

**SUFFOLK COUNTY
COMPREHENSIVE
WATER RESOURCES
MANAGEMENT PLAN**

**Section 6
ESTUARY PROGRAMS**

Section 6

Estuary Programs

6.1 Introduction

An estuary is a semi-enclosed coastal body of water that connects to the open sea. It is a transition zone where saltwater from the ocean mixes with fresh water from rivers and land, an area called the watershed. The amount of fresh water flowing into the estuary varies from season to season and from year to year. This variation, together with the daily rise and fall of the tides and the consequent movement of saltwater up and down rivers, creeks, and in embayments creates a unique environment. Estuaries are among the most productive of the earth's ecosystems. More than 80 percent of all fish and shellfish species use estuaries as a primary habitat or as a spawning and nursery ground. Estuaries also provide feeding, nesting, breeding and nursery areas for a wide variety of animals.

Suffolk County borders three major estuarine systems: the Long Island Sound to its north, the South Shore Estuary to its south, and the Peconic Estuary to its east as shown on **Figure 6-1**. All three local estuary programs draw their programmatic boundaries, sometimes called study areas, differently. The Long Island Sound Study (LISS) uses the surface water divide, as defined by USGS Hydrologic Unit Code 02030201, which follows the Harbor Hill moraine through Queens, Nassau, and Suffolk Counties. The Peconic Estuary Program (PEP) boundary is based on the shallow groundwater contributing area determined by Suffolk County and the United States Geological Survey (USGS). The South Shore Estuarine Reserve (SSER) boundary was most likely determined from a combination of watersheds within the Reserve, political boundaries and transportation routes.

Each of these estuaries is unique in both physical characteristics and ecosystem composition as summarized by **Table 6-1**. Wastewater discharges to the estuaries may be found in **Appendix I**. Separately, stakeholders around each of these waterbodies recognized their significance and developed watershed-based management structures to help protect and restore them (**Table 6-2**). Both the Peconic Estuary and the Long Island Sound were nominated and subsequently designated estuaries of national significance by the US Congress, making them part of the USEPA's National Estuary Program (NEP), under the authority of the Clean Water Act. The South Shore Estuary benefits from a similar stakeholder-driven watershed-based management partnership that is designated the South Shore Estuary Reserve by New York State executive law.

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Table 6-1 Physical Characteristics of Suffolk County’s Three Main Estuaries

Water Body	Length	Surface Area	Mean Depth	Volume
Peconic/Gardiners Bays	~ 40 km	~ 110,000 acres	>> 4.0 m	~ 1.2 billion m ³
Great South Bay	~ 40 km	~ 58,000 acres	<< 2.0 m	~ 0.27 billion m ³
Long Island Sound Estuary	~ 177 km	~ 845,000 acres	~ 20 m	~ 68 billion m ³

Table 6-2 Watershed-based Management Programs in Suffolk County

Water Body	Program Founded	CCMP	Management Chair	Enabling Legislation
Peconic Estuary Program	1992	2001	US EPA	§320 Clean Water Act
South Shore Estuary Reserve	1993	2001	US EPA	Article 46 NYS Executive Law
Long Island Sound Study	1985	1991; 2014 (draft)	NYS Dept. of State	§320 Clean Water Act

Each NEP and the SSER have a Management Conference (MC) made up of diverse stakeholders including citizens, local, state, and Federal agencies, as well as non-profit, academia, and private sector entities. Using a consensus-building approach and collaborative decision-making process, each MC works closely together to implement the Comprehensive Conservation and Management Plan (CCMP). The MC ensures that the CCMP is uniquely tailored to the local environmental conditions, is based on local input, and supports local priorities.

The benefits of this watershed-based management approach are numerous, and include the ability to generate public support and leverage skills and funding for regional priorities. One study¹ found the networks in NEP areas span more levels of government, integrate more experts into policy discussions, nurture stronger interpersonal ties between stakeholders, and



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create greater faith in the procedural fairness of local policy than other comparable estuaries (Schneider et al. 2003).

Suffolk County has historically enjoyed very different levels of involvement in these three different programs. Suffolk County was the primary force behind the Peconic Estuary's nomination to the NEP. Since its inception, Suffolk County has not only been a member of the Management Conference, but also hosted the PEP program Office, and administered much of the federal funding on behalf of the program partners. Because the Peconic Estuary sits entirely within Suffolk County's borders, the county had taken a leadership role in many of its initiatives as well. Historically Suffolk County Involvement in PEP has been coordinated through the Department of Health Services.

The Long Island Sound Study is a much larger program, spanning multiple states, and Suffolk County constitutes only a small percentage of its watershed. Involvement of Long Island municipalities in the LISS is generally coordinated through New York State; Suffolk County has not historically been heavily involved in that program.

The South Shore Estuary Reserve program includes Suffolk County on its Reserve Council. In recent years, the SSER has suffered from lack of leadership after its director retired, and staff and attention have been diverted to Superstorm Sandy recovery programs for more than two years, but the NYS DOS hopes to re-invigorate this program during 2015. Historically Suffolk County involvement in SSER has been coordinated through the Department of Economic Development and Planning.

All three programs have similar missions to protect and restore the environmental quality of their respective estuaries. Although each has a long list of locally specific CCMP implementation actions, there are several elements in common, which are also common to Suffolk County's Reclaim Our Waters initiative. Primarily, those include reduction of nitrogen loading to ground and surface waters and protection and restoration of the natural infrastructure that makes our coasts resilient to the impacts of storms and climate change, such as wetlands, seagrass meadows, and healthy sustainable fisheries.

6.2 The Peconic Estuary

6.2.1 Introduction

The Peconic Estuary, situated between the North and South Forks of eastern Long Island, New York, consists of more than 100 distinct bays, harbors,

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embayments, and tributaries. The Peconic Estuary System includes the Peconic Estuary and those land areas that contribute groundwater and stormwater runoff to the Peconic River and Estuary, known as the watershed. The Peconic watershed, which includes the areas that contribute groundwater, surface water and stormwater runoff to the estuary, covers an area of 196 square miles. Over 125,000 acres of land and 158,000 acres of surface water are a part of the Peconic Study Area.

The Peconic Estuary supports commercial and recreational fin and shell fishing, although the once abundant Peconic Bay Scallop populations have decreased dramatically during the last 30 years as shown on **Figure 6-2**, resulting in a dwindling population of local “baymen” fishing the waters of the Peconic Bays. Tourism and recreation are central to the local economy, including businesses such as restaurants and marinas that cater to recreational

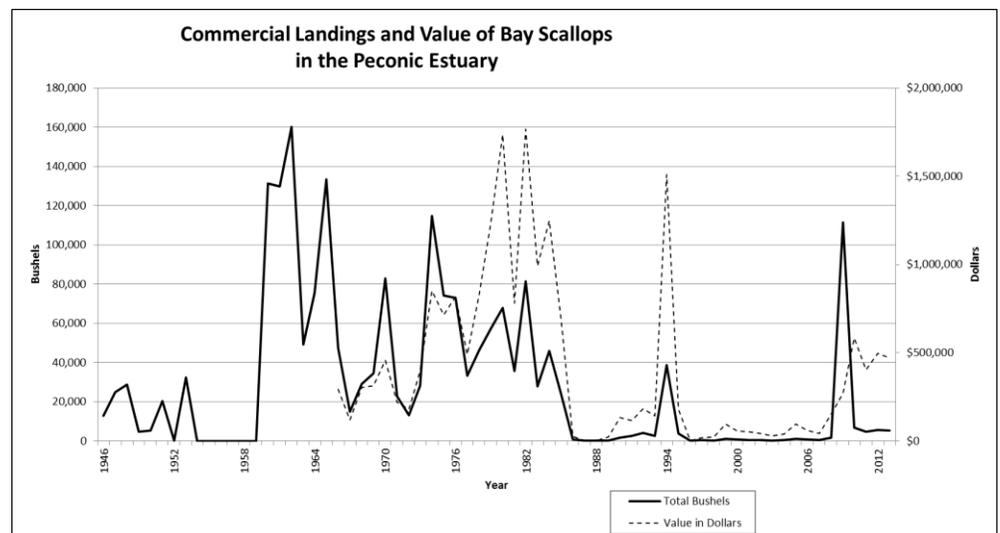


Figure 6-2 Commercial Landings and Value of Bay Scallops from the Peconic Estuary

fishermen, boaters, bathers, hunters, and nature enthusiasts. In 1993, more than 1,100 establishments were identified as “estuarine dependent” and gross revenues for these establishments exceeded \$450 million per year (equal to approximately \$680 million in 2014). More than 7,300 people were employed in these businesses, with a combined annual income of more than \$127 million (equal to approximately \$192 million in 2014).

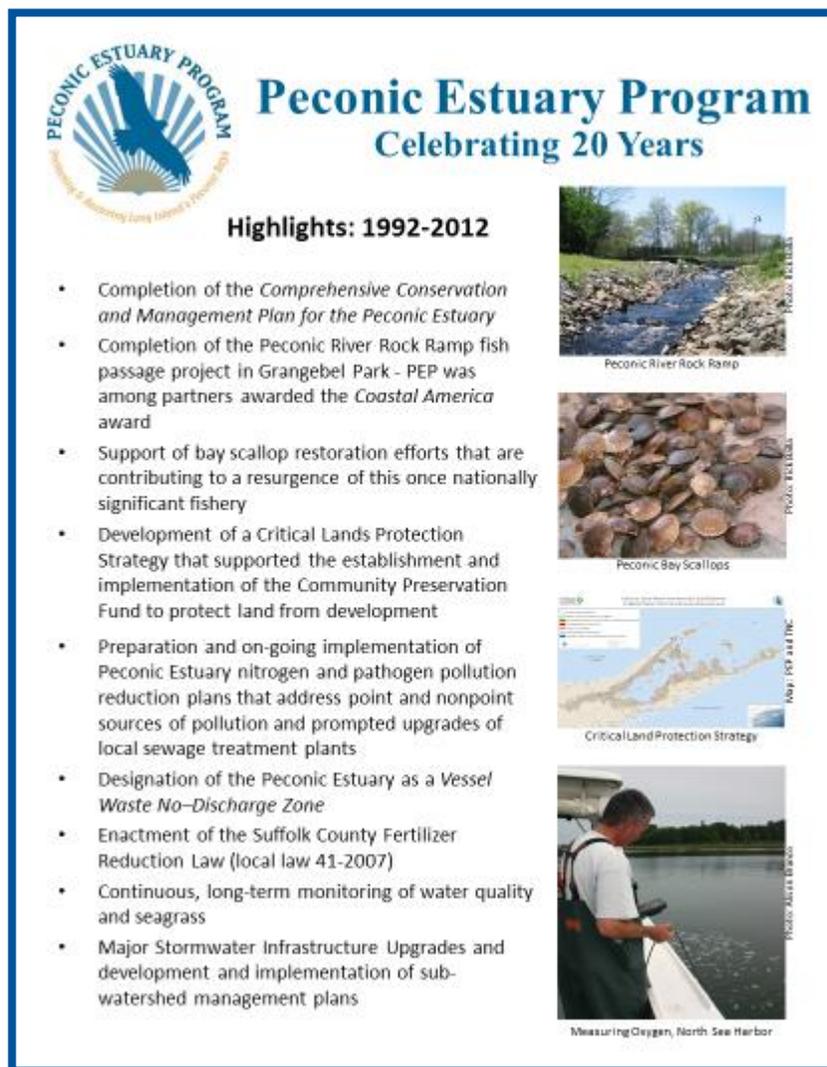
The estuary system features numerous rare ecosystems that are home to many plant and animal species, including several nationally and locally threatened

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and endangered plants and animals. The Nature Conservancy has designated the Peconic Estuary System as one of the “Last Great Places” in the Western Hemisphere.

6.2.2 Problem Identification

The Peconic Estuary suffered from a series of harmful algal blooms during the 1980’s, devastating eelgrass and shellfish populations, and drawing the region’s attention to the water quality in the Peconic Bays. After a Suffolk County led effort to nominate it, in 1992, the Peconic Estuary became the 20th estuary in the nation to receive the designation as an “Estuary of National Significance” by the U.S. Congress, making it part of the US Environmental Protection Agency’s (USEPA’s) National Estuary Program (NEP). This created the Peconic Estuary Program (PEP), an innovative partnership of local, state, and federal governments, citizen and environmental groups, businesses and industries, and academic institutions tasked with developing a comprehensive, watershed-based management plan to protect and restore the environmental quality of the Peconic Bays. Suffolk County hosts the Peconic Estuary Program Office within its Department of Health Services, Division of Environmental Quality, and has taken a leadership role in the program’s implementation for much of its history.



PECONIC ESTUARY PROGRAM
Celebrating 20 Years

Highlights: 1992-2012

- Completion of the *Comprehensive Conservation and Management Plan for the Peconic Estuary*
- Completion of the Peconic River Rock Ramp fish passage project in Grangebél Park - PEP was among partners awarded the *Coastal America* award
- Support of bay scallop restoration efforts that are contributing to a resurgence of this once nationally significant fishery
- Development of a Critical Lands Protection Strategy that supported the establishment and implementation of the Community Preservation Fund to protect land from development
- Preparation and on-going implementation of Peconic Estuary nitrogen and pathogen pollution reduction plans that address point and nonpoint sources of pollution and prompted upgrades of local sewage treatment plants
- Designation of the Peconic Estuary as a *Vessel Waste No-Discharge Zone*
- Enactment of the Suffolk County Fertilizer Reduction Law (local law 41-2007)
- Continuous, long-term monitoring of water quality and seagrass
- Major Stormwater Infrastructure Upgrades and development and implementation of sub-watershed management plans

Peconic River Rock Ramp
Photo: Facebook

Peconic Bay Scallops
Photo: Facebook

Critical Land Protection Strategy
Map: PEP and the

Measuring Oxygen, North Sea Harbor
Photo: Aucta Barlow

The PEP *Comprehensive Conservation and Management Plan* (CCMP) was formally approved on November 15, 2001 by EPA Administrator Christine Whitman, with the concurrence of New York State Governor George Pataki. This plan contains 340 management actions, organized around priority topics including “brown tide”, nutrients, habitat and living resources, pathogens, toxic pollutants, and critical lands protection. The CCMP also addressed management and financing for CCMP Implementation and public education and outreach.

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In 2015, the Peconic Estuary Program will begin the process of updating this CCMP, adjusting the goals and implementation strategies to adapt to current circumstances, and adding new or emerging concerns that were not included in 2001, such as climate change and coastal resiliency.

The Peconic Estuary Watershed includes portions of six Suffolk County towns (Brookhaven, Riverhead, Southold, Southampton, East Hampton, and Shelter Island) and four villages (Greenport, Deering Harbor, North Haven, and Sag Harbor). The year-round population within the watershed is approximately 100,000, but nearly triples during summer.

Although open space protection has been extremely successful on the East End of Long Island, thanks to programs like the Pine Barrens Protection Act and the Community Preservation Fund, the year-round and seasonal populations put pressure on the area's natural resources and impact water quality. The primary ecological concern in the Peconic watershed is excess nitrogen loading, coming primarily from wastewater and fertilizer (Lloyd, 2014; Total Maximum Daily Load for Nitrogen in the Peconic Estuary Program Study Area, NYSDEC 2007 and Peconic Estuary TMDL Review, USEPA, 2013). This excess nitrogen loading contributes to hypoxia in the Western Estuary and fuels the frequent, and sometimes severe, harmful algal blooms (HABs) that now occur annually in the Peconic Estuary. These contribute to declines in eelgrass habitat and reduced populations of shellfish. Some HABs can even pose a public health threat.

6.2.3 Goals and Objectives

Broadly, the goals of the Peconic Estuary Program were, and still are (*Peconic Estuary Program*, 2001, pg. 1-2):

- Ensure a healthy and diverse marine community; optimizing opportunities for water dependent recreation.
- Promote the social and economic benefits, which have been associated with the Peconic Estuary System.
- Establish a comprehensive water quality policy, which ensures the integrity of marine resources, habitat, and terrestrial ecosystems while supporting human activities in the Peconic Estuary study area.
- Ensure an effective technical, regulatory, and administrative framework for the continued monitoring and management of the Peconic Estuary study area.

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- Achieve zero discharge (from point and nonpoint sources) of toxic pollutants, and particularly of bio-accumulative chemicals.
- Promote an understanding and, thus, appreciation of the value of the Peconic Estuary as an ecosystem and as a mainstay to the East End economy so that it is preserved and restored as one of the last great places in the Western Hemisphere.
- Involve the many and diverse stakeholders in the Peconic Watershed regarding the implementation of the CCMP and in the future direction and decisions affecting the estuary.



In 2013, the PEP Management Conference held a strategic planning session, in which they determined that accelerating the implementation of the Nitrogen TMDL should be the top priority for CCMP implementation for time period 2013-2018. This would involve some new work to allocate the loads among the various sources contributing nitrogen to the estuary via groundwater, and then an update to the TMDL implementation plan to better address the non-point source loads. In 2014, Suffolk County Executive Steven Bellone declared nitrogen reduction to be the top priority of his first administration as well, highlighting the link between water quality and resilient coastlines. Later in 2014, NY State Governor Cuomo also committed to helping Long Island reduce its nitrogen pollution and increase its coastal resiliency. Also during this period, many of Long Island's environmental advocacy organizations joined forces to develop an aggressive media and public information campaign focused on nitrogen pollution.

With the strategic focus of these various entities converging, opportunities for renewed collaboration and join goal setting are abundant. The Peconic

Estuary Program was originally created to act as the forum for the kind of joint planning and management that is necessary to finally address the more difficult aspects of nitrogen load reduction on Long Island's East End: on-site wastewater treatment and fertilizer from developed areas and agriculture.

The most important focus areas shared by the Peconic Estuary Program CCMP and Suffolk County's "Reclaim Our Waters" initiative include:

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- Wastewater Infrastructure
 - Suffolk County is preparing to begin a county-wide wastewater planning study that will help determine which areas are most appropriate for various types of wastewater infrastructure and propose mechanisms to fund and manage the substantial infrastructure upgrades that will be necessary to protect our surface waters from nitrogen pollution. In the Peconic watershed, where 90% of homes utilize on-site wastewater treatment, this will necessitate collaboration among federal, state, county, and local governments to develop funding mechanisms to upgrade these systems. The Peconic Estuary Program can serve as the central planning entity that brings these agencies together and helps towns plan their wastewater management strategies and seek funding to subsidize or incentivize upgrades. The Estuary Program partners can also use the program structure and technical support to help standardize policies and codes across jurisdictions.

- Agricultural Nutrient Loading
 - Suffolk County, and many partners, including the Peconic Estuary Program have set out to update the Agricultural Stewardship Plan for Suffolk County. This document will outline goals and recommendations for implementation of programs within the agricultural industry in Suffolk to help farmers reduce their impacts on surface waters while maintaining their profitability.

- Wetlands Restoration & Protection
 - Good water quality is critical to maintaining healthy seagrass and wetland populations in our coastal bays and harbors, which are an essential line of defense from coastal storms, rising sea level, and other climate impacts. Both Suffolk County and the Peconic Estuary Program are working to restore degraded wetland and seagrass habitats, and to protect those that remain.

 - Suffolk County has initiated a project, in partnership with NY Sea Grant, to develop a plan for monitoring, research, and management of HABs in Suffolk County. PEP staff and partners, including the New York State Department of Environmental Conservation (NYSDEC) and PEP Technical Advisory Committee members, will participate in this process. The resulting plan will inform the update to the PEP CCMP's HAB chapter (formerly called "brown tide"), and PEP will work with its partners to implement the recommendations.

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6.2.3.1 Existing Metrics

The Peconic Estuary includes three identified nitrogen impaired water bodies: Lower Peconic River and Tidal Tributaries, Western Flanders Bay and Lower Sawmill Creek, and Meetinghouse Creek, Terrys Creek and Tributaries. In 2007, New York State developed a TMDL for the Peconic Estuary, which sets load reduction targets designed to alleviate hypoxia in the impaired segments. New York State and its partners in the Peconic Estuary Program seeks to have the TMDL fully implemented by 2022. Using modeling, the submittal calculated that in the average pre-implementation year, 5,357,364 pounds of nitrogen entered the Peconic Estuary. According to TMDL modeling, most of this nitrogen, 56%, results from atmospheric deposition. An estimated 41% comes from groundwater (integrating inputs primarily from fertilizer use and on-site wastewater disposal systems), 1% from the Peconic River and seven western tidal creeks, and 1% from three sewage treatment plants.

This document contains discharge limits for permitted point-source discharges of nitrogen into the Peconic Estuary, which were later codified in State Pollution Discharge Elimination System (SPDES) permits issued by NYSDEC, and voluntary suggested reductions for non-point sources. The practical load reduction scenario recommended included a 37.5% reduction from all sources during winter, and a 42.3% reduction from all sources during summer.

The pace of implementation does not appear to be sufficient to meet these goals. In order to achieve the goals of the TMDL by 2022, the pace of implementation will need to be accelerated. Unfortunately, the 2007 TMDL and associated documentation did not provide detailed information on nonpoint source loads for particular sources or land use activities, such as agricultural operations, residential fertilizer use, on-site wastewater disposal systems and golf courses. To some degree, this has made it difficult in the implementation phase to assess the relative priority of sources. It is also important to continue to monitor surface water, groundwater, atmospheric deposition and point sources so that loads, current conditions and trends can be determined and evaluated. Further, there are other important environmental endpoints that are related to nutrient loads that were not fully addressed in this TMDL which emphasized achieving dissolved oxygen standards. These include the presence of harmful algal blooms (both micro algae and macro algae), direct impacts on eelgrass, and achieving human health drinking water standards. The role of nitrogen in these and other endpoints should continue to be evaluated.

The two largest sources of nitrogen to the estuary are atmospheric deposition, which accounts for 56% of the nitrogen, and groundwater which accounts for 41% of nitrogen loading. The EPA has estimated that atmospheric deposition

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levels will be below the TMDL target by 2022. Most of the nitrogen in groundwater comes from either onsite wastewater treatment systems or fertilizer. The Peconic Estuary Program Management Committee has created a Nitrogen Workgroup, with members of the Technical Advisory Committee, to refine the allocation of loads and revise the TMDL implementation plan based on this new information. Recent modeling, conducted by the Nature Conservancy (Lloyd, 2014) using Valiela et al.'s NLM model (Valiela et al, 1997), focused on land-based loadings (leaving out the direct-to-water atmospheric deposition in the open bays) and quantifying the sources that contribute to the groundwater-based loads. This study indicates that 24% of the land-based load comes from atmospheric deposition, 26% from fertilizer (including 16.7% from agriculture, 5.7% from lawns, and 4% from golf courses), 6.6% from sewage treatment plants, and 43% from on-site wastewater treatment. This study supports the regional focus on non-point source load reduction, and the investments being made by New York State and Suffolk County in on-site wastewater treatment upgrades.

The TMDL includes other considerations that can be important for managing nutrients, such as shellfish restoration and eelgrass restoration; though no load allocations or reductions are cited. These should also be considered during the update of the implementation plan, as should consideration of other potential bases for nitrogen reduction targets, such as eelgrass health and HABs.

6.2.4 Recommendations

6.2.4.1 Nitrogen: “Public Enemy Number One”

In 2013, PEP's Management Conference agreed that reducing the non-point source nitrogen loading to the Peconic Estuary was the top short-term priority. ***Suffolk County's most important role in implementing the regionally agreed-upon goals articulated in the PEP CCMP is to improve the regulations and incentives that determine non-point source nitrogen loading from on-site wastewater treatment.*** During 2014, Suffolk County began a major initiative to address this, the largest source of nitrogen loading to the Peconic Estuary. It is essential that the county's numerous new initiatives to allow, incentivize, and eventually require improved on-site wastewater treatment throughout the Peconic Estuary watershed continue to progress.

The Peconic Estuary Program's role in this process includes:

- Engagement of the stakeholders on the east end, including local governments and citizens

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- Incorporation of East End-specific considerations into Suffolk County's assessment of alternative onsite wastewater treatment systems and the development of a County-wide Wastewater Management Plan
- Public outreach and education about on-site wastewater treatment impacts to the Peconic to generate public support for upgrade initiatives
- Collaboration with Local Government, Suffolk County, New York State and Federal partners to seek funding for incentive programs and technical assistance, and to cultivate legal and policy mechanisms to generate public funding for the necessary upgrades.
- Technical support for Suffolk County efforts from PEP staff and voluntary Technical Advisory Committee members.

In addition to this single most important role, Suffolk County is a key partner in the implementation of many PEP CCMP goals. Below includes CCMP Action items in the high priority categories of HABs, Nitrogen Load Reduction, Habitat and Living Resources, and Pathogen Load Reduction, followed by specific recommendations for the most effective and high priority activities that Suffolk County and PEP will need to collaborate on over the next five to ten years.



6.2.4.2 Nutrients

Collaborative action priorities for Suffolk County regarding nutrients are:

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PEP CCMP Actions Re: Nutrient Inputs

N-1. Continue to Use and Refine Water Quality Standards and Guidelines.

N-2. Preserve Water Quality East of Flanders Bay.

N-3. Implement a Quantitative Nitrogen Load Allocation Strategy for the Entire Estuary.

N-4. Control Point Source Discharges from STPs and Other Dischargers.

N-5. Implement Nonpoint Source Control Plans.

N-6. Use Land Use Planning to Control Nitrogen Loading Associated with New Development.

N-7. Ensure that Funding Is Distributed Evenly Between Preservation and Mitigation Projects.

N-8. Integrate PEP Recommendations into Other Programs.

N-9. Sponsor and Coordinate Research and Information Gathering.

N-10. Monitor Conditions within the Estuary System to Determine the Effectiveness of Management Strategies.

- The Peconic Estuary Program has created a Nitrogen Workgroup to re-examine the Nitrogen TMDL and recommend updates to the implementation plan. As that update process progresses, Suffolk County should be actively involved in the development and implementation of those recommendations, particularly with respect to on-site wastewater treatment.
- Suffolk County has embarked on an effort to update its Agricultural Cornell Cooperative Extension and the agricultural producers. This effort should continue and the implementation of the revised plan should be prioritized for funding through County mechanisms and other external sources. PEP should collaborate with county agencies and other partners to seek funding.
- The majority of point-source nitrogen loads to the Peconic Estuary have been reduced, including all of the large sewage treatment plants (STPs). The final remaining improvements needed include the Riverhead STP (which began final upgrades in 2014, with a great deal of funding from Suffolk County) and the Crescent Duck Farm. The PEP and Suffolk County should continue to provide technical and logistical assistance to New York State and the owners to ensure that these point-source upgrades are completed and the associated load reductions are achieved.
- It is recognized that current drinking water safety standards are not sufficient to protect surface waters from nutrient loading. Suffolk County and New York State should work together to continue to evaluate the utility of more restrictive groundwater discharge standards with respect to nitrogen concentrations. They should also consider whether the application of such standards should be extended to a broader range of effluent sizes and types (e.g. individual on-site wastewater treatment systems, agricultural inputs, etc.).
- Suffolk County and PEP should continue to support the Riverhead Sewage Treatment Plant's effort to develop a system to re-use effluent for golf course irrigation at Suffolk County's Indian Island Golf Course.
- PEP has created an inter-municipal coalition of municipalities, including Suffolk County, within the Peconic Estuary watershed who will work together to implement stormwater and nitrogen focused water quality improvement projects. It is important for PEP to

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remain engaged with this coalition, and for the County to continue to fund its membership and support the collective efforts.

- PEP and Suffolk County have partnered to develop Subwatershed Management Plans for impaired subwatersheds within the Peconic Estuary, which present conceptual designs and costs for stormwater retrofit projects. These plans should continue to be developed, and their implementation should be prioritized for County and State funding. The PEP should continue to promote green infrastructure solutions that provide more pathogen, and nitrogen, treatment upon infiltration, and Suffolk County should model these best management practices in their own stormwater management program.
- With the assistance of the PEP, Suffolk was among the first in the nation to implement fertilizer use reduction laws. Those regulations need to be re-evaluated for effectiveness and more stringent rules, perhaps governing sales or application rates, should be considered.
- Suffolk County has succeeded in integrating PEP priorities into existing environmental protection programs and priorities (e.g. Water Quality Protection and Restoration Program), but as time has passed and decision makers have turned over, widespread knowledge about the PEP within County government has decreased. Suffolk County and PEP should collaborate to educate county officials, legislators, and advisory committees about the PEP and its role in protecting assets of value to the county, such as surface water quality and coastal habitats.
- Suffolk County is the primary agency responsible for monitoring water quality in the Peconic Estuary. This monitoring effort has become more and more difficult to fund over the years, with the county relying more heavily on federal grant funds to support that effort. The value of this professional and long-term data set is widely understood. PEP and Suffolk County should work with partners who value these data to cultivate enhanced and stable funding for monitoring programs.
- While a great deal of water quality monitoring is occurring, reporting is irregular and sometimes non-existent. PEP must work to require regular reporting as a condition of funding for water quality monitoring. Suffolk County should work to develop regular reporting and analysis mechanisms and develop the necessary skill sets within their existing staff.

PEP CCMP Actions Re: Harmful Algal Blooms

B-1. Ensure Continued Brown Tide Monitoring, Research, Coordination, and Information Sharing (PEP CCMP, 2001)

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PEP CCMP Actions Re: Habitat and Living Resources

HLR-1 Use Critical Natural Resource Areas (CNRAs) to Develop and Implement Management Strategies to Protect High Quality Habitats and Concentrations of Special Emphasis.

HLR-2 Manage Shoreline Stabilization, Docks, Piers, and Flow Restriction Structures to Reduce or Prevent Additional Hardening and Encourage Restoration of Hardened Shorelines to a Natural State.

HLR-3 Assess the Impacts of Dredging Activities on Habitat & Natural Resources & Develop Recommendations & Guidelines for Reducing Impacts.

HLR-4 Examine & Promote Methods of Shellfish Harvesting that are Most Compatible with Establishment & Growth of Eelgrass Beds & Vegetated Salt Marshes.

HLR-5 Implement, Enforce, and Encourage the Continuation of Current Policies & Regulations Protective of Wetlands.

6.2.4.3 Harmful Algal Blooms (HABs)

PEP CCMP Actions re: HABs:

Collaborative action priorities for Suffolk County re: **HABs** are:

- Suffolk County and PEP should continue to work together and with NY Sea Grant to develop a HAB Research, Monitoring and Management Plan.
- Once this plan is completed, Suffolk County and PEP should collaborate to prioritize funding for the resultant recommendations, and to promote their implementation throughout the watershed. It is understood that reduction of nitrogen loading is a necessary management measure that will be recommended during this process, so all recommendations related to that goal will help further this one as well.

6.2.4.4 Habitat and Living Resources

PEP CCMP Actions re: Habitat and Living Resources:

Collaborative action priorities for Suffolk County re: **HABITATS:**

- Suffolk County should continue to support the Suffolk County Aquaculture Lease Program in Peconic and Gardiners Bay. The PEP supports this effort through the Program Director's representation of the Department of Health Services on the Aquaculture Lease Board, by promoting local awareness and support for the program through its public education and outreach initiatives, and by providing technical and project management support to the evaluation of the program and the design of its associated monitoring plan.
- Historically, Suffolk County has implemented many habitat restoration projects on county lands, and financially supported other habitat restoration efforts through capital improvement programs, Water Quality Protection and Restoration Program funding, and by incorporating PEP Habitat Restoration Plan activities in routine maintenance programs. This support for habitat restoration program should continue, and additional ways to prioritize projects of regional significance, such as those listed in the PEP Habitat Restoration Plan, should be sought.

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PEP CCMP Actions Re: Habitat and Living Resources

HLR-6 Evaluate Effectiveness of Current Policies in Preserving Eelgrass Habitat & Develop Ways to Provide Increased Protection for Extant Eelgrass.

HLR-7 Develop and Implement an Estuary-Wide Habitat Restoration Plan (HRP).

HLR-8 Develop and Implement Specific Restoration Projects.

HLR-9 Monitor and Evaluate the Success of Restoration Efforts.

HLR-10 Develop an Aquaculture Plan for the Peconic Estuary.

HLR-11 Determine the Suitability of Artificial Reefs in the Peconic Estuary.

HLR-12 Foster Sustainable Recreational and Commercial Finfish and Shellfish Uses of the Peconic Estuary that are Compatible with Biodiversity Protection.

- The PEP regularly collaborates with the Department of Economic Development and Planning (DEDP), and the Department of Public Works (DPW) Vector Control Unit on wetland restoration projects. One project, now in the design phase, at Indian Island County Park will be a significant accomplishment for those groups, creating important wetland habitat in the most impaired western Peconic Estuary, while serving as the first demonstration of Tier 15 of the Suffolk County Wetland Stewardship Strategy.
- Suffolk County and PEP have long collaborated on eelgrass restoration efforts in the Peconic Estuary. As these efforts progress, it will be critical to continually evaluate restoration success and feasibility in the face of warming waters and degraded water quality.
- In the face of rising sea level and increasing storm frequency and severity, the value of wetland and seagrass buffers in protecting coastal properties and residents has come to the forefront of the public consciousness, as well as funding priorities. Suffolk County and PEP should collaborate to take advantage of this opportunity to accelerate the pace of seagrass and wetland restoration.
- While PEP and its local partners have made some strides in preventing new shoreline hardening, climate change impacts and storm recovery efforts have worked to reverse that progress. Suffolk County and PEP should continue to engage regulatory authorities on this issue, promote the benefits of living shorelines, and create demonstration projects on county lands.

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PEP CCMP Actions Re: Habitat and Living Resources, continued:

HLR-13 Protect Nesting and Feeding Habitat of Shorebirds.

HLR-14 Protect Sea Turtles and Marine Mammals.

HLR-15 Utilize Land Use Planning, BMPs, and Other Management Measures to Reduce the Negative Impacts of Human Uses and Development on the Estuary System.

HLR-16 Develop and Implement a Living Resources Research, Monitoring, and Assessment Program.

HLR-17 Establish a Working Group to Examine the Role of Grazers and Filter Feeding Organisms in Influencing Water Quality and Productivity to Better Understand Food Web Dynamics and to Develop Management Applications.



6.2.4.5 Pathogens

PEP CCMP Actions re: Pathogen Management:

Collaborative action priorities for Suffolk County re: **PATHOGENS:**

Pathogen management is an area where PEP and its partner organizations have made a great deal of progress. The NYSDEC has issued fairly stringent MS4 general permits and worked to regulate most municipalities within the Peconic Estuary watershed, the Peconic Estuary was designated a no-discharge zone, treatment upgrades have been installed at the last remaining duck farm on Long Island, and sanitary codes were made more stringent.

However, pathogen impairments continue to exist in many areas, necessitating a re-examination of controls on non-point sources.

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PEP CCMP Actions Re: Pathogen Management

P-1 Use Existing or Implement New Stormwater Management Regulations to Control Pathogen Loading and Other Forms of Nonpoint Source Pollution.

P-2 Develop Land Use Regulations that Eliminate or Minimize New Sources of Stormwater Runoff.

P-3 Use Construction Site Guidelines which Eliminate or Minimize Stormwater Runoff.

P-4 Develop Land Use Regulations that Eliminate or Minimize New Sources of Stormwater Runoff.

P-5 Demonstrate and Implement Technologies to Remediate Stormwater Runoff.

P-6 Enhance Existing Septic System Controls and Implement New Best Management Practices.

P-7 Provide Pumpout Facilities and Encourage their Use.

P-8 Establish Vessel Waste No Discharge Areas.

P-9 Use Administrative and Regulatory Measures to Control Pollution from Boaters and Marinas.



- Cesspools and septic systems that do not conform to modern standards are still abundant due to “grandfathering” provisions in the sanitary code. Because a great deal of the Peconic Watershed, especially along the coast, was developed before newer sanitary standards were in place, this remains a largely un-measured, but potentially important source of pathogens. It is imperative that New York State and Suffolk County work together to quantify this potential threat and then revise codes and policies appropriately to handle those residential sources that were not address by updating the sanitary code.
- Stormwater MS₄ permitting addresses only surface water discharges of stormwater. While that works well in many areas, the relatively permeable soils of Long Island allow easy groundwater infiltration of stormwater, with little or no treatment. Near the coastline, where groundwater travel times are insufficient to diminish pathogen loads, this creates another potential non-point source, which is unregulated under the current system. PEP and Suffolk County have partnered to develop Subwatershed Management Plans for impaired subwatersheds within the Peconic Estuary, which present conceptual designs and costs for stormwater retrofit projects. These plans should continue to be developed, and their implementation should be prioritized for County and State funding. The PEP should continue to promote green infrastructure solutions that provide more pathogen, and nitrogen, treatment upon infiltration, and

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PEP CCMP Actions Re: Pathogen Management, Continued

P-10 Promote the Use of Best Management Practices to Control Pathogen Loadings from Marinas, Mooring Areas, and Boatyards.

P-11 Ensure Adequate Disinfection at Sewage Treatment Plants.

P-12 Monitor Effluent from the Corwin Duck Farm.

P-13 Identify Sources and Loadings of Nonpoint Sources of Pathogens.

P-14 Develop and Implement Nonpoint Source Control Plans for Pathogens.

P-15 Obtain Funding to Address Stormwater Runoff.

P-16 Conduct Water Quality Monitoring.

Suffolk County should model these best management practices in their own stormwater management program.

- PEP has created an inter-municipal coalition of municipalities, including Suffolk County, within the Peconic Estuary watershed who will work together to implement stormwater and nitrogen focused water quality improvement projects. It is important for PEP to remain engaged with this coalition, and for the County to continue to fund its membership and support the collective efforts through its stormwater management program.
- Suffolk County's Beach and water quality monitoring programs are critical to quantifying the pathogen impairments that exist in the Peconic Estuary, to nominating waters to be designated as impaired by NY State. This monitoring should be continued and supported by Suffolk County funding and Federal grants, like the Beach Act grant.

6.2.5 Implementation

Large-scale reduction of non-point source nitrogen loads to the Peconic Estuary, and the other high priority recommendations discussed above, will require substantial financial and human resources. Options for the implementation of the type of large-scale, integrated wastewater and drinking water management system that will be necessary to solve our region's non-point source pollution problems are discussed in chapters 1, 2, 3, 5, and 7. The discussion below summarizes the programmatic infrastructure and funding opportunities that are created or enhanced through Suffolk County's partnership in the Peconic Estuary Program, a federally-funded NEP. It should be noted that many of these advantages are applicable to the Long Island Sound Study (LISS, also an NEP) and the South Shore Estuary Reserve (SSER, a New York State program) as well.

6.2.5.1 Programmatic Mechanisms

The National Estuary Program was founded on the principle that water quality protection is best achieved by managing on a watershed scale, with all levels of government collaborating with one another, and with a diverse range of stakeholders impacting and impacted by water quality. The Peconic Estuary Program Management Conference structure facilitates this collaborative management. The PEP Management Conference offers regular opportunities for the USEPA, NYSDEC, Suffolk County, and local government to meet along with representatives of the Citizens Advisory Committee and Technical Advisory Committee. It is essential that this structure and the associated opportunities for regular communications, are used to keep all levels of government informed about one-another's efforts toward CCMP

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implementation. It is also an opportunity to engage the technical community, and leverage technical expertise between levels of government. Additionally, the robust stakeholder engagement offered by the PEP Management Conference, Citizens Advisory Committee, and Public Education and Outreach Programs offer the opportunity to build citizen support for regional and local initiatives. All of the government entities who partner on the Peconic Estuary Program, including Suffolk County, should make use of this stakeholder engagement framework to develop programs that reflect local priorities and have community support.

Beyond the Peconic Estuary Program's own Management Conference structure, the PEP has worked with local communities to develop additional collaborative mechanisms. Most significantly, all 6 towns and 3 of the villages within the Peconic Estuary watershed, plus Suffolk County and New York State's Department of Transportation have initiated an Inter-municipal Agreement (IMA) which allows these municipalities to jointly fund a coordinator, seek outside funding, and collaboratively implement water quality improvement initiatives. This coalition intends to work together on the many stormwater management program elements that benefit from consistency across jurisdictional boundaries and economies of scale. Beyond stormwater management, the group intends to seek opportunities to jointly examine other water quality issues, especially on-site wastewater management. The IMA provides the legal mechanism for these municipalities to jointly implement optional and required water quality management efforts, fund a coordinator and other joint activities, and to jointly apply for external funding. The annual

Both of these collaborative mechanisms provide opportunities for coordination among agencies, regular meetings focused on water quality interests, the ability to solicit technical expertise and public input. Because all of Suffolk County's "Reclaim Our Waters" initiatives can benefit from engagement in these activities.

6.2.5.2 Funding Mechanisms

Inter-municipal Agreement (IMA)

As mentioned above, the IMA among east end towns, villages, Suffolk County and New York State provides a mechanism for joint funding of coordination and collective activities. This joint funding is accomplished via a dues structure, and is currently limited to a maximum total budget of \$100,000. While the dues funds could provide funding for water quality initiatives, the more significant opportunity provided by the IMA is the ability of these municipalities to leverage local funding and jointly apply for external funding. Other similar coalitions on Long Island, such as the Hempstead Harbor

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Protection Committee, have received many millions of dollars in grants for water quality and related public outreach initiatives through a similar mechanism.

Community Preservation Fund

The Community Preservation Fund is a real-estate transfer tax of 2% applied in the five East End towns, all of which intersect the Peconic Estuary watershed. This fund was initially developed, through NY State legislation, with the involvement of the Peconic Estuary Program partners, including Suffolk County, as a mechanism to purchase open space on the East End to protect community character, including safe drinking water and healthy coastal ecosystems. This fund generates millions of dollars annually. Because of its success, the availability of quality parcels for purchase is beginning to diminish. As the East End towns begin to examine the future of this program, they will likely consider whether stewardship of preserved lands and other water quality improvement initiatives could be eligible uses of this fund in the future. The Peconic Estuary Program has begun to discuss this opportunity with the East End towns and intends to continue working with interested towns as they develop recommendations for any future changes to this program.

Watershed Improvement Districts

Currently, Long Island towns have the authority, via New York State legislation, to designate *Watershed Improvement Districts*, subject to referendum, to generate tax revenue for the purposes of water quality protection. The New York State legislature has discussed similar legislation that would give this authority to Suffolk County as well, but that has not yet been enacted. The watershed improvement district concept presents a unique opportunity to designate a district based around the Peconic Estuary, the purpose of which would be to improve water quality in the Peconic Estuary. This type of funding could be utilized for wastewater treatment upgrades or other water quality improvement programs.

State Revolving Fund

The State Revolving Fund (SRF) allows municipalities to access low-cost loans for capital improvements and other programs. This funding source would be appropriate to finance the substantial on-site wastewater treatment upgrades that are needed on the east end. The existence of a recognized estuary of national significance, the USEPA- approved TMDL for Nitrogen and Pathogens, and the identification of non-point source nitrogen load reduction as a top priority for PEP CCMP implementation all help to justify SRF requests. New York State's partnership in PEP and concurrence on the regional priorities

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in the PEP CCMP will help support potential future requests for SRF funding for Water Quality initiatives in the Peconic Estuary.

New York State Water Quality Improvement Program and Suffolk County Water Quality Protection and Restoration Program

The fact that the *Reclaim Our Waters* priorities were previously included in the PEP CCMP, as described above, means that they are necessarily prioritized for funding under both the New York State Water Quality Improvement Program (WQIP) and the Suffolk County Water Quality Protection and Restoration Program (WQPRP). Though neither of these funding sources provide steady annual funding, they do offer periodic opportunities to fund water quality improvement initiatives. In the past, both sources have provided funding for large-scale sewer infrastructure and should be further explored for on-site wastewater treatment upgrades and for planning studies to facilitate programs for those types of upgrades.



Next Steps for PEP

Beginning in 2015, PEP intends to focus attention on building the program's financial resources and conducting an update to the CCMP, possibly by way of a 5-year Action Plan. This update will build consensus around current priorities developed during recent strategic planning, like non-point source nitrogen loading, update some outdated aspects of the CCMP goals, like "brown tide", and re-examine the goals in light of climate impacts.

6.2.6 Education and Outreach

The PEP CCMP outlines Public Education and Outreach as a primary function of the Program. Annually, PEP typically allocates \$50,000 to \$100,000 to public education and outreach. This funding supports the Citizens' Advisory Committee and numerous public education and engagement initiatives that vary from year to year in order to keep pace with current program priorities. This outreach program and existing committee structure can work to the

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advantage of Suffolk County as new water quality initiatives come on line. The PEP can serve as a mechanism to educate the public about county programs, about their personal responsibilities regarding water quality (for example fertilizer application and septic system maintenance) and can generate support for wastewater upgrades and the funding mechanisms that will support them.

PEP should work closely with LISS and the SSER to leverage funding and to generate consistent messaging across Long Island about water quality problems and their potential solutions.

6.3 Long Island Sound

6.3.1 Introduction

The analysis presented below focuses on the new insights and recommendations contained in the LISS CCMP Update, and how they relate in a broad sense from a local government perspective to Suffolk County's *Reclaim Our Water* initiative and the Draft CWRMP. *Reclaim Our Water* is a comprehensive initiative to improve the quality of groundwater and surface water and restore wetland health through the reduction of nitrogen pollution from sanitary waste that would be primarily achieved by the provision of wastewater collection and treatment infrastructure in targeted areas, and by installing new and advanced on-site septic systems in locations not served by sewers.

The Long Island Sound Estuary is much larger than either Great South Bay, or the area in Peconic and Gardiners Bays where Suffolk County has an underwater land ownership interest, as shown in **Table 6-1**.

This Long Island Sound watershed drains an area of more than 16,000 square miles, covering virtually the entire state of Connecticut, portions of New York, Massachusetts, New Hampshire, Vermont, and Rhode Island as well as a small area at the source of the Connecticut River in Quebec, Canada. Only 210 square miles of this watershed land area is located along the north shore in Nassau and Suffolk Counties (1.3% of the total). Hence, the LISS is not Suffolk-centric. The New York State Dept. of Environmental Conservation (NYSDEC) is the principal player in coordinating the participation of New York's cities, counties and other local jurisdictions in LISS CCMP activities. The level of resources committed to the LISS and its relatively long history distinguish this national estuary from the Peconic Estuary Program and New York's South Shore Estuary Reserve

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The analysis is based primarily on preliminary information contained in the following two draft reports.



- USEPA Long Island Sound Office, Draft Comprehensive Conservation and Management Plan Update - Investing in a Regional Asset, September 2014, Stamford, CT. (LISS CCMP Update)
- USEPA Long Island Sound Office, Draft Comprehensive Conservation and Management Plan Update - Investing in a Regional Asset, Supplemental Document, Implementation Actions, September 8, 2014, Stamford, CT. (LISS CCMP Update Actions).

Other information sources that were reviewed to determine the current status of the LISS are listed below.

- J.S. Latimer et al. (eds.), Long Island Sound - Prospects for the Urban Sea (Chapter 7, Synthesis for Management), 2014, Springer Series on Environmental Management, New York, NY.
- Protection & Progress, 2011-2012 Long Island Sound Study Biennial Report.
- Sound Update, Newsletter of the Long Island Sound Study, Winter 2013-2014 issue.

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- Suffolk County Dept. of Health Services, Draft Suffolk County Comprehensive Water Resources Management Plan, January 2011 (CWRMP):
 - Section 5.0 Surface Water Resources
 - CDM Technical Memorandum Task 6.2 Coastal Marine Resources (June 21, 2007)
 - CDM Technical Memorandum Task 6.3 Estuary Study Recommendations (November 11, 2008)

6.3.2 Background and Problem Identification

In 1988, the LISS Management Conference began work on a CCMP for protecting and improving the health of the Sound while ensuring compatible human uses with the Sound ecosystem. In 1994, the States of Connecticut and New York and the USEPA approved the LISS CCMP, which addressed six priority problems: (1) low dissolved oxygen (hypoxia), (2) toxic contamination, (3) pathogen contamination, (4) floatable debris, (5) the impact of these water quality problems and habitat degradation and loss on the health of living resources, and (6) land use and development resulting in habitat loss and degradation of water quality. The CCMP outlined actions to improve the quality and health of the waters and habitats of Long Island Sound.

Significant progress has been made in implementing the CCMP over the last 20 years.

- An innovative, bi-state pollution budget called a Total Maximum Daily Load (TMDL) to reduce nitrogen pollution to Long Island Sound was developed. (A TMDL establishes the maximum amount of a pollutant that may be introduced into a waterbody while ensuring that water quality standards are met.)
- By the end of 2013, reductions of nitrogen from publicly owned wastewater treatment facilities (WWTFs) achieved 88 percent of the reduction goal established in the 2000 dissolved oxygen TMDL, which means 98,000 fewer pounds of nitrogen discharged to LIS every day, as compared to amounts discharged in the early 1990s. This translates into a reduction of 35 million pounds per year of nitrogen discharged from 106 WWTFs located in the LIS watershed. (Six WWTFs in Suffolk County discharge treated effluent to LIS.)
- Many indicators of the health of Long Island Sound are trending positive. Levels of many contaminants have declined in the water,

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sediments, and wildlife. These reductions may be starting to have an effect. The maximum area of hypoxia (or low dissolved oxygen levels in the water), which averaged 208 square miles between 1987 and 2000, decreased to 176 square miles between 2000 and 2013. The summer of 2012 was a relatively severe year, while in the summer of 2013, water quality monitoring of LIS recorded the third smallest area of hypoxia in the past 27 years. While the stark difference between 2012 and 2013 highlights the high amount of inter-annual variability in hypoxia, there is a general trend of improvement over the last decade.

- The Long Island Sound Futures Fund program is administered by the EPA LISS Office and the National Fish and Wildlife Foundation. This program supports stewardship, habitat restoration, education and water quality improvement projects in local communities. Annual funding levels vary and are included in the LISS budget. A project investigating decentralized wastewater treatment in the hamlet of Orient in the Town of Southold has been funded under this program.
- The LISS has also developed a Sentinel Monitoring for Climate Change Strategy; projects funded under this program will help to provide early warnings of climate change impacts on LIS estuarine and coastal ecosystems. One project of interest is the creation of Coastal Erosion Hazard Area maps for the coastal bluffs found along the north shore of Suffolk County.
- Understanding how LIS functions has improved greatly, thanks to extensive citizen involvement, monitoring and scientific discoveries. Many emerging issues, including sea level rise, effects of Super Storm Sandy, planning for community and ecosystem resiliency, stormwater management, and aquaculture (shellfish and seaweed culture for nutrient bioextraction) have come to the forefront of social and environmental issues in LIS. Furthermore, the theory behind managing large ecosystems has also evolved.
- There is also greater appreciation of the value of natural habitats that provide a variety of goods and services through provision of flood and storm protection, water filtration, recreation, commercially and recreationally important fish and bird populations, carbon sequestration, and other functions. The financial value of goods and services provided to the region's economy by Long Island Sound Basin's natural systems ranges between \$17 billion and \$36.6 billion annually. Treated as a capital

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asset, the value of these natural systems, calculated using a standard 4% discount rate with a lifespan of 100 years, is \$690 billion to \$1.3 trillion.

The LISS CCMP is currently being updated in order to incorporate this new knowledge and to make the CCMP effective over the next 20 years.



The information base for the LISS CCMP Update was buttressed by the preparation of *Long Island Sound: Prospects for the Urban Sea* (Latimer et al. 2013). This book reviewed the extensive inventory of scientific research reports published and environmental data collected over the last 35 years. It presents a synthesis of the science that describes the state-of-the-art in understanding the current condition of Long Island Sound and potential future impacts on its resources and ecology. Excerpts from this book that are particularly relevant to Reclaim Our Water and the north shore of Suffolk County are quoted below:

- ...the Sound's embayments are relatively understudied, and little is known about their interaction with the main basins.
- Groundwater contributions of N can be a perplexing problem especially in the sandy, porous soils of Long Island. ...further research is needed to understand the relative importance of groundwater sources of N, their origin (e.g., contributions of

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subsurface disposal compared to fertilizers), and the transport mechanisms in ground water...

- They highlight nutrients as a “pervasive and disrupting” problem – one clearly associated with human presence, lifestyle, and economy, with cultural eutrophication showing few signs of improvement and at greater risk from a changing climate.
- ...nutrient inputs to LISS for all major input categories (WWTFs, atmospheric deposition, tributaries) have decreased significantly in several watersheds. ...Trends in concentrations or fluxes of N in groundwater also are much less definitive, but there is a clear evidence of increase groundwater concentrations of N in Suffolk County...
- ...reduced nutrient delivery to receiving water through groundwater sources can be delayed for years after effective control practices are put into place.
- Sewage discharges, whether from septic systems or WWTFs, remain a threat to the Sound, and solutions warrant innovative and forward thinking. Hypoxia, harmful algal blooms, shellfish bed closures, fish consumption warnings, and swimming restrictions all are linked to sewage. Long Island’s groundwater aquifer, in particular, is threatened severely by sewage and land use.
- Eliminating discharge of polluted storm water into the Sound is also a necessary long-term goal.

All in all, the book ends with a positive note:

- The outlook for the future of the quality of the Sound, its waters, ecological functioning, and aesthetic pleasures is actually quite positive, particularly if we eliminate sewage pollution.

Ten recommendations for enhancing management of Long Island Sound were advanced; they integrate ecosystem based management, sustainability, long-term climate change and resiliency concerns. These recommendations are listed below.

- Embrace sustainability
- Prioritize management of existing pollution sources and impairments

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- Establish baselines of historical condition and magnitudes of change
- Integrate climate change across programs
- Enhance positive feedback loops
- Improve eutrophication and ecological modeling and monitoring
- Design adaptive management framework
- Conduct marine spatial planning
- Improve data management interpretation
- Reconnect people to the Sound.

6.3.3 Themes, Goals, Targets, Outcomes, Objectives and Strategies

The LISS CCMP Update is organized around four themes: Clean Waters and Healthy Watersheds, Thriving Habitats and Abundant Wildlife, Sustainable and Resilient Communities; and Sound Science and Inclusive Management. Each theme has a long-term goal that describes the desired result, as follows.

Clean Waters and Healthy Watersheds - Attain water quality objectives by reducing contaminant and nutrient loads from the land and the waters impacting Long Island Sound.

Thriving Habitats and Abundant Wildlife - Restore and protect the LIS's ecological balance in a healthy, productive, and resilient state for the benefit of both people and the natural environment.

Sustainable and Resilient Communities - Support vibrant, informed, and engaged communities that use, appreciate, and help protect LIS.

Sound Science and Inclusive Management - Manage LIS using sound science and cross-jurisdictional governance that is inclusive, adaptive, innovative, and accountable.

Throughout the four themes, the LISS CCMP Update incorporates integrative principles that have emerged as key challenges and environmental priorities. These include resiliency to climate change, long-term sustainability, environmental justice, and ecosystem-based management.

The LISS CCMP Update is built around a framework developed to achieve theme goals. This framework is comprised of ecosystem targets, specific outcomes, objectives, strategies, and implementation actions. The level of

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detail associated with this framework is intense. All told, there are 20 ecosystem targets, 15 outcomes, 39 objectives, 103 strategies and 136 recommended implementation actions discussed in the LISS CCMP Update. (Specific mention of Suffolk County is infrequent in the LISS CCMP Update. Indeed, a search of “Suffolk County” and “SCDHS” yielded only two hits in the entire LISS CCMP Update Actions report, which contains detailed descriptions for each of the 136 recommended actions.) For the purposes of this analysis, focus has been directed to the Clean Waters and Healthy Watersheds theme only, and how it relates to the Reclaim Our Water initiative.

6.3.3.1 Existing Metrics

Clean Waters and Healthy Watersheds

Ecosystem-Level Indicators and Targets

The following indicators and targets have been developed in order to measure overall progress toward the *Clean Water and Healthy Watersheds (WW)* goal.

Hypoxia: By 2035, achieve a measurable reduction in the zone of hypoxia in LIS from pre-2000 Dissolved Oxygen TMDL averages as measured by the 5-year running average size of the zone.

Nitrogen loading: Attain WWTF nitrogen-loading at the recommended 2000 Dissolved Oxygen TMDL allocation level by 2017 and maintain the loading cap. Have all practices and measures installed to attain the allocations in nonpoint source inputs from the entire watershed by 2025.

Water clarity: By 2035, improve water clarity as defined by the LISS report card to support healthy eelgrass communities.

Pervious Cover: Through green infrastructure and low impact development, maintain or increase the area of pervious cover in the watershed in 2035 relative to a 2010 baseline.

Riparian buffer extent: By 2035, increase natural vegetation within 300 feet of any stream or lake by 10 percent compared to 2010 baseline of 65 percent.

Open space extent protected: Preserve 21 percent of the Connecticut land, or 673,210 acres, by 2023; maintain or increase protected land within the LIS coastal boundary by 2035.

Outcome 1-1: Contaminant and nutrient loads from land-based sources in the watershed of LIS are reduced.

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Objective 1-1a: To reduce contaminant and nutrient loads from point and nonpoint sources

Strategy 1-1a1: Evaluate and reduce contaminant and nutrient contributions from Combined Sewer Overflows and from Municipal Separate Storm Sewer Systems (MS4s), incorporating climate change and sea level rise in planning, regulation and best management practices (BMPs)

Strategy 1-1a2: Evaluate and reduce contaminant and nutrient loads from WWTFs, conveyance systems and other associated sewer lines

Strategy 1-1a3: Develop pathogen TMDL or alternate control plans for LISS harbors, coasts, and embayments using the existing pathogen TMDL

Strategy 1-1a4: Continue enhanced implementation of existing 2000 TMDL for nitrogen in LIS and embayments, and adapt and revise as appropriate based on monitoring, modeling, and research findings

Strategy 1-1a10: Improve and manage decentralized, package, and on-site wastewater treatment systems (OSWTSS) to reduce contaminant and nutrient loading

Outcome 1-2: The negative impacts of contaminants and nutrients in the waters and sediments of LIS and tributaries/embayments are reduced.

Objective 1-2c: To improve understanding of the sources of nutrients and contaminants and how they interact with the ecosystem and human health

Strategy 1-2c1: Understand drivers and impacts of harmful algal blooms (HABs) and develop and implement methods to minimize the impact on ecosystem services

Outcome 1-3: Research, monitoring, and modeling to support attainment of water quality objectives is maintained and improved.

Objective 1-3b: To research, monitor, and assess water quality and factors that contribute to water quality change

Strategy 1-3b4: Research, monitor and assess HABs and their impacts on water quality

Objective 1-3c: To improve access and usage of information, databases, and resources and incorporation of data into management actions

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Strategy 1-3c1: Support collaboration between LISS partner organizations including upper basin agencies/partners to improve utility of monitoring data

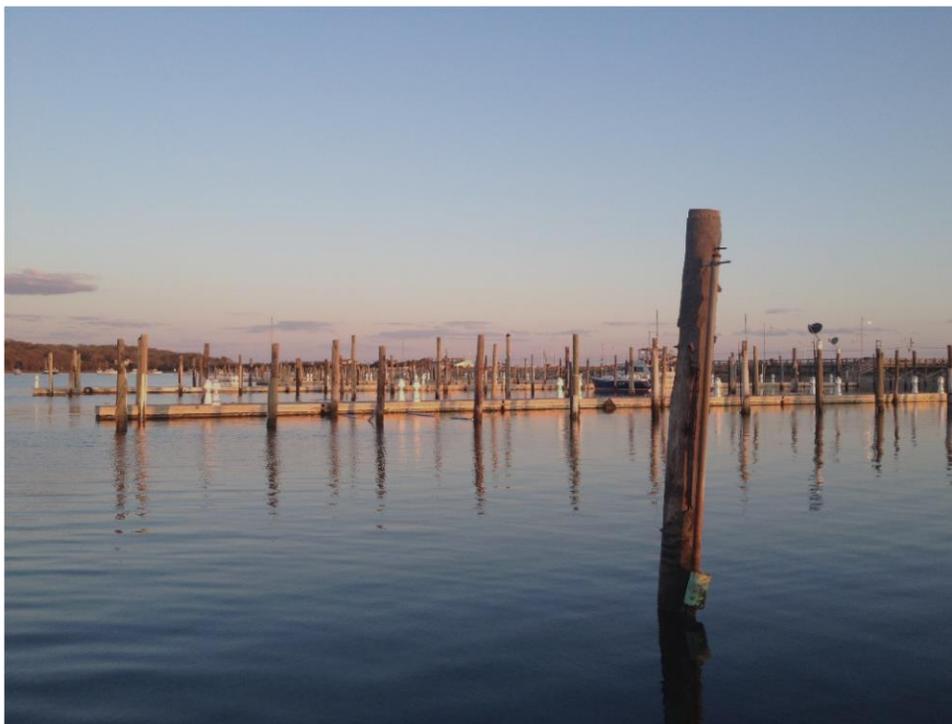
6.3.4 Recommendations

As stated earlier, the primary focus of this analysis is the Clean Waters and Healthy Watersheds theme. Twelve selected Implementation Actions pertaining to this theme are listed below. (Details on all of the 136 actions can be found in the LISS CCMP Update Actions report.)

- WW-4 Encourage wastewater treatment plant upgrades, combined sewer overflow mitigation and elimination (where possible) to support goals and targets of LISS programs.
- WW-5 Continue enhanced implementation of the LIS TMDL for dissolved oxygen and evaluate revision of those TMDL targets.
- WW-6 Modify the reporting requirements of MS4 communities to improve dissolved oxygen TMDL implementation tracking and to better quantify the success of control measure actions.
- WW-7 Improve and enforce pesticide/herbicide/fertilizer regulations and other Best Management Practices (BMPs) for agriculture and urban turf.
- WW-10 Develop a nonpoint source and stormwater tracking system tool for the LIS watershed.
- WW-14 Develop improved policies for package/decentralized wastewater treatment facilities and on-site septic systems.
- WW-15 Improve understanding, management and design of denitrifying on-site wastewater treatment systems to reduce nitrogen and pathogens.
- WW-16 Modify septic system use and siting policies to accommodate climate change and sea level rise (SLR).
- WW-17 Improve efficiency and resiliency of existing/new waste treatment systems including septic, WWTF and stormwater infrastructure to accommodate SLR.
- WW-23 Identify and recommend removal or protection of sensitive infrastructure in the coastal zone (e.g., oil tanks, pump/power

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stations, etc.) and work to enact legislation to prevent future siting of such infrastructure in vulnerable coastal floodplains.



- WW-25 Monitor and track occurrences and contributing factors of biotoxin and HAB outbreaks.
- WW-39 Assess sources of nutrient and pathogen contamination to LIS embayments.

6.3.5 Implementation

The public comment review period for the LISS CCMP Update ended in early November 2014. According to Mark Tedesco, Director, LISS Office, the goal is to complete technical edits to the revised, final LISS CCMP Update by the end of 2014, and then produce a “public” version for release in early 2015. Formal approval of the LISS CCMP Update by the Connecticut Dept. of Energy and Environmental Protection, the US EPA and the NYS DEC may occur at a high-level event in spring 2015.

The LISS CCMP Update has a 20-year horizon and includes specific implementation actions organized by theme to help attain the plan goals and ecosystem targets. In addition to the work of ongoing programs, these specific, tactical actions will carry out the strategies over the next five years. Review and

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development of implementation actions every five years will allow for adaptive management and inclusion of emerging scientific and technological advances.

The Federal Government through provisions in the Clean Water Act, has charged EPA with providing overall coordination of and support for the regional effort. The legislation supporting these efforts includes the Long Island Sound Improvement Act and the Long Island Sound Stewardship Act. The federal fiscal year 2014 budget provided approximately \$4.5 million for the LISS. The LISS CCMP Update recommended that annual funding be increased to a level of \$10 million. The States of Connecticut and New York will estimate the federal and state funds needed over the next 20 years to meet statewide needs, including additional Long Island Sound-specific project needs.

Next Steps for LISS

The Long Island Sound Study intends to finalize their CCMP Update in 2015, and will then return their programmatic focus to implementation.

6.3.6 Education and Outreach

The EPA LISS Office is located in Stamford, CT. For New York State, New York Sea Grant located at Stony Brook University provides public outreach support. The LISS has numerous committees (Policy; Executive Steering; Management; Citizens Advisory; and Science and Technical Advisory Committees) and work groups (Five State/EPA TMDL; Habitat Restoration; Nonpoint Source, Pollution and Watersheds; Sentinel Monitoring for Climate Change; and Stewardship Work Groups) that help to implement the LISS CCMP. The LISS also maintains an active website that provides access to all aspects of the CCMP Update process, schedules, reports, newsletters, etc. (<http://longislandsoundstudy.net>).

6.4 South Shore Estuary

6.4.1 Introduction

The analysis presented below focuses on the *Long Island South Shore Estuary Reserve Comprehensive Management Plan*, dated April 2001, the *Partners for Progress – Long Island SSER Comprehensive Management Plan Accomplishments 2003-2005* and any new insights and recommendations contained in the *Long Island SSER Comprehensive Management Plan Implementation Status Report 2006-2010*, dated November 2011, and how it relates in a broad sense from a local government perspective to Suffolk County's Reclaim Our Water initiative and the *Draft Comprehensive Water Resources Management Plan* (2011). Reclaim Our Water is a comprehensive initiative to improve the quality of groundwater and surface water and restore wetland health through the reduction of nitrogen

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pollution from sanitary waste that would be primarily achieved by the provision of wastewater collection and treatment infrastructure in targeted areas, and by installing new and advanced on-site septic systems in locations not served by sewers.

6.4.1.1 Overview of the Long Island SSER

The *Long Island South Shore Estuary Reserve Comprehensive Management Plan* (CMP), dated April 2001, was prepared pursuant to the Long Island South Shore Estuary Reserve Act (Article 46 of the Executive Law), to establish a consensus-based blueprint for the protection and restoration of the estuary's natural, cultural and economic-related resources. The CMP contains recommended actions focused on improving water quality, restoring and protecting living resources, expanding public use and enjoyment of the estuary, sustaining and expanding the estuary-related economy and increasing education, outreach and stewardship in the Reserve.

To assist the Council, the New York State Department of State Division of Coastal Resources (now the Office of Planning and Development), working through partnerships with local governments and federal agencies, gathered and analyzed information on land and embayment uses, the estuarine economy, water quality, living resources, and other aspects of the Reserve. Much of this information was analyzed by the Department of State through geographic information systems technology, and the analyses have served as a basis for the implementation actions offered in the CMP. Important data was also supplied by the towns and counties in the Reserve as part of assessments of their nonpoint source management practices conducted in conjunction with the Department of State. All of this information is presented in the series of technical reports and working papers referenced in Appendix A to the CMP.

The South Shore Estuary Reserve is home to about 1.5 million people. The anchor of the region's tourism, seafood and recreation industries, the Reserve stretches from the western boundary of the Town of Hempstead to the middle of the Town of Southampton. South to north, the Reserve extends from the mean high tide line on the ocean side of the barrier islands to the inland limits of the mainland watersheds that drain into Hempstead Bay, South Oyster Bay, Great South Bay, Moriches Bay and Shinnecock Bay.

6.4.2 Problem Identification

Human population growth and burgeoning development in the Reserve, especially since World War II, had and continues to have a dramatic effect on the estuary. Most habitat loss in the Reserve has been the result of the filling of low-lying lands in the western portion of the Reserve for residential and commercial uses. Other development activities, including construction of

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canals, roads and bridges, have also destroyed or degraded habitats. According to the NYSDEC's 1996 Priority Waterbody List, stormwater polluted by elevated levels of fecal coliform bacteria, excessive nutrients and sediment has affected the viability of fish populations in the Reserve's tributaries and has closed over 34,000 acres of hard clam beds in its bays.

For purposes of planning and description, the South Shore Estuary Reserve is conveniently viewed as three sub-regions: the western bays, Great South Bay and the eastern bays. The Great South Bay and the Eastern Bays sub-regions are located within Suffolk County and will be the focus of this discussion.



Great South Bay is the largest shallow estuarine bay in New York State, with extensive back barrier and tidal creek salt marshes, eelgrass beds, and intertidal flats. Most marshes in the sub-region are ditched, with many mainland marshes impaired by fill and bulkheads or restrictions to tidal flow. The watershed of Great South Bay can be described as "developing," in contrast to the more fully "developed" western bays region, and development is generally less intense and open areas more extensive. Like the western bays sub-region, Great South Bay has extensive impervious surfaces in its watershed. For this reason, nonpoint source pollution from stormwater runoff is

the primary issue.

Nutrients, sediment and coliform bacteria are the principal pollutants carried by stormwater runoff into the sub-region's tributaries and ultimately Great South Bay. Vessel waste discharges and waterfowl are also contributors to the bacterial load. Elevated levels of coliform are responsible for the closure of 10,711 acres of shellfish beds in Great South Bay and the periodic closure of three of its bathing beaches. Nutrients and sediments in stormwater runoff threaten fishing, fish propagation and fish survival in the sub-region's tributaries and coves. Hydromodifications - alterations of water level and stream flow - and lowering of groundwater levels also have significant effects on fishery resources in tributaries.

The shallow eastern bays - Moriches and Shinnecock - are distinguished by the presence of inlets, strong tidal exchanges between the ocean and the bays, and minor inflows of lower salinity water from the Peconics through the

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Shinnecock Canal. Salt marshes and dredged material islands of the eastern bays support significant nesting colonies of terns, gulls, and wading birds. Shallow water areas are highly productive, especially the salt marshes and intertidal flats that fringe the barrier islands and the estuarine habitats around the tributary mouths.

Although the watershed of Moriches and Shinnecock Bays is the least developed in the Reserve, elevated levels of fecal coliform bacteria from polluted stormwater runoff have closed 6,075 acres of shellfish beds. Sediment and excessive nutrients in stormwater runoff have affected fish survival in tributaries, and organic nutrients play a role in the brown tide outbreaks in the sub-region. Agriculture occurs in this sub-region to some degree, with potential impacts on water quality from sediments, fertilizers and pesticides.

6.4.3 Goals and Objectives

There are five recommended actions that the CMP focused their efforts. They include:

1. Improve and Maintain Water Quality
2. Protect and Restore Living Resources
3. Expand Public Use and Enjoyment
4. Sustain and Expand Estuary-related Economy
5. Increase Education, Outreach and Stewardship

The discussion below will be directed to the first recommended action listed above: Improve and Maintain Water Quality.

Water quality in the South Shore Estuary Reserve is important to everyone on Long Island. Poor water quality diminishes recreational and economic opportunities.

Nonpoint source pollution is the primary water quality concern in the South Shore Estuary Reserve. Polluted stormwater runoff alone is the principal source of nonpoint pollution in 48 of the 51 waterbody segments in the Reserve with use impairments. Elevated levels of coliform bacteria in stormwater runoff, an indicator of the potential presence of pathogens, are responsible for the closures of shellfish beds and bathing beaches. Sediment and excessive nutrients in stormwater runoff have pronounced negative effects on the Reserve's living resources.

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Point sources of pollution - municipal wastewater treatment plants, inactive hazardous waste sites and active and inactive solid waste disposal facilities - are not as widespread and are comparatively less significant sources of pollution than nonpoint sources, but still cause water quality degradation in their immediate areas. Point sources are regulated and monitored through the State Pollution Discharge Elimination System (SPDES) permit program.

Improving water quality in the Reserve is dependent on federal, State and local governments, and private sector partners, implementing a strategy that:

- 1) Identifies opportunities and develops schedules to protect lands that provide significant pollutant abatement functions;
- 2) Designs and undertakes projects that retrofit existing storm sewer and other conveyance systems to remove pollutants from storm water;
- 3) Adopts nonpoint source pollution best management practices; and
- 4) Increases education and outreach to modify resident and user behavior.

In keeping with Article 46 of Executive Law, the Council established as one of its goals the need to "achieve and maintain the water quality necessary to preserve and rehabilitate resources of the estuary." Attaining this ambitious water quality goal depends upon the cooperative efforts of many players -- federal, State, and local governments, non-governmental organizations, resource users and residents.

Recommendations presented in the SSER CMP provide for the implementation of a strategy to control nonpoint source pollution and to further evaluate the effects of point sources. They include: reduce and control nonpoint source pollution; enhance point source controls; implement the Environmental Protection Agency's Storm Water Phase II Final Rule; and address scientific information needs.

Two of the most significant pollutants in the South Shore Estuary Reserve are elevated levels of coliform bacteria and excessive concentrations of certain nutrients. Nonpoint sources of nutrients include fertilizers from lawns and agricultural lands; wildlife, waterfowl and pet wastes; and on-site wastewater treatment systems. The **Summary Report: South Shore Estuary Reserve Water Quality Workshop** (1999) also determined that human development of the margins of the estuary's bays and tributaries had increased nutrient loading and resulted in an increased level of eutrophication. The seasonal occurrence of hypoxic conditions associated with excess nutrients and dissolved oxygen highlights this concern. Although the shallow waters of the

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South Shore bays are well mixed (which discourages oxygen depletion), low levels of dissolved oxygen (hypoxia) are typical along the northern margins of the bays and in the tributary mouths, with tributaries showing clear signs of seasonal hypoxia, a serious threat to aquatic life in these areas.

As nonpoint source pollution originates from land use and water-based human activities, the Council's strategy calls on municipalities within the Reserve to assume a leadership role in reducing and controlling nonpoint pollution by exerting their legal authority to influence such activities, and preserving high quality waters from future pollution. The strategy presents corrective and preventive actions that local governments can take, supported by State and federal programs and grants and augmented by the efforts of non-governmental organizations, to reduce and control nonpoint source pollution.

The strategy's corrective and preventive measures fall into four management approaches: 1) identifying opportunities and developing schedules to protect lands that provide significant pollutant abatement functions; 2) designing and undertaking projects that retrofit existing storm sewer and other conveyance systems to remove pollutants carried by stormwater; 3) adopting nonpoint source pollution best management practices; and 4) increasing education and outreach to modify resident and user behavior. The degree to which each of the four approaches may be institutionalized in a municipality will depend upon local circumstances.

Several steps are fundamental to the implementation of the corrective component of the strategy. First, the distribution and relative magnitude of nonpoint source pollution in each watershed should be identified by municipalities. Satellite imagery of land cover has been used with soils, topography and distance to surface water data to identify nonpoint pollution potential for the entire Reserve (see map at end of this chapter). This information will help focus implementation of site-specific stormwater remediation projects and water quality monitoring efforts.

Next, municipalities should characterize their watersheds. These characterizations should include a delineation of sub-watersheds or contributing areas, and the location and condition of storm sewer outfalls and stormwater conveyance systems through which pollutants in stormwater are discharged. Existing drainage and runoff patterns should be accounted for in this delineation.

An assessment of the likelihood of correcting discharge problems through infrastructure retrofit improvements should also be included. The likelihood of improvement and value of the receiving water resources are two key factors to be considered in setting priorities and are essential to preparing watershed

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management plans, a follow-up step that would establish the basis for the design of cost-effective corrective projects. Environmental Protection Fund Local Waterfront Revitalization Program grants are available to assist in this phase of the process.

6.4.4 Recommendations

The Council offers the following recommendations to achieve and maintain water quality in the South Shore Estuary Reserve. In an effort to reduce and control nonpoint source pollution, Recommendations 1 through 13 call for corrective actions in the form of remediation projects to manage storm water as it moves across the landscape and preventive actions that control the level of pollutants that enter stormwater runoff and the Reserve's bays and tributaries. Many of these preventive actions involve the implementation of best management practices by municipalities in the Reserve. In an effort to address point sources of pollution, Recommendations 14 through 17 call for enhancements to existing source controls. Recommendations 18 through 21 relate to the Environmental Protection Agency's Storm Water Phase II Final Rule. Recommendations 22 through 24 identify information gaps that need to be addressed within the next three years in order to move toward fulfillment of the Council's vision for Long Island's South Shore Estuary Reserve.

6.4.4.1 Recommendations to Reduce and Control Nonpoint Source Pollution

1. Complete assessments of nonpoint source pollution management practices and identify and implement needed preventive measures based on priorities.

The six towns and two counties in the Reserve have already completed assessments of their current nonpoint source pollution control practices. Villages in the Reserve and relevant State agencies should conduct similar assessments of their nonpoint control practices and identify gaps in those practices. Towns should consider assisting villages within their borders with the completion of such assessments.

2. Spatial analysis of land cover, soils, topography and satellite imagery should be used by municipalities in the Reserve to determine the distribution and relative magnitude of nonpoint source pollution in their communities.

Comprehensive spatial analysis of land cover, soils and topography by the NYS Department of State has resulted in a nonpoint pollution potential model. The model identifies the potential distribution and relative magnitude of nonpoint

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source pollution and should be used by municipalities as they develop watershed plans that address management of nonpoint source pollution.

3. Complete specific watershed analyses to determine localized distribution and magnitude of nonpoint pollution, and prepare watershed plans and retrofit improvement designs for cost-effective nonpoint source pollution control projects.

A watershed analysis involves identifying and setting priorities for improvements to storm sewers and other runoff conveyance systems. It should also: examine the overall watershed character, including existing drainage and runoff patterns; evaluate the benefits and feasibility of correcting runoff problems through road infrastructure improvements; and identify opportunities for preservation of high quality waters from future pollution. This information could be supported with data from targeted water quality monitoring programs.

Based on the results of watershed analyses, watershed plans should identify significant nonpoint source contributing areas and identify and set priorities for site-specific projects for stormwater remediation. Designs for these projects should be developed according to the practices from either the USEPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* or the NYSDEC's *Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State*. The latter is incorporated by reference into the *New York State Coastal Nonpoint Pollution Control Program*, a compendium of nonpoint pollution control and abatement practices currently implemented in New York State.

4. Implement priority stormwater remediation projects in significant nonpoint source contributing areas identified in individual municipal watershed plans.

Stormwater remediation projects can be implemented through a mix of local resources, such as general funds, capital improvements programs, special bond initiatives, or municipal work crews, and State funding mechanisms such as the 1996 New York State Clean Water/Clean Air Bond Act and the Environmental Protection Fund. In some instances, federal dollars may be available to fund projects through the Transportation Enhancement Act (TEA-21), section 319 of the federal Clean Water Act, and through the proposed authorization for the Coastal Nonpoint Source Pollution Control Program.

5. Municipalities should periodically report to the Council on progress made and problems encountered in implementing the water quality

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component of this plan in an effort to enlist its aid in identifying sources of technical assistance and potential funding.

A system of reporting to the Council by municipalities should be established to measure Reserve-wide progress against objectives, and to enable early detection and resolution of Reserve-wide problems. The Council could also serve as a clearinghouse of information and techniques that would be shared with individual South Shore Estuary Reserve municipal stewards.

6. Adopt best management practices to control drainage, erosion and sedimentation prior to and during construction.

In an effort to reduce levels of hazardous and toxic substances associated with construction activities from contaminating stormwater runoff, Southampton, Hempstead and Babylon should incorporate into their site plan review regulations, and Nassau County into its subdivision regulations, management practices that: 1) control erosion and sedimentation before and during site preparation and construction; and 2) minimize detrimental effects on the water quality of waterbodies before and during site preparation and construction. These practices are found in NYS Department of Transportation design specification documents and the NYSDEC's *Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State*; the former document is also incorporated by reference in *New York State Coastal Nonpoint Pollution Control Program*. Additionally, all towns should immediately ensure that their land use regulations address construction activities that disturb from one to less than five of acres of land in advance of the permit conditions that will be required by the Environmental Protection Agency's Final Storm Water Phase II Rule.

7. Adopt best management roadway operation and maintenance.

To reduce the significant water quality impacts of stormwater runoff from existing roads, highways and bridges, all towns in the Reserve should formally adopt roadway operation and maintenance practices from portions of NYS Department of Transportation procedural manuals and NYS Department of Environmental Conservation's *Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State*.

8. Institute appropriate best management practices to reduce the contamination of stormwater runoff by hazardous materials, fertilizers, herbicides and pesticides, household hazardous wastes, and wildlife and pet wastes.

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- To reduce the impacts caused by stormwater runoff contaminated by activity-specific nonpoint sources of pollution, the following practices should be instituted:
- To mitigate and prevent spills of petroleum products and hazardous materials, all towns in the Reserve should: a) incorporate standards from the National Fire Protection Association and Environmental Conservation Law Article 27 for generation, storage, application, handling and disposal activities before, during and after site preparation and construction into site plan review regulations, and local law; b) incorporate U.S. Occupational Safety and Health Administration standards and procedures pertaining to spill cleanups into site plan review regulations, subdivision requirements and local law; and c) train an emergency spill response team in these standards and procedures.
- To address excessive fertilizer, herbicide and pesticide use as part of management of turf grass in public and private areas, all towns in the Reserve should educate citizens, contractors, construction workers, and owners and managers of private facilities on the importance of carrying out best management practices, including soil testing, use of integrated pest management, organic gardening and lawn care.
- To reduce the amount of wildlife and pet wastes entering waterbodies, Babylon, Hempstead and Southampton should undertake multi-component education programs that discourage the feeding of waterfowl, and Brookhaven and Southampton should institute "pooper-scooper" laws.

9. Adopt marina and recreational boating best management practices, and educate marina patrons about specific best management practices.

To reduce elevated levels of fecal coliform bacteria and toxic substances associated with existing marinas, all towns in the Reserve should incorporate into local law practices from the NYS Coastal Nonpoint Pollution Control Program, the NYSDEC *Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State* and the National Fire Protection Association *Fire Protection Standard for Pleasure and Commercial Motor Craft*. Such efforts should include adoption of appropriate regulations and practices that mitigate the impacts of vessel waste discharges. The imposition of best management practices on private marinas should be balanced against the provision of incentive subsidies such as tax relief and public funding for rehabilitation.

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All Reserve towns except Southampton need to target outreach efforts at marina patrons in an effort to reduce solid waste reduction and encourage recycling, while all towns except Babylon need to target outreach efforts on fish cleaning practices at sites designated for that purpose.

10. Adopt best management practices for the siting and design of new and substantially redeveloped marinas.

To reduce levels of fecal coliform bacteria and toxic substances associated with new marinas, all towns in the Reserve should incorporate siting and design practices from the NYS Coastal Nonpoint Pollution Control Program and the NYSDEC *Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State* into site plan review.

These practices should be applied to new and expanding private marinas and to public marinas through formally adopted planning approval procedures. The imposition of these practices on private marinas undergoing redevelopment should be balanced against the provision of incentive subsidies such as tax relief and public funding for rehabilitation.

11. Adopt best management practices to restore and create wetlands.

To reduce the water quality impacts of existing hydromodification activities, all towns in the Reserve should adopt into local operation and maintenance procedures those practices from the NYSDEC *Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State* for restoring and creating wetlands. All towns except Southampton need to adopt those practices from the catalogue that address improvements to stream corridors and the restoration of riparian habitat and vegetation.

12. Adopt best management practices to protect wetlands and streams.

To prevent the water quality impacts of new private hydromodification activities, all towns in the Reserve should incorporate into their site plan review, practices from NYS Department of Transportation design specification documents and the NYSDEC *Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State* to protect wetlands and streams, and control erosion and sedimentation before and during site preparation and construction. These practices also should be formally adopted into local operation and maintenance procedures and applied to municipal hydromodification activities as well.

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All towns also should formally adopt into local operation and maintenance procedures those practices from NYS Department of Transportation procedural manuals and NYSDEC's *Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State* that address the clearing of debris from streams and culverts.

13. Adopt best management practices that reduce the environmental effects of on-site wastewater treatment systems (OWTS).

To reduce the water quality impacts of on-site wastewater treatment systems, Suffolk County should work with Babylon, Islip and Brookhaven to develop and implement on-site system management strategies that include a regulatory and incentive program for periodic inspections and pumpouts of OWTS, require upgrades of OWTS as part of substantial residential and commercial redevelopment, and establish a public education component that informs system owners of proper use and the maintenance necessary for proper operation. Southampton should institute a similar public education program.

The Town of Brookhaven should enforce those provisions of its town code that address new and replacement systems in special flood areas and that establish design criteria for systems in coastal high hazard areas. Southampton should fully implement those provisions of its town code that require inspections of systems at five-year intervals and remediation as necessary, amend those provisions to allow inspections by private individuals certified by the Town, and establish such a certification program. Additionally, Southampton should extend its requirement of OWTS upgrades whenever wetland permits are issued for expansions and additions to commercial establishments.

The Council offers the following recommendations to address actual and potential point source pollution. The recommendations are based on, respectively: a water quality initiative provided for in the federal Clean Water Act; comments from Council members; and completed South Shore Estuary Reserve technical reports. Implementation of these actions will take the concerted effort of State, federal and local governments.

6.4.4.2 Recommendations to Enhance Point Source Controls

14. Determine point and nonpoint source controls to reduce loadings of pathogens, nutrients and toxic substances contributing to water quality problems in the Reserve's tributaries and bays.

In order to determine point and nonpoint source controls necessary to address water quality problems associated with nutrient enrichment, pathogens or toxic substances, a systematic and sequential process must be followed. First,

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water quality data in the Reserve's tributaries and bays must be evaluated. Based on this evaluation, the NYS Department of Environmental Conservation will identify any specific waterbodies that should be included on its 303(d) list of impaired waterbodies that require the development of Total Maximum Daily Loads. In accordance with recently promulgated federal regulations, the next 303(d) list is expected to be finalized in April 2002. Later, for those waterbodies identified on the 303(d) list, the Department of Environmental Conservation will develop Total Maximum Daily Loads (TMDLs) in accordance with the schedule included in the list. TMDLs will identify reductions in point and nonpoint sources of pollutants necessary to meet water quality standards. Finally, the Department of Environmental Conservation, the Department of State, the Council and local governments should work together to implement any load reduction actions identified in the TMDL allocations.

15. Re-examine the need, benefits and feasibility of upgrading the municipal sewage treatment plants discharging into the estuary or relocating their outfalls to the Atlantic Ocean.

TMDL wasteload allocations for the waterbodies receiving discharges from wastewater treatment plants that discharge secondarily treated effluent should be used to determine whether upgrades of the municipal wastewater plants to tertiary treatment are necessary.

16. Ensure Compliance with Existing State Pollution Discharge Elimination System (SPDES) permits.

The compliance of point source discharges into the Reserve with current SPDES limits and conditions should be investigated. Based on the results, existing and future infrastructure or operational needs necessary to ensure compliance should be identified. The NYS Department of Environmental Conservation, the Department of State, the Council and local governments should then work together to assure that the needs identified are met.

17. Prevent the future contamination of sediments through continued implementation of existing programs that address the management of hazardous waste, and remediate identified areas of contaminated sediments where the sources of contamination and impairments to living resources and/or uses are known and well documented, mitigation action is feasible, and funds are available.

National Fire Protection Association and Environmental Conservation Law Article 27 standards regulate hazardous waste generation, storage, application, handling and disposal activities before, during and after site preparation and

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construction. Practices in previously cited documents are designed to manage nonpoint source pollution. Areas of contaminated sediments that potentially impair waterbodies in the Reserve should be tested to determine required actions, and, if necessary, should be remediated on a priority basis when funding becomes available.

6.4.4.3 Recommendations to Implement EPA's Storm Water Phase II Final Rule

18. The NYSDEC should designate as "urbanized areas" under the EPA's Storm Water Phase II Final Rule those portions of the Reserve not so designated by the Bureau of Census.

The Phase II Final Rule requires nationwide coverage of all small municipal separate storm sewer systems that are located within the boundaries of a Bureau of Census-defined "urbanized areas" based on the latest decennial Census. All of Nassau County has been designated as an "urbanized area." It is anticipated that most of the Suffolk County portion of the Reserve also will be designated as "urbanized areas" based on Census data. The NYSDEC, as the permitting authority, should ensure that this stormwater management program applies throughout the entire Reserve by designating those parts of the Reserve not considered "urbanized areas" on the basis of Census figures.

19. All municipalities in the Reserve designated as "urbanized areas" under the Environmental Protection Agency's Storm Water Phase II Final Rule should immediately begin to prepare to meet Phase II permit conditions and secure the necessary permits by the mandated deadline.

The National Pollution Discharge Elimination System permitting authority (the NYSDEC) will issue general permits for Phase II designated small municipal separate storm sewer systems and small construction activity by December 9, 2002. Designated municipalities must obtain permit coverage within 90 days of permit issuance. The permitting authority may phase in coverage for municipalities with populations under 10,000 on a schedule consistent with a State watershed permitting approach. Permitted municipalities must fully implement their stormwater management programs by the end of the first permit term, typically a five year period. Permit conditions will include at least six program elements: public outreach and education; public participation and involvement; illicit discharge detection and elimination; construction site runoff control; post-construction runoff control; and pollution prevention. All municipalities should immediately start the process to meet permit requirements. The implementation actions offered in this plan will help municipalities establish a foundation upon which to base their efforts at meeting the required permit conditions.

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20. Information and education programs need to be developed and conducted for municipal officials on implementation of the Environmental Protection Agency's Phase II Final Rule.

A cooperative information and education program will facilitate the timely implementation of the Phase II Final Rule by municipalities in the Reserve. Such a program should include: an overview of why the Phase II Storm Water Program is necessary; who is covered by the rule and what the rule requires to manage small municipal separate storm sewer systems and small construction activity; and the Phase II program approach, the schedule for implementation, and the Environmental Protection Agency's "tool box" of materials available to ensure that program implementation is effective and cost-efficient.

21. Institutional arrangements for implementation of the Phase II Final Rule need to be established.

Implementation of the Phase II Final Rule will be the responsibility of counties, towns and villages in the South Shore Estuary Reserve. In an effort to address the reality of overlapping municipal authorities and to make implementation of the rule workable, the Departments of State and Environmental Conservation and municipalities in the Reserve should work together to identify optimal ways to develop stormwater management districts and explore the feasibility of those options.

6.4.4.4 Recommendations to Address Information Needs

22. Implement a coordinated water resources monitoring strategy that monitors water quality in the Reserve's tributaries and bays, and evaluates the extent to which management actions are successful in achieving water quality goals.

The Coordinated Water Resources Monitoring Strategy for the South Shore Estuary Reserve proposed a two-tiered program for monitoring the physical, chemical, biological and human-induced conditions of the Reserve and its watershed. Tier 1 monitoring is designed to establish baseline data on water quality in the Reserve's bays and tributaries, identify and assess trends in water quality, and evaluate the extent to which desired uses of the Reserve's water resources are met. Tier 1 efforts include monitoring the occurrence of brown tide blooms in the Reserve's waters. Tier 2 monitoring activities are in general short-term investigations, more intensive in temporal and /or spatial scale, and designed to test specific hypotheses regarding water quality or ecological issues in the South Shore Estuary Reserve.

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The monitoring strategy builds on existing monitoring programs and offers recommendations for improved coordination among agencies conducting those programs. It calls for the hiring of a program manager, the implementation of a quality assurance/quality control program, and centralized data analysis and reporting.

23. Develop a hydrologic model of the Reserve.

Once strategic information is developed from the coordinated water quality monitoring program (Recommendation 22, above), a hydrodynamic model addressing groundwater underflow, tributary inputs, water circulation, currents, dispersion and residence times would add to the capability of refining and enhancing management strategies. Such a model would need to identify the potential hydrodynamic and water quality impacts, ecological consequences and long-term environmental fate of toxic substances, coliform bacteria, nutrients, and other pollutants to the bays to be of value. The model would be used to test the potential effects of alternative locations for wastewater outfalls and predict the water quality consequences of a storm-related island breach or inlet closure. Coupled with land use and water quality monitoring data through a GIS system, the model would be of use to local governments for understanding water quality impacts of alternative land use decisions.

24. Further investigate the hypothesis that brown tide blooms are related to the ratios of available dissolved organic and inorganic nitrogen.

Additional data are needed to further test the hypothesis that brown tide is related to inputs and the ratios of available dissolved organic nitrogen and dissolved inorganic nitrogen from groundwater, sediment nutrient flux, and other sources. Such research could also shed light on other ecological processes such as the influence of trace metals and pesticides. This research effort could also provide valuable information on conventional water quality and living resource management issues. Effective enhancement of hard clams, scallops, oysters, finfish, crustaceans, and submerged aquatic vegetation will be difficult until this harmful algal bloom is better understood.

6.4.5 Implementation

Building on what has already been accomplished by the State, local governments and the Reserve's Council, the implementation actions presented below provide the necessary road map to fulfilling the recommendations offered and assuring the long-term health of the Reserve. The actions target efforts where the greatest potential exists for halting further degradation of the



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Reserve's natural resources and realizing improvements to them, and where multiple goals and objectives of the Council can be achieved.

The actions focus attention where problems have been clearly identified and where the existence of motivated partners assures a higher likelihood of success. They are organized and presented according to outcomes they will fulfill.

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Table 6-3 South Shore Estuary Study Recommendations to Reduce Nonpoint and Point Source Pollution

South Shore Estuary Study Recommendations to Reduce Nonpoint and Point Source Pollution

Outcome 1: Reduced nonpoint source pollution.

1-1 Construction of stormwater abatement projects in significant nonpoint source contributing areas associated with closed shellfish beds, impaired living resources, and bathing beaches that experience periodic closures due to water quality concerns.

1-2 Amendment of county and local government codes and regulations to include best management practices.

1-3 Implementation of on-site wastewater treatment (septic) system maintenance and upgrades.

1-4 Implementation of Agricultural Environmental Management.

1-5 Completion of assessments of municipal nonpoint pollution management practices.

1-6 Development of watershed action plans.

1-7 Preparation for compliance with the Environmental Protection Agency's Stormwater Phase II Final Rule.

1-8 Exploring the feasibility of stormwater management districts.

Outcome 2: Reduced Point Source Pollution

2-1 Assessment of inactive hazardous waste sites.

2-2 Assessment of abandoned and closed landfills.

2-3 Exploring regulation of private petroleum tanks less than 1,100 gallons.

2-4 Evaluation of need for wastewater treatment plant upgrades and outfall relocations.

2-5 Expansion of Village of Patchogue Sewer District.

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Table 6-4 South Shore Estuary Study Recommendations to Increase Shellfish Harvest and Protect and Restore Coastal Habitat

South Shore Estuary Study Recommendations to Increase Shellfish Harvest and Protect and Restore Coastal Habitat

Outcome 3: Increased harvest levels of hard clams and other estuarine shellfish species.

3-1 Population assessment and seeding of hard clams and other shellfish species.

3-2 Feasibility of Islip hatchery expansion.

3-3 Increasing grow-out of shellfish.

3-4 Enhancement of hard clam habitat through shell augmentation.

3-5 Evaluation of potential spawner sanctuaries.

3-6 Creation of a Reserve shellfish management forum.

Outcome 4: Coastal habitats protected and restored to support shellfish, finfish and coastal bird populations.

4-1 Restoration of tidal wetlands.

4-2 Coordination of wetland restoration efforts.

4-3 Restoration of anadromous fish.

4-4 Habitat restoration in tributaries.

4-5 Evaluation and restoration of eelgrass beds.

4-6 Vegetation management for coastal birds.

4-7 Recognition of shorebird reserves.

4-8 Increased protection of marine turtle populations.

4-9 Management of upland ponds.

4-10 Augmentation of streamflow.

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Table 6-5 South Shore Estuary Study Recommendations to Preserve Open Space and Improve Knowledge for Ecosystem Management

South Shore Estuary Study Recommendations to Preserve Open Space and Improve Knowledge for Ecosystem Management

Outcome 5: Open space preserved to sustain community character and protect water quality and habitat.

- 5-1 Development of a Reserve open space acquisition and protection action strategy.
- 5-2 Analysis of small parcel open space opportunities.
- 5-3 Use of a land trust to assist local acquisition efforts.
- 5-4 Implementation of local open space plans.
- 5-5 Acquisition of open space.

Outcome 6: Improved knowledge for ecosystem management.

- 6-1 Monitoring water quality.
- 6-2 Land use build-out analysis.
- 6-3 Determination of additional point and nonpoint source pollution controls.
- 6-4 Determination of sediment composition in Reserve tributaries and bays.
- 6-5 Monitoring landfill performance and compliance.
- 6-6 Analysis of existing information on leaks and spills.
- 6-7 Development of a Reserve-wide hydrologic model.
- 6-8 Monitoring the ecosystem.
- 6-9 Study of hard clam biology.
- 6-10 Assessment of additional tidal wetland sites for restoration.
- 6-11 Completion of baseline inventory of eelgrass distribution.
- 6-12 Undertaking research on flooding and erosion.
- 6-13 Expansion of brown tide research.

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Table 6-6 South Shore Estuary Study Recommendations to Increase Public Use of the Estuary, Sustain Water-Dependent Businesses and Thriving Maritime Centers

**South Shore Estuary Study Recommendations to Increase Public Use of the Estuary,
Sustain Water-Dependent Businesses and Thriving Maritime Centers**

Outcome 7: Increased public use of the estuary and expanded tourism.

- 7-1 Expanding public access and recreation facilities at existing sites.
- 7-2 Creating new public access and recreation opportunities.
- 7-3 Expansion of existing interpretive centers and development of new ones.
- 7-4 Establishing a South Shore Estuary Reserve Coastal Heritage Trail.

Outcome 8: Water-dependent businesses sustained.

- 8-1 Provision of adequate infrastructure to support existing and new water-dependent uses.
- 8-2 Development of a dredging and dredged materials management plan.
- 8-3 Dredging for safe navigation.
- 8-4 Planning for local waterfront development.
- 8-5 Improving local waterfront regulation.

Outcome 9: Maritime centers thrive.

- 9-1 Preparation of maritime center action plans.
- 9-2 Implementation of maritime center action plans.
- 9-3 Promotion of maritime centers.

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Table 6-7 South Shore Estuary Study Recommendations to Increase Public Use of the Estuary, Sustain Water-Dependent Businesses and Thriving Maritime Centers

South Shore Estuary Study Recommendations to Heighten Public Awareness of the Estuary and Advance Council Partnerships

Outcome 10: Heightened public awareness of the estuary.

- 10-1 Supporting a Reserve web site.
- 10-2 Updating education resource directory.
- 10-3 Creation of an access guide.
- 10-4 Production of South Shore video.
- 10-5 Working with outreach partners.
- 10-6 Identification of professional development opportunities for teachers.
- 10-7 Supporting the existing network of entities that conduct education programs on board watercraft.
- 10-8 Identification of potential mentors.
- 10-9 Establishment of a clearinghouse for student research.
- 10-10 Establishing an awards program.
- 10-11 Designation of bird conservation areas.
- 10-12 Undertaking a native landscaping pilot program.
- 10-13 Creation of a homeowner certification program.

Outcome 11: Actions advanced through Council partnerships and office.

- 11-1 Promotion and oversight of plan implementation.
- 11-2 Establishment and operation of Reserve office.

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Projects to Improve and Maintain Water Quality

Implementation Outcome 1: Reduced Nonpoint Source Pollution

The primary water quality concern in the SSER is nonpoint source pollution. Stormwater runoff transports pollutants, which impairs living resources, deteriorates the SSER related economy, and diminishes the public's use and enjoyment. Reducing nonpoint pollution requires improved policies and regulations, adopting best management practices, completing watershed management plans, and encouraging watershed-friendly practices through education and outreach.

Implementation Outcome 2: Reduced Point Source Pollution

Point sources of pollution—typically discrete and discernible pipe outfalls that discharge directly into surface waters—are generally not widespread, but can cause significant water quality impacts in their immediate areas. Point sources of pollution are regulated and monitored through the State Pollution Discharge Elimination System (SPDES) permit program.

The Long Island SSER Comprehensive Management Plan Implementation Status Report- April 2001- July 2003, called on local governments in the Reserve to assume a leadership role in reducing nonpoint source pollution. Under the priority goal of Improving and Maintaining Water Quality, most of the work effort was focused on stormwater runoff inventories, stormwater abatement projects and plans; the creation of a stormwater runoff work group, watershed studies for Ketchams Creek, Beaver Dam Creek and Mud Creek; and baseline water quality monitoring efforts. An analysis of historical stream flow and nitrogen data was published by the USGS to aid in the understanding of the effects of urbanization on the South Shore tributaries and bays.

In 2006, the report entitled, *Partners for Progress* was prepared by the LI SSER Council, which outlined the SSER CMP Accomplishments from 2003-2005. Under Outcome 1: Reduced Nonpoint Source Pollution, most of the work effort was focused on stormwater runoff infrastructure mapping and abatement projects. The development of Watershed Management Plans was also undertaken for Brown's River, Green's Creek, Swan River, Quantuck Creek and Forge River.

As chair of the South Shore Estuary Reserve Council (SSERC), the New York State Department of State (DOS) collaborates extensively with SSERC members and others to achieve coastal resource protection and waterfront revitalization within the SSER. Together the DOS and SSERC successfully advanced nonpoint source pollution projects and best management practices for improved surface water quality, while protecting habitats, and ensuring a high level of public estuary use with increased opportunities for regional tourism.

According to the *Implementation Status Report 2006-2010*, from January 1, 2006 through December 31, 2010, New York State supported 94 projects in the SSER that are advancing state and regional priorities resulting in significant implementation of the SSER CMP for water quality protection, habitat restoration, and estuary-related economic support. Many of the projects were funded through the Environmental Protect Fund (EPF), leveraging more than \$31.6 million in federal and local government funds for a total of more than \$74.9 million toward SSER CMP implementation in these areas:

Improve and Maintain Water Quality: 34 projects funded (\$15.3 million)

Protect and Restore Living Resources: 27 projects funded (\$28.2 million)

Expand Public Use and Enjoyment of the SSER: 25 projects funded (\$12.3 million)

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Sustain and Expand the Estuary-related Economy: 6 projects funded (\$18.1 million)

Increase Education, Outreach and Stewardship: 2 projects funded (\$756 thousand)

Coupled with state agency technical assistance to local governments and SSER partners, these projects implement specific SSER CMP recommendations for watershed management plan development, water quality assessment, improved stormwater management, marine species restoration, maritime trail and signage development, historic building restoration and preservation, and shoreline erosion control. An additional 119 projects/activities supporting SSER CMP priorities reported to the DOS and funded entirely by counties, city, towns, villages, or non-governmental organizations resulted in more than \$59.8 million toward advancement of CMP implementation actions. Not all projects, or amounts for projects, may have been reported. The combined total for New York State-assisted and reported partner-funded projects in the SSER between 2006 and 2010 is more than \$134.8 million.

The 2006 – 2010 Significant Accomplishments listed below are for the projects undertaken to *Improve and Maintain Water Quality*.

Municipalities throughout the SSER completed 20 stormwater improvement projects, including installation of more than 2,000 new catch basins, catch basin inserts or other devices, to capture, filter and reduce pollutants from reaching SSER bays. Thirteen of these projects mitigated stormwater impacts by altering drainage patterns, installing sediment reduction/filtering features and, where appropriate, improving water flow. In addition to improved water quality in the estuary, these projects protect habitats from degradation.

All SSER municipalities completed assessments of their nonpoint management practices to comply with the US EPA Municipal Separate Storm Sewer System (MS4) requirements. In addition, municipalities embarked on 12 stormwater management/watershed planning projects, which include evaluating existing watershed conditions, mapping stormwater conveyance systems, identifying and prioritizing mitigation projects, developing an implementation strategy, identifying best management practices, and preparing construction plans, specifications and estimates.

Municipalities have increased efforts to sweep streets, clean catch basins, remove settleable solids from swirl separators, and maintain stormwater infrastructure on a regular basis. Eight new street sweepers and vacuum eductor trucks were purchased to provide additional stormwater infrastructure

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cleaning capability to remove pollutants and sediments from entering the south shore estuary.

SSER municipalities increased capacity to improve water quality by adding seven new pumpout vessels and one land-based pumpout facility to eliminate discharge of septic waste from recreational boats into south shore bays by removing and properly disposing of waste. It is estimated that the new pumpout vessels collected more than 200,000 gallons of boater septic waste between 2006 and 2010. Numerous federal, state and municipally operated land-based pumpout facilities continued receiving recreational boater septic waste. In 2009, the existence of adequate pumpout facilities enabled the USEPA to declare the SSER a Vessel No Discharge Zone under the federal Clean Water Act.

SSER enabling legislation charged the SSERC with reviewing the effectiveness of the SSER CMP's implementation actions and to make revisions accordingly. Water quality impairments and habitat degradation remain pressing issues. Emerging sea level rise and climate change threats will affect the SSER and questions about shoreline sustainability remain unanswered. Reviewing progress over the past 10 years as well as defining specific implementation actions necessary over the next decade to minimize flooding and erosion threats and enhance biological viability are all priorities.

Leading the effort to protect the estuary's future, the DOS is preparing a Long Island South Shore Estuary (SSE) Amendment to the NYS Coastal Management Program for Water Quality Improvement, Habitat Protection, and Climate Change Adaptation. An SSE Amendment will achieve greater collaboration between the SSERC and partners to protect and restore critical coastal resources, enable SSE communities to adapt to climate change, and focus on critical areas where further actions are needed to benefit the SSE. With expertise in interpreting scientific information into sound coastal resource management the DOS is well positioned to facilitate partnerships, coordinate multi-level interaction between constituents, and replicate successes across the SSE.

The SSE amendment will provide state, federal and local governments with new information and current scientific knowledge to improve decisions affecting the SSE's health. It will be based on the DOS and SSERC's knowledge of the region, as well as pertinent information generated from the Oceans and Great Lakes Ecosystem Conservation Council and other initiatives such as the NYS Seagrass Task Force, NYS Sea Level Rise Task Force and NYS Climate Action Council.

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Suffolk County funded and partner-funded projects/activities that are being implemented to improve and maintain Great South Bay water quality are summarized on **Tables 6-8** through **6-10**.

Table 6-8

Suffolk County Projects to Improve and Maintain Great South Bay Water Quality

Watershed Boundary Delineations, 2006

Suffolk County Soil and Water Conservation District determined the surface flow watershed boundaries for Mud Creek, Swan River and Forge River in Brookhaven Town. These boundary delineations help identify best management practices in each watershed.

Removal and Disposal of Obsolete Underground Petroleum Storage Tanks

Suffolk County Water Quality Protection and Restoration Program, 2008. Total project cost: \$111,000

Suffolk County is removing and disposing of 24 underground petroleum storage tanks throughout the county to protect soil and water from potential petroleum contamination. The tanks are obsolete due to conversion to natural gas heating fuel or because the buildings served by the tanks are scheduled for demolition.

Suffolk County Water Quality Protection and Restoration Program, 2008. Total project cost: \$70,000

Suffolk County is developing standard operating procedures for inspecting petroleum and chemical tanks and preventing leaks. The manual will standardize design, operation and environmental compliance for underground and above ground tanks to help prevent soil and groundwater contamination.

Stormwater Remediation, Yaphank Lakes and Carmans River

Suffolk County Water Quality Protection and Restoration Program, 2009. Total project cost: \$200,000

Suffolk County is implementing stormwater runoff improvements at four discharge points along a 1.4-mile stretch of CR 21 in Brookhaven Town to prevent pollutants from entering the Yaphank Lakes and Carmans River. Project includes a detailed topographic survey and drainage system reconnaissance; preparing design alternatives, including information on flow rate, pollutants of concern, and construction cost/benefit analysis; preliminary design and necessary permits; and final construction plans, specifications, and estimates.

Local Law Adopted, 2008

Fertilizer Nitrogen Pollution Reduction: Suffolk County adopted a local law to reduce nitrogen pollution from fertilizer. The law prohibits applying fertilizer during cold months and on most county-owned properties year-round, and includes training requirements for licensed landscapers and educational programs at the retail level. The legislation is an important step toward restoring SSER water quality.

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Table 6-9 New York State-Assisted Projects to Improve and Maintain Great South Bay Water Quality

Babylon (T)	Digitization of Babylon Drainage Infrastructure
Babylon (T)	Carlls River Watershed Environmental Clean-up
Babylon (V)	Purchase of Street Sweeper to Implement Stormwater Management Program
Babylon (V)	Purchase of Drain Cleaning Equipment to Implement Stormwater Management Program
Brightwaters (V)	Stormwater Infrastructure Mapping with Pollutant Mitigation Assessment
Islandia (V)	Implementation of Required Stormwater Laws
Islip (T)	Implementation of Green's Creek and Brown's River Watershed Management Plan
Islip (T)	Tariff Street Stormwater Mitigation
Patchogue (V)	Wastewater Treatment Plant Reconstruction and Expansion
Bellport (V)	Former Bellport Gas Station Remediation (Suffolk County project)
Brookhaven (T)	Illicit Discharge Reporting and Response Program
Brookhaven (T)	Tuthills Creek Watershed Management Plan
Brookhaven (T)	Swan River Watershed Management Plan Implementation
Brookhaven (T)	Pine Neck Boat Ramp Drainage Implementation
Brookhaven (T)	Beaver Dam Creek Watershed Management Plan
Brookhaven (T)	Stormwater Remediation to Narrow Bay at County Rd. 46, William Floyd Parkway (segment 1) (Suffolk County project)
Brookhaven (T)	Upgrade Waste Water Treatment System in the Lower Forge River Watershed (Suffolk County Soil and Water Conservation District project)
Brookhaven (T)	Forge River Watershed Management Plan
Brookhaven (T)	Forge River Total Maximum Daily Loads

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Table 6-10 Projects to Improve and Maintain Great South Bay Water Quality with Other Cooperators

National Park Service, U.S. Department of the Interior, Fire Island National Seashore (FINS)

Groundwater-Submarine Aquifer Relationship Study, Ongoing

FINS, in cooperation with the United States Geological Survey (USGS), is examining the nature of groundwater and surface water interactions and associated nutrient fluxes along the Great South Bay shoreline by measuring quantity, quality, and variability of submarine groundwater discharge at representative locations. Results will be used to help limit groundwater as a source of nonpoint pollution.

U.S. Army Corps of Engineers (USACE)

Forge River Watershed Ecosystem Restoration and Flood Damage Reduction Reconnaissance Study, 2008; and Feasibility Study, 2009

Total project cost: \$3,100,000 (USACE: \$1,600,000; Brookhaven Town funds: \$1,500,000)

USACE completed a Section 905 (b) Reconnaissance Study for the Forge River watershed which confirmed a federal interest in participating in a cost-shared Feasibility Study to evaluate environmental restoration improvements to the Forge River watershed. USACE completed a Forge River Feasibility Study Project Management Plan, which made recommendations for integrated and enhanced existing water quality monitoring and implementation efforts that contribute to a healthy Forge River. Brookhaven Town matched funds for the Feasibility study.

Babylon

Green Homes Septic Assistance Program, 2010

Babylon Town is implementing its *Green Homes Septic Assistance Program*, which allows residents to install modern and efficient septic systems with no upfront costs. The Town will apply a benefit assessment to the property that will pay up to \$12,000 for the upgraded system. Participants save money by having to perform maintenance on their systems less frequently. The program was first implemented in the Carlls River area as the high water table minimizes the ground's leaching capability. System upgrades can result in a 50 percent reduction in nitrogen loads to groundwater resources.

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With the SSERC, the DOS will continue to pursue opportunities to improve and protect the SSER with strong technical assistance and leadership.

Next Steps for SSER

At the present time, the Department of State Office of Planning and Development (OPD) is working on the following three SSER CMP water quality initiatives in Suffolk County:

- The Long Island South Shore Estuary Reserve Eastern Bays Project: Nitrogen Loading, Sources and Management Options is in final stages of completion by Stony Brook University School of Marine and Atmospheric Sciences.
- Coordinated Water Resources Monitoring Strategy Update for the SSER was started in October 2014 by the United States Geological Survey (USGS) and will take two years to complete.
- Evaluate Innovative/Alternate Sewage Disposal Systems within the SSER is proposed for a contract with Suffolk County Department of Health Services in 2015.

The SSER Office continues to be in operation, but without a Director at the present time. According to the Long Island SSER Office, OPD anticipates the preparation of the next SSER CMP Implementation Status Report for 2011-2014 in 2015. With regard to updating the SSER Comprehensive Management Plan, the OPD is evaluating how to proceed.

6.5 Summary

All three of the major estuaries surrounding Suffolk County are well served by stakeholder-driven consensus-building management frameworks focused on improving water quality and habitats in their respective estuaries. Suffolk County is uniquely positioned where the many common goals of these three regional programs intersect. Suffolk County could serve as a coordinating entity among these three programs where the top priority common goals, most importantly the reduction of non-point source nutrient pollution which is also the top priority for Suffolk County, can be enhanced through collaboration and joint implementation. This would, in turn, reinforce Suffolk County's role as a key partner in CCMP implementation for all three estuary programs.

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		Reclaim Our Waters Focus Areas				
		Point Source Nitrogen Reduction	Non-Point Source Nitrogen Reduction	Pathogen Management	Wetland & Seagrass Restoration & Protection	Harmful Algal Bloom Management
Estuary Programs	PEP					
	LISS					
	SSER					