54	18.01	23.1	24.34	23.72	7.95	8.2	8.3	8.0	8.1	21.3	1.3	2.52	1.78	6.9	9:30
5/26/10	15.76	14.8	15.28	24.18	24.25	24.22	10.13	9.57	8.0	7.9	8.0	26.5	2.0	0.98	0.74	9.2	10:45
5/20/10	14.96	11.33	13.15	23.24	24.42	23.83	9.3	7.94	7.8	7.7	7.8	21.1	2.0	1.44	1.27	7.4	10:40
Average			*19.68*			*26.32*		*5.16*			*7.8*	*22.4*					

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp	Secchi	Turbidity @ 0.5m	Turbidity @ secchi	Depth (m)	Time
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	Bottom	(AM)
CSHH #3 - Glen Cove Creek, Red Marker																	
11/3/10	12.19	12.72	12.46	26.82	27.29	27.06	11.2	10.25	8.1	8.0	8.1	9.1	3.0	0.8	1.12	5.4	11:00
10/28/10	16.49	16.54	16.52	26.51	27.01	26.76	7.88	7.63	7.9	7.8	7.9	19.2	2.5	0.79	0.66	3.3	9:05
10/20/10	15.59	15.85	15.72	25.82	26.49	26.16	10.14	9.34	8.0	8.0	8.0	15.5	1.9	0.67	0.62	5.3	11:25
10/13/10	17.89	18	17.95	25.75	26.35	26.05	8.06	7.82	8.0	8.0	8.0	13.0	2.3	0.31	0.46	3.5	9:35
10/7/10	No data collected at this station--platform detached from sonde.																
9/29/10	20.77	20.98	20.88	26.66	27.47	27.07	6.27	4.46	7.8	7.7	7.8	20.5	1.8	0.85	1.06	3.3	9:28
9/22/10	20.33	20.37	20.35	26.43	26.7	26.57	8.09	7.56	8.0	8.0	8.0	22.4	1.8	2.06	2.37	4.3	8:40
9/15/10	21	20.89	20.95	26.74	26.81	26.78	8.23	7.8	7.9	7.9	7.9	17.9	1.0	1.91	2.12	3.8	9:00
9/8/10	23.18	22.98	23.08	26.54	26.63	26.59	6.31	5.03	7.7	7.6	7.6	28.0	1.5	2.35	2.13	5.6	11:15
9/2/10	25.9	23.95	24.93	25.99	26.77	26.38	11.91	4.94	8.2	7.7	8.0	29.0	1.0	3.3	3.02	3.9	9:55
8/26/10	21.65	21.91	21.78	25.63	26.27	25.95	5.17	4.28	7.61	7.46	7.5	22.8	2.0	1.2	1.4	3.6	0.3819
8/18/10	24.22	23.33	23.78	26.73	27.29	27.01	8.61	5.23	8.0	7.6	7.8	24.3	1.0	1.91	2.23	4.8	9:34
8/11/10	23.96	23.69	23.83	26.76	26.89	26.83	6.17	4.77	7.7	7.7	7.7	26.8	0.8	1.44	1.73	3.2	8:55
8/4/10	22.86	22.36	22.61	26.27	26.74	26.51	5.94	4.18	7.6	7.5	7.5	27.3	1.0	2.03	1.68	4.4	9:14
7/28/10	24.99	22	23.50	25.53	26.65	26.09	7.76	2.1	8.0	7.4	7.7	30.0	1.0	1.89	2.2	3.9	10:05
7/21/10	26.83	22.73	24.78	25.29	26.38	25.84	9.72	2.79	8.2	7.4	7.8	30.3	1.1	2.25	2.26	4.8	10:30
7/15/10	22.61	22.08	22.35	25.25	25.81	25.53	5.91	3.72	7.6	7.5	7.5	24.4	2.0	0.75	0.89	3.0	9:12
7/7/10	23.97	19.58	21.78	25.6	26.31	25.96	10.12	7.31	8.2	7.7	7.9	32.5	1.5	1.54		4.7	9:55
6/30/10	21.82	21.77	21.80	25.68	25.78	25.73	9.61	9.94	8.3	8.2	8.3	19.9	1.5	1.73	2.21	3.0	9:40
6/23/10	21.67	16.74	19.21	25.01	25.83	25.42	11.15	4.69	8.3	7.6	7.9	26.5	0.9	2.08	2.28	5.0	11:05
6/16/10	18	18	18.00	No electronic equipment.				6.5	--	--	--	22.1	1.5	1.46	1.28	2.5	10:05
6/9/10	No data collected at this station--trouble with electronic meter--DO probe malfunction.																
6/2/10	19.64	17.58	18.61	23.79	24.14	23.97	8.7	9.25	8.4	8.0	8.2	22.2	1.0	2.14	2.04	3.2	10:00
5/26/10	16.56	14.5	15.53	23.8	24.24	24.02	9.53	9.37	8.0	7.9	8.0	28.9	1.8	0.31	1.17	5.6	11:05
5/20/10	13.89	12.27	13.08	23.37	24.11	23.74	8.94	8.44	7.8	7.8	7.8	20.5	2.4	1.08	1.34	3.4	11:05
Average			*20.15*			*26.00*		*6.41*			*7.9*	*23.2*					

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp	Secchi	Turbidity @ 0.5m	Turbidity @ secchi	Depth (m)	Time
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	Bottom	(AM)
CSHH #8 - Glen Cove Sewage Treatment Plant Outfall																	
11/3/10	12.57	12.85	12.71	25.41	26.96	26.19	10.59	9.82	8.0	8.0	8.0	10.0	2.0	1.22	1.35	4.0	11:30
10/28/10	15.91	16.26	16.09	26.26	26.69	26.48	8.26	7.73	7.8	7.8	7.8	20.0	1.0	2.71	2.03	2.6	9:26
10/20/10	15.86	15.63	15.75	25.24	26.04	25.64	9.03	8.67	7.9	7.9	7.9	15.9	1.8	1.01	1.03	4.5	11:09
10/13/10	18.41	18.16	18.29	25.69	26.15	25.92	7.04	7.23	7.9	7.9	7.9	13.3	1.2	1.25	0.62	2.5	10:00
10/7/10	No data collected at this station--platform detached from sonde.																
9/29/10	21.22	21.12	21.17	26.24	26.7	26.47	3.61	3.45	7.6	7.7	7.7	20.9	1.5	0.64	1.44	2.7	9:55
9/22/10	20.32	20.99	20.66	22.78	26.48	24.63	7.26	6.17	7.9	7.8	7.8	21.5	0.8	1.21	1.53	3.3	9:00
9/15/10	21.32	21.6	21.46	22.97	26.67	24.82	7.8	7.17	7.8	7.8	7.8	17.6	1.0	2.86	2.34	2.7	9:30
9/8/10	22.88	23.18	23.03	21.95	26	23.98	6.47	5.37	7.7	7.6	7.6	28.9	1.0	3.43	3.71	4.4	11:35
9/2/10	25.82	24.34	25.08	23.89	26.49	25.19	15.62	6.17	8.4	7.8	8.1	30.6	0.8	3.84	4.66	3.1	10:40
8/26/10	22.28	22.33	22.31	24.99	26.62	25.81	3.7	2.05	7.4	7.3	7.4	23.1	1.5	1.53	2.01	3.0	8:40
8/18/10	24.5	23.41	23.96	26.13	26.93	26.53	11.03	4.07	8.1	7.5	7.8	25.0	0.8	2.54	2.49	3.5	10:00
8/11/10	24.58	23.8	24.19	26.12	26.85	26.49	7.05	4.8	7.8	7.6	7.7	27.8	0.8	1.93	2.41	2.6	9:17
8/4/10	23.94	23.87	23.91	22.4	26.31	24.36	6.42	4.18	7.6	7.5	7.5	28.5	1.0	3.37	2.49	2.9	10:00
7/28/10	25.68	24.39	25.04	22.02	25.96	23.99	9.73	4.37	8.1	7.6	7.8	30.5	0.8	2.95	2.95	3.0	10:35
7/21/10	26.36	23.58	24.97	23.28	26.28	24.78	10.9	2.46	8.2	7.4	7.8	31.3	0.8	2.59	3.45	3.9	10:50
7/15/10	22.65	22.46	22.56	25.75	25.88	25.82	4.27	3.16	7.5	7.4	7.5	24.4	1.1	1.14	1.93	1.8	9:42
7/7/10	24.67	20.68	22.68	23.39	26.15	24.77	10.83	6.88	8.2	7.8	8.0	33.4	1.0	2.45	2.73	3.5	10:30
6/30/10	23.39	22.18	22.79	23.78	25.45	24.62	12.92	8.21	8.4	8.0	8.2	19.7	0.8	2.7	2.7	2.3	10:02
6/23/10	21.81	17.75	19.78	25.45	25.79	25.62	15.22	5.57	8.3	7.6	8.0	29.4	0.7	2.43	2.92	4.9	11:33
6/16/10	18.8	18	18.40	No electronic equipment.				7.25	--	--	--	23.1	1.5	1.86	--	2.3	10:20
6/9/10	No data collected at this station--trouble with electronic meter--DO probe malfunction.																
6/2/10	20.04	18.5	19.27	17.93	23.95	20.94	10.72	11.51	8.2	8.1	8.2	23.4	0.5	3.18	--	2.5	10:25
5/26/10	16.95	15.59	16.27	21.02	23.86	22.44	9.39	9.49	7.7	7.9	7.8	29.8	0.9	2.62	3.18	4.5	11:30
5/20/10	13.62	13.21	13.42	22.9	23.48	23.19	8.59	8.24	7.7	7.7	7.7	22.4	1.5	1.51	1.19	2.3	11:26
Average			*20.60*			*24.94*		*6.26*			*7.8*	*23.9*					

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp	Secchi	Turbidity @ 0.5m	Turbidity @ secchi	Depth (m)	Time
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	Bottom	(AM)
CSHH #13 - 60' West of the Mill Pond Weir																	
11/3/10	13.88	13.53	13.71	19.41	27.02	23.22	9.86	8.27	8.0	7.8	7.9	10.8	1.5	2.97	2.55	2.2	11:50
10/28/10	15.8	--	15.80	25.8	--	25.80	5.64	--	7.5		7.5	22.3	0.4	1.59	--	0.4	9:45
10/20/10	16.21	15.94	16.08	24.85	25.76	25.31	8.81	6.26	7.8	7.7	7.8	16.1	1.5	3.71	3.12	2.4	10:19
10/13/10	18.36	18.23	18.30	25.64	26.19	25.92	5.73	6.42	7.7	7.8	7.7	14.3	1.1	3.63	3.69	2.5	10:23
10/7/10	No data collected at this station--platform detached from sonde.																
9/29/10	20.8	21.18	20.99	24.21	26.11	25.16	4.48	2.49	7.6	7.5	7.5	21.6	1.2	2.33	3.11	0.9	10:15
9/22/10	19.88	21.18	20.53	19.72	26.27	23.00	6.24	3.88	7.6	7.5	7.6	22.5	1.8	2.29	3.52	2.9	9:20
9/15/10	21.01	21.36	21.19	23.29	25.79	24.54	4.93	4.98	7.5	7.5	7.5	19.4	1.0	3.49	3.79	1.0	9:55
9/8/10	Ran out of time--no sampling at CSHH #13.																
9/2/10	23.69	25.26	24.48	19.3	25.84	22.57	11.64	9.04	8.1	7.9	8.0	31.8	1.3	3.36	4.96	1.8	10:55
8/26/10	21.96	22.53	22.25	25	26.66	25.83	4.25	0.5	7.4	7.3	7.3	23.9	1.3	2.42	4.65	2.9	10:02
8/18/10	23.86	24.44	24.15	25.97	26.81	26.39	11.25	8.25	8.0	7.9	8.0	25.5	0.8	5.64	3.17	2.0	10:35
8/11/10	24.11	24.14	24.13	24.88	26.6	25.74	7.43	3.91	7.8	7.5	7.6	28.1	0.8	6.56	3.36	2.0	9:24
8/4/10	23.32	23.33	23.33	25.52	26.05	25.79	3.18	2.5	7.4	7.3	7.3	29.7	0.9	6.38	4.95	1.6	10:25
7/28/10	22.88	25.02	23.95	15.6	25.26	20.43	11.01	5.38	8.1	7.6	7.8	31.2	1.0	5.68	4.36	1.9	10:55
7/21/10	26.02	25.85	25.94	24.91	25.63	25.27	8.27	6.46	7.9	7.8	7.9	31.6	1.0	3.5	3.62	1.5	11:05
7/15/10	Tide too low--couldn't hold position for sampling at this station.																
7/7/10	22.81	20.27	21.54	25.69	26.03	25.86	6.8	1.67	7.7	7.3	7.5	34.2	1.0	2.61	2.45	3.5	10:50
6/30/10	20.33	21.04	20.69	15.59	25.4	20.50	9.24	3.55	7.9	7.5	7.7	20.0	1.0	3.06	4.06	2.3	10:18
6/23/10	21.14	19.1	20.12	23.91	25.34	24.63	9.98	4.39	8.1	7.4	7.8	28.9	0.7	3.12	3.02	2.1	11:50
6/16/10	18	18	18.00	No electronic equipment.				4	--	--	--	18.5	1.0	3.77	4.45	2.0	10:45
6/9/10	No data collected at this station--trouble with electronic meter.																
6/2/10	18.82	17.4	18.11	14.14	23.8	18.97	9.81	4.54	8.1	7.4	7.8	24.9	0.8	3.4	3.85	2.4	10:43
5/27/09	Barges blocking head of Glen Cove Creek--no access to CSHH #13.																
5/20/10	Barges blocking head of Glen Cove Creek--no access to CSHH #13.																
													*bottom (11/28,9/15)				
Average		*20.70*			*24.16*		*4.81*			*7.7*	*24.0*						*Average*

Date	**Water Temp (°C)**			**Salinity (ppt)**			**DO (ppm)**		**pH**			**Air Temp**	**Secchi**	**Turbidity @ 0.5m**	**Turbidity @ secchi**	**Depth (m)**	**Time**
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	Bottom	(AM)
CSHH #14 - NW Corner of Power Plant ~50 Yards from Cement Outfall																	
11/3/10	11.32	12.28	11.80	26.28	26.86	26.57	9.22	8.43	8.0	8.0	8.0	3.6	2.3	1.02	1.02	2.7	8:40
10/20/10	14.74	15.14	14.94	25.51	25.79	25.65	8.61	7.77	7.9	7.9	7.9	14.3	1.8	0.64	1.06	1.9	9:45
9/22/10	20.22	20.27	20.25	26.5	26.5	26.50	7.14	7.16	8.0	8.0	8.0	22.1	1.5	2.34	2.13	1.6	9:55
9/8/10	22.99	22.91	22.95	26.65	26.65	26.65	4.52	4.03	7.6	7.5	7.5	27.7	0.8	5.05	5.18	2.4	10:28
8/11/10	22.76	22.6	22.68	27.02	27.03	27.03	2.07	1.97	7.3	7.3	7.3	29.2	1.8	1.75	1.24	4.1	10:20
7/21/10	25.69	25.27	25.48	25.43	25.78	25.61	6.03	5.12	7.7	7.6	7.6	30.0	0.8	3.17	3.17	2.0	9:45
													*bottom (11/3)				
Average			*19.68*			*26.33*		*5.75*			*7.7*	*21.2*					

Date	**Water Temp (°C)**			**Salinity (ppt)**			**DO (ppm)**		**pH**			**Air Temp**	**Secchi**	**Turbidity @ 0.5m**	**Turbidity @ secchi**	**Depth (m)**	**Time**
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	Bottom	(AM)
CSHH #15 - 50 yds from Scudders Pond Outfall, North of Tappen Pool																	
11/3/10	11.64	12.81	12.23	26.19	27.24	26.72	10.31	10.01	8.0	8.0	8.0	9.2	2.5	1.06	0.98	2.5	10:20
10/20/10	15.18	15.72	15.45	25.84	26.33	26.09	8.94	7.8	8.0	7.9	7.9	15.1	2.2	0.68	1.12	2.6	10:10
9/22/10	19.85	19.83	19.84	25.88	25.89	25.89	7.85	7.87	7.8	7.9	7.9	21.9	2.0	1.97	2.32	2.3	9:40
9/8/10	22.89	23.07	22.98	26.3	26.34	26.32	5.84	5.09	7.6	7.6	7.6	27.5	1.2	2.85	2.34	2.6	10:46
8/11/10	23.89	23.83	23.86	26.41	26.41	26.41	6.2	6.2	7.6	7.6	7.6	27.0	1.0	no sample		1.7	10:07
7/21/10	25.72	24.67	25.20	25.73	26.03	25.88	6.08	4.18	7.8	7.6	7.7	29.8	1.0	2.9	3.68	1.8	10:01
													*bottom (11/3, 10/20)				
Average			*19.93*			*26.22*		*6.86*			*7.8*	*21.8*					

Date	Water Temp (°C)		Salinity (ppt)			DO (ppm)			pH			Air Temp	Secchi	Turbidity @ 0.5m	Turbidity @ secchi	Depth (m)	Time
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	Bottom	(AM)
CSHH #4 - North Hempstead Beach (S)(former Bar Beach) Spit Creek																	
11/3/10	11.2	12.67	11.94	26.25	27.16	26.71	8.87	8.39	8.0	8.0	8.0	5.9	2.3	1.25	2.94	2.9	8:55
10/20/10	15.09	15.71	15.40	25.68	26.27	25.98	7.89	7.75	7.9	7.9	7.9	14.0	2.0	1.33	1.02	2.6	9:46
9/22/10	20.21	20.28	20.25	26.55	26.6	26.58	7.66	7.6	8.0	8.0	8.0	23.4	1.5	2.29	1.72	5.4	10:05
9/8/10	23.05	22.98	23.02	26.34	26.42	26.38	4.48	4.13	7.5	7.5	7.5	24.8	1.0	3.44	3.83	6.7	9:00
8/11/10	23.82	23.53	23.68	26.74	26.81	26.78	5.6	4.49	7.6	7.5	7.5	29.5	1.0	2.7	2.8	5.3	10:35
7/21/10	25.7	23.2	24.45	25.58	26.15	25.87	5.74	2.18	7.7	7.3	7.5	30.4	0.8	2.75	3.17	7.2	9:35
6/9/10	Trouble with electronic meter--no sample collection at this station.																
													*bottom (11/3)				
Average			*21.36*			*26.31*		*5.23*			*7.7*	*24.4*					

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp	Secchi	Turbidity @ 0.5m	Turbidity @ secchi	Depth (m)	Time
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	Bottom	(AM)
CSHH #5 - Mott's Cove																	
11/3/10	11.92	12.32	12.12	26.3	26.84	26.57	7.8	7.65	8.0	8.0	8.0	5.7	2.3	1	1.82	2.3	9:05
10/20/10	15.4	15.63	15.52	25.63	26.11	25.87	7.49	7.34	7.9	7.9	7.9	12.5	2.0	1.36	1.36	1.9	9:31
9/22/10	19.99	20.03	20.01	25.68	25.79	25.74	7.68	7.83	8.0	8.0	8.0	22.7	1.3	3.37	3.63	1.6	10:15
9/8/10	22.98	23.06	23.02	25.62	26.04	25.83	4.18	3.93	7.5	7.5	7.5	25.6	1.0	3.56	3.89	1.5	9:24
8/11/10	24.64	24.17	24.41	26.38	26.77	26.58	3.65	3.24	7.4	7.4	7.4	30.7	1.0	2.5	2.84	1.8	10:53
7/21/10	26.65	25.17	25.91	24.83	25.59	25.21	7.3	5.16	7.8	7.5	7.6	29.2	0.5	5.98	--	1.8	9:21
													*bottom (10/20)				
Average			*20.16*			*25.97*		*5.86*			*7.7*	*21.1*					

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp	Secchi	Turbidity @ 0.5m	Turbidity @ secchi	Depth (m)	Time
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	Bottom	(AM)
CSHH #6 - East of Former Incinerator Site																	
11/3/10	10.96	11.64	11.30	25.37	26.22	25.80	10.35	9.75	8.0	8.0	8.0	6.9	1.8	1.95	1.82	2.8	9:30
10/20/10	15.07	15.18	15.13	25.39	25.56	25.48	7.88	7.32	7.9	7.9	7.9	12.0	1.8	2.19	1.89	2.3	9:12
9/22/10	20.19	20.14	20.17	25.78	26.02	25.90	8.01	7.95	8.0	8.0	8.0	23.7	1.8	2.72	3.06	2.4	10:30
9/8/10	23.16	23.09	23.13	25.94	25.98	25.96	4.31	4.01	7.5	7.5	7.5	26.7	1.2	4.67	4.28	2.3	9:45
8/11/10	24.72	24.79	24.76	26.56	26.57	26.57	4.97	4.39	7.5	7.4	7.5	27.6	0.5	3.52	--	2.4	11:04
7/21/10	27.04	25.66	26.35	25.16	25.65	25.41	6	4.76	7.5	7.5	7.5	29.7	0.8	4.33	3.78	1.3	9:05
Average			*18.89*			*25.94*		*6.68*			*7.8*	*19.4*					

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp	Secchi	Turbidity @ 0.5m	Turbidity @ secchi	Depth (m)	Time
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	Bottom	(AM)
CSHH #7 - West of Bryant Landing (formerly site of oil dock)																	
11/3/10	10.57	11.06	10.82	23.92	25.4	24.66	9.58	9.81	7.9	7.9	7.9	7.3	1.0	3.05	3.31	2.1	9:50
10/20/10	14.3	14.94	14.62	24.64	25.21	24.93	7.62	7.12	7.9	7.9	7.9	10.7	1.3	2.7	3	2.0	8:58
9/22/10	20.26	20.12	20.19	25.49	25.62	25.56	7.44	7.5	8.0	8.0	8.0	24.2	1.3	4.67	4.3	1.8	10:40
9/8/10	23.22	23.09	23.16	25.56	25.73	25.65	4.69	3.94	7.6	7.5	7.5	28.0	1.0	5.18	4.59	2.0	10:00
8/11/10	26	25.7	25.85	25.5	26.16	25.83	6.68	6.11	7.6	7.5	7.5	29.1	0.5	6.38	--	2.2	11:15
7/21/10	26.65	26.98	26.82	24.8	25.17	24.99	4.89	4.82	7.5	7.5	7.5	29.0	0.5	4.56	--	1.5	8:45
Average			*18.93*			*25.32*		*6.90*			*7.8*	*19.9*					

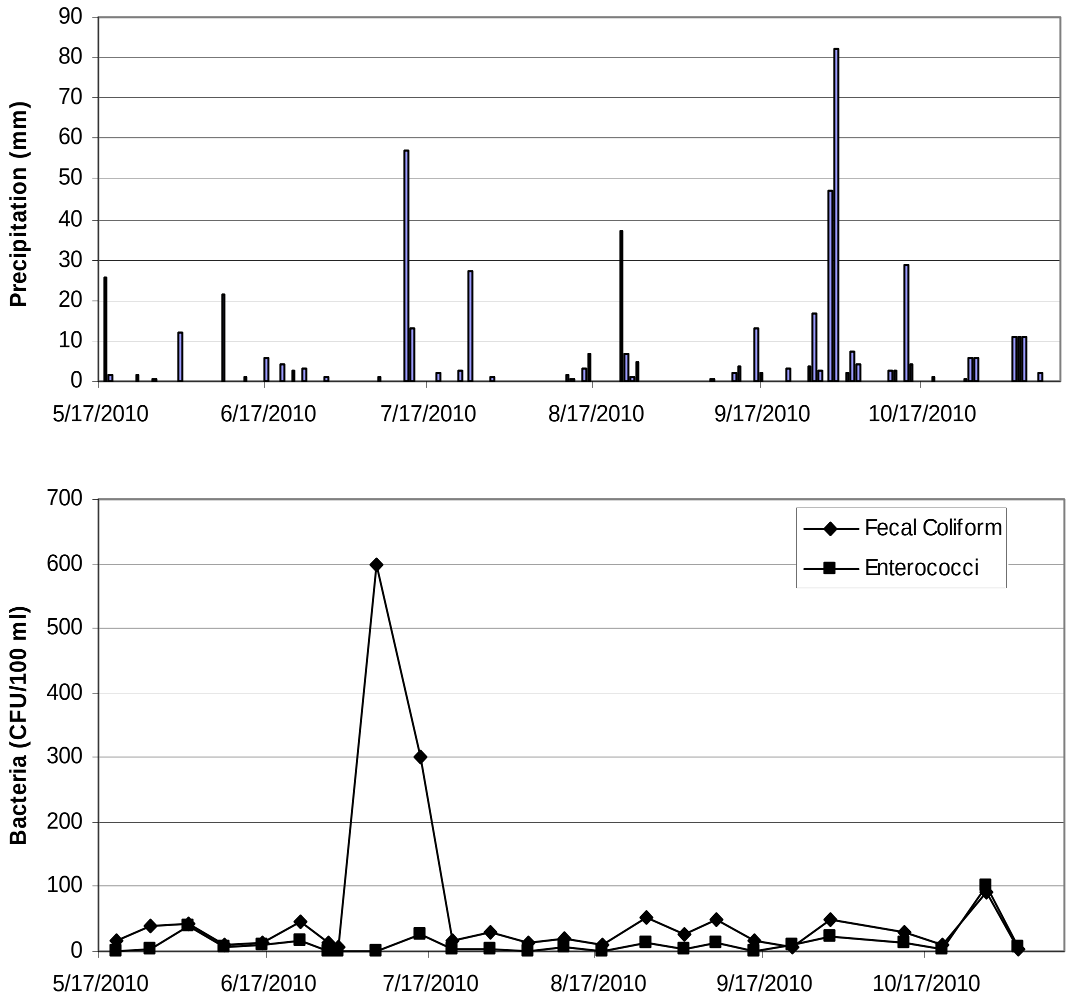
Appendix B

2010 Bacteria and Precipitation Data

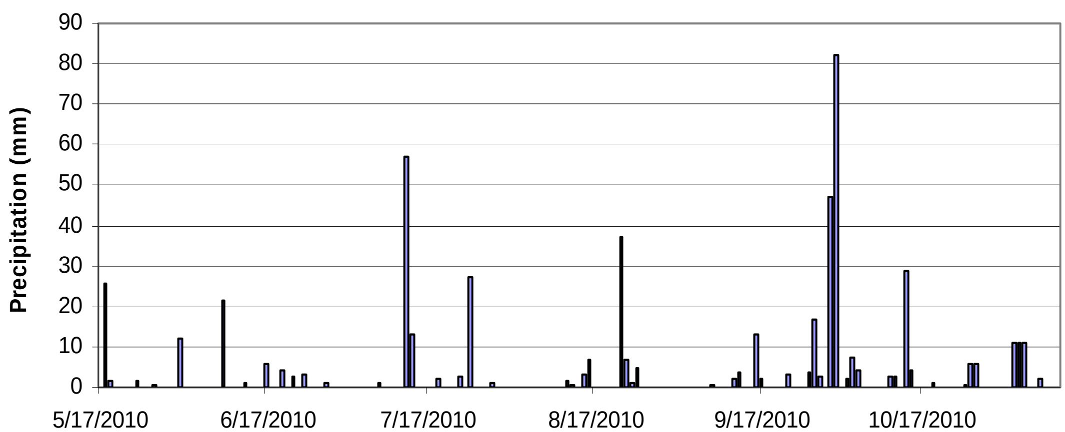
Appendix B – 2010 In-Harbor Precipitation and Bacteria Graphs

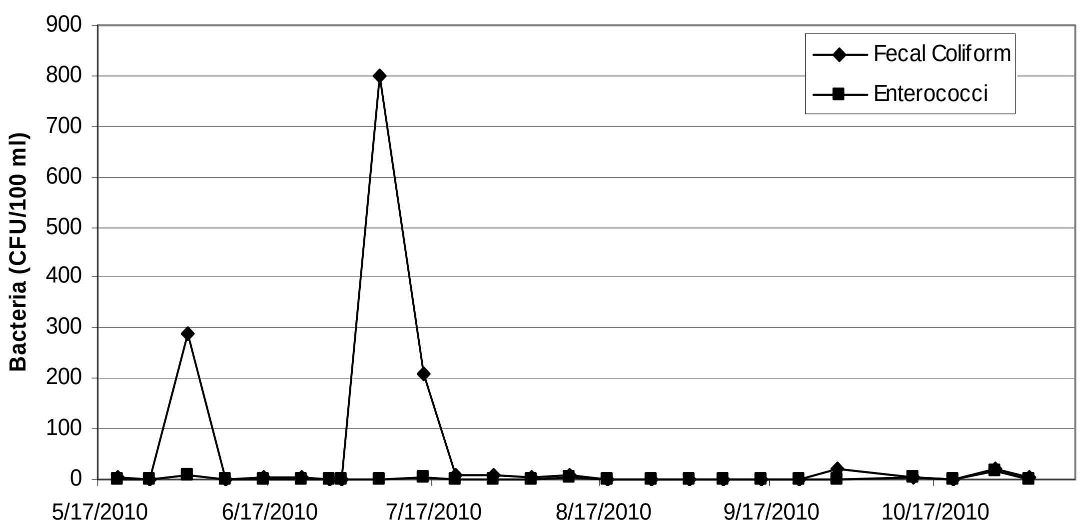
Note: All fecal coliform data for July 7, 2010 is suspected. As evidence, the fecal coliform count at CSHH #2, station closest to the sound, was very elevated – high counts have never been witnessed at this location. NCDH recognized the abnormality in the data results; however, nothing conclusive was found to cause the high results. Enterococci results were low on this data.

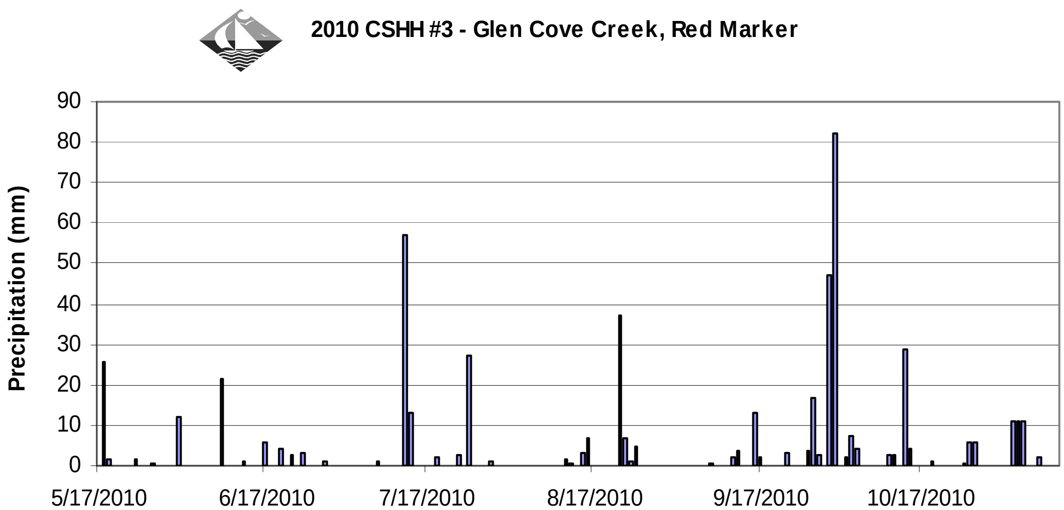
2010 CSHH #1 - Beacon 11

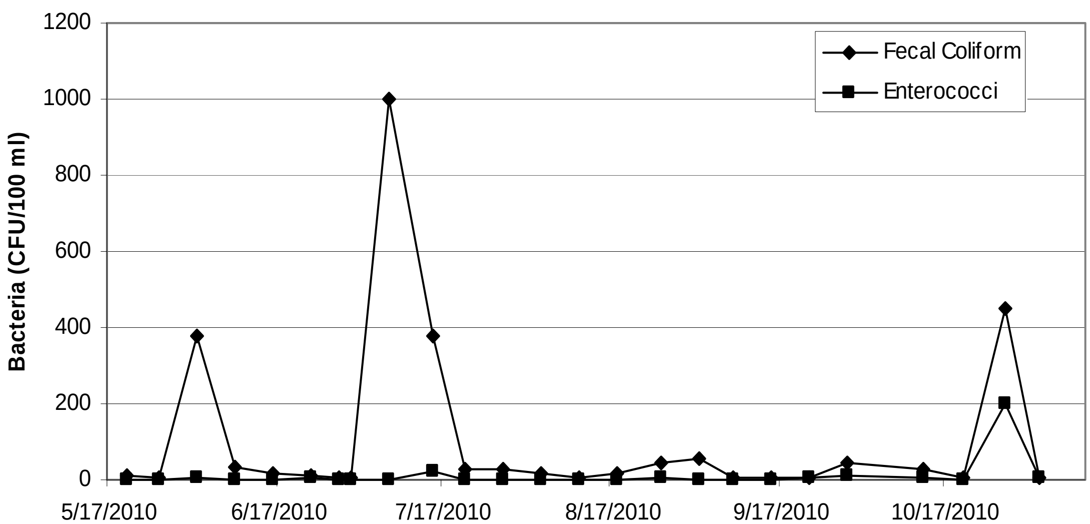


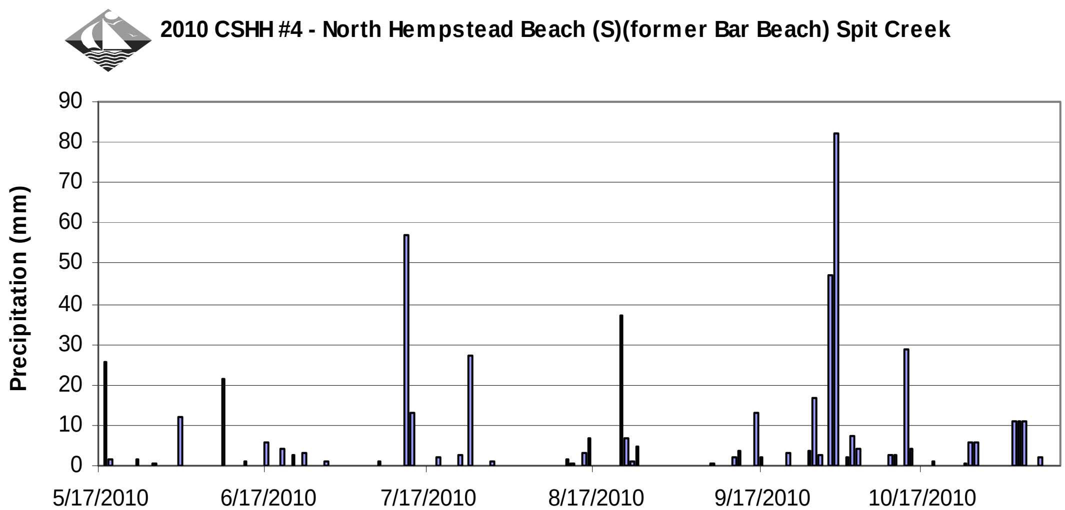
2010 CSHH #2 - Bell Marker 6

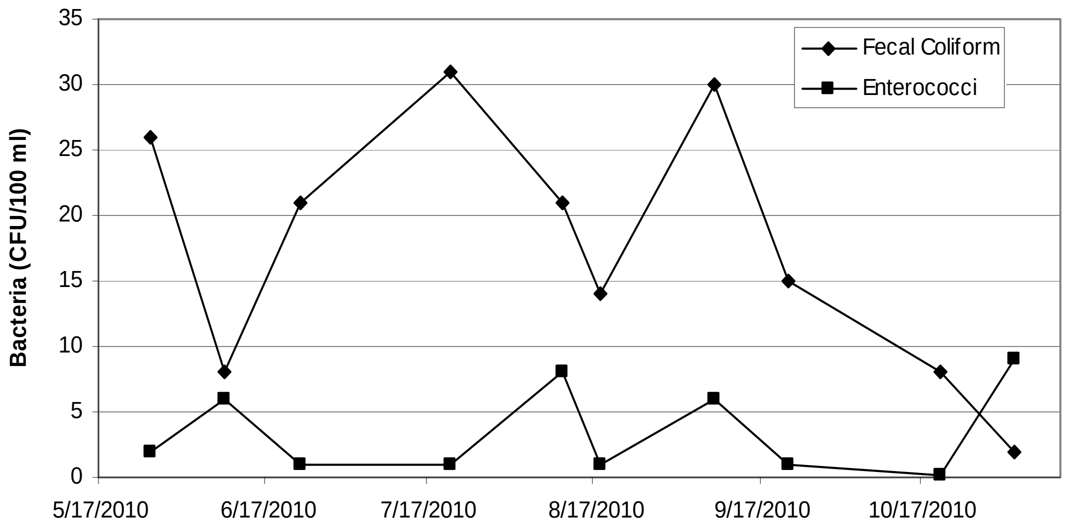




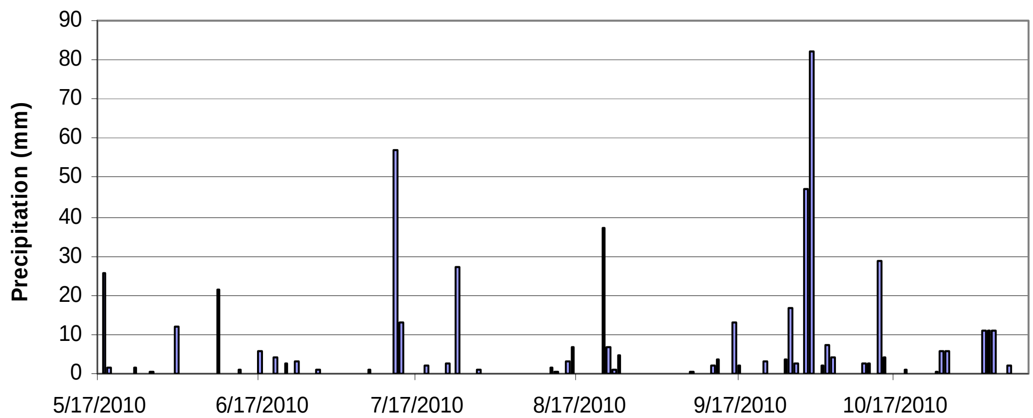

2010 CSHH #3 - Glen Cove Creek, Red Marker
Precipitation (mm)
90
80
70
60
50
40
30
20
10
0
5/17/2010
6/17/2010
7/17/2010
8/17/2010
9/17/2010
10/17/2010

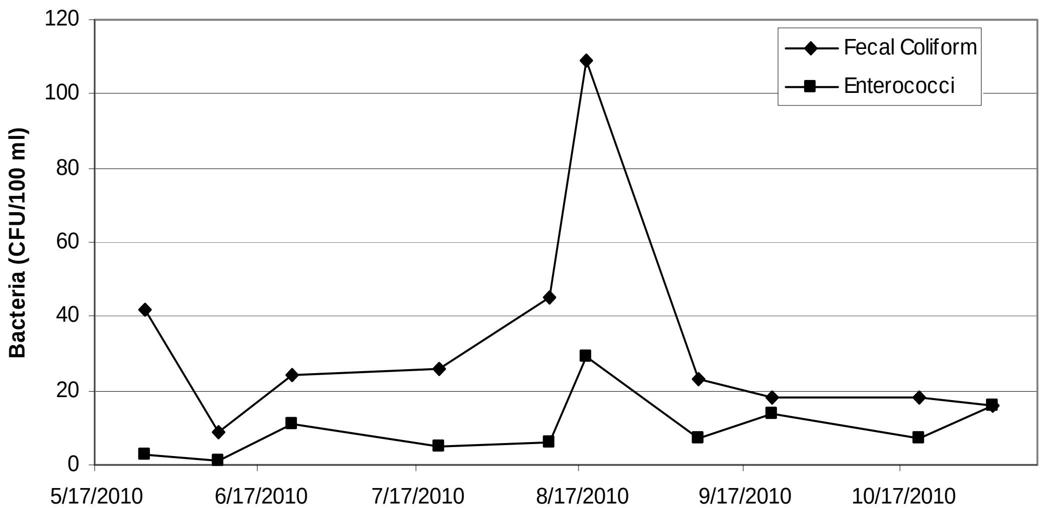

Bacteria (CFU/100 ml)
1200
1000
800
600
400
200
0
5/17/2010
6/17/2010
7/17/2010
8/17/2010
9/17/2010
10/17/2010
Fecal Coliform
Enterococci


2010 CSHH #4 - North Hempstead Beach (S)(former Bar Beach) Spit Creek
Precipitation (mm)
90
80
70
60
50
40
30
20
10
0
5/17/2010
6/17/2010
7/17/2010
8/17/2010
9/17/2010
10/17/2010

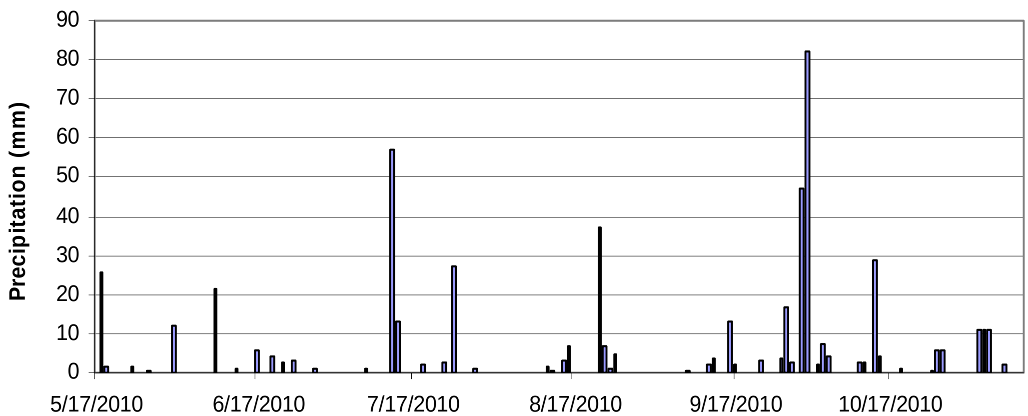

Bacteria (CFU/100 ml)
35
30
25
20
15
10
5
0
Fecal Coliform
Enterococci
5/17/2010
6/17/2010
7/17/2010
8/17/2010
9/17/2010
10/17/2010

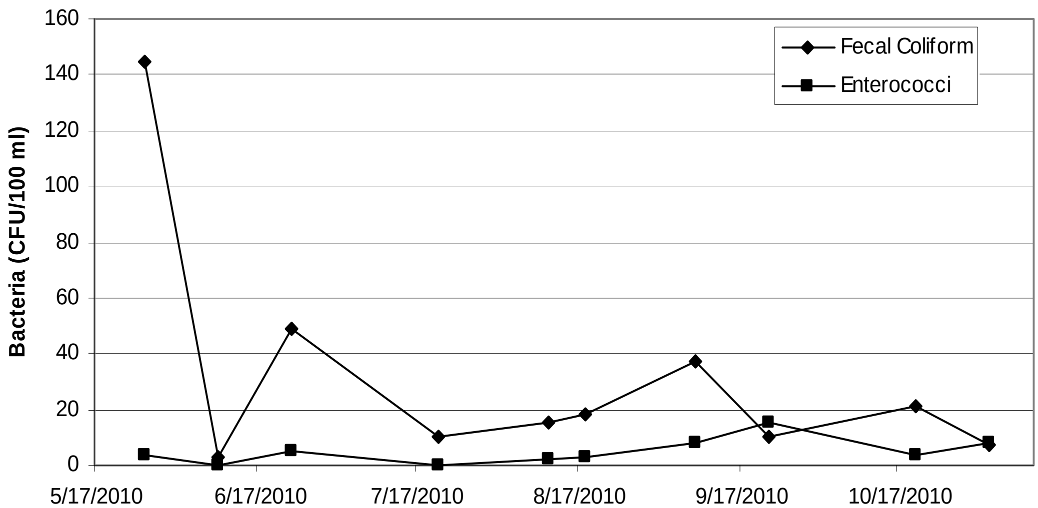
2010 CSHH #5 - Mott's Cove



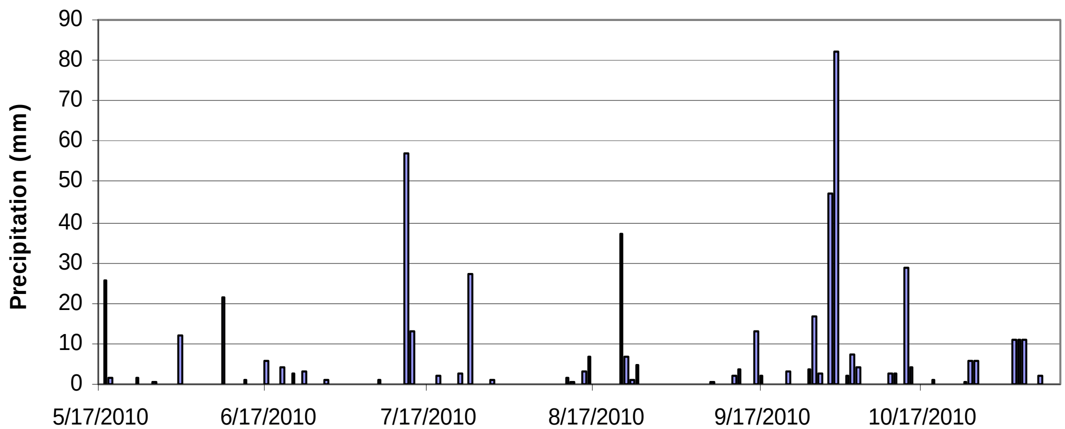


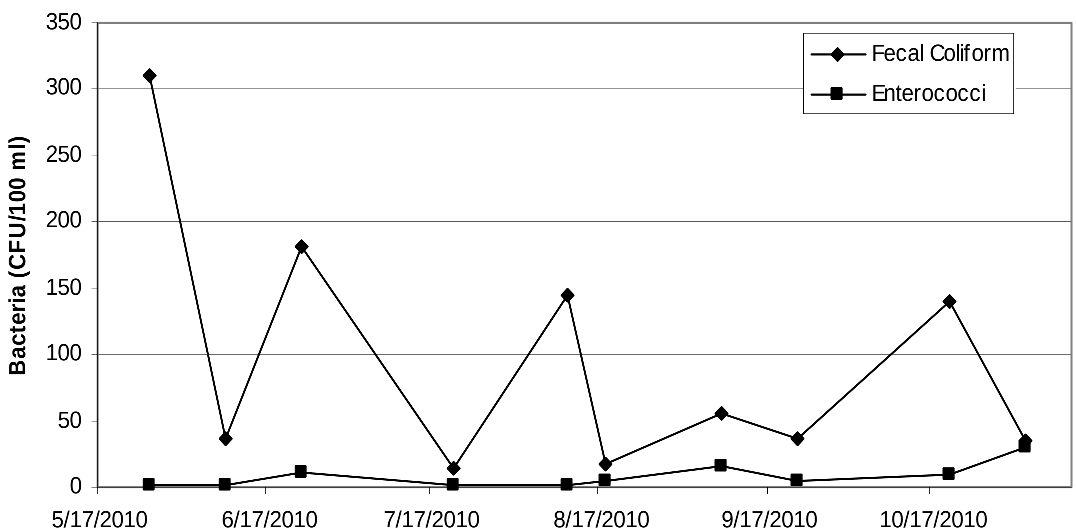
2010 CSHH #6 - East of Former Incinerator Site



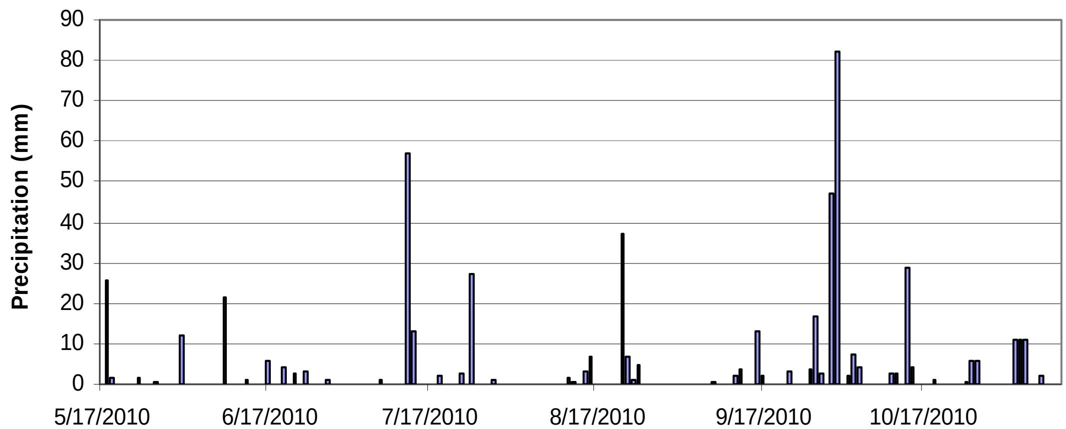


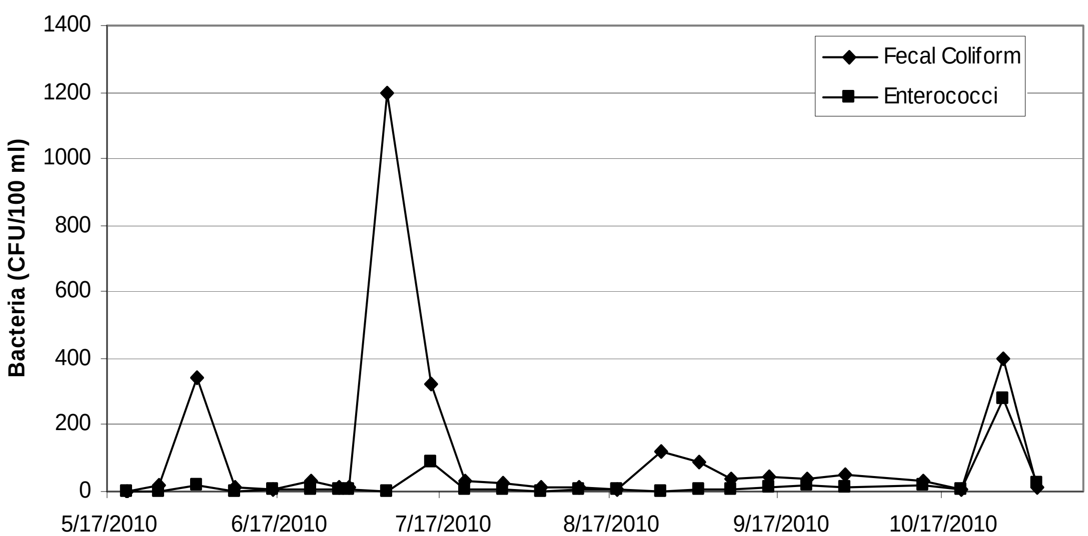
2010 CSHH #7 - West of Bryant Landing (former site of oil dock)



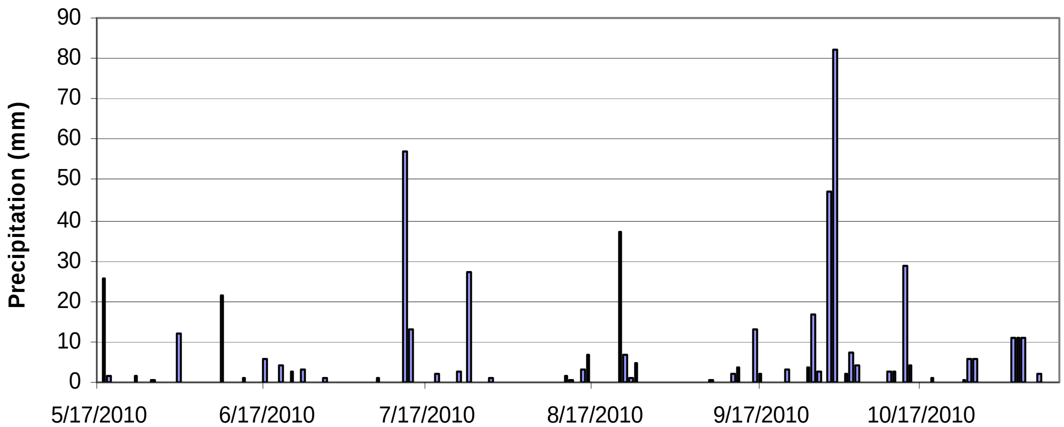


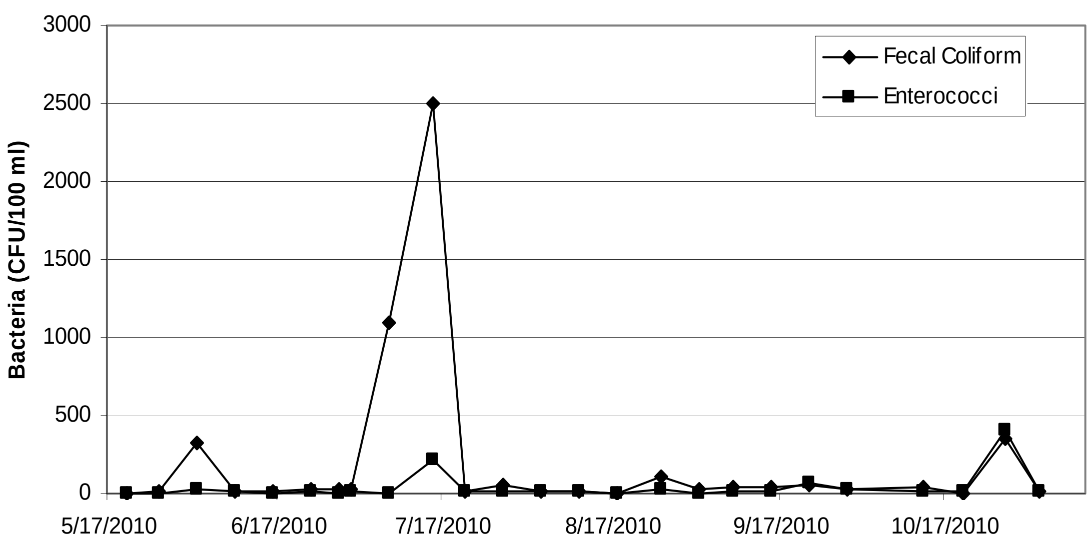
2010 CSHH #8 - Glen Cove Sewage Treatment Plant Outfall



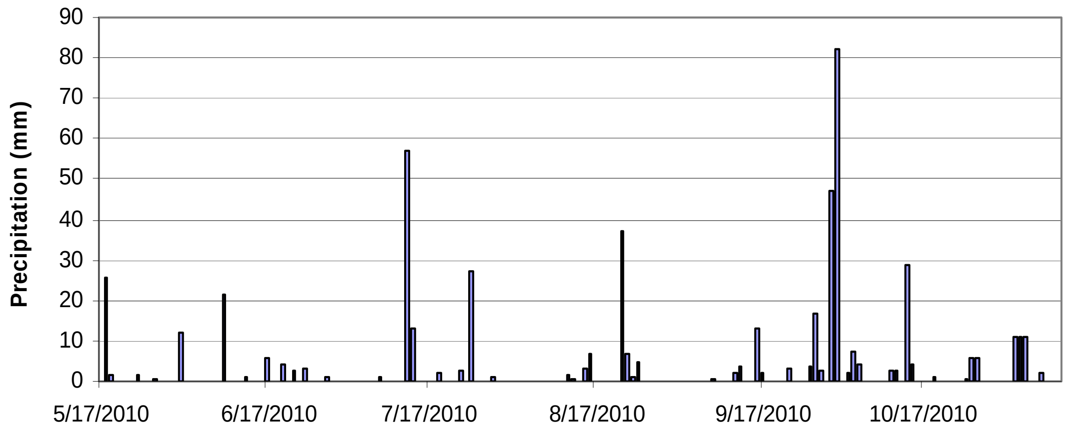


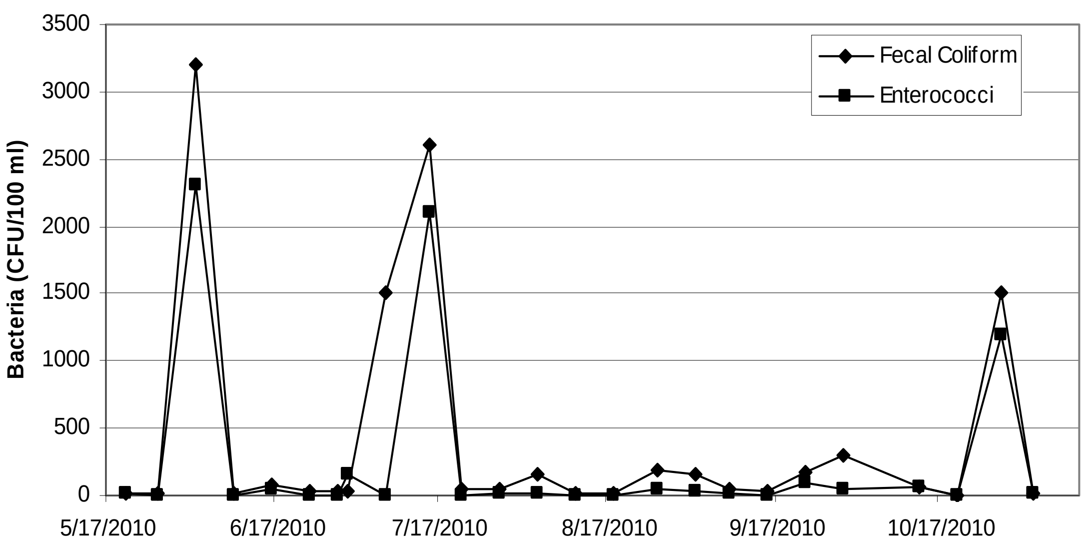
2010 CSHH #9 - First Pipe West of STP Outfall



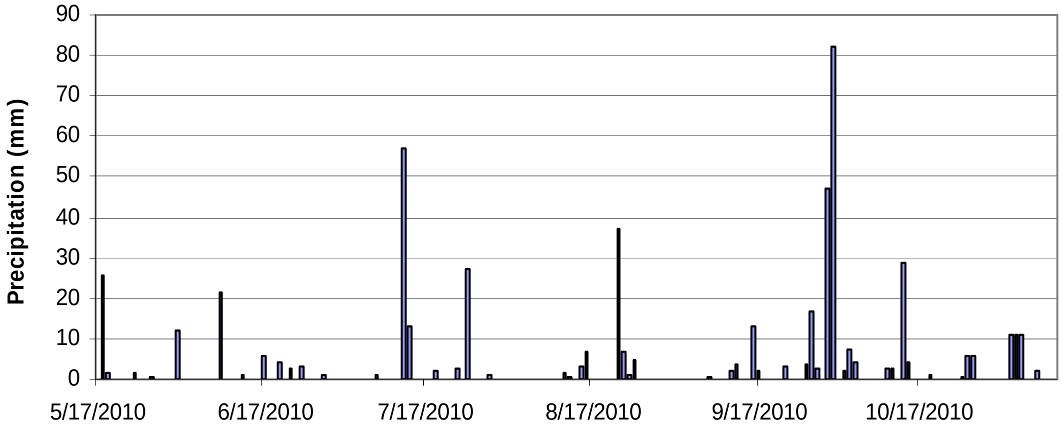


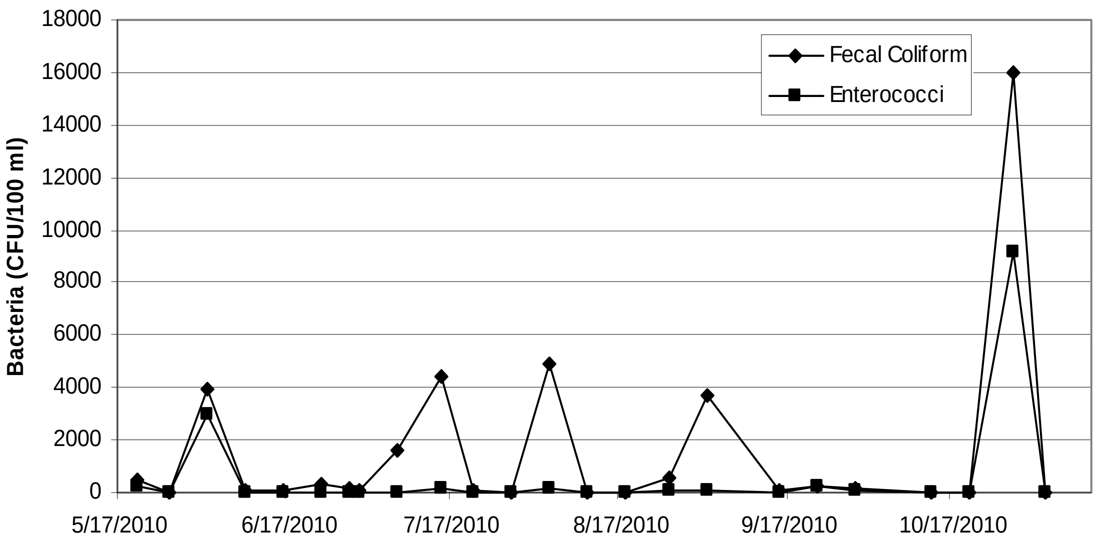
2010 CSHH #10 - Pipe at Corner of Seawall, West of STP Outfall



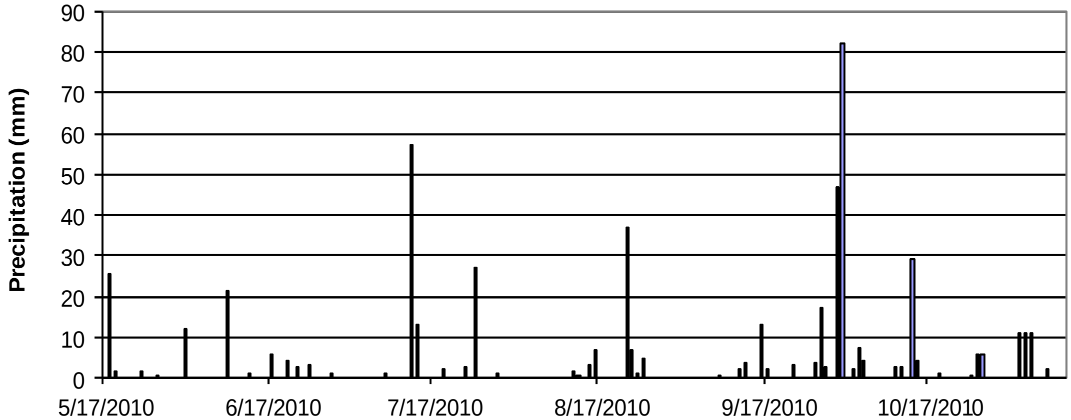


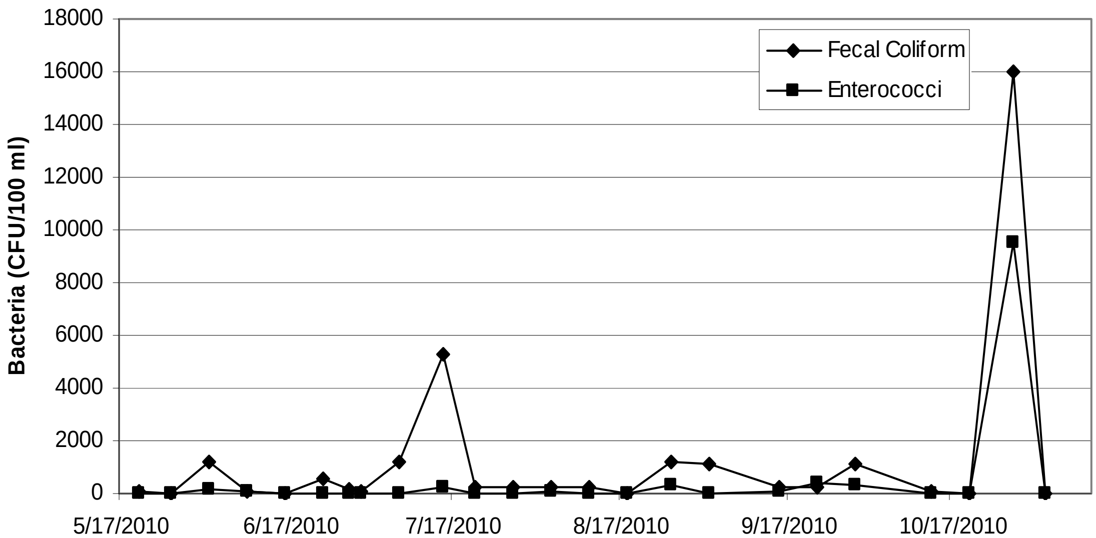
2010 CSHH #11 - 50 Yards East of STP Outfall

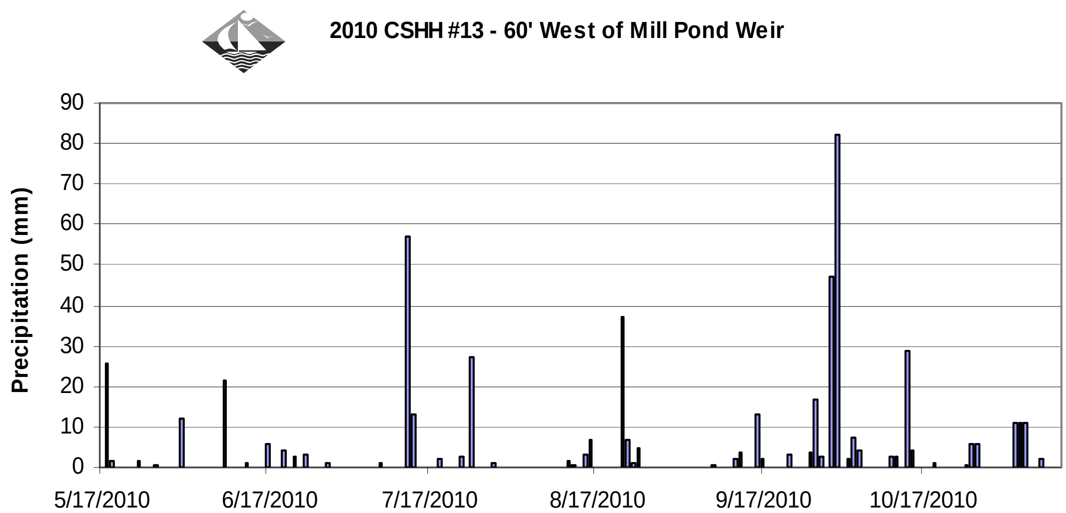


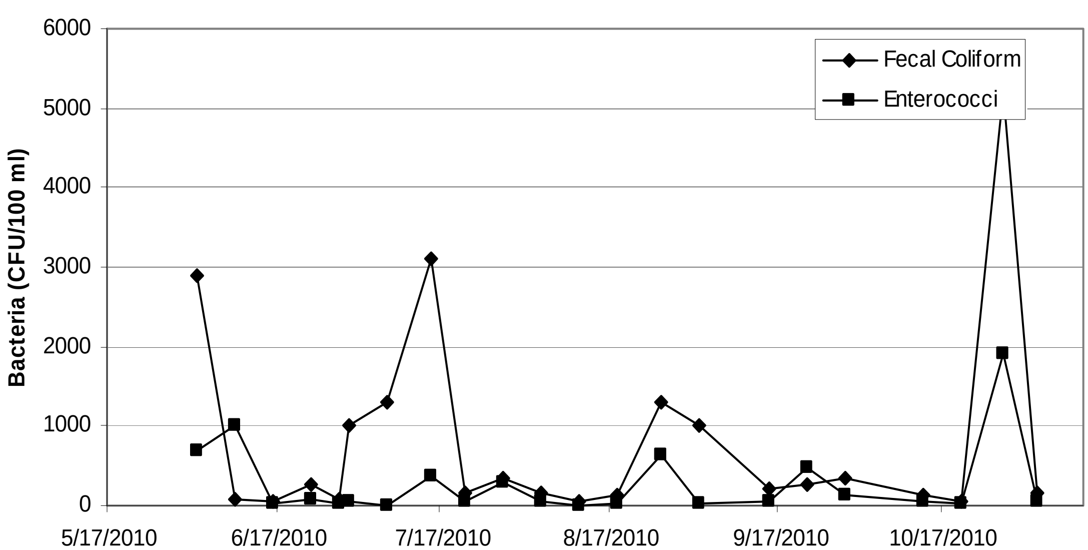


2010 CSHH #12 - East of STP Outfall, by Bend in Seawall

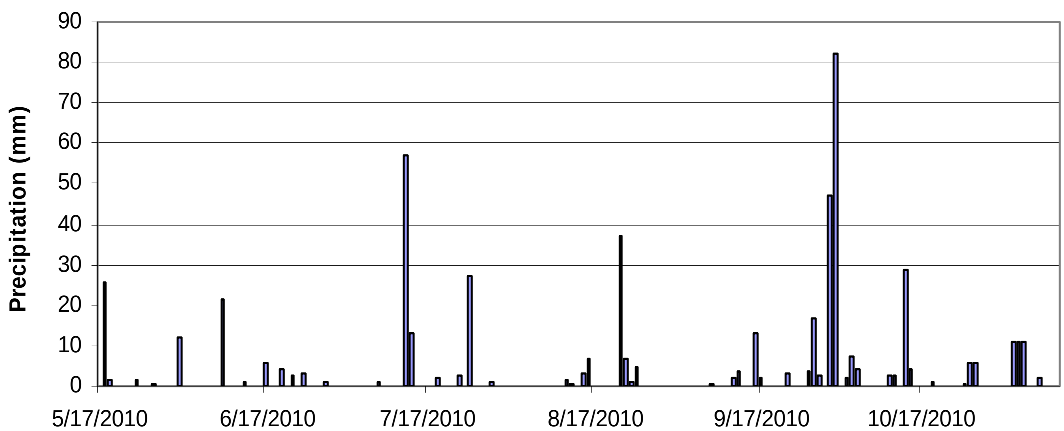


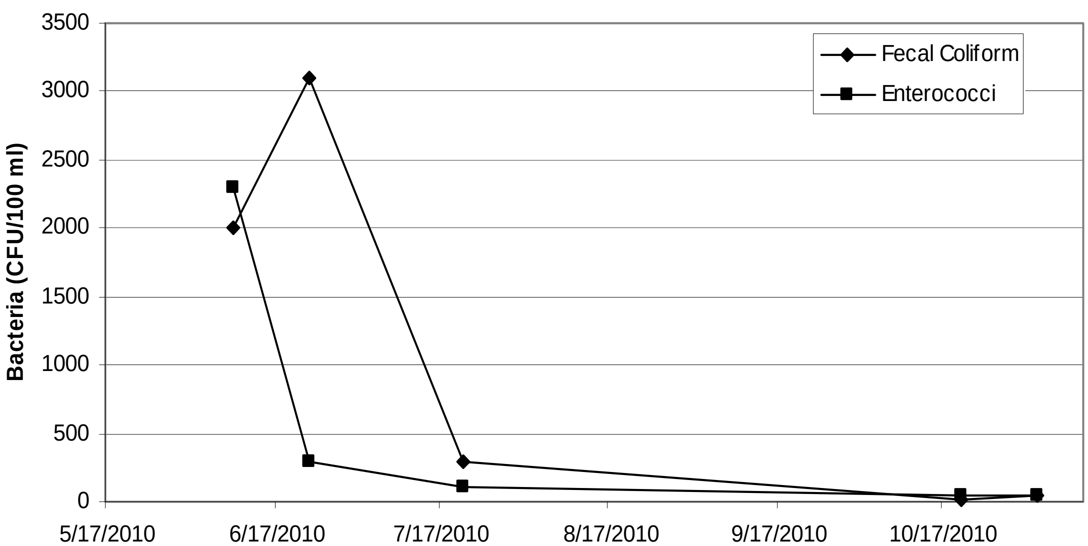



2010 CSHH #13 - 60' West of Mill Pond Weir
Precipitation (mm)
90
80
70
60
50
40
30
20
10
0
5/17/2010
6/17/2010
7/17/2010
8/17/2010
9/17/2010
10/17/2010

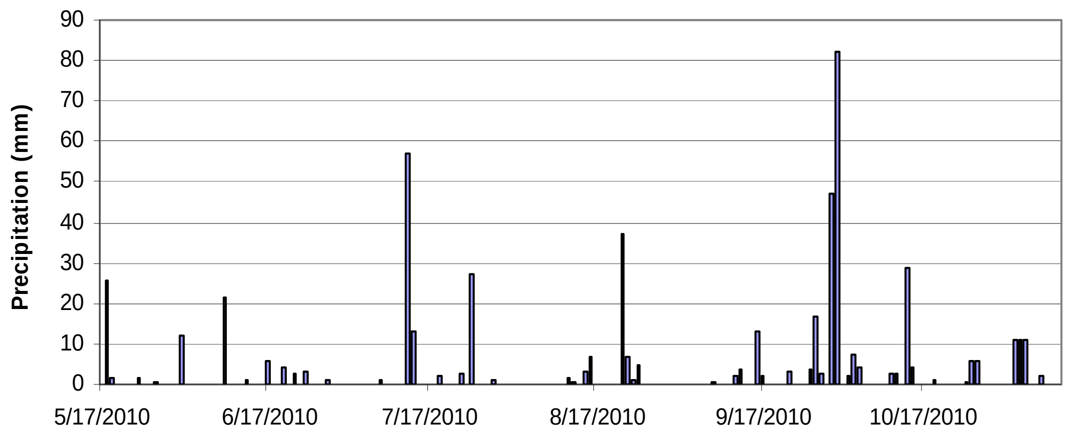

Bacteria (CFU/100 ml)
6000
5000
4000
3000
2000
1000
0
Fecal Coliform
Enterococci
5/17/2010
6/17/2010
7/17/2010
8/17/2010
9/17/2010
10/17/2010

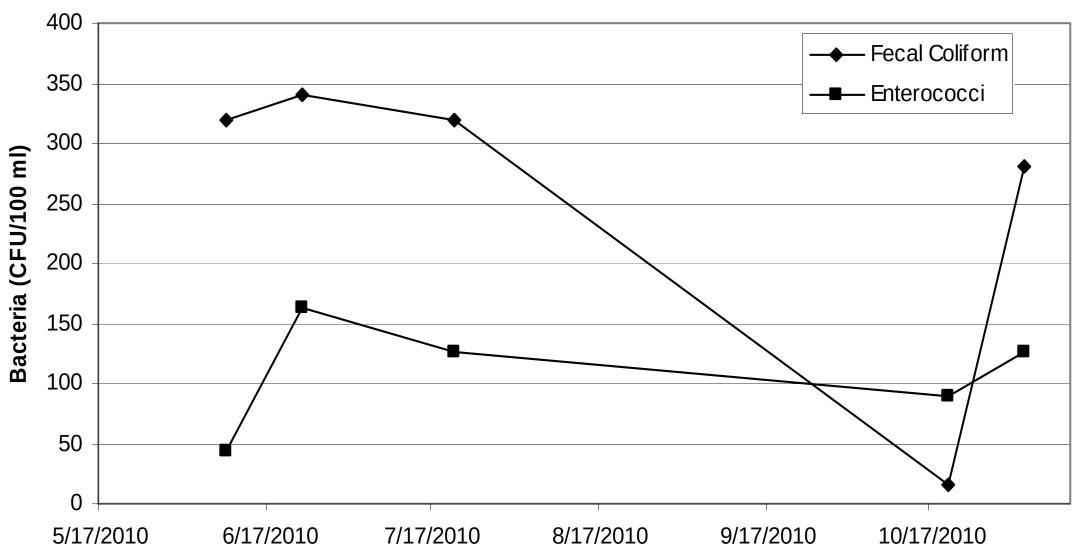
2010 CSHH #13A - Head of Glen Cove Creek - County Pipe



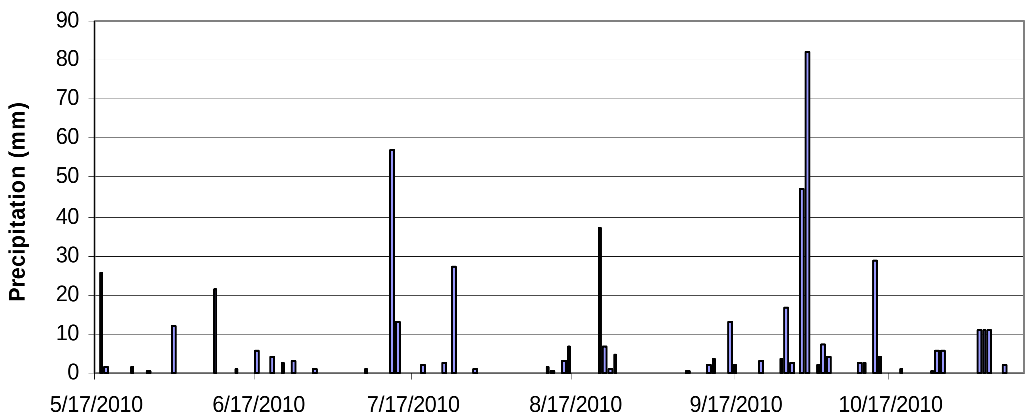


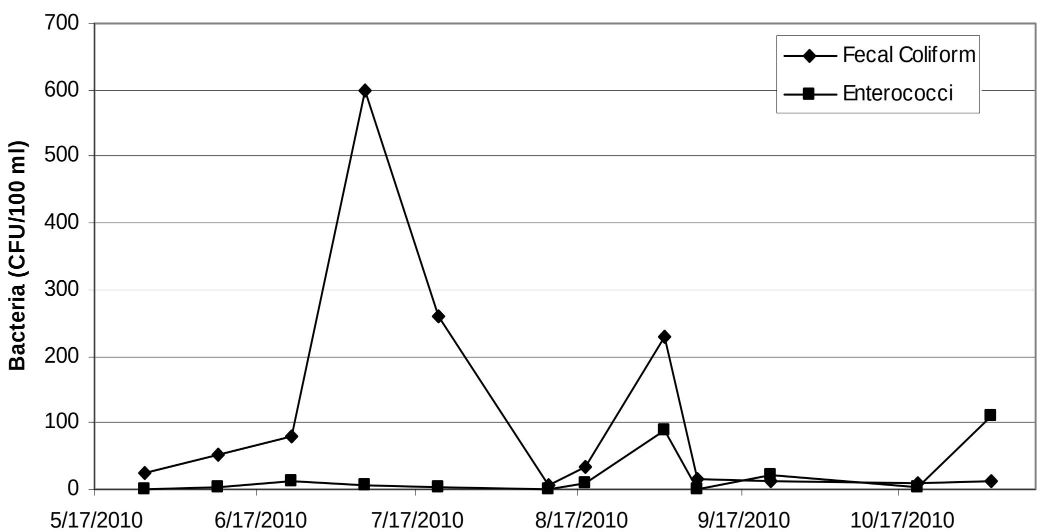
2010 CSHH #13B - Dog Leg @ Head of Glen Cove Creek



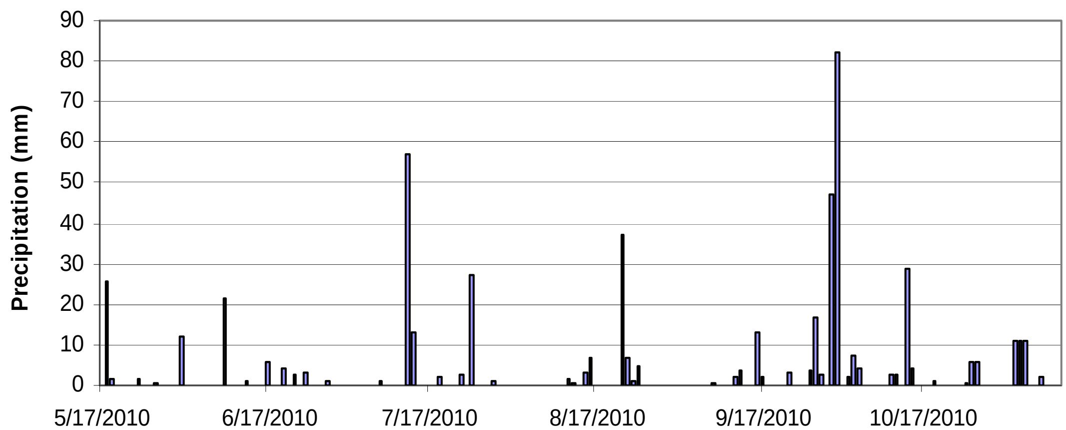


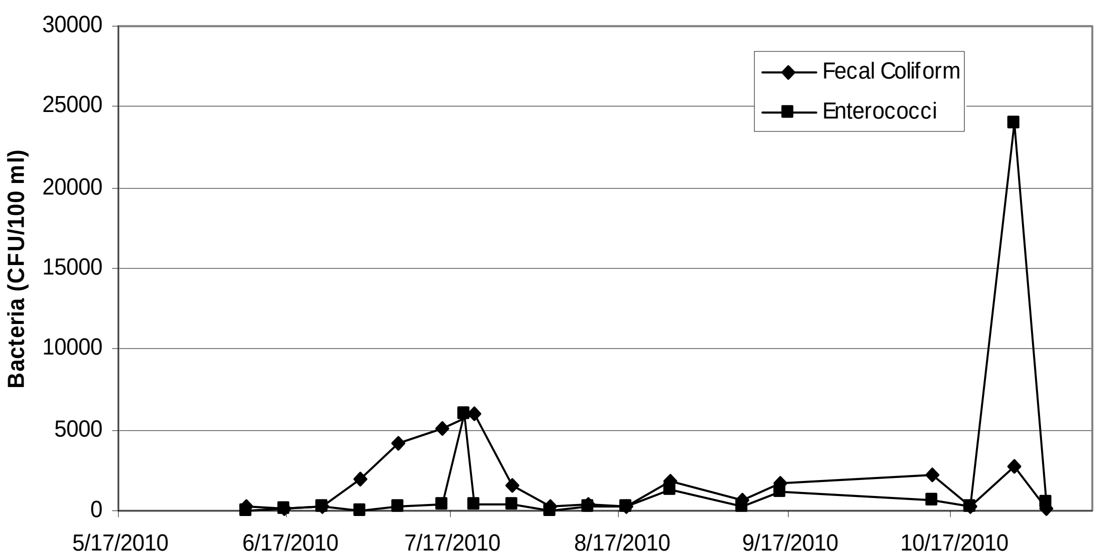
2010 CSHH #14 - NW Corner of Power Plant ~50 Yards from Cement Outfall



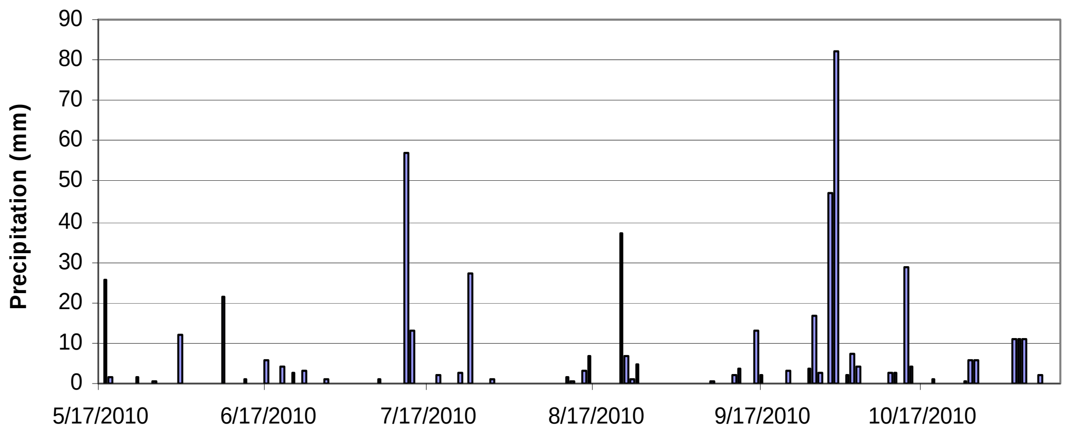


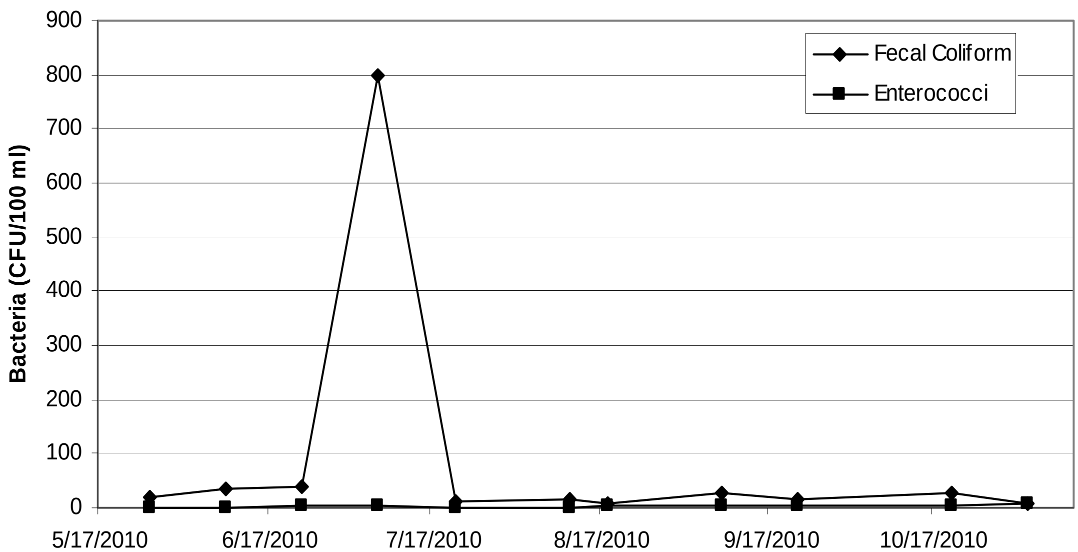
2010 CSHH #14A - Cement Outfall Adjacent to Power Plant



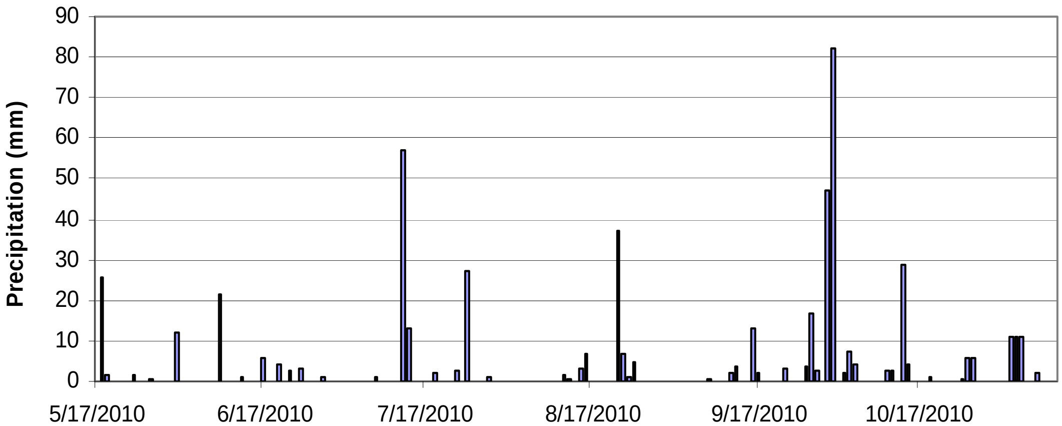


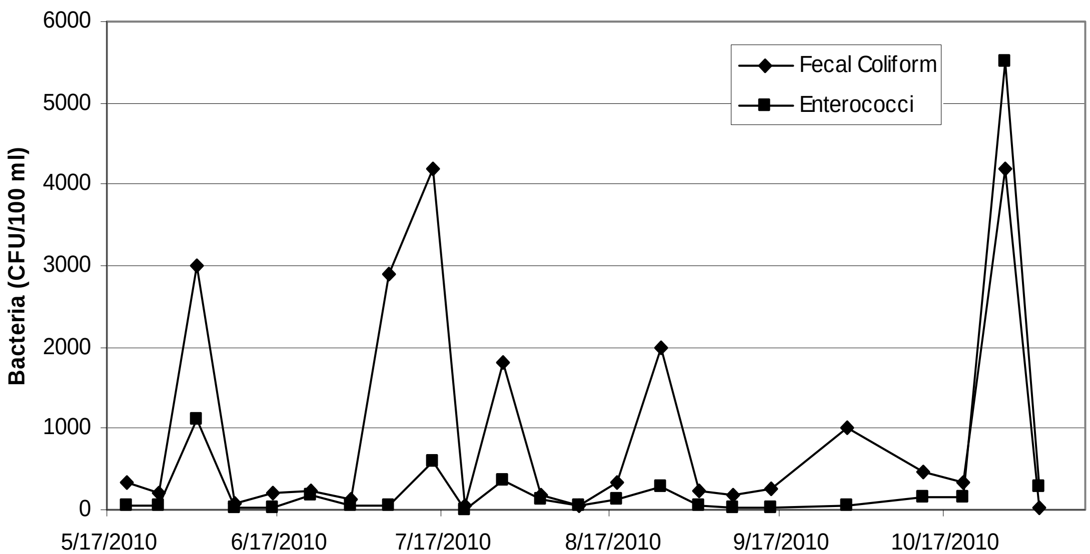
2010 CSHH #15 - 50 yds from Scudders Pond Outfall, North of Tappen Pool



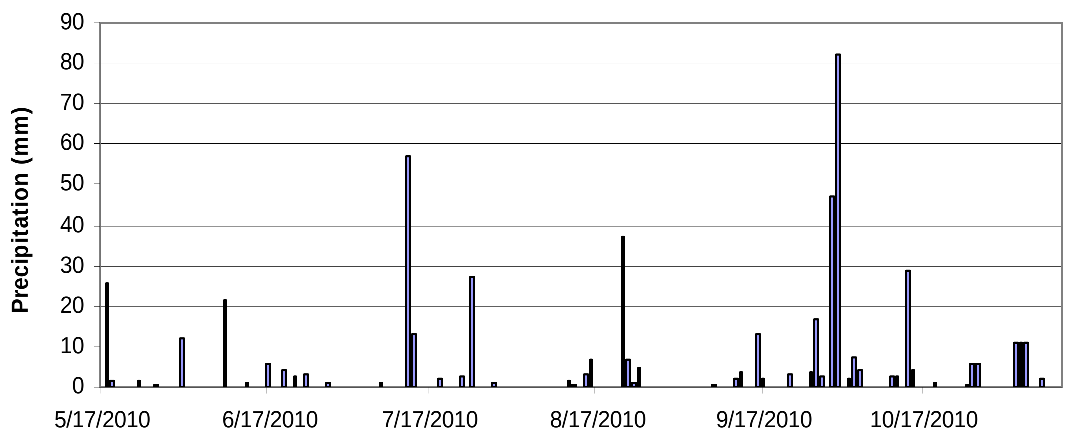


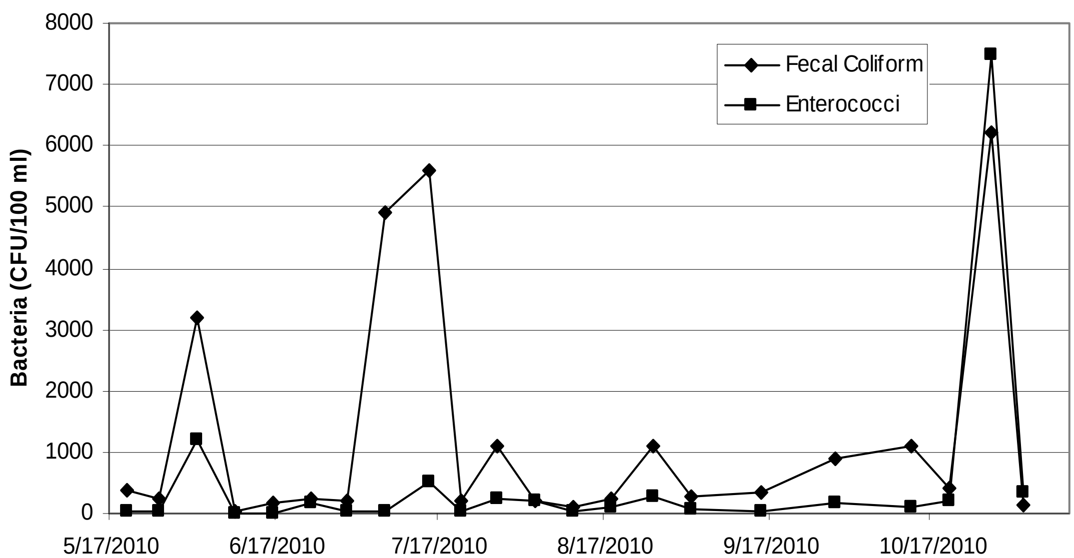
2010 CSHH #15A - Scudder's Pond Outfall at Seawall North of Tappen Pool





2010 CSHH 15B - Scudder's Pond Weir





CSHH #1 - Beacon 11

	Fecal Coliform		Enterococci	
Date	CFU/100ml.	Log AvgFC	CFU/100ml.	Log AvgEnt
05/20/10	16.00	0.00	0.10	0.00
05/26/10	39.00	24.98	2.00	0.45
06/02/10	44.00	30.17	39.00	1.98
06/09/10	10.00	22.89	5.00	2.50
06/16/10	14.00	20.75	11.00	3.36
06/23/10	46.00	25.63	16.00	9.28
06/28/10	13.00	20.57	0.10	5.09
06/30/10	8.00	17.57	0.10	2.65
07/07/10	600.00	27.17	0.10	0.98
7/15/10	300.00	47.88	25.00	1.28
7/21/10	16.00	48.96	2.00	0.96
7/28/10	28.00	45.07	4.00	0.76
8/4/10	14.00	64.65	1.00	1.82
8/11/10	20.00	32.74	8.00	4.37
8/18/10	9.00	16.24	1.00	2.30
8/26/10	51.00	20.48	12.00	3.29
9/2/10	26.00	20.17	3.00	3.10
9/8/10	49.00	25.92	12.00	5.10
9/15/10	15.00	24.47	0.10	2.12
9/22/10	5.00	21.76	10.00	3.37
9/29/10	49.00	21.58	23.00	3.83
10/13/10	28.00	17.91	12.00	4.08
10/20/10	9.00	15.76	2.00	8.62
10/28/10	91.00	32.56	100.00	15.33
11/3/10	4.00	17.40	6.00	10.95

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

CSHH #2 - Bell Marker 6

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
05/20/10	5.00	0.00	0.10	0.00
05/26/10	0.10	0.71	0.10	0.10
06/02/10	290.00	5.25	7.00	0.41
06/09/10	0.10	1.95	0.10	0.29
06/16/10	5.00	2.36	1.00	0.37
06/23/10	3.00	2.13	0.10	0.37
06/28/10	0.10	2.13	0.10	0.37
06/30/10	1.00	1.88	0.10	0.30
07/07/10	800.00	2.22	0.10	0.15
07/15/10	210.00	7.95	5.00	0.28
07/21/10	7.00	8.41	0.10	0.19
07/28/10	10.00	10.27	1.00	0.28
08/04/10	3.00	32.32	2.00	0.63
08/11/10	7.00	12.53	4.00	1.32
08/18/10	0.10	2.71	0.10	0.60
08/26/10	1.00	1.84	0.10	0.60
09/02/10	2.00	1.33	0.10	0.38
09/08/10	0.10	0.67	0.10	0.21
09/15/10	1.00	0.46	0.10	0.10
09/22/10	1.00	0.72	1.00	0.16
09/29/10	20.00	1.32	2.00	0.29
10/13/10	5.00	3.16	3.00	0.88
10/20/10	0.10	1.78	0.10	0.88
10/28/10	20.00	3.76	15.00	1.73
11/03/10	4.00	2.51	2.00	1.73

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

CSHH #3 - Glen Cove Creek

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
05/20/10	10.00	0.00	0.10	0.00
05/26/10	3.00	5.48	1.00	0.32
06/02/10	380.00	22.51	8.00	0.93
06/09/10	33.00	24.77	2.00	1.12
06/16/10	16.00	22.69	0.10	0.69
06/23/10	11.00	23.13	3.00	1.37
06/28/10	6.00	26.57	0.10	0.86
06/30/10	4.00	19.38	0.10	0.60
07/07/10	1000.00	22.77	0.10	0.29
07/15/10	380.00	34.22	24.00	0.44
07/21/10	30.00	38.00	2.00	0.72
07/28/10	26.00	43.85	1.00	0.60
08/04/10	19.00	89.15	0.10	0.86
08/11/10	8.00	33.94	0.10	0.86
08/18/10	17.00	18.23	1.00	0.46
08/26/10	46.00	19.86	4.00	0.53
09/02/10	53.00	22.90	1.00	0.53
09/08/10	8.00	19.26	0.10	0.53
09/15/10	8.00	19.26	0.10	0.53
09/22/10	8.00	16.57	5.00	0.72
09/29/10	44.00	16.42	11.00	0.89
10/13/10	27.00	16.61	5.00	2.29
10/20/10	6.00	15.45	2.00	4.84
10/28/10	450.00	42.32	**200.00**	12.18
11/03/10	4.00	23.24	4.00	9.46

CSHH #4 – North Hempstead Beach (S)(former Bar Beach) Sand Spit

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
5/26/10	26.00	0.00	2.00	0.00
6/9/10	8.00	14.42	6.00	3.46
6/23/10	21.00	16.35	1.00	2.29
7/21/10	31.00	25.51	1.00	1.00
8/11/10	21.00	25.51	8.00	2.83
8/18/10	14.00	20.89	1.00	2.00
9/8/10	30.00	20.66	6.00	3.63
9/22/10	15.00	21.21	1.00	2.45
10/20/10	8.00	10.95	0.10	0.32
11/3/10	2.00	4.00	9.00	0.95

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

CSHH #5 - Mott's Cove

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
5/26/10	42.00	0.00	3.00	0.00
6/9/10	9.00	19.44	1.00	1.73
6/23/10	24.00	20.86	11.00	3.21
7/21/10	26.00	24.98	5.00	7.42
8/11/10	45.00	34.21	6.00	5.48
8/18/10	109.00	50.34	29.00	9.55
9/8/10	23.00	48.32	7.00	10.68
9/22/10	18.00	20.35	14.00	9.90
10/20/10	18.00	18.00	7.00	9.90
11/3/10	16.00	16.97	16.00	10.58

CSHH #6 - East of the Former Incinerator Site

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
5/26/10	145.00	0.00	4.00	0.00
6/9/10	3.00	20.86	0.10	0.63
6/23/10	49.00	27.73	5.00	1.26
7/21/10	10.00	22.14	0.10	0.71
8/11/10	15.00	12.25	2.00	0.45
8/18/10	18.00	13.92	3.00	0.84
9/8/10	37.00	21.54	8.00	3.63
9/22/10	10.00	19.24	15.00	10.95
10/20/10	21.00	14.49	4.00	7.75
11/3/10	7.00	12.12	8.00	5.66

CSHH #7 - West of Old Oil Dock

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
5/26/10	310.00	0.00	1.00	0.00
6/9/10	37.00	107.10	1.00	1.00
6/23/10	182.00	127.80	11.00	2.22
7/21/10	15.00	52.25	1.00	3.32
8/11/10	145.00	46.64	1.00	1.00
8/18/10	17.00	33.31	4.00	1.59
9/8/10	56.00	51.68	16.00	4.00
9/22/10	36.00	44.90	4.00	8.00
10/20/10	140.00	70.99	10.00	6.32
11/3/10	35.00	70.00	30.00	17.32

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

CSHH #8 - Glen Cove STP Outfall

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
05/20/10	0.10	0.00	1.00	0.00
05/26/10	20.00	1.41	1.00	1.00
06/02/10	340.00	8.79	20.00	2.71
06/09/10	12.00	9.50	1.00	2.11
06/16/10	8.00	9.18	4.00	2.40
06/23/10	30.00	28.73	5.00	3.31
06/28/10	12.00	25.94	6.00	4.74
06/30/10	14.00	23.41	5.00	4.78
07/07/10	***1200.00***	28.88	3.00	3.49
07/15/10	320.00	49.92	91.00	7.40
07/21/10	30.00	62.23	9.00	8.47
07/28/10	27.00	61.14	9.00	9.34
08/04/10	13.00	83.44	2.00	8.49
08/11/10	14.00	34.26	5.00	9.41
08/18/10	7.00	15.95	8.00	5.79
08/26/10	120.00	21.04	3.00	4.64
09/02/10	91.00	26.83	5.00	4.13
09/08/10	41.00	33.76	8.00	5.45
09/15/10	46.00	42.83	14.00	6.69
09/22/10	38.00	60.08	22.00	8.19
09/29/10	48.00	50.02	15.00	11.31
10/13/10	29.00	39.50	16.00	16.49
10/20/10	6.00	23.74	7.00	13.87
10/28/10	400.00	42.75	***280.00***	26.19
11/03/10	14.00	31.42	25.00	29.76

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

CSHH#9 - First Pipe West of STP Outfall

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
05/20/10	6.00	0.00	3.00	0.00
05/26/10	20.00	10.95	2.00	2.45
06/02/10	320.00	33.74	25.00	5.31
06/09/10	15.00	27.55	12.00	6.51
06/16/10	10.00	22.49	3.00	5.58
06/23/10	21.00	28.90	8.00	6.79
06/28/10	24.00	29.97	4.00	7.80
06/30/10	26.00	29.27	7.00	7.66
07/07/10	***1100.00***	35.96	1.00	4.48
07/15/10	***2500.00***	84.36	***210.00***	7.22
07/21/10	16.00	91.23	9.00	8.67
07/28/10	52.00	106.11	14.00	9.51
08/04/10	20.00	135.55	7.00	11.31
08/11/10	12.00	54.91	7.00	16.69
08/18/10	6.00	16.43	2.00	6.58
08/26/10	109.00	24.12	25.00	8.07
09/02/10	30.00	21.61	4.00	6.28
09/08/10	34.00	24.03	10.00	6.75
09/15/10	39.00	30.41	13.00	7.64
09/22/10	59.00	48.04	70.00	15.55
09/29/10	32.00	37.60	24.00	15.43
10/13/10	36.00	40.35	18.00	25.04
10/20/10	4.00	22.83	7.00	21.45
10/28/10	350.00	35.64	***400.00***	33.16
11/03/10	10.00	26.64	15.00	29.49

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

CSHH#10 - Pipe at Corner of Seawall West of STP Outfall

	Fecal Coliform		***Enterococci***	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
05/20/10	20.00	0.00	12.00	0.00
05/26/10	14.00	16.73	5.00	7.75
06/02/10	**3200.00**	96.41	**2300.00**	**51.68**
06/09/10	18.00	63.37	6.00	30.17
06/16/10	73.00	65.19	41.00	32.07
06/23/10	27.00	69.22	3.00	24.31
06/28/10	25.00	77.73	7.00	26.00
06/30/10	28.00	65.57	**164.00**	**35.34**
07/07/10	**1500.00**	57.79	3.00	11.68
07/15/10	**2600.00**	132.38	**2100.00**	31.01
07/21/10	42.00	120.72	5.00	21.84
07/28/10	45.00	131.45	20.00	29.96
08/04/10	164.00	**260.90**	19.00	26.04
08/11/10	12.00	99.33	3.00	26.04
08/18/10	13.00	34.43	2.00	6.48
08/26/10	182.00	46.16	46.00	10.10
09/02/10	155.00	59.11	31.00	11.02
09/08/10	40.00	44.58	8.00	9.27
09/15/10	28.00	52.81	7.00	10.98
09/22/10	180.00	89.33	90.00	23.51
09/29/10	300.00	98.72	47.00	23.61
10/13/10	60.00	97.59	57.00	**36.04**
10/20/10	6.00	66.40	4.00	31.34
10/28/10	***1500.00***	112.82	**1200.00**	***59.88***
11/03/10	17.00	55.04	21.00	***48.96***

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

CSHH #11 - 50 Yards East of STP Outfall

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
05/20/10	460.00	0.00	***250.00***	0.00
05/26/10	23.00	102.86	9.00	***47.43***
06/02/10	***3900.00***	***345.55***	***3000.00***	***188.99***
06/09/10	90.00	***246.86***	22.00	***110.39***
06/16/10	51.00	180.08	8.00	***65.31***
06/23/10	310.00	166.42	6.00	30.97
06/28/10	145.00	***240.50***	3.00	24.86
06/30/10	109.00	***210.78***	3.00	17.48
07/07/10	***1600.00***	181.70	1.00	4.60
07/15/10	***4400.00***	***347.44***	***173.00***	6.49
07/21/10	118.00	***399.58***	6.00	6.19
07/28/10	38.00	***281.63***	5.00	6.00
08/04/10	***4900.00***	***688.47***	***190.00***	15.80
08/11/10	31.00	***312.85***	9.00	24.53
08/18/10	26.00	112.11	17.00	15.42
08/26/10	540.00	151.96	***120.00***	28.07
09/02/10	***3700.00***	***379.69***	47.00	***43.95***
09/15/10	56.00	***232.24***	17.00	***35.73***
09/22/10	230.00	***400.52***	***220.00***	***67.77***
09/29/10	182.00	***305.17***	91.00	***63.24***
10/13/10	24.00	86.61	29.00	***56.05***
10/20/10	10.00	56.30	8.00	***46.42***
10/28/10	***16000.00***	162.59	***9200.00***	***118.05***
11/03/10	25.00	98.98	17.00	***77.61***

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

CSHH #12 - Bend in Seawall East of STP Outfall

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
05/20/10	90.00	0.00	4.00	0.00
05/26/10	22.00	44.50	5.00	4.47
06/02/10	***1200.00***	133.44	***164.00***	14.86
06/09/10	70.00	113.56	70.00	21.89
06/16/10	28.00	85.83	5.00	16.29
06/23/10	580.00	124.58	5.00	17.04
06/28/10	182.00	190.10	4.00	16.29
06/30/10	82.00	165.24	5.00	13.38
07/07/10	***1200.00***	165.24	7.00	7.91
07/15/10	***5300.00***	***339.88***	***220.00***	9.57
07/21/10	230.00	***482.78***	12.00	11.08
07/28/10	270.00	***425.02***	19.00	13.84
08/04/10	240.00	***624.24***	96.00	32.03
08/11/10	260.00	***459.74***	15.00	***37.30***
08/18/10	27.00	159.93	11.00	20.49
08/26/10	***1200.00***	***222.55***	***310.00***	***39.26***
09/02/10	***1100.00***	***294.73***	8.00	33.02
09/15/10	220.00	***297.57***	74.00	***37.69***
09/22/10	210.00	***496.94***	***410.00***	***93.14***
09/29/10	***1100.00***	***486.25***	***360.00***	***96.68***
10/13/10	58.00	***233.01***	20.00	***121.57***
10/20/10	3.00	79.62	15.00	***81.57***
10/28/10	***16000.00***	***235.24***	***9500.00***	***178.97***
11/03/10	38.00	101.42	15.00	***80.86***

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

CSHH #13 – 60 Feet Downstream of Mill Pond Weir

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
6/2/10	***2900.00***	0.00	***700.00***	0.00
6/9/10	70.00	***450.56***	***1000.00***	***836.66***
6/16/10	56.00	***224.85***	20.00	***241.01***
6/23/10	270.00	***235.38***	76.00	***180.61***
6/28/10	82.00	190.62	26.00	***122.57***
6/30/10	1000.00	***251.27***	52.00	***106.25***
7/7/10	***1300.00***	***219.82***	5.00	***46.63***
7/15/10	***3100.00***	***413.47***	***380.00***	***39.68***
7/21/10	163.00	***494.06***	44.00	***45.25***
7/28/10	340.00	***513.41***	***290.00***	***56.57***
8/4/10	154.00	***509.68***	52.00	***66.09***
8/11/10	43.00	***257.75***	13.00	***80.00***
8/18/10	127.00	136.05	30.00	***48.15***
8/26/10	***1300.00***	***206.08***	***650.00***	***82.50***
9/2/10	1000.00	***255.71***	23.00	***49.70***
9/15/10	210.00	***431.51***	43.00	***66.27***
9/22/10	270.00	***521.05***	***470.00***	***131.84***
9/29/10	340.00	***372.62***	***127.00***	***87.65***
10/13/10	127.00	***222.44***	48.00	***105.35***
10/20/10	40.00	146.95	25.00	***92.00***
10/28/10	***5200.00***	***307.85***	***1900.00***	***130.45***
11/3/10	164.00	***256.55***	55.00	***105.82***

CSHH #13A – Head of Glen Cove Creek - County Pipe

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
6/9/10	***2000.00***	0.00	***2300.00***	0.00
6/23/10	***3100.00***	***2489.98***	***300.00***	***830.66***
7/21/10	300.00	***964.37***	***109.00***	***180.83***
10/20/10	10.00	0.00	52.00	0.00
11/3/10	42.00	20.49	48.00	***49.96***

CSHH #13B – Dog Leg @ Head of Glen Cove Creek

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
6/9/10	320.00	0.00	43.00	0.00
6/23/10	340.00	***329.85***	***164.00***	***83.98***
7/21/10	320.00	***329.85***	***127.00***	***144.32***
10/20/10	15.00	0.00	90.00	0.00
11/3/10	280.00	64.81	***127.00***	***106.91***

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

CSHH #14 – NW Corner of Power Plant ~50 yards from Cement Outfall

	Fecal Coliform		Enterococci	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
5/26/10	24.00	0.00	1.00	0.00
6/9/10	53.00	35.67	3.00	1.73
6/23/10	80.00	46.69	12.00	3.30
7/7/10	600.00	136.51	5.00	5.65
7/21/10	260.00	***231.96***	4.00	6.21
8/11/10	5.00	36.06	1.00	2.00
8/18/10	34.00	35.36	9.00	3.30
9/2/10	230.00	33.94	90.00	9.32
9/8/10	16.00	28.12	1.00	5.33
9/22/10	13.00	36.30	21.00	12.36
10/20/10	10.00	11.40	3.00	7.94
11/3/10	11.00	10.49	***109.00***	18.08

CSHH #14A – Cement Outfall Adjacent to Power Plant

	Fecal Coliform		Enterococci	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
6/9/2010	320.00	0.00	21.00	0.00
6/16/2010	98.00	177.09	72.00	***38.88***
6/23/2010	210.00	187.44	***220.00***	***69.29***
6/30/2010	***1900.00***	***334.45***	58.00	***66.28***
7/7/2010	***4200.00***	***554.78***	***280.00***	***88.41***
7/15/2010	***5100.00***	***965.17***	***420.00***	***160.96***
7/19/2010	--	--	***6001.00***	***389.85***
7/19/2010	--	--	***6001.00***	***614.87***
7/21/2010	***6001.00***	***2928.45***	***380.00***	***574.02***
7/28/2010	***1600.00***	***3914.02***	***380.00***	***620.63***
8/4/2010	260.00	***2945.96***	34.00	***575.04***
8/11/2010	420.00	***2120.16***	***210.00***	***551.89***
8/18/2010	240.00	***1370.08***	***240.00***	***509.49***
8/26/2010	***1800.00***	***596.44***	***1320.00***	***243.70***
9/8/2010	600.00	***574.41***	***240.00***	***355.47***
9/15/2010	***1700.00***	***814.74***	***1200.00***	***549.60***
10/13/2010	***2200.00***	***1933.91***	***600.00***	***848.53***
10/20/2010	250.00	***741.62***	***300.00***	***424.26***
10/28/2010	***2700.00***	***1140.89***	***24000.00***	***1628.65***
11/3/2010	82.00	***590.72***	***580.00***	***1258.14***

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

CSHH #15 – NW Corner of Tappen Pool

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
5/26/10	20.00	0.00	0.10	0.00
6/9/10	37.00	27.20	0.10	0.10
6/23/10	38.00	30.41	2.00	0.27
7/7/10	800.00	104.00	3.00	0.84
7/21/10	13.00	73.38	1.00	1.82
8/11/10	16.00	14.42	1.00	1.00
8/18/10	7.00	11.33	4.00	1.59
9/8/10	29.00	14.81	4.00	2.52
9/22/10	15.00	20.86	4.00	4.00
10/20/10	29.00	20.86	2.00	2.83
11/3/10	7.00	14.25	7.00	3.74

CSHH #15A – Scudder's Pond Outfall at Seawall N. of Tappen Pool

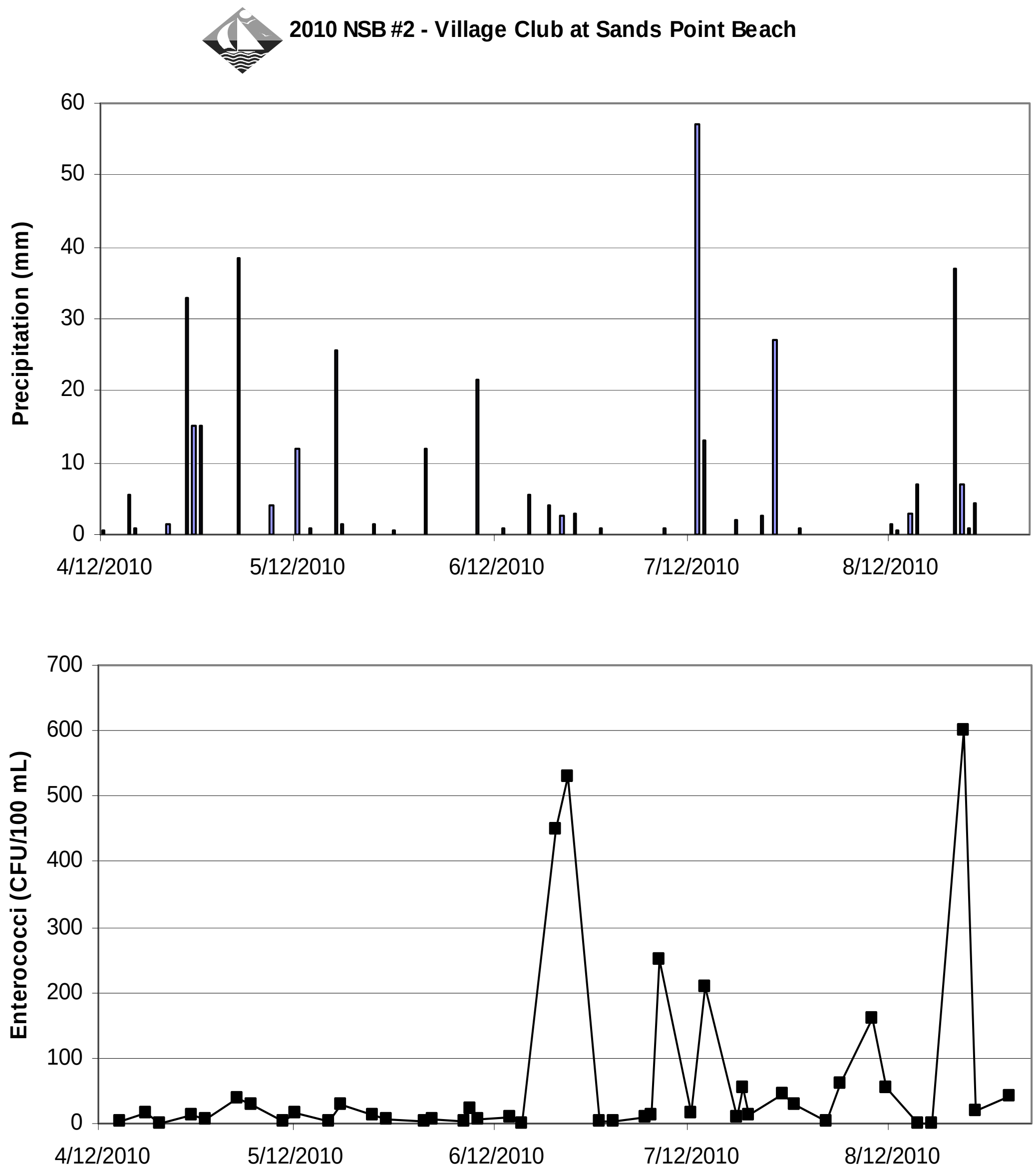
	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
5/20/10	340.00	0.00	48.00	0.00
5/26/10	200.00	***260.77***	58.00	***52.76***
6/2/10	***3000.00***	***588.68***	***1100.00***	***145.22***
6/9/10	80.00	***357.42***	26.00	***94.46***
6/16/10	200.00	***318.24***	38.00	***78.73***
6/23/10	240.00	***296.82***	***173.00***	***101.75***
6/30/10	118.00	***267.10***	47.00	***97.56***
7/7/10	***2900.00***	***265.29***	41.00	***50.53***
7/15/10	***4200.00***	***585.81***	***590.00***	***94.34***
7/21/10	55.00	***452.50***	11.00	***73.63***
7/28/10	***1800.00***	***677.07***	***370.00***	***85.72***
8/4/10	190.00	***744.74***	***130.00***	***105.06***
8/11/10	57.00	***339.39***	46.00	***107.51***
8/18/10	340.00	***205.28***	***120.00***	***78.18***
8/26/10	***2000.00***	***421.19***	***280.00***	***149.36***
9/2/10	240.00	***281.49***	53.00	***101.27***
9/8/10	190.00	***281.49***	38.00	***79.18***
9/15/10	270.00	***384.21***	25.00	***70.09***
9/29/10	1000.00	***333.11***	41.00	***37.90***
10/13/10	460.00	***498.93***	***145.00***	***52.97***
10/20/10	340.00	***538.78***	***150.00***	***96.25***
10/28/10	***4200.00***	***900.27***	***5500.00***	***264.64***
11/3/10	13.00	***303.99***	***280.00***	***427.80***

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

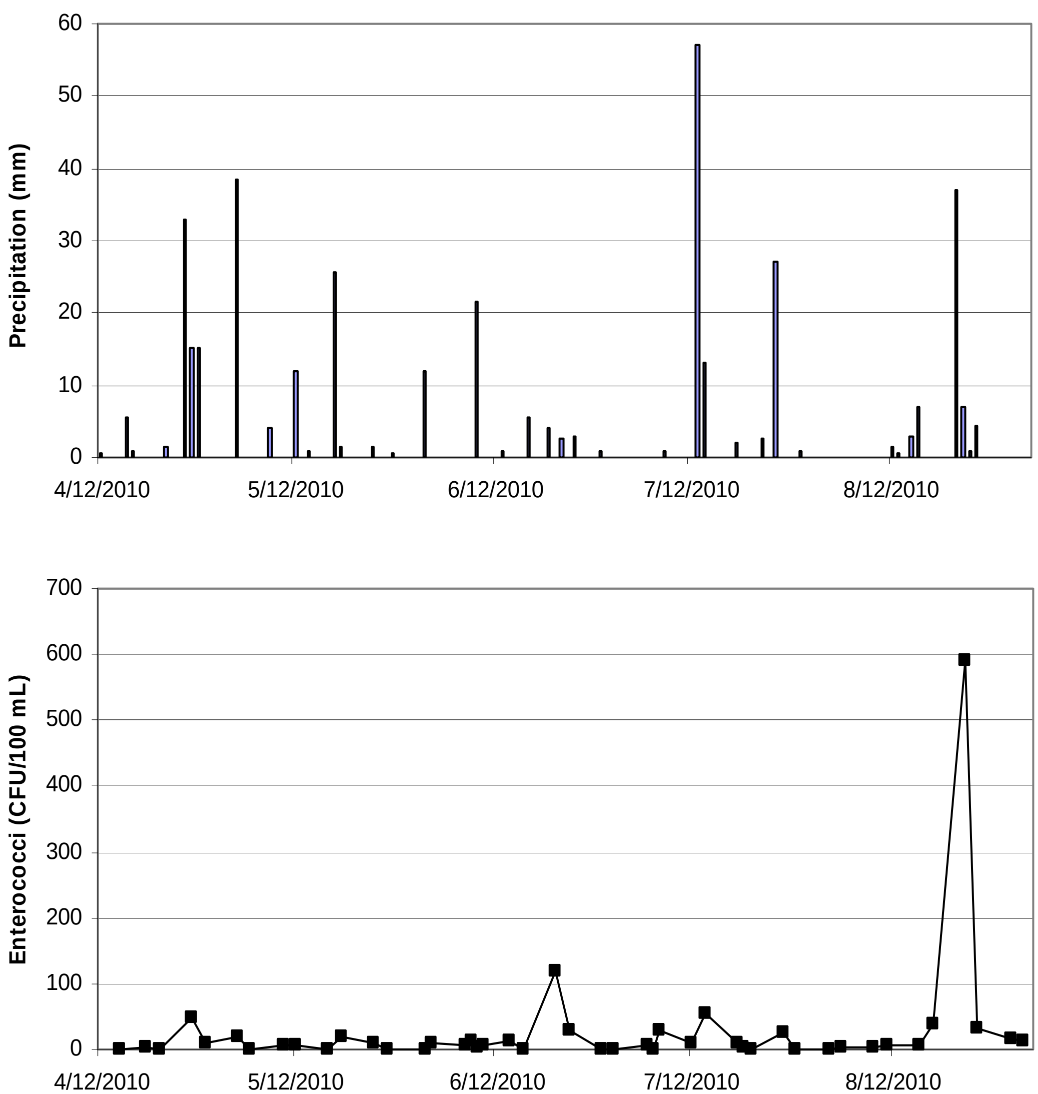
CSHH #15B – Scudder's Pond Weir

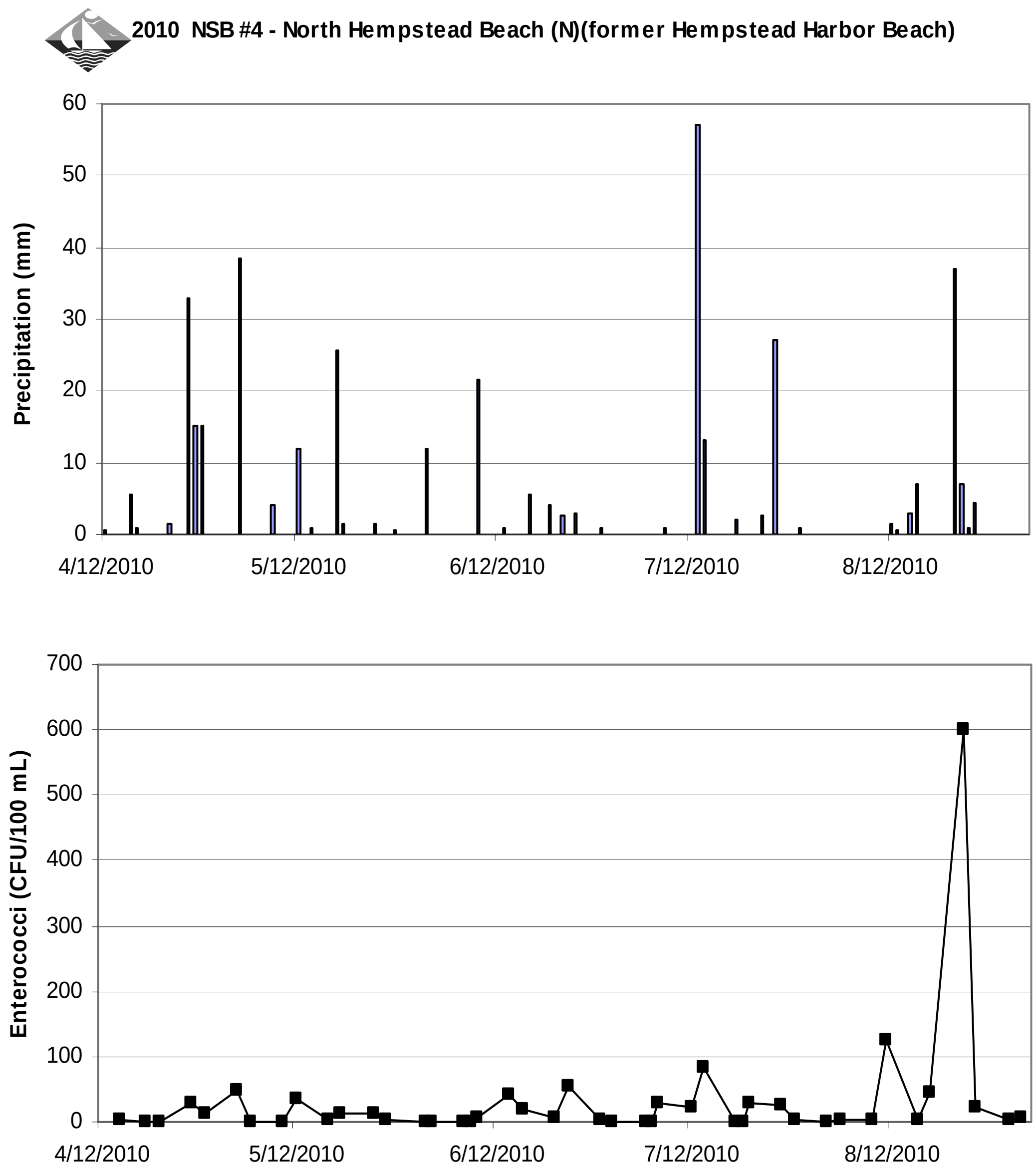
	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml.**	**Log AvgFC**	**CFU/100ml.**	**Log AvgEnt**
5/20/10	380.00	0.00	28.00	0.00
5/26/10	230.00	***295.63***	41.00	33.88
6/2/10	***3200.00***	***653.96***	***1200.00***	***111.27***
6/9/10	33.00	***309.95***	8.00	***57.62***
6/16/10	173.00	***275.83***	17.00	***45.14***
6/23/10	230.00	***249.48***	***173.00***	***64.97***
6/30/10	220.00	***247.27***	24.00	***58.37***
7/7/10	***4900.00***	***269.27***	30.00	27.91
7/15/10	***5600.00***	***751.82***	***530.00***	***64.57***
7/21/10	200.00	***773.95***	51.00	***80.43***
7/28/10	***1100.00***	***1058.39***	***250.00***	***86.58***
8/4/10	200.00	***1038.41***	***190.00***	***130.96***
8/11/10	109.00	***485.08***	32.00	***132.66***
8/18/10	230.00	***256.17***	100.00	***95.03***
8/26/10	***1100.00***	***360.24***	***290.00***	***134.54***
9/2/10	290.00	***275.93***	70.00	***104.30***
9/15/10	360.00	***403.14***	48.00	***99.35***
9/29/10	900.00	***454.62***	***164.00***	***81.98***
10/13/10	***1100.00***	***709.00***	***109.00***	***95.02***
10/20/10	420.00	***746.38***	***200.00***	***152.91***
10/28/10	***6200.00***	***1267.12***	***7500.00***	***404.66***
11/3/10	145.00	***802.79***	***360.00***	***492.56***

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

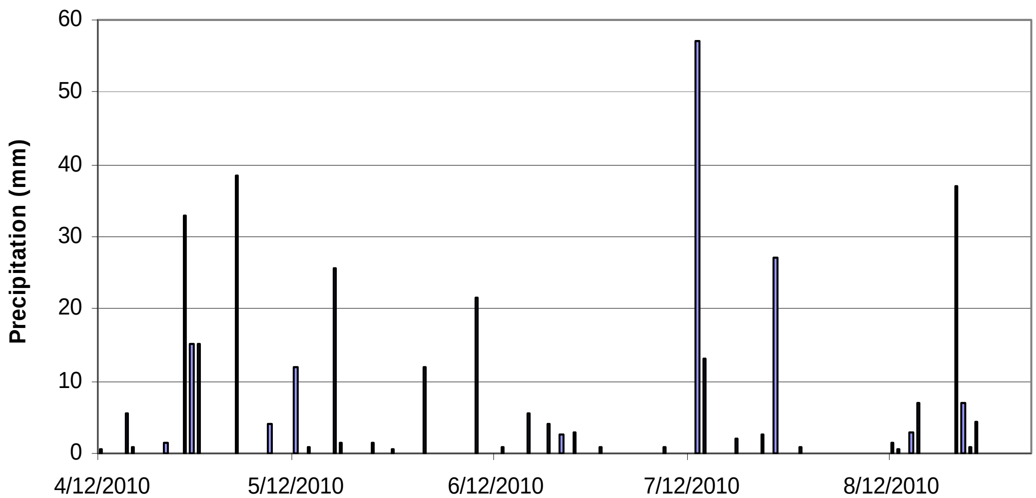

2010 NSB #2 - Village Club at Sands Point Beach
Precipitation (mm)
60
50
40
30
20
10
0
4/12/2010
5/12/2010
6/12/2010
7/12/2010
8/12/2010
Enterococci (CFU/100 mL)
700
600
500
400
300
200
100
0
4/12/2010
5/12/2010
6/12/2010
7/12/2010
8/12/2010

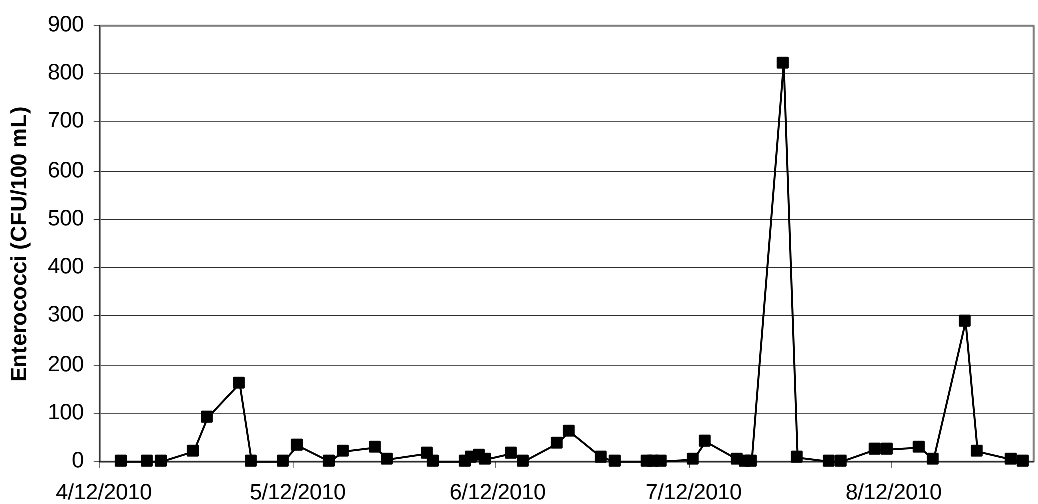
2010 NSB #3 - North Hempstead Beach (S)(former Bar Beach)



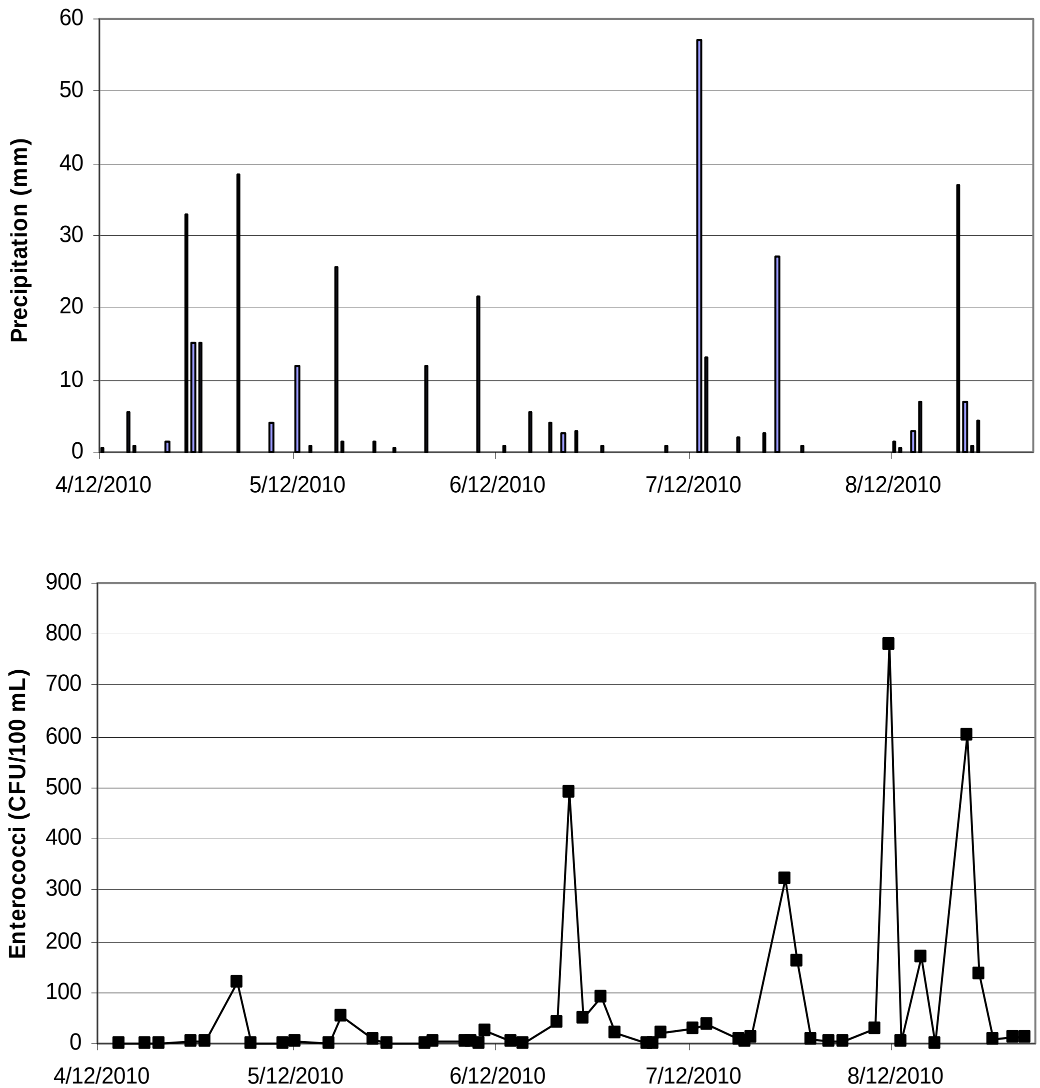

2010 NSB #4 - North Hempstead Beach (N)(former Hempstead Harbor Beach)
Precipitation (mm)
60
50
40
30
20
10
0
4/12/2010
5/12/2010
6/12/2010
7/12/2010
8/12/2010
Enterococci (CFU/100 mL)
700
600
500
400
300
200
100
0
4/12/2010
5/12/2010
6/12/2010
7/12/2010
8/12/2010

2010 NSB #5 - Tappen Beach





2010 NSB #6 - Sea Cliff Beach



NSB#2 - Village Club at Sands Point Beach (Formerly IBM Beach)

	Enterococci	
Date	**CFU/100ml.**	**Log AvgEnt**
04/15/10	2.00	0.00
04/19/10	15.00	5.48
04/21/10	0.10	1.44
04/26/10	12.00	2.45
04/28/10	5.00	2.83
05/03/10	40.00	4.39
05/05/10	30.00	5.78
05/10/10	3.00	5.33
05/12/10	16.00	6.02
05/17/10	4.00	6.50
05/19/10	30.00	7.58
05/24/10	12.00	11.95
05/26/10	8.00	11.48
06/01/10	3.00	10.79
06/02/10	5.00	10.00
06/07/10	4.00	6.85
06/08/10	21.00	7.66
06/09/10	8.00	7.69
06/14/10	10.00	8.06
06/16/10	0.10	5.41
06/21/10	***450.00***	7.31
06/23/10	***530.00***	10.79
06/28/10	4.00	9.96
06/30/10	3.00	8.93
07/05/10	11.00	10.78
07/06/10	14.00	11.04
07/07/10	***250.00***	14.32
07/12/10	15.00	16.67
07/14/10	***210.00***	20.98
07/19/10	10.00	***35.81***
07/20/10	55.00	***37.24***
07/21/10	12.00	33.88
07/26/10	44.00	21.36
07/28/10	29.00	21.91
08/02/10	2.00	24.65
08/04/10	60.00	26.55
08/09/10	***160.00***	29.56
08/11/10	54.00	31.22
08/16/10	0.10	15.64
08/18/10	1.00	12.18
08/23/10	***601.00***	16.26
08/25/10	20.00	16.60
08/30/10	41.00	15.48

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

NSB#4 - North Hempstead Beach (N) (Formerly Hempstead Harbor Beach)

	Enterococci	
Date	CFU/100ml.	Log AvgEnt
04/15/10	2.00	0.00
04/19/10	1.00	1.41
04/21/10	0.10	0.58
04/26/10	30.00	1.57
04/28/10	14.00	2.43
05/03/10	48.00	3.99
05/05/10	1.00	3.27
05/10/10	1.00	2.82
05/12/10	34.00	3.72
05/17/10	2.00	3.72
05/19/10	14.00	4.25
05/24/10	14.00	8.64
05/26/10	2.00	7.46
06/01/10	1.00	4.77
06/02/10	0.10	3.24
06/07/10	0.10	1.86
06/08/10	0.10	1.39
06/09/10	7.00	1.61
06/14/10	42.00	1.72
06/16/10	20.00	2.15
06/21/10	8.00	2.05
06/23/10	56.00	2.77
06/28/10	2.00	2.36
06/30/10	1.00	2.18
07/05/10	0.10	2.36
07/06/10	0.10	1.77
07/07/10	28.00	2.23
07/12/10	22.00	4.64
07/14/10	82.00	6.03
07/19/10	1.00	3.68
07/20/10	1.00	3.27
07/21/10	29.00	3.92
07/26/10	27.00	3.44
07/28/10	2.00	3.29
08/02/10	0.10	2.79
08/04/10	4.00	2.87
08/09/10	4.00	4.63
08/11/10	***124.00***	6.24
08/16/10	2.00	3.80
08/18/10	44.00	4.74
08/23/10	***601.00***	9.39
08/25/10	21.00	10.18
08/30/10	3.00	9.55
09/01/10	7.00	9.26

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

NSB#3 - North Hempstead Beach (S) (Formerly Bar Beach)

	Enterococci	
Date	**CFU/100ml.**	**Log AvgEnt**
04/15/10	0.10	0.00
04/19/10	2.00	0.45
04/21/10	0.10	0.27
04/26/10	49.00	0.99
04/28/10	11.00	1.61
05/03/10	20.00	2.45
05/05/10	1.00	2.15
05/10/10	8.00	2.54
05/12/10	5.00	2.74
05/17/10	1.00	3.54
05/19/10	20.00	4.20
05/24/10	10.00	7.62
05/26/10	0.10	4.94
06/01/10	0.10	2.27
06/02/10	11.00	2.66
06/07/10	6.00	2.59
06/08/10	13.00	3.05
06/09/10	2.00	2.93
06/10/10	8.00	2.93
06/14/10	13.00	3.20
06/16/10	1.00	2.90
06/21/10	***120.00***	3.76
06/23/10	29.00	4.46
06/28/10	1.00	5.11
06/30/10	0.10	3.68
07/05/10	5.00	4.76
07/06/10	1.00	4.18
07/07/10	30.00	4.86
07/12/10	11.00	4.87
07/14/10	56.00	6.08
07/19/10	9.00	7.02
07/20/10	2.00	6.26
07/21/10	1.00	5.37
07/26/10	26.00	4.01
07/28/10	0.10	2.95
08/02/10	0.10	3.25
08/04/10	2.00	3.12
08/09/10	4.00	2.73
08/11/10	5.00	2.89
08/16/10	5.00	1.98
08/18/10	40.00	2.60
08/23/10	***590.00***	4.75
08/25/10	33.00	5.76
08/30/10	15.00	8.51
09/01/10	13.00	8.88

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

NSB#5 - Tappen Beach

	Enterococci	
Date	**CFU/100ml.**	**Log AvgEnt**
04/15/10	2.00	0.00
04/19/10	1.00	1.41
04/21/10	1.00	1.26
04/26/10	19.00	2.48
04/28/10	90.00	5.09
05/03/10	***160.00***	9.04
05/05/10	1.00	6.60
05/10/10	2.00	5.69
05/12/10	31.00	6.87
05/17/10	0.10	4.92
05/19/10	21.00	5.69
05/24/10	29.00	10.04
05/26/10	3.00	8.89
06/01/10	18.00	6.84
06/02/10	1.00	5.64
06/07/10	0.10	3.01
06/08/10	8.00	3.32
06/09/10	12.00	3.73
06/10/10	6.00	4.12
06/14/10	16.00	3.88
06/16/10	1.00	3.47
06/21/10	37.00	5.04
06/23/10	60.00	6.20
06/28/10	8.00	5.89
06/30/10	1.00	5.08
07/05/10	0.10	3.67
07/06/10	1.00	3.29
07/07/10	0.10	2.52
07/12/10	5.00	2.60
07/14/10	43.00	3.36
07/19/10	3.00	3.21
07/20/10	0.10	2.34
07/21/10	2.00	2.31
07/26/10	***820.00***	2.28
07/28/10	8.00	2.53
08/02/10	0.10	1.85
08/04/10	0.10	1.45
08/09/10	23.00	3.38
08/11/10	25.00	4.05
08/16/10	29.00	3.82
08/18/10	5.00	3.91
08/23/10	***290.00***	10.53
08/25/10	22.00	11.33
08/30/10	3.00	6.31
09/01/10	1.00	5.25

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

NSB#6 - Sea Cliff Village Beach

	Enterococci	
Date	CFU/100ml.	Log AvgEnt
04/15/10	0.10	0.00
04/19/10	1.00	0.32
04/21/10	0.10	0.22
04/26/10	5.00	0.47
04/28/10	5.00	0.76
05/03/10	***120.00***	1.76
05/05/10	0.10	1.17
05/10/10	2.00	1.25
05/12/10	5.00	1.46
05/17/10	0.10	1.46
05/19/10	53.00	2.09
05/24/10	7.00	3.64
05/26/10	2.00	3.43
06/01/10	0.10	2.13
06/02/10	6.00	2.36
06/07/10	3.00	2.22
06/08/10	6.00	2.46
06/09/10	1.00	2.26
06/10/10	26.00	2.86
06/14/10	5.00	2.86
06/16/10	1.00	2.62
06/21/10	40.00	3.44
06/23/10	***490.00***	5.19
06/25/10	48.00	6.10
06/28/10	91.00	8.38
06/30/10	22.00	9.03
07/05/10	0.10	9.34
07/06/10	2.00	8.30
07/07/10	21.00	8.86
07/12/10	28.00	12.44
07/14/10	36.00	13.60
07/19/10	8.00	17.99
07/20/10	6.00	16.42
07/21/10	11.00	15.92
07/26/10	***320.00***	12.74
07/28/10	***160.00***	15.73
07/30/10	8.00	12.84
08/02/10	5.00	11.35
08/04/10	4.00	10.48
08/09/10	29.00	19.14
08/11/10	***780.00***	26.07
08/13/10	6.00	22.93
08/16/10	***170.00***	26.10
08/18/10	1.00	20.31
08/23/10	***601.00***	***35.52***
08/25/10	***136.00***	***39.73***

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

	Enterococci	
Date	**CFU/100ml.**	**Log AvgEnt**
08/27/10	10.00	29.76
08/30/10	14.00	26.87
09/01/10	11.00	24.95

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

CSHH 2010 RAINFALL DATA FOR SEA CLIFF

MO/DAY	**AMT(MM)***	**MO/DAY**	**AMT(MM)**	**MO/DAY**	**AMT(MM)**	**MO/DAY**	**AMT(MM)**	**MO/DAY**	**AMT(MM)**
MAR		**MAY**		**JULY**		**SEPTEMBER**		**NOVEMBER**	
4,5	snow	3	38.5A	8	1	3	trace	3,4,5	33
12	6	8	4	13	57B	8	0.5	8	2
13	96.5A	12	12	14**	13B	12	2	16-17	23
14	24	14	1	19	2	13	3.5		
15	trace	18	25.5C	23	2.5	16	13	**Total**	**58+**
22	29	19	1.5	25**	27B	17	2		
23	10	24	1.5	29	1	22	3		
26	3	27	0.5	**Total**	**103.5**	26	3.5		
28	1	29	trace			27	17		
29	67	**Total**	**84.5**			28	2.5		
30	72.5					30	47		
31	3					**Total**	**97**		
Total	**312+**								
APRIL		**JUNE**		**AUGUST**		**OCTOBER**			
9	7.5	1	12	5	trace	1	82		
11	trace	3	trace	10	trace	3	2		
12	0.5	9**	21.5C	12	1.5	4	7.5		
16	5.5	13	1	13	0.5	5	4		
17	1	14	trace	15	3	11	2.5		
22	1.5	17	5.5	16	7	12	2.5		
25	33	20	4	22	37B	14	29C		
26,27	30.5	22	2.5	23**	7	15	4		
Total	**79.5**	24	3	24	1	19	1		
		28	1	25	4.5	25	0.5		
		Total	**50.5**	**Total**	**61.5**	26-27	11		
						Total	**146**		

*Rainfall is recorded from midnight to midnight.

"A" designates that at least 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. (This is meaningful during beach season.)

**Administrative beach closures: 7/14, 7/26, and 8/23 for TNH Beach Park, Tappen Beach and Sea Cliff Beach;

additional preemptive closing for TNH Beach Park on 6/10 (other beaches around Hempstead Harbor not officially open then).

Appendix C

Summary Tables for 2010 and Previous Seasons

2010

	Units in CFU/100 ml	Sands Point Golf Club	North Hempstead Beach (N) (former Hempstead Harbor Beach)	North Hempstead Beach (S)(former Bar Beach)	Tappen Beach	Sea Cliff Beach
April	Enterococci	6.82	9.42	12.44	22.60	2.24
May	Enterococci	17.88	14.50	8.14	30.89	23.65
June	Enterococci	94.37	12.48	17.02	14.01	56.85
July	Enterococci	65.00	19.22	14.11	88.23	54.55
August	Enterococci	104.34	89.23	77.12	44.13	159.64
September*	Enterococci	na	7.00	13.00	1.00	11.00
Season Average **	*Enterococci*	*65.22*	*29.61*	*26.22*	*40.19*	*67.48*

na = not analyzed
* Only one data point collected in September.
**The "Season Averages" are the averages of all of the data points collected during the monitoring season.

2009

	Units in CFU/100 ml	Sands Point Golf Club	North Hempstead Beach (N) (former Hempstead Harbor Beach)	North Hempstead Beach (S)(former Bar Beach)	Tappen Beach	Sea Cliff Beach
April	Enterococci	2.20	1.52	1.53	2.52	9.70
May	Enterococci	6.78	5.16	4.14	4.03	5.78
June	Enterococci	104.24	47.22	290.88	247.31	21.46
July	Enterococci	31.03	102.89	206.46	23.24	26.62
August	Enterococci	84.00	86.24	16.82	7.37	70.36
September*	Enterococci	4.00	120	90.00	0.10	11.00
Season Average **	*Enterococci*	*48.69*	*54.70*	*109.23*	*65.02*	*29.97*

* Only one data point collected in September.
**The "Season Averages" are the averages of all of the data points collected during the monitoring season.

2008

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

na = not analyzed

2007

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

2006

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

2005

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

2004

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

2003

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

2002

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

2001

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

CSHH #1 - Beacon 11

	2010					2009				
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Turbidity (NTUs) (0.5 m)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Turbidity (NTUs) (0.5 m)
May	13.02	8.50	24.11	18.10	1.50	14.15	8.33	24.54	14.37	1.95
June	18.21	6.68	24.94	21.46	2.70	17.93	7.29	24.00	18.73	2.11
July	22.13	3.48	26.06	27.43	2.35	21.06	5.67	23.99	23.30	1.88
Aug.	22.58	2.96	27.00	24.03	2.19	23.40	3.71	24.55	25.68	2.81
Sept.	21.81	5.45	26.65	22.30	2.19	21.33	5.31	24.80	19.24	3.46
Oct.	17.14	7.05	26.47	13.88	1.04	14.60	7.07	24.75	11.53	2.93
Nov.	12.83	8.33	27.25	4.00	1.17	-	-	-	-	-
Average	18.25	6.06	26.07	18.74	1.88	18.74	6.23	24.44	18.81	2.52

	2008					2007			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Turbidity (NTUs) (0.5 m)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
May	12.93	7.20	23.69	16.80	-	-	-	-	-
June	18.81	7.38	24.27	19.15	-	16.96	6.95	24.11	21.33
July	19.81	3.62	25.75	23.70	2.35	19.08	3.91	25.10	23.90
Aug.	23.25	4.52	25.28	22.00	3.83	22.67	3.61	25.92	21.70
Sept.	22.49	4.86	25.54	20.70	2.68	21.84	5.02	26.26	19.18
Oct.	16.37	6.21	25.96	12.08	2.77	19.3	4.65	26.99	16.64
Nov.	12.60	7.06	25.85	14.80	1.89	-	-	-	-
Average	18.04	5.83	25.19	18.46	2.70	19.97	4.83	25.68	20.55

	2006				2005			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	17.35	6.81	25.22	22.42	17.19	4.5	22.94	20.22
July	20.78	3.77	25.79	24.18	23.19	4.22	24.52	24.3
Aug.	23.64	3.29	25.64	23.78	23.73	1.85	25.36	24.4
Sept.	20.58	7.28	25.4	18.9	22.54	4.85	26.49	23.6
Oct.	16.41	7.98	25.56	14.78	16.3	7.36	25.09	13.3
Average	19.75	5.83	25.52	20.81	20.59	4.56	24.88	21.16

CSHH #1 - Beacon 11

	2004 Avg. Water Temp. (°C) (Bottom)	2004 Avg. DO (ppm) (Bottom)	2004 Avg. Salinity (ppt) (Bottom)	2004 Avg. Air Temp. (°C)	2003 Avg. Water Temp. (°C) (Bottom)	2003 Avg. DO (ppm) (Bottom)	2003 Avg. Salinity (ppt) (Bottom)	2003 Avg. Air Temp. (°C)
June	18.3	5.38	25	23.6	17	5.82	23.67	24.6
July	20.87	4.28	25.9	24	18.74	3.6	24.97	21.9
Aug.	22.33	3.86	26.31	24	21.75	2.1	25.79	23.6
Sept.	22.14	3.67	26.15	20.4	21.6	4.32	26.4	22.2
Oct.	16.53	7.66	25.21	12.9	16.49	6.73	25.23	12.8
Average	20.10	4.94	25.73	20.80	18.94	4.63	25.25	20.40

	2002 Avg. Water Temp. (°C) (Bottom)	2002 Avg. DO (ppm) (Bottom)	2002 Avg. Salinity (ppt) (Bottom)	2002 Avg. Air Temp. (°C)	2001 Avg. Water Temp. (°C) (Bottom)	2001 Avg. DO (ppm) (Bottom)	2001 Avg. Salinity (ppt) (Bottom)	2001 Avg. Air Temp. (°C)
June	18.85	4.82	26.42	24.1	20.31	6.62	24.78	24.1
July	21.28	2.31	26.55	25	19.4	3.8	25.68	25.2
Aug.	24.02	2.91	26.89	25	23.25	2.96	26.19	25.4
Sept.	21.98	5.7	26.5	20.3	22.56	5.45	26.7	20.5
Oct.	17.12	7.13	26.38	13.5	17.05	7.86	26.79	15.8
Average	20.67	4.64	26.56	21.10	20.90	5.16	26.02	22.50

	2000 Avg. Water Temp. (°C) (Bottom)	2000 Avg. DO (ppm) (Bottom)	2000 Avg. Salinity (ppt) (Bottom)	2000 Avg. Air Temp. (°C)	1999 Avg. Water Temp. (°C) (Bottom)	1999 Avg. DO (ppm) (Bottom)	1999 Avg. Salinity (ppt) (Bottom)	1999 Avg. Air Temp. (°C)
June	17.1	5.63	24.43	22.2	19.66	7.07	24.89	23
July	21.8	5.27	25.03	22.2	21.72	3.42	25.78	30
Aug.	22.53	6.41	24.7	24.2	24.35	4.6	25.99	25
Sept.	20.99	4.9	25.07	20.9	21.9	5.57	25.72	22
Oct.	16.78	6.02	25.24	13.2	17.76	8.29	24.7	12
Average	19.49	5.64	24.87	20.40	21.01	5.85	24.15	22.22

CSHH #1 - Beacon 11

	1998				1997			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	17.24	6.24	24.18	21.33	18.1	7.01	23.71	24.33
July	21.23	4.89	24.66	24.6	20.83	4.34	24.78	23.5
Aug.	23.95	3.66	24.84	24.5	21.85	1.96	25.96	21.5
Sept.	22.02	4.57	25.48	20.5	22.13	3.26	25.81	19.5
Oct.	17.19	6.84	25.27	13.75	17.45	5.83	26.06	13.67
Average	20.52	5.17	24.88	21.10	20.10	4.39	25.20	20.81

	1996				1995			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	19	8.35	N/A	23.25	17.78	5.3	26.27	19.67
July	20.04	3.74	24.66	22.75	20.77	2.66	26.53	25.25
Aug.	21.75	2.88	25.13	22.25	23.78	4.56	27.56	24.7
Sept.	21.7	5.14	25.48	19.83	21.72	4.34	28.05	20.5
Oct.	17.34	9.21	24.97	15.25	17.71	6.9	27.34	16.5
Average	19.87	5.90	25.03	20.71	20.80	4.60	27.21	21.84

CSHH #2 - Bell Marker 6

	2010 Avg. Water Temp. (°C) (Bottom)	2010 Avg. DO (ppm) (Bottom)	2010 Avg. Salinity (ppt) (Bottom)	2010 Avg. Air Temp. (°C)	2010 Avg. Turbidity (NTUs) (0.5 m)	2009 Avg. Water Temp. (°C) (Bottom)	2009 Avg. DO (ppm) (Bottom)	2009 Avg. Salinity (ppt) (Bottom)	2009 Avg. Air Temp. (°C)	2009 Avg. Turbidity (NTUs) (0.5 m)
May	13.07	8.76	24.34	23.80	1.21	12.90	7.94	25.16	16.40	1.88
June	16.88	5.89	25.51	21.60	1.78	16.79	6.58	24.73	19.50	2.45
July	20.21	1.84	26.59	27.95	1.54	18.93	3.80	24.90	23.84	1.39
Aug.	22.09	2.66	27.21	24.70	1.54	21.43	1.34	25.28	25.78	1.94
Sept.	21.69	5.39	27.07	23.22	2.37	21.70	6.17	25.16	21.53	2.38
Oct.	16.82	7.54	27.06	15.00	0.78	14.66	7.90	25.64	12.47	1.58
Nov.	12.66	10.14	27.43	9.6	1.05	-	-	-	-	-
Average	17.63	6.03	26.46	20.84	1.47	17.73	5.62	25.15	19.92	1.93

	2008 Avg. Water Temp. (°C) (Bottom)	2008 Avg. DO (ppm) (Bottom)	2008 Avg. Salinity (ppt) (Bottom)	2008 Avg. Air Temp. (°C)	2008 Avg. Turbidity (NTUs) (0.5 m)	2007 Avg. Water Temp. (°C) (Bottom)	2007 Avg. DO (ppm) (Bottom)	2007 Avg. Salinity (ppt) (Bottom)	2007 Avg. Air Temp. (°C)
May	12.13	8.72	24.22	14.20	-	-	-	-	-
June	16.03	6.35	25.29	20.80	-	16.03	6.92	24.66	22.53
July	18.69	3.37	26.06	25.58	2.62	17.62	4.49	25.88	24.67
Aug.	22.12	4.27	26.09	25.13	1.82	21.65	3.28	26.36	22.77
Sept.	22.19	5.34	26.13	20.68	2.11	21.55	5.43	26.78	21.48
Oct.	16.30	5.87	26.55	13.60	2.50	19.32	5.07	27.65	17.08
Nov.	12.64	7.98	26.32	15.10	1.28	-	-	-	-
Average	17.16	5.98	25.81	19.30	2.07	19.23	5.04	26.27	21.71

	2006 Avg. Water Temp. (°C) (Bottom)	2006 Avg. DO (ppm) (Bottom)	2006 Avg. Salinity (ppt) (Bottom)	2006 Avg. Air Temp. (°C)	2005 Avg. Water Temp. (°C) (Bottom)	2005 Avg. DO (ppm) (Bottom)	2005 Avg. Salinity (ppt) (Bottom)	2005 Avg. Air Temp. (°C)
June	16.93	7.74	25.89	22.72	16.8	5.22	23.21	21.9
July	18.67	3.99	26.51	25.5	21.78	4.59	23.03	24.4
Aug.	21.91	1.91	26.42	26.53	23.13	2.07	25.58	26.6
Sept.	20.41	5.98	26.24	20.33	22.8	2.98	27.01	24.2
Oct.	17.66	7.3	26.32	18.89	17.01	6.84	25.91	13.9
Average	19.12	5.38	26.28	22.79	20.30	4.34	25.35	22.22

CSHH #2 - Bell Marker 6

	2004				2003			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	16.38	5.92	25.41	22.5	15.58	6.35	24.26	22.4
July	19.82	5.11	26.24	24.8	17.16	2.93	25.35	22.9
Aug.	21.47	3.04	26.62	24.1	21.01	1.74	26.14	23.6
Sept.	21.96	6.17	26.33	20.7	21.2	5.38	26.55	22
Oct.	17.37	8.16	25.63	14.3	17.19	6.47	26.03	15
Average	19.49	5.57	26.06	21.50	18.37	4.55	25.70	21.10

	2002				2001			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	18.06	6.13	26.55	23.4	16.67	4.97	25.36	23.2
July	19.91	1.81	26.87	27.4	18.45	5.32	26	26.2
Aug.	22.85	3.08	27.23	25.4	22.33	3.83	26.46	26
Sept.	21.97	5.84	26.89	21.4	21.88	5.8	27.07	21.1
Oct.	17.74	7.68	27.25	13.9	16.94	8.55	27.24	15.9
Average	20.13	5.11	26.99	21.50	19.58	5.46	26.41	22.80

	2000				1999			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	16.45	6.29	24.77	22.4	17.13	6.41	25.42	23
July	20.19	4.8	25.38	22.7	19.62	2.87	26.23	27
Aug.	22.08	6.46	24.95	24.7	22.88	4.29	26.8	25
Sept.	20.89	6.08	25.54	22.3	22.15	5.75	26.84	26
Oct.	16.86	7.18	26.07	16.3	17.18	8.46	26.3	13
Average	19.03	6.10	25.28	21.80	19.67	5.44	26.21	22.73

CSHH #2 - Bell Marker 6

	1998				1997			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	16.39	6.9	24.45	21.33	16.7	9.12	24.14	24.5
July	19.88	4.78	25.13	24.6	18.32	3.12	25.33	23.25
Aug.	22.88	3.3	25.27	24.5	21.12	2.86	26.41	21.37
Sept.	21.62	6.03	25.82	20.5	21.33	3.18	26.79	19.75
Oct.	17.18	6.9	26.27	13.75	18.02	5.22	26.59	14.5
Average	19.66	5.45	25.40	21.10	19.12	4.54	25.69	21.37

	1996				1995			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	17.5	7.8	N/A	22	17.61	7.78	26.5	21.25
July	19.15	5.17	24.92	24.5	20.09	4.19	26.93	24.87
Aug.	21.1	4.29	24.99	23.17	22.9	4.87	27.77	25.12
Sept.	22.05	8	25.73	20.17	21.73	5.27	28.44	21.5
Oct.	16.95	9.11	25.34	15.75	17.48	7.72	27.8	15.83
Average	19.20	7.14	25.28	20.53	20.30	5.67	27.53	22.16

CSHH #3 - Glen Cove Creek

	2010					2009				
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Turbidity (NTUs) (0.5 m)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Turbidity (NTUs) (0.5 m)
May	13.39	8.91	24.18	24.70	0.70	14.10	9.22	24.71	17.40	2.00
June	18.52	7.60	25.25	22.68	1.85	17.60	7.83	24.38	20.40	1.68
July	21.60	3.98	26.29	29.30	1.61	20.50	5.56	24.46	24.54	1.80
Aug.	22.82	4.62	26.80	25.30	1.64	23.13	5.62	24.76	26.83	2.64
Sept.	21.83	5.96	26.88	23.56	2.09	21.27	5.54	25.10	19.64	3.13
Oct.	16.80	8.26	26.62	15.90	0.59	14.98	7.76	25.27	13.80	2.28
Nov.	12.72	10.25	27.29	9.10	0.80	-	-	-	-	-
Average	18.24	7.08	26.18	21.51	1.32	18.60	6.92	24.78	20.43	2.25

	2008					2007			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Turbidit y (NTUs) (0.5 m)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
May	12.82	8.58	23.69	15.15	-	-	-	-	-
June	18.23	7.53	24.89	21.60	-	16.82	8.47	24.15	21.98
July	19.39	3.83	25.89	26.33	1.62	19.19	4.75	25.40	24.25
Aug.	23.12	6.08	25.68	24.15	-	22.67	5.98	26.16	23.20
Sept.	22.47	5.74	25.93	21.45	-	21.87	5.18	26.63	22.13
Oct.	16.43	7.25	26.17	13.58	1.67	19.31	4.7	27.59	17.7
Nov.	12.60	7.49	26.36	15.60	-	-	-	-	-
Average	17.86	6.64	25.52	19.69	1.64	19.97	5.82	25.99	21.85

	2006				2005			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	17.37	8.35	25.6	23.38	17.46	5.46	23.08	22.32
July	20.32	4.51	25.98	25.25	22.32	4.29	24.82	24.8
Aug.	23.19	5.13	26.13	25.46	23.53	2.16	25.67	25.3
Sept.	20.58	7.5	26	19.85	22.76	5.23	26.8	24.8
Oct.	16.91	8.55	26.17	16.03	16.66	8.14	25.58	14.3
Average	19.67	6.81	25.98	21.99	20.54	5.05	25.19	22.29

CSHH #3 - Glen Cove Creek

	2004 Avg. Water Temp. (°C) (Bottom)	2004 Avg. DO (ppm) (Bottom)	2004 Avg. Salinity (ppt) (Bottom)	2004 Avg. Air Temp. (°C)	2003 Avg. Water Temp. (°C) (Bottom)	2003 Avg. DO (ppm) (Bottom)	2003 Avg. Salinity (ppt) (Bottom)	2003 Avg. Air Temp. (°C)
June	17.67	7.36	25.23	23.4	16.47	7.02	23.97	23.9
July	20.39	4.96	26.15	25.1	18.41	4.25	25.08	22.8
Aug.	22	4.3	26.48	22.8	21.26	3.74	25.92	23.6
Sept.	22.02	4.66	26.34	21.3	21.48	4.81	26.49	22.4
Oct.	16.86	7.62	25.97	13.1	16.97	6.58	25.61	15.6
Average	19.87	5.76	26.04	20.90	18.90	5.21	25.45	21.80

	2002 Avg. Water Temp. (°C) (Bottom)	2002 Avg. DO (ppm) (Bottom)	2002 Avg. Salinity (ppt) (Bottom)	2002 Avg. Air Temp. (°C)	2001 Avg. Water Temp. (°C) (Bottom)	2001 Avg. DO (ppm) (Bottom)	2001 Avg. Salinity (ppt) (Bottom)	2001 Avg. Air Temp. (°C)
June	19.05	6.36	26.48	23.7	18.45	7.63	25.23	24.4
July	20.71	2.61	26.69	25.4	18.55	4.53	25.92	26
Aug.	23.36	2.49	27.1	26.9	23.09	4.83	26.34	27.7
Sept.	21.78	6.49	26.71	22	22.1	6.92	26.88	21.3
Oct.	17.7	7.98	27.05	14.7	17.02	9.01	27.12	16.3
Average	20.53	5.20	26.83	22.10	20.23	6.47	26.27	23.60

	2000 Avg. Water Temp. (°C) (Bottom)	2000 Avg. DO (ppm) (Bottom)	2000 Avg. Salinity (ppt) (Bottom)	2000 Avg. Air Temp. (°C)	1999 Avg. Water Temp. (°C) (Bottom)	1999 Avg. DO (ppm) (Bottom)	1999 Avg. Salinity (ppt) (Bottom)	1999 Avg. Air Temp. (°C)
June	17.69	6.6	24.35	21.6	18.43	6.32	25.09	23
July	21.16	5.87	25.26	23	21.57	5.02	25.89	30
Aug.	22.66	6.44	24.68	23.5	23.82	4.87	26.44	26
Sept.	21.45	6.13	24.99	20.5	21.8	6.16	26.25	23
Oct.	16.69	7.5	25.52	16.7	16.74	8.7	25.81	14
Average	19.59	6.54	24.94	20.90	20.20	6.32	25.74	23.04

CSHH #3 - Glen Cove Creek

	1998				1997			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	17.23	7.25	24.27	21.33	17.36	8.32	24.11	26.5
July	21.03	6.34	24.76	24.6	20.2	6.21	25.07	23.37
Aug.	23.39	3.87	25.14	24.5	21.34	2.29	26.29	21.5
Sept.	21.88	5.76	25.75	20.5	21.61	3.12	26.67	20
Oct.	16.9	7.79	25.88	13.75	17.12	5.69	26.69	13.67
Average	20.28	6.16	25.16	21.10	19.55	5.14	25.66	21.25

	1996				1995			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	18.25	9.35	N/A	22.12	17.82	5.4	26.58	21.5
July	20.32	7.1	24.46	23.67	20.74	4.5	26.87	25
Aug.	21.45	3.2	25.29	22.87	23.24	4.79	27.94	24.7
Sept.	22.09	6.85	25.69	20.83	21.61	4.78	28.22	21
Oct.	16.61	9.88	25.12	15.4	17.4	7.54	27.57	16.5
Average	19.43	7.44	25.15	20.55	20.59	5.26	27.55	22.18

CSHH #8- Glen Cove Creek STP Outfall

	2010 Avg. Water Temp. (°C) (Bottom)	2010 Avg. DO (ppm) (Bottom)	2010 Avg. Salinity (ppt) (Bottom)	2010 Avg. Air Temp. (°C)	2010 Avg. Turbidity (NTUs) (0.5 m)	2009 Avg. Water Temp. (°C) (Bottom)	2009 Avg. DO (ppm) (Bottom)	2009 Avg. Salinity (ppt) (Bottom)	2009 Avg. Air Temp. (°C)	2009 Avg. Turbidity (NTUs) (0.5 m)
May	14.40	8.87	23.67	26.10	2.07	14.49	8.46	24.62	19.37	2.78
June	19.11	8.14	25.06	23.90	2.54	18.08	7.71	24.22	20.85	1.74
July	22.78	4.22	26.07	29.90	2.28	21.12	5.23	24.26	25.86	2.58
Aug.	23.35	3.78	26.68	26.10	2.34	24.01	6.65	24.44	28.20	4.27
Sept.	22.25	5.67	26.47	23.90	2.40	21.38	6.21	24.74	20.46	3.15
Oct.	16.68	7.88	26.29	16.40	1.66	15.14	7.03	25.00	14.08	2.88
Nov.	12.85	9.82	26.96	10.00	1.22	-	-	-	-	-
Average	18.77	6.91	25.89	22.33	2.07	19.04	6.88	24.55	21.47	2.90

	2008 Avg. Water Temp. (°C) (Bottom)	2008 Avg. DO (ppm) (Bottom)	2008 Avg. Salinity (ppt) (Bottom)	2008 Avg. Air Temp. (°C)	2008 Avg. Turbidity (NTUs) (0.5 m)	2007 Avg. Water Temp. (°C) (Bottom)	2007 Avg. DO (ppm) (Bottom)	2007 Avg. Salinity (ppt) (Bottom)	2007 Avg. Air Temp. (°C)
May	13.22	6.81	23.67	19.30	-	-	-	-	-
June	19.08	8.34	24.55	23.80	4.75	17.69	8.75	24.03	22.83
July	20.53	4.83	25.64	28.80	3.02	19.76	4.46	25.26	26.50
Aug.	23.23	4.49	25.46	24.13	2.89	22.76	5.27	25.84	24.33
Sept.	22.67	4.04	25.84	20.80	2.74	22.17	6.05	26.27	21.75
Oct.	16.68	6.67	26.17	13.38	2.14	19.3	5.13	27.59	17.76
Nov.	12.47	6.34	25.96	15.80	1.53	-	-	-	-
Average	18.27	5.93	25.33	20.86	2.84	20.34	5.93	25.80	22.63

	2006 Avg. Water Temp. (°C) (Bottom)	2006 Avg. DO (ppm) (Bottom)	2006 Avg. Salinity (ppt) (Bottom)	2006 Avg. Air Temp. (°C)	2005 Avg. Water Temp. (°C) (Bottom)	2005 Avg. DO (ppm) (Bottom)	2005 Avg. Salinity (ppt) (Bottom)	2005 Avg. Air Temp. (°C)
June	18.21	7.98	25.27	24.52	18.9	7.1	22.25	23.72
July	21.43	5.08	25.51	26.33	23.07	5.48	24.5	25.5
Aug.	24	8.85	25.71	25.18	24.32	3.45	25.32	27.2
Sept.	20.65	8.25	25.36	20.2	23.24	5.07	26.42	25.2
Oct.	17.12	8.18	25.97	15.57	16.98	7.31	25.28	14
Average	20.28	7.67	25.56	22.36	21.30	5.68	24.75	23.10

CSHH #8- Glen Cove Creek STP Outfall

	2004				2003			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	19.38	8.14	24.8	26.3	17.01	5.92	23.7	25.7
July	21.26	4.52	25.39	27	18.94	4.03	24.94	24.4
Aug.	22.78	5.98	25.89	24.4	22.51	5.23	25.51	26.1
Sept.	22.22	4.66	25.62	22.1	21.58	4.87	25.99	23.5
Oct.	16.6	7.79	25.72	13.4	16.49	6.49	25.1	14.6
Average	20.49	6.22	25.50	22.20	19.10	5.28	25.09	22.10

	2002				2001			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	19.89	7.65	26.12	25.5	20.11	7.61	24.57	26.6
July	22.13	4.33	26.27	26.8	20.18	5.56	25.31	27.1
Aug.	24.64	4.85	26.67	27.7	23.82	6.16	25.86	29.2
Sept.	21.91	6.01	26.41	23	22.45	5.74	26.58	22.1
Oct.	17.67	7.69	26.77	16.4	16.67	9.56	26.54	16.7
Average	21.29	6.11	26.47	23.40	21.05	6.82	25.76	24.80

	2000				1999			
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)
June	18.66	7.13	23.59	23.8	19.99	9.11	24.71	23
July	21.99	6.51	24.93	24.1	22.7	6.03	25.53	30
Aug.	23.58	7.75	24.18	24.5	24.28	5.32	26.19	26
Sept.	21.17	8.63	24.81	23.6	21.78	6.14	25.84	24
Oct.	17.25	7.17	24.87	15.3	16.63	8.63	25.53	15
Average	20.40	7.35	24.40	21.90	21.02	7.14	25.49	23.70

Salinity Averages

	Beacon 11 CSHH #1	Bell 6 CSHH #2	Red Channel Marker, Near Glen Cove Creek, CSHH #3	Glen Cove STP Outfall, CSHH #8
2010	25.77 ppt	26.32 ppt	26.00 ppt	24.94 ppt
2009	24.22	24.87	24.54	23.68
2008	25.01	25.78	25.28	24.29
2007	25.41	26.07	25.62	24.30
2006	25.3	26.0	25.6	24.3
2005	24.60	24.95	24.71	23.66
2004	25.73	26.06	26.04	25.50
2003	25.25	25.70	25.45	25.09
2002	26.56	26.99	26.83	26.47
2001	26.02	26.41	26.27	25.76
2000	24.87	25.28	24.94	24.40
1999	24.15	26.21	25.49	25.49
1998	24.88	25.40	25.16	N/A
1997	25.20	25.69	25.66	N/A

Total Precipitation Per Month

	June	July	August	September	October
2010	50.5 mm	103.5 mm	61.5 mm	97 mm	146 mm
2009	294	150.5	83	69	175
2008	9.5	91	205.5	177.5	118
2007	159.5	198.5	132.5	36.5	136
2006	262	148	89	105	166.5
2005	45	81	41	28.5	460.5
2004	95	214	91	310.5	40
2003	291.5	87	88	194.5	134
2002	180.5	22.5	175.5	116.5 (9/15-9/30)	180
2001	167	70.5	165	94	19.5
2000	146	159	158	125	6
1999	31	21	135	323	92
1998	191	59	145	90	97
1997	47	232	141	84	27 (10/1-15)

Bottom Dissolved Oxygen Averages

Averages for Bottom DO	***2010***	***2009***	***2008***	***2007***	***2006***
Beacon 11, CSHH #1	5.55 ppm	6.09 ppm	5.50 ppm	4.99 ppm	5.8 ppm
Bell Buoy 6, CSHH #2	5.16	5.30	5.31	5.37	5.3
Glen Cove Creek, Red Channel Marker, CSHH #3	6.41	6.72	6.35	6.02	6.8
Glen Cove STP Outfall, CSHH #8	6.26	6.73	5.73	5.93	7.0

Averages for Bottom DO	***2005***	***2004***	***2003***	***2002***	***2001***
Beacon 11, CSHH #1	4.59 ppm	4.94 ppm	4.63 ppm	4.64 ppm	5.16 ppm
Bell Buoy 6, CSHH #2	4.63	5.57	4.55	5.11	5.46
Glen Cove Creek, Red Channel Marker, CSHH #3	5.09	5.76	5.21	5.20	6.47
Glen Cove STP Outfall, CSHH #8	5.76	6.22	5.28	6.11	6.82

Averages for Bottom DO	***2000***	***1999***	***1998***	***1997***	***1996***
Beacon 11, CSHH #1	5.64 ppm	5.85 ppm	5.17 ppm	4.39 ppm	5.90 ppm
Bell Buoy 6, CSHH #2	6.10	5.44	5.45	4.54	7.11
Glen Cove Creek, Red Channel Marker, CSHH #3	6.54	6.32	6.48	5.15	7.45
Glen Cove STP Outfall, CSHH #8	7.35	7.14	N/A	N/A	N/A