Hempstead Harbor Protection Committee

WATER-MONITORING PROGRAM
HEMPSTEAD HARBOR
Long Island, New York

2009 Water-Monitoring Report
(Full Report, including Appendices)

Prepared by

Coalition to Save Hempstead Harbor

and

FUSS & O'NEILL
Disciplines to Deliver

June 2010

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) 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 it monitoring efforts, the nine municipalities that share jurisdiction over Hempstead Harbor recognized they also shared the harbor's water-quality problems but did not, individually, have the resources to tackle large harbor issues. It became increasingly evident that they needed a mechanism to overcome the complexities of municipal boundaries and facilitate a more coordinated government approach to water-quality problems. In 1995, the Hempstead Harbor Protection Committee was created and became Long Island's first watershed-based intermunicipal organization, 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 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 harbor 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 2010) 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 2009, 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 NY 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) as a resource 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 Bay and the Peconic Estuary.

Since 1995, the HHPC has received dozens of 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 2009.

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

ACKNOWLEDGMENTS

Environmental restoration and conservation require dedication, passion, patience, broad-based community support, and collaboration, as well as large infusions of technical expertise and funding. We therefore gratefully acknowledge the financial support and participation of all who have partnered with 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; Nassau County Department of Public Works staff Ken Arnold, Tim Kelly, and Dan Fucci; and Interstate Environmental Commission engineer, Peter Sattler.

Our efforts would not be possible without the assistance of the following organizations and agencies that work with the CSHH and HHPC as technical advisers and partners:

- New York State Department of State
- New York State Department of Environmental Conservation
- New York State Legislative Commission on Water Resource Needs of Long Island
- New York Sea Grant/NEMO
- The Glenwood/Glen Head Civic Association
- U.S. Environmental Protection Agency, Long Island Sound Study Office

2009 Long Island Sound Futures Fund grant-award recipients (NY) with representatives from EPA LIS Office, NYS DEC, and others (photo by Peter Fraboni)

CONTENTS

1. HARBOR OVERVIEW 1

2. METHODS 3
- 2.1. Quality Assurance Project Plan 3
- 2.2. Location of Testing Stations 3
- 2.3. Frequency of Testing and Testing Parameters 8

3. MONITORING RESULTS 10
- 3.1. Dissolved Oxygen 10
- 3.2. Temperature 15
- 3.3. Salinity 17
- 3.4. pH 19
- 3.5. Turbidity/Water Clarity 19
  - 3.5.1. Secchi-Disk Measurements 19
  - 3.5.2. Turbidity-Meter Measurements 20
- 3.6. Nitrogen 22
  - 3.6.1. The Nitrogen Cycle 22
  - 3.6.2. Nitrogen Monitoring by CSHH 23
- 3.7. Chlorine 23
- 3.8. Bacteria 24
  - 3.8.1. Beach Monitoring for Bacteria Levels 25
  - 3.8.2. Beach-Closure Standards 26
  - 3.8.3. Monitoring Midharbor Points and Glen Cove Creek for Bacterial Levels 26
  - 3.8.4. Comparing Bacteria Data 27
  - 3.8.5. Shellfish Pathogen TMDLs 28
  - 3.8.6. Monitoring Shellfish Growing Area #50 29
- 3.9 Precipitation 29

4. OBSERVATIONS 30
- 4.1. Fish-Survey Reports 30
  - 4.1.1. Glenwood Power Station Entrainment and Impingement Monitoring Report 30
  - 4.1.2. A Study of the Striped Bass in the Marine District of New York State 31
- 4.2. Marine-Life Observations and Recreational-Fishing Reports 33
  - 4.2.1. Crabs 39
  - 4.2.2. Jellies 39
- 4.3. Shellfish 39
  - 4.3.1. Shellfish-Seeding Projects 40
  - 4.3.2. Surveys to Assess Survival of Seed Clams and Oysters 41
- 4.4. Birds 44
- 4.5. Diamondback Terrapins 46
- 4.6. Algal Blooms 47

CONTENTS

Monitoring Locations Map	Page 4
Blank Data-Reporting Sheets	End of Text

Appendix A	2009 Field Monitoring Results	A-1
Appendix B	2009 Bacteria and Precipitation Data	B-1
Appendix C	Summary Tables for 2009 and Previous Seasons	C-1
Appendix D	2009 NYSDEC Hempstead Harbor Bacteria Data	D-1

APPENDIX CONTENTS

Appendix A - 2009 Field Monitoring Results	*Page*
Weekly Results Graphs for Water-Quality Parameters, CSHH #1-3, 8	A-2 through A-4
Turbidity and Secchi-Disk Transparency Graphs	A-5 through A-7
Field-Monitoring Data	A-8 through A-14

Appendix B - 2009 Bacteria and Precipitation Data	
In-Harbor Bacteria and Precipitation Graphs, CSHH #1-13	B-2 through B-14
In-Harbor Bacteria Data, CSHH #1-13	B-15 through B-24
Beach-Monitoring Bacteria and Precipitation Graphs *for Sands Point, North Hempstead (N), North Hempstead (S), Tappen, and Sea Cliff Beaches*	B-25 through B-29
Beach-Monitoring Bacteria and Precipitation Data *for Sands Point, North Hempstead (N), North Hempstead (S), Tappen, and Sea Cliff Beaches*	B-30 through B-34
Sea Cliff Rainfall Data	B-35

Appendix C - Summary Tables for 2009 and Previous Seasons	
Comparison of Averaged Indicator Bacteria Data, 2001 - 2009	C-2 through C-6
1995 through 2009 Water-Quality Data Summary	C-7 through C-17
Salinity Averages	C-18
Precipitation Averages	C-18
Bottom Dissolved Oxygen Averages	C-18

Appendix D - 2009 NYSDEC Hempstead Harbor Bacteria Data	
Bacteria Data, DEC #1-15, DEC #1A, DEC #15A-B, DEC STP	D-2 through D-3

STATE OF THE HARBOR 2009

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.)

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.

Autumn view of harbor, looking north (10/30/09) (photo by Carol DiPaolo)

Today, Hempstead Harbor continues to support many diverse uses and activities. Fuel is transported to a Glenwood Landing oil terminal 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.

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.

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.

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

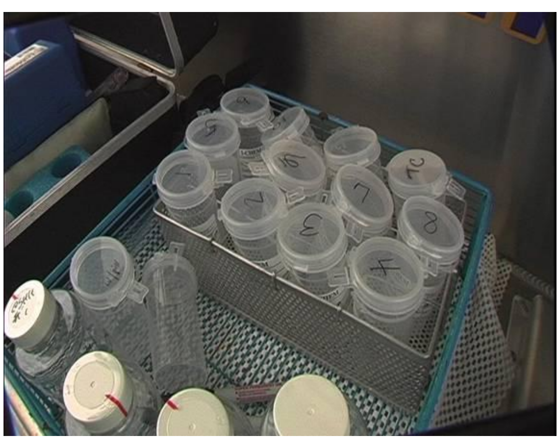
Map of Hempstead Harbor showing locations of CSHH Stations along with DEC Stations sampled in 2009.

Sound, as well as stations in Glen Cove Creek. *Table 1* includes the latitude/longitude points for most of the monitoring stations.

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.

An egret and swans at head of Glen Cove Creek by CSHH #13 (8/12/09) (photo by Carol DiPaolo)

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.



Different sample bottles (left) 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 (11/12/09) (photos by Carol DiPaolo)

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. These 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.

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

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
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

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 8 AM and typically continuing for 4 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 17 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 occasionally at CSHH #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.

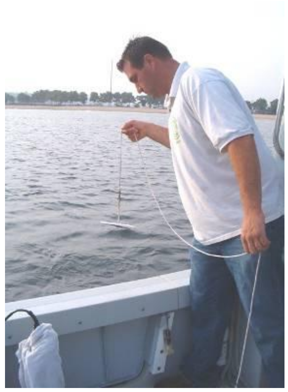
Table 2. CSHH Monitoring-Program Parameters

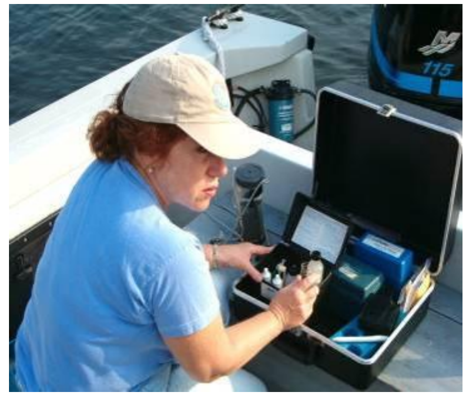
Parameter	Location	Analyzer or Method	Location of Analysis
Dissolved Oxygen	Vertical profiles at 1-meter intervals at CSHH #1-8, and 13	YSI 600	Field
Dissolved Oxygen	One location for electronic meter validation	LaMotte 7414	Field
Water Temperature	Vertical profiles at 1-meter intervals at CSHH #1-8, and 13	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, and 13	YSI 600	Field
pH	Vertical profile at 1-meter intervals at CSHH #1-8, and 13	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 13-15	LaMotte 2020e (USEPA 180.1)	Field
Clarity	CSHH #1-8, and 13	LaMotte Secchi Disk	Field
Ammonia	Grab sample at half-meter depth at CSHH #2-7 and 13	LaMotte 4795 (Nessler Method)	Field
Ammonia	More refined method used at CSHH #1, 8, and other stations when the test above detects ammonia	LaMotte 3304 (Salicylate Method)	Field
Nitrate	Grab sample at half-meter depth at CSHH #1- 8 and 13	Hach 8192	Oyster Bay Town Lab
Nitrite	Grab sample at half-meter depth at CSHH #1-8 and 13	Hach 8507	Oyster Bay Town Lab
Fecal Coliform Bacteria	Grab sample half-meter depth at CSHH #1-13	Membrane Filter	Nassau County Department of Health
Enterococci	Grab sample at half meter depth at CSHH #1-13	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, and 13 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-disc 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 from 1995 through 2009. *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.

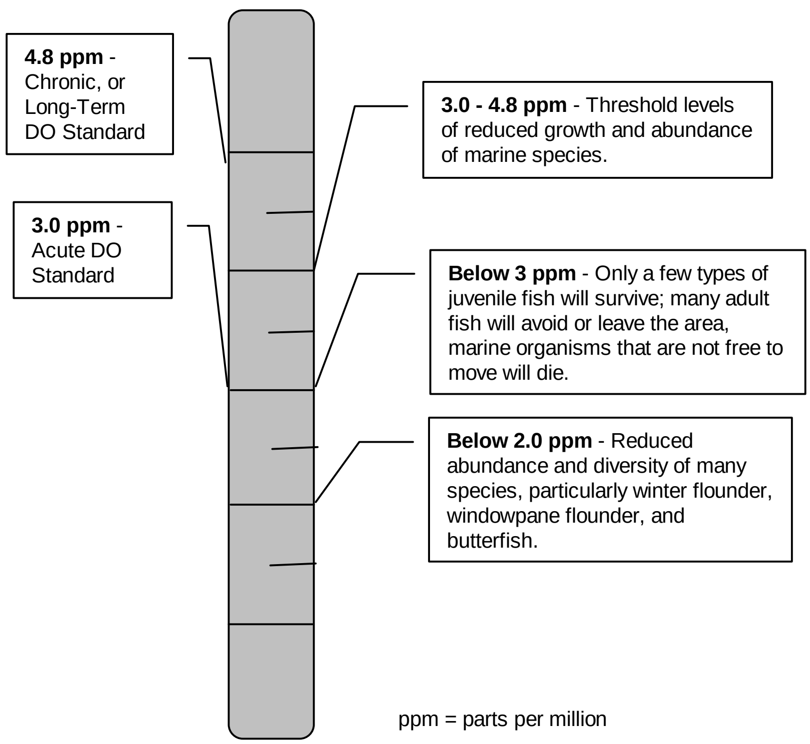


Figure 1. New DO standards and effect of depleted DO on marine life

However, states often interpret effects of environmental conditions on marine life differently; for example, Connecticut has established a standard of 5.0 ppm and defined 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 under saturated 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, less than 1.0 ppm in this report) 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 2009.

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.

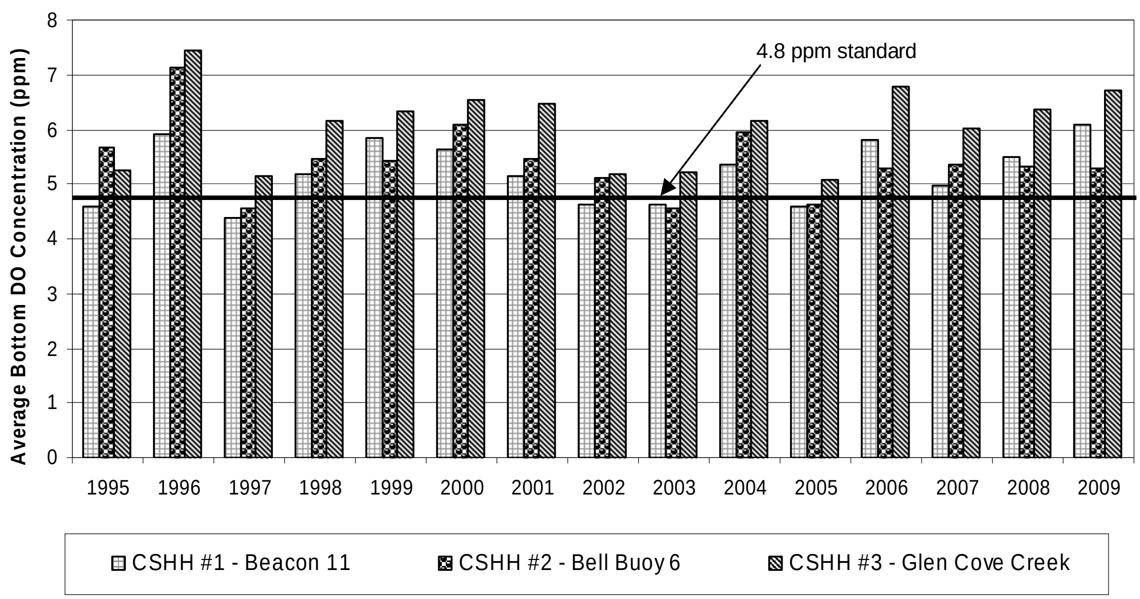


Figure 2. Measured average DO in Hempstead Harbor for 3 monitoring stations

Average DO levels at all locations for the 2009 monitoring season were generally within the range of values for many previous years and above the average values of DO levels for the previous five years. Levels at CSHH #1 (6.09 ppm) saw the greatest increase from the average of the previous five years (+11%) and represented the highest on record for this location. The percent improvement ranged from +3% at CSHH #2 to +8% at CSHH #3 and #8 as compared with the average of the past five years of data.

The number of hypoxic measurements in 2009 was low. Hypoxic conditions were recorded on two days in July: July 15 at CSHH #2 (1.0 ppm) and July 29 at CSHH #3 (2.86 ppm), and four days in August: on August 5 at CSHH #1, CSHH #2, and CSHH #3 (1.98 ppm, 1.49 ppm, and 2.66 ppm respectively), August 12 at CSHH #2 (0.82 ppm), August 19 at CSHH #1 and CSHH #2 (2.15 ppm and 1.60 pm respectively), and August 26 at CSHH #2 (1.43 ppm). One anoxic event, CSHH #2 on August 12 (0.82 pm), as well as a second borderline event, CSHH#2 on July 15 (1.0 ppm), was measured during the May 13 through October 30, 2009 sampling season.

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

Average Bottom DO (ppm)	2009	2008	2007	2006	2005	2004	2003	2002
CSHH #1	6.09	5.50	4.99	5.76	4.59	5.36	4.63	4.64
CSHH #2	5.30	5.31	5.37	5.27	4.63	5.96	4.55	5.11
CSHH #3	6.72	6.35	6.02	6.80	5.09	6.17	5.21	5.20
CSHH #8	6.73	5.73	5.93	7.05	5.76	6.58	5.28	6.11

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 increased in 2009 compared with levels in 2008 and seem to have maintained measurements seen first in 2008 returning to those seen historically at each sampling location (see *Table 4*). The percentage of DO measurements in the mid- to low-level ranges (3 to 5 ppm) in 2009 compared with the percentage in previous years decreased in all locations except CSHH #3 where is stayed stable. The percentage of DO measurements in the hypoxic range, however, increased in two of the four sampling locations (CSHH #1 and CSHH #2) and showed no change in a third (CSHH #3). There were no DO measurements in the hypoxic range measured at CSHH #8 in 2009. It should be noted that these statistical changes resulted from only one and two additional hypoxic measurements at CSHH #1 and #2, 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.

Likewise, the cause of apparently improved DO levels in 2009 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 1996-2009 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
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

	>6 ppm		5 to 6 ppm		3 to 5 ppm		<3 ppm	
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
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

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), the saturation concentration of DO in water (meaning that the water is 100% saturated) is 14.6 ppm, whereas at 68ºF (20ºC), the DO saturation concentration is 9.2 ppm, and at 77ºF (25ºC), it is 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; since 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.

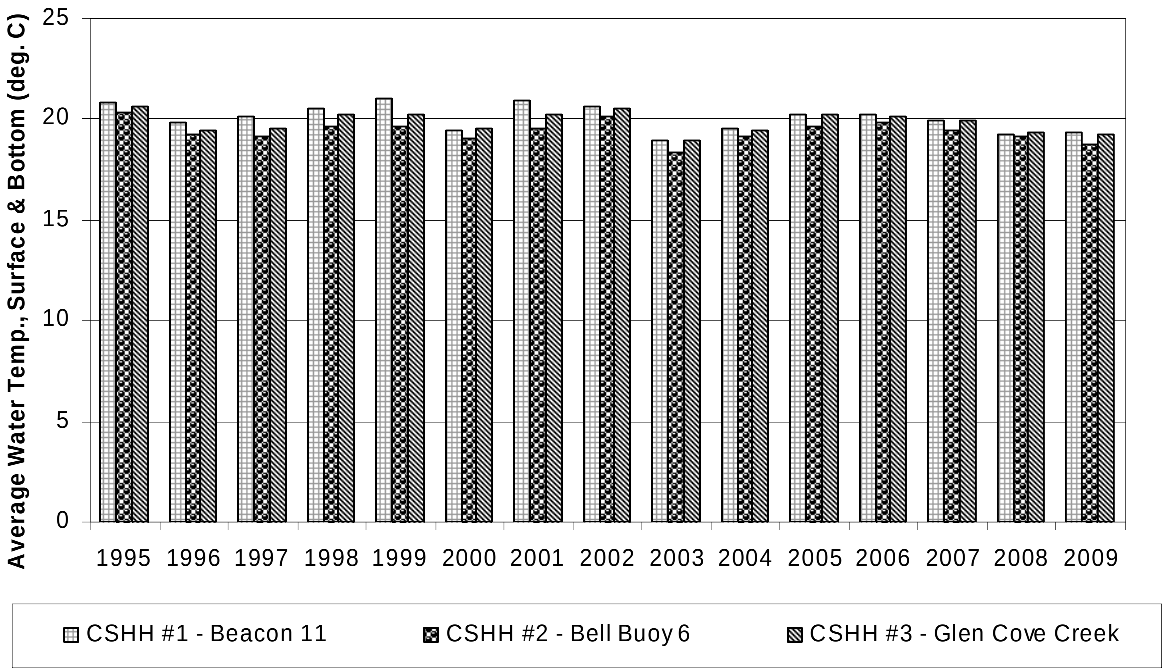


Figure 3. Average water temperature recorded during seasonal monitoring events

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 2009, water temperature was slightly cooler than typical in all locations (average water temperatures for all years is 19.8ºC, 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 4 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 2009, as in 2004 and 2008, the air temperature was markedly cooler than previous years. The average temperature in 2009 was only 0.6ºC higher than 2004, making it the third coolest monitoring season on record, 0.1ºC higher than average temperatures measured in 2008.

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

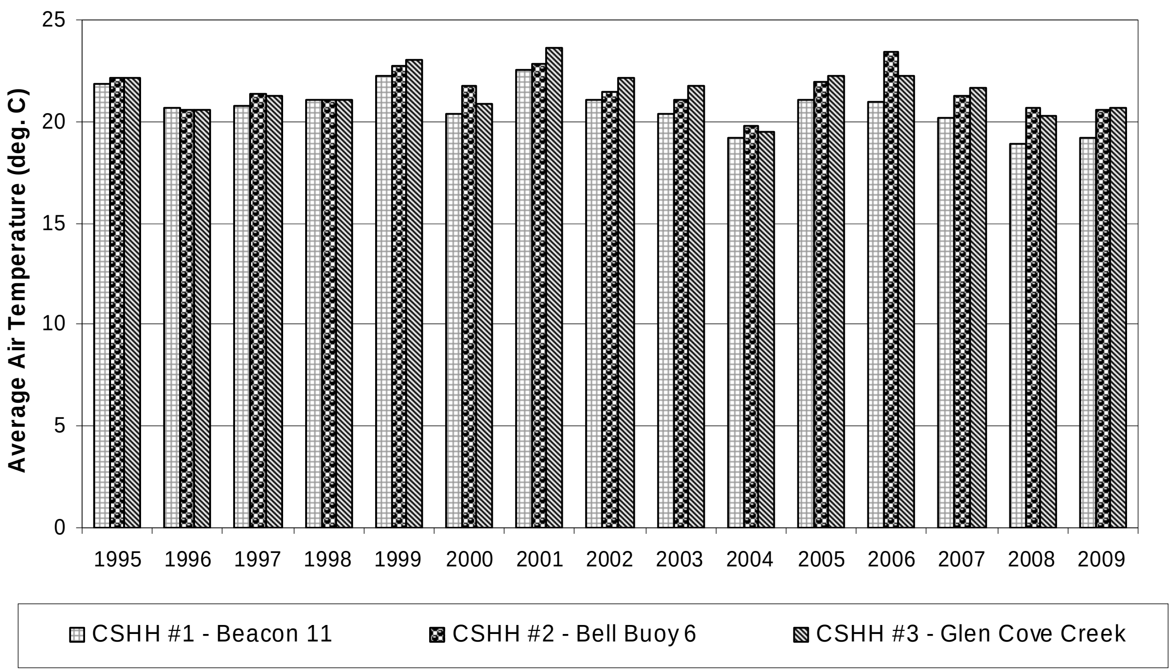


Figure 4. Average air temperature recorded during seasonal monitoring events

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 rivers or 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 22 ppt to 26 ppt, with lower readings generally observed in the spring, and gradually increasing through the fall.

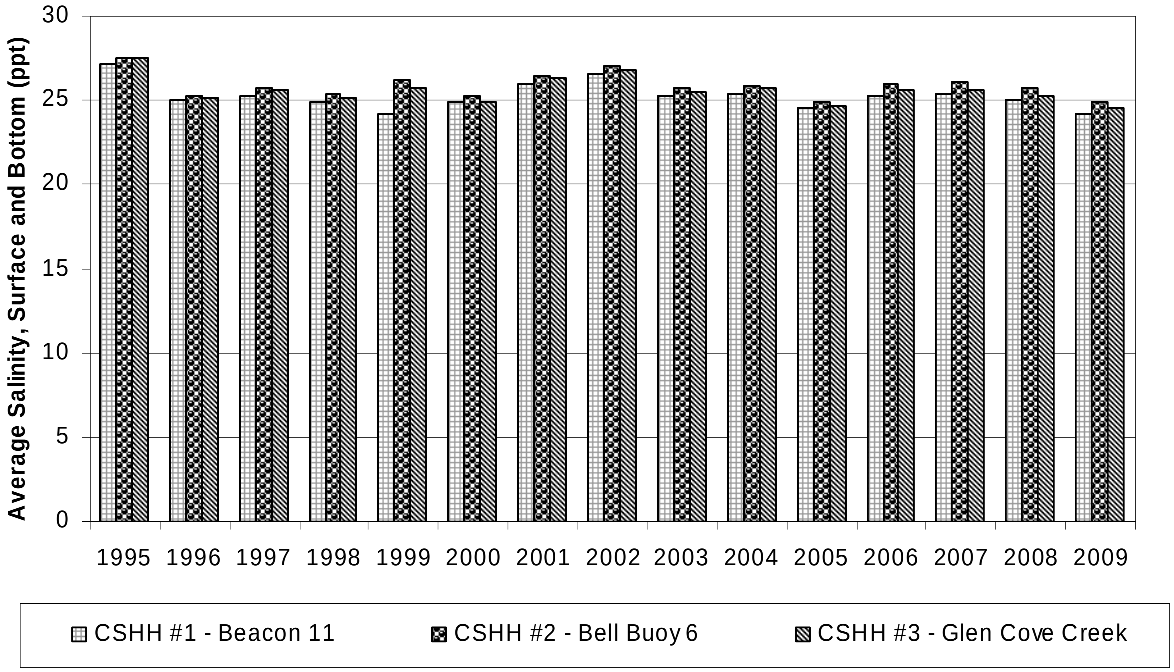


Figure 5. Measured average salinity in Hempstead Harbor during seasonal monitoring events

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 2009), 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 2009 (24.6 ppt) were approximately equal to average levels from 1996 through 2004 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 in June ranged approximately from 22.4 ppt to 24.8 ppt, whereas the monthly average in October for each station ranged from approximately 23.9 ppt to 25.8 ppt.

3.4. pH

pH is monitored to follow trends in aquatic life and water chemistry. Carbon dioxide (CO_2) release 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 was relatively consistent over the previous three monitoring seasons; however, during the 2009 season the average pH is higher in all locations (higher by approximately 0.1 over the previous years).

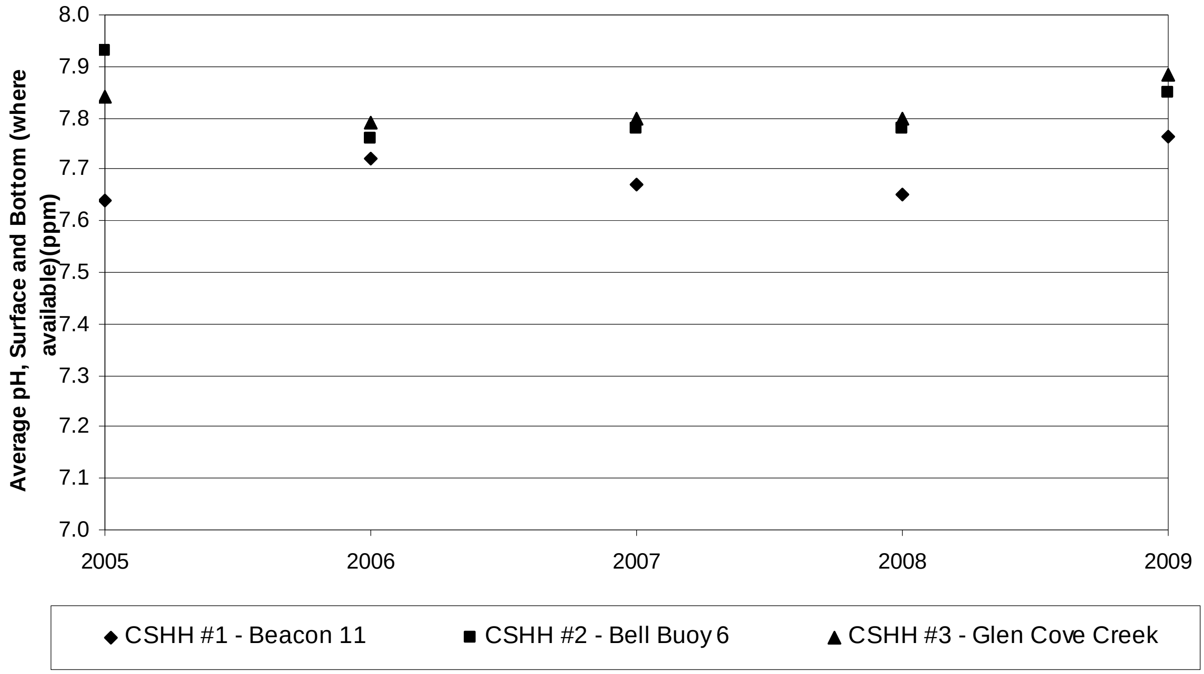


Figure 6. Measured average pH in Hempstead Harbor during seasonal monitoring events

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 2009, the range for the monitoring season was 0.3 to 3.5 meters. 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 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 2009, the turbidity ranged from 0.28 to 9.08 NTUs at the sampling depth of one-half meter. See *Appendix A* for additional turbidity data.

3.6. Nitrogen

3.6.1. The Nitrogen Cycle

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. *Figure 6* presents a diagram of the nitrogen cycle in the water environment.

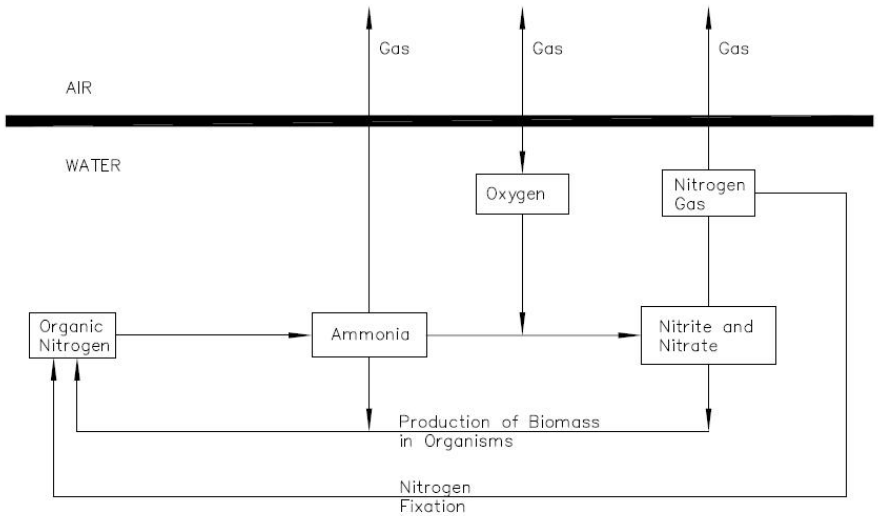


Figure 6. Nitrogen in marine environments

(Adapted from: Surface Water Quality Modeling, Steven Chapra, McGraw-Hill, 1997)

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., over fertilization 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. Ammonia and nitrate generally originate from fertilizer, and 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.

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 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 2009 as in 2008, 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 salicylate method at CSHH #1, #7, and #8 and the Nessler method at other stations. If ammonia is detectable at CSHH #1, a midpoint in the harbor, ammonia levels are then measured at the other locations using a salicylate method for fine-tuning the results. 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.

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).

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

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.)

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 **preemptive or 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 (often 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 2009, the Sea Cliff Village Beach was closed preemptively for nine days (one more than in 2006, 2007, and 2008), related to ten rain events. The beach closings occurred on 6/6, 6/21, 7/1, 7/8, 7/24, 7/27, 8/1, 8/22, and 8/29, based on a threshold of ½-inch of precipitation over a 24-hour period. North Hempstead Beach Park was closed for 16 days and Tappen Beach was closed for 11 days during the 2009 beach season.

Sailboats launched from the North Hempstead Beach Park (west shore of Hempstead Harbor) (9/5/09) (photo by Carol DiPaolo)

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 Midharbor Points and Glen Cove Creek for Bacterial Levels

CSHH collects samples for bacteria analysis weekly (weather and tide permitting) at the 17 CSHH monitoring stations in Hempstead Harbor. 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.

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 2009, monthly average bacteria results for enterococci at the area beaches ranged from 2.20 CFU/100 ml at Sands Point Golf Club in April to 290.88 CFU/100 ml at North Hempstead Beach Park (south)(formerly Bar Beach) in June (September averages were not considered as there was only one sample during the month). Overall, North Hempstead Beach Park (south) witnesses the highest average bacteria levels whereas Sea Cliff Beach sees the lowest (see *Table 6*).

Table 6. Monthly Average for Beach Enterococci Data for 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**	**120.00**	**90.00**	**0.10**	**11.00**
Season Average	**Enterococci**	**38.71**	**60.51**	**101.64**	**47.43**	**24.15**

**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, #12, and #13 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 seven samples collected in 2009 at CSHH #4, #5, #6, and #7, 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 approximately 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. Total and fecal coliform are the indicator organisms that are used to determine whether certain water bodies are safe for shellfish harvesting. These coliform bacteria are associated with human and animal waste and are 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" and an informational meeting to discuss the TMDLs (total maximum daily loads) scheduled for August 10, 2007. 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.) Representatives of CSHH, HHPC, and NCDPW attended the 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 recently developed 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).

A storm that dropped only 14 mm of rain combined with winds and a high tide, caused the harbor to surge over the wall in front of the Tappen Pool and over the boat ramp at Tappen Beach (10/18/09) (photo by Carol DiPaolo)

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 2009.

The total quantity of precipitation that fell in June through October in 2009 was significantly higher than the quantity that fell in 2007 and 2008 but similar to what fell in 2006 and 2004. In general, the distribution of precipitation varied from month to month. August and September were atypically dry while June was extremely wet.

Table 7. Monthly Rainfall Totals for the 1997-2009 Monitoring Seasons, in mm

	June	July	August	September	October	Total
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

The 2009 water-monitoring season began on May 13. No unusual weather conditions preceded this trip. Instead of our usual April reconnaissance, we scheduled a full survey on May 20 on the high tide.

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 (5/13/09)
(photo by Carol DiPaolo)

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. In 2008, the survey crew seined at five stations in Hempstead Harbor once a month from May through October. DEC marine biologist Jennifer O'Dwyer provided preliminary information on the seining so that we could compare the crew's catch with our monitoring observations and fishing reports. The crew's 2009 seining dates and catch totals for Hempstead Harbor are listed below.

May 15 — A few moon jellies and grass shrimp along with 2 Atlantic tomcod, 6 bay anchovies, 1 calico crab, 1 cunner, 22 green crabs, 1 menhaden, 5 mud crabs, 2 naked goby, 17 pipefish, 70 pollock, 137 silversides, 1 spider crab, 2 tautog, and 3 winter flounder.

June 17 — Small amounts of jellies, shrimp, and algae. Most of the catch consisted of silversides (937), but there were also 1 bay anchovy, 1 grubby sculpin, 1 Asian shore crab, 11 horseshoe crabs, 7 killifish, 1 mud crab, 159 sandlance, 2 striped bass, and 2 young-of-the-year winter flounder.

July 27 — An increasing amount of algae and comb jellies were part of the catch, along with 206 snapper blues, 1 alewife, 2 blueback herring, 2 grubby sculpin, 5 pipefish, 1 northern puffer, 11 winter flounder, 10 tautog, 73 killifish, 3,175 silversides, 5 striped bass, 1 Asian shore crab, 2 calico crabs, 4 green crabs, 5 mud crabs, and 1 blue crab. All of the winter flounder and tautog, as well as the bluefish, were young of the year.

September 23 — Comb jellies and algae were collected at each station with a large number (1,536) of snapper-size bluefish, 4 striped bass, 5 winter flounder, 1 menhaden, 2 white mullet, 1 crevalle jack, 12 pipefish, 1,641 silversides, 120 killifish, 13 mud crabs, 10 calico crabs, 15 green crabs, 1 spider crab, 1 sea star. All the bluefish were young of the year with a mix

	of spring and summer spawn. All the winter flounder were young of the year, and the bass were all older fish.
October 15	The catches dropped dramatically, with a lot less algae, shrimp, and comb jellies but still lots of silversides (1,197) along with 35 killifish, 1 winter flounder, 2 bluefish, 2 striped mullet, 3 white mullet, 1 lady crab, and 1 blue crab. The winter flounder, bluefish, and blue crab were all young of the year.

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

On May 13 and 20, we noticed large schools of bunker but no evidence of the arrival of comb or other jellies (although the DEC crew caught a few moon and comb jellies in the May seine for the stripped-bass survey). On May 27, we still saw no comb jellies during our water sampling. A large blue-mussel set was noted all along the south seawall parallel to the floating dock beneath The Wharf (formerly Steamboat Landing Restaurant) and the sewage treatment plant, with the highest density closest to the STP outfall.

Pete Emmerich, a member of the Hempstead Harbor Anglers who has become our reporter for fishing news, described fishing as "red hot" during the week preceding our May 27 water sampling:

> *Red-hot bass fishing in the middle of the harbor off Webb and Maxwells. Friday night [May 22] two of us boated 40 bass from 26 to 38 inches in huge bunker schools from 5pm until 8:30 and quit because we were too tired to continue.*
>
> *Friends had 9 fluke to 5 pounds at Matinecock on Saturday. Monday night [May 24] was another red-hot fishing night; my buddy had 10 bass himself, 3 of which were over 30 pounds, weighed one in at 34 pounds.*
>
> *Large bluefish are also in the mix. It is possible to catch bass only, but many people are having blues mixed in. So far it looks like a very promising season. We just hope the bunker stay-- it is great fishing right now.*

On May 28, Pete reported:

> *Took a ride last night, but I could not get past Maxwell's due to the east wind. Rode around the harbor and marked plenty of bait but could find no bunker jumping. I saw many cormorants, so I guess they are feeding on smaller bait.*

June

During our four water-sampling trips in June, we saw little activity from the boat. However, horseshoe-crab activity was expected in light of the full moon on Sunday. (No activity was noted or reported during the May full moon.) We saw signs on June 3 that the horseshoe crabs were in because we noted about 6 dead horseshoe crabs on the surface of the water while we were sampling (there are often casualties during the horseshoe-crab mating season). On Saturday, June 6, at 9 am, at about 2½ hours before high tide, a couple of volunteers and I walked along Tappen Beach from the boat ramp to the rocks below the pool and noted only 4 horseshoe crabs along the water's edge, including 1 very large female that was stuck between the boat-ramp pilings; it was dislodged and brought back to the water. There was also a dead female on the beach and shallow areas in the sand that were signs that the horseshoe crabs had been there to lay their eggs. At 11:30 am, a few horseshoe crabs could be seen coming in on the rising tide and mating, but the numbers were much lower than expected—only 4 males and 2 females. Two other volunteers checked the beach again on Saturday evening and saw no horseshoe crabs.

This large female horseshoe crab was raring to get back to the water after being dislodged from the Tappen boat ramp (6/6/09) (photo by Carol DiPaolo)

Pete Emmerich gave us a different view of what was happening on the water as he shared some of his night-fishing experiences:

> *We were on the water Tuesday night 6/2 and again Thursday 6/4. There is a tremendous amount of "rain bait" in the harbor, particularly along the west side from Mott's Point to Prospect Point. I was unable to distinguish what type of bait it was (and we didn't stop as we were looking for bunker), but I hear from a good source that it was sand eels. What was so interesting about this is that there were acres upon acres of bluefish feeding on this bait, and the feed was not the normal bluefish slash and burn type feeding but they were acting almost in a majestic manner. Sporadically the blue would "porpoise" out of the water and slip back in without the violent thrash you expect from a blue. This action was one fish at a time; then 25 feet away another blue would repeat this action. You could see these blues feeding in this pattern all over the area I*

described. On Thursday the action was a starting to move east towards the middle of the harbor.

Tuesday night we found bunker with bass feeding on them close to Buoy 42A near Mamaroneck and boats were catching all through the sound with a large concentration of boats fishing in 50 feet of water off Matinecock Point. While snagging bunker, we caught a bass that swallowed the bunker as soon as it was snagged, and I even snagged a bluefish in the same school of bunker. Last night was tougher with the SW wind against an incoming tide, so we had fish under the boat and wrapped around the anchor line. We were fishing in 52 feet of water off Webb.

It was interesting, perhaps even prophetic, that Pete used the word *porpoise* to describe the bluefish behavior above. On Saturday, June 27, **about 200 bottlenose dolphins made an appearance in Long Island Sound** and nearby bays. On Saturday, at about 10:30 am, **about 100 dolphins were plying the waters near Tappen Beach and out toward the sound**. They were back in and out again at about 1:30 pm. It was an incredible sight! It seemed that there were two groups of different sizes and color (one light gray and one darker), and people on boats who had a closer look at the dolphins said the pod contained a lot of young dolphins. On Sunday, there were reports that the dolphins were traveling west to other bays, and by midweek there were no more sightings. This was a rare visit by so many dolphins so far west in Long Island Sound and an incredible sight for anyone who was lucky enough to be out in a boat or by the harbor's shores when these beautiful marine mammals arrived.

Bottlenose dolphins in Hempstead Harbor (6/27/09)
(photos by Karen and Serge Papasergiou)

July

Although the DEC seine in June produced some jellies, our first sighting of comb jellies for the season occurred during our July 1 water sampling; we saw a few each of sea walnuts and sea gooseberries. We received reports, however that there were large numbers of comb jellies and moon jellies in Oyster Bay. By July 29, numerous comb jellies were seen at different stations throughout Hempstead Harbor.

Local residents who were kayaking on July 11 in Glen Cove Creek and then into Brewer's Marina by the Sea Isle sand spit said they observed grass shrimp, silversides, minnows, and baby flounder; on the way out of the area they saw a diamondback terrapin swimming between the docks of the marina. We followed up on the report and visited the area on July 15; at low tide the bottom was exposed, and we saw a dense set of ribbed mussels.


Back of Sea Isle at low tide, looking toward marina *View from Sea Isle looking out toward harbor*
(7/15/09) (photos by Carol DiPaolo)

On July 16, Hempstead Harbor Anglers member Pete Emmerich reported:

> *Stripped bass season was OK, but not gangbuster fishing like we had in the past. We were really lucky this year with all the bunker around, but the weather really hurt and the big run seemed early and short. Thinking the odd cold weather had some effect and maybe more bass found their way through the Hudson the south shore rather than making a left into the sound.*
>
> *Fluke however are making a great showing. The 21-inch minimum really hurts but we are catching all the 18- and 19-inch fish you want. I went to Prospect Point on Friday July 3, which was the opening day of the 2nd part of the season and caught 24 fluke in about 3 hours during a slow drift, but no keepers. All my contacts are doing the same. I fished last night at Mott's Point and at Morgan Park with no success, but once I moved to Crescent Beach we found a good bite in 15 to 25 feet of water with sea robins mixed in. I caught 5 fluke, 4 in the 18-to-19-inch range then was finally rewarded with a fluke of 21.5 inches. So needless to say there will be a nice fluke dinner at the Emmerichs' tonight.*

When I asked Pete on July 29 about fishing in Hempstead Harbor, he reported on very different conditions:

> *Fishing is lousy. Everyone is complaining, everyone wants to sell their boats. The harbor has no bunker, and what blues are in the harbor are very small. People I know that have been fluke fishing in the harbor are finding no fluke, especially on the east side. Two weeks ago there were plenty of fluke…. One guy I know fished all day from Morgan's to Matinecock and had one fluke that happened to be 21.5" and ten sea robins. Others I have spoken with have caught nothing. The people who can afford the gas are going to Bayville, Centre Island, and my friends out here are saying that they have never seen the fishing better in Smithtown Bay. One friend says the water there is so clean you can see the bottom detail in 7 or 8 feet of water; the sea robins are so thick they are following and feeding on the surface, and all the 20" fluke you can handle.*

So, no bunker schools with larger blitzing blues and no fluke in the West will make for a boring August. Fluke season closes in 2 weeks…maybe these big storms will shake it up a bit.

Despite the above report, on July 29, we saw snapper-size fish chasing silversides around the main dock of Tappen Marina. There was also a lot of bird activity throughout the harbor, which is usually an indicator of fish activity as well. When we sampled at CSHH #8 (Glen Cove STP), we saw two small brown **frogs** by the dock. We also saw a gull on the sand bar on the north side of Glen Cove Creek, below the promenade, trying to make a meal out of a large **eel**.

August

Throughout August, comb jellies—both types, sea walnuts and sea gooseberries—were noted in large quantities on monitoring dates.

On August 5, we met a fisherman near Bell 6 who told us that morning he caught 1 bluefish, 4 short fluke, and 20 sea robins; he said he caught a 5-lb fluke by Bell 6 the previous day.

Local resident Rich Boehm reported that on August 16 he was fishing with some friends off of Bayville and saw a 2-3-ft sea turtle at the surface stretch it neck and then dive under the water. He said he didn't have a chance to note the shell pattern, but the color was light brown. On about the same date, a local boater reported seeing a large (about 10 inches) diamondback terrapin swimming in Brewer's Marina in Glen Cove Creek

During water sampling on August 19, we noted a school of large bunker along with schools of small baitfish breaking the surface of the water in Glen Cove Creek.

On August 21, Hempstead Harbor angler Pete Emmerich reported:

I did have a shot at some of the bunker blitzes 2 weeks ago. We caught a blue right outside of Tappen, biggest I have seen in years. It weighed 17 pounds 5 ounces the next day, so I am sure it was 18 pounds plus when it was caught.

September

On all water-sampling dates in September, we noted large quantities of comb jellies—both sea walnuts and sea gooseberries—throughout the harbor. Large schools of baitfish were also noted, particularly in Tappen Marina and Glen Cove Creek. On September 23, we saw small baitfish and shrimp—too numerous to count—by the main dock at Tappen Marina, and 3 pipefish were by the marina bulkhead.

October

Comb jellies—both sea walnuts and sea gooseberries—were noted on all water-sampling dates in October, but they were in much smaller quantities than noted in previous weeks. On October 10, a sea star hitched a ride on the anchor when it was pulled up at CSHH #4, our station near the bar of the Bar Beach/North Hempstead Beach Park.

On October 5, Pete Emmerich reported:

"… it was another great porgy season. You can find them at any point and in the rocks. Bluefish have been cooperative but I don't know many who have been chasing them.

Now that October has arrived, all efforts are for blackfish. I went on Saturday to Rye because we are looking for cooler water and we need rocks in shallow water. It was a very slow bite but I did mange a keeper at 14.5 inches…. I have heard of other blackfish reports but I think things need to cool off some. I saw the weather buoy at Execution is down. I think I will start targeting schoolie stripers at the barges possibly this week.

On October 16, Pete reported:

Got out fishing last Sunday and had a good catch of blackfish right on the point of Maxwell's breakwater. Big difference was I was able to harvest Asian crabs for bait under the rocks near SC Yacht Club on Saturday at low tide. I had 11 fish myself with 5 keepers over 14 inches.

The real good news was the amount of spearing swimming all around that breakwater. Last fall we did not see all this bait. Understand fishermen are doing well with blues and stripers are now turning up while trolling.

View of eastern shore of the harbor at Cedarmere
(10/27/09) (photo by Carol DiPaolo)

4.2.1. Crabs

An assortment of crabs can be seen around Hempstead Harbor, including blue-claw, lady, green, spider, horseshoe, 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.

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.

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.

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, 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 will provided information on the movement (dilution, dispersion, and time of travel) of the sewage effluent discharged by the Glen Cove STP. FDA will produce a final report on the findings of the dye study some time in 2010.

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

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.

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

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.

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).

Surf clams or "duck feed" found in black mud (10/10/08) (photo by Carol DiPaolo)

Close-up of duck feed in foreground (10/10/08) (photo by Carol DiPaolo)

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:

1. The normal survival rate for seeded clams and oysters is 10-20 percent, and we may have simply missed the survivors.
2. We (and/or the clams and oysters) may have drifted from the waypoints taken in 2007.
3. Many of the seeds may have ended up in the thick muddy bottom and did not survive.
4. 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 of the rakings (10/10/08) (photo by Carol DiPaolo)

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

During 2009, **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.

Three terns on a navigational marker (9/23/09*) (photo by Carol DiPaolo)*

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

On May 20, six active osprey nests were visible along the shores of the harbor—the same that had been previously occupied at Beacon 11 and on five nests south of that, including two on pilings south of Bar Beach, on the south platform on the west shore, on a private dock on the east shore, and on the blue sailboat outside of Mott's Cove.

Osprey nest in sailboat in lower harbor with three eggs (5/20/09) (left) and two newly hatched osprey chicks (right) (6/3/09) (photos by Carol DiPaolo)

Three osprey chicks, about 4 weeks old, in sailboat nest (7/1/09) (photo by Carol DiPaolo)

Local resident Theresa Hauck reported seeing, on July 11, plover-type birds, yellow legs, and terns on the Sea Isle sand spit (adjacent to Brewer's Marina) and apparent nesting activity by plovers and terns. While monitoring on July 15, we saw 6 **killdeer** along the shore of Sea Isle. We saw two killdeer at the head of Glen Cove Creek as well. On July 29, we saw 2 killdeer and 2 **hawk/falcon-type birds** in the vicinity of Glen Cove Creek.

Large numbers of **brandts** visited the harbor on different occasions: On May 13, about 150 were seen near the north end of North Hempstead Beach Park, about 20 were seen on May 20 near the south end of the beach park, on October 10, about a dozen brandts were seen in that same area, and a large raft of brandts were seen again in the area on October 28.


Canada goose nesting on duck blind in Mott's Cove (5/20/09) *Part of a large raft of brandts in lower harbor (10/28/09)*
(photos by Carol DiPaolo)

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.

On August 9, a young (about 1 year old) **great horned owl** was rescued from the water at the Glen Cove Marina in Glen Cove Creek. According to an article in the Gold Coast Gazette (8/13/09), the bird appeared to be hurt and was rescued by Glen Cove Harbor Patrol, the police, local boaters, and Volunteers for Wildlife member James Jones. The owl was taken to the Volunteers for Wildlife at the Caumsett State Park animal hospital and, according to the Gazette article, had recovered and was ready for release.

In a letter to the editor of the Port Washington News (11/5/09), Port Washington resident Greg Winter reported seeing a mature **bald eagle** circling over the shoreline of Manhasset Bay, near Mill Pond on October 25.

In 2008, we had our first sighting of a **turkey vulture** flying over Glen Cove Creek in May (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, there were reports of sightings of a turkey vulture flying over Glen Cove Road, north of the Northern Boulevard, at the end of February, late March, early April, and again on April 29, 2009, in the East Hills area around 3:45pm.

4.5. Diamondback Terrapins

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.

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

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 continues, and materials are barged to an area north of Mott's Cove and then trucked to the viaduct. It is not known whether 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.

4.6. Algal Blooms

Color and turbidity of water within the harbor in 2009 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. Low 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.

On May 7, 2009, Karen Chytalo from NYS DEC Marine Resources asked us to be on the lookout for any red water in Hempstead Harbor and to report it to DEC. 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. Some forms of Alexandrium (known for causing red tide), can be toxic, producing paralytic shellfish poisoning.

On June 3, we started to notice signs of a red tide while water sampling near CSHH #2, where a thick brown to reddish brown 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, while Tony Alfieri was taking the Environmental Resources boat around from Hempstead Harbor to Oyster Bay at about 2 pm, he reported seeing patches of a red tide 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. Also, in his fishing report for June 3, Pete Emmerich commented:

> *What is up with the red bloom in the LI Sound? I heard it came out of Manhasset, but the water was red last night at Sands Point, Prospect Point, and well into the sound and in the mouth of Hempstead.*

The following week, things were back to normal—a normal dark green at all stations. For the rest of the season, water color was judged to be within a normal range, varying between and green and brown color. However, on September 2 and 9, it seemed that an algal bloom was in progress.

Egret in flooded wetlands south of Tappen Marina, high tide (11/2/09) (photo by Carol DiPaolo)

BLANK DATA REPORTING SHEETS

Water-Monitoring Data Sheet

Collection Date : ______________________________ **Time :** _________________________
Monitor Name : ____
Site Name : __________________________________ **Location :** ______________________

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

% Cloud Cover : ❑ 0% ❑ 25% ❑ 50% ❑ 75% ❑ 100% other ________

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

		Date	Amount
Rainfall : Previous 24 hrs accumulation	____.__ 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

Wildlife Observations (type, approximate number ...)
____
____
____
____

Floatables Observations (type, approximate number ...)
____
____
____

Human Activities
____
____
____

Cal. constants: ______

Water Monitoring Data Sheet

Date: ______

Air Temperature : ______ **°C**

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								

DO Cal check ___ % sat.

Air Temp: ______

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								

DO Cal. chec ___ % sat.

Air Temp: ______

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								

DO Cal. chec ___ % sat.

Water-Monitoring Data Sheet

Collection Date : ______________________ **Time :** ______________________

Monitor Name : ____

Site Name : ______________________ **Location :** ______________________

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

% Cloud Cover : ❑ 0% ❑ 25% ❑ 50% ❑ 75% ❑ 100% other ________

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

		Date	Amount
Rainfall : Previous 24 hrs accumulation	_____.__ 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

Wildlife Observations (type, approximate number ...)

____

____

____

____

____

Floatables Observations (type, approximate number ...)

____

____

____

Human Activities

____

____

____

Cal. constants: ____________

Water Monitoring Data Sheet

Date: ____________

Air Temperature : _______ °C

Station :

Time : ____________

Depth (meters)	Temp °C	Salinity (ppt)	DO (ppm)	pH	Secchi (meters)	Nitrogen (ppm) NO₂	NO₃	NH₃
Surface								
0.5								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

DO Cal check ____ % sat.

Air Temp: ____________

Station :

Time : ____________

Depth (meters)	Temp °C	Salinity (ppt)	DO (ppm)	pH	Secchi (meters)	Nitrogen (ppm) NO₂	NO₃	NH₃
Surface								
0.5								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

DO Cal. chec[k] ____ % sat.

Air Temp: ____________

Station :

Time : ____________

Depth (meters)	Temp °C	Salinity (ppt)	DO (ppm)	pH	Secchi (meters)	Nitrogen (ppm) NO₂	NO₃	NH₃
Surface								
0.5								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

DO Cal. chec[k] ____ % sat.

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 N.Y. 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 AIR	TEMPERATURE WATER	WIND	WEATHER	WAVE HEIGHT	LABORATORY USE ONLY: 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 COVE CREEK										
CSHH-4	10		5	BAR BEACH SPIT										
CSHH-5	10		5	MOTT'S COVE										
CSHH-6	10		5	EAST OF INCINERATOR										
CSHH-7	10		5	BRYANT LANDING										
CSHH-8	10		5	GLEN COVE STP										
CSHH-9				FIRST PIPE WEST OF STP OUTFALL										
CSHH-10				PIPE AT CORNER OF SEAWALL WEST OF STP OUTFALL										
CSHH-11				50 YARDS EAST OF STP OUTFALL										
CSHH-12				EAST OF STP OUTFALL BY BEND IN SEAWALL										
CSHH-13				60 FEET WEST OF MILL POND WEIR										
				TRIP BLANK										

COMMENTS / REMARKS

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

Data Entry ________ Proofed ____________

TNTC = "TOO NUMEROUS TO COUNT"

TEST	METHOD	CODE
Fecal Coliform / 100 ml.	Membrane Filtration	SM-18-20 9222D
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 report shall not be reproduced except in full without the written approval of the laboratory. Current New York State laboratory certification status is maintained under ELAP ID #10339.

VERIFICATION REVIEW

NAME: TITLE: DATE:

COMMENTS:

BEACH MONITORING - DAILY SAMPLING LOG

ELAP ID #10339

NASSAU COUNTY DEPARTMENT OF HEALTH
DIVISION OF PUBLIC HEALTH LABORATORIES
209 MAIN STREET, HEMPSTEAD N.Y. 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
TRIP BLANK														

COMMENTS / REMARKS

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

Data Entry __________ Proofed ________________

TNTC = "TOO NUMEROUS TO COUNT"

TEST	METHOD	CODE
Fecal Coliform / 100 ml.	Membrane Filtration	SM-18-20 9222D
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 report shall not be reproduced except in full without the written approval of the laboratory. Current New York State laboratory certification status is maintained under ELAP ID #10339.

VERIFICATION REVIEW

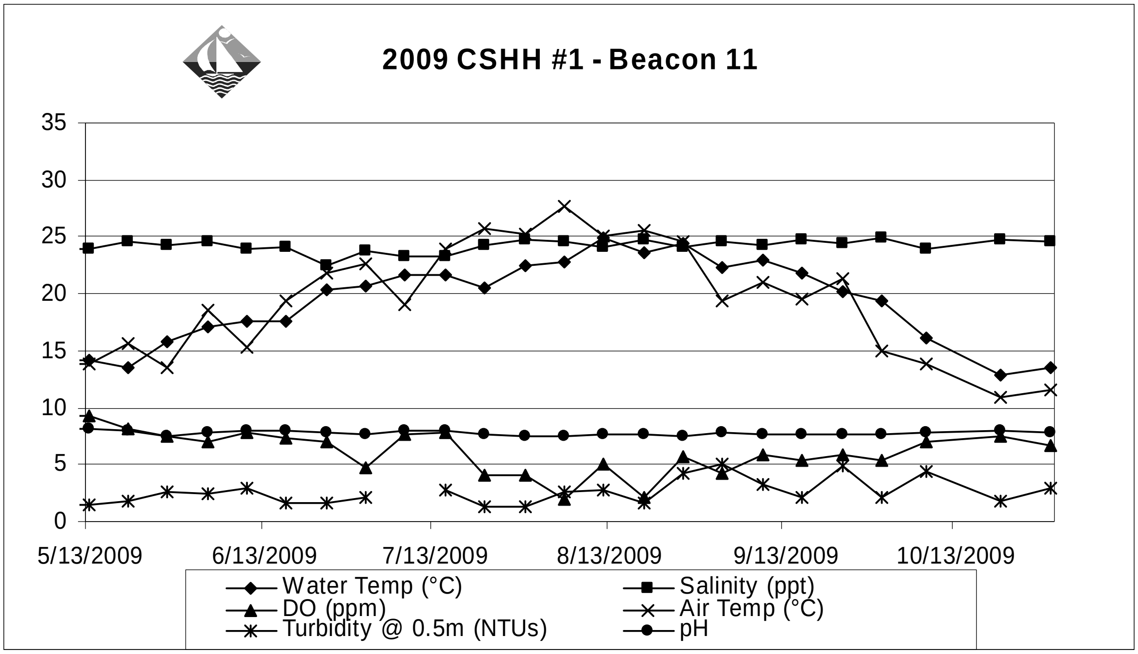
NAME: TITLE: DATE:

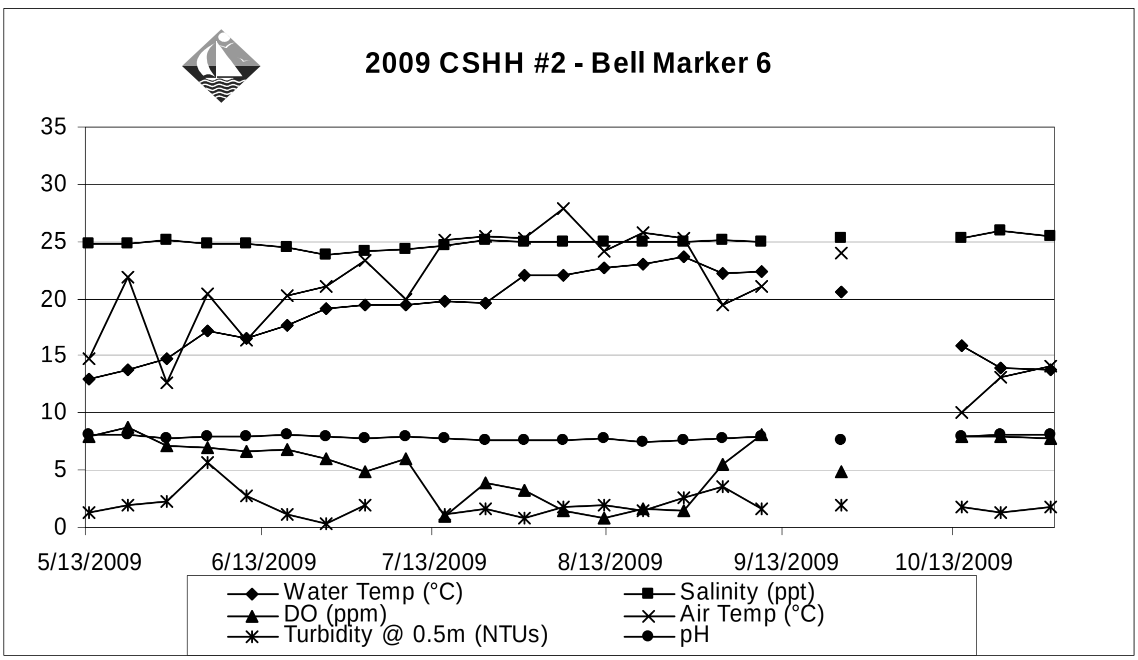
COMMENTS:

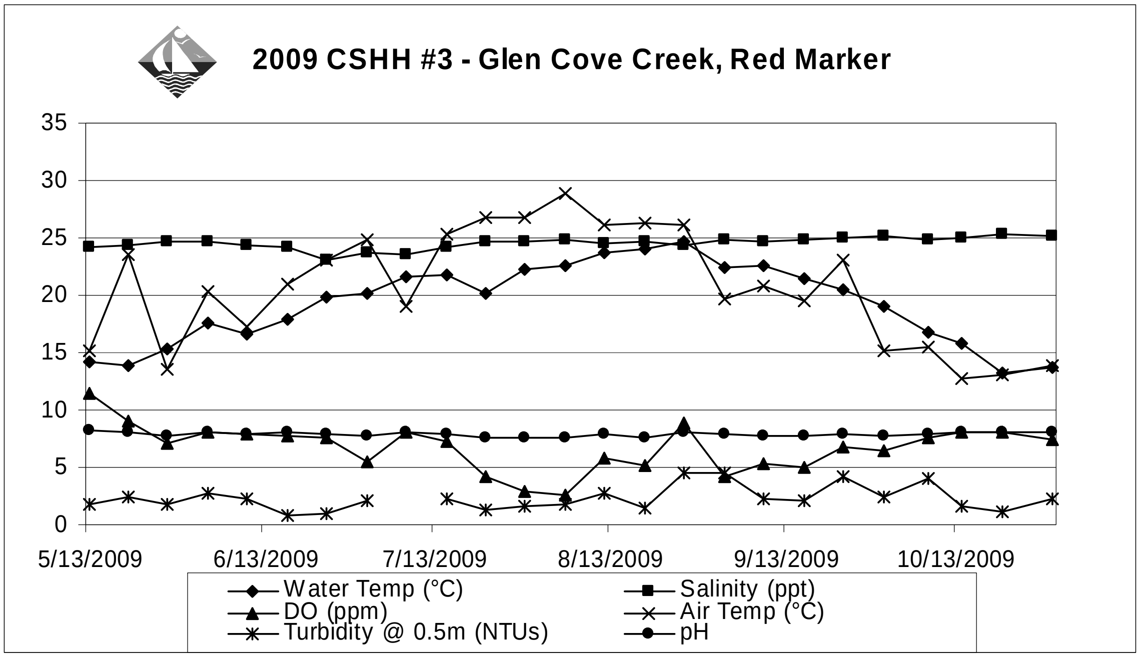
FORM #BCH-MF 03/12/2008

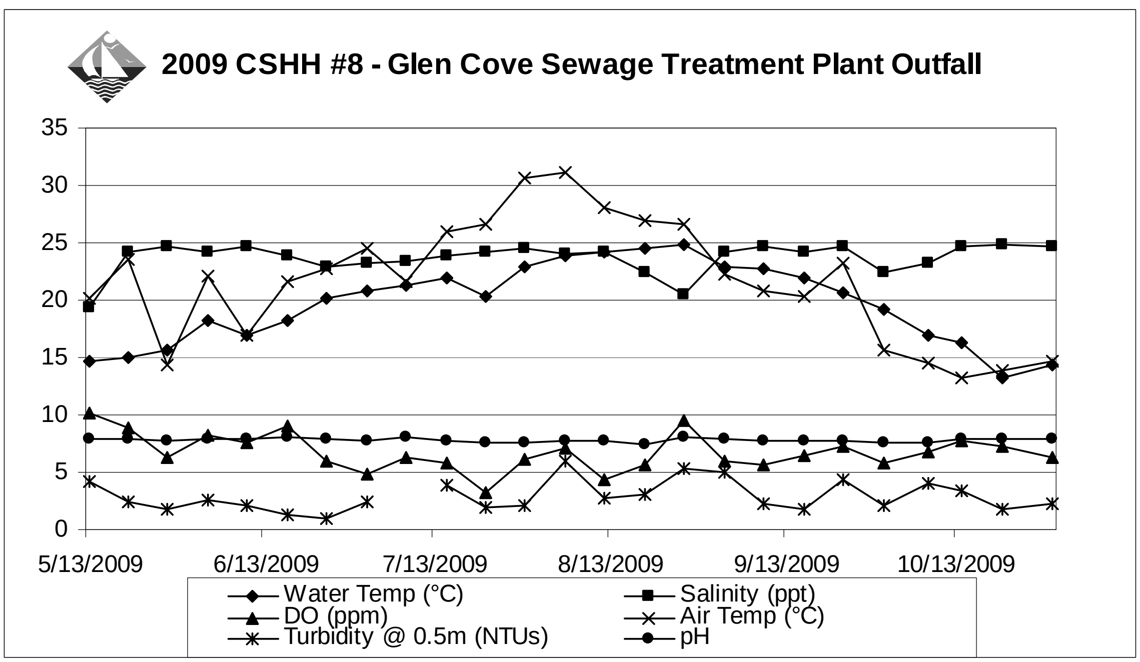
APPENDIX A

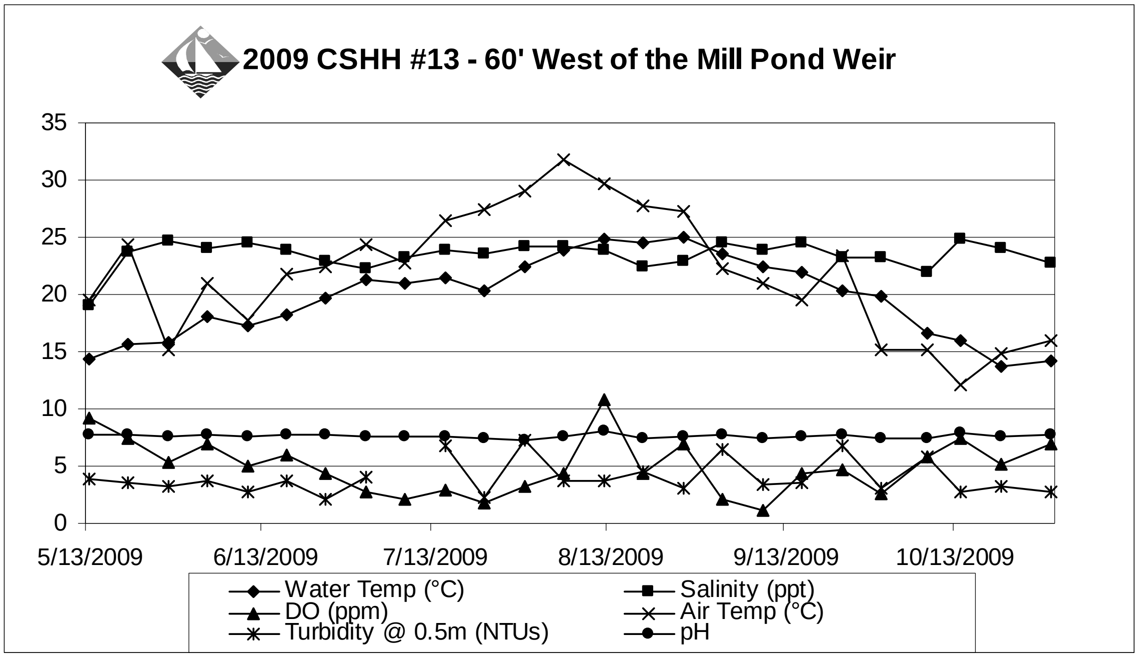
2009 Field Monitoring Results


2009 CSHH #1 - Beacon 11
35
30
25
20
15
10
5
0
5/13/2009
6/13/2009
7/13/2009
8/13/2009
9/13/2009
10/13/2009
Water Temp (°C)
Salinity (ppt)
DO (ppm)
Air Temp (°C)
Turbidity @ 0.5m (NTUs)
pH


2009 CSHH #2 - Bell Marker 6
35
30
25
20
15
10
5
0
5/13/2009
6/13/2009
7/13/2009
8/13/2009
9/13/2009
10/13/2009
Water Temp (°C)
Salinity (ppt)
DO (ppm)
Air Temp (°C)
Turbidity @ 0.5m (NTUs)
pH

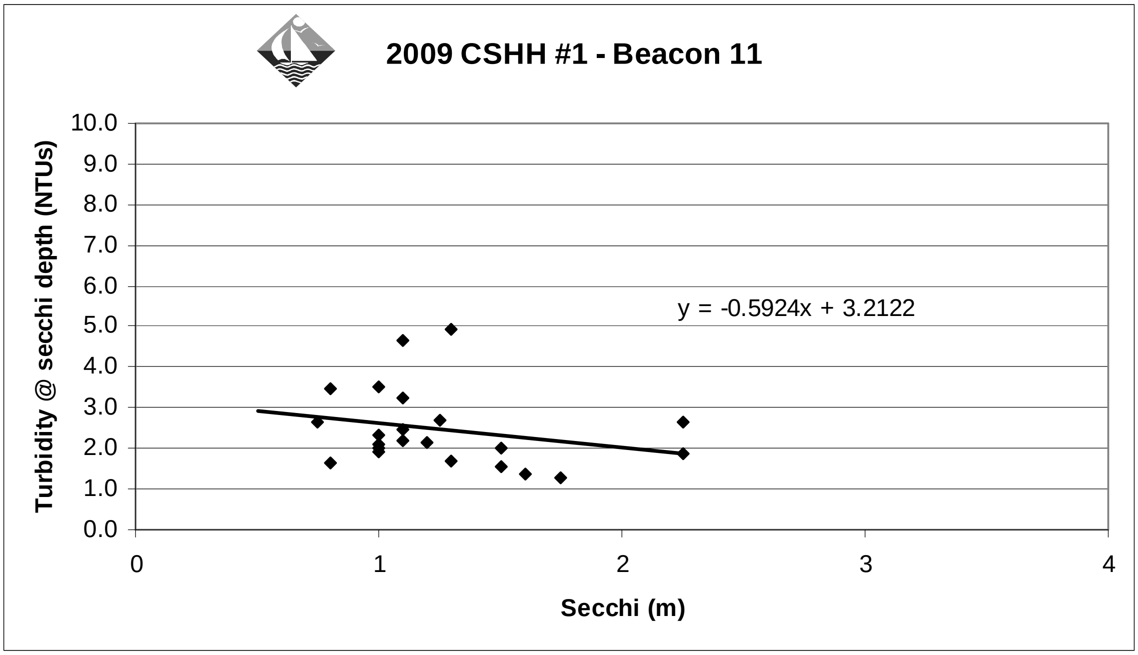

2009 CSHH #3 - Glen Cove Creek, Red Marker
35
30
25
20
15
10
5
0
5/13/2009
6/13/2009
7/13/2009
8/13/2009
9/13/2009
10/13/2009
Water Temp (°C)
Salinity (ppt)
DO (ppm)
Air Temp (°C)
Turbidity @ 0.5m (NTUs)
pH

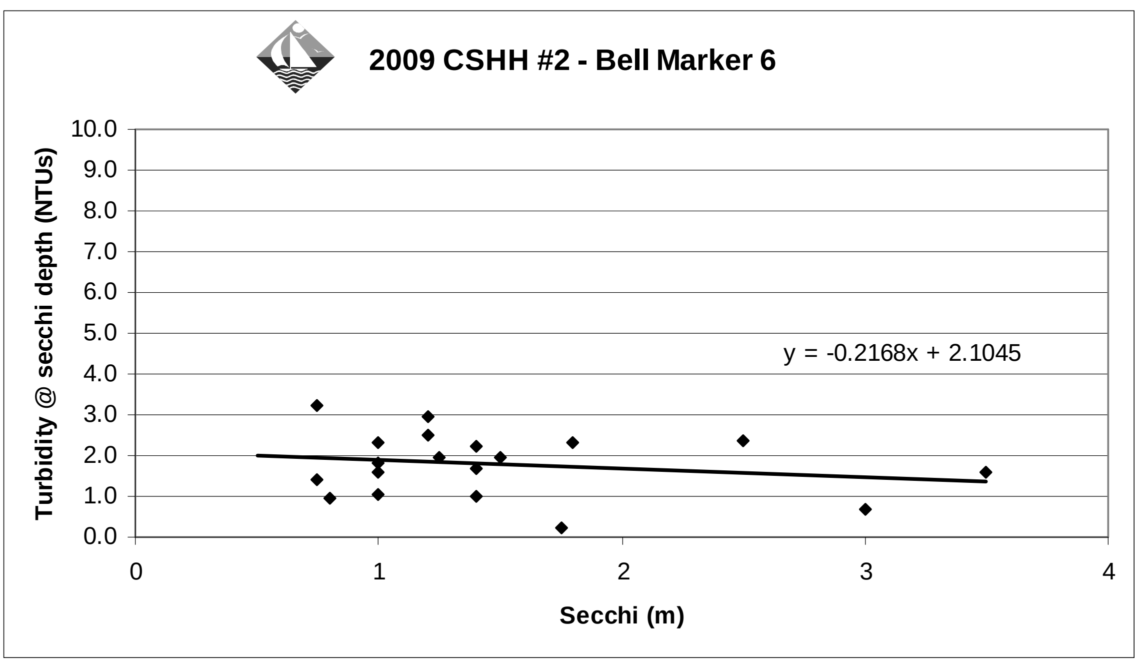

2009 CSHH #8 - Glen Cove Sewage Treatment Plant Outfall
35
30
25
20
15
10
5
0
5/13/2009
6/13/2009
7/13/2009
8/13/2009
9/13/2009
10/13/2009
Water Temp (°C)
Salinity (ppt)
DO (ppm)
Air Temp (°C)
Turbidity @ 0.5m (NTUs)
pH

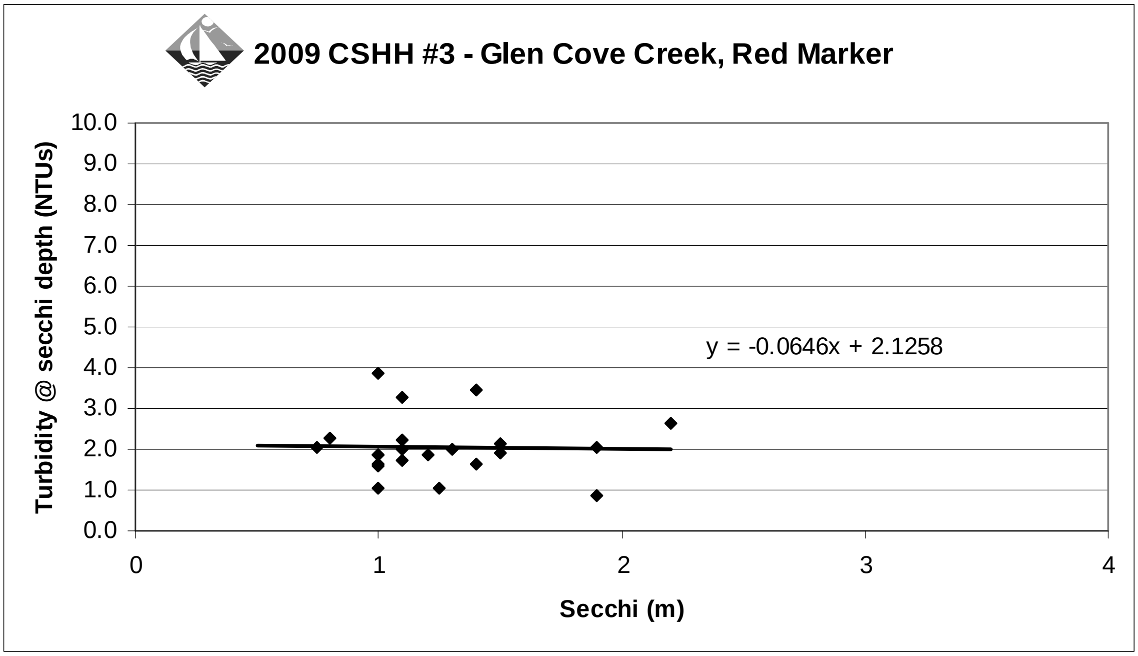

2009 CSHH #13 - 60' West of the Mill Pond Weir
35
30
25
20
15
10
5
0
5/13/2009
6/13/2009
7/13/2009
8/13/2009
9/13/2009
10/13/2009
Water Temp (°C)
Salinity (ppt)
DO (ppm)
Air Temp (°C)
Turbidity @ 0.5m (NTUs)
pH

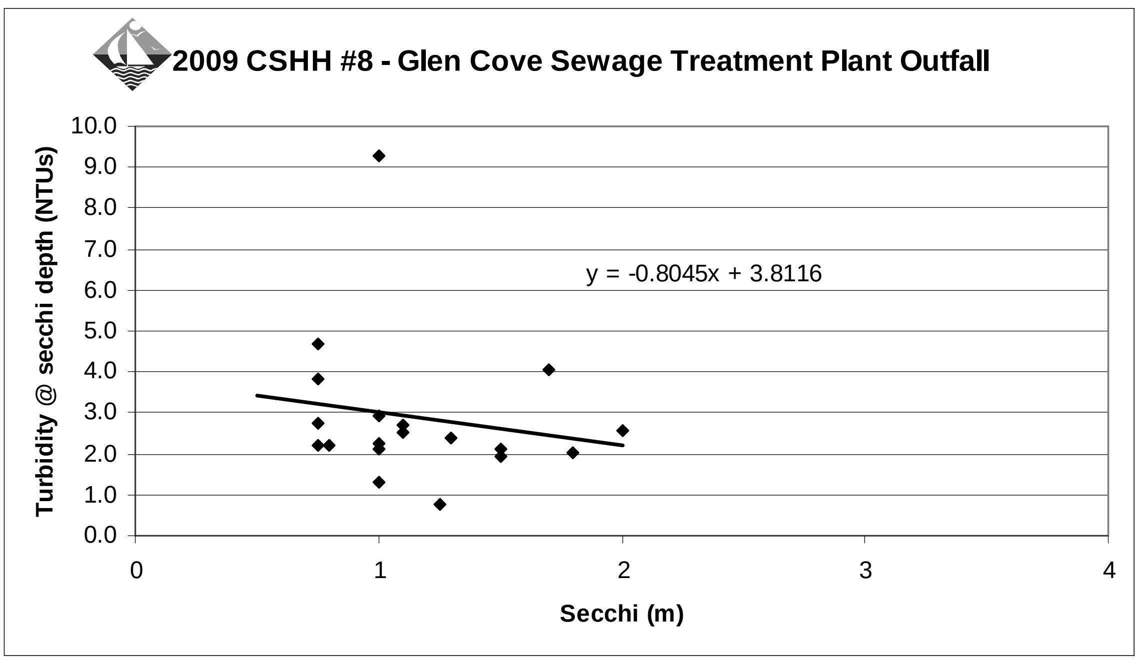
Appendix A – 2009 Turbidity and Secchi Disk Transparency Graphs

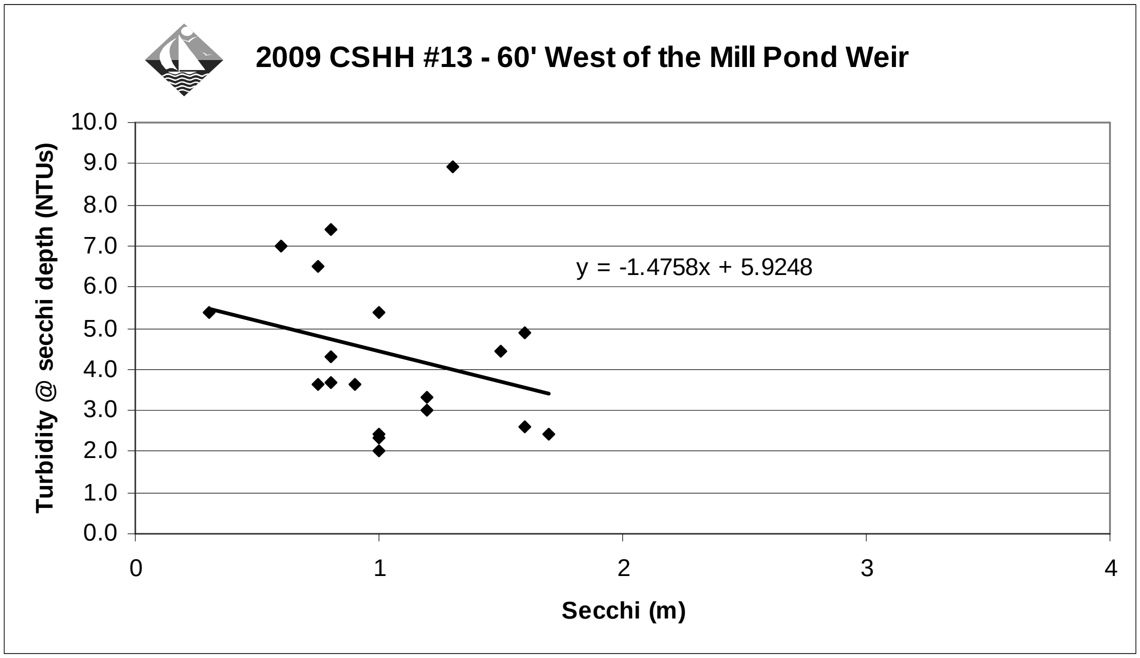
Note: A linear relationship line and its formula are shown for each graph as generated by Microsoft Excel. This line depicts the inverse relationship between the Secchi-disk depth and turbidly at Secchi-disk depth (as the turbidity increases, the Secchi-disk depth decreases). The inverse relationship 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]).






2009 CSHH #3 - Glen Cove Creek, Red Marker
Turbidity @ secchi depth (NTUs)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
y = -0.0646x + 2.1258
0
1
2
3
4
Secchi (m)


2009 CSHH #8 - Glen Cove Sewage Treatment Plant Outfall
Turbidity @ secchi depth (NTUs)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
y = -0.8045x + 3.8116
0
1
2
3
4
Secchi (m)


2009 CSHH #13 - 60' West of the Mill Pond Weir
y = -1.4758x + 5.9248
Turbidity @ secchi depth (NTUs)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
1
2
3
4
Secchi (m)

CSHH Water-Monitoring Program 2009

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp (°C)	Secchi	Turbidity @ 0.5m (NTUs)	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																	
10/30/09	13.1	13.96	13.53	23.77	25.45	24.61	7.96	6.62	7.8	7.9	7.8	11.6	2.25	2.85	2.64	4.9	8:29
10/21/09	12.65	12.96	12.81	24.66	24.95	24.81	8.48	7.56	7.9	7.9	7.9	10.9	2.25	1.77	1.85	2.3	8:40
10/14/01	14.5	15.21	14.86	24.83	24.74	24.79	7.87	7.13	7.9	7.9	7.9	9.7	1.25	2.62	2.68	5.0	8:45
10/8/09	16.08	16.26	16.17	23.86	23.86	23.86	7.70	6.95	7.7	7.7	7.7	13.9	1.3	4.46	4.93	2.0	8:40
9/30/09	19.28	19.42	19.35	24.97	25.00	24.99	5.50	5.32	7.7	7.7	7.7	14.9	1.5	2.1	2.02	4.5	8:30
9/23/09	20.25	20.28	20.27	24.27	24.42	24.35	6.37	5.89	7.7	7.6	7.6	21.3	1.1	4.83	4.65	3.3	8:15
9/16/09	21.81	21.75	21.78	24.48	25.05	24.77	7.87	5.39	7.8	7.6	7.7	19.6	1.1	2.06	2.21	6.8	8:38
9/9/09	23.04	22.83	22.94	23.96	24.39	24.18	6.39	5.78	7.7	7.7	7.7	21.0	0.8	3.21	3.46	3.8	7:35
9/2/09	22.25	22.35	22.30	24.13	25.12	24.63	9.44	4.19	8.0	7.5	7.8	19.4	0.5	5.08		4.9	9:00
8/26/09	24.37	24.33	24.35	23.99	24.10	24.05	5.88	5.62	7.5	7.5	7.5	24.6	0.5	4.23		3.1	8:10
8/19/09	24.27	22.85	23.56	24.47	24.96	24.72	4.62	2.15	7.8	7.4	7.6	25.5	1.0	1.64	1.94	3.5	7:50
8/12/09	25.08	24.63	24.86	24.00	24.17	24.09	5.53	5.08	7.8	7.5	7.7	25.0	0.75	2.77	2.63	3.1	8:05
8/5/09	23.71	21.78	22.75	24.27	24.96	24.62	6.17	1.98	7.7	7.3	7.5	27.6	1.0	2.59	2	3.6	8:41
7/29/09	22.91	21.92	22.42	24.59	24.91	24.75	4.77	4.13	7.6	7.4	7.5	25.2	1.8	1.26	1.26	3.6	8:30
7/22/09	20.75	20.41	20.58	24.15	24.39	24.27	5.68	4.03	7.9	7.6	7.7	25.7	1.6	1.28	1.37	1.5	8:55
7/15/09	21.70	21.71	21.71	23.29	23.41	23.35	8.07	7.81	7.9	7.9	7.9	24.0	1.0	2.83	3.5	3.1	8:40
7/8/09	21.67	21.67	21.67	23.17	23.29	23.23	8.12	7.64	8.0	8.0	8.0	19.0	1.0	---		2.7	8:48
7/1/09	21.7	19.61	20.66	23.45	23.95	23.70	6.83	4.76	7.7	7.6	7.6	22.6	1.1	2.13	2.47	3.7	9:25
6/24/09	20.48	20.24	20.36	22.26	22.53	22.40	6.62	7.03	7.9	7.9	7.9	21.8	1.5	1.56	1.56	1.4	8:30
6/17/09	17.70	17.51	17.61	23.90	24.31	24.11	8.49	7.35	8.0	7.9	7.9	19.3	0.8	1.56	1.63	4.1	9:05
6/10/09	17.71	17.46	17.59	23.79	24.19	23.99	8.22	7.85	8.1	7.9	8.0	15.3	1.1	2.92	3.22	2.7	8:40
6/3/09	17.69	16.51	17.10	24.32	24.95	24.64	7.96	6.92	7.9	7.7	7.8	18.5	1.0	2.39	2.11	4.7	8:35
5/27/09	15.87	15.72	15.80	24.18	24.48	24.33	7.20	7.54	7.5	7.6	7.6	13.5	1.0	2.61	2.33	2.3	8:40
5/20/09	13.98	13.14	13.56	24.19	24.88	24.54	9.17	8.21	8.0	7.9	8.0	15.7	1.2	1.77	2.14	4.3	8:16
5/13/09	14.62	13.60	14.11	23.45	24.27	23.86	9.43	9.23	8.2	8.0	8.1	13.9	1.3	1.48	1.69	3.4	9:00
Average			*19.31*			*24.22*		*6.09*			*7.8*	*19.2*					

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp (°C)	Secchi	Turbidity @ 0.5m (NTUs)	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																	
10/30/09	13.64	13.92	13.78	25.36	25.59	25.48	8.53	7.80	8.0	8.0	8.0	14.1	3.5	1.71	1.60	9.5	10:30
10/21/09	13.74	14.14	13.94	25.77	25.92	25.85	8.27	7.89	8.1	8.1	8.1	13.2	3.0	1.30	0.70	6.5	9:20
10/14/09	15.80	15.92	15.86	25.23	25.42	25.33	8.35	8.01	8.0	8.0	8.0	10.1	1.8	1.72	2.32	7.1	11:28
10/8/09	Abandoned station because of high winds and waves.																
9/30/09	Abandoned station because of high winds and waves.																
9/23/09	20.73	20.45	20.59	25.16	25.28	25.22	7.24	4.86	7.7	7.5	7.6	24.0	2.5	1.87	2.37	8.3	10:30
9/16/09	Abandoned station--winds and timeframe for returning samples.																
9/9/09	22.40	22.43	22.42	24.94	24.99	24.97	8.19	8.12	8.0	8.0	8.0	21.1	1.0	1.64	1.58	5.3	10:00
9/2/09	22.35	22.21	22.28	25.11	25.21	25.16	7.97	5.52	7.9	7.6	7.8	19.5	1.2	3.62	2.96	8.9	9:35
8/26/09	24.23	23.09	23.66	24.76	25.18	24.97	8.65	1.43	8.0	7.3	7.6	25.3	0.75	2.56	3.22	8.3	9:05
8/19/09	24.17	21.96	23.07	24.73	25.18	24.96	7.14	1.60	7.8	7.3	7.5	25.7	0.75	1.48	1.39	9.6	8:20
8/12/09	25.19	20.23	22.71	24.54	25.35	24.95	9.47	0.82	8.2	7.3	7.8	24.2	0.50	1.89		6.6	9:40
8/5/09	23.67	20.43	22.05	24.58	25.40	24.99	9.26	1.49	8.0	7.3	7.7	27.9	1.25	1.82	1.94	9.0	9:30
7/29/09	22.76	21.27	22.02	24.83	25.07	24.95	8.21	3.29	7.9	7.4	7.6	25.3	0.8	0.88	0.94	8.4	8:45
7/22/09	20.09	19.13	19.61	25.00	25.35	25.18	6.89	3.86	7.8	7.5	7.6	25.5	1.4	1.61	1.02	7.2	9:35
7/15/09	21.76	17.83	19.80	24.20	25.08	24.64	9.80	1.00	8.2	7.3	7.8	25.1	1.4	1.12	1.69	8.3	9:15
7/8/09	20.56	18.28	19.42	23.86	24.64	24.25	8.06	6.01	8.1	7.8	7.9	19.9	2.0	---		5.9	9:15
7/1/09	20.67	18.13	19.40	23.75	24.38	24.07	9.27	4.82	8.0	7.6	7.8	23.4	1.0	1.95	1.83	7.4	10:00
6/24/09	19.62	18.48	19.05	23.55	24.06	23.81	8.01	6.05	8.1	7.8	7.9	21.1	1.75	0.28	0.23	7.7	8:52
6/17/09	18.12	17.21	17.67	24.15	24.77	24.46	11.62	6.73	8.3	7.9	8.1	20.2	1.0	1.15	1.05	8.7	9:30
6/10/09	17.26	15.64	16.45	24.39	25.04	24.72	9.49	6.57	8.1	7.7	7.9	16.3	1.2	2.74	2.52	6.3	9:00
6/3/09	18.66	15.83	17.25	24.47	25.04	24.76	12.81	6.95	8.2	7.8	8.0	20.4	0.5	5.63		8.3	10:07
5/27/09	15.21	14.15	14.68	24.81	25.26	25.04	7.24	7.15	7.8	7.8	7.8	12.7	1.0	2.34	2.34	6.5	9:15
5/20/09	14.57	12.89	13.73	24.53	25.07	24.80	10.17	8.80	8.1	8.0	8.1	21.8	1.4	1.98	2.23	9.4	10:20
5/13/09	14.35	11.66	13.01	24.27	25.16	24.72	10.45	7.88	8.2	7.9	8.1	14.7	1.5	1.31	1.94	7.4	9:45
Average			*18.75*			*24.87*		*5.30*			*7.8*	*20.5*					

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp (°C)	Secchi	Turbidity @ 0.5m (NTUs)	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																	
10/30/09	13.41	13.97	13.69	24.69	25.56	25.13	8.82	7.45	8.0	8.0	8.0	13.9	2.2	2.28	2.64	5.5	10:50
10/21/09	13.06	13.34	13.20	25.15	25.47	25.31	8.52	8.01	8.0	8.0	8.0	13.1	1.9	1.16	0.87	3.3	9:35
10/14/09	15.76	15.88	15.82	24.61	25.24	24.93	8.98	8.04	8.1	8.0	8.0	12.7	1.9	1.66	2.06	4.1	11:47
10/8/09	16.73	16.72	16.73	24.80	24.79	24.80	7.55	7.52	7.9	7.9	7.9	15.5	1.4	4.01	3.44	2.3	9:20
9/30/09	18.83	19.29	19.06	25.25	25.07	25.16	7.39	6.42	7.8	7.8	7.8	15.1	1.5	2.42	1.93	4.3	8:55
9/23/09	20.65	20.45	20.55	24.81	25.14	24.98	8.56	6.83	7.9	7.8	7.8	23.1	1.0	4.23	3.86	3.3	9:15
9/16/09	21.43	21.58	21.51	24.63	25.15	24.89	7.22	5.07	7.8	7.6	7.7	19.5	1.5	2.14	2.14	5.6	11:35
9/9/09	22.50	22.63	22.57	24.42	24.96	24.69	6.62	5.25	7.8	7.7	7.7	20.8	1.0	2.32	1.86	3.2	8:30
9/2/09	22.31	22.42	22.37	24.48	25.18	24.83	9.95	4.12	8.1	7.6	7.9	19.7	0.75	4.54		5.1	10:00
8/26/09	24.96	24.40	24.68	24.28	24.40	24.34	7.20	8.95	8.1	8.0	8.0	26.1	0.50	4.52		3.2	9:25
8/19/09	24.13	23.78	23.96	24.65	24.80	24.73	5.66	5.09	7.6	7.5	7.6	26.3	1.0	1.46	1.88	4.9	9:00
8/12/09	24.87	22.70	23.79	24.10	24.78	24.44	10.70	5.78	8.1	7.7	7.9	26.1	0.75	2.80	2.04	3.5	10:05
8/5/09	23.53	21.64	22.59	24.57	25.04	24.81	8.27	2.66	7.9	7.4	7.6	28.8	1.0	1.77	1.57	4.9	10:10
7/29/09	23.16	21.26	22.21	24.33	24.97	24.65	6.85	2.86	7.6	7.6	7.6	26.7	1.1	1.57	1.99	3.5	10:20
7/22/09	20.74	19.63	20.19	24.45	25.05	24.75	6.46	4.14	7.7	7.5	7.6	26.7	1.0	1.31	1.64	4.7	10:00
7/15/09	22.25	21.15	21.70	23.92	24.42	24.17	7.56	7.28	8.0	8.0	8.0	25.3	1.3	2.20	2.02	3.3	9:45
7/8/09	21.94	21.31	21.63	23.28	23.74	23.51	9.59	8.08	8.2	8.0	8.1	19.1	1.2	---		3.7	9:40
7/1/09	21.19	19.14	20.17	23.46	24.10	23.78	7.86	5.42	7.9	7.7	7.8	24.9	0.8	2.11	2.26	4.3	10:25
6/24/09	20.18	19.62	19.90	22.77	23.45	23.11	7.90	7.62	8.0	8.0	8.0	23.1	1.25	0.93	1.04	2.8	9:25
6/17/09	18.22	17.45	17.84	24.00	24.50	24.25	11.19	7.77	8.2	7.9	8.1	20.9	1.0	0.80	1.04	4.1	10:10
6/10/09	16.75	16.53	16.64	24.24	24.61	24.43	8.58	7.87	7.9	7.9	7.9	17.3	1.1	2.19	2.21	3.9	10:15
6/3/09	18.40	16.79	17.60	24.39	24.97	24.68	12.12	8.04	8.2	7.8	8.0	20.3	1.1	2.80	3.26	4.1	11:45
5/27/09	15.35	15.24	15.30	24.32	24.96	24.64	7.51	7.16	7.8	7.8	7.8	13.5	1.2	1.8	1.88	2.9	9:45
5/20/09	14.66	13.23	13.95	23.82	24.88	24.35	10.29	9.07	8.1	8.0	8.0	23.5	1.1	2.41	1.74	4.2	10:57
5/13/09	14.70	13.84	14.27	24.05	24.3	24.18	10.6	11.42	8.2	8.2	8.2	15.2	1.4	1.8	1.62	3.3	10:16
Average			*19.27*			*24.54*		*6.72*			*7.9*	*20.7*					

Appendix A – 2009 CSHH Field Monitoring Data

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp (°C)	Secchi	Turbidity @ 0.5m (NTUs)	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																	
10/30/09	14.40	14.22	14.31	23.90	25.36	24.63	7.75	6.29	7.9	7.9	7.9	14.7	2.0	2.3	2.57	4.3	11:17
10/21/09	13.09	13.36	13.23	24.38	25.42	24.90	8.53	7.31	7.9	7.9	7.9	13.8	1.8	1.72	2.03	2.7	10:00
10/14/09	16.85	15.71	16.28	24.58	24.91	24.75	7.72	7.70	7.8	8.0	7.9	13.3	1.5	3.42	2.13	3.2	12:12
10/8/09	16.70	17.28	16.99	22.29	24.29	23.29	8.34	6.83	7.6	7.7	7.6	14.5	1.7	4.07	4.07	1.9	9:55
9/30/09	19.66	18.83	19.25	20.23	24.49	22.36	5.79	5.76	7.6	7.7	7.7	15.7	1.3	2.09	2.4	4.1	9:19
9/23/09	20.72	20.63	20.68	24.56	24.73	24.65	7.58	7.25	7.7	7.7	7.7	23.3	0.75	4.41	4.7	2.4	9:40
9/16/09	21.98	21.83	21.91	23.28	25.01	24.15	7.72	6.45	7.8	7.7	7.7	20.3	0.75	1.84	2.2	4.3	11:55
9/9/09	22.77	22.73	22.75	24.51	24.72	24.62	6.28	5.67	7.7	7.7	7.7	20.8	0.8	2.33	2.2	2.4	9:10
9/2/09	22.82	22.88	22.85	23.50	24.73	24.12	10.37	5.93	8.1	7.7	7.9	22.2	0.5	5.08		4.3	10:25
8/26/09	24.69	25.07	24.88	16.72	24.39	20.56	12.87	9.58	8.2	8.0	8.1	26.6	0.5	5.32		2.2	10:00
8/19/09	24.47	24.48	24.48	20.59	24.26	22.43	3.26	5.69	7.4	7.5	7.4	27	0.75	3.07	3.84	4.3	9:30
8/12/09	25.38	23.04	24.21	23.96	24.55	24.26	10.04	4.28	8.0	7.6	7.8	28	0.5	2.71		2.6	10:40
8/5/09	24.40	23.46	23.93	23.35	24.56	23.96	8.33	7.06	7.7	7.7	7.7	31.2	1.0	5.98	9.29	3.2	10:50
7/29/09	22.98	22.76	22.87	24.34	24.74	24.54	6.66	6.19	7.5	7.5	7.5	30.6	0.5	2.13		1.1	10:40
7/22/09	20.69	19.87	20.28	23.54	24.83	24.19	6.43	3.15	7.6	7.4	7.5	26.6	1.0	1.99	2.1	4.7	10:35
7/15/09	22.12	21.71	21.92	23.66	24.18	23.92	7.53	5.76	7.9	7.8	7.8	26	0.5	3.83		1.9	10:32
7/8/09	21.69	20.87	21.28	22.97	23.95	23.46	9.48	6.25	8.2	7.9	8.0	21.6	0.75	---		3.5	10:25
7/1/09	21.32	20.39	20.86	22.97	23.60	23.29	7.51	4.79	7.8	7.6	7.7	24.5	1.0	2.37	2.95	2.6	11:05
6/24/09	20.81	19.66	20.24	22.47	23.39	22.93	8.12	5.93	8.0	7.7	7.8	22.7	1.25	0.98	0.75	2.8	9:48
6/17/09	18.51	18.05	18.28	23.49	24.13	23.81	10.09	9.09	8.1	8.0	8.0	21.6	1.0	1.31	1.3	2.9	10:40
6/10/09	17.11	16.84	16.98	24.58	24.76	24.67	7.97	7.56	7.8	7.8	7.8	17.0	1.1	2.08	2.52	2.3	10:45
6/3/09	18.61	17.77	18.19	23.67	24.61	24.14	8.80	8.27	7.9	7.8	7.9	22.1	1.1	2.58	2.71	2.3	12:15
5/27/09	15.73	15.51	15.62	24.61	24.84	24.73	7.50	6.37	7.8	7.7	7.7	14.4	1.5	1.79	1.92	2.5	10:25
5/20/09	15.65	14.40	15.03	23.94	24.49	24.22	9.05	8.85	7.9	7.9	7.9	23.6	1.0	2.42	2.24	2.9	11:23
5/13/09	15.83	13.56	14.70	14.30	24.52	19.41	9.71	10.17	7.9	8.0	8.0	20.1	0.75	4.13	2.76	2.8	10:50
Average			*19.68*			*23.68*		*6.73*			*7.8*	*21.7*					

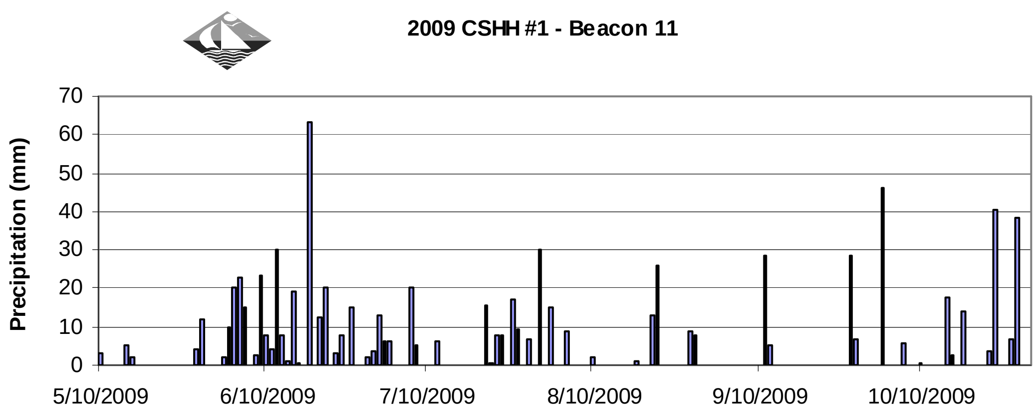
Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp (°C)	Secchi	Turbidity @ 0.5m (NTUs)	Turbidity @ secchi	Depth (m)	Time
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	(Bottom)	(AM)
CSHH #13 - 60' West of the Mill Pond Weir																	
10/30/09	13.86	14.49	14.18	20.77	24.87	22.82	9.06	7.01	7.9	7.8	7.8	15.9	1.6	2.82	2.62	3.4	11:42
10/21/09	13.56	13.75	13.66	22.97	25.12	24.05	9.23	5.16	7.7	7.6	7.7	14.9	1.6	3.15	4.88	2.6	10:18
10/14/09	15.89	15.98	15.94	24.76	24.82	24.79	8.31	7.50	7.9	7.9	7.9	12.1	1.7	2.72	2.42	2.6	12:31
10/8/09	15.97	17.23	16.60	19.45	24.37	21.91	8.39	5.75	7.3	7.5	7.4	15.2	1.3	5.81	8.92	1.9	10:05
9/30/09	19.44	20.20	19.82	22.00	24.57	23.29	4.57	2.52	7.4	7.4	7.4	15.2	1.5	3.09	4.45	4.0	9:38
9/23/09	20.10	20.46	20.28	22.02	24.55	23.29	8.43	4.74	7.9	7.6	7.7	23.4	0.75	6.79	6.49	2.2	10:00
9/16/09	21.99	21.88	21.94	24.23	24.69	24.46	6.11	4.29	7.6	7.4	7.5	19.5	0.8	3.49		4.0	12:05
9/9/09	22.26	22.58	22.42	23.24	24.55	23.90	4.80	1.19	7.4	7.3	7.4	20.9	0.5	3.39		1.3	9:35
9/2/09	24.01	23.03	23.52	24.22	24.95	24.59	9.16	2.14	8.0	7.4	7.7	22.3	0.5	6.42		3.3	10:50
8/26/09	24.83	25.18	25.01	22.05	23.83	22.94	7.52	7.00	7.6	7.6	7.6	27.3	0.8	3.02	7.42	0.9	10:25
8/19/09	24.23	24.69	24.46	21.32	23.62	22.47	4.45	4.33	7.4	7.4	7.4	27.7	1.0	4.53	5.37	3.1	9:50
8/12/09	24.95	24.69	24.82	23.52	24.18	23.85	12.51	10.74	8.2	8.1	8.1	29.6	0.4	3.79		1.3	11:00
8/5/09	24.44	23.43	23.94	23.95	24.44	24.20	8.74	4.39	7.8	7.5	7.6	31.7	0.9	3.64	3.64	3.8	11:15
7/29/09	22.61	22.35	22.48	24.02	24.39	24.21	4.10	3.27	7.3	7.2	7.3	29.0	0.6	7.27	6.99	1.7	11:05
7/22/09	20.47	20.13	20.30	22.55	24.58	23.57	5.61	1.85	7.5	7.3	7.4	27.5	1.0	2.27	2.03	3.4	11:00
7/15/09	21.52	21.32	21.42	23.69	23.98	23.84	5.39	2.87	7.7	7.5	7.6	26.4	0.3	6.79	5.38	1.9	11:30
7/8/09	21.47	20.52	21.00	22.49	23.99	23.24	7.81	2.05	7.9	7.5	7.7	22.7	0.6	---		3.4	10:40
7/1/09	21.93	20.49	21.21	21.11	23.55	22.33	8.30	2.67	7.8	7.4	7.6	24.3	0.5	4.10		2.6	11:25
6/24/09	19.99	19.48	19.74	22.33	23.37	22.85	7.48	4.43	7.8	7.6	7.7	22.4	1.0	2.16	2.42	2.8	10:12
6/17/09	18.52	17.90	18.21	23.63	24.08	23.86	9.08	5.96	7.9	7.6	7.7	21.8	0.75	3.72	3.65	2.2	11:10
6/10/09	17.45	17.00	17.23	24.42	24.70	24.56	7.29	4.94	7.7	7.5	7.6	17.8	1.2	2.72	3.01	3.2	11:05
6/3/09	18.25	17.97	18.11	23.86	24.20	24.03	7.63	6.98	7.7	7.7	7.7	21.0	1.2	3.66	3.33	1.4	12:30
5/27/09	15.89	15.67	15.78	24.64	24.75	24.70	6.13	5.27	7.6	7.6	7.6	15.1	1.0	3.30	2.33	1.7	10:40
5/20/09	15.97	15.37	15.67	22.96	24.30	23.63	8.37	7.41	7.7	7.7	7.7	24.3	0.8	3.47	3.69	1.8	11:40
5/13/09	14.65	13.92	14.29	14.27	23.93	19.10	9.70	9.18	7.6	7.7	7.7	19.5	0.8	3.87	4.31	1.8	11:20
Average			*19.68*			*23.46*		*4.95*			*7.6*	*21.9*					
CSHH #14 - 50 yds from Powerhouse Drain																	
10/30/09	13.60	13.97	13.79	24.03	25.16	24.60	7.77	7.30	7.9	7.9	7.9	13.5	2.5	2.42	2.19	2.4	9:57
10/14/09	14.15	14.98	14.57	24.73	24.45	24.59	9.02	8.04	7.9	7.9	7.9	10.3	1.8	1.98	2.34	1.9	10:39
9/2/09	22.69	22.42	22.56	24.04	24.57	24.31	8.32	6.56	8.0	7.8	7.9	23.2	0.8	5.49	5.49	2.1	8:24
9/16/09	21.78	21.81	21.80	24.47	24.55	24.51	6.46	6.06	7.7	7.6	7.7	19.7	1.3	2.19	1.95	2.6	11:00
Average			*18.18*			*24.50*		*6.99*			*7.8*	*16.7*					

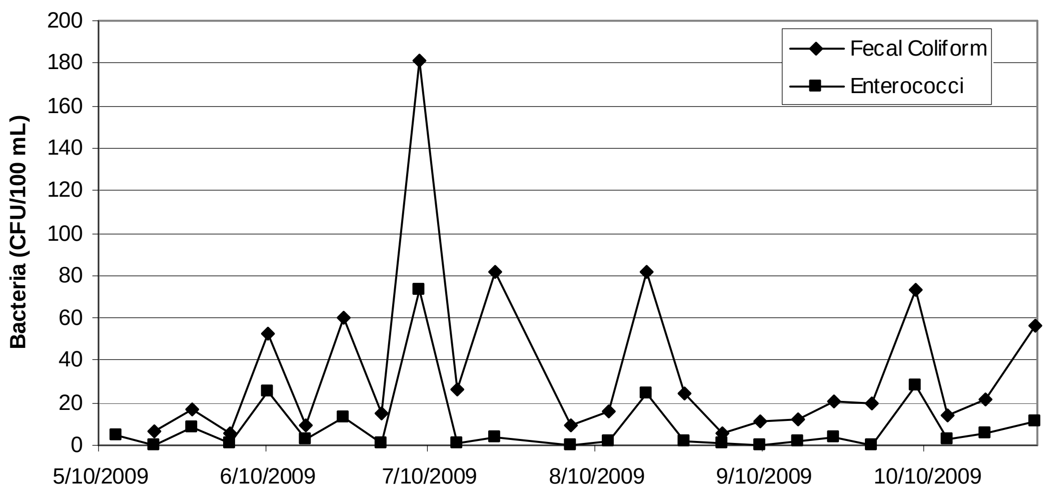
Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp (°C)	Secchi	Turbidity @ 0.5m (NTUs)	Turbidity @ secchi	Depth (m)	Time
	Surface	Bottom	Ave	Surface	Bottom	Ave	Surface	Bottom	Surface	Bottom	Ave	(°C)	(m)	(NTUs)	(NTUs)	(Bottom)	(AM)
CSHH #15 - 50 yds from Scudders Pond Outfall, North of Tappen Pool																	
10/30/09	13.97	14.07	14.02	24.20	25.45	24.83	7.64	7.19	7.9	7.9	7.9	13.7	2.2	2.4	2.3	2.6	10:11
10/14/09	14.97	15	14.99	24.62	24.63	24.63	8.72	8.57	8.1	8.0	8.0	12.1	1.3	2.34	2.64	2.4	10:55
9/16/09	21.65	21.8	21.73	24.28	24.6	24.44	7.43	6.85	7.7	7.7	7.7	19.3	1.3	1.65	1.98	2.5	11:15
9/2/09	22.32	22.39	22.36	24.33	24.92	24.63	9.63	5.04	8.0	7.7	7.8	22.1	0.8	5.87	5.59	2.4	11:20
8/19/09	24.54	24.1	24.32	24.36	24.64	24.50	5.41	4.97	7.5	7.5	7.5	27.8	1.0	2.41		3.0	10:20
Average			*19.48*			*24.60*		*6.52*			*7.8*	*19.0*					
CSHH #4 - North Hempstead Beach (S)(former Bar Beach) Spit Creek																	
10/30/09	13.52	13.94	13.73	23.60	25.20	24.40	7.60	7.41	7.9	7.9	7.9	13.8	2.0	2.51	2.34	3.2	9:15
10/14/09	14.70	15.04	14.87	24.62	24.50	24.56	8.52	7.79	7.9	7.9	7.9	10.1	1.5	2.14	2.20	5.9	10:24
9/16/09	21.76	21.80	21.78	24.47	24.51	24.49	7.51	7.24	7.8	7.8	7.8	20.1	1.0	1.76	2.20	2.2	10:00
8/5/09	26.31	24.34	25.33	24.32	24.50	24.41	11.13	8.90	8.1	7.9	8.0	32.6	1.0	3.87	2.86	7.8	2:25
7/1/09	20.23	19.49	19.86	23.63	23.92	23.78	4.54	3.89	7.5	7.5	7.5	23.0	1.0	2.36	2.26	2.3	9:06
6/17/09	17.76	17.50	17.63	23.87	24.30	24.09	8.48	6.94	7.9	7.8	7.9	18.8	0.8	1.89	2.12	4.6	8:50
6/3/09	17.83	17.08	17.46	24.36	24.68	24.52	7.73	6.80	7.8	7.7	7.7	20.5	1.1	2.96	2.72	4.8	10:35
5/20/09	14.75	13.33	14.04	23.87	24.67	24.27	8.63	8.43	7.9	7.9	7.9	22.4	1.0	2.87	2.98	7.4	10:00
Average			*18.09*			*24.31*		*7.18*			*7.8*	*20.2*					
CSHH #5 - Mott's Cove																	
10/30/09	13.66	13.96	13.81	23.87	24.99	24.43	8.39	7.31	7.9	7.9	7.9	13.4	2.2	2.68	2.48	2.1	9:30
10/14/09	14.81	14.96	14.89	23.62	24.19	23.91	7.75	7.63	7.8	7.9	7.9	11.0	1.5	1.64	2.45	1.9	10:05
9/16/09	20.74	21.75	21.25	24.12	24.53	24.33	6.54	5.87	7.6	7.6	7.6	20.0	1.0	2.22	2.58	2.3	9:42
8/5/09	24.26	23.70	23.98	24.18	24.47	24.33	7.42	6.77	7.7	7.6	7.6	33.8	1.0	2.64	2.12	1.5	2:00
7/1/09	20.72	19.89	20.31	22.96	23.35	23.16	5.40	3.78	7.7	7.5	7.6	23.3	1.2	2.22	2.11	1.6	8:33
6/17/09	17.52	17.64	17.58	23.40	24.04	23.72	7.93	7.21	7.8	7.8	7.8	18.2	1.0	1.08	1.45	1.5	8:25
6/3/09	17.52	17.34	17.43	24.13	24.30	24.22	6.86	6.74	7.7	7.7	7.7	19.9	0.6	3.89	3.57	1.5	10:05
5/20/09	14.13	13.81	13.97	23.89	24.27	24.08	8.77	8.59	7.9	7.9	7.9	21.4	1.0	2.13	3.67	1.4	9:37
Average			*17.90*			*24.02*		*6.74*			*7.7*	*20.1*					

Date	Water Temp (°C)			Salinity (ppt)			DO (ppm)		pH			Air Temp (°C)	Secchi	Turbidity @ 0.5m (NTUs)	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																	
10/30/09	13.94	13.95	13.95	23.50	24.75	24.13	6.97	6.97	7.8	7.9	7.8	12.5	1.5	3.08	3.28	2.5	9:14
10/14/09	13.86	14.24	14.05	23.73	23.77	23.75	8.53	7.39	7.8	7.8	7.8	10.0	1.0	3.62	3.29	2.2	9:45
9/16/09	22.09	22.06	22.08	24.08	24.19	24.14	5.42	5.15	7.5	7.5	7.5	19.9	0.9	3.08	2.79	2.7	9:26
8/5/09	25.63	23.53	24.58	23.97	24.49	24.23	8.12	4.64	7.7	7.5	7.6	32.2	1.1	2.18	2.42	2.3	1:15
7/1/09	Stations farthest south not surveyed because of tidal cycle.																
6/17/09	17.57	17.80	17.69	23.49	23.75	23.62	8.38	8.10	7.9	7.9	7.9	17.4	0.75	1.98	1.70	1.9	7:55
6/3/09	18.04	17.87	17.96	24.02	24.17	24.10	6.85	6.71	7.6	7.6	7.6	18.9	1.10	3.44	3.26	2.0	9:40
5/20/09	14.51	13.96	14.24	23.50	24.09	23.80	8.51	8.52	7.8	7.9	7.8	20.9	0.75	3.33		2.0	9:18
Average			*17.79*			*23.96*		*6.78*			*7.7*	*18.8*					
CSHH #7 - West of Bryant Landing (formerly site of oil dock)																	
10/30/09	13.93	14.06	14.00	23.05	23.72	23.39	7.59	6.77	7.8	7.8	7.8	12.5	1.6	3.85	3.94	2.2	8:57
10/14/09	12.52	14.17	13.35	22.45	23.39	22.92	9.43	7.33	7.8	7.8	7.8	10.0	0.4	9.08		2.1	9:35
9/16/09	21.84	22.10	21.97	22.86	23.73	23.30	4.21	4.23	7.6	7.5	7.5	19.9	0.5	7.38		2.4	9:10
8/5/09	24.70	24.41	24.56	24.07	24.21	24.14	7.41	5.63	7.7	7.5	7.6	32.6	1.1	3.59	2.35	1.7	12:50
7/1/09	Stations farthest south not surveyed because of tidal cycle.																
6/17/09	17.54	17.72	17.63	23.35	23.72	23.54	7.99	7.88	7.8	7.9	7.8	17.4	0.5	3.63		1.6	7:35
6/3/09	18.15	18.02	18.09	23.67	24.08	23.88	6.51	6.24	7.6	7.6	7.6	18.3	0.9	4.21	4.21	1.6	9:18
5/20/09	14.42	14.39	14.41	23.61	23.75	23.68	8.03	8.05	7.8	7.8	7.8	18.3	0.8	5.25	4.97	1.2	9:00
Average			*17.71*			*23.55*		*6.59*			*7.7*	*18.4*					

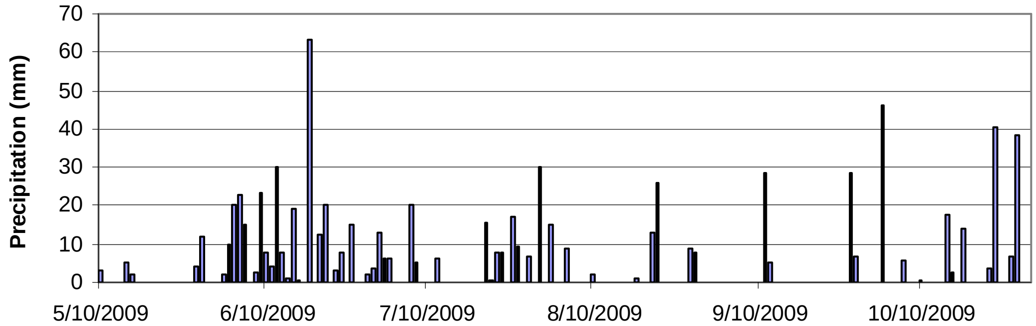
APPENDIX B

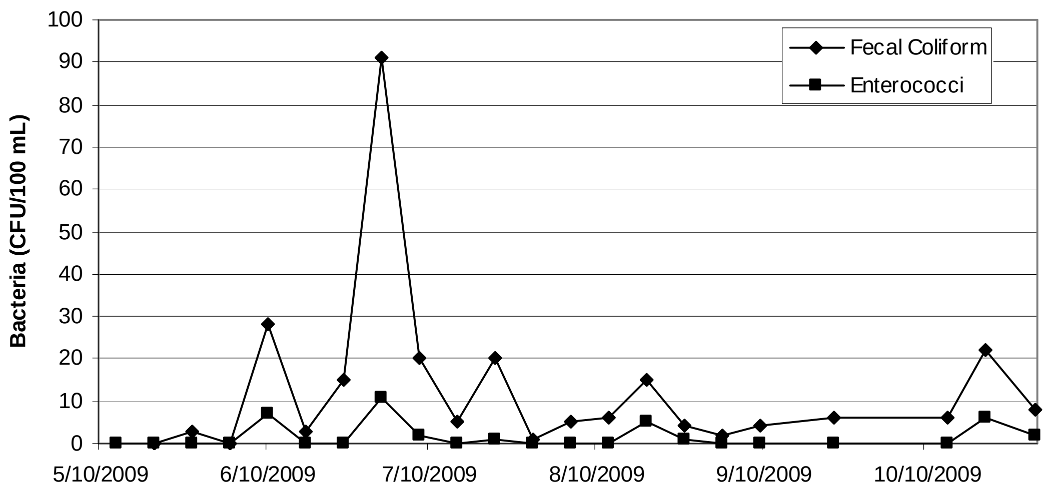
2009 Bacteria and Precipitation Data


2009 CSHH #1 - Beacon 11
Precipitation (mm)
70
60
50
40
30
20
10
0
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009
10/10/2009

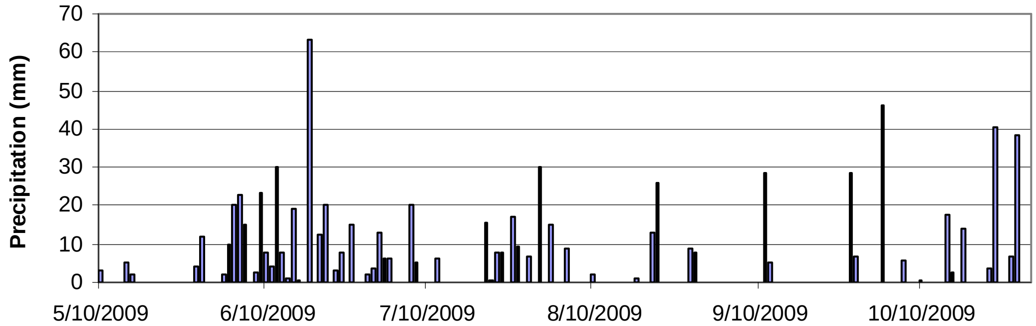

Bacteria (CFU/100 mL)
200
180
160
140
120
100
80
60
40
20
0
Fecal Coliform
Enterococci
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009
10/10/2009

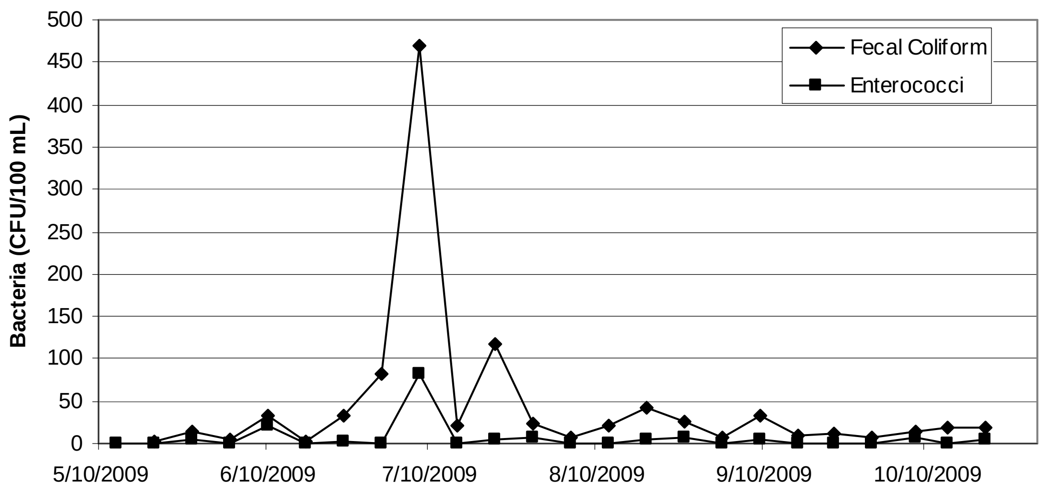
2009 CSHH #2 - Bell Marker 6



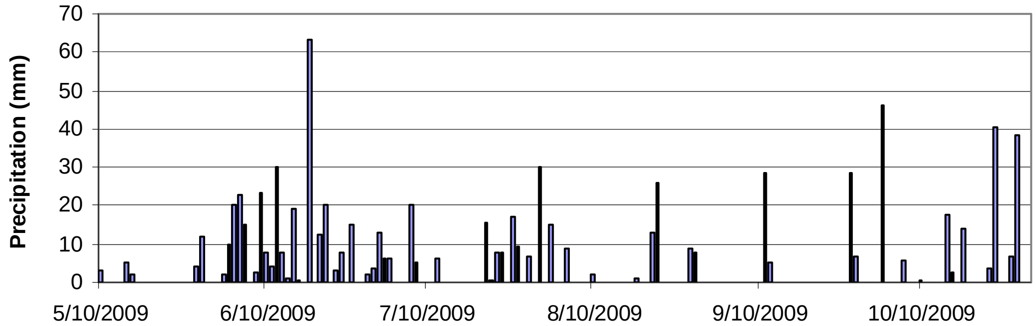


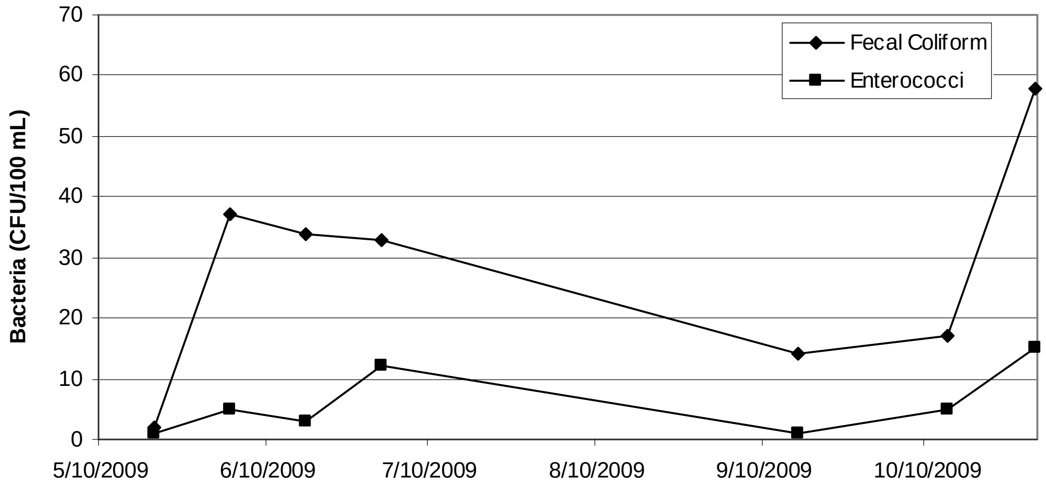
2009 CSHH #3 - Glen Cove Creek, Red Marker

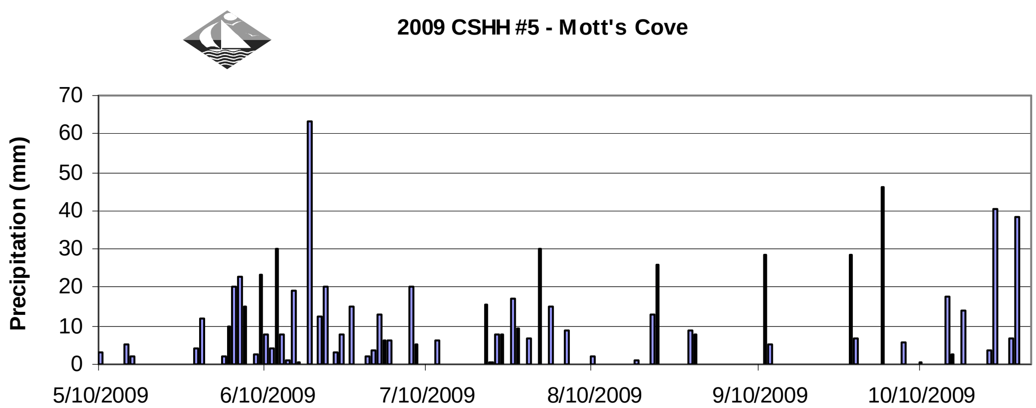


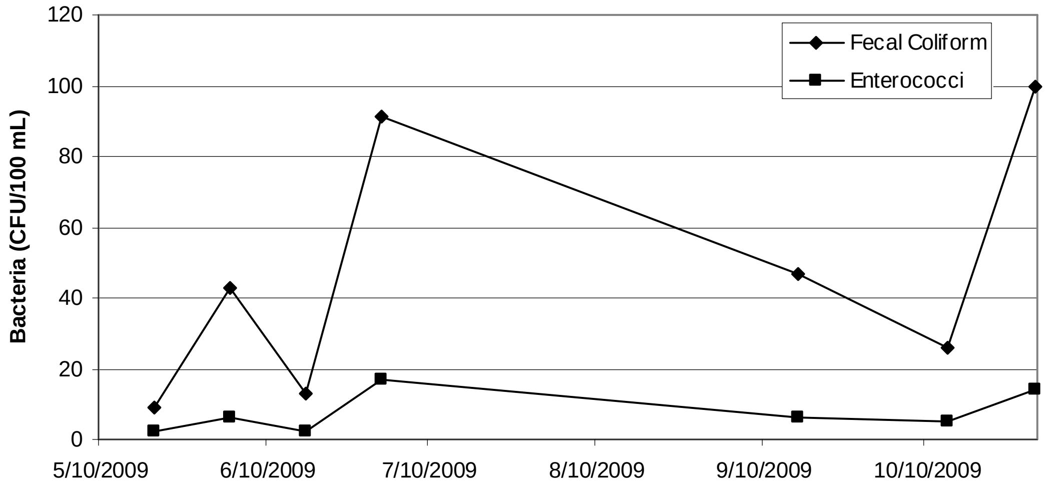


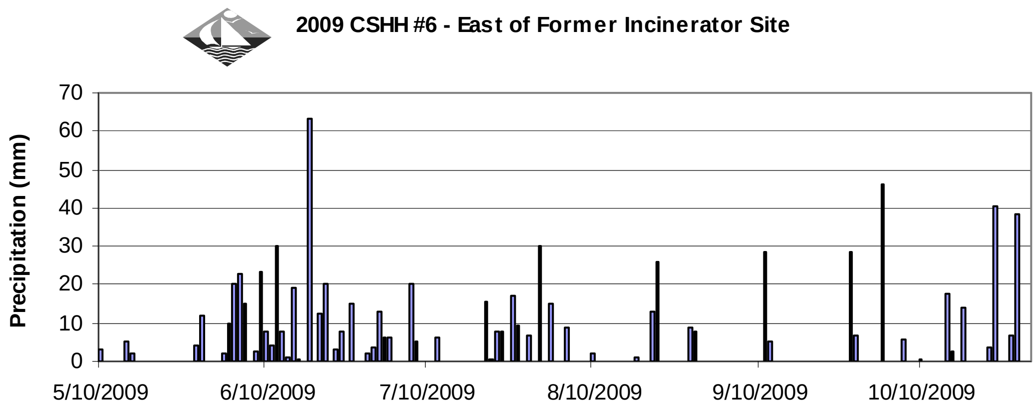
2009 CSHH #4 - North Hempstead Beach (S)(former Bar Beach) Spit Creek

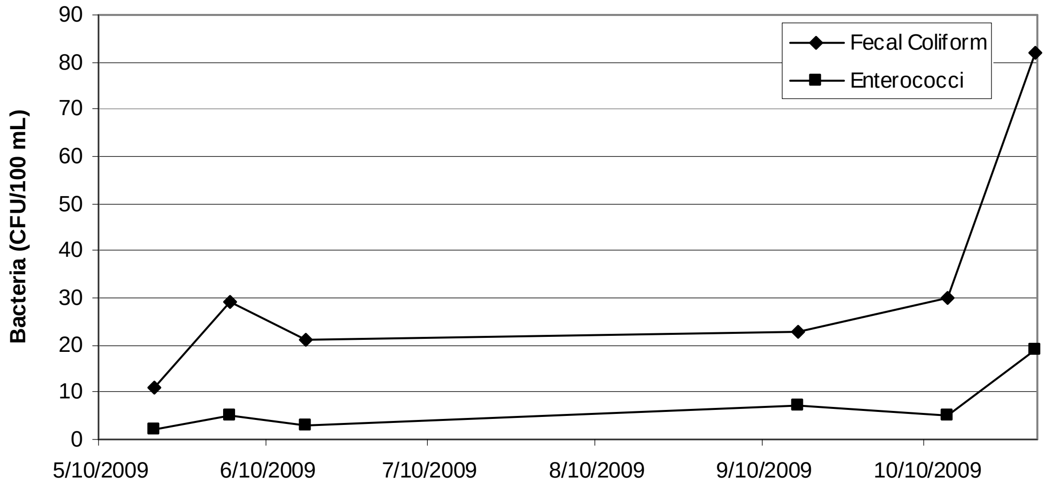


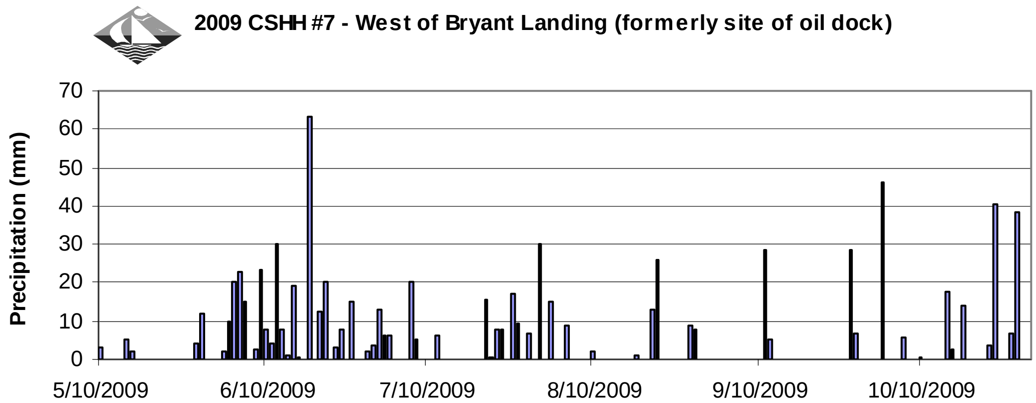


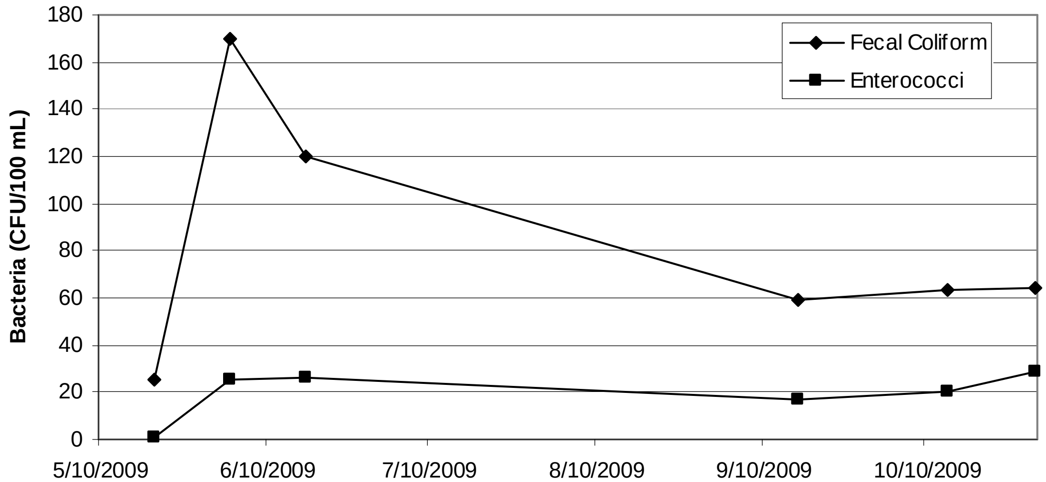

2009 CSHH #5 - Mott's Cove
Precipitation (mm)
70
60
50
40
30
20
10
0
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009
10/10/2009

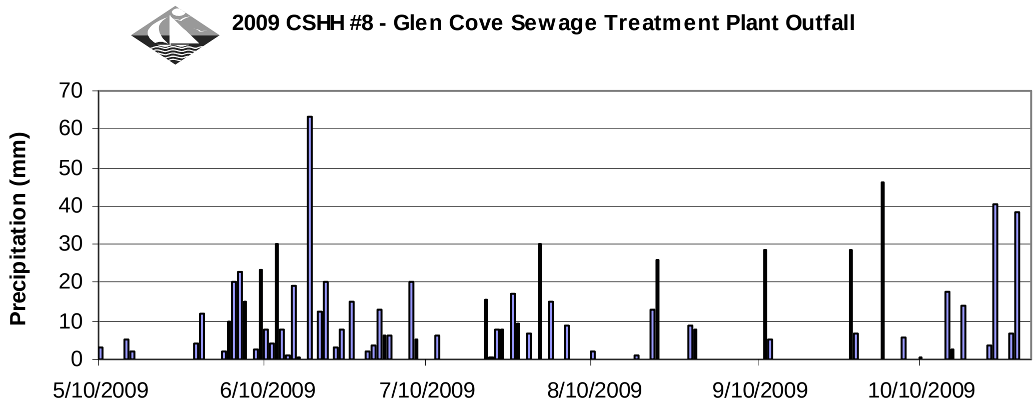

Bacteria (CFU/100 mL)
120
100
80
60
40
20
0
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009
10/10/2009
Fecal Coliform
Enterococci

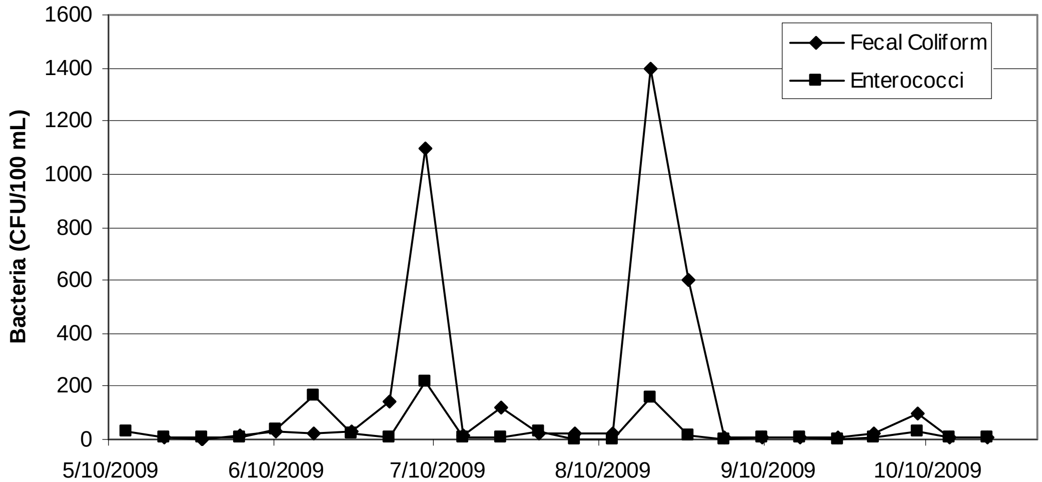

2009 CSHH #6 - East of Former Incinerator Site
Precipitation (mm)
70
60
50
40
30
20
10
0
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009
10/10/2009

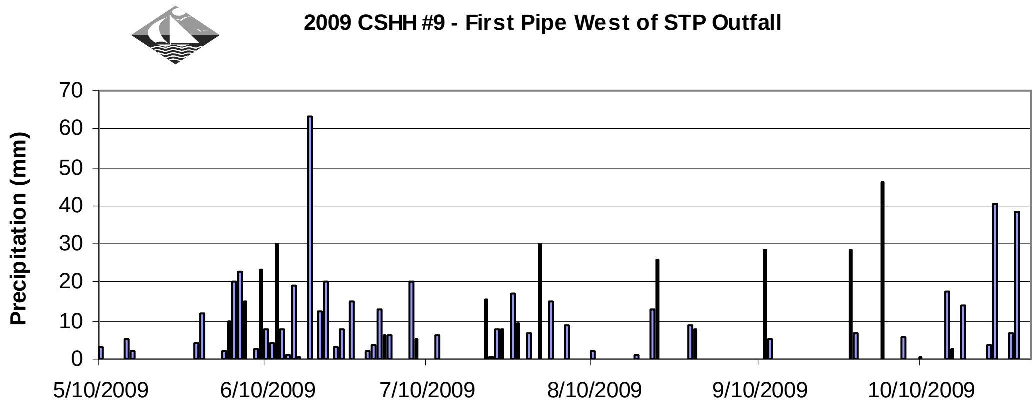

Bacteria (CFU/100 mL)
Fecal Coliform
Enterococci
90
80
70
60
50
40
30
20
10
0
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009
10/10/2009

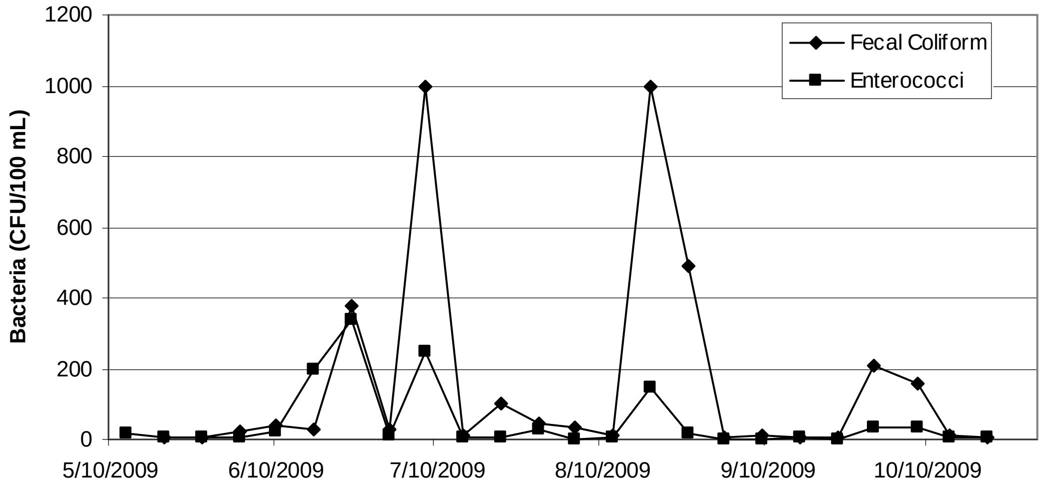

2009 CSHH #7 - West of Bryant Landing (formerly site of oil dock)
Precipitation (mm)
70
60
50
40
30
20
10
0
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009
10/10/2009


Bacteria (CFU/100 mL)
180
160
140
120
100
80
60
40
20
0
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009
10/10/2009
Fecal Coliform
Enterococci

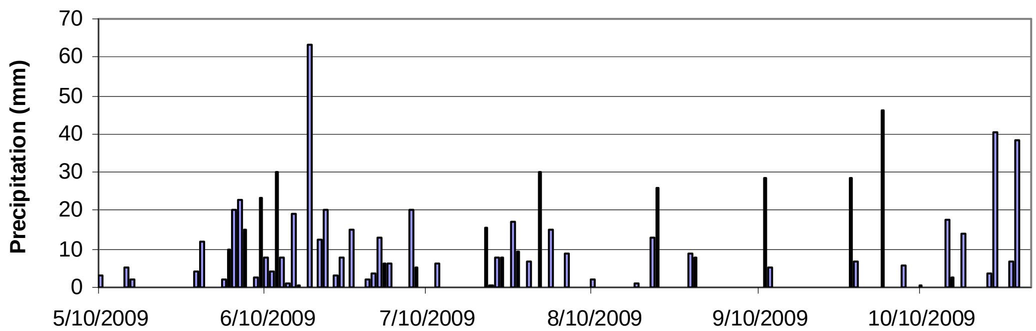

2009 CSHH #8 - Glen Cove Sewage Treatment Plant Outfall
Precipitation (mm)
70
60
50
40
30
20
10
0
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009
10/10/2009

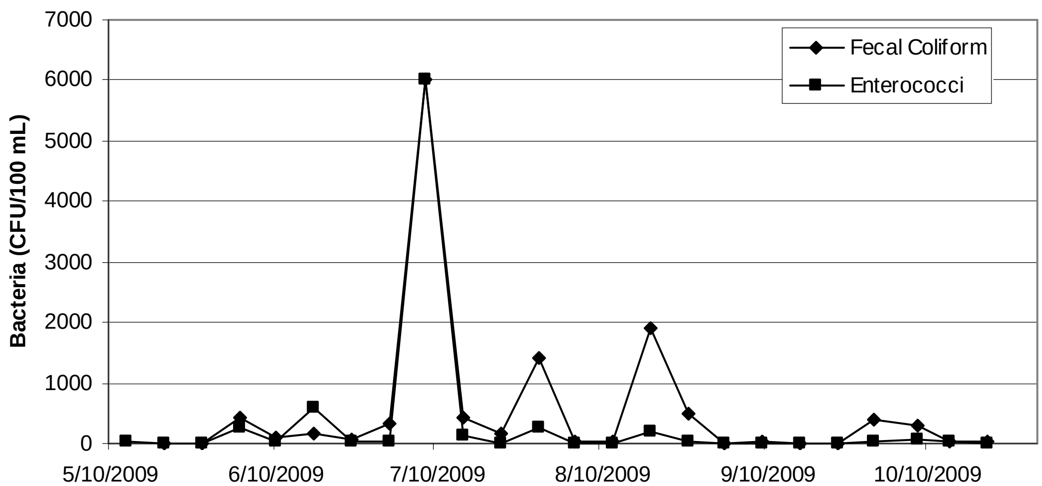

Bacteria (CFU/100 mL)
1600
1400
1200
1000
800
600
400
200
0
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009
10/10/2009
Fecal Coliform
Enterococci


2009 CSHH #9 - First Pipe West of STP Outfall
Precipitation (mm)
70
60
50
40
30
20
10
0
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009
10/10/2009

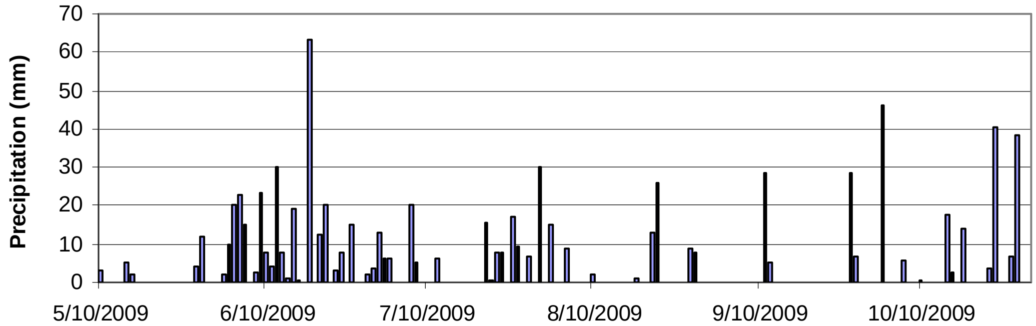

Bacteria (CFU/100 mL)
1200
1000
800
600
400
200
0
Fecal Coliform
Enterococci
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009
10/10/2009

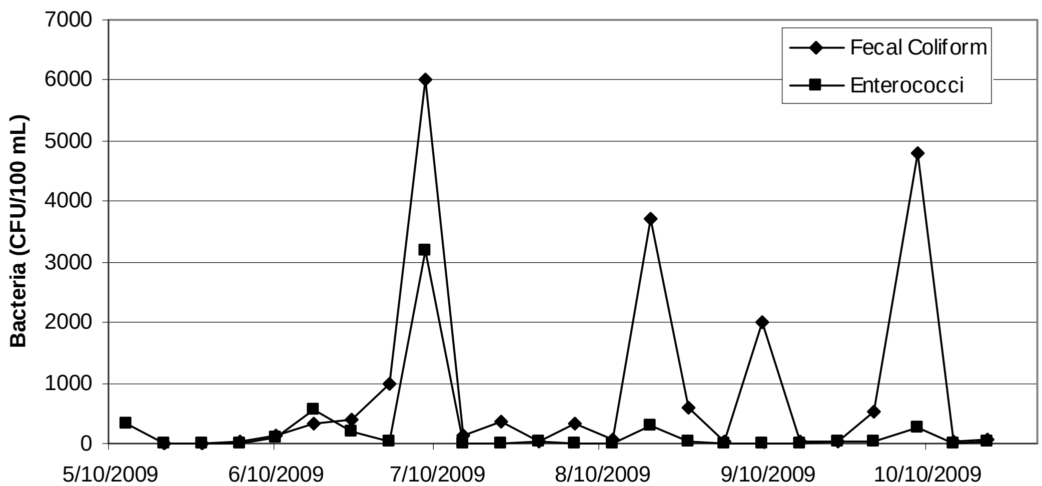
2009 CSHH #10 -Pipe at Corner of Seawall, West of STP Outfall



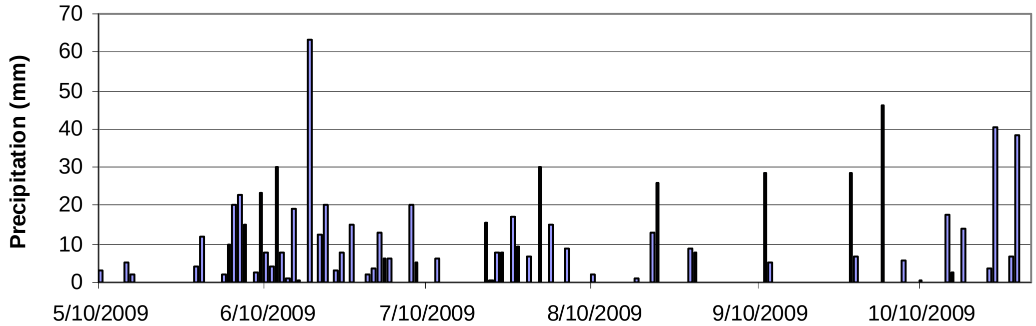


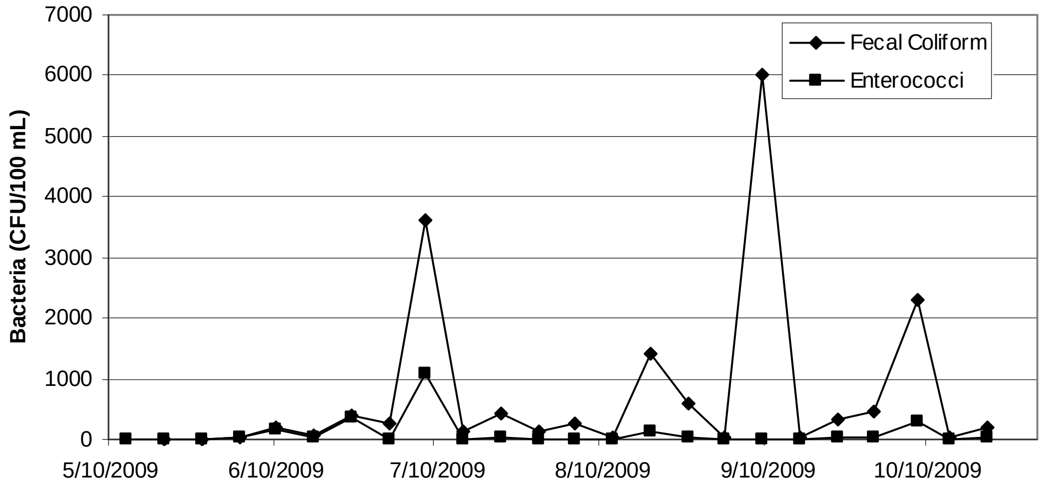
2009 CSHH #11 - 50 Yards East of STP Outfall



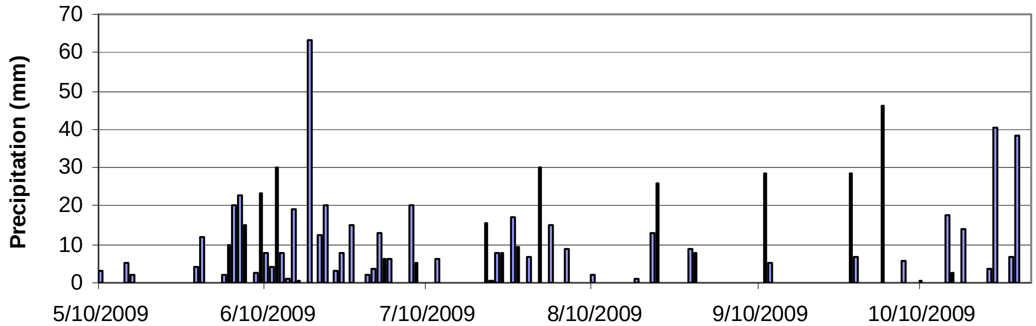


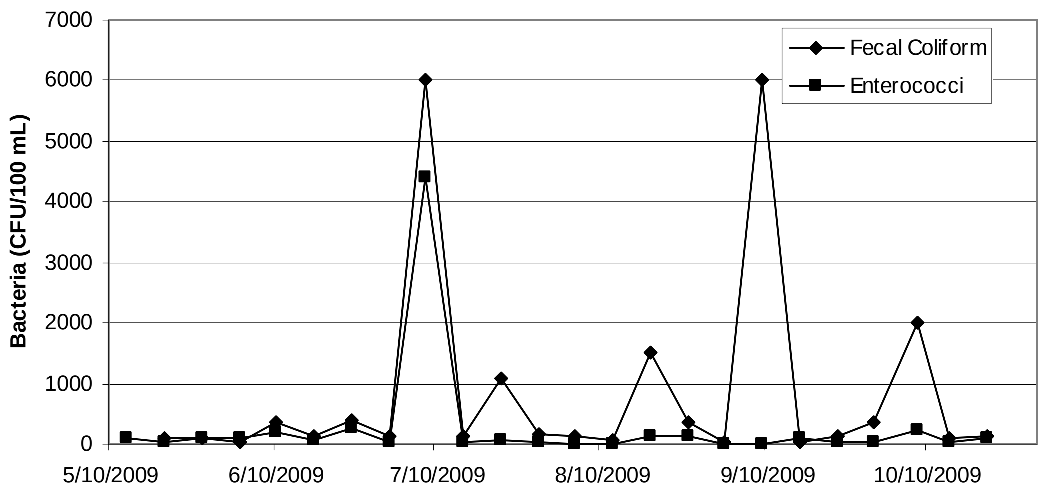
2009 CSHH #12 - East of STP Outfall, By Bend in Seawall





2009 CSHH #13 - 60' West of the Mill Pond Weir





CSHH #1 - Beacon 11

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml**	**Log AvgFC**	**CFU/100ml**	**Log AvgEnt**
5/13/09	---	---	5.00	0.00
5/20/09	7.00	5.92	0.10	0.71
5/27/09	17.00	8.41	8.00	1.59
6/3/09	6.00	7.73	1.00	1.41
6/10/09	53.00	11.36	25.00	2.51
6/17/09	9.00	12.78	3.00	2.27
6/24/09	60.00	19.64	13.00	6.00
7/1/09	15.00	19.15	1.00	3.96
7/8/09	181.00	37.85	73.00	9.34
7/15/09	26.00	32.83	1.00	4.91
7/22/09	82.00	51.07	4.00	5.20
8/5/09	9.00	43.17	0.10	2.32
8/12/09	16.00	23.54	2.00	0.95
8/19/09	82.00	31.37	24.00	2.09
8/26/09	24.00	23.07	2.00	1.76
9/2/09	6.00	17.62	1.00	1.57
9/9/09	11.00	18.35	0.10	1.57
9/16/09*	12.00	17.32	2.00	1.57
9/23/09	21.00	13.19	4.00	1.10
9/30/09	20.00	12.72	0.10	0.60
10/8/09	73.00	20.96	28.00	1.18
10/14/09	14.00	22.00	3.00	2.32
10/21/09	22.00	24.83	6.00	2.89
10/30/09	56.00	30.21	11.00	3.54

* >6hr hold time

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**
05/13/09	---	---	0.10	0.00
05/20/09	0.10	0.10	0.10	0.10
05/27/09	3.00	0.31	0.10	0.10
06/03/09	0.10	0.23	0.10	0.10
06/10/09	28.00	0.61	7.00	0.23
06/17/09	3.00	1.20	0.10	0.23
06/24/09	15.00	3.28	0.10	0.23
07/01/09	91.00	6.48	11.00	0.60
07/08/09	20.00	18.71	2.00	1.09
07/15/09	5.00	13.26	0.10	0.47
07/22/09	20.00	19.37	1.00	0.74
07/29/09	1.00	11.27	0.10	0.74
08/05/09	5.00	6.31	0.10	0.29
08/12/09	6.00	4.96	0.10	0.16
08/19/09	15.00	6.18	5.00	0.35
08/26/09	4.00	4.48	1.00	0.35
09/02/09	2.00	5.14	0.10	0.35
09/09/09	4.00	4.92	0.10	0.35
09/23/09	6.00	3.72	0.10	0.18
10/14/09	6.00	6.00	0.10	0.10
10/21/09	22.00	9.25	6.00	0.39
10/30/09	8.00	10.18	2.00	1.06

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

Date	Fecal Coliform CFU/100ml	Fecal Coliform Log AvgFC	Enterococci CFU/100ml	Enterococci Log AvgEnt
05/13/09	---	---	0.10	0.00
05/20/09	2.00	0.45	0.10	0.10
05/27/09	15.00	1.44	5.00	0.37
06/03/09	5.00	1.97	0.10	0.27
06/10/09	33.00	3.46	22.00	0.64
06/17/09	3.00	6.83	1.00	1.02
06/24/09	34.00	12.03	2.00	1.86
07/01/09	82.00	16.90	0.10	0.85
07/08/09	470.00	41.94	82.00	3.25
07/15/09	20.00	37.94	1.00	1.75
07/22/09	118.00	79.08	4.00	2.31
07/29/09	24.00	73.76	6.00	2.88
08/05/09	8.00	46.31	0.10	2.88
08/12/09	22.00	25.10	0.10	0.75
08/19/09	43.00	29.26	5.00	1.04
08/26/09	26.00	21.62	7.00	1.16
09/02/09	8.00	17.35	1.00	0.81
09/09/09	34.00	23.18	5.00	1.77
09/16/09	9.00	19.38	1.00	2.81
09/23/09	11.00	14.76	1.00	2.04
09/30/09	6.00	11.01	1.00	1.38
10/08/09	14.00	12.31	7.00	2.04
10/14/09	19.00	10.96	0.10	0.93
10/21/09	19.00	12.72	5.00	1.28
10/30/09	20.00	14.34	4.00	1.70

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

Date	Fecal Coliform CFU/100ml	Fecal Coliform Log AvgFC	Enterococci CFU/100ml	Enterococci Log AvgEnt
05/20/09	2.00	0.00	1.00	0.00
06/03/09	37.00	8.60	5.00	2.24
06/17/09	34.00	13.60	3.00	2.47
07/01/09	33.00	34.63	12.00	5.65
09/16/09	14.00	0.00	1.00	0.00
10/14/09	17.00	15.43	5.00	2.24
10/30/09	58.00	31.40	15.00	8.66

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**
05/20/09	9.00	0.00	2.00	0.00
06/03/09	43.00	19.67	6.00	3.46
06/17/09	13.00	17.14	2.00	2.88
07/01/09	91.00	37.05	17.00	5.89
09/16/09	47.00	0.00	6.00	0.00
10/14/09	26.00	34.96	5.00	5.48
10/30/09	100.00	50.99	14.00	8.37

CSHH #6 - East of the Former Incinerator Site

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml**	**Log AvgFC**	**CFU/100ml**	**Log AvgEnt**
05/20/09	11.00	0.00	2.00	0.00
06/03/09	29.00	17.86	5.00	3.16
06/17/09	21.00	18.85	3.00	3.11
09/16/09	23.00	0.00	7.00	0.00
10/14/09	30.00	26.27	5.00	5.92
10/30/09	82.00	49.60	19.00	9.75

CSHH #7 - West of Old Oil Dock

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml**	**Log AvgFC**	**CFU/100ml**	**Log AvgEnt**
5/20/09	25.00	0.00	1.00	0.00
6/3/09	170.00	65.19	25.00	5.00
6/17/09	120.00	79.90	26.00	8.66
9/16/09	59.00	0.00	17.00	0.00
10/14/09	63.00	60.97	20.00	18.44
10/30/09	64.00	63.50	29.00	24.08

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**
05/13/09	---	---	28.00	0.00
05/20/09	7.00	14.00	5.00	11.83
05/27/09	2.00	7.32	4.00	8.24
06/03/09	13.00	8.45	8.00	8.18
06/10/09	27.00	10.66	37.00	11.06
06/17/09	22.00	10.16	***164.00***	15.76
06/24/09	29.00	13.50	20.00	20.79
07/01/09	145.00	31.79	8.00	23.88
07/08/09	***1100.00***	77.23	***220.00***	46.34
07/15/09	16.00	69.56	8.00	34.11
07/22/09	118.00	97.33	10.00	19.50
07/29/09	22.00	92.10	27.00	20.70
08/05/09	26.00	65.31	2.00	15.69
08/12/09	22.00	29.87	1.00	5.33
08/19/09	***1400.00***	73.04	***155.00***	9.65
08/26/09	601.00	101.15	13.00	10.17
09/02/09	11.00	88.06	2.00	6.04
09/09/09	10.00	72.74	4.00	6.94
09/16/09	5.00	54.08	5.00	9.58
09/23/09	9.00	19.71	1.00	3.49
09/30/09	23.00	10.26	7.00	3.09
10/08/09	100.00	15.96	29.00	5.27
10/14/09	4.00	13.29	9.00	6.20
10/21/09	11.00	15.56	5.00	6.20
10/30/09	14.00	16.99	39.00	12.89

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**
05/13/09	---	---	19.00	0.00
05/20/09	4.00	8.72	3.00	7.55
05/27/09	6.00	7.70	4.00	6.11
06/03/09	23.00	10.12	6.00	6.08
06/10/09	42.00	13.45	25.00	8.07
06/17/09	26.00	14.32	***200.00***	12.92
06/24/09	380.00	35.61	***340.00***	33.28
07/01/09	26.00	47.75	9.00	***39.14***
07/08/09	***1000.00***	101.53	***250.00***	***82.51***
07/15/09	13.00	80.30	6.00	***62.03***
07/22/09	100.00	105.13	7.00	31.72
07/29/09	46.00	68.92	29.00	19.39
08/05/09	33.00	72.28	1.00	12.49
08/12/09	13.00	30.33	3.00	5.16
08/19/09	***1000.00***	72.28	***145.00***	9.75
08/26/09	490.00	99.33	15.00	11.36
09/02/09	7.00	68.16	0.10	3.66
09/09/09	9.00	52.56	2.00	4.20
09/16/09	8.00	47.70	3.00	4.20
09/23/09	8.00	18.16	1.00	1.55
09/30/09	210.00	15.33	31.00	1.79
10/08/09	155.00	28.48	36.00	5.82
10/14/09	9.00	28.48	5.00	6.99
10/21/09	7.00	27.73	4.00	7.41
10/30/09	14.00	31.02	16.00	12.90

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**
05/13/09	---	---	18.00	0.00
05/20/09	4.00	8.49	1.00	4.24
05/27/09	3.00	6.00	13.00	6.16
06/03/09	430.00	17.46	***250.00***	15.55
06/10/09	90.00	24.23	37.00	18.50
06/17/09	170.00	37.97	***601.00***	***37.31***
06/24/09	82.00	69.47	33.00	***75.07***
07/01/09	340.00	178.93	38.00	***93.04***
07/08/09	***6001.00***	***303.14***	***6001.00***	***175.68***
07/15/09	440.00	***416.37***	***145.00***	***230.86***
07/22/09	164.00	***413.39***	8.00	***97.32***
07/29/09	***1400.00***	***729.16***	***260.00***	***147.06***
08/05/09	29.00	***445.67***	5.00	***98.02***
08/12/09	24.00	147.71	14.00	29.17
08/19/09	***1900.00***	197.91	***210.00***	31.41
08/26/09	480.00	***245.33***	22.00	***38.45***
09/02/09	10.00	91.31	2.00	14.53
09/09/09	28.00	90.67	2.00	12.09
9/16/09	3.00	59.82	8.00	10.81
09/23/09	10.00	20.95	3.00	4.62
09/30/09	390.00	20.09	25.00	4.74
10/08/09	280.00	39.13	56.00	9.24
10/14/09	29.00	39.40	46.00	17.29
10/21/09	20.00	57.59	3.00	14.21
10/30/09	14.00	61.60	16.00	19.86

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 #11 - 50 Yards East of STP Outfall

	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml**	**Log AvgFC**	**CFU/100ml**	**Log AvgEnt**
05/13/09	---	---	***320.00***	0.00
05/20/09	14.00	66.93	0.10	5.66
05/27/09	12.00	37.74	8.00	6.35
06/03/09	27.00	34.71	14.00	7.74
06/10/09	118.00	44.33	110.00	13.16
06/17/09	320.00	44.33	***560.00***	14.71
06/24/09	390.00	86.24	***182.00***	***66.03***
07/01/09	***1000.00***	**208.88**	30.00	***86.02***
07/08/09	***6001.00***	**615.55**	***3200.00***	***254.91***
07/15/09	136.00	**633.28**	13.00	***166.30***
07/22/09	370.00	**651.94**	8.00	***71.10***
07/29/09	28.00	**384.97**	18.00	***44.76***
08/05/09	320.00	**306.52**	4.00	29.92
08/12/09	58.00	121.20	5.00	8.22
08/19/09	***3700.00***	***234.65***	***300.00***	15.39
08/26/09	601.00	***258.56***	25.00	19.33
09/02/09	29.00	***260.38***	0.10	6.84
09/09/09	***2000.00***	***375.65***	1.00	5.19
09/16/09	22.00	***309.45***	13.00	6.28
09/23/09	47.00	129.23	28.00	3.91
09/30/09	530.00	126.02	48.00	4.45
10/08/09	***4800.00***	***350.12***	***270.00***	21.61
10/15/09	39.00	159.30	12.00	***35.53***
10/21/09	50.00	187.73	19.00	***38.33***
10/30/09	21.00	159.79	24.00	***37.17***

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**
05/13/09	---	---	2.00	0.00
05/20/09	7.00	3.74	0.10	0.45
05/27/09	14.00	5.81	8.00	1.17
06/03/09	34.00	9.04	17.00	2.28
06/10/09	191.00	16.63	***160.00***	5.34
06/17/09	58.00	32.62	22.00	8.63
06/24/09	380.00	72.51	***370.00***	***44.63***
07/01/09	270.00	131.04	13.00	***49.18***
07/08/09	**3600.00**	***332.95***	***1100.00***	***113.24***
07/15/09	145.00	***315.10***	0.10	25.89
07/22/09	420.00	***468.18***	23.00	26.12
07/29/09	127.00	***376.03***	15.00	13.76
08/05/09	260.00	***373.20***	0.10	5.20
08/12/09	39.00	150.97	0.10	0.81
08/19/09	**1400.00**	***237.60***	***118.00***	3.33
08/26/09	601.00	***255.25***	25.00	3.38
09/02/09	27.00	187.28	0.10	1.24
09/09/09	**6001.00**	***350.86***	15.00	3.38
09/16/09	25.00	***321.00***	13.00	8.95
09/23/09	320.00	***238.95***	27.00	6.67
09/30/09	450.00	***225.52***	43.00	7.43
10/08/09	**2300.00**	***548.59***	***310.00***	***37.09***
10/14/09	48.00	***208.86***	9.00	33.49
10/21/09	182.00	***310.66***	43.00	***42.54***
10/30/09	36.00	***200.68***	20.00	***40.06***

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.

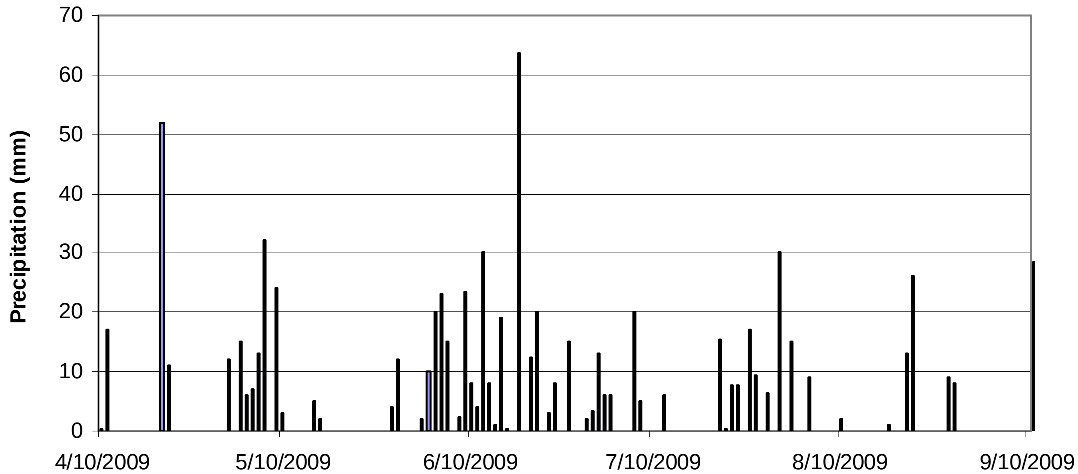
CSHH #13 – 60 Feet Downstream of Mill Pond Weir

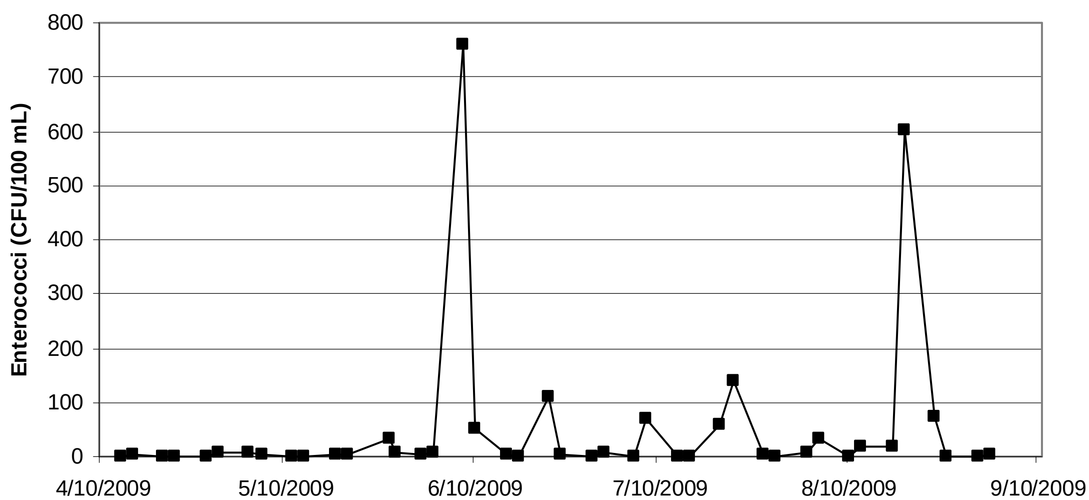
	Fecal Coliform		*Enterococci*	
Date	**CFU/100ml**	**Log AvgFC**	**CFU/100ml**	**Log AvgEnt**
5/13/09	---	---	100.00	0.00
5/20/09	93.00	96.44	34.00	***58.31***
5/27/09	110.00	100.76	100.00	***69.80***
6/3/09	35.00	77.35	***110.00***	***78.20***
6/10/09	350.00	104.62	***210.00***	***95.28***
6/17/09	140.00	111.90	54.00	***84.24***
6/24/09	410.00	150.55	***270.00***	***127.49***
7/1/09	145.00	159.10	33.00	***102.14***
7/8/09	***6001.00***	***445.16***	***4400.00***	***213.59***
7/15/09	136.00	***368.48***	33.00	***147.52***
7/22/09	***1100.00***	***556.50***	60.00	***150.66***
7/29/09	164.00	***463.31***	32.00	***98.35***
8/5/09	145.00	***463.31***	2.00	***56.14***
8/12/09	52.00	179.24	1.00	10.49
8/19/09	***1500.00***	***289.69***	***145.00***	14.10
8/26/09	350.00	***230.40***	***140.00***	16.70
9/2/09	31.00	165.11	2.00	9.59
9/9/09	***6001.00***	***347.66***	5.00	11.52
9/16/09	31.00	***313.49***	90.00	28.34
9/23/09	120.00	189.16	17.00	18.46
9/30/09	350.00	189.16	43.00	14.58
10/8/09*	***2000.00***	***435.28***	***220.00***	***37.32***
10/14/09	109.00	195.26	23.00	***50.64***
10/21/09	145.00	***265.84***	***109.00***	***52.61***
10/30/09	145.00	***276.09***	91.00	***73.59***

* ~80 yds away from Mill Pond weir-very low tide

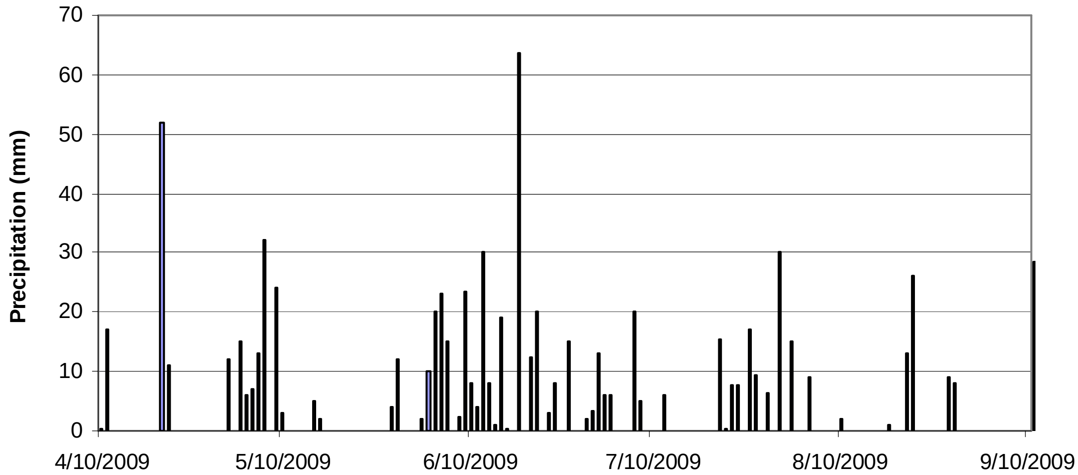
Note: CFU refers to the number of colony forming units, or the number of bacterial cells in the water sample. Log AvgFC (log average for fecal coliform) and Log AvgEnt (log average for enterococci) refer to the running seasonal average of bacteria results at each location. Boldfaced, italicized values 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.

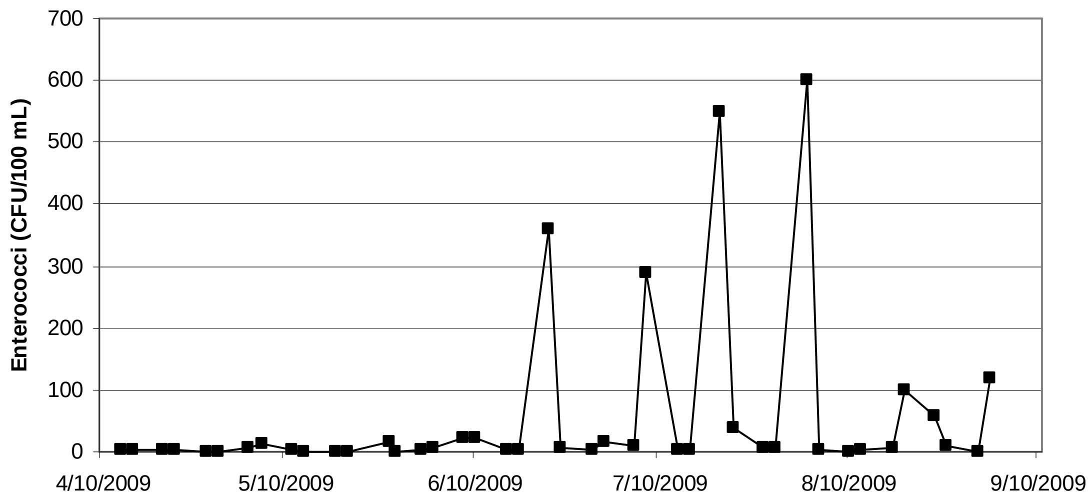
2009 NSB #2 - Village Club at Sands Point Beach

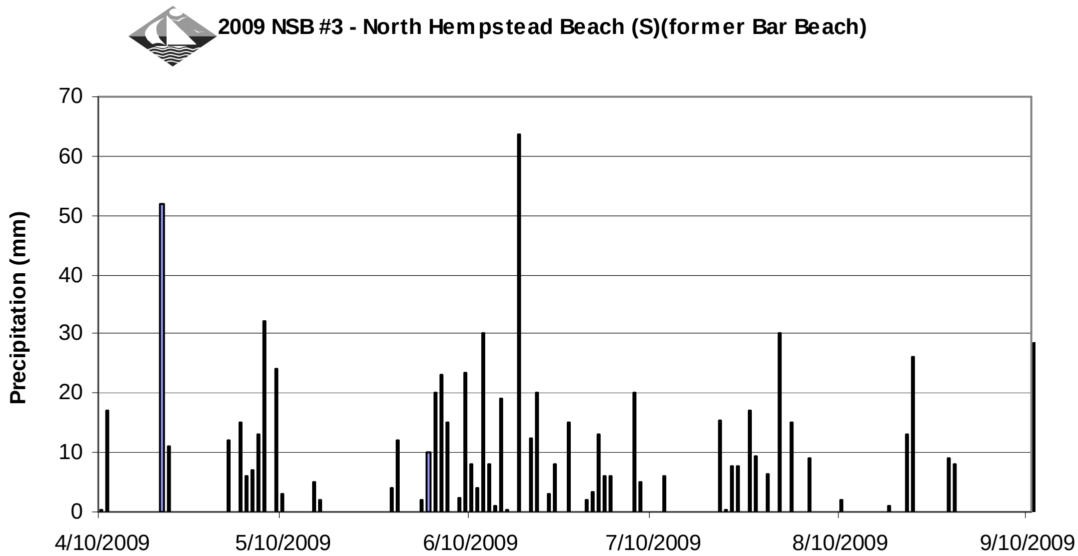


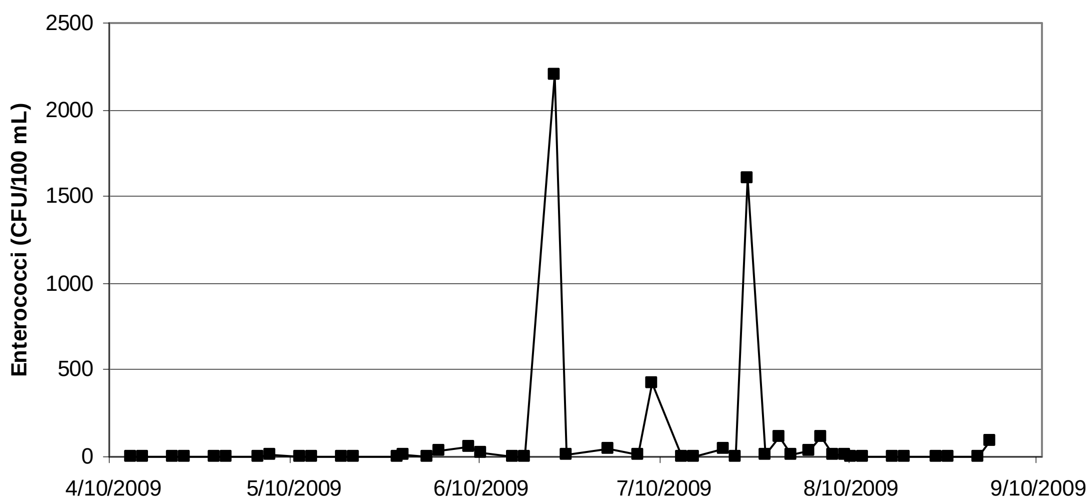


2009 NSB #4 - North Hempstead Beach (N)(former Hempstead Harbor Beach)

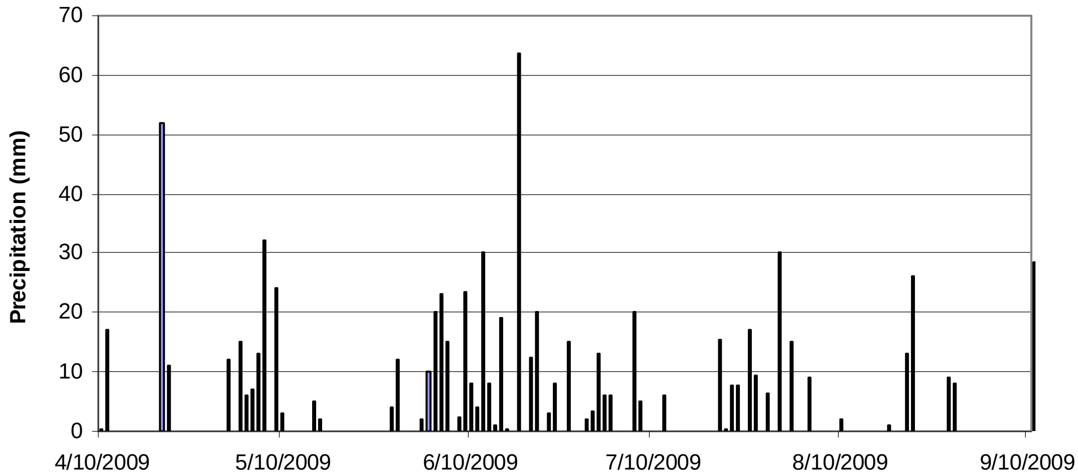


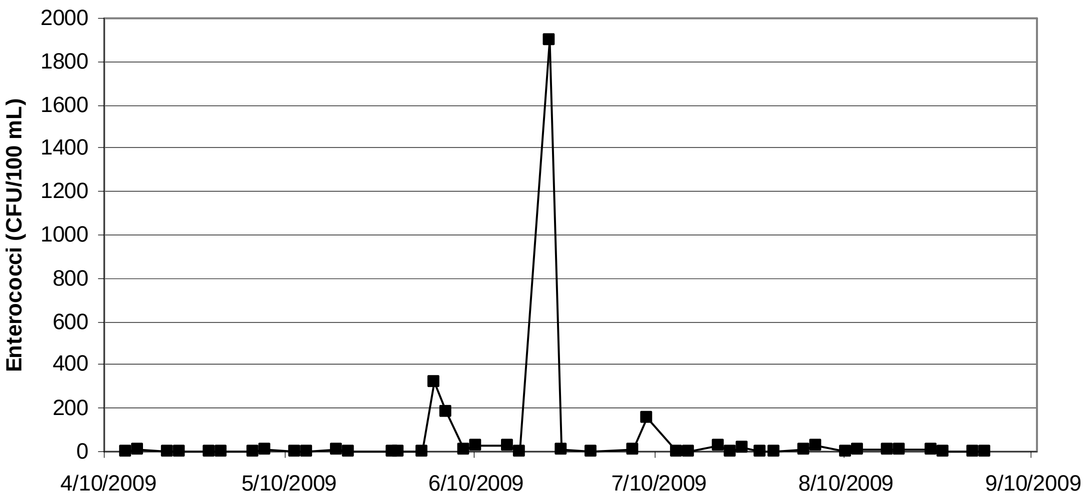



2009 NSB #3 - North Hempstead Beach (S)(former Bar Beach)
Precipitation (mm)
70
60
50
40
30
20
10
0
4/10/2009
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009

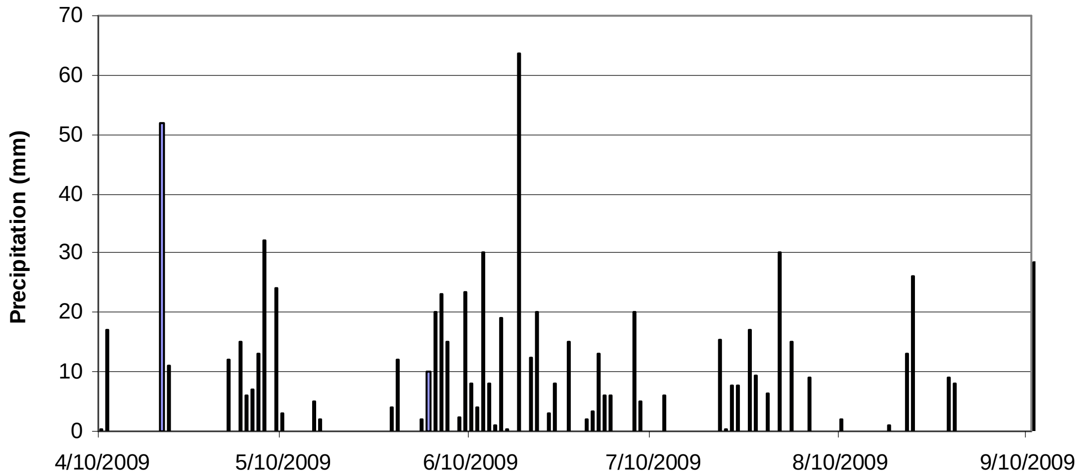

Enterococci (CFU/100 mL)
2500
2000
1500
1000
500
0
4/10/2009
5/10/2009
6/10/2009
7/10/2009
8/10/2009
9/10/2009

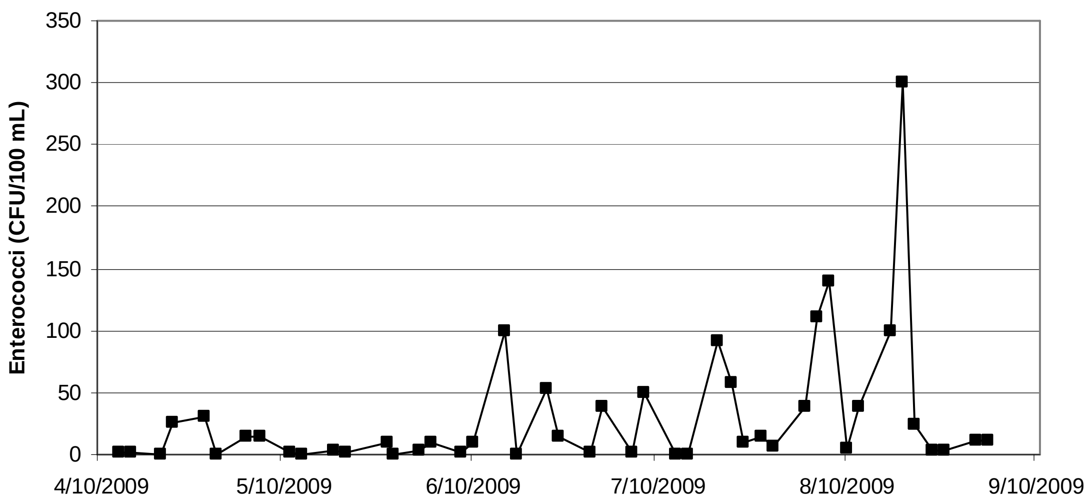
2009 NSB #5 - Tappen Beach





2009 NSB #6 - Sea Cliff Beach





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

Date	*Enterococci* CFU/100ml.	Log AvgEnt
04/13/09	1.00	0.00
04/15/09	4.00	2.00
04/20/09	0.10	0.74
04/22/09	0.10	0.45
04/27/09	1.00	0.53
04/29/09	7.00	0.81
05/04/09	7.00	1.10
05/06/09	2.00	1.19
05/11/09	0.10	0.90
05/13/09	0.10	0.72
05/18/09	3.00	0.68
05/20/09	3.00	0.78
05/27/09	32.00	1.87
05/28/09	7.00	2.32
06/01/09	2.00	2.02
06/03/09	9.00	2.35
06/08/09	***760.00***	4.02
06/10/09	50.00	5.18
06/15/09	5.00	12.39
06/17/09	0.10	7.65
06/22/09	***109.00***	12.66
06/24/09	3.00	10.96
06/29/09	0.10	6.07
07/01/09	7.00	6.16
07/06/09	0.10	4.23
07/08/09	70.00	5.60
07/13/09	0.10	1.63
07/15/09	0.10	1.23
07/20/09	57.00	2.13
07/22/09	***140.00***	3.24
07/27/09	4.00	2.26
07/29/09	1.00	2.09
08/03/09	7.00	2.92
08/05/09	34.00	3.74
08/10/09	1.00	3.49
08/12/09	20.00	4.15
08/17/09	18.00	11.18
08/19/09	***601.00***	16.66
08/24/09	73.00	13.51
08/26/09	1.00	10.42
08/31/09	1.00	11.59
09/02/09	4.00	10.42

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**
04/13/09	2.00	0.00
04/15/09	2.00	2.00
04/20/09	2.00	2.00
04/22/09	2.00	2.00
04/27/09	1.00	1.74
04/29/09	0.10	1.08
05/04/09	8.00	1.44
05/06/09	13.00	1.90
05/11/09	2.00	1.91
05/13/09	0.10	1.42
05/18/09	0.10	0.98
05/20/09	0.10	0.78
05/27/09	17.00	0.89
05/28/09	1.00	0.89
06/01/09	2.00	1.24
06/03/09	5.00	1.43
06/08/09	21.00	1.24
06/10/09	22.00	1.66
06/15/09	2.00	2.27
06/17/09	3.00	2.33
06/22/09	***360.00***	8.21
06/24/09	7.00	8.08
06/29/09	3.00	8.41
07/01/09	16.00	8.96
07/06/09	11.00	11.56
07/08/09	***290.00***	15.96
07/13/09	3.00	12.40
07/15/09	2.00	10.33
07/20/09	***550.00***	22.13
07/22/09	40.00	23.48
07/27/09	7.00	17.34
07/29/09	7.00	15.83
08/03/09	***600.00***	28.49
08/05/09	2.00	21.85
08/10/09	0.10	9.72
08/12/09	3.00	8.64
08/17/09	5.00	10.76
08/19/09	100.00	13.45
08/24/09	57.00	9.26
08/26/09	9.00	9.24
08/31/09	0.10	5.94
09/02/09	***120.00***	8.03

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
04/13/09	2.00	0.00
04/15/09	0.10	0.45
04/20/09	0.10	0.27
04/22/09	1.00	0.38
04/27/09	2.00	0.53
04/29/09	4.00	0.74
05/04/09	5.00	0.97
05/06/09	11.00	1.31
05/11/09	2.00	1.38
05/13/09	3.00	1.49
05/18/09	2.00	2.01
05/20/09	0.10	1.49
05/27/09	2.00	2.17
05/28/09	8.00	2.53
06/01/09	2.00	2.34
06/03/09	35.00	3.07
06/08/09	55.00	3.48
06/10/09	21.00	4.16
06/15/09	3.00	4.51
06/17/09	4.00	4.46
06/22/09	***2200.00***	14.80
06/24/09	7.00	13.74
07/01/09	49.00	20.81
07/06/09	6.00	22.37
07/08/09	***430.00***	31.07
07/13/09	5.00	24.18
07/15/09	0.10	13.14
07/20/09	41.00	21.14
07/22/09	5.00	18.01
07/24/09	***1600.00***	17.39
07/27/09	15.00	18.92
07/29/09	***110.00***	22.56
07/31/09	10.00	20.95
08/03/09	37.00	20.43
08/05/09	***110.00***	23.50
08/07/09	8.00	24.07
08/09/09	7.00	17.08
08/10/09	3.00	14.94
08/12/09	1.00	12.32
08/17/09	5.00	17.84
08/19/09	5.00	16.29
08/24/09	4.00	10.10
08/26/09	2.00	8.92
08/31/09	3.00	6.07
09/02/09	90.00	7.60

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**
04/13/09	3.00	0.00
04/15/09	5.00	3.87
04/20/09	3.00	3.56
04/22/09	1.00	2.59
04/27/09	3.00	2.67
04/29/09	0.10	1.54
05/04/09	4.00	1.77
05/06/09	12.00	2.25
05/11/09	2.00	2.22
05/13/09	0.10	1.63
05/18/09	9.00	1.62
05/20/09	0.10	1.23
05/27/09	2.00	1.20
05/28/09	3.00	1.20
06/01/09	2.00	1.67
06/03/09	***320.00***	2.83
06/05/09	***180.00***	4.14
06/08/09	8.00	3.98
06/10/09	29.00	4.77
06/15/09	26.00	9.07
06/17/09	1.00	7.42
06/22/09	***1900.00***	19.49
06/24/09	7.00	17.76
06/29/09	0.10	15.72
07/06/09	5.00	8.92
07/08/09	***160.00***	12.29
07/13/09	0.10	6.39
07/15/09	0.10	4.02
07/20/09	23.00	4.72
07/22/09	4.00	4.63
07/24/09	14.00	2.68
07/27/09	1.00	2.16
07/29/09	2.00	2.14
08/03/09	7.00	3.28
08/05/09	26.00	3.96
08/10/09	0.10	1.85
08/12/09	5.00	2.02
08/17/09	5.00	4.04
08/19/09	13.00	4.50
08/24/09	10.00	3.66
08/26/09	0.10	2.55
08/31/09	0.10	2.03
09/02/09	0.10	1.50

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
04/13/09	1.00	0.00
04/15/09	1.00	1.00
04/20/09	0.10	0.46
04/22/09	26.00	1.27
04/27/09	30.00	2.39
04/29/09	0.10	1.41
05/04/09	15.00	1.97
05/06/09	15.00	2.54
05/11/09	2.00	2.48
05/13/09	0.10	1.80
05/18/09	3.00	2.17
05/20/09	1.00	2.01
05/27/09	10.00	2.52
05/28/09	0.10	1.34
06/01/09	3.00	1.95
06/03/09	10.00	2.29
06/08/09	1.00	1.38
06/10/09	10.00	1.68
06/15/09	100.00	3.55
06/17/09	0.10	2.49
06/22/09	53.00	3.78
06/24/09	14.00	4.31
06/29/09	2.00	5.48
07/01/09	38.00	6.65
07/06/09	1.00	5.63
07/08/09	49.00	6.98
07/13/09	0.10	5.20
07/15/09	0.10	3.50
07/20/09	91.00	5.14
07/22/09	57.00	6.54
07/24/09	9.00	5.48
07/27/09	15.00	5.52
07/29/09	6.00	5.56
08/03/09	38.00	6.16
08/05/09	***110.00***	8.00
08/07/09	***140.00***	12.54
08/10/09	5.00	10.19
08/12/09	38.00	11.37
08/17/09	100.00	32.76
08/19/09	**300.00**	***39.40***
08/21/09	24.00	***35.26***
08/24/09	3.00	30.55
08/26/09	4.00	25.79
08/31/09	12.00	28.85
09/02/09	11.00	26.62

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.

MO/DAY	**AMT(MM)***	**MO/DAY**	**AMT(MM)***	**MO/DAY**	**AMT(MM)***	**MO/DAY**	**AMT(MM)***	**MO/DAY**	**AMT(MM)***
JAN		**(May cont'd)**		**(June cont'd)**		**(August cont'd)**		**NOV**	
FEB		27	trace	29	2	21	13C	1	2
MAR		28	4	30	3.5	22	26A	5	trace
		29	12	**Total**	**294**	23	trace	11	trace
APR		**Total**	**135**			28	9	12	4.5
1	3			**JULY**		29	8	13	4.5
2	3	**JUNE**		1	13	**Total**	**83**	14	16.5
3	17	2	2	2-3	12			15	0.5
6	15	3	10	7	20C	**Sept**		19	1.5
10	0.5	4	20A	8	5	11	28.5	20	22
11	17	5	23B	12	6	12	5	23	trace
20	52	6**	15C	17	trace	27	28.5	24	0.5
21	11	8	2.5	21	15.5	28	7	25	1.5
28	trace	9	23.5	22	0.5	**Total**	**69**	27	2
Total	**118.5**	10	8	23-24	15.5C			30	6.5
		11	4	25	trace	**OCT**		**Total**	**62**
MAY		12	30A	26	17C	3	46		
1	12	13	8	27	9.5	7	5.5	**DEC**	
3	15	14	1	29	6.5	10	0.5	2, 3	26.5
4	6	15	19A	31	30A	13	trace	5	21.5
5	7	16	0.5	**Total**	**150.5**	15	17.5	9	43
6	13	18	63.5B			16	2.5	Tracking ended	
7	32A	20	12.5	**August**		18	14		
9	24A	21	20	2	15B	23	3.5		
10	3	22	trace	5	9	24	40.5		
12	trace	23	3	6	trace	27	6.5		
15	5	24	8	10	2	28	38.5		
16	2	25	trace	18	1	**Total**	**175**		
		26	15						

*Rainfall is recorded from midnight to midnight.
**Administrative beach closures (Sea Cliff Village Beach): 6/6 (reopened 6/7), 6/21 (reopened 6/22), 7/1 (reopened 7/2), 7/8 (reopened 7/9), 7/24 (reopened 7/25), 7/27 (reopened 7/28), 8/1 (reopened 8/2), 8/22 (reopened 8/23), 8/29 (reopened 8/30).
"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.

APPENDIX C

Summary Tables for 2009 and Previous Seasons

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*

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.

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

	2009				
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Turbidity (NTUs) (0.5 m)
May	14.15	8.33	24.54	14.37	1.95
June	17.93	7.29	24.00	18.73	2.11
July	21.06	5.67	23.99	23.30	1.88
Aug.	23.40	3.71	24.55	25.68	2.81
Sept.	21.33	5.31	24.80	19.24	3.46
Oct.	14.60	7.07	24.75	11.53	2.93
Average	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

	2009				
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Turbidity (NTUs) (0.5 m)
May	12.90	7.94	25.16	16.40	1.88
June	16.79	6.58	24.73	19.50	2.45
July	18.93	3.80	24.90	23.84	1.39
Aug.	21.43	1.34	25.28	25.78	1.94
Sept.	21.70	6.17	25.16	21.53	2.38
Oct.	14.66	7.90	25.64	12.47	1.58
Average	17.73	5.62	25.15	19.92	1.93

	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	12.13	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				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	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

	2009				
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Turbidity (NTUs) (0.5 m)
May	14.10	9.22	24.71	17.40	2.00
June	17.60	7.83	24.38	20.40	1.68
July	20.50	5.56	24.46	24.54	1.80
Aug.	23.13	5.62	24.76	26.83	2.64
Sept.	21.27	5.54	25.10	19.64	3.13
Oct.	14.98	7.76	25.27	13.80	2.28
Average	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. Turbidity (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				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	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				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	19.05	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				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	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

	2009				
	Avg. Water Temp. (°C) (Bottom)	Avg. DO (ppm) (Bottom)	Avg. Salinity (ppt) (Bottom)	Avg. Air Temp. (°C)	Avg. Turbidity (NTUs) (0.5 m)
May	14.49	8.46	24.62	19.37	2.78
June	18.08	7.71	24.22	20.85	1.74
July	21.12	5.23	24.26	25.86	2.58
Aug.	24.01	6.65	24.44	28.20	4.27
Sept.	21.38	6.21	24.74	20.46	3.15
Oct.	15.14	7.03	25.00	14.08	2.88
Average	19.04	6.88	24.55	21.47	2.90

	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	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				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	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
2009	24.22 ppt	24.87 ppt	24.54 ppt	23.68 ppt
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
2009	294 mm	150.5 mm	83 mm	69 mm	175 mm
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	***2009***	***2008***	***2007***	***2006***	***2005***	***2004***	***2003***
Beacon 11, CSHH #1	6.09 ppm	5.50 ppm	4.99 ppm	5.8 ppm	4.59 ppm	4.94 ppm	4.63 ppm
Bell Buoy 6, CSHH #2	5.30	5.31	5.37	5.3	4.63	5.57	4.55
Glen Cove Creek, Red Channel Marker, CSHH #3	6.72	6.35	6.02	6.8	5.09	5.76	5.21
Glen Cove STP Outfall, CSHH #8	6.73	5.73	5.93	7.0	5.76	6.22	5.28

Averages for Bottom DO	***2002***	***2001***	***2000***	***1999***	***1998***	***1997***	***1996***
Beacon 11, CSHH #1	4.64 ppm	5.16 ppm	5.64 ppm	5.85 ppm	5.17 ppm	4.39 ppm	5.90 ppm
Bell Buoy 6, CSHH #2	5.11	5.46	6.10	5.44	5.45	4.54	7.11
Glen Cove Creek, Red Channel Marker, CSHH #3	5.20	6.47	6.54	6.32	6.48	5.15	7.45
Glen Cove STP Outfall, CSHH #8	6.11	6.82	7.35	7.14	N/A	N/A	N/A

APPENDIX D

2009 NYSDEC Hempstead Harbor Bacteria Data

SGA #50 Hempstead Harbor. Evaluation of Fecal Coliform Data 2009 to date. FC values are MPN/100ml

DATE	FC_1 DEC-1	FC_2 DEC-2	FC_3 DEC-3	FC_4 DEC-4	FC_5 DEC-5	FC_6 DEC-6	FC_7 DEC-7	FC_8 DEC-8	FC_9 DEC-9	FC_10 DEC-10
8/5/09	3.6	3.6	9.1	9.1	***240.0***	28.0	43.0	23.0	3.6	9.1
8/12/09	23.0	43.0	23.0	3.6	3.6	43.0	43.0	***93.0***	***75.0***	***240.0***
8/19/09	***93.0***	***93.0***	43.0	43.0	23.0	***93.0***	2.9	3.6	2.9	9.1
8/26/09	9.1	43.0	3.6	3.6	23.0	3.6	***1201.0***	***1100.0***	***150.0***	***460.0***
8/31/09	9.1	43.0	***240.0***	9.1	9.1	9.1	9.1	9.1	43.0	7.3
9/2/09	7.3	15.0	23.0	9.1	2.9	3.6	3.6	3.6	***93.0***	2.9
9/9/09	9.1	9.1	23.0	***93.0***	3.6	9.1	9.1	***240.0***	43.0	***93.0***
9/14/09	***93.0***	43.0	***93.0***	***460.0***	43.0	23.0	7.3	23.0	9.1	7.3
9/16/09	9.1	23.0	39.0	***93.0***	21.0	23.0	23.0	15.0	23.0	23.0
9/20/09	2.9	9.1	43.0	43.0	23.0	23.0	15.0			
9/22/09	43.0	7.3	***460.0***	9.1	23.0	23.0	43.0			
9/23/09	23.0	***240.0***	9.1	43.0	23.0	15.0	7.3	***240.0***	***93.0***	***150.0***
9/28/09	***150.0***	***93.0***	***240.0***	***240.0***	***240.0***	***240.0***	43.0	***1201.0***	11.0	43.0
9/30/09	9.1	43.0	23.0	9.1	14.0	23.0	7.3	23.0	15.0	43.0
10/5/09	***460.0***	***240.0***	***240.0***	***93.0***	***93.0***	***75.0***	***1100.0***			
10/6/09	***93.0***	***240.0***	***240.0***	43.0	43.0	23.0	***240.0***			
10/8/09	***93.0***	43.0	43.0	***240.0***	29.0	9.1	9.1	***1201.0***	***240.0***	***1100.0***
10/13/09	43.0	***93.0***	23.0	43.0	9.1	9.1	9.1	15.0	9.1	2.9
10/14/09	43.0	23.0	43.0	23.0	23.0	9.1	23.0	3.6	3.6	9.1
10/19/09	***240.0***	43.0	***240.0***	***240.0***	***150.0***	***93.0***	23.0	43.0	43.0	7.3
10/20/09	9.1	21.0	43.0	23.0	3.6	43.0	***93.0***			
10/27/09	23.0	***93.0***	43.0	93.0	43.0	43.0	43.0	***93.0***	43.0	***93.0***
10/28/09	***240.0***	***240.0***	43.0	***120.0***	43.0	***93.0***	***93.0***	***460.0***	***93.0***	15.0
11/2/09	23.0	15.0	***93.0***	43.0	23.0	43.0	43.0	23.0	3.6	2.9
Sample #	19	19	19	19	19	19	19	19	19	19
Geo Mean	***33.0***	***39.5***	***69.0***	***43.3***	***28.5***	***26.8***	***22.0***	***22.4***	***17.4***	11.2
90th Pcntile	***225.1***	***185.5***	***274.4***	***208.9***	***136.3***	***108.2***	***93.6***	***162.4***	***104.5***	42.2

NOTE: Values in ***bold italics*** in the dataset exceed 49 FC/100ml. A Geometric Mean in ***bold italics*** exceeds 14FC/100ml. A 90th percentile value in ***bold italics*** exceeds 49FC/100ml.
Stations with the Geometric Mean in excess of 14 FC/100ml or the 90th percentile in excess of 49 FC/100ml do not meet NYS & NSSP standards for a certified area.
Per NSSP requirements, an evaluation of FC data collected by systematic random sampling requires at least 30 data points (samples) at a w/q monitoring station.

SGA #50 Hempstead Harbor, Inner. Evaluation of Fecal Coliform Data 2009 to date. FC values are MPN/100ml (cont.)

DATE	FC_11 DEC-11	FC_12 DEC-12	FC_13 DEC-13	FC_14 DEC-14	FC_15 DEC-15	FC_15A DEC-15A	FC_15B DEC-15B	FC_1A DEC-1A	FC_STP DEC-STP
8/5/09	3.6	15.0	***1201.0***						
8/12/09	7.3								
8/19/09	9.1	***75.0***	***460.0***	***240.0***	43.0	***460.0***	***75.0***	23.0	43.0
8/26/09	***1100.0***								
8/31/09	23.0	3.6	43.0	43.0	***75.0***	43.0	***460.0***	43.0	3.6
9/2/09	2.9	9.1	23.0	9.1	23.0	***240.0***	***93.0***	23.0	3.6
9/9/09	23.0								
9/14/09	9.1	3.6	23.0	***460.0***	15.0	***460.0***	***460.0***	***240.0***	***93.0***
9/16/09	3.6	15.0	23.0	9.1	23.0	43.0	***460.0***	43.0	23.0
9/20/09									
9/22/09									
9/23/09	9.1								
9/28/09	23.0	***93.0***	***1201.0***	***240.0***	43.0	***460.0***	***1201.0***	43.0	23.0
9/30/09	3.6	3.6	***1100.0***	***460.0***	***150.0***	***150.0***	***240.0***	***75.0***	23.0
10/5/09									
10/6/09									
10/8/09	***93.0***								
10/13/09	2.9	3.6	***240.0***	43.0	23.0	43.0	***460.0***	43.0	9.1
10/14/09	9.1	23.0	***93.0***	***93.0***	23.0	***460.0***	***460.0***	***240.0***	2.9
10/19/09	3.6	9.1	***93.0***	***93.0***	***240.0***	7.3	***93.0***	***460.0***	43.0
10/20/09									
10/27/09	***93.0***	***93.0***	***1100.0***	***1201.0***	***240.0***	***460.0***	***1100.0***	***93.0***	43.0
10/28/09	43.0	***240.0***	***1201.0***	***460.0***	***93.0***	***1201.0***	***460.0***	***1100.0***	***93.0***
11/2/09	3.6	***93.0***	***93.0***	23.0	***240.0***	***240.0***	43.0	***150.0***	15.0
Sample #	19	19	19	18	14	18	17	18	18
Geo Mean	9.1	***22.0***	***229.0***	***76.5***	***60.3***	***159.1***	***286.5***	***99.3***	***23.9***
90th Pcntile	34.9	***176.6***	***1571.8***	***489.7***	***213.9***	***799.5***	***1067.1***	***511.2***	***155.6***

NOTE: Values in ***bold italics*** in the dataset exceed 49 FC/100ml. A Geometric Mean in ***bold italics*** exceeds 14FC/100ml. A 90th percentile value in ***bold italics*** exceeds 49FC/100ml.
Stations with the Geometric Mean in excess of 14 FC/100ml or the 90th percentile in excess of 49 FC/100ml do not meet NYS & NSSP standards for a certified area.
Per NSSP requirements, an evaluation of FC data collected by systematic random sampling requires at least 30 data points (samples) at a w/q monitoring station.