
CHAPTER
ONE

OVERVIEW

PLEDGE FOR THE PECONIC ESTUARY

We find and declare that

The Peconic Estuary is an important natural resource that provides incomparable beauty and significant recreational and commercial benefits;

The Peconic Estuary's living resources, water quality, and aesthetic character have suffered from development and other human uses; and

Restoration and protection of the Peconic Estuary's environmental quality require focused management by a partnership of Federal, State, and local governments, affected industries, academia, and the public.

We therefore pledge to restore and protect the environmental quality of the Peconic Estuary through the preparation and implementation of the Comprehensive Conservation and Management Plan.

— **Peconic Estuary Management Conference**



GOALS

- 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.
- Achieve zero discharge (from point and nonpoint sources) of toxic pollutants, and particularly of bioaccumulative 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.



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, embayments, and tributaries (See **Figure 1-1**). The area surrounding the Peconic Estuary's watershed is rich in rolling farmland, scenic beaches and creeks, lush woodlands, and wetlands.

The Peconic Estuary System includes the Peconic Estuary and those land areas that contribute groundwater and stormwater runoff to the Peconic River and Estuary. The estuary system features numerous rare ecosystems that are home to many plant and animal species, including several nationally and locally threatened 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.

Bountiful living resources support commercial fin and shellfishing, as well as other water-dependent and water-related activities.

Tourism and recreation are central to the local economy, including businesses such as restaurants and marinas that cater to

recreational 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. More than 7,300 people are employed in these businesses, with a combined annual income of more than \$127 million.¹

The numerous ecological, cultural, and economic assets of the Peconic Estuary System are enjoyed by both residents and visitors. The East End towns are home to approximately 100,000 people. During the summer season, this number swells to over 280,000. These year-round and seasonal populations put pressure on the area's natural resources and impact water quality. In recent years, many stakeholder groups have expressed concern about the impacts of population growth, new development, and natural resource exploitation on the overall health of the system. Some of the earliest concerns were raised in 1985, after the first appearance of the Brown Tide. The devastating impacts of this algal bloom heightened public awareness about the linkage between the region's ecology and economy. The Brown Tide also served to mobilize the citizens and local governments of eastern Long Island in an effort to save the estuary from careless exploitation and irreversible degradation.

Historically, impacts from population growth and unchecked development have not been as severe in the Peconic Estuary as in certain other regions on Long Island. However, a number of problems have emerged in recent years, in addition to the Brown Tide, which suggest that the estuary is at a crossroads.

What is an Estuary?

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 freshwater from rivers and land. The amount of freshwater 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 systems. 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.

¹Estuarine-dependent establishments include businesses such as commercial fishing, marine transportation, marinas, boat building and repair, eating and drinking establishments, hotels and motels, selected retail and membership sport clubs, and other enterprises that cater in whole or in part to tourists and recreationists during the peak season.

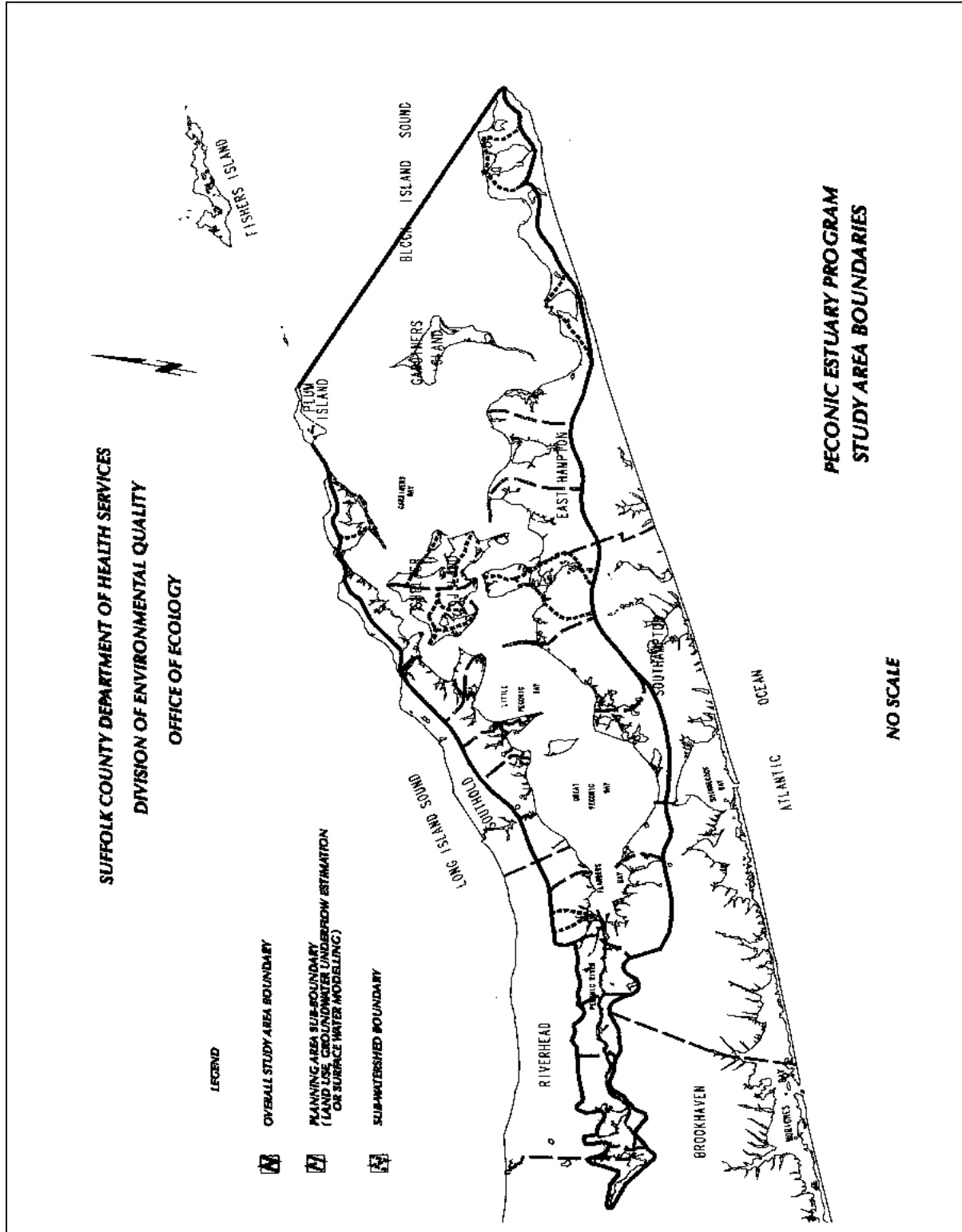


Figure 1-1. Study Area Boundaries.



These problems include the closure of shellfish beds due to pathogenic organisms, declines in finfish abundance, the loss and fragmentation of habitats, nutrient over-enrichment resulting in low dissolved oxygen (DO) levels (in Flanders Bay), the potential for low levels of toxics to impact the system, and the loss of open space and farmland to residential development. There is a growing awareness of the need for remedial efforts to correct existing problems as well as proactive efforts to prevent further degradation of the system.

THE PECONIC ESTUARY PROGRAM

The National Estuary Program (NEP) was established by the Federal Water Quality Act of 1987, which amended the Clean Water Act. Congress added the Peconic Estuary System to the priority list of estuaries for inclusion in the NEP in October

1988. In 1991, the Peconic Estuary was nominated for inclusion in the NEP. This nomination represented the effort and desires of a wide variety of estuary stakeholders, including citizen's groups, environmental groups, local and State governments, academic institutions, and many private organizations. The Peconic Estuary was accepted into the ranks of the NEP in September 1992, and the Peconic Estuary Program (PEP), a partnership of all stakeholders, including Federal, State, and local interests and the public, officially commenced with a kick-off conference in April 1993. This **Comprehensive Conservation and Management Plan** (CCMP) is the product of a tremendous amount of research and effort by resource agency staff and local citizens serving on the various task forces and committees known collectively as the Peconic Estuary Program Management Conference. The Management Conference structure and membership are shown in Appendices B and C.

The National Estuary Program

Congress recognized the significance of preserving and enhancing coastal environments with the establishment of the National Estuary Program (NEP) in the 1987 amendments to the Clean Water Act. The purpose of the NEP is to promote the development of comprehensive management plans for estuaries of national significance threatened by pollution, development, or overuse. There are currently 28 estuaries in the program.

Peconic Estuary Program Management Conference Objectives

- *To protect and improve the Peconic Estuary system water quality to ensure a healthy and diverse marine community;*
- *To preserve and enhance the integrity of the ecosystems and natural resources present in the study area so that:*
 - *Optimal fish and wildlife habitat and diversity of species can be ensured; and*
 - *Conservation and wise management of consumable, renewable resources of the estuary are promoted and enhanced;*
- *To optimize opportunities for water dependent recreation;*
- *To promote to the maximum practicable extent, the social and economic benefits that have been associated with the Peconic Estuary system;*
- *To minimize health risks from human consumption of shellfish and finfish; and*
- *To promote, to the maximum extent possible, public awareness and involvement in estuarine management issues.*



Geographic Scope of the Program

The Peconic Estuary is located on the eastern end of Long Island, New York, and is bordered by Long Island's north and south forks. The major river discharging freshwater into the estuary is the Peconic River. This freshwater mixes with the salt water from the many bays in the estuary system leading out to the Atlantic Ocean. **Figure 1-1** depicts the boundaries of the Peconic Estuary Program study area. The eastern end of the study area is an imaginary line through Block Island Sound between Plum Island and Montauk Point, beyond which lies the open sea. The western boundary is at the headwaters of the Peconic River, just west of the William Floyd Parkway. The study area also includes those land areas that contribute groundwater and stormwater runoff to the river and estuary.

The study area includes the following municipalities: all of the Town of Shelter Island; significant portions of the Towns of Riverhead, Southold, East Hampton and Southampton; a small portion of the town of Brookhaven; and all or portions of the Villages of Greenport, Dering Harbor, Sag Harbor, and North Haven. More than 128,000 acres of land and 121,000 acres of surface water are included. **Figure 1-2** shows the percent distribution of land uses in the Peconic Estuary Watershed.

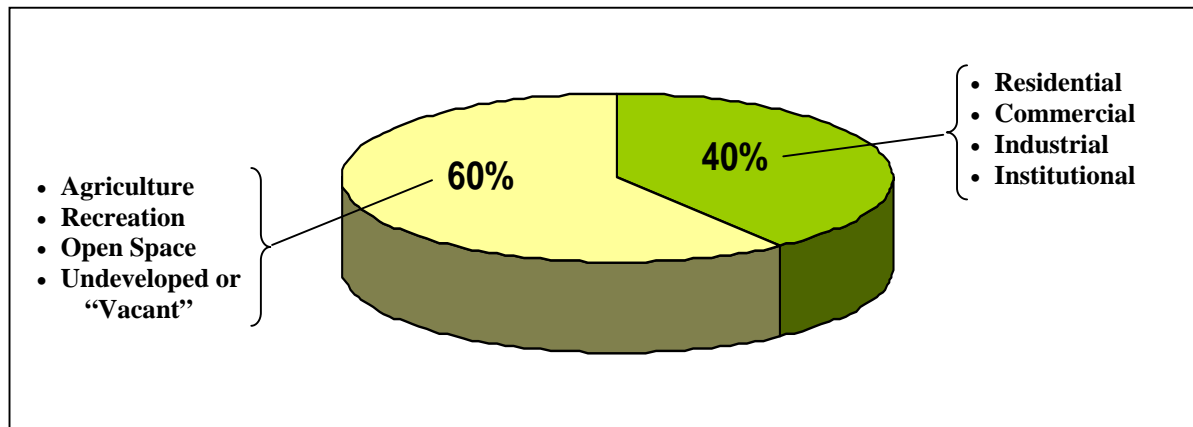


Figure 1-2. Land Uses in the Peconic Estuary.

PECONIC ESTUARY PRIORITY MANAGEMENT ISSUES

Priority management topics were initially identified in the Peconic Estuary nomination document for inclusion in the National Estuary Program. These topics were Brown Tide, nutrients, habitats and living resources, pathogens, and toxics. In this final CCMP, these topics are joined by critical lands protection, public education and outreach, financing, and overall implementation. These priority issues have been selected, both initially and currently, based on impacts, threats, and importance in meeting the overall goals of the Peconic Estuary Program. It is not enough to only address known or existing problems; management conference participants recognize the need to also take a proactive approach and prevent problems from occurring now and in the future. Each of these priority management topics is discussed below. Specific actions to address each of these priority management topics can be found in the Management Plan chapters of this CCMP.



The PEP has developed measurable goals for each chapter. In many cases, these measurable goals are first order estimates based on best available information and on management conference judgment. These goals will be refined in each annual report, as new information becomes available.

Brown Tide

The Suffolk County Department of Health Services (SCDHS) has routinely monitored the water quality of the Peconic Estuary since 1977. In June 1985, an unusually large and persistent algal bloom, now known as Brown Tide, was first noted in Peconics. The Brown Tide organism is identified as the phytoplankton species *Aureococcus anophagefferens*² and has also bloomed in Long Island's South Shore Estuaries, as well as in Narragansett Bay, RI, and Barnegat Bay, NJ.

In 1988 Suffolk County expanded its monitoring operations in an effort to determine the cause of Brown Tide. Although the cause of Brown Tide is still not known, the study's resulting final report, the Brown Tide Comprehensive Assessment and Management Program (BTCAMP) (SCDHS, 1992), was the primary source for the Peconic Estuary Program's National Estuary Program Nomination Report (SCDHS, 1991).

The BTCAMP serves as the initial Brown Tide characterization for the Peconic Estuary Program. Brown Tide research and characterizations are routinely reported in scientific literature and are systematically updated through Sea Grant's Brown Tide Research Initiative Reports and SCDHS' Brown Tide Workplan (last updated in 1998).

Since its first appearance in 1985, the Brown Tide has had a serious impact on natural resources, the local economy, the general aesthetic value of the estuary, and possibly regional tourism. The abundant Peconic bay scallop population was virtually eradicated by the onset of this bloom. Eelgrass beds, which contribute to the regional importance of the estuary as a shellfish and finfish spawning and nursery area, have been adversely impacted. Hard clams appear to have been affected by the blooms, although to a lesser extent than scallops. In addition, finfish landings may have declined during the blooms. The Brown Tide turns the normally blue waters of the bays brown — a situation which is unappealing (although not harmful) to swimmers and tourists.

While a significant amount of research has been completed and additional projects are still underway, the chemical, physical, and/or biological factors that cause, sustain, and end Brown Tide blooms are yet to be determined. Efforts are ongoing to determine what management actions can be undertaken to prevent or, if that is not possible, mitigate the effects of the recurrent Brown Tide on the ecosystem and economy of the estuary.

The PEP's measurable goals with respect to Brown Tide blooms include:

- Continue to better coordinate, focus, and expand Brown Tide research efforts (measured by funding appropriated, frequency of Brown Tide symposiums and frequency of updating the Brown Tide Workplan and coordinations within the Brown Tide Steering Committee). [See Action B-1]

² Different Brown Tide organisms have been associated with algae blooms in various parts of the country. Throughout this CCMP, the term "Brown Tide" refers specifically to the phytoplankton species *Aureococcus anophagefferens*, which has been identified as the source of the Brown Tide blooms in the Peconic Estuary.



- Continue the current level of water quality sampling in the Peconic Estuary (measured by the number and frequency of samples taken per year and the number of bays and peripheral embayments sampled). Currently, the Suffolk County Department of Health Services conducts biweekly monitoring at 32 stations in the Peconic Estuary throughout the year, resulting in over 830 samples taken annually. [See Action B-1]

Measurable goals for the Brown Tide-related natural resource impacts are found in the Habitat and Living Resources Chapter (**Chapter 4**).

Nutrient Pollution

The Long Island Comprehensive Waste Treatment Management Plan (“L.I. 208 Study”; Long Island Regional Planning Board, 1978) and the BTCAMP (SCDHS, 1992) identified nutrients, specifically nitrogen, as a priority management issue facing the Peconic Estuary. More recent status and trends information in the Point and Nonpoint Source Nitrogen Loading Overview (SCDHS, 1998), the Surface Water Quality Monitoring Report (1976–1996) (SCDHS, 1998), the Peconic Estuary Surface Water Quality: Nitrogen, Dissolved Oxygen, and Submerged Aquatic Vegetation report (SCDHS, 1998), and the Nitrogen Loading Budget and Trends report (SCDHS, 1999) emphasize the need to reduce anthropogenic (human-influenced) nitrogen loads to the estuary. These reports incorporate the results of many other technical studies dealing with groundwater quality and quantity, sediment nutrient flux, etc.

Excessive nutrient loading in an estuary can result in low dissolved oxygen levels in the water, a condition that can be harmful to marine life. Although nitrogen itself is generally not harmful, too much nitrogen can lead to excessive algal blooms. Algae consume oxygen (respire) at night, potentially depleting dissolved oxygen levels in the water column. Also, when algae die, they can settle through the water column to the sediments, where the organic matter is decomposed by bacteria. Bacterial decomposition uses oxygen (“sediment oxygen demand”), as well as releases nitrogen back into the water column (“sediment nutrient flux”). Thus, algal blooms can lead to repeated or prolonged periods of low dissolved oxygen, particularly in poorly flushed embayments. Algal blooms can also produce a shading effect in the water that can impact eelgrass.

Overall, the system is not experiencing widespread low levels of oxygen related to excessive nitrogen loading. However, the western portion of the system (Peconic River and Flanders Bay) has a legacy of nutrient over enrichment and periodic, short-term dissolved oxygen problems. Although there are larger sources of nitrogen, the PEP surface water computer model indicates that the Riverhead Sewage Treatment Plant (STP) is a controllable nitrogen loading sources of major significance in the Peconic River/Flanders Bay area. The importance of the treatment plant nitrogen loading is due to the concentrated nature of the STP discharge at a location near the mouth of the Peconic River, a poorly flushed area of the estuary system.

Historically, duck farming along the shores of the Peconic Estuary was a major pollutant source. At the peak of the industry in the middle of the twentieth century, there were 21 duck farms in the Peconic River and Flanders Bay area discharging large quantities of animal wastes that contained nitrogen into the system. Presently, there is only one duck farm remaining in operation located on Meetinghouse Creek, which discharges to the north-central portion of Flanders Bay.



Bottom sediments contribute recycled nutrients to the water that originate from external point and nonpoint source inputs. The release of nitrogen from the sediments represents more than 50 percent of the estimated total nitrogen load to the system.

Groundwater, accounting for more than 21 percent of the nitrogen input, is the largest external, locally manageable source to the estuary. It combines nitrogen from residential and agricultural fertilizer, on-site sewage disposal systems, and other sources.

Atmospheric deposition to surface waters represents approximately 26 percent of the nitrogen load to the system. The remaining small load (less than 3 percent) to the estuary is from stormwater runoff, tributary streams, and sewage treatment plants. Although these sources are a small percentage of the total regional loading, they may have localized adverse effects.

The quantity of nitrogen found in both groundwater and surface water is directly related to land uses within the system. Undoubtedly, the amount of open space found throughout the study area has spared the system thus far from significant long-term, widespread problems. The fact that much of this open space is available for development heightens the need for enlightened and carefully thought-out growth management plans. This is especially true in most of the western portion of the system (the Peconic River Corridor and Flanders Bay area) and around embayments poorly flushed by cleaner seawater.

The PEP's measurable goals with respect to nutrients include:

- Decrease the total nitrogen concentrations in the western estuary to a summer mean of no more than 0.45 mg/l (based on 1994-96 model verification conditions, and measured by surface water nitrogen concentrations as compared to the PEP nitrogen guidelines). [See Actions N-4, N-5, N-10]
- Improve the dissolved oxygen concentrations in the western estuary to ensure that the New York State dissolved oxygen standard (currently 5.0 mg/l) is not violated (measured by surface and bottom dissolved oxygen levels as compared to the New York State dissolved oxygen standard). [See Actions N-1, N-10]
- Ensure that the total nitrogen levels in shallow waters remain at or below 0.4 mg/l to help optimize water clarity, maintaining and potentially improving conditions for eelgrass beds, a critical habitat (based on 1994-96 model verification conditions, and measured by light extinction coefficients as compared to the recommended eelgrass habitat optimization goal of at or below $0.75 \pm 0.05 \text{ m}^{-1}$). [See Actions N-1, N-4, N-5, N-10]
- Ensure that the existing total nitrogen and dissolved oxygen levels are maintained or improved in waters east of Flanders Bay (*i.e.*, do not increase TN nor decrease DO) (measured by surface water total nitrogen concentrations as compared to the PEP nitrogen guidelines and surface and bottom dissolved oxygen levels as compared to the New York State dissolved oxygen standard). [See Actions N-1, N-2, N-4, N-5, N-10]
- Develop a quantitative total nitrogen load allocation strategy for the entire estuary (measured by development of a strategy and timely endorsement by local and State agencies). Preliminary work group estimates, and work performed by other programs, indicate that a 10-25 percent fertilizer reduction goal is a reasonable first order target for existing residential and agricultural fertilizing programs. [See Action N-3]



- Implement a quantitative nitrogen load allocation strategy for the entire estuary (measured by attaining the PEP recommendations including the implementation of the recommended Agricultural Environmental Management (AEM) program, as well as other recommendations, which may include fertilizer reduction programs, sanitary system upgrade programs, point source controls, etc., as well as monitoring for the impacts on measurable groundwater quality parameters). [See Actions N-3, N-4, N-5, N-10]
- Ensure that there is no substantial net increase in nitrogen loading to areas east of Flanders Bay and reductions in the Peconic River/Flanders Bay region so that an increase in new development would be offset by reductions in loads from pre-existing uses. The nitrogen work groups will develop means of attaining this goal, which may include groundwater performance standards (*e.g.*, nitrogen concentrations in groundwater resulting from post-development discharge/recharge), implementing fertilizer and clearing restrictions, and zoning. [See Actions N-3, N-4, N-5, N-6, N-10]
- Continue sponsoring and coordinating research and information gathering (measured by funding appropriated, and research conducted, relative to PEP recommendations). [See Actions N-7, N-8, N-9]
- Continue and expand open space acquisition programs (measured by funding appropriated and acres acquired in target areas). [See Action N-6]

Habitat and Living Resources

The eastern end of Long Island, including the Peconic Estuary, contains a large variety of natural communities, from upland pine barrens along the Peconic River to soft-bottom benthos in the main bays. There is a larger percentage of undisturbed habitats and a greater diversity of natural communities within this watershed than anywhere else in the coastal zone of New York State. The Peconic Estuary System is home to a number of species that are rare or endangered globally, nationally, and locally, including a variety of plants, birds, insects, amphibians, reptiles, and fish. In addition to these individual species, there are complete habitats in the region that are found nowhere else in New York State and are rare even on the east coast of the United States, such as pine barrens and Atlantic white cedar swamps. Some of these are currently in danger of being reduced in size or completely lost.

The Characterization Report of the Living Resources of the Peconic Estuary (1998) identified the living resources that are at risk and determined how human activities have or could alter their health. Other PEP reports characterizing the Peconic's living resources include:

- Tidal Creeks Study (1999)
- Eelgrass Habitat Criteria Study (1999)
- Peconic Estuary Surface Water Quality Nitrogen, Dissolved Oxygen, and Submerged Aquatic Vegetation Habitat (1998)
- Historic Shellfishing in the Peconic Estuary Based on Baymen's Interviews; 1945–1985 (1998)
- The Peconic Watershed — Recent Trends in Wetlands and Their Buffers (1998)



- Species Composition, Seasonal Occurrence and Relative Abundance of Finfish and Macroinvertebrates Taken by Small-Mesh Otter Trawl in Peconic Bay, New York (1998)
- An Assessment of Shellfish Resources in the Tributaries and Embayments of the Peconic Estuary (1998)
- Protocols for Harvesting and Transplanting Eelgrass in the Peconic Estuary (1997)
- Peconic Bay System: Aquaculture (1997)
- An Annotated Bibliography of the Natural Resources of the Peconic Estuary and Adjacent Locations on Eastern Long Island, NY (1997)
- An Assessment of Shellfish Resources in the Deep Waters of the Peconic Estuary (1997)
- Submerged Aquatic Vegetation Study (1996)
- Marine Mammal and Sea Turtle Report (1996)
- Commercial Finfish and Crustacean Landings from Peconic and Gardiners Bay 1980–1992 (1995)
- Bay Scallop Restoration, Western Peconic Bay (1995)
- Rare Plants, Rare Animals and Significant Natural Communities in the Peconic Estuary (1995)
- Planting Bay Scallops: Results of Reseeding Bay Scallops in the Peconic Bay, NY, 1986 to 1992 (1993)

Habitat loss, fragmentation, and degradation are frequently the result of physical alteration of the land. In the Peconic Estuary System, low-lying marshes and swamps historically have been ditched, drained, and filled for mosquito control and construction. Most of the inlets and navigation channels in the embayments and surrounding creeks have been dredged. The use of bulkheads, rip-rap, and other structures has been widely permitted in order to stabilize waterfront property throughout the system. Much of the uplands have been cleared for agriculture or, more recently, residential use. The natural resources most affected by these practices include wetlands, beaches, grasslands, forests, coastal ponds, and possibly eelgrass beds.

In some cases, these land use practices have caused direct impacts to living resources and habitats in the Peconic Estuary System. More often, however, development and land alteration cause indirect degradation to habitats and subtle changes in natural communities. For example, fill for roads and railroads has cut off the flow of water into some tidal wetlands. Over time, the vegetation has changed and the marsh has either become a freshwater wetland or has gradually filled in and become upland. Dams have been built on many of the rivers and creeks emptying into the estuary, which prevents the movement of anadromous fish into fresh water for spawning. Dredging has altered water currents in small embayments and creeks, which has led to changes in sediment distribution, suspended solids in the water column, and community composition. The use of hard structures along the shoreline has caused scouring in shallow areas and the loss of associated communities. In many cases, these changes have been quite localized and subtle, with no apparent impairments to human uses of the area.

In some cases, development and human uses have caused degradation and destruction of habitat to the degree that the habitat can no longer support certain species, some of which are now endangered. Many species have requirements for very specific habitats, such as pine barrens, freshwater wetlands,



and maritime grasslands that have been slowly degraded and destroyed over time. Other species have historically been over-exploited for food (turtles) and fur (seals). And some species, such as the osprey, became victims of contamination by synthetic chemicals. Because the reasons for the declines in different species vary, solutions for protecting and restoring endangered wildlife populations must be tailored to specific needs. In some cases, preservation and restoration of a single habitat type will contribute to the protection of a whole suite of species. In other cases, species-specific actions must be taken to protect the organisms.

Evidence from monitoring some of the important species found in the estuary, such as winter flounder, scup, weakfish, bay scallops, eelgrass, piping plovers, and least terns, indicates poor productivity and recruitment of these species. Low fish recruitment may be due to less egg development, fewer adults producing eggs, and/or less habitat. Loss of eelgrass from Brown Tide and possibly nutrient enrichment may contribute indirectly to poor recruitment of juvenile bay scallops. Predation, off-road vehicles, and heavy beach use are some of the causes attributed to poor piping plover and least tern productivity. Other causes of poor productivity and recruitment include invasive species, changes in water quality, and habitat loss, degradation, and fragmentation. Impacts may be occurring from specific activities such as navigational dredging, shellfish dredging, overharvesting, shoreline hardening, mosquito control, and tidal obstructions. Many of the actions in the Habitat and Living Resources chapter are intended to reduce or eliminate these threats and to protect, restore, and enhance productivity and recruitment. Additional investigations and monitoring that determine the extent of these threats would be of great value to the Peconic Estuary Program.

Estuary-wide impacts of all kinds can potentially result from the accumulation of localized changes to the system. Daily road runoff of oil and gas, farm and lawn runoff of herbicides and pesticides, nutrient pollution, Brown Tide, and small scale physical changes (*i.e.*, propeller scour, addition of individual docks and piers) are only a few examples of activities that can have reverberating effects throughout the Peconic ecosystem. Physical and chemical disturbances can threaten habitat, health, and reproduction of fish, shellfish, and wildlife. In some instances, effects are only sublethal, altering fecundity or growth, while other outcomes result in low diversity. Unfortunately, stresses on the Peconic Estuary ecosystem from either incremental or “every day” activities have not been fully quantified and analyzed to understand their cumulative impacts. To accurately understand cause and effect relationships, more scientific inquiry and monitoring of Peconic Estuary living resources and its watershed are needed.

The actions of this CCMP focus on broad natural resource conservation efforts, as well as specific management actions for selected species and habitats.

The PEP’s measurable goals with respect to habitat and living resources include:

- Protect the high quality habitats and concentrations of species in the Critical Natural Resource Areas (measured by acres of open space protected and development of model ordinances). [See Actions HLR-1, HLR-6, HLR-10, HLR-11, HLR-13, HLR-14, HLR-15, HLR-16]
- Maintain current linear feet of natural shoreline and over the next 15 years reduce shoreline hardening structures by five percent (measured by the percent change of natural vs. hardened shorelines through GIS mapping). [See Actions HLR-1, HLR-2, HLR-5, HLR-8, HLR-13, HLR-15]
- Maintain current eelgrass acreage (2,100 acres in main stem of the estuary) and increase acreage by ten percent over 10 years (measured by inter-annual aerial surveys with GIS)



- and SCUBA assessments). [See Actions HLR-1, HLR-3, HLR-4, HLR-6, HLR-9, HLR-10, HLR-15, HLR-16]
- Maintain and increase current tidal and freshwater marsh acreage, and restore areas that have been degraded (*e.g.*, restricted flow, *Phragmites australis* dominated, hardened shoreline) (measured as number of acres of marsh with GIS). [See Actions HLR-1, HLR-2, HLR-4, HLR-5, HLR-7, HLR-8]
 - Maintain a policy of no new mosquito ditches and not re-opening ditches that have filled-in by natural processes; and restore 10-15 percent of mosquito ditched marshes through Open Marsh Water Management (measured by the number of acres of restored tide marsh using Open Marsh Water Management). [See Actions HLR-1, HLR-2, HLR-5, HLR-7, HLR-8]
 - Increase the number of piping plover pairs to 115 with productivity at 1.5 (over a three-year average), distributed across the nesting sites in the Peconic Estuary (measured by annual piping plover surveys). [See Actions HLR-1, HLR-8, HLR-13, HLR-15, HLR-16]
 - Develop recommendations and guidelines to reduce impacts to marine life from dredging-related activities (measured by amount of reduced dredging volumes and protected benthic habitat acreage). [See Actions HLR-1, HLR-3, HLR-5, HLR-6, HLR-15]
 - Foster sustainable recreational and commercial finfish and shellfish uses of the Peconic Estuary that are compatible with biodiversity protection (measured by juvenile finfish trawl surveys, bay scallop landings, and identifying, protecting, and restoring key shellfish and finfish habitat). [See Action HLR-1, HLR-11, HLR-12]
 - Enhance the shellfish resources available to harvesting through reseeding, creation of spawning sanctuaries and habitat enhancement (measured by scallop and clam abundance/landings). [See Actions HLR-4, HLR-7, HLR-8, HLR-9, HLR-10, HLR-12, HLR-16, HLR-17]
 - Link land usage with habitat quality in tidal creeks (measured by continued funding of benthic and water quality surveys to measure the quality/impacts to the habitats within selected tidal creeks).
 - Ensure that the existing and future aquaculture (shellfish and finfish) and transplanting activities are situated in ecologically low-productive areas of the estuary and that they are mutually beneficial to the aquaculture industry, natural resources, and water quality (measured by the extent and location of aquaculture/transplant facilities, water quality measures, and natural resource data). [See Actions HLR-1, HLR-3, HLR-4, HLR-6, HLR-10, HLR-15, HLR-17]
 - Annually initiate five percent of the projects identified in the Habitat Restoration Workgroup Plan for the Peconic Estuary (measured by the number of projects funded and implemented annually). [See Actions HLR-7, HLR-8]

Pathogens and Closed Shellfish Beds

Pathogens are disease-causing organisms that include bacteria, viruses, algae and fungi. The Peconic Estuary Program focused on the potential health risks associated with consumption of contaminated shellfish and direct water contact and/or ingestion, as well as the economic losses associated with shellfish bed and beach closures in the Peconic Estuary. The Characterization Report of the



Pathogens of the Peconic Estuary (1997) identified the main pathogens of concern, as well as their sources. Other PEP reports and projects characterizing the Peconic's pathogen concerns include:

- Water Quality Monitoring (SCDHS)
- Shellfish Sanitation Unit and water quality monitoring/sanitation surveys (NYSDEC)
- Three-Dimensional Hydrodynamic and Water Quality Model of the Peconic Estuary (Tetra-Tech, Inc.)
- Delineations of the stormwater contributing areas in the estuary (SCDHS)
- Regional Stormwater Runoff Management Project (Horsely and Witten, Inc.)
- Several Action Plan Demonstration Projects
- Several Section 319 Nonpoint Source Grant Projects

The primary pathogens of concern in the Peconic Estuary are those associated with human and animal wastes. It is difficult to directly measure the concentration of specific pathogens in seawater due to the variable nature of their occurrence. Instead, the level of fecal bacteria in the water is measured using bacterial indicator species such as coliform.

Nonpoint sources of pathogens (especially stormwater runoff) have been identified as the main contributors to the degradation of shellfish beds in the Peconics. Although these pathogens do not directly affect shellfish, human health is at risk from the consumption of contaminated water or seafood harvested from contaminated waters. To protect human health, shellfish beds can be closed to harvesting in two ways: documented violations of bacterial standards ("water quality closures") or proximity to potential sources of pathogens ("administrative closures"), such as sewage treatment plant (STP) outfalls, marinas, or mooring areas. Administrative closures are used because of the potential for unpredictable, intermittent releases of pathogens or the discharge of untreated or insufficiently treated wastes. Both water quality and administrative closures can be either year-round or seasonal. There are also "conditional" closures in which beds are open for the season except when a specified amount of rainfall occurs. This is to avoid pathogens that may be transmitted with stormwater runoff.

Shellfish bed closures in the Peconic Estuary due to pathogen contamination are a significant problem. The number of highly productive, commercially important shellfish lands has been estimated at nearly 21,000 acres. Almost 3,000 of these 21,000 acres, or 14 percent, are closed to shellfishing.

Bathing waters are also sampled for the presence of bacterial indicator organisms. Only one bathing beach, the Town of East Hampton public beach at the south end of Lake Montauk, has been closed due to contamination in recent years. It is believed that this contamination results from wildlife and waterfowl, stormwater runoff, and possibly malfunctioning or failing on-site disposal systems in the Ditch Plains community south of Lake Montauk.

Pathogens that cause disease in marine organisms are not a significant issue in the estuary.



The PEP's measurable goals with respect to pathogens include:

- Maintain current level of lands available to shellfish harvesting, with the ultimate aim of re-opening lands currently closed to harvesting (measured through coliform levels and numbers of acres of shellfish beds available to harvest). [All Actions]
- Maintain and improve water quality of the estuary through a reduction of overall stormwater runoff, particularly key areas identified through the Regional Stormwater Runoff Study (measured through the number of stormwater remediation projects implemented). [See Actions P-1, P-2, P-3, P-4, P-12, P-13, P-14]
- Eliminate all vessel waste discharge to the estuary (measured by the adoption/implementation of a Vessel Waste No Discharge Area in the Peconic Estuary, the number of pump-out facilities and the volume of waste pumped annually). [See Actions P-6, P-7, P-8, P-9]
- Attain a zero discharge of stormwater runoff in new subdivisions (measured by site plans for new developments that achieve this goal and the development of new ordinances and Habitat Protection Overlay Districts). [See Actions P-1, P-2, P-3, P-4]

Toxics

Toxic contamination is not currently a significant problem in the estuary. However, toxic substances have been found in the estuary, and impacts from toxic substances have been documented, and limiting the inputs of toxic substances to the system remains a management topic, particularly as human uses in the watershed and estuary intensify. At some specific locations, remedial investigations and clean-ups are occurring under Federal and State hazardous waste clean-up laws.

Toxic contaminants include both human-made and naturally occurring substances that can cause adverse ecosystem or human health effects. Toxics can be present in surface water, groundwater, soil, sediments, and plant and animal life. Toxics can directly affect the ability of fish, shellfish, and wildlife to survive or reproduce. Some toxics can accumulate in the edible tissues of fish, shellfish, and wildlife, making them unsafe as a food source for either people or wildlife. Toxic contamination could also impact dredging and dredged material placement operations because limited placement options are available for contaminated sediments.

New York has established statewide health advisories to limit or restrict human consumption of fish, shellfish, and wildlife due to the presence of chemicals, including PCBs, pesticides such as dichloro-diphenyl-trichloroethane (DDT) and chlordane, and metals such as cadmium. Some of these advisories are in place for species that can be harvested from the Peconic Estuary. Because these species may migrate, the source of these pollutants may be from outside of the Peconic Estuary.

Toxic contaminants that may be present in the estuary are as diverse as the land uses and activities from which they originate. Sources include runoff from residential developments and businesses, roads and parking lots, sewage treatment plants and individual on-site disposal systems, agriculture, golf courses, mosquito control measures, marinas and recreational boating, Federal and State Superfund sites, treated lumber, and leaking underground storage tanks. Environmental standards, guidelines, or criteria exist for only a small portion of the literally tens of thousands of substances that support our modern lifestyles. Work continues to better assess the impacts toxic substances individually and cumulatively have on the system. The focus of this Management Plan is on those land uses and activities that could contribute toxics to the system in order to prevent problems from



occurring in the future. Of particular concern are those land uses and activities that take place on, are adjacent to, or directly affect surface waters.

Pesticides, an emerging concern, may be introduced to the Peconic System from suburban and urban sources as well as from agricultural operations and mosquito control measures. Though no causal link has been identified, low levels of pesticides may be affecting aquatic resources, including eelgrass, sensitive larval stages of commercially and recreational important finfish and shellfish, including lobsters, and other ecologically important species. Even pesticides that are banned or not being applied can cause or contribute to environmental problems if they are not disposed of or are improperly stored. Several pesticides have already been detected in groundwater resources.

“A Characterization of the Resources of the Peconic Estuary with Respect to Toxics” (PEP, January 2001) is the primary document describing the status of the Peconic Estuary with respect to toxics. Other PEP reports addressing toxic substances in the estuary include:

- Chemical Contaminant Distributions in Peconic Estuary Sediments (Arthur D. Little, Inc., 1996)
- Peconic Estuary Fish, Shellfish and Crustacean Toxics Survey Quality Assurance Project Plan for Field Collection Effort (EPA Region II, 1999)
- Preliminary Data Tables for the Peconic Estuary Tributaries Sediment Toxics Survey (EPA Region II, 1999)
- Sediment Toxicity Testing in the Peconic Estuary/Watershed Using the Amphipod, *Ampelisca abdita* (EPA Region II, August 1998)

Other reports related to toxics that may be of interest include:

- (Final) Plutonium Contamination Characterization and Radiological Dose and Risk Assessment Report for Operable Unit V (IT Corporation for Brookhaven National Laboratory/Brookhaven Science Associates, 2000)
- Proposed Plan for Operable Unit V: Peconic River/Sewage Treatment Plant, Brookhaven National Laboratory (U.S. Department of Energy, 2000)
- Water Quality Monitoring Program to Detect Pesticide Contamination in Groundwaters of Nassau and Suffolk Counties, NY (Suffolk County Department of Health Services, June 1999)
- Pesticide Concentrations in Surface Waters of New York State in Relation to Land Use — 1997 (U.S. Geological Survey, June 1998)
- Pesticides in Streams in New Jersey and Long Island, New York and Relation to Land Use (U.S. Geological Survey, May 1999)
- Pesticides and their Metabolites in Wells of Suffolk County, New York 1998 (U.S. Geological Survey, June 1999)

The PEP’s measurable goals with respect to toxics are:

- Improve the quality of the ambient environment (surface waters, groundwaters, sediments and biota) where there is evidence that human inputs impair or threaten these resources



(as measured by surface water, groundwater, sediment and biota monitoring programs). [See Actions T-2, T-3, T-4, T-5, T-6, T-7, T-8, POE-5]

- Comply with schedules for conducting site characterizations, remedial actions and post-remedial monitoring at hazardous waste sites; effectively characterize risks and protect human health and the environment at hazardous waste sites; ensure compliance with permit limits for point source discharges (as measured by compliance with schedules at hazardous waste sites; conducting effective characterizations; and point source monitoring). [See Action T-2]
- Decrease overall emissions of reportable toxics from the five East End towns (as measured by the Federal Toxics Release Inventory). [See Action T-7]
- Eliminate holdings of banned, unneeded and unwanted pesticides and hazardous substances by 2005 (as potentially measured by collections during “Clean Sweep” programs, household hazardous waste collection programs and events, or surveys of farmers/commercial landscapers/homeowners). [See Action T-4]
- Decrease overall agricultural/residential/institutional pesticide applications in the five East End towns (as potentially measured by point-of-sale surveys, surveys of residents, or commercial applicator tallies). [See Actions T-4, POE-5]
- Eliminate to the maximum extent practicable, pesticide applications on turf grass on all publicly held land by 2003 (as potentially measured by resolutions passed [or equivalent]). [See Action T-4]
- Eliminate underground storage tanks exempt from current replacement requirements via incentive programs and public education and outreach (as potentially measured following baseline established of number of underground storage tanks [USTs] and monitoring of the number of underground tanks removed, retired, and replaced). [See Actions T-6, POE-5]
- Decrease the total amount of treated lumber installed in the marine/estuarine environment (as potentially measured by baseline established from shoreline surveys and monitoring of permits issued for bulkheading installations, replacements, and removal). [See Actions T-6, POE-5]
- Reduce the number of two stroke marine engines in use in the estuary (as potentially measured by harbormaster conducted surveys). [See Action POE-5]

Critical Lands Protection

Ever increasing development is consuming and fragmenting open space and natural habitats, and stressing watersheds and natural communities. Numerous PEP reports, already mentioned in the Nutrients and Habitat and Living Resources chapters, detail the importance of protecting open space to protect the Region’s water quality and natural habitats.

This chapter represents the Peconic Estuary Program’s strategy for developing a Critical Lands Protection Plan, a recommendation that arose from the public comments of the September 1999 draft Comprehensive Conservation and Management Plan (CCMP). The Critical Lands Protection Plan (CLPP) will ultimately evaluate the land available in the Peconic Estuary Study Area and identify land protection priorities with respect to estuarine management concerns. It is the intent of the Critical Lands Protection Plan to prioritize the land available for development “through the lens” of



habitat and water quality protection and evaluate the funding needed for that protection. The Critical Lands Protection Plan will be a useful tool for state and local agencies that make land acquisition decisions in part on estuarine considerations.

Since the actual Critical Lands Protection Plan still needs to be developed, there are no measurable goals associated with this strategy at this point. Measurable goals will be developed and included in the Post-CCMP annual report.

Public Education and Outreach

Citizen involvement has been a critical component of the PEP since its inception. The Program formed a Citizens Advisory Committee (CAC) to ensure broad-based public participation in the development of the CCMP. This CAC consists of representatives from marine-related industries, environmental and civic organizations, as well as baymen, boaters, recreational fishermen, and other interested citizens. The CAC has made significant contributions by assuring public involvement in all aspects of the program and encouraging the public to learn more about the Peconic Estuary System. The CAC has utilized television events and radio broadcasts as well as printed materials in its public education and outreach efforts.

Educating and involving the public and obtaining public support is vital to the success of the PEP. All residents of eastern Long Island need to understand their role as users of the system and the effect that actions and inaction have on the quality and sustainability of the area's many resources. Effective public participation will provide the broad-based public support needed to ensure that actions reach the implementation phase. The ultimate goal of public participation in the PEP is to establish a public consensus that will ensure long-term support for the implementation of the CCMP. While developing this consensus among individuals and key segments of the public, an understanding of individual and collective roles in watershed protection can be established, making that constituency dedicated to caring for the Peconic Estuary System.

The Public Participation Strategy during implementation of the CCMP stresses the need to continue to bring together the stakeholders in the watershed, participate in decision-making affecting the estuary, encourage participation in programs to protect, enhance and restore the estuary and its watershed, and conduct education and outreach efforts on priority topics. A hallmark of the Peconic Estuary Program has been and will continue to be the preparation and use of innovative and high quality participation, education and outreach methods, including printed materials, television and radio spots, and conferences. The elements of the Public Participation Strategy itself are embodied in the actions in this chapter, as well as through the representation of the Citizens Advisory Committee chair on the Management Committee.

The PEP's measurable goals with respect to Education and Outreach are:

- Annually, embark on one new, substantial public education effort addressing each of the following areas:
 - Conducting Brown Tide education and outreach;
 - Reducing residential fertilizer use in the Peconic Watershed;
 - Improving, protecting or enhancing habitats and living resources;
 - Reducing pathogen loadings to the estuary; and



- Reducing the use and loadings of toxics substances to the estuary.
(as measured by the Peconic Estuary Program Office and the PEP Citizens Advisory committee). [See Actions POE-3, POE-4, POE-5, POE-6, POE-7]
- Annually, conduct one major watershed effort involving students in estuary management (as measured by the Peconic Estuary Program Office and the PEP Citizens Advisory committee). [See Action POE-7]
- Annually, conduct one major watershed-wide event to educate those who live, work, or recreate in the Peconics (as measured by the Peconic Estuary Program Office and the PEP Citizens Advisory Committee). [See Actions POE-7, POE-8]
- Annually, support the establishment of one new local embayment or tidal creek association (as measured by the Peconic Estuary Program Office and the PEP Citizens Advisory Committee). [See Action POE-7]

Financing

This Management Plan contains actions for the protection, enhancement, and restoration of the Peconic Estuary System. For some actions in this Plan, the agency or organizations involved have made a commitment to carry out the action. For other actions, the PEP is recommending the action be undertaken; often additional funding is needed. These actions and this Plan have been created as part of the characterization and planning phases of the PEP. Funding for the development portion of this process has been provided by the National Estuary Program under Section 320 of the Clean Water Act. Once the final CCMP is approved, the PEP will focus on implementation of the Management Plan and its actions. Funding for the continued operation of the PEP and for the implementation of each action in the Plan will need to be secured.

A wide variety of funding sources will need to be secured to ensure full implementation of the CCMP. Securing this funding is a responsibility of the Peconic Estuary Program as a whole and the agencies, organizations and individuals that make up the Management Conference. Without a comprehensive strategy for funding the implementation of all aspects of the Plan, the PEP runs the risk of not fully achieving its goal of becoming a guide to managing water quality, living resources, and habitats of the Peconic Estuary. The ability of the PEP to achieve its goals and objectives, and the pace at which progress is made, will clearly be a function of the availability of funding.

Substantial funding is currently available for land acquisition programs in the five East End towns at the town, County, and State level. There is also \$30 million commitment to implement this Plan and the South Shore Estuarine Reserve Plan under the New York State Clean Air/Clean Water Bond Act. Under the leadership of Governor George E. Pataki, sixty-seven projects have been funded under the New York State Bond Act, Environmental Protection Fund, and State Revolving Fund, for the Peconic Estuary. There are, however, limitations on the types of activities that may be funded under these programs, and therefore additional sources of funding must be secured. Many actions will continue to be funded through ongoing activities of existing governmental and non-governmental stakeholders. Collectively, these are referred to as “Base Programs.”

Numerous existing and new funding sources and mechanisms are described in the Plan, including existing programs at the Federal, State and County level, the State Revolving Loan fund, municipal bonds, funds from fines and settlement, tax abatements and incentives and the establishment of municipal improvement districts, as well as encouraging participation in implementation by not for profit organizations and other private entities.



The PEP's measurable goals with respect to financing are:

- Effectively use existing funding and secure new or additional governmental funding for CCMP implementation from the following sources:
 - Federal Government, particularly the U.S. Department of Agriculture;
 - State Government, particularly the Clean Water/Clean Air Bond Act and State Revolving Loan Fund;
 - County Government, particularly the Suffolk County ¼% Sales Tax Program;
 - Town Governments; and
 - Village Governments.(as measured by the Peconic Estuary Program Office). [See Actions F-2, F-3]
- Secure new or additional private sector funding for CCMP implementation, from the following sources:
 - Businesses; and
 - Not for profit organizations.(as measured by the Peconic Estuary Program Office). [See Actions F-4, F-7]

Plan Implementation and Post-CCMP Management

The Peconic Estuary Program has long recognized the need for establishing a long-term framework for Peconic Estuary management. In light of the significance placed upon post-CCMP management and monitoring by Congress, the United States Environmental Protection Agency (EPA), the PEP Management Conference, and the PEP Management Committee directed that a separate section of this Management Plan specifically deal with the issue of long-term management. **Chapter 10** of this CCMP includes not only an extended discussion on the critical issue of long-term institutional and organizational framework, but also a summary of other important parameters, such as long-term monitoring, mechanisms for measuring progress, and data management.

The PEP is continuing the existing management structure. A Program Office will continue to be located in the Suffolk County Department of Health Services Office of Ecology, with oversight from a Management Committee consisting of voting representatives from the EPA, the New York State Department of Environmental Conservation (NYSDEC), Suffolk County, Local Government, and chairs of the Technical Advisory Committee and Citizens Advisory Committee.

Chapter 10 also includes actions on reporting progress in implementing the CCMP and measuring environmental quality, as well as working with local governments and local government officials to develop plans for particular waterbodies in each town.

The Peconic Estuary Program's measurable goals with respect to post-CCMP management and implementation are:

- Implement the Peconic Estuary Program Environmental Monitoring Plan. [See Action M-2]



- Produce annual reports. [See Action M-3]
- Update municipal officials. [See Action M-4]
- Develop sub-watershed implementation plans (as measured by the number of sub-watershed plans initiated). [See Action M-5]

Environmental Monitoring Plan

An effective monitoring program is necessary to assess the status and trends of the health and abundance of the Peconic Estuary's water quality, habitat, and living resources. This Environmental Monitoring Plan reports on the region's existing and future monitoring efforts and coordinates the environmental changes these data can be used to track. By reporting on environmental changes, the Peconic Estuary Program will be able to evaluate whether measurable environmental results have been achieved and whether the goals and objectives of the PEP CCMP are being met.

Compiling monitoring programs into one document promotes cooperation among agencies and stakeholders, clarifies existing efforts, and provides an avenue for integrating results from different monitoring programs and projects for scientific, regulatory, and general interests. The Peconic Estuary Program has identified 25 core monitoring workplans, those activities required to determine whether the CCMP measurable goals are being met. These workplans are discussed in detail in **Appendix I**.

A key component of the long-term Plan is the Suffolk County Department of Health Services routine surface water quality monitoring program, which addresses Brown Tide, nitrogen, dissolved oxygen, light extinction, and point sources. The Suffolk County Planning Department will also monitor changes in land use. For habitat and living resources, the New York State Department of Environmental Conservation (NYSDEC) will continue its juvenile finfish trawl surveys, and will integrate information from other monitoring programs such as the NYSDEC wetlands inventory, the Endangered Species Program, and the NMFS Commercial Landings Program. The Submerged Aquatic Vegetation Long Term Monitoring Program (Cornell Cooperative Extension and U.S. Fish and Wildlife Service) is also a key component of the Plan. Coliform bacteria monitoring (NYSDEC Shellfish Sanitation Program) and toxic chemical monitoring (EPA) are also included in the Environmental Monitoring Plan. The PEP will continue to sponsor and coordinate Brown Tide research, and will seek funding for the Habitat and Living Resources Research and Monitoring Plan.



CCMP ORGANIZATION

The primary purpose of this CCMP is to identify actions that need to be taken by government agencies, businesses, private organizations, and citizens to attain the goals and objectives established by the Management Conference. Toward this end, the CCMP contains seven individual but interrelated Management Plans that address the priority problems of the estuary, as well as the need for public education and outreach. Each Management Plan contains specific actions to address issues and impacts in the Peconic Estuary System. In some cases, the actions fall within the scope of existing programs, while in other cases they represent new programs or initiatives. To aid in implementation, lead and participating agencies and organizations who are committed to implementing actions, or to whom recommendations are being made, are identified. Time frames, schedules, and where possible, the costs and sources of funding for carrying out these actions also have been identified. The costs for some actions will be borne by agencies and organizations in the normal course of carrying out their business and therefore no “new” funding is needed. In such cases, however, existing environmental program funding levels must be maintained and funding authorizations and appropriations continued. Other actions and certain components of general Plan implementation will require the identification of new funding sources or the allocation of funds already set aside for the broad purpose of implementing the Plan (such as the New York Clean Water/Clean Air Bond Act).

There are many existing regulatory programs at the Federal, State, and local level that effectively prohibit or control point and nonpoint sources of pollution. In order to prevent duplication of effort between the actions in this CCMP and existing programs, a Base Program Analysis has been completed as part of the CCMP development process. The Base Program Analysis describes existing mechanisms for addressing priority problems and recommends options for improving or enhancing the management of those problems. In keeping with the findings of the Base Programs Analysis, some of the actions found in the CCMP call for new actions and programs, whereas others expand on existing programs or call for review or coordination with existing management activities.

The PEP will seek funding for the implementation of specific recommendations. Funding opportunities to be explored include public/private partnerships as well as opportunities to apply enforcement settlement and other funds to carry out recommended actions. These funding options are discussed further in **Chapter 9**.

Management Actions

Within the CCMP, some steps within the actions have been identified as priorities, as indicated under the step number. The PEP will seek to implement priority actions in the near term. Priorities may be either new or ongoing, commitments or recommendations. Completing some priority actions does not require any new or additional resources, because they are being undertaken through "base programs" or with funding that has been committed. In other cases, in order to complete the priority actions, new or additional resources, or endorsements need to be secured by some or all of the responsible entities.

The Peconic Estuary Program and Management Conference were formed specifically to prepare the CCMP. However, much work remains to be done to ensure coordinated implementation of the Plan. This effort will be led by the Peconic Estuary Program, as discussed in **Chapter 10**. Remaining research needs, long-term monitoring efforts, and a mechanism for measuring the progress of CCMP implementation are also included in **Chapter 10**.



Action Costs

Information in the cost column of the management action tables in the back of each chapter represents the Peconic Estuary Program's best estimate of the costs associated with each action implementation. "Base Program" means that no new or additional funds will be needed outside of the responsible entity's operating budget to implement the action. Where practicable, the Peconic Estuary Program has made estimates of the costs of base programs, either in terms of dollars or work years. Where this Plan recommends or commits to new, expanded, or enhanced efforts beyond those tasks that may be described as base programs, the Peconic Estuary Program has attempted to quantify the necessary resources to carry out the new, expanded, or enhanced work.

Resources were expressed as a dollar amount, typically for projects suitable for contracting out, or as "work years" or "full time equivalent" employees (or "FTEs") for work that is most likely to be carried out by governmental staff. Some activities require both contracting dollars and FTEs. Resource needs expressed as FTEs are usually estimated to the nearest one-tenth of a work year (*i.e.*, approximately one month or 20 work days). For some of the smaller tasks that are likely to be undertaken with other separate but related tasks, the FTE estimates may be combined, and this is indicated in the table. For estimating the overall cost of implementing this Plan, the Program will use an estimate of \$75,000 per FTE per year, which includes salary, fringe benefits, and indirect costs. The actual cost of a full time worker may be more or less than this amount and will likely vary by agency, complexity of task, and point in time at which work is initiated.

Carrying out some tasks requires an annual and ongoing investment of resources. Other tasks have been expressed as one-time investments. This distinction is made for each action in the Plan, and is also reflected in the total cost of implementing the Plan.

For programmatic resource allocation analysis, a significant effort has been made to quantify time commitments for actions involving PEP sponsoring agencies (EPA, NYSDEC, or SCDHS). For such actions, a commitment has been indicated and resource needs have been estimated. Carrying out these actions forms the core workplan for the PEP coordinators from the sponsoring agencies and the Program Office staff.

In many cases, the Peconic Estuary Program was unable to quantify resources (either in dollar amount or in work years) associated with these base programs. This is because elements related to recommendations and actions are frequently inextricably linked to regional management initiatives targeted at areas larger than the PEP watershed, making segregation of PEP resources exceedingly difficult or impossible (*e.g.*, coastal zone management programs for all of Long Island; endangered species management, etc.). Also, recommendations and actions are often intertwined in larger and/or related programs, making their individual cost isolation impractical (*e.g.*, staff working on wetland mapping and trends analysis also work on numerous other natural resource efforts, such as permitting and enforcement, as well). Finally, parties responsible for implementing actions use diverse and often incompatible methods of accounting and cost/time analysis, making efforts to discretize costs difficult and ultimately, inherently inaccurate, and thus, unhelpful.

Not all resource needs have been estimated at this point in time, and the costs of some activities will be subject to further refinement in the future. Many costs have not been estimated for the private sector, because the planning processes have not developed actions specific enough to do so (*e.g.*, septic tank management recommendations, since recommended pump-out intervals have not yet been specified and upgrade incentive programs have not been fully agreed upon). The PEP will attempt to estimate these costs in the future as needed and will attempt to identify funding for compliance assistance where possible.



Status

An action's status is designated in the table by either an "R" for "Recommendation" or a "C" for "Commitment." Actions that are commitments are being implemented because resources or funding and organizational support is available to carry them out. Actions that are "recommendations" require new or additional resources by some or all of the responsible entities. "O" refers to ongoing activities; "N" indicates new actions.

Timeframe

This category refers to the general timeframe for action implementation. Some actions are ongoing or nearing completion; implementation of other actions is not anticipated until some time in the future.

Cost

Information in the cost column represents the PEP's best estimate of the costs associated with action implementation. "Base Program" means that no new or additional funds will be needed outside of the responsible entity's operating budget to implement the action. Where additional funding is needed, resources to implement an action may be expressed in dollar amounts or work years or both. One full time equivalent employee or "FTE" is estimated as costing \$75,000 per year, which includes salary, fringe benefits and indirect costs. The "Action Costs" description in both **Chapter 1** and **Chapter 9** provides an expanded explanation of base programs and action costs.