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## CHAPTER FOUR

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# HABITAT AND LIVING RESOURCES MANAGEMENT PLAN

## OBJECTIVES

- 1) Preserve and enhance the integrity of the ecosystems and natural resources present in the study area so that optimal quantity and quality of fish and wildlife habitat and diversity of species can be assured and conservation and wise management of the consumable, renewable natural resources of the estuary are promoted and enhanced.
- 2) Protect and enhance biogeographical areas within the Peconic watershed with concentrations of high quality spawning, breeding, feeding, and wintering or seasonal habitat for shellfish, finfish, waterfowl, shorebirds, anadromous fish, and rare plant, animal, and natural communities.
- 3) Protect and enhance the ecosystems and the diversity of ecological communities and habitat complexes throughout the system, particularly tidal wetlands, eelgrass meadows, and beaches and dunes by preventing or minimizing loss, degradation, and fragmentation and by maintaining and restoring natural processes essential to the health of the estuary and its watershed.
- 4) Restore degraded habitats to maintain or increase native species and community diversity, provide connectivity of natural areas, and expand existing natural areas.
- 5) Foster recreational and commercial uses of the Peconic Estuary that are sustainable and compatible with protection of biodiversity.
- 6) Protect and enhance species which are endangered, threatened, or of special concern throughout the system by mitigating stresses to these species and ensuring essential habitats crucial for their survival.
- 7) Promote coordination and cooperation among Federal, state, and local governments and stakeholders to maximize protection, stewardship, and restoration of the Peconic Estuary.
- 8) Develop and carry out an estuary-wide research, monitoring, and assessment program to guide and evaluate management decisions concerning the estuary and to ensure management and policy decisions are based on the best available information.



## MEASURABLE GOALS

Priority living resource issues for the Peconic Estuary include submerged aquatic vegetation, shellfish, finfish habitat, and “critical areas” (areas of particular ecological significance). The PEP has designated Critical Natural Resource Areas (CNRAs: geographically specific locations that have significant biodiversity) and has convened a Habitat Restoration Work Group to address the enhancement of existing resources and the restoration of habitats. While the list of threatened and impaired natural resources is extensive, the PEP has established management priorities focused on protecting existing resources, restoring damaged habitats, and enhancing the integrity of the ecosystem so that the quantity and quality of fish and wildlife can be assured.

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]



## INTRODUCTION

The eastern end of Long Island, New York and the Peconic Estuary contain a large variety of natural communities, from dwarf pitch pine forests to soft-bottom benthos in the main bays; all of which are important to the ecology and productivity of this ecosystem. There is a larger percentage of undisturbed habitats and a greater diversity of natural communities within this watershed, on a per unit area basis, than anywhere else in the coastal zone of New York State. These communities are home to a number of species that are endangered or threatened globally, nationally, and locally. According to the New York State Natural Heritage Program, there are 111 endangered, threatened, rare, or special concern terrestrial and freshwater species documented in the Peconic Estuary and its watershed — 13 insects, one freshwater fish, two amphibians, one reptile, 12 birds, and 82 vascular plants. There are a total of 553 separate, confirmed occurrences of these 111 species in the watershed. Another 45 rare species — one amphibian and the rest plants — have been historically reported in the Peconics but have not been documented recently. In addition to these, there are four species of endangered or threatened sea turtles and eight species of marine mammals (seals, porpoises, and whales) which are found in or migrate through the Peconic Estuary.

Many economically important species spend all or part of their lives in the estuary. These species enhance the productivity of the estuary and its contiguous waters. The Peconic Estuary provides important habitat, as well as spawning and nursery grounds, to a wide variety of marine organisms—most notably shellfish, such as bay scallops, hard clams, and fish, such as bay anchovy, Atlantic silverside, scup (also called porgy), summer flounder (also called fluke), winter flounder, windowpane flounder, weakfish (also called grey sea trout), and tautog (also called blackfish). One of the most important underwater habitats of the estuary is the meadows of eelgrass found along the edges of the eastern end of the Peconic Estuary. These eelgrass beds provide food, shelter, and nursery grounds to many marine animals including worms, shrimp, scallops and other bivalves, crabs, and fish. Eelgrass beds stabilize the bay bottom and are also an important component of the nutrient cycle in the estuary.

In addition to individual species, there are entire habitats or natural communities rarely found on the east coast of the United States and only found in this region of the State, such as the Pine Barrens. Some of these habitats are currently in danger of being reduced to remnants or of being lost completely. It is for these reasons that The Nature Conservancy designated the Peconic Bioserve as one of the Last Great Places in the Western Hemisphere.

## HABITATS AND LIVING RESOURCES OF THE PECONIC ESTUARY SYSTEM

The Peconic Estuary Program (PEP) identified species of “special emphasis” which are plants and animals that have been identified as Federal trust, endangered or threatened, State protected, natural heritage listed, and of commercial and recreational importance.

For convenience in discussing the variety of habitats and species found in the Peconic Estuary System, this chapter has divided the estuary system into several zones. Each of these zones are discussed individually—first in terms of the habitat and living resources associated with the zone, and second in relation to observed impacts and impairments. These zones consist of the: 1) deep water; 2) shallow water (including embayments); 3) intertidal-shoreline; 4) Peconic River, freshwater wetlands, and coastal ponds; and 5) terrestrial zones. A detailed description of the ecology of these



areas has also been described in the separate Living Resources of the Peconic Estuary Characterization Report.

### ***Deep Water Zone***

The deep-water zone is defined for this program as that portion of the main stem of the estuary in which the water depth is greater than three meters (approximately 10 feet). These open waters of the Peconic Estuary include most of Flanders, Great Peconic, Little Peconic, Noyack, Southold, and Gardiners Bays; portions of Northwest and Orient Harbors; and Shelter Island Sound. This zone includes everything from the overlying water column to the bottom communities.

#### **Finfish**

The deep, open waters contain a large portion of the adult finfish, which are harvested commercially or recreationally in the Peconic Estuary System. To assess the use of deep waters of the Peconic Estuary by juvenile finfish, the NYSDEC has conducted trawl surveys for juveniles in the open waters west of Shelter Island over the past decade. Results from these trawl surveys indicate that these waters contain juveniles of many species of finfishes and are an especially important nursery area for tautog, weakfish, scup, winter flounder, bay anchovy, Atlantic silversides, butterfish, bluefish, and northern puffer. Many of these species are found at locations throughout the estuary and may seasonally or diurnally move back and forth between the deep and shallow water zones.

#### **Shellfish**

Natural populations of commercially and recreationally important shellfish species have never been abundant in the deep-water zone of the Peconic Estuary System according to NYSDEC shellfish surveys. Natural populations of hard clams in waters greater than approximately four feet (1.2 m), which were never very high, have declined in abundance as have the levels of other, non-commercial shellfish species. Fishermen have reported, though, that scallops are common in greater than ten feet of water. At one time, oysters were the most valuable commercial species in the Peconic Estuary System. The populations were not natural, but came from the seeding of bottom waters for grow-out (primarily in the deep-water zone). This practice has been discontinued, and oysters are rarely found in this zone.

Other shellfish, which are found in the deep waters in relatively great abundance (in both surveys), include channeled and knobbed whelks (colloquially called conchs or winkles), slipper shells (locally called quarterdecks), blood arks, oyster drills, and jingle shells.

#### **Other Invertebrates**

The results of the NYSDEC juvenile finfish trawl survey and the PEP deep water shellfish survey have provided evidence of the presence of a large variety of other invertebrates inhabiting the system. Species found in this zone include green, lady, and blue crabs, spider crabs, horseshoe crabs, mantis shrimp, and long-finned squid. There are also areas of the bottom in which the sediment is completely bound up in dense mats of tubes built by amphipods and populations of polychaete and oligochaete worms, which are common members of benthic communities throughout the estuary.

#### **Birds**

The deep-water zone is used by a variety of birds for feeding, notably sea ducks such as red-breasted mergansers, three species of scoters (*Melanitta perspicillata*, *fusca*, and *nigra*), and common eiders.



Sea ducks are so-called because they feed and rest in deep, open coastal waters and rarely, if ever, come to shore while in the Peconics. The sea ducks do not breed and rear their young in the Peconic system but use it exclusively as an over-wintering site. These waterfowl are found in high concentrations during the early months of the year at a number of sites (see **Figure 4-1**). They feed primarily on shellfish such as blue mussels and benthic invertebrates. For example, diving ducks such as scaup and canvasbacks are found in 2-18 meters of water and feed on submerged aquatic vegetation, bivalves and hard clams.

### **Sea Turtles and Marine Mammals**

Deep waters are the preferred habitat of the four species of sea turtles, two species of cetaceans, (whales, dolphins, and porpoises), and five species of pinnipeds (seals) that are found regularly in the estuary. All of these animals feed on a variety of marine organisms in the open waters. The most common species of pinnipeds are harbor seals and less common are the harp seals and grey seals. These seals are found in association with a number of haul-out areas around the eastern Peconics and Block Island Sound. The number of seals in the New York region has increased dramatically in the past decade, and these animals are now found year round in the Peconics instead of only in winter.

Only two species of cetacean—the bottle-nosed dolphin and the harbor porpoise—have been sighted in the Peconics in recent history. Occurrences of these animals in New York waters also have increased greatly in the past decade. Occasionally, a right whale has been sighted in Block Island Sound and at the eastern end of Gardiners Bay.

Three of the four sea turtle species found in the Peconics use the system extensively at the end of April through October and a number are found in waters greater than 10 feet (three meters). Kemp's ridleys, the smallest and most endangered of all sea turtles, use the Peconics as juveniles for feeding on spider crabs. Loggerhead turtles and green sea turtles also feed in the system as juveniles and are found throughout the Peconics. Studies have found that the Peconic bays are important developmental habitat during the early life stages of Kemp's ridley and green turtles. Leatherback turtles are only occasionally found in the estuary.

### **Shallow Water Zone**

This zone is defined as those waters in the main bays with a depth of less than three meters (approximately 10 feet) that remain submerged through the tidal cycle. This zone also includes subtidal portions of all tidal creeks, ponds, and large embayments in the Peconic Estuary.

### **Finfish**

Many juvenile forms of finfish are found to feed in the shallow water zone. Some species of adult finfish move in close to shore to spawn and reproduce (*e.g.*, weakfish, winter flounder, and Atlantic silversides). Others spawn in the ocean and the larvae move inshore, metamorphose, and the juveniles feed in the shallow areas (*i.e.*, nursery areas) until they are large enough to migrate back offshore (*e.g.*, bluefish, summer flounder). Because of these differential uses by a number of species, the entire shallow water zone appears to be crucial to local populations of breeding finfish. Past surveys have indicated that, for some species (*e.g.*, weakfish, winter flounder, and scup), the area from Great Peconic Bay to Montauk Point, both deep and shallow waters, appears to be much more productive than other estuaries and embayments around Long Island.



### **Shellfish**

A survey of shellfish in shallow, subtidal waters was performed by the PEP in summer 1997. Results of this study determined that although shallow water regions make up only 6.6 percent of the estuary, they contribute the majority of the commercial shellfish harvest. Both scallops and hard clams are harvested from the shallow water zone, although bay scallop populations are extremely susceptible to the recurring Brown Tide algae bloom. With the crash of the scallops in the 1980s due to the Brown Tide, East End fishermen began to harvest hard clams in greater numbers. There is also a thriving transplant industry in the Peconic Estuary System with private harvesters transferring thousands of hard clams from uncertified waters of Raritan Bay in New York Harbor to the Peconic Estuary for biological cleansing before later reharvest and sale. Despite greater numbers in shallow waters, PEP research has found an overall low abundance of clams, indicating the possibility of low recruitment, high mortality, and/or preferential harvesting of small size classes.

### **Birds**

There are more birds feeding in the shallow water zone than in the deep-water zone. These birds consist of waders, such as herons and egrets, and waterfowl such as puddle and bay ducks. Puddle ducks (also called dabbling ducks) are usually found in shallow embayments and frequently feed on land as well as in the water. Black ducks and mallards are examples of puddle ducks. Bay ducks are similar to sea ducks in that they spend most of their time offshore in deep waters, although they remain in fairly sheltered embayments rather than the open ocean. Examples of bay ducks include greater and lesser scaup, canvasbacks, and redheads. Raptors such as osprey and shorebirds such as the terns (*e.g.*, least tern and roseate tern) also depend on fish in these areas for food. Critical areas for puddle and bay ducks are shown in **Figure 4-1**. Wading birds are found throughout the estuary.

### **Submerged Aquatic Vegetation**

Most of the beds of estuarine submerged aquatic vegetation are found in the shallow water zone according to a PEP study performed by Cashin Associates. Submerged aquatic vegetation is defined as beds of rooted vascular plants or macroalgae, both of which require complete immersion for all or most of the day to survive. Submerged aquatic vegetation, particularly eelgrass, is of great ecological importance in shallow environments. Eelgrass beds provide shelter and food for a variety of juvenile finfish and shellfish as well as many other invertebrates. Shelter is provided not only by the actual structure of the eelgrass blades but also by the fact that eelgrass beds dampen currents, resulting in a low velocity zone among the blades. Food for the resident species is provided by epiphytes and their associated grazers on grass blades as well as increased suspended material which falls to the bottom as a result of the slow currents within the beds. These rooted plants also stabilize the underlying substrate and prevent scouring and erosion.



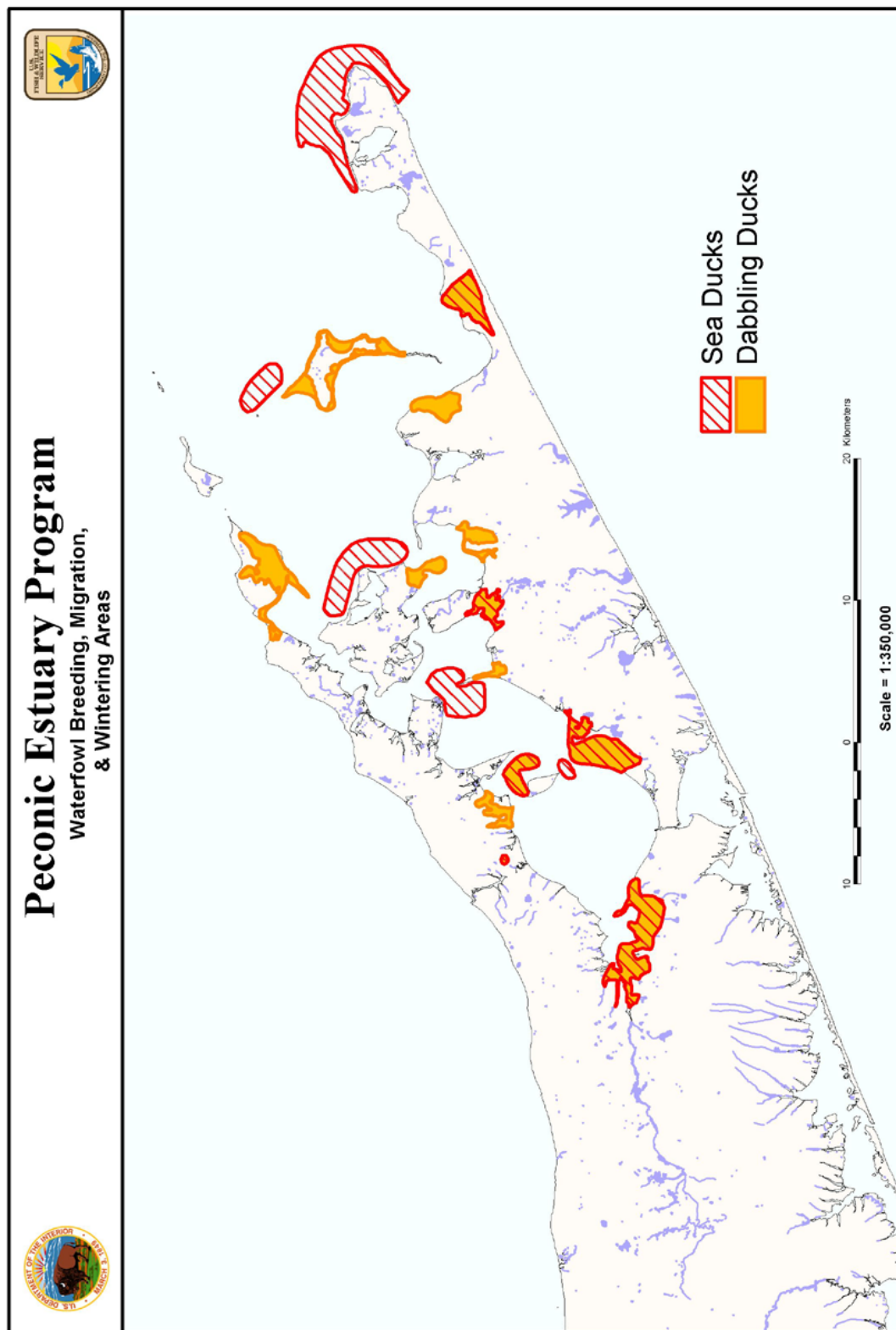


Figure 4-1. Waterfowl Breeding, Migration, & Wintering Areas.





Macroalgae beds are generally considered poorer habitat compared to eelgrass. Since macroalgae are not rooted, they do not stabilize soft bottoms. Rather, they are easily uprooted and can be carried some distance where they foul eelgrass beds, beaches, and bare bottoms.

The most abundant species of rooted vascular plant in the shallow water zone is eelgrass, although some small areas of widgeon grass are also found in brackish waters. Eelgrass beds are found around Shelter Island and to the east along the fringes of Gardiners Bay and within a few small embayments and creeks (see **Figure 4-2**). Critical areas for eelgrass are currently considered to be all those areas where this species currently exists. More areas may be identified for restoration purposes after eelgrass habitat criteria studies have been completed. The macroalgae species that occur in greatest abundance throughout the system are green fleece, an invasive species, and sea lettuce. Fishermen have reported sets of scallops in areas of green fleece in the western portion of Peconic Bay.

### ***Intertidal/Shoreline Zone***

As suggested by the name, this zone includes all areas around the edge of the estuary that are periodically inundated by tides or are found upland of the mean high tide line. This includes all tidal wetlands, mud and sand flats, beaches, and dunes. The location of tidal wetlands in the Peconics is shown in **Figure 4-3**.

Data from the NYSDEC aerial photographs taken in 1974 indicate there were roughly 12,466 acres (5,049 hectares) of vegetated and unvegetated tidal wetlands in the Peconic Estuary. Approximately 3,898 acres of this is vegetated salt marsh of different types. According to the NYSDEC's tidal wetlands trends analysis program, approximately 33 acres of high marsh have been created in Great Peconic Bay when comparing the original 1974 inventory to present conditions. According to the USFWS, approximately 256 acres of all types of wetlands were lost between 1972 and 1994. The definitions for wetlands were different for both of these analyses. A comparison of these analyses is being conducted by NYSDEC.

Because of tidal fluctuations, this zone is home to a wide variety of organisms, which are adapted to the twice-daily inundations of seawater. There is an entire invertebrate community, which is associated almost exclusively with the intertidal area. Organisms found only in these areas include several species of snails and bivalves, fiddler and other crabs, various species of polychaete and oligochaete worms, and a huge variety of microorganisms.

### **Marshes**

Marshes play an important role in estuarine ecology. The vegetated areas stabilize the shoreline and protect small tidal ponds and creeks, which are ideal areas for juvenile fish and invertebrates to grow and reproduce. The vegetated areas are also prime nesting areas for some species of waterfowl and waterbirds, such as puddle ducks, which rely on the physical protection and abundant food sources provided by these areas. Marshes also provide food for large herbivores, such as deer, and omnivores, such as raccoons. Salt marshes are home to the diamondback terrapin, an exclusively estuarine reptile. These animals live in the marsh, but lay their eggs in soft sand, usually at the upper margins of the marsh and beaches.

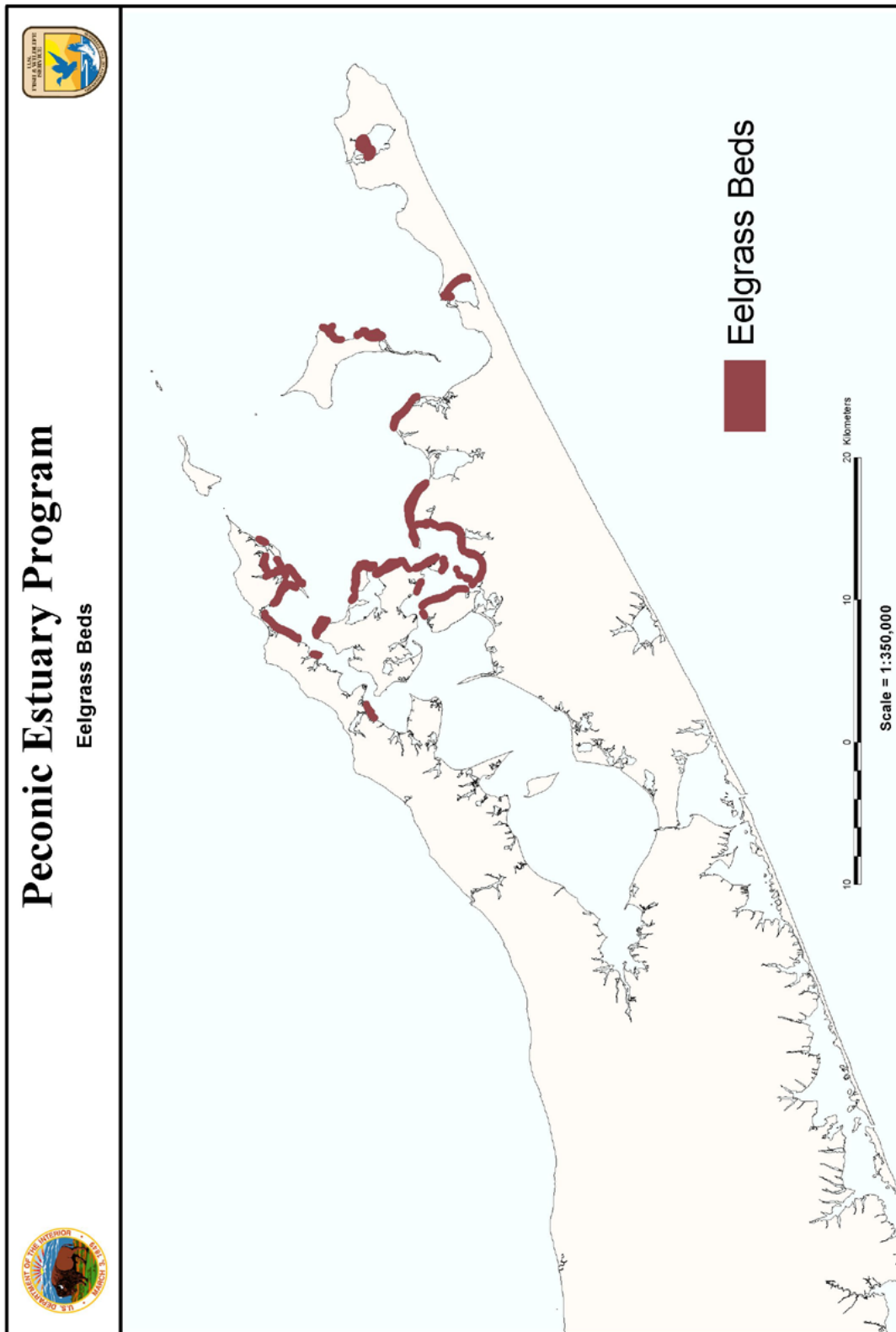


Figure 4-2. Eelgrass.

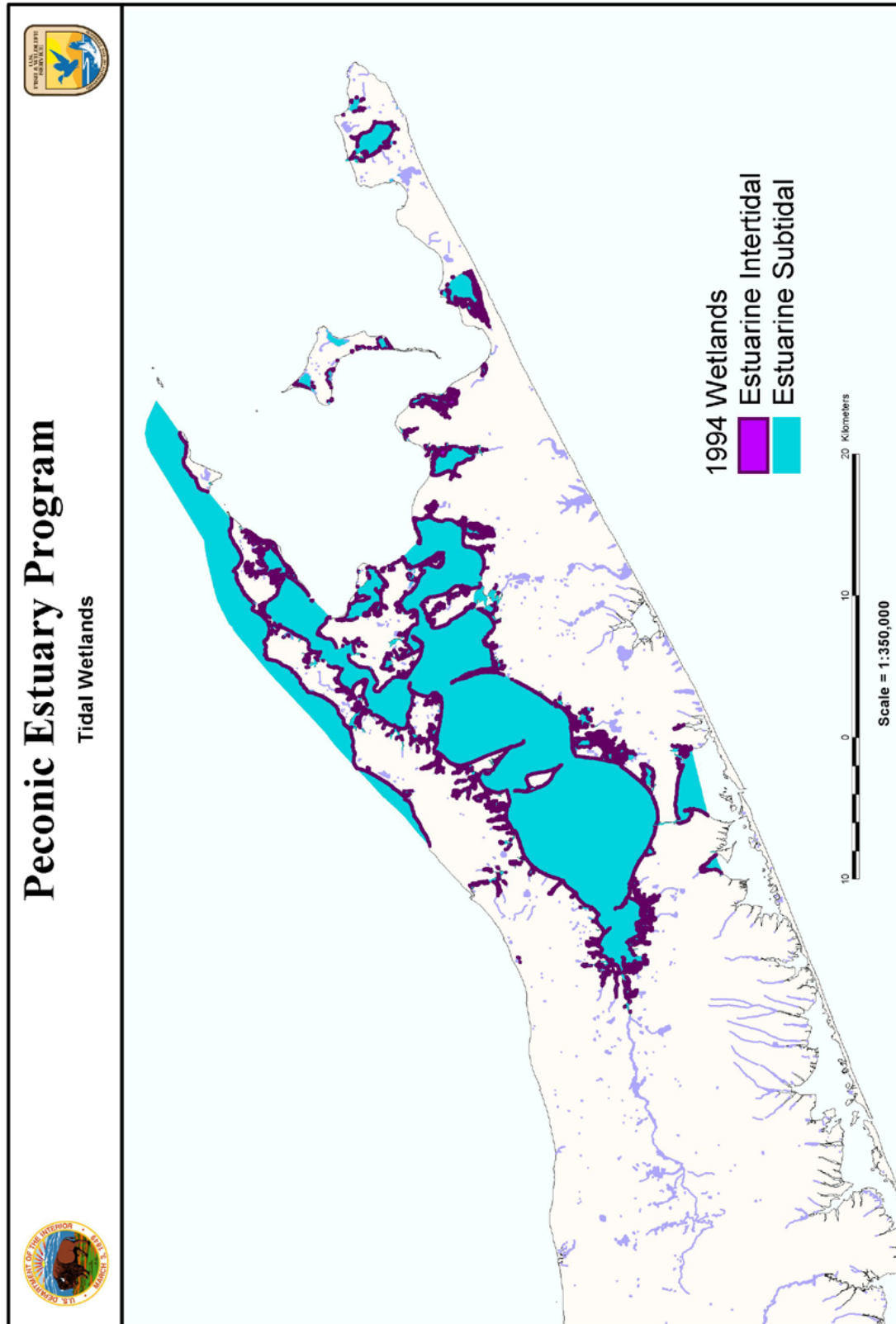


Figure 4-3. Tidal Wetlands.



The marshes also play a role beyond that of habitat for birds and fishes and invertebrates. They provide a hydrologic buffer zone that acts in two ways. These habitats are capable of filtering a large amount of surface runoff from land, buffering the estuarine waters from excess nutrients and contaminants that might be contained in stormwater runoff. Conversely, they can absorb a large amount of floodwater from the estuary during storm surges. In this way, they are vital as a transition zone between the estuary and the terrestrial environment.

### **Mud and Sand Flats and Sandy Beaches**

Several species of commercially important bivalves are found on intertidal mudflats, including hard clams and soft clams. These areas are also used by finfish for spawning and nursery grounds with the adults, larvae, and juveniles moving on and off these unvegetated areas with the tides.

The estuary margins are extremely important to birds. Wading birds and raptors feed over the mud and sand flats at high tide. Sandy beach strands are used for nesting by shorebirds, such as terns and plovers. The proximity to saltwater and a reliable food source are key for these species.

Sandy beaches are found throughout the system. In addition to the endangered beach sand-nesting birds previously mentioned, beaches are home to a variety of rare plants that are exclusively adapted to these nutrient-poor environments. These are all found upland of the mean high tide and include various succulents and grasses, such as seabeach knotweed. Horseshoe crabs also actively use the sandy beaches.

### **Coastal Bluffs and Islands**

Another habitat found along open shorelines is coastal bluffs. This habitat is not as abundant around the Peconic Estuary System as on the northern shore of Long Island, but a few areas exist in the Peconic Estuary System. These habitats are vulnerable to erosion by wind and waves. Coastal bluffs can support some vegetation, which stabilizes them to some extent but are eventually eroded inland. There are few species adapted exclusively to these areas; erosion is of concern for areas immediately landward of the bluff. Bluffs are an important part of the beach system and are an excellent source of sand for the beaches. In addition to the edges of the estuary around the forks, there are several small coastal islands (exclusive of Gardiners and Robins Islands) which could be considered to fall within the intertidal/shoreline zone. Although not strictly within the PEP study area, they are included here because of their significance to the region. These small, rocky islands lie east of Plum Island. They serve as haul-out areas for marine pinnipeds, and support large colonies of terns (Great Gull Island in particular).

### ***Peconic River, Freshwater Wetlands, and Ponds***

This zone comprises the entire freshwater surface drainage of the Peconic Estuary including freshwater creeks and coastal ponds. The Peconic River and its basin make up the largest fraction of this zone in the study area.

The freshwater environment is crucial to the Peconic system, because it is the influx of fresh water that makes the system estuarine. A mix of fresh and salt water is vital for the growth and development of many species, some of which cannot survive in highly saline seawater. As with salt marshes, freshwater swamps, bogs, and vernal ponds are also important as areas that absorb and filter stormwater runoff and support a variety of fish, invertebrate, and bird species.



There are approximately 3,739 acres of freshwater wetlands in the Peconic Estuary System, which are hydrologically connected via permanent surface water to the estuary (as compared to those that are connected via groundwater or are ephemeral wetlands). Approximately 55 percent of these are associated with the Peconic River and its tributaries, comprising a total of 2,079 acres. There are also a number of small pockets of freshwater wetlands that do not connect to the Peconic River but are within the boundaries of the Peconic Estuary study area. These pocket wetlands contain many rare and endangered species and represent important habitats.

Fresh water ponds connected to the Peconic River and the upper reaches of the river itself are home to a New York State listed “special concern” fish, the banded sunfish, found only in pine barren ponds in the eastern United States. There are also two species of rare amphibians found in the Peconic River basin, the tiger salamander, which requires quiet ponds with good water quality to reproduce, and the southern leopard frog. The river and a few other streams in the Peconic region continue to sustain runs of alewife, an anadromous fish. Although the Peconic River has been dammed, each spring these fish can be found at the base of the first dam, attempting to move upstream. A temporary fish ladder was installed in the spring of 2000 to provide fish passage above the first dam in downtown Riverhead. Puddle ducks are also found in abundance at several freshwater ponds around the eastern end of the Island.

### ***Terrestrial Zone***

Although this zone makes up the remainder of the habitats within the study area, a major focus in this Management Plan will be on natural terrestrial communities that are directly adjacent to or heavily influenced by the presence of the estuary.

The terrestrial zone starts landward of habitats that are inundated by tides but not including the Peconic River, freshwater wetlands, and ponds. There are a number of characteristic plant communities, which occur in this upland coastal zone around the Peconic Estuary. Soil type, hydrology, and microclimates determine the occurrence of these communities. Forest types include maritime red cedar (found on the long, narrow peninsula of Orient State Park), maritime oak (found on the exposed bluffs of Jessups Neck and Mashomack Preserve), oak-holly (on the Montauk peninsula), and pitch-pine oak (the dominant community in the central Long Island Pine Barrens). The Peconic watershed may also contain significant examples of other communities such as the chestnut-oak forest.

Other significant coastal upland communities include remnant maritime grasslands (found in the Peconics at Conscience Point, Montauk, and the Shinnecock Hills) and maritime heathlands (found at Montauk Mountain). These communities consist of tall grasses and shrubs and are notable for their lack of large trees and diversity of specialized plants and insects.

All these plant communities contain insects, birds, and other organisms, which are specifically adapted to them. In recent years, nine of 13 insect species, two of 12 bird species, and many of the 82 vascular plants identified as threatened, endangered, or species of special concern have been documented in the terrestrial zone.



## OVERALL QUALITY AND USE IMPAIRMENTS

Impacts to most of the habitats and species in the estuary system are the result of either physical alteration of the land and seascape or chemical contamination of waterways from compounds deriving primarily from land-based sources. Examples of the former include channel dredging, filling of low-lying areas, hardening of the shoreline (*e.g.*, bulkheads, docks, and groins) and clearing of land for

### **Environmental Criteria (Laws & Regulations)**

*Since habitat and living organisms are resources to be protected rather than pollutants to be controlled and discouraged, it is difficult to describe them in terms of standards or guidelines. There are numerous laws that regulate the human use of, or interaction with, these resources. They have been promulgated at Federal, State, County, and town levels. Most of these regulations are aimed at individual species or a particular habitat type or natural community. An overview of these laws and regulations can be found in **Appendix K**.*

human uses. Chemical contamination occurs when excessive amounts of natural compounds, elements, or toxic anthropogenic compounds are released into the system.

Invasive species are another threat to habitat and living resources of the estuary system. Non-indigenous species are of particular concern because these species often have no natural predators and, thus, either parasitize and kill or out-compete the native species for food and space.

### ***Physical Alteration***

Physical alteration has occurred throughout the Peconic Estuary and its watershed. Low-lying marshes and swamps historically have been ditched and drained for mosquito control or filled for construction or agriculture. Dredging has been carried out on most of the inlets and navigation channels in the embayments and surrounding creeks. Bulkheads, rip-rap and other structures have been widely used to stabilize waterfront property throughout the estuary. These structures have altered shoreline erosion and accretion patterns and reduced the amount of natural shoreline available to living organisms. Roads have also disconnected and degraded many tidal wetland systems in the past. Although culverts have been installed to reconnect these wetlands, they are often poorly maintained and do not flush properly. Hence they often block migratory fish from spawning and further reduce habitat quality. Much of the uplands have been cleared, historically for agriculture and recently for residential developments. In this respect the Peconic Estuary is no different from other parts of the country, although such clearing has not occurred to the degree that it has around other estuaries in the region. Natural communities most affected by development include wetlands, beaches, grasslands, forests, and coastal ponds.

In addition to direct impacts, development and land use have also led indirectly to the degradation of habitat and changes in natural communities. Filling for roads and railroads has cut off the flow of water to a number of tidal wetlands. Over time, the vegetation has changed (including invasion of nuisance species), and the marsh has either become a freshwater wetland or it has gradually filled in and become upland. Dams have been built on a number of the streams emptying into the Peconics, preventing the movement of anadromous fish into fresh water for spawning. It is believed that dredging has changed the current patterns 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 led to the loss of wetlands and beaches as well as the scouring of shallow areas with impacts to the shallow water benthic communities. In many cases, the changes associated with bulkheads may have been quite localized and subtle, with no apparent





impairment to human uses of the area. However, many small changes can lead to widespread cumulative damage of natural communities throughout the system.

### ***Chemical Contamination***

Chemical contamination can have a variety of effects. The addition of toxic substances can have an acute or chronic toxic effect on many species. Extensive contamination of the surface water in the Peconics with toxic substances, however, has been rare, and long-term impacts on populations of living organisms have probably been minimal (see **Chapter 6**). One of the most significant chemical contaminants in the Peconics has been excess nitrogen (see **Chapter 3**). Inputs of nitrogen can lead to phytoplankton blooms, the loss of rooted macrophytes, such as eelgrass, or hypoxic conditions that can kill sedentary benthic organisms and cause mobile species to relocate. Sediment loading may also be included in this category since many contaminants attach to particles. Such loading also results in siltation, which is a physical alteration. Resources most affected by chemical contamination include eelgrass beds, soft-bottom benthic communities, wetlands, and plankton communities.

### ***Invasive Species***

Invasive species can impact native plant and animal communities around the estuary. For example, *Phragmites australis* is an invasive species that forms monotypic stands in disturbed tidal wetland areas. While recent evidence suggest that *Phragmites australis* has some habitat value (*e.g.*, fish and bird habitat), these stands have generally decreased the overall habitat value for native species, alter nutrient cycling regimes, and are a fire hazard. Non-indigenous plant and animal species, which have been either accidentally or purposefully introduced to Long Island, can also represent a threat. These species can out-compete indigenous populations, causing irreparable damage to the local ecosystem. There are already non-indigenous species in the Peconics (*e.g.*, the marine macroalgae *Codium fragile* or Green Fleece) whose impact on the environment is unknown. Green Fleece is abundant throughout the estuary. Because fishermen have reported sets of scallops in areas of *Codium fragile* in the western portion of Peconic Bay, its significance needs further evaluation.

### ***Deep Water Zone***

Water quality in the deep water zone east of Flanders Bay is generally excellent with respect to dissolved nutrients, oxygen, and suspended solids. There are no significant concentrations of toxic contaminants or pathogens found in this zone. The Brown Tide algae bloom was found in these areas and in shallow waters and enclosed embayments. The effects on finfish and benthic communities is unknown.

### **Finfish**

Populations of many species of finfish that inhabit the deep water zone of the Peconics have been greatly reduced in the past few decades. The major cause of this impairment is probably overfishing by both commercial and recreational participants on the entire Atlantic coast. Other causes may include the loss of feeding and reproductive habitat. Some fishermen believe that it might be juvenile mortality. With the data available, it is impossible to determine how much of the decline in finfish populations in the Peconic Estuary is due to habitat losses as compared to overfishing. It is not clear at all how previous activities such as commercial trawling, recreational fishing, oyster culturing, recreational boating, and dredging may have affected local populations through habitat disturbance and modification in this zone.





## **Shellfish**

A shellfish survey conducted in the deep water (greater than three meters) of the Peconic Estuary showed this zone to have a low abundance of commercially important species, despite supporting a rich benthic fauna overall. For example, a comparison between a 1979-80 open water shellfish survey conducted by the NYSDEC and a 1995 survey conducted by the PEP and the NYSDEC at the same sites show that natural populations of hard clams in waters greater than approximately four feet (1.2 m), which were never very high, have declined in abundance as have the levels of other, non-commercial shellfish species. It is not clear if these communities have changed or became impaired in recent years. A number of historical activities may have seriously affected these bottom communities, including trawling for fish and dredging of oysters. Boating activities and the use of lime for starfish control may also be responsible for bay bottom impacts.

*Oysters were originally the most valuable commercial species in the Peconic Estuary system. The populations were not natural, however, but came from the seeding of bottom waters for grow-out (primarily in the deep water zone). These cultivated populations were the basis for the reputation of Peconic Bay oysters in the past. The oyster industry began declining in the 1960s due to the loss of seed in Connecticut, and by the 1980s, landings of this species accounted for only a small percentage of the shellfish harvested from the Peconic Estuary system. The 1979/1980 NYSDEC survey yielded no oysters; the 1995 PEP survey found only one.*

Commercial trawling for finfish existed in the estuary until the State imposed a ban on this activity in 1994. There is anecdotal information that, in addition to soft bottoms, trawling may have damaged or destroyed hard bottom substrates such as shell hash, along with the communities that depend on them. Widespread oyster culturing in soft-bottom areas also may have affected benthic communities. In this process, juvenile oysters were laid out in deep water areas and then dredged up, an activity that repeatedly rakes up the bottom. There are no data, however, on the impacts of these activities on benthic communities before, during, or after the most intensive period of oyster aquaculture, trawling, or boating activities in the Peconic Estuary.

Most of the oyster grow-out activities and clam cleansing that currently takes place in the estuary is done on trays or shellfish cages. The State-sponsored transplant program transfers hard clams from Raritan Bay in New York Harbor to deep water portions of the Peconics for cleansing before

they are marketed. Most of the transplanted shellfish are not placed on the bottom for later dredging, but on racks or cages which are pulled up after a 21-day cleansing period. It is not clear how these ongoing activities are affecting benthic communities. Possible benefits could include spawning of naturally occurring populations and improved local water quality through the shellfish's natural seawater filtration process.

## **Birds**

Sea ducks are found in the estuary primarily from November to April. They use the deep water portions of the estuary for feeding and resting. There are no obvious impairments to these populations aside from local impairments by either hunting, which is permitted at certain times of the year, or damage to their food supply (shellfish and other benthic invertebrates).

## **Sea Turtles and Marine Mammals**

Marine mammal and sea turtle populations in the Peconics are increasing. The reasons for these increases are likely the result of the protection of these animals from hunting and, in the case of turtles, protection of their breeding grounds outside of the region. The main potential for impairment to these populations in the Peconic Estuary is damage to or loss of feeding grounds (in the case of all species of marine mammals and sea turtles) or loss of or damage to haul-out areas (in the case of



seals). Since the sea turtles subsist on certain macrocrustacean species or macroalgae, damage or modification of their habitat or their food species could adversely or positively affect the species. Threats to individual animals include collisions with motorboats or possibly with trawls, entanglements, and attacks on hauled-out seals.

### ***Shallow Water Zone***

#### **Shellfish**

Shellfish populations in the Peconics have fluctuated over time. Most of these fluctuations have been the result of natural variations in the environment. The algae bloom known as Brown Tide wiped out the scallop populations in the mid-1980s and again in the mid-1990s, but it is not known if anthropogenic factors played a role in the appearance of these recurring blooms (see **Chapter 2**). The scallop populations have never regained levels seen during pre-Brown Tide years. Aside from Brown Tide, the greatest limitation to shellfish harvesting in the shallow water zone at the current time is the closure of shellfish beds due to pathogen contamination. These closures may prevent over-harvesting of some species of shellfish and provide spawning sanctuaries for future stocks. Despite that, pathogens are a threat to human health and closures are an impairment to the shellfish industry.

#### **Submerged Aquatic Vegetation**

The PEP recognizes that some of the most important underwater habitats of the estuary are the meadows of eelgrass found along the eastern end of the Peconic Estuary. These eelgrass beds provide food, shelter, and nursery grounds to many marine animals including the commercially important bay scallop. Eelgrass beds are also an important contributor to the detrital food web by providing carbon and nutrients to bacteria and fungi, which in turn are prey for numerous marine invertebrates and fish. Many of the eelgrass beds along the East Coast were wiped out by a mysterious “wasting disease” in the 1930s. It is believed now that the disease was caused by the slime mold *Labyrinthula zosterae*. The beds were extremely slow to recover and many areas have not been recolonized to this day.

According to anecdotal information, eelgrass was once found throughout the estuary and may have been lost, in part, to effects from Brown Tide that first occurred in Peconic waters in 1985. The PEP study performed by Cashin Associates in 1996 confirmed a decline in eelgrass beds. The Cashin survey estimated that there are 8.5 square km of eelgrass in the estuary, while Dennison estimated in 1989 13.5 square km of eelgrass in Gardiners Bay alone. Cashin Associates also reported a decline in eelgrass beds from March to October 1994 that was unrelated to a Brown Tide bloom. Poor water quality, including high levels of nitrogen and suspended sediments, have been implicated as causes leading to declines in eelgrass beds in the Peconics as well as other estuaries along the Atlantic seaboard. In addition to these factors, which operate on relatively large scales, eelgrass beds can also be damaged by scallop dredging and motorboat traffic, both of which snag and uproot the plants. But according to fishermen, if a scallop dredge is catching eelgrass roots, it means it is not catching scallops and hence not worthwhile.

### ***Intertidal/Shoreline Zone***

The impairments to tidal wetlands, mudflats, and shoals are among the best documented and well known in the region. In an effort to improve and increase agricultural land, prevent local flooding, improve waterways for use by vessels, and control mosquitoes, these intertidal habitats have been dredged, filled, ditched, and diked. Considered for years to be “useless” property, it has only been in



the last few decades that governments and the general public have come to realize the important role that these habitats play in nurturing many of the estuarine species valued by humans.

As discussed earlier in this chapter, actual loss of tidal wetlands in the Peconics has been close to zero in the past few decades. Unfortunately, there are few reliable estimates of the percentage of vegetated salt marsh loss prior to the 1970s, let alone any estimates of the loss of unvegetated intertidal habitats. Nevertheless, it is probably safe to say that there was a significant loss of these habitats in certain locations around the estuary, particularly in those areas that have been occupied by humans for generations.

Although wetland loss has been minimal in the past few decades, many areas of salt marsh have been degraded by adjacent land use practices. The State Tidal Wetlands Law and Federal Clean Water Act prohibit physical alteration of wetlands and require a permit for all activities in areas adjacent to the wetlands. If the activity will cause significant harm to the wetland, a permit may be modified or denied. Because this law allows development and dredging in areas adjacent to wetlands, there is the risk of habitat degradation over time. Even though these activities may not cause direct loss of wetlands, there is the danger that they will impair the ability of these habitats to function as they should. Therefore, while the extent of wetlands may not decrease in the future, the quality of those wetlands may become very poor. Such impaired marshes often appear to be functioning wetlands, but are, in fact, unable to support the extensive wildlife communities they once did, or to absorb and filter the same amount of water and contaminants in surface runoff. Fragmentation is also a problem where marshes are parsed into small pieces interrupted by filled areas, docks, roads, culverts or bulkheads. These small fragments are incapable of functioning the way larger tracts of marsh do, although they may still provide habitat for a limited variety of organisms. Additionally, leaching of toxic chemicals from wood preservatives in bulkheads (*e.g.*, creosote, copper-chromium-arsenic) may have adverse effects on the biota of shallow-water habitats that are adjacent to these structures (see **Chapter 6**).

Over the long term, it is estimated that the current laws protecting tidal wetlands will effectively protect only about 60 percent of the existing, privately-owned areas. The biggest long-term threat is the development of small waterfront lots (existing before the tidal wetlands law was taken into account when subdivision plans were approved). Under existing State law, if an owner is not able to build a structure on his/her property that is compatible with existing zoning due to the existence of wetlands, the State will either have to permit the filling of the marsh to accommodate the structure or compensate the owner for the property. The economically feasible choice in most cases is to allow filling rather than purchasing the property.

The placement of bulkheads and other hard structures at the water line represents another long-term threat to the tidal wetlands fragmentation. If sea-level continues to rise, these structures will prevent the natural shoreward migration of the wetlands. In time, the wetlands will be submerged and cease to exist.

Tidal wetlands around the Peconic Estuary System have also been adversely affected by the invasion of huge colonies of the common reed *Phragmites australis*. This plant can successfully colonize tidal marshes that have been disturbed, as well as areas that are undisturbed, replacing *Spartina* species. The addition of impervious areas such as roads, parking lots, and driveways increases stormwater runoff and can result in lowered salinity—a condition favored by this plant, which propagates in water with reduced salinity. Because *Phragmites* colonies are clonal (*i.e.*, they propagate as individual plants from a single rhizome root system), as long as part of a rhizome is in fresh or brackish water, a colony can propagate into higher salinity waters. This accounts for the presence of



these plants in the salt marsh far from fresh water. Despite its invasive nature, researchers have found that tidal marsh invertebrates (*e.g.*, snails, amphipods, and isopods), which are prey species for mummichogs, were common to abundant in reed grass-dominated regions, as well as in areas covered by typical tidal marsh vegetation along a salinity gradient of the lower Connecticut River. Therefore, the potential value of *Phragmites* also needs to be ascertained.

Many species of birds are vulnerable to loss of intertidal habitat in the Peconic Estuary System. Puddle ducks, Canada geese, and black ducks use these areas for feeding, breeding, and rearing young, particularly since wetlands and tidal creeks have historically been reduced in size and physically altered. Loss of wetland and intertidal habitat has had the effect of concentrating overwintering ducks and geese into the remaining unaltered areas around the estuary. Increased concentrations of these birds in poorly flushed embayments may lead to increased loading of pathogen indicators into the waters, which may in turn result in closure of adjacent shellfish beds to harvesting (see **Chapter 5**).

Beaches and dunes, as well as wetlands have been adversely impacted by human activities, primarily through direct or indirect physical alteration. Dunes act as barriers, which protect areas behind them from overwash and erosion by wind and storms; they are stabilized by vegetation adapted to the exposed environment. Dune habitats have been destroyed throughout the region as vegetation has been removed or when they have been irreparably damaged by pedestrian and vehicular traffic. Dunes also have been excavated to make way for parking lots and summer homes. Conversely, dunes migrate naturally, and over-stabilization of these land forms with non-indigenous vegetation or hard structures such as fencing or groins, has also led to a loss of habitat. Species which use beaches or dunes for nesting, such as diamondback terrapins and shorebirds, have been forced to abandon many sites due to human disturbance (from foot traffic, off-road vehicles, boats and jet-skis in the shallow zones, and construction), as well as poaching and predation by gulls, crows, foxes, raccoons, and feral cats. Dredging and construction of bulkheads and jetties also have caused loss of beaches. These activities change current patterns, altering erosion and transport processes. In some cases, beaches have been nourished and maintained by dredging/placement operations.

The protection from chemical degradation afforded to marshes and mudflats under the Tidal Wetlands Law is limited. Stormwater runoff from roads, private property, and marinas is a common problem around the Peconic Estuary. This flow can carry toxic substances such as motor oil, polynuclear aromatic hydrocarbons (PAHs) from engine exhaust, and heavy metals from tire and engine wear as well as lawn and garden herbicides, pesticides, and fertilizers. In addition, road sand and sediment from improperly-contained construction sites are washed into these low-lying areas. Regulations generally do not allow the direct discharge of this runoff into tidal wetlands, but indirect inputs are common.

### ***Peconic River, Freshwater Wetlands, and Ponds***

Threats to freshwater wetlands are potentially greater than to tidal wetlands because the laws protecting these habitats are weaker. Specifically, wetlands less than 12.4 acres in size are not protected under the New York State Environmental Conservation Law (ECL) Article 24, the Freshwater Wetlands Protection Program, unless they are shown to be of local importance. This State law provides for the preservation and protection of freshwater marshes, swamps, sloughs, bogs and flats over 12.4 acres (five hectares) that support aquatic or semi-aquatic vegetation. Smaller wetlands may also be protected if deemed to be of local importance. Additionally some local governments also have regulations that protect freshwater wetlands. Permits are required for almost all activities within



or adjacent to wetlands [within 100 ft (30.5 m) of a wetland boundary]. Activities requiring permits include: 1) construction of buildings, roadways, septic systems, bulkheads or dams; 2) placement of fill, excavation or grading; 3) modification or restoration of existing structures; 4) drainage; and 5) application of pesticides. All agricultural activities are exempted from this law. Most of the freshwater wetlands in the Peconic Estuary drainage basin are smaller than 12.4 acres, but they have all been designated as being of local importance and any activities in these areas require a State permit.

Freshwater wetlands and ponds are threatened by the same activities as tidal wetlands and creeks, including sedimentation, hardening of the shoreline, and stormwater runoff, as well as groundwater draw-down and dams. Even wetlands in the Peconic River drainage basin, which are protected by being in parkland or in the Pine Barrens Core Preservation Area, are impaired due to erosion caused by vehicular and foot traffic, runoff, and groundwater draw-down by drinking water wells for nearby housing developments. The loss of these small wetlands would result in the extinction of local populations of organisms dependent on these swamps and ponds. These species include the banded sunfish, several species of amphibians, and a variety of aquatic plants and insects.

Another potential threat to small freshwater ponds and wetlands is toxic contamination. These areas may receive this contamination from a variety of sources, including runoff and aerosol deposition from agricultural and residential application of pesticides and herbicides. Unlike the Tidal Wetlands Law, the Freshwater Wetlands Law does have a provision, which prevents the use of herbicides and pesticides in the vicinity of these areas as a protective measure for finfish. Unfortunately, the NYSDEC Division of Fish and Wildlife does not have the staff to enforce this provision except in cases of gross and obvious contamination. For this reason, low-level, chronic impacts from these toxic sources remain a threat to these habitats.

Several stretches of the Peconic River have been designated as scenic or recreational under the State Wild, Scenic, and Recreational Rivers Act, which means that permits are required for activities that take place along the banks in those sections. These activities may be limited if they violate the scenic or recreational nature of the river. The Peconic River, however, has already been extensively modified in the past through damming, bulkheading and toxic contaminants from Brookhaven National Laboratory (see **Chapter 6**). Runoff and erosion have also caused some degradation in the water quality. Further indirect impacts to the upstream portion of the river from changes in land use should be minimized by the implementation of the Pine Barrens Plan, which will preserve land around the Peconic River.

### ***Terrestrial Zone***

The most significant threats to terrestrial communities are: 1) outright loss to agriculture or residential development; 2) fragmentation of remaining communities; 3) fire suppression; and 4) invasive species. Larger continuous areas of terrestrial habitat are more biologically diverse and have higher densities of individuals. Reducing the size of natural areas or dividing them up into pieces with barriers such as roads or developments will result in fewer species and individuals living in the pieces, even if the total area is not reduced. Overall size and continuity are especially critical for species which are territorial, including many birds and mammals. Other species, such as neo-tropical warblers, require large tracts of woodland for successful reproduction. In the case of these birds, their small open nests are vulnerable to predation by foxes and domestic cats or parasitism by cowbirds. Because predators and cowbirds only penetrate woodlands to a certain distance, survival of viable





populations of warblers depends on the existence of forests, which are large enough to exclude predator species and cowbirds from a significant portion of the habitat.

The dwarf pitch pine forests in the Pine Barrens depend on fire for survival. Periodic burnings initiate germination in the pitch pine seeds and also destroy undergrowth species. Without fire, these trees and their associated plant and animal communities will not reproduce and will be replaced by scrub oaks. Grassland habitats also depend on fire to some extent. Successful long-term maintenance of these communities depends on periodic burnings to prevent plant succession to shrubs and trees. The native grasses are drought tolerant, so burning which destroys young trees only removes above-ground stems and shoots of these species, without damaging the deep root systems, and allows regeneration.

All native plant communities around the estuary are threatened by the invasion of non-indigenous plant and animal species, which have been either accidentally or purposefully introduced to Long Island. Often these species have no natural predators and, thus, they either parasitize and kill or out-compete the native species for food and space. Although nuisance species are a problem in all environments, their impacts in terrestrial environments have been particularly well-documented.

## MANAGEMENT STRATEGY AND ACTIONS

The Peconic Estuary and its watershed are sites of human activity of all kinds. In addition to residential, commercial, and agricultural land uses, the area supports a significant tourism industry. Fishing, shellfishing, boating, swimming, hiking, and hunting are only some of the recreational uses actively pursued in the estuary and surrounding watershed. Many of these activities depend on the existence of high quality water and healthy living resources. Shellfish, such as bay scallops and hard clams, and finfish, such as winter flounder and weakfish, support large groups of commercial and recreational enthusiasts. Upland habitats sustain many species that are recreationally important, such as deer and birds. Undisturbed habitat also provides aesthetic benefits, which add to the enjoyment of other activities. All these resources need to be conserved and enhanced as much as possible for these purposes and future, currently unforeseen uses of the system. It is also important to remember that living communities other than our own are valuable and necessary in their own right and not just as they are directly useful to humans. Humans are part of the overall ecology of the planet and need to conserve all components of our ecosystem. The PEP has tried to develop recommendations for the management of the estuary and its watershed that will foster recreational and commercial uses of the Peconic Estuary that are sustainable and compatible with protection of biodiversity. It is possible that through the implementation of these recommendations there will be an enhancement of economically and ecologically important species.

Good water quality is extremely important for the protection and restoration of estuarine and maritime communities. However, since water quality is addressed through other chapters of this draft Management Plan, the management actions in this chapter will not focus on actions linked to the impacts of contaminants on habitat and living resources. The actions will be focused primarily on the impacts of habitat fragmentation and habitat degradation on living organisms, and the protection and restoration of natural communities in and around the estuary from causes other than poor water quality. Since the Peconic Estuary is in excellent health compared to neighboring estuaries, these actions are aimed at prevention of incremental and cumulative problems.



### ***Critical Natural Resource Areas***

Although it is clear that the entire estuary is ecologically important, the PEP has chosen to apply the concept of “critical natural resource areas” to focus protection efforts on the variety of species and natural communities that exist within the PEP study area. Critical Natural Resource Areas (CNRAs) are geographically-specific locations that currently have significant biodiversity and may require an extra level of protection (management and/or regulation) to preserve their unique characteristics. Many of these areas are presently threatened by development or uses that could degrade their quality.

In March 1996, the U.S. Fish and Wildlife Service (USFWS) Coastal Ecosystems Program generated a list of species and species habitats for the watershed (referred to as species of special emphasis). This list was reviewed by the PEP Natural Resources Committee and used as the basis for examining the waters and watershed of the Peconics. The list included USFWS trust species, threatened and endangered species, anadromous and migratory species, New York State Natural Heritage Program species and communities of concern, and important commercial and recreational species.

The PEP, together with area stakeholders, followed a two-step process to identify potential CNRAs. First, the PEP and stakeholders identified 97 “hot spots” in the system that represented (1) feeding, breeding, and over-wintering areas for species of special emphasis; (2) key reproductive areas (spawning, breeding colonies, nest sites) for species of special emphasis; (3) areas with significant concentrations and co-occurrence of species of special emphasis; and (4) imperiled natural communities or exemplary examples of common natural coastal communities. Once these hotspots were identified and mapped, larger CNRAs were delineated to encompass multiple proximate and overlapping hot spots. Through this process, 17 CNRAs have been defined which encompass most of the hot spots. These 17 CNRAs are roughly outlined in **Figure 4-4**.

Now that these CNRAs have been very broadly delineated on a purely technical basis, additional personnel, including natural resource managers and planners from all levels of government will be consulted. Based on these discussions, recommendations and commitments for management and/or regulation of the CNRAs will be developed.

In addition to management actions directed at CNRAs, the PEP is developing management actions, which are focused on specific habitats or species that exist throughout the estuarine system, whether they are contained in critical areas or not (*i.e.*, deep water and shallow water management zones). This approach recognizes the interconnected and interdependent nature of the estuary system.

Therefore, there will be many areas in and around the estuary, which are worthy of protection and, more importantly, of restoration, which will not fall within one of the critical areas. It is not the intent of the PEP to protect only certain high-quality areas at the expense of areas with poorer quality habitat which have the potential to improve or which may yet serve important ecosystem functions. The management of habitats and living resources in the Peconics will require a blend of protecting existing natural areas and restoring or enhancing others in an effort to achieve the best natural, sustainable ecosystem possible.



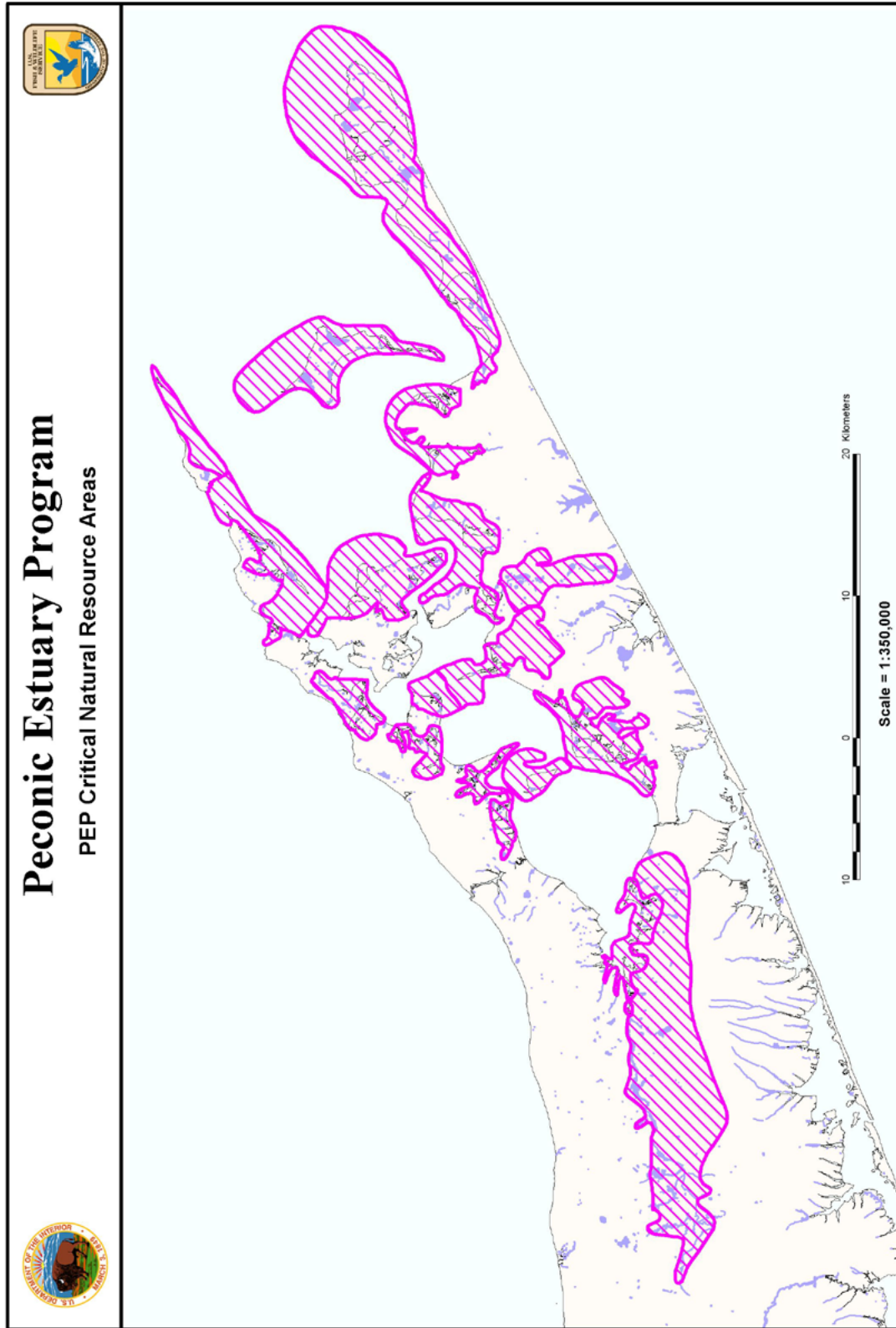


Figure 4-4. PEP Critical Natural Resource Areas (CNRAS).



### ***Habitat Restoration Work Group***

To address the enhancement of existing resources or restoration of habitats, which have been lost or degraded, the PEP has convened a Habitat Restoration Work Group (HRWG). The purpose of this group is to identify and prioritize the significant natural habitats of the system, develop overall habitat restoration goals, identify locations where these habitats can be restored, and develop, in conjunction with public and private landowners, specific restoration projects.

The short-term goal of the HRWG is to identify specific habitat restoration projects within the Peconic Estuary and Peconic River and their watersheds, which are ready for immediate funding. The voters of New York, in November 1996, passed the Clean Water/Clean Air Bond Act, which has the restoration of aquatic habitats as one of its goals. This Act, which was pioneered by Governor George E. Pataki, provides \$30 million jointly for the Peconic Estuary and South Shore Estuarine Reserve. It is the expectation of the PEP that a portion of those funds will be used for aquatic habitat restoration projects. The long-term (2-3 years) goal of the work group, to be carried out in parallel with the short-term goal, is to identify the natural habitats throughout these areas, which are most in need of restoration as well as to develop criteria for inclusion of projects in a prioritized restoration list. It is hoped that, eventually, the two goals will merge after a year so that projects which are submitted for Bond Act funding incorporate identified habitats and restoration criteria developed for the Peconic Estuary study area as a whole. The HRWG also will develop habitat-specific restoration criteria as well as criteria for monitoring restoration projects.

## **MANAGEMENT ACTIONS**

The designation of critical areas and the identification and prioritization of habitat restoration sites will be two of the most significant efforts carried out by the PEP. These efforts, although done separately and through different processes, are intended to compliment each other and, in some cases, will be done in coordination. The implementation of measures recommended by PEP to protect and restore natural habitats will be crucial in the management of the entire system.

The actions listed below have been developed in consensus by the PEP Management Conference to meet the natural resources objectives listed at the beginning of this chapter. These proposed actions reflect the best measures that can be taken to preserve the habitats and living resources of the estuary.

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 need to be secured by some or all of the responsible entities.



### **HABITAT AND LIVING RESOURCES ACTIONS**

- HLR-1 Use Critical Natural Resource Areas (CNRAs) to Develop and Implement Management Strategies to Protect High Quality Habitats and Concentrations of Species 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 and Natural Resources and Develop Recommendations and Guidelines for Reducing those Impacts.
- HLR-4 Examine and Promote Methods of Shellfish Harvesting that are Most Compatible with Establishment and Growth of Eelgrass Beds and Vegetated Salt Marshes.
- HLR-5 Implement, Enforce, and Encourage the Continuation of Current Policies and Regulations Protective of Wetlands.
- HLR-6 Evaluate the Effectiveness of Current Policies in Preserving Eelgrass Habitat and Develop Ways to Provide Increased Protection for all 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.
- 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.



<b>HLR-1 Use Critical Natural Resource Areas (CNRAs) to Develop and Implement Management Strategies to Protect High Quality Habitats and Concentrations of Species of Special Emphasis.</b>
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**Addresses Habitat and Living Resources Management Objectives 1, 2, 3, 6, 7, and 8.**

***Delineate CNRAs***

There are many natural areas within the Peconics that are of very high ecological quality and provide important spawning, breeding, nursery, and feeding habitats for a diversity of rare, keystone, and commercially important species of fish, shellfish, birds, sea turtles, and sea mammals. Many of these areas are comprised of interconnected marine, estuarine, and upland systems. To further protect these existing high quality natural areas, CNRAs were delineated in two expert workshops and refined at meetings with the Towns. Known data sets were acquired and digitized using a geographic information system (GIS). Using these maps further, non-mapped data were collected by convening a scientific group meeting on March 26, 1996. Twenty-eight biologists with expertise in a wide variety of specialties used the USFWS species and species habitat list and the USFWS mapped natural resources GIS data and identified 97 “hotspots” within the Peconics.

Seventeen CNRAs were identified on July 30, 1996 by a second group of biologists who combined the already mapped data and the “hot spots” to delineate the “critical areas.” These areas encompassed terrestrial, tidal, and subtidal lands and waters, and, in many cases, included protected areas within the watershed where Federal, State, town, and other organizations have acquired property for conservation purposes. The boundaries of the CNRAs also closely correlate to existing Federal, State, and town designations.

Further meetings were conducted during the Spring of 1998 with town planners, conservation boards, and other interested officials from the Towns of East Hampton, Southampton, Riverhead, Southold, and Shelter Island to finalize the CNRAs. Adjustments were completed during the summer of 1998, and ArcInfo/GIS map files were created. Twenty-nine ArcInfo/GIS files containing CNRA data and maps are available on CD-ROM at the PEP Office.

Most of these areas are undeveloped and primarily in public ownership, but there are developed areas within or adjacent to the CNRAs. Although the entire estuary is important to natural resources and many of the species found in the CNRAs are also found outside of the CNRAs, it is recognized that these high quality areas require special attention to prevent incremental and cumulative ecological degradation.

The draft boundaries with assessment of each area need to be finalized (*e.g.*, benthic/underwater mapping). Analyses of existing data sets should be performed to identify any information gaps that need to be filled and to evaluate individual and cumulative threats to the CNRAs. Compilation of data sets is necessary to obtain a comprehensive inventory of information. These data sets include the USFWS Federal trust listings, Federally listed endangered and threatened species, State protected species, biological conservation statistics of the NY Natural Heritage Program, water quality data collected by SCDHS, NYSDOS Significant Coastal Fish and Wildlife Habitats (SCFWH), land use data collected by the Suffolk County Planning Department (land use and change inventory, population and population saturation inventory, water dependent uses, land available for development) biological data collected by NYSDEC, and marine data collected in surveys for the



PEP. GIS analyses will be used to integrate these data sets and evaluate impacts. This information will strengthen our understanding of the CNRAs and lay the groundwork for developing implementation strategies to manage and protect these areas.

### ***Protect CNRAs***

There are already a variety of programs in existence that seek to preserve, protect, restore, or call attention to coastal resources in conjunction with human activities around the Peconic Estuary System. These include the Significant Coastal Fish and Wildlife Habitats, Local Waterfront Revitalization Plans, the New York Open Space Conservation Plan, the Peconic Bioreserve, and others. Many of these efforts, however, are focused on specific habitats or communities or are very small in scope geographically. The CNRAs encompass whole ecosystems and include portions of the estuary as well as freshwater and terrestrial zones. The designated CNRAs will merge a variety of existing efforts into the management of large areas containing a range of valuable natural resources. Specific protection efforts for the CNRAs are emphasized, including zoning, land use planning, environmental review, land acquisition and other protection tools, limitations on marina construction and expansion, and installation of shoreline hardening structures.

As part of the designation process for CNRAs, the PEP has identified and mapped (very broadly) the resources at these sites that require protection. Land in the Peconic watershed available for development has been mapped by the Suffolk County Planning Department based on current use and zoning. Through these two efforts, specific parcels of land that contain significant habitats and species to be protected can be identified (see **Chapter 7**).

Protection of open space should be a key component, although other zoning and land use controls should be applied. The most decisive means of protecting these resources is for a government or private conservation organizations to acquire the property and manage it for preservation purposes. Currently, the New York State Open Space Preservation Plan identifies priority parcels for acquisition by the State. Open space acquisition programs funded by local governments or other groups largely use this document to guide their acquisition decisions. The purchase of conservation easements is a less expensive alternative and may be equally protective of the resources. If direct acquisition or conservation easements are not possible, local governments should work with landowners and developers to create site plans that maximize protection of the resources while allowing suitable use of properties (see **Chapter 7**).

Many current and potential activities within the CNRAs may affect their long-term viability. The following activities may have serious individual and potential cumulative impacts: docks, shoreline stabilization structures, dredging, marinas, artificial reefs, fish farms, fishing, pesticides, golf courses, jet skis, swimming pools, sewage treatment and disposal, building and adjacent upland development, and clearing of vegetation. As boundaries are finalized, additional threats may be recognized that need to be addressed.

### ***Coordinate CNRA Activities with the Significant Coastal Fish and Wildlife Habitat Program***

As part of the Coastal Zone Management Program, which is managed by the NYSDOS, Significant Coastal Fish and Wildlife Habitats (SCFWH) were designated more than ten years ago. Many of these sites overlap with or are contained within the large CNRAs identified by PEP. Narratives for



these sites are in the process of being updated with current natural resources information, and the designation and scoring of these sites are being revised on the basis of this new information. In order to foster consistency and coordination, the PEP, NYSDOS, and NYSDEC should work together to review updated Peconics region SCFWH designations, and to ensure that the CNRA initiative complements existing protection and management mechanisms, including the SCFWH and Local Waterfront Revitalization Plan programs. In addition, all governmental agencies should use the SCFWH guidelines to evaluate potential impacts that may occur when development and other activities are considered in these areas.

### *Steps*

- HLR-1.1**     Collect and interpret natural resource, water quality, and land use data sets. Use GIS  
**Priority**     technology to finalize a comprehensive inventory of species, natural communities and water quality, refine maps (including development of maps of each CNRA), and evaluate individual and cumulative threats within each CNRA.
- HLR-1.2**     Finalize CNRA boundaries and adopt CNRAs by appropriate levels of government.  
**Priority**
- HLR-1.3**     Develop management recommendations and plans to protect CNRAs in each town in  
**Priority**     coordination with existing Federal, State, county, and municipal programs that address individual and potential cumulative impacts including, but not limited to, docks, shoreline stabilization structures, dredging, marinas, artificial reefs, fish farms, shellfish culture, fishing, pesticides, golf courses, motorized personal watercraft, swimming pools, sewage treatment and disposal, building and adjacent upland development, and clearing of vegetation.
- HLR-1.4**     Protect the CNRAs through land acquisition and other protection tools (*e.g.*, clearing  
**Priority**     restrictions, setback requirements, zoning, Transfer of Development Rights) principally within the areas themselves and including essential watershed buffers (see **Chapter 7**).
- HLR-1.5**     Prohibit the installation of new shoreline hardening structures within CNRAs.  
Investigate ecologically enhancing, innovative designs to replace or use as an alternative to hard structures.
- HLR-1.6**     Coordinate PEP recommendations for CNRAs with the NYSDOS Significant Coastal Fish and Wildlife Habitat Program and Local Waterfront Revitalization Plan Programs.
- HLR-1.7**     Encourage increased use of the NYSDOS Significant Coastal Fish and Wildlife Habitat Program guidelines by appropriate Federal, State, county, and municipal agencies.
- HLR-1.8**     Examine the possibility of establishing marine reserves (*e.g.*, protect eelgrass beds) within the CNRAs.
- HLR-1.9**     Discourage expansion of existing marinas and the creation of new ones within the PEP CNRAs. The marina expansion and creation issue will be further evaluated as part of a comprehensive strategy dealing with shoreline hardening, marinas, docks, and public access (see HLR-1.3).





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***Responsible Entities***

- HLR-1.1 NYSDEC, The Nature Conservatory (TNC) (co-leads) with towns and USFWS assistance
- HLR-1.2 NYSDEC, The Nature Conservatory (co-leads); PEP Natural Resources Subcommittee; Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead, and Brookhaven; NYSDEC; OPRHP; Suffolk County Parks Department; USFWS; and NYSDOS
- HLR-1.3 NYSDEC, and The Nature Conservatory (co-leads) to assist local governments in coordination with PEP Management Conference, EPA, SCDHS
- HLR-1.4 NYSDEC; NYS Office of Parks; Recreation and Historic Preservation; Suffolk County Planning Department; Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead, and Brookhaven
- HLR-1.5 Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead, villages, and NYSDEC, TNC, SCDHS, EPA, Peconic BayKeeper
- HLR-1.6 NYSDOS (lead), NYSDEC, and PEP Natural Resources Subcommittee
- HLR-1.7 NYSDOS (lead), NYSDEC, towns, USACE, USFWS, and NMFS
- HLR-1.8 PEP Natural Resources Subcommittee, EPA, NYSDEC, SCDHS
- HLR-1.9 Contingent upon adoption of CNRAs (see HLR-1.2)





## **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.**

**Addresses Habitat and Living Resources Management Objectives 1, 3, 4, 6, 7, and 8.**

### ***Hardened Shorelines and Physical Barriers***

Bulkheads can result in erosion or deposition of sediments up or downstream of the structure, which may result in the destabilization of the shoreline and encourage adjacent landowners to install hardening structures along the shoreline. The scour in front of hardened structures could also eliminate the productive and protective features of intertidal and shallow water areas. Loss of shallow-water habitats will negatively impact shellfish, forage and juvenile fish and other species that use these areas for spawning, feeding, or mating (*e.g.*, horseshoe crabs and birds). This “domino effect” of replacing natural shoreline with human-made structures in a relatively short period of time is increasing in some areas and resulting in considerable risk to remaining natural, vegetated shoreline. Furthermore, hardened shorelines prevent the natural shoreward migrations of salt marshes, which is particularly important to consider with respect to rising sea-level. In addition to the loss of beach and inter-tidal habitats, bulkheads can adversely impact the living resources from the leaching of toxins such as copper, chromium and arsenic that are used to treat lumber (see **Chapter 6**).

Past construction of physical barriers to tidal flow, such as tide gates, culverts, and dams, may have resulted in significant changes to hydrography, such as reduced flushing and decreased salinity in various bodies of water. Such structures also have blocked the passage of anadromous fish such as alewives, into creeks and the Peconic River. Decreased salinity can result in a change to the system from salt marsh to fresh or brackish wetlands or to conditions which favor the invasion of the nuisance species, *Phragmites australis*. Lower flow and exchange of water may lead to increased sedimentation and accumulation of toxic compounds, subsidence of the marsh surface, drying of marsh substrates, and increased erosion. Over the long term, these conditions may result in the conversion of the marsh to terrestrial habitat.

Many of these restrictions have been in place for a considerable period of time and the surrounding habitats have adjusted to the new flow regime. In some cases, these equilibrations may have resulted in conversion of one type of habitat to another of equal value (*e.g.*, estuarine or brackish tidal marshes to nontidal freshwater wetlands), and removing the structure may not result in a gain in habitat. In other cases, the habitats upstream from the structure may have become severely degraded and may no longer support a biological community of comparable diversity and quality.

An inventory of hardened shorelines and physical barriers is the first step to assess the impacts that these structures may have on local natural resources. An inventory of hardened shorelines will also establish a baseline from which estimates can be made regarding the rate at which natural shorelines are being replaced by hard structures. Such an inventory is currently underway for all shoreline hardening structures in the Peconic Estuary. Dams have already been mapped in the PEP Geographic Information System by the USFWS, but the status of other structures is unknown. All watershed creeks should be inventoried for physical barriers. This information can then be used in the development of site-specific recommendations for these practices.



The PEP CAC has recommended, “ideally,” a no net increase in hardened shoreline and no loss in habitat policy. State policy, while permitting hard structures under some circumstances, gives preference to non-structural measures where possible. East End local governments can further this policy through the adoption of local laws. A potential alternative is for the East End Towns to create and adopt local regulations that further control the installation of such structures in the Peconics. A recent example of how shoreline hardening structures can be managed by local governments is the Town of East Hampton’s proposed Coastal regulations. The Town of East Hampton has developed different management zones for its coastlines to reduce impacts to natural resources resulting from shoreline hardening structures. If adopted, the proposed regulations would prohibit new shoreline hardening structures from being installed in certain zones, while other zones would require a natural resources permit from the town. Similar regulations could also be adopted by the other East End towns.

In order to encourage property owners to remove existing structures, incentive programs should be developed under which owners would get some financial benefit for removing structures and replacing them with a natural shoreline. This program, coupled with a public education program on the benefits of natural shorelines and a program that disallows additional hardening in certain areas, could lead, in time, to restoration of habitats. Extensive legal research would be required to implement this action and may require legislation. Exploration of natural, softer-solution alternatives to shoreline protection are also encouraged. Possible incentives could include the following:

- “Bulkhead removal districts” where groups of property-owners could have removal costs subsidized by local governments (alternatively, the cost to the municipality of removal could be reimbursed by land owners over a period of time through property taxes);
- A local property tax reduction for a period of time to encourage property-owners to remove hard structures at their own expense; and,
- A program for purchasing conservation easements on shorefront property (or that portion of properties within a certain distance of the water).

### ***Docks and Marinas***

Marinas provide a valuable service to the boating public and allow for a concentration of boats such that individual docks and mooring areas are not needed throughout the estuary. They also represent a significant portion of the economic value generated by the estuary. However, the structures and activities associated with marinas may cause damage or degradation to local water quality and living organisms. Improperly sited and designed marinas may also cause unnecessary damage to adjacent communities.

The best management practices (BMPs) documented in the Coastal Nonpoint Source Control Program (CZARA, Section 6217) are protective of natural communities and habitats while allowing the continued operation of marina facilities. The PEP has funded a demonstration project of a model marina, which implements a number of the CZARA BMPs. These BMPs should be implemented throughout the estuary in order to minimize the overall impacts of marina operations on the system.

The cumulative impacts of docks will eventually contribute to the degradation of local water quality and natural communities through fragmentation of habitats, shading of submerged aquatic vegetation and other potential impacts. It is not clear just how many of these structures exist in the Peconics and exactly where they are located. A concentrated effort to identify all of them and to assess the impacts



that they have had and are having on adjacent natural communities will help in the development of recommendations on how to manage them in the future.

### ***Steps***

- HLR-2.1     Quantify and map all hardened shoreline, docks and piers, and flow-restriction structures  
**Priority**     in the Peconic Estuary and assess the overall impacts of stabilization structures on natural resources. Develop recommendations to promote alternative shoreline management and incentives for maintaining and restoring natural shorelines.
- HLR-2.2     Review existing regulations for shoreline hardening structures at all levels of government, encourage consistent policies and strengthen regulations where appropriate.
- HLR-2.3     Establish and enforce a policy of “no net increase” of hardened shoreline in the Peconic  
**Priority**     Estuary and, if possible, a net decrease in hardened shoreline. Use HLR-1 and HLR-2 as a mechanism to establish this strategy.
- HLR-2.4     Develop a variety of financial incentives and programs to encourage property owners to  
**Priority**     remove or modify hardened shoreline structures and replace them with natural vegetation and other vegetated (bioengineered) alternatives to restore the natural shoreline of the estuary.

### ***Responsible Entities***

- HLR-2.1     Contract with Cornell and USFWS; NYSDEC, EPA, SCDHS, NYSDOS, Towns
- HLR-2.2     PEP Natural Resources subcommittee through contract
- HLR-2.3     PEP Management Conference (lead); NYSDEC; Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead; villages; NYSDOS; USACE; PEP; SCDHS; EPA
- HLR-2.4     Peconic BayKeeper (lead); Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; villages; HRWG; NYSDEC; SCDHS; PEP



### **HLR-3 Assess the Impacts of Dredging Activities on Habitat and Natural Resources and Develop Recommendations and Guidelines for Reducing those Impacts.**

#### **Addresses Habitat and Living Resources Management Objectives 1, 2, 3, 6, and 7.**

The Suffolk County Department of Public Works (SCDPW) periodically dredges approximately 62 sites, with 12 of these dredged on a yearly basis. About 50,000 cubic yards of sediment are dredged by SCDPW in the Peconics every year (see: Suffolk County's Generic Environmental Impact Statement for dredging in the Peconic Estuary). All SCDPW dredging is done to maintain Federal, State, and town navigational channels. Permission for new dredging has not been granted for years; only maintenance dredging has been permitted. Dredging is usually done because of the accumulation of sediment that fills in channels and basins, effectively reducing the depth and the draft of vessels that can use these areas. Sediment accumulation at these sites may be the result of changes in the shoreline or in adjacent land uses, such as increases in impervious surfaces (and a corresponding increase in stormwater runoff); the loss of buffering vegetation along the shoreline; hardening of the shoreline by the replacement of natural vegetation with bulkheads and rip-rap; historical hydrological modifications from diking, draining, and filling of shoreline areas or creation of dredge spoil islands; and loss of submerged aquatic vegetation which would normally stabilize bottom sediments. These changes can alter currents and the effects of tides, allowing erosion or scouring and subsequent resuspension of particles. The need for repeated dredging may be reduced or eliminated in the long term if some of these problems are remediated.

A variety of concerns have arisen over the years about the impacts of dredging on natural communities. One concern is that dredging disturbs habitat used by different species during various life stages, such as reproduction. For example, it is possible that the current window of time during which dredging is allowed may not be sufficiently protective of winter flounder, which spawn in mid-to late winter in shallow embayments and creeks and have demersal eggs. Endangered shorebirds, which nest on beaches from April through August, also are vulnerable to disturbance. Other possible impacts include damage to existing eelgrass beds or the creation of water quality conditions that are not favorable to eelgrass (high turbidity). The re-suspension of toxic chemicals, including metals, PAHs, PCBs, and pesticides, which tend to be found in association with particles in aquatic systems, is another concern. In the past, dredged material from the Peconic Estuary System has shown very little contamination; however, examination of sediments in the Peconic Estuary System by PEP contractors has shown that some chemicals can be found in a few sites at concentrations above background. For that reason, it may be useful to have newly-dredged material tested occasionally. The NYSDEC is drafting marine dredging and disposal protocols, which will provide guidance on testing requirements.

In order to foster public discussion about dredging and its impacts, the PEP will sponsor a workshop for all interested parties to define specific concerns. The workshop should result in the production of a report containing consensus-based dredging recommendations and guidelines. The guidelines should be specific for each site dredged in the Peconic Estuary System and should include descriptions of each site and the natural resources of concern at each site, including endangered species. The guidelines should also include recommendations on timing, frequency, and equipment, as well as dredged material placement.



### ***Steps***

- HLR-3.1 **Priority** Hold a “Dredging Summit” for the Peconic Estuary System to address specific concerns (*i.e.*, impacts on shorebird nesting, demersal fish eggs, benthic communities, and the potential release of contaminants) and develop dredging guidance on an embayment-specific basis and for identified CNRAs. Integrate dredging guidance into existing regulatory programs.
- HLR-3.2 **Priority** Assess navigational dredging in tidal creeks and embayments (utilizing Suffolk County’s Generic Environmental Impact Statement) for damages or impacts to eelgrass beds and other habitats and develop permit conditions to minimize impacts that potentially could result in habitat loss and degradation. Determine if navigational dredging locally impairs water quality to the point of precluding restoration of eelgrass.
- HLR-3.3 Determine the need for frequency of maintenance dredging and develop recommendations to reduce runoff and erosion in creeks to reduce the need for maintenance dredging.

### ***Responsible Entities***

- HLR-3.1 NYSDEC (lead) through contractor; USACE; NYSDOS; SCDPW; EPA; SCDHS; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; and other interested stakeholders
- HLR-3.2 PEP through contractor, NYSDEC, DOS, SCDHS
- HLR-3.3 Frequency of dredging: SCDPW (lead); Runoff recommendations: NYSDEC, NYSDOS (co-leads), PEP, SCDHS



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

##### **Addresses Habitat and Living Resources Management Objectives 1, 3, 5, 6, and 8.**

Eelgrass beds are the preferred habitat of bay scallops, and dredging for scallops is frequently done near the few remaining eelgrass beds in the estuary. Certain types of dredges or improper operation of dredges can result in uprooting or damaging the plants, which may, over time, lead to permanent damage to the beds. In other areas of the country, beds of seagrasses are frequently damaged and scarred by boat propellers, which become tangled in the seagrass when the boats are run at high speed through the beds. It is not clear if the potential damage caused by either scallop dredges or boat propellers from commercial and recreational vessels is significant in Peconic Estuary eelgrass beds. This issue should be investigated to determine if further recommendations should be made regarding types of equipment or methods of dredging, or recommendations regarding the speed and manner at which boats should be operated when over eelgrass beds.

The Towns of Riverhead and Southampton permit the use of a method of shellfish harvesting known as propeller dredging. In this method, the propeller of a boat engine (either attached to a boat or not) is used to churn away soft sediments where soft clams are found. The New York State Environmental Conservation Law allows for “churning” for soft clams only below the low tide mark. The method can be a faster, less labor-intensive method of removing sediment and finding the buried shellfish. Unfortunately, this method also disturbs much larger areas and may be more damaging to certain communities over the long term. Fishermen contend that churning is not done near eelgrass beds, only in mudflats and subtidal areas, where it is believed to increase productivity. Communities of particular concern include eelgrass beds, mudflats, and shallow subtidal areas adjacent to vegetated tidal wetlands. This potential for permanent damage to sensitive communities should be examined in comparison to disturbance and damage caused by other methods of harvesting shellfish before recommendations are developed regarding this method. The State permits the use of rakes and tongs on public bottom for hard clams while dredges are allowed on private lands.

Hard clams, soft clams, and oysters are found in unvegetated mudflats (usually where mud and sand meet) and harvesters typically concentrate in these areas. In many cases, however, harvesters may work their way in the mudflats right up to the edge of the vegetated zone, where the salt marsh peat forms. These commercial species of shellfish are not found in the vegetated or peat areas. Digging for shellfish right at this edge destabilizes the vegetation and renders these areas vulnerable to erosion with subsequent loss of *Spartina*. This may contribute over time to loss of the vegetated wetlands. Therefore, this practice should be discouraged or banned.

#### ***Steps***

- HLR-4.1 Examine methods of harvesting clams, scallops, and other shellfish and determine which are most compatible with eelgrass establishment and growth. Develop recommendations for harvesting methods, frequency, and timing, which will allow recovery of eelgrass throughout the estuary and enhance shellfish productivity.



- HLR-4.2 Discourage harvesting of shellfish at the edge of vegetated salt marshes and encourage the use of methods that minimize impacts to vegetated habitats.

***Responsible Entities***

- HLR-4.1 NYSDEC (lead) through contract
- HLR-4.2 NYSDEC (lead); Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; PEP Public Education and Outreach program; and shellfishermen





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

### **Addresses Habitat and Living Resources Management Objectives 1, 2, 3, 4, 6, and 7.**

The protection from draining, filling, and dredging of all wetlands by section 404 of the Clean Water Act and tidal wetlands by Article 25 of the NYS ECL has been very successful. It is important that no matter what additional preservation and restoration activities are undertaken to increase the quality and quantity of the wetland resources in the Peconic Estuary System, these existing programs must remain intact and continue to be supported by the public and elected officials. These programs represent the most fundamental level of protection that these habitats have.

In the past, tidal wetlands were extensively ditched in order to facilitate the drainage of the wetlands at low tide. The purpose of this was to minimize the amount of standing water in the marsh, which could be used as mosquito breeding areas. However, these ditches caused excessive drainage of tidal wetlands at low tide, disturbing the natural functioning of the marsh, which supports a wide variety of other species in the standing pools of water which are left on the marsh at low tide. Although diminution of standing water was thought to reduce the populations of mosquitoes, it is now thought that the pools actually provide habitat for small finfish (killifish) which eat mosquito larvae. Over the past few years, Suffolk County Vector Control (SCVC) has discontinued its practice of creating new ditches and implementing Open Marsh Water Management to restore marshes to their former State and control mosquito populations. This policy should be supported. Additionally, the PEP encourages better coordination among SCVC and all other agencies and towns for maintenance of existing ditches and planning of mosquito control practices in wetlands.

### ***Steps***

- HLR-5.1 Ensure continued protection of freshwater and tidal wetlands through the implementation and enforcement of current regulations under the Federal Clean Water Act and the State Wetlands Protection Programs, local government regulations and local land use practices.
- HLR-5.2 Review existing tidal wetlands protection policies to determine if they provide for maintenance of tidal wetlands with respect to future sea-level rise.
- HLR-5.3 Maintain and enforce the policy of creating no new mosquito ditches in tidal wetlands and establish a policy for not re-opening ditches that have filled-in by natural processes.
- HLR-5.4 Ensure that SCVC works cooperatively with all government agencies, East End towns and local conservation organizations in the planning of wetland mosquito ditch maintenance and pesticide spraying.



***Responsible Entities***

HLR-5.1 NYSDEC (lead), USACE, East End Towns

HLR-5.2 PEP- Natural Resources Subcommittee through contractor

HLR-5.3 SCVC (lead), NYSDEC, EPA, SCDHS, NYSDOS, East End Towns

HLR-5.4 SCVC (lead), SCDHS, EPA, NYSDEC, East End Towns



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

**Addresses Habitat and Living Resources Management Objectives 1, 2, 3, 5, 6, and 8.**

Eelgrass beds are an important marine habitat for finfish and invertebrates which use them for foraging, shelter and nursery areas. Unfortunately, many of the eelgrass beds in Peconic Estuary have been declining and the causal factors responsible for this decline remain somewhat elusive. The remaining eelgrass beds therefore, should be protected from direct human threats such as: propeller scarring and anchor dragging, while further research on the factors contributing to the health of eelgrass beds in the Peconics should be encouraged for future management recommendations. The NYS Tidal Wetlands Act (NYS ECL, Article 25) gives the NYSDEC authority over lands under tidal waters to a depth of six feet below mean low water. This means that eelgrass located in water of six feet or less are protected from activities such as excavation, dumping, erection of pilings or any other activity that may substantially impair or alter natural conditions. Eelgrass located at a depth of six feet below mean low water also are protected by NYS Use and Protection of Waters (NYS ECL, Article 15, Title 5) for activities involving excavation and placement of fill and docks and moorings. However, because eelgrass beds have not been thoroughly mapped and sometimes may not be visible with the naked eye, they could be overlooked during a permit application review.

***Steps***

- HLR-6.1**    Evaluate the effectiveness of current policies in preserving eelgrass habitat and  
**Priority**    develop ways to provide increased protection for all extant eelgrass.
- HLR-6.2**    Monitor and protect extant eelgrass (*Zostera marina*) beds, and restore degraded eelgrass beds.
- HLR-6.3**    Evaluate anchor dragging, propeller scarring, dredging and other known impacts to extant eelgrass beds in the Peconic Estuary and develop recommendations to reduce them.
- HLR-6.4**    Hold a workshop to evaluate the factors that regulate the health and extent of eelgrass beds in the Peconic Estuary and develop management recommendations based on these findings.

***Responsible Entities***

- HLR-6.1**    NYSDEC (lead) through contract
- HLR-6.2**    NYSDEC (lead), Cornell Cooperative Extension, PEP-Natural Resources Subcommittee, and PEP HRWG
- HLR-6.3**    NYSDEC and Habitat Restoration Workgroup (co-leads) through contract
- HLR-6.4**    NYSDEC, PEP-NRSC, and PEP HRWG (co-leads)



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

### **Addresses Habitat and Living Resources Management Objectives 1, 2, 4, and 7.**

Areas where resources are under stress or no longer exist need to be identified for restoration. To ensure a comprehensive and coordinated approach to restoration activities, the PEP advocates formulating an overall strategy for restoration: an estuary-wide Habitat Restoration Plan (HRP).

The PEP has committed to the formation of a Habitat Restoration Work Group (HRWG) which will articulate the overall goals of restoration in the Peconic Estuary, identify and prioritize the types of habitats in need of restoration, identify the specific locations in the Peconic Estuary where restoration of these habitat types is feasible, and develop a process and criteria for project selection as well as prioritization of selected sites.

Not all estuarine, intertidal, or terrestrial habitats found in the Peconic watershed are in need of restoration, are considered important to restore, or can be successfully restored given current levels of knowledge and technology. As the first step in developing the restoration plan, the HRWG will develop a list of the habitats it considers most important for restoration. A draft list has already been developed and will be discussed and reviewed prior to acceptance into the final plan. These habitats currently include:

- Coastal Grasslands;
- Beaches and Dunes;
- Riverine Migratory Corridors and Habitat;
- Tidal Wetlands;
- Non-tidal Freshwater Wetlands;
- Submerged Aquatic Vegetation;
- Estuarine Embayments;
- Coastal Forest Communities; and,
- Intertidal Flats.

The next step in the development of an overall restoration plan is the assessment of the current quantity of identified priority habitats. Information collected for this inventory would include the quantity of habitat, the subjective condition in which it exists, whether it is in need of restoration, and what level of restoration can be achieved. In some cases, there have been inventories done on particular lands for certain types of habitat (*e.g.*, Town of Southampton-owned properties have been identified which once were estuarine wetlands and could be restored). The HRWG will compile inventories that have been done and will solicit additional site nominations from Federal, state, and local governments and interest groups.

The third step in the HRP creation process is the development of criteria for the selection of restoration sites. There are a number of factors which must be considered when selecting sites to be restored, including: 1) the general level of knowledge about the specific habitat type; 2) the history of success of restorations of each habitat type; and 3) historical information for each site, including



causes of loss or degradation of the habitat and the current status of those stressors. Other factors to be considered in site selection are cost and ease of restoration, community acceptance of restoration, and surrounding land uses, all of which affect the likelihood of success. To assist in the final selection of restoration sites, information about ongoing and completed restoration projects needs to be compiled and assessed as to cost, success, and other parameters. Restoration projects that are completed or ongoing include tidal wetland restorations at a variety of locations, a freshwater wetland restoration in Southold (*e.g.*, Cassidy Preserve), and a maritime grassland restoration at Orient Point.

The HRWG will encourage municipalities to develop plans for identified restoration opportunities and will assist municipalities who have completed restoration planning in obtaining funding and implementing their restoration projects. The PEP HRWG and its member agencies will develop the HRP and a variety of planning efforts associated with it, but it will be up to local governments and other groups to implement restoration projects through the NYS Clean Water/Clean Air Bond Act and with other funds (*e.g.*, Suffolk County 1/4% sales tax). Because projects that are eligible for NYS Bond Act funds must involve actual implementation of habitat restoration projects, Bond Act funds cannot be spent on planning or other activities done in preparation for implementation. Therefore, the NYSDOS has targeted the EPF funds over which it has jurisdiction towards inventory and planning projects in order to complement the Bond Act funds. Local governments that have the desire to restore habitats but have not yet developed plans may use these funds for that initial work.

There are already existing habitat inventories and sites targeted for habitat restoration by groups participating in the PEP HRWG. If these efforts meet the criteria being developed by the HRWG, they should not be held up by the development of the entire Habitat Restoration Plan, but should be allowed to move forward for funding. These projects should be reviewed and discussed by the HRWG with regard to the priority habitat list and the monitoring criteria to be developed. Based on these discussions, recommendations for funding under the NYS Bond Act should be prepared for forwarding to NYSDEC Bond Act staff. Not all of these projects will be able to be funded through the Bond Act, so other sources of restoration funds should also be sought and application should be encouraged.

### *Steps*

HLR-7.1 Develop and implement an estuary-wide Habitat Restoration Plan (HRP).

#### **Priority**

HLR-7.2 Identify and list priority habitat types for the HRP.

HLR-7.3 Inventory and prioritize a list of restoration projects for which planning is underway and recommend these for “fast-tracking” towards Bond Act funding.

#### **Priority**

HLR-7.4 Inventory and list restoration opportunities in the PEP area and estimate costs.

HLR-7.5 Develop and include in the HRP criteria for selection of restoration sites.

HLR-7.6 Inventory and list completed, ongoing, and proposed restoration projects for inclusion in the HRP. Include all restoration sites on GIS maps.

HLR-7.7 Develop and include in the HRP a list of funding sources available for habitat restoration in the PEP area.



- HLR-7.8 Develop model guidelines for habitat restoration planning for use by municipalities in applying for Environmental Protection Fund (EPF) monies.

***Responsible Entities***

- HLR-7.1 PEP HRWG (lead)
- HLR-7.2 PEP HRWG (lead)
- HLR-7.3 NYSDOS (lead), NYSDEC, and PEP HRWG
- HLR-7.4 PEP HRWG (lead) and East End Towns
- HLR-7.5 PEP HRWG (lead)
- HLR-7.6 PEP HRWG (lead)
- HLR-7.7 PEP HRWG (lead)
- HLR-7.8 NYSDEC and NYSDOS (co-leads); PEP HRWG; EPA; Towns; CCE





## **HLR-8    Develop and Implement Specific Restoration Projects.**

### **Addresses Habitat and Living Resources Management Objectives 1, 3, 4, 6, 7, and 8.**

Tidal wetlands, beaches, and submerged aquatic vegetation are three priority habitats designated for restoration by the PEP HRWG. A number of effective actions can be taken by the HRWG and others to ensure that restoration plans are created and implemented for these important habitats.

Tidal wetlands have been altered by mosquito ditching and the growth of the invasive species *Phragmites australis*. Mosquito ditches cause excessive drainage of tidal wetlands at low tide. Although the diminution of standing water was thought to reduce the populations of mosquitoes, it is now thought that those pools actually provide habitat for small finfish which eat mosquito larvae. In addition, the ditches allowed pathogens contained in the water to enter the system and be taken up by shellfish. Damming or otherwise maintaining the water on the marsh allows time for the pathogens to die off before entering the estuary (see **Chapter 5**). These ditches should be dammed or modified, through a series of practices known as Open Marsh Water Management (OMWM), so as to restore the marshes to a condition similar to that which existed prior to ditching.

Tidal wetlands and beaches have been negatively impacted by the construction of hard shoreline structures and the removal of native plants. Restoration of tidal wetlands and beaches could be accomplished through the removal of hard shoreline structures and regrading and planting of the areas with wetland or beach plants.

Eelgrass beds are declining in the Peconic Estuary. Exact causes are not known, but it is believed that the beds have been impacted by the effects of the Brown Tide as well as poor water quality conditions, including high levels of nitrogen and suspended sediment and possibly terrestrial applications of pesticides and herbicides. Actions to implement this additional goal of protecting, restoring, and enhancing eelgrass habitat supports the overall vision of what the CCMP hopes to achieve with water quality, habitat, and living resources.

Not all habitat restoration projects require large amounts of funding and highly technical work plans in order to mitigate the impacts of stress and encourage the return of plant and animal communities. Many areas are only slightly degraded and can be restored with the aid of relatively untrained individuals. Examples include dune restoration through the planting of beach grasses; *Phragmites australis* and other exotic or nuisance species removal by physically cutting or digging out the plants in areas of minimal invasion and replanting with native species; or simply removing garbage and trash from beaches, wetlands, and clogged waterways. Some of these efforts have already been organized and, if possible, should be expanded. Citizen restoration projects should be identified and local groups should be encouraged to work with technical experts to implement restoration and post-restoration monitoring. This kind of effort not only saves money, but also fosters a sense of stewardship and caring for the environment in the public. Therefore, three steps should be taken: 1) identify simple restoration actions appropriate for local volunteers; 2) identify and contact appropriate local groups to participate; and 3) develop an outreach effort to solicit additional projects and volunteers.



### ***Steps***

- HLR-8.1 Encourage cooperation among governmental agencies to plan and implement Open Marsh Water Management (OMWM) to manage tidal wetlands with grid ditches for mosquito control with the goal of also restoring more natural conditions.
- HLR-8.2 Develop recommendations in the PEP Habitat Restoration Plan for control of *Phragmites australis* by restoration of natural processes such as removal or modification of flow-restriction devices, removal of hardened shorelines, and revegetation of bay and creek shorelines or by other means.
- HLR-8.3 Develop a quantitative goal for eelgrass restoration based on ongoing monitoring and mapping efforts.
- Priority**
- HLR-8.4 Identify and prioritize locations where restoration of eelgrass is most feasible based on water quality and environmental criteria which are being developed for eelgrass in the Peconic Estuary System and elsewhere in its range.
- HLR-8.5 Develop and/or utilize cooperative programs with the public for simple, local habitat improvements and enhancements.

### ***Responsible Entities***

- HLR-8.1 Cornell Cooperative Extension (CCE), SCVC, USFWS, East Hampton Department of Natural Resources, and NYSDEC (co-leads), PEP
- HLR-8.2 PEP HRWG (lead) through contractor
- HLR-8.3 PEP HRWG (lead), NYSDEC, SCDHS, CCE, DOS, Towns
- HLR-8.4 PEP HRWG (lead), PEP, NYSDEC, and NYSDOS
- HLR-8.5 PEP HRWG (lead), NY Sea Grant, and Cornell Cooperative Extension



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

### **Addresses Habitat and Living Resources Management Objective 8.**

Restoration activities have been conducted in the past which may not have actually resulted in a long-term recovery of the targeted habitat. These projects were frequently done with little or no follow-up monitoring, an activity that might have helped determine if the restored habitat was able to maintain itself or if the conditions causing loss or degradation of the habitat still existed, leading to the failure of the restoration. If restored areas are monitored, factors affecting the success of the project over the long term can be identified and steps can be taken to mitigate or “correct” the restoration so that the habitat can flourish. It is important to develop sets of criteria or guidelines for restoration monitoring for each priority habitat type that are relatively easy to measure, can be tailored to projects of differing conditions and goals, and employed by groups of various levels of technical expertise. The above facts have been recognized by the Habitat Restoration Committee of the Long Island Sound Study, by the NYSDOS Coastal Resources Program, and by the NYSDEC, particularly with respect to the NYS Clean Water/Clean Air Bond Act Aquatic Habitat Restoration projects to be funded. The PEP HRWG can work with all of these entities to develop a set of criteria for each habitat type.

Monitoring data and other information collected from restoration projects are most useful if collected in a standardized fashion, stored in a central repository, and made accessible to managers, interested groups, academic researchers, and other programs conducting and evaluating restoration. Project information not collected and stored in this manner may be lost over time as a result of staff turnover or student graduation, among other factors. Also, lack of access to information from prior projects may hinder regional planning efforts and result in the repetition of mistakes. Therefore, the PEP should develop an appropriate collection procedure and storage format for restoration project information, and identify a location for a long-term repository of such information for the PEP area.

### ***Steps***

- HLR-9.1 Develop and implement procedures to track and evaluate restoration efforts using success criteria and monitoring protocols in the PEP area.
- HLR-9.2 Develop procedures for the management and storage of habitat restoration project and monitoring information for the Peconic Estuary.
- HLR-9.3 Identify a regional set of reference sites to assist in habitat restoration evaluation and monitoring and provide a framework for long-term habitat and living resources research and monitoring.

### ***Responsible Entities***

- HLR-9.1 PEP HRWG (lead)
- HLR-9.2 PEP HRWG (lead) and PEP
- HLR-9.3 PEP HRWG and PEP Natural Resources Subcommittee



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

### **Addresses Habitat and Living Resources Management Objectives 1, 2, 5, 6, 7, and 8.**

Historically, the Peconic Estuary has supported successful shellfish aquaculture. Aquaculture activities can vary widely in scale and therefore, in the potential impacts they may have on the environment. In an estuarine system such as the Peconic Estuary, which is relatively shallow and fairly enclosed, especially west of Shelter Island, it is important to determine the amount and type of aquaculture that should be permitted without causing adverse impacts to the entire estuary or to local embayments. An estuary-wide aquaculture plan could be used to develop guidelines and criteria for aquaculture operations, identify suitable areas where aquaculturing can be employed, develop monitoring protocols, and control the commercial culture of non-indigenous and imported species.

The NYSDEC has responsibility for developing and enforcing State-wide aquaculture policy, however, Suffolk County has been given certain specific rights to develop such policies in the Peconic Estuary. An overall plan has not yet been developed, but could be facilitated through input from the PEP and other interested groups. For this reason, it is important to begin to develop a comprehensive aquaculture policy for the Peconic Estuary Program by sponsoring a workshop to which all interested parties are invited so that all of the concerns can be discussed and incorporated into the estuary-wide aquaculture plan. At this workshop, the development of guidelines or criteria for aquaculture can be initiated based on the different kinds of operations which currently exist and which may be proposed for this body of water. These criteria will include scale of operation, methods of culturing, amount and type of inputs into the environment, genotypes and species used, location, and amount and type of artificial structure to be used.

Depending on the nature, scale, and intensity of the operation, aquaculture activities in natural waters can have a significant impact on local water quality, living resources, and habitats. For example, small-scale shellfish culturing, which is a common type of culturing that exists in the Peconic Estuary, is probably associated with lesser impacts to the estuary than large-scale fish farms. Shellfish culturing can also be beneficial to water quality through their filtering of particles, however, they should not be located in naturally productive shellfish or finfish areas (*e.g.*, eelgrass beds, finfish spawning/nursery areas, etc.). In order to ensure that neither water quality nor the natural communities of organisms will be adversely impacted, aquaculture sites should be carefully selected, the use of culture stocks should be regulated, and water quality monitoring should be conducted for a variety of parameters.

### ***Location of Facilities***

The habitat, food sources, and general health and behavior of species such as sea turtles and marine mammals, and habitats that are important to the recruitment of natural stocks of finfish and shellfish could be impacted by aquaculture facilities. Based on existing information on the ways in which species of concern use the estuary system, it should be possible to identify embayments or other areas where large-scale culturing or grow-out operations and associated activities may be detrimental to these species and therefore, avoided. For example, one concern is the potential impact of culturing operations, such as fish pens, on the interaction between spider crabs populations and sea turtles. Kemp's ridley sea turtles feed primarily on spider crabs. If either spider crabs or sea turtles are attracted to aquaculture operations, there is a potential for adverse interactions between the cultured organisms, the structure or materials of the operation, and the species of concern. Conversely, if



spider crabs are driven from an area by the presence of aquaculture activities, this could potentially have either an adverse or positive impact on the turtles. Seals are another concern. Seals may be attracted to fish pens because of the proximity to their haul-out areas and because of their attraction to concentrations of finfish. If this happens, there is the potential for adverse interactions between the structure and materials associated with the aquaculture and these animals. To date, there have been no known or reported takes of marine mammals at the net pens located off Plum Island; whereas at net pens off the coast of Washington and British Columbia there have been major incidents. The impacts of the presence of net pens off Plum Island are not known on the population dynamics of marine mammals. The CNRAs identified by the PEP need to be surveyed to assess potential impacts to marine organisms and habitats from existing and future aquaculture activities.

### ***Culture Stocks***

Research has been done on the genetic differences between local populations and stocks of the same species. Often, local populations are better adapted to local conditions and prey species which makes them better able to function in the local ecosystem. In order to minimize concerns about the impact of culture stocks on natural waters and maximize their successful culture, all aquaculture operations should try to use culture stock taken from the Peconic Estuary rather than from other areas of the country. This is the case for certain shellfish seeding operations. Other stock may be necessary if the Peconic Estuary System stock is not available. However, a State importation permit is required of all products used for aquaculture that are brought in from another State. Shellfish stock only from certain locations north of New York are acceptable for importation into New York.

Another concern about importing organisms into the Peconic Estuary System for the purpose of culturing them commercially is the parasites or diseases that may be brought in with them. These pests may be transmitted to wild populations if not detected in the cultured animals soon enough. As part of developing an aquaculture plan for the entire system, a plan of action for dealing with unforeseen outbreaks should be developed. NYSDEC should maintain the policy of not allowing the importation of southern shellfish.

The transplanting of shellfish into Peconic Estuary waters for cleansing presents a similar concern. New York's shellfish transplant program has been administered by the NYSDEC Bureau of Marine Resources, Shellfisheries Section since 1964. The primary goals of the transplant program are to protect public health and provide a long-term opportunity for utilization of shellfish resources which are presently unusable due to coliform contamination (see **Chapter 5**). In this program, shellfish are placed in certified waters for cleansing and reharvested after 21 days. Some of these transfers are carried out within the estuary itself, but a large segment of the New York transplant program involves the transfer of hard clams from Raritan Bay in New York Harbor to the clean near shore waters of the Peconic Estuary System. It is generally believed that the potential difference between shellfish in both bodies of water in terms of genetics, disease, or parasites is negligible; therefore, no monitoring of the harvested shellfish is done. Also, there have been no reported diseases or parasites in hard clams in New York waters. With the occurrence of oyster diseases such as *Perkinsus marina* (dermo) and *Haplosporidium nelsoni* (MSX) in other waters, however, it may be useful to monitor for these and other known parasites in oysters in order to determine if they may be transferred to the Peconic Estuary should a transplant program for oysters commence (although dermo has already been documented in the Peconics [summer 1997] and MSX may already exist there as well).



### ***Non-Indigenous Species***

There are many documented cases of non-indigenous species (finfish, shellfish, and other invertebrates) introduced into natural waters for culturing and subsequently released either accidentally or intentionally beyond the culturing facility (though, there are no documented cases in New York). In many of these cases, the species quickly outcompete and outnumber indigenous populations, causing irreparable damage to the local ecosystem. There are already non-indigenous species in the Peconic Estuary System (*e.g.*, the marine macroalga *Codium fragile*) whose impact on the environment is unknown. The NYSDEC does not permit the importation or introduction of non-indigenous species for aquaculture whether they are proposed to be maintained in an upland facility or in marine waters. It is important that NYSDEC continue to prohibit the introduction of exotic species and require indigenous genotypes for aquaculture. If non-indigenous species are maintained on land in tanks, measures should be taken to prevent the introduction of these species into the wild as well as into surface water discharges containing waste or disease.

### ***Monitoring***

Reduction of water quality associated with culturing, particularly that of large-scale finfish culture, has been documented in other areas throughout the world. In order to maintain high water quality in the Peconic Estuary, ambient monitoring (by the permittee or by others) should be implemented when aquaculture permits are granted. Examples of water quality parameters which have been incorporated in these permits include dissolved oxygen, nitrogen compounds, total suspended solids, and chemicals found in conjunction with food for the cultured organisms (*e.g.*, antibiotics). Biological parameters which are measured include chlorophyll *a*, changes in adjacent benthic populations and interactions with turtles, marine mammals, finfish, and large mobile epifauna (*e.g.*, crabs, whelks). A protocol for monitoring of aquaculture sites should be matched to the scale, location and type of culturing operation (*e.g.*, finfish vs. shellfish). For example, the one net pen finfish operation off Plum Island does have a water and sediment quality monitoring program and a marine mammal and avian reporting requirement. This net pen operation also conducts daily monitoring of dissolved oxygen inside and outside the pens to ensure good water quality for the caged farm fish. Complementary monitoring by an independent agency or entity could be conducted if funded.

### ***Steps***

- HLR-10.1 Assist in the development and implementation of an estuary-wide aquaculture plan.
- Priority** Include criteria regarding scale, location, assessment, monitoring, and methodologies of shellfish and finfish aquaculture which would be ecologically beneficial and would help sustain aquaculture as a beneficial estuarine use when performed in a manner that is sensitive to the natural conditions, productivity and ecology of the Peconic Estuary.
- HLR-10.2 Identify suitable areas for shellfish and finfish aquaculture activities that are compatible with the water quality and habitat protection objectives in the CCMP to ensure that a balance is maintained between cultivated and wild stocks, and include in the estuary-wide aquaculture plan.
- HLR-10.3 Investigate the need to require monitoring of imported cultured organisms and intrastate transplant of shellfish for disease and parasites and determine if a requirement should be established to certify that they are disease free.





HLR-10.4 Continue to support the prohibition of commercial culture or introduction of non-indigenous species in New York's waters and require that all aquaculture operations in the estuary use indigenous genotypes.

HLR-10.5 Develop water quality and natural resource monitoring protocols for existing and future shellfish and finfish aquaculture projects

### ***Responsible Entities***

HLR-10.1 Organize workshop: Suffolk County Planning Department; SCDHS (co-leads); NYSDEC; PEP - Natural Resources Subcommittee; NYSDOS; NY Sea Grant; NYSOGS; USACE; EPA; NOAA/NMFS; Suffolk County; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; villages; Cornell Cooperative Extension; fish farmers; other groups; and individuals interested in aquaculture; Aquaculture Plan: Suffolk County with input from PEP and other stakeholders (NYSDEC, Long Island Sound Study, and New York-New Jersey Harbor Estuary Program)

HLR-10.2 Suffolk County Planning Department, SCDHS, NYSDEC (co-leads), NYSDOS, USACE, USFWS, PEP-Natural Resources Subcommittee, and Suffolk County Planning Department

HLR-10.3 Monitoring assessment: NYSDEC (lead); Disease and parasite screening: PEP; NYSDEC; NYSDOS; NYSOGS; USACE; EPA; NOAA/NMFS; Suffolk County; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; villages; Cornell Cooperative Extension; other groups; and individuals interested in aquaculture (co-leads)

HLR-10.4 NYSDEC (lead) to implement legislation and NYS legislature

HLR-10.5 SCDHS, NYSDEC (co-leads), USACE, NYSDOS, NYSOGS, USFWS, PEP, NOAA, and fish farmers (permittees)



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

**Addresses Habitat and Living Resources Management Objectives 1, 3, 4, 6, and 8.**

Unintentional artificial reefs have existed as long as humans have used seagoing vessels and lost them at sea. The deliberate placement of structures in the water for the purpose of attracting finfish is a more recent phenomenon. It is clear from anecdotal and more rigorous, quantitative research that these areas of relief do indeed attract finfish, some of which use the structures as refuges from predators or for breeding and feeding. What is less clear are the impacts of these structures on local benthic populations and regional finfish populations. Topics that need further investigation, either through literature research or actual studies, include the following:

- Benefits of the structure beyond attracting finfish and providing “good fishing;”
- Effects on finfish stocks (*i.e.*, Do the reefs concentrate fish into a small area and then cause them to be depleted through fishing or render them more vulnerable to predators, or do they provide additional refuge and feeding areas, thus increasing populations over time? Does the concentration of finfish at reef sites result in a decrease in the populations elsewhere or result in a shift in finfish community structure?);
- Specific effects of artificial reefs on sea turtle, marine mammals, shark, and other large marine species populations;
- The potential for and extent of habitat and species displacement and a determination of how many reefs could be supported in the estuary without causing adverse effects such as those mentioned above; and
- A definition of areas where artificial reefs should not be located due to the presence of sensitive species or habitats of concern, and areas that may be suitable for reef structures (*i.e.*, are consistent with the water quality and habitat objectives in the CCMP).

The NYSDEC Artificial Reef Plan and GEIS was prepared in the late 1980s and approved through a public process in 1991. Since that time, marine mammal use of the system has been increasing. Since all artificial reef sites require a full evaluation (including public input and the collection of relevant information) prior to decision making, special attention should be given to marine mammal and sea turtle issues and addressed in a pre-placement/siting monitoring program. The Reef Plan outlines the process for this decision making.

One concern related to sea turtles is the potential impact of artificial reefs on populations of spider crabs. Kemp’s ridley sea turtles feed primarily on spider crabs. If either spider crabs or sea turtles are attracted to artificial reefs, there is a potential for adverse interactions between the reef structure or materials and these organisms. Conversely, if spider crabs are driven from an area by the presence of a reef, this could have an adverse impact on the turtles. Seals are another concern. Seals may be attracted to reefs in the eastern end of the Peconics because of the proximity to their haul-out areas and because of their attraction to concentrations of finfish. If this happens, there is the potential for adverse interactions between the reef structure and materials or fishermen and these animals. Locations where these interactions might occur have been identified by some researchers and these



sites should be avoided for the placement of artificial reefs, but this information needs to be documented. These potential sites include:

- Orient Harbor;
- Waters off Plum Island and Great Gull Island;
- Waters off Jessups Neck, within three-quarters of a mile around the entire peninsula; and
- Waters off shore from Three Mile Harbor to Accabonac Harbor, including those embayments.

At least one site recommended for reefs in the Peconics is located in a prime feeding area for Kemp's ridley sea turtles (Orient Harbor). Presently, an evaluation for placement of a demonstration reef is proceeding in areas to the east (where there is an unverified wreck) and the west (where there is a known wreck) off Robin's Island. The information developed from this evaluation and others should be used to evaluate potential sites. Sea turtle and marine mammal monitoring is recommended for known wrecks and natural reef areas and where artificial reefs are sited.

### ***Steps***

- HLR-11.1 Evaluate the use of natural reefs, wrecks, artificial reefs, and aquaculture facilities by finfish, sea turtles, diving birds, marine mammals, and other estuarine organisms. Develop recommendations to minimize the impact on resources by these structures.
- HLR-11.2 Determine environmental and habitat criteria (*e.g.*, productivity, etc.) for site selection of different reef structures, and evaluate the potential for the extent of habitat and species displacement and the number of reefs that could be supported in the estuary without causing adverse effects.
- HLR-11.3 Evaluate the potential placement of artificial reefs in known sea turtle and marine mammal feeding areas as part of the siting process outlined in the NYSDEC Artificial Reef Plan.

### ***Responsible Entities***

- HLR-11.1 PEP Natural Resources Subcommittee (lead) (long-term research plan) through contractor
- HLR-11.2 PEP Natural Resources Subcommittee and NYSDEC (co-leads)
- HLR-11.3 NYSDEC (lead); and Towns of East Hampton, Southampton, and Southold



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

**Addresses Habitat and Living Resources Management Objectives 1, 2, 3, 5, 6, 7, and 8.**

Habitat degradation, pollution, overfishing, and improper fishing practices can all lead to depletions of commercial and recreational fish and shellfish populations. Data collection on stocks and harvests, regulation of fishing and shellfish harvesting practices, habitat protection, and pollution prevention are all needed to ensure the sustainable use of these stocks by humans.

### ***Data Collection***

New York is one of 23 partners in the Atlantic Coastal Cooperative Statistics Program. The goal of this program is to cooperatively collect, manage, and disseminate fishery statistical data. Data on commercial fishing are compiled by NMFS. A certain amount of information is also periodically compiled and analyzed by NYSDEC fisheries staff. In fact, new State reporting requirements have been developed which will require commercial fishermen to report on all species caught. As long as this commercial data continues to be collected at the estuary level, this increased information should prove useful for better understanding the volume and distribution of landings for finfish and certain crustacean (lobster) and shellfish (squid) species in the Peconic Estuary. For recreational fishing, there is extensive data on catch, harvest, and discard for New York, but it is not available specific to the Peconics. Better information on both of these types of fishing at the estuary level would enable better understanding and ultimately, better management of the resources.

Fisheries for bait and for shellfish, such as conch, have existed for a long time. Although reliable statistics on most of these species are unavailable, scientific research on a few species indicates that they may be in some danger of being depleted. To ascertain the stocks of bait fish, a multi-gear and temporal study of bait fish populations should be performed on a variety of tributaries, and regulations should be developed to prevent overfishing of these populations. For horseshoe crabs, NYSDEC has collected harvest data informally from lobster fishermen, juvenile anadromous fish seine surveys, and the Peconic Trawl Survey. This information will be collected under the proposed Atlantic Coastal Cooperative Statistical Program and incorporated into the Horseshoe Crab Fishery Management Plan (FMP) (approved in October 1998). Based on the recommendations in the FMP, NYSDEC will develop appropriate regulations for horseshoe crabs. Recently adopted regulations for horseshoe crabs include a 25 percent reduction of current landings coastwide and the recommendation that additional harvest control measures be considered for future reductions.

### ***Regulation and Management***

Overfishing of finfish stocks that are highly desirable has been a concern for decades. Both commercial and recreational fishermen contribute to this problem. Fishery management plans and fishery regulations have been designed to allow for sustainable use of these stocks by humans. State and Federal agencies, including NYSDEC and NMFS, are responsible for developing plans for managing coastal migratory finfish stocks, which are then implemented by individual States. The PEP has recognized the fact that many of the species of finfish taken in the Peconic Estuary System that are commercially and recreationally valuable are migratory in nature and, therefore, cannot be



managed by efforts exclusive to the Peconic Estuary. Regulations on the taking of these fishes are promulgated at the Federal and State level and must be implemented over large areas by the appropriate government entities. Therefore, the best way that the PEP can hope to protect from overfishing the coastal, migratory species of finfish which use the estuary is for all members of the Management Conference, not just the NYSDEC, to support these management plans and regulations. This support would include consistent enforcement of regulations, public education and outreach regarding fishery regulations and management practices, and development of new regulations when necessary to protect the sustainable use of a fishery resource.

New regulations and management practices may be warranted to protect water quality and to protect species in the estuary system from injury, death, and overfishing. Four issues proposed for action include management of fishing gear, implementation of BMPs regarding fish waste, regulations for fish used as bait, horseshoe crabs, and whelks, and identification and regulation of spawner sanctuaries.

Fishing gear can result in permanent injury or death to unintended species. For example, fishing gear which is lost in the estuary may continue to “ghost fish” for a long period of time. Pots, traps, fishing lines, and nets lost during storms or due to cut lines may remain in the water column or on the bottom in a functional form. Finfish and other organisms that are caught by this gear may be permanently injured trying to escape or may not escape and will eventually die. In addition, certain types of gear may be very effective at catching not only the target species but other, non-target species which may be injured or die before the gear is retrieved and they can be released. Regulations and management measures should be implemented that will reduce injury and death to non-target species.

The waste generated by fishermen from cleaning fish is often discarded back into the water in the mistaken belief that, because it is biodegradable and came from the estuary, it is acceptable to return it there. In fact, this material attracts scavengers, both aquatic and terrestrial, and adds to the organic matter already decaying in the sheltered embayments where marinas are usually located. A number of simple practices can be implemented to minimize this problem, including:

- Establishing fish-cleaning areas with proper waste receptacles;
- Developing and implementing rules governing the conduct and location of fish-cleaning stations;
- Implementing fish composting where appropriate; and
- Educating boaters and fishermen regarding the importance of proper fish-cleaning procedures.

Research on hard clams in the Great South Bay of Long Island has indicated that the hydrographic regime associated with certain tributaries provides prime habitat for shellfish reproduction. These areas usually contain concentrations of coliform bacteria introduced from stormwater runoff and are uncertified for shellfish harvesting due to coliform contamination. Because shellfish in these areas are not routinely harvested, the populations are often larger and the reproductive output higher than in other areas of the estuary system. Thus, these areas may be supplying a disproportionate share of larval hard clams to the Great South Bay. It is not clear if there are any areas in the Peconic Estuary system which function similarly. This should be studied because if similar de facto spawner sanctuaries exist in the Peconic Estuary, some harvesting restrictions should be considered, particularly if efforts to improve water quality and reduce pathogen contamination are successful and these areas could be re-opened to shellfishing. Certified areas should also be examined for potential



designations as spawner sanctuaries. Spawner sanctuaries for scallops are viewed by NYSDEC as having more potential to succeed in the Peconic Estuary System.

### ***Habitat Protection and Pollution Prevention***

A variety of habitats are important to different finfish species that use the Peconic Estuary System. A number of coastal migratory species use the system as spawning, nursery, or feeding grounds. These include weakfish, tautog, winter flounder, scup, bluefish, butterfish, and summer flounder. Habitats which are of importance to these species for a variety of reasons include shallow subtidal areas, both vegetated (eelgrass) and unvegetated, deep subtidal areas (sandy and muddy substrate), and intertidal salt marshes (feeding over both vegetated *Spartina* beds and unvegetated flats). These habitats should be identified, protected, and restored to enhance shellfish and fish stocks. Principal threats to these include: physical and chemical impacts from shoreline hardening structures; physical and chemical inputs from runoff; and physical, chemical and biological impacts to eelgrass beds.

### ***Steps***

- HLR-12.1** Collect better statistical data on commercial and recreational fishing landings and by-catch specific to the Peconic Estuary System.  
**Priority**
- HLR-12.2** Identify, protect, and restore key shellfish and finfish spawning, nursery, and feeding habitats in the Peconic Estuary to enhance shellfish and fish stocks and incorporate this data into the on-going Essential Fish Habitat work being conducted under the Atlantic States Marine Fisheries Commission (ASMFC).  
**Priority**
- HLR-12.3** Support the Atlantic Coastal Cooperative Statistics Program.
- HLR-12.4** Support the fishery management plans which have been and are being developed by the Mid-Atlantic Fishery Management Council (MAFMC) and the ASMFC.
- HLR-12.5** Ensure the enforcement of existing regulations on both commercial and recreational fisheries.
- HLR-12.6** Support NMFS Essential Fish Habitat Designations within the Peconic Estuary.
- HLR-12.7** Develop a public education program about the value of fish and fishing and the importance of commercial and recreational fishing regulations and compliance with the regulations.
- HLR-12.8** Support the prevention, or at least minimization, of the effects on finfish and non-target species by lost or incorrectly-designed fishing gear. Measures to be supported include: (1) developing a program to encourage commercial and recreational fishermen to retrieve and properly dispose of fishing line, nets, traps, pots, and other gear; (2) work with the AMI to develop a campaign for dockside recovery and recycling programs; (3) support implementation of fishery regulations requiring escape vents and degradable panels in fish and lobster pots; (4) implementing fishery regulations requiring minimum mesh size for gill, fyke, and otter trawl nets; and (5) promoting the use of fishing gears that minimize by-catch and discard (*e.g.*, pound nets).





- HLR-12.9 Implement CZARA section 6217 BMPs regarding fish waste at marinas and on docks. Develop public education materials for distribution at marinas, bait and tackle shops, and other related businesses detailing these BMPs.
- HLR-12.10 Expand the monitoring and analysis of the NYSDEC finfish trawl survey to the east of Shelter Island and coordinate with PEP Living Resources Research, Monitoring, Assessment Plan.
- HLR-12.11 Examine the role of areas uncertified for shellfishing as “spawner sanctuaries” for shellfish species.
- HLR-12.12 On a biennial cycle, perform deep- and shallow-water shellfish abundance surveys.

### ***Responsible Entities***

- HLR-12.1 NOAA/NMFS and NYSDEC (co-leads)
- HLR-12.2 PEP, NOAA/NMFS, ASMFC, New York Sea Grant Institute, NYSDEC, and local universities and colleges
- HLR-12.3 NMFS, NYSDEC, and PEP (co-leads)
- HLR-12.4 NYSDEC, PEP (co-leads), ASMFC, NMFS, and MAFMC
- HLR-12.5 NYSDEC Division of Law Enforcement (lead), Suffolk County Marine Police, and town bay constables
- HLR-12.6 PEP-MC, NYSDEC, and NMFS.
- HLR-12.7 PEP Public Education and Outreach program (lead), NYSDEC, Sea Grant, CCE - Marine Program, AMI, and marina and fishing business-owners
- HLR-12.8 NMFS, NYSDEC, NYS Sea Grant (co-leads), CCE, AMI, and commercial and recreational fishing community
- HLR-12.9 PEP Public Education and Outreach program (lead), AMI, marina owners, other business owners, NYSDEC, Sea Grant, and CCE - Marine Program
- HLR-12.10 NYSDEC (lead) and PEP Natural Resources Subcommittee
- HLR-12.11 PEP Natural Resources Subcommittee (lead), NYSDEC, and CCE
- HLR-12.12 PEP through contractor



### **HLR-13 Protect Nesting and Feeding Habitat of Shorebirds.**

#### **Addresses Habitat and Living Resources Management Objectives 1, 2, 3, 6, 7, and 8.**

Shorebird nests and chicks on open beaches are vulnerable to disturbance, injury, and death from vehicles, humans, and unleashed dogs, predators such as foxes, crows, raccoons, gulls, and cats, and flooding. However, many of these impacts can be reduced through careful habitat management and public education. For example, research and monitoring has shown that shorebird chicks and eggs are extremely vulnerable to off-road vehicles and noise from motorized watercraft near or within their nesting and feeding habitat. Vehicular disturbance can lead to abandonment of nests, injury or death of eggs and chicks, or reduced ability to feed, leading to malnourishment. Seasonally restricting the use of vehicles and watercraft on or in the vicinity of nesting and feeding shorebirds can aid in the recovery of these species. Therefore, the current county and town practice of selling beach-driving permits may not be compatible with a management goal of protecting critical nesting and feeding habitat of rare shorebirds.

Plovers and terns are so vulnerable to disturbance that they need annual management. Since it is unreasonable to ban the public from beaches, signs and fences should be placed around nesting and feeding habitat to protect the birds during the breeding season. Since the plovers begin nesting in mid to late April, every effort should be made to find and fence each pair's early season nest to ensure a high rate of fledglings before the Fourth of July. Fencing and posting also protects the landowner from a "taking" under the Federal Endangered Species Act. Terns that are protected by New York State need their nesting habitat protected from mid-May to mid-August. Existing state and local programs generally are underfunded and understaffed to carry out the recommended fencing and monitoring.

The USFWS has developed guidelines to manage recreational activities in piping plover breeding habitat. Compliance with these guidelines will assist in the recovery of threatened and endangered species and conservation of other coastal species. Implementing these guidelines will also ensure that violations of Section 9 of the Endangered Species Act are avoided. The guidelines provide a variety of management options intended to prevent mortality, harm, and/or harassment of piping plovers and their eggs due to recreational activities.

Management is best accomplished when the cause for bird mortality is known and qualified with documentation so that the management actions can be targeted to site specific threats. Therefore, intensive monitoring and threat documentation is very important.

#### ***Steps***

- HLR-13.1** Strengthen existing municipal shorebird (terns and plovers) management programs to ensure timely fencing and erection of enclosures, adequate monitoring and reporting, and management of recreation and other activities within nesting and feeding habitat. Implement the 1997 Suffolk County Department of Parks, Recreation and Conservation Piping Plover Protection Program and the NYSDEC Bureau of Wildlife 1998 Action Plan for Piping Plover Conservation in New York.
- Priority**



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- HLR-13.2 Restrict the use of off-road vehicles and small watercraft in shorebird nesting areas during breeding season (April – August).
- HLR-13.3 Consult with the USFWS to comply with Federal guidelines for managing recreational activities in piping plover breeding habitat.
- HLR-13.4 Document threats to nesting shorebirds (plovers and terns) such as off-road vehicles, predation, and recreation, and develop and implement measures that lead to higher productivity and larger nesting populations.

***Responsible Entities***

- HLR-13.1 NYSDEC; Suffolk County Parks Department; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; villages; Trustees; The Nature Conservancy; and USFWS (co-leads)
- HLR-13.2 OPRHP, Suffolk County Parks Department; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; villages; and NYSDEC for DEC-owned properties (co-leads)
- HLR-13.3 Beach managers including Federal (USFWS), State, Suffolk County, towns, and property owners (co-leads)
- HLR-13.4 East End towns and NYSDEC



## **HLR-14 Protect Sea Turtles and Marine Mammals.**

**Addresses Habitat and Living Resources Management Objectives 1, 3, 4, 6, 7, and 8.**

The Kemp's ridley, loggerhead, and green sea turtles use the Peconic Estuary as important developmental habitat when they are juveniles. Leatherback turtles are found to a much lesser extent in the estuary. All of these species of turtles are Federally-listed as either endangered or threatened. Therefore, any activities that kill, injure, or significantly disturb the behavior of these organisms are of concern.

Sea turtles are most frequently sighted in Southold Bay, Orient Harbor, Noyack Bays, the waters from Accabonac Harbor to Napeague Harbor, including the embayments, and the waters off Plum Island, Great Gull Island, Gardiners Island, and Jessup's Neck. Current activities that may directly or indirectly kill, injure, or disturb turtles include boating and dredging. Activities in the system which are not of concern yet, but which have the potential to expand and result in more frequent turtle encounters, are large-scale, intensive aquaculture projects or relatively large-scale, poorly-designed artificial reefs. All the current activities and all proposed activities in these areas should be reviewed with the impact on sea turtles in mind.

Under New York State Environmental Conservation Law Article 11, Section 0107, it is illegal to injure or cause the death of harbor seals. It is also illegal under this law to buy, sell, transport, or have possession of these animals. The law was implemented a number of years ago when the harbor seal was the only species of pinniped found in New York waters. Currently, there are five species of seals that are found in these waters, of which three have become fairly common. In order to protect these species, as well as other marine mammals, such as the bottlenose dolphin and the harbor porpoise, this law should be expanded.

### ***Steps***

- HLR-14.1 Review uses of areas which have been identified as sea turtle and marine mammal feeding areas and consider what restrictions may be necessary to be more protective of these species and their food resources.
- HLR-14.2 Evaluate the expansion of existing laws to ensure that all species of seals as well as other marine mammals are protected from intentional injury or death.
- HLR-14.3 Expand New York State law protecting harbor seals (ECL Article 11, Section 0107) to include all species of seals in NYS marine waters.

### ***Responsible Entities***

- HLR-14.1 NYS agencies (*e.g.*, NYSDEC, NYSDOS, NYS Office of Parks, Recreation and Historic Preservation, NYS Office of General Services) (co-leads), Suffolk County, and Towns
- HLR-14.2 NYS agencies (*e.g.*, NYSDEC, NYSDOS, NYS Office of Parks, Recreation and Historic Preservation, NYS Office of General Services) (co-leads), SCDHS, and towns
- HLR-14.3 New York State Legislature and NYSDEC (co-leads)

**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.****Addresses Habitat and Living Resources Management Objectives 1, 2, 3, 4, 6, 7, and 8.**

Measures are needed to counteract the effects of increasing human populations and development of the lands and waters of the watershed surrounding the estuary. The pressure on the natural system, if not controlled or mitigated, will result in replacement or loss of natural habitats (conversion to lawns and gardens, hardening of the shoreline resulting in lost wetlands, increased siltation and lowered salinity from runoff); increased introduction of toxic chemicals and excess nutrients to surface and ground waters as a result of increases in impervious surface areas and other inputs (pesticides, herbicides, household chemicals, septic systems, fertilizers); and displacement of wildlife (shorebirds, diamondback terrapins, small mammals, indigenous plant communities). With proper planning and management, residents and visitors will be able to continue to use and enjoy the many resources the estuary has to offer for generations to come; the finfishery and shellfishery resources of the estuary can also be sustained and improve as viable economic resources. Otherwise, the estuary risks becoming unproductive ecologically and economically.

***Planning***

Coordinated land use planning and comprehensive planning on a local level can be used to ensure protection of natural resources and habitats from cumulative impacts. A master plan, especially when developed in conjunction with those of other towns, is a powerful tool for managing the way in which an area is developed. The East End of Long Island is under increasing pressure for development. It will require careful planning and uniform implementation to ensure that increases in population do not overwhelm the natural resources that make the East End such a desirable place to live. The development of a master plan in each town and minimization of variances allowed are good measures for achieving such control. Towards this action, the Towns of East Hampton, Southold, and Southampton are in the process of developing Local Waterfront Revitalization Plans. The Villages of Greenport and Sag Harbor have already adopted such plans. These types of plans can be used to address the need for public access and the impacts associated with public demands for open space. Providing well-sited and well-planned public access points protects habitat and meets the public's demand while building a constituency for enhanced protection of natural habitat and species populations. Planning is needed to ensure that access points are coupled with the right kind of space to accommodate different uses: places to fish, places to swim, places close to wildlife habitat for observation, safe places for boating including support facilities, and places to walk along the water. People must be able to enjoy and appreciate a clean estuary for there to be continuing support for further investments to improve water quality and coastal habitats. PEP supports maintaining a balance between the needs and opportunities for public access and the requirements for sustaining living resources.

One local plan that has been used successfully in the estuary is the Harbor Protection Overlay District (HPOD). The Town of East Hampton created the HPOD to address developments on waterfront property. The HPOD imposes restrictions on newly-developed or redeveloped waterfront property. A number of these restrictions are particularly useful in the protection of living resources, such as



requirements that the shoreline be maintained with a natural buffer made up of native vegetation. The PEP encourages other towns to adopt similar planning measures.

Regulations already exist that protect natural resources of the estuary from human impacts (*e.g.*, NYS freshwater and tidal wetland regulations that require minimum setbacks for house and sanitary systems and vegetated buffer zones). Statewide plans are also useful tools for protecting estuary resources. New York has developed a State Coastal Nonpoint Management Plan in response to CZARA Section 6217. This plan addresses all of the categories of nonpoint source pollution which have been identified as being of concern in the Peconic Estuary System and recommends BMPs or management measures for controlling sources of nonpoint pollution in coastal waters. Many of these BMPs are protective of habitat and living resources. The PEP should work with local governments and other agencies to implement BMPs and encourage or require land owners to adopt BMPs.

Another plan that is protective of the Peconic Estuary is the Areawide Contingency Plan for dealing with large oil spills. This plan, which was developed by the U.S. Coast Guard (USCG), in conjunction with other Federal and State agencies, is periodically revised and updated. The review period provides an opportunity for the PEP to contribute information with regard to critical areas and species of concern in the estuary such as waterfowl (ducks and geese), waterbirds (herons, terns, etc.), sea turtles, and marine mammals. In addition, this plan could be a conduit for including PEP stakeholders in clean-up efforts for large spills. At this time, there are no trained wildlife rehabilitators to care for the species most at risk from a large-scale oil spill. In order to be prepared for this contingency, local rehabilitators should be encouraged to take training in handling oiled wildlife. The NYSDEC and USCG could then include them in the clean-up effort for a large spill.

The use of town councils or planning boards for reviewing actions that affect public lands and open space is another tool for minimizing cumulative impacts of development and population growth. Currently, the Town of Southampton has a Conservation Advisory Board; the Towns of East Hampton, Southold, and Shelter Island have Conservation Advisory Councils. State legislation exists which enables towns to increase the status of these councils in order to provide them with a role in reviewing Town Board actions. Any action that may be taken by a Board, which would have an effect on the overall open space of a town, is reviewed by the Conservation Advisory Board and appropriate recommendations are made. Such reviews may provide the Town Board with important information on the impacts of individual actions on the entire inventory of open space and its management in the town.

All of these planning and management efforts will not be successful if they are not conducted in a coordinated manner. One way to ensure that these protection and conservation efforts are implemented in a coordinated manner is to develop a group such as the Protected Lands Council, which has been established for the management of the Pine Barrens. The Council includes all groups that manage the Pine Barrens for preservation and ensure that uses are managed equitably. The Council fosters communication and cooperation among the managers in order to use staff and financial resources more efficiently. It may be possible to expand this group to include the management of lands throughout the Peconic River and estuary watershed. Alternatively, it may be more feasible to establish a similar group for the estuary that includes different entities, since the PEP CCMP and the Pine Barrens Plan have different goals.





### ***Steps***

- HLR-15.1 Priority** Each town should develop a master or comprehensive management plan, coordinated with plans of other towns that increases the level of protection of natural resources and habitats and accounts for cumulative impacts.
- HLR-15.2 Priority** Increase public access to the estuary consistent with other ecosystem objectives.
- HLR-15.3** Develop and implement a Harbor Protection Overlay District such as that developed by the Town of East Hampton and include it in the master plan for each town.
- HLR-15.4** Develop implementation mechanisms for all measures required by Section 6217(g) of CZARA that are applicable to the Peconic Estuary. These measures would include BMPs for the use of natural vegetation, minimization of impervious surfaces, safe and reasonable use of lawn, garden, and household chemicals, and minimization of stormwater runoff. Incorporate these BMPs into the site plan requirements for all newly-developed and redeveloped property, particularly along the shoreline.
- HLR-15.5** Use the Protected Lands Council of the Central Pine Barrens Comprehensive Land Use Plan as a model for developing a similar coalition of public agencies and conservation organizations to address common issues of concern throughout the estuary.
- HLR-15.6** Encourage towns with existing Conservation Advisory Councils or planning staff, to be given the responsibility as Conservation Advisory or Planning Boards to review proposed Town Board actions as they affect public lands and open space concerns.
- HLR-15.7** Review and provide comments to NYSDEC on any revisions to the Statewide Oil Spill Areawide Contingency Plan for the Peconic Estuary relating to waterfowl, marine mammals, and sea turtles and their rehabilitation if oiled. Develop and distribute information on reporting and responding to small-scale spills.
- HLR-15.8** Develop regulations for new marinas or expansion of existing marinas which include the following (from CZARA section 6217): (1) assessment of water quality conditions during and after construction; (2) site and design such that tides and/or currents will aid in the flushing of the site or renew its water regularly; (3) site and design to protect against adverse effects on shellfish resources, wetlands, submerged aquatic vegetation, or other important riparian and aquatic habitat areas as designated by local, State, or Federal governments; (4) designate and enforce no-wake zones and ensure that shoreline areas are stabilized effectively by vegetative means; and (5) require effective stormwater runoff control measures to reduce sediment and toxic inputs.

### ***Responsible Entities***

- HLR-15.1** Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; and NYSDOS (co-leads); EPA, NYSDEC, SCDHS
- HLR-15.2** All Federal, state, and local governmental agencies in the PEP watershed (co-leads); NYSDEC



- HLR-15.3 NYSDOS (lead); Towns of Southampton, Southold, Shelter Island, and Riverhead
- HLR-15.4 NYSDEC, NYSDOS, PEP Education and Outreach Program (co-leads), Suffolk County Soil and Water Conservation District, SCDHS, USDA NRCS, CCE, NY Sea Grant, Peconic BayKeeper, SCDHS
- HLR-15.5 PEP and Pine Barrens Commission and Protected Lands Council (co-leads); Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead; NYSDEC; SCDHS
- HLR-15.6 Towns of East Hampton, Southold, Shelter Island, and Riverhead (co-leads)
- HLR-15.7 PEP Natural Resources Subcommittee in conjunction with the USCG, NYSDEC, USFWS (co-leads); Rehabilitation: local wildlife rehabilitators (licensed); Education: PEP Public Education and Outreach program in conjunction with the USCF, NYSDEC, and USFWS; BMPs: NYSDOS; AMI; Towns of East Hampton, Southampton, Southold, Shelter Island; and Riverhead; and villages
- HLR-15.8 NYSDEC (lead); SCDHS; EPA; PEP; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; AMI; and private marina owners



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

### **Addresses Habitat and Living Resources Management Objectives 1, 2, 3, 5, 6, 7, and 8.**

Although humans have lived around and worked in the Peconic Estuary for thousands of years, a relatively small amount of scientific research has been performed on the living resources of this system. To understand the impacts of humans and their activities on this system, there must be a better understanding of how the estuary functions ecologically. This understanding can only be achieved through a focused research, monitoring, and assessment effort (RM&A).

Monitoring involves the multi-year collection of data on living resources and water quality to understand natural variability of populations over time as well as changes in those populations which result from human influences. Monitoring certain sensitive species or communities as overall indicators of ecosystem health can be a valuable tool in keeping track of conditions which may stress a system. Data from monitoring programs can provide an “early warning” about the declining health of the estuary. Monitoring living resources is needed for the estuary system.

As part of the process of developing this CCMP, the PEP identified and performed a number of priority characterization projects. Many of the important questions about the system could not be answered, however, due to time and funding constraints. The PEP now needs to identify and prioritize all of the remaining research and monitoring needs and develop an RM&A Program. The RM&A Program will define the critical research questions that need to be answered, facilitate coordination among various new and ongoing research, monitoring, and assessment programs, and identify private and public sources of funding. The RM&A Program would outline monitoring needs, agencies, and organizations responsible for conducting monitoring activities, funding sources, and methods for coordination with ongoing programs. The development of integrated water quality and living resource indicators should also be included in the RM&A Program. The PEP sponsored a workshop in 1998 involving scientists and participants of the PEP Management Conference to develop a framework for the RM&A Program.

Topics already identified by the PEP Natural Resources Subcommittee for inclusion in the Program poses questions regarding finfish spawning, larval development, and recruitment to the fishery; population dynamics of the benthic communities of the system; distribution, abundance, and growth, including habitat use and preference, by juvenile and forage fish; and the links among these different components of the food web.

One of the monitoring needs identified by the PEP includes monitoring eelgrass by aerial photographic interpretation, appropriate groundtruthing, periodic mapping, and other surveillance techniques to adequately assess trends in eelgrass distribution, abundance and overall health. Given the recent decline in eelgrass beds over the last decade, a long-term commitment to eelgrass monitoring is essential to provide adequate management, preservation, and restoration measures.



Additional research, monitoring, and assessment needs identified by the PEP include the following:

- 1) impacts of macroalgae and toxic contaminants on eelgrass distribution and abundance;
- 2) distribution, abundance, habitat preferences, and life stage requirements of forage fish species, horseshoe crabs, slipper shells, bay scallops and hard clams;
- 3) critical spawning habitats for local populations of winter flounder;
- 4) basic food web ecology;
- 5) benthic habitat mapping;
- 6) assessing and monitoring the impacts of shoreline hardening on habitat and living resources; and,
- 7) effects of sea level rise on saltmarsh distributions and shallow water habitats.

Information sharing, coordination of research and monitoring efforts, and funding and incentives for increased research and monitoring are needed to ensure that research, monitoring, and assessment activities within the Peconic Estuary System are successful.

Dissemination of research and monitoring information is essential to evaluate progress made in restoration and conservation efforts and develop improved methods for research, monitoring, and stewardship of our important natural resources. A biennial conference would provide an opportunity for scientists to meet together with managers and the public to review and discuss findings. By creating an accessible database of natural resources, data would be available in a standard, meaningful format that could be used by managers, researchers, and stewards of the Peconic Estuary.

Although the Peconic Bays are an excellent estuarine laboratory for basic and applied research by universities (*e.g.*, SUNY Stony Brook), colleges (*e.g.*, LIU-Southampton College), institutions (*e.g.*, Brookhaven National Laboratory), and public and private schools, very little basic and applied research takes place here. Necessary incentives to encourage researchers to focus their scientific inquiries here need to be identified, developed, and promoted. Establishing a research center/scientific platform and targeting funding are two incentives which can support cutting edge marine research and monitoring.

Other National Estuary Programs have embarked on research projects, which have resulted in significant findings about marine systems that are applicable to many estuaries. The PEP should participate in coordinated research and information exchange with other National Estuary Programs.

### ***Steps***

- HLR-16.1** Develop and implement a research program for the Peconic Estuary and its watershed to investigate natural processes, impairments, and links to water quality, maintenance of systems and species, and effects of recreation and pollution on biodiversity, among other research needs. Investigate and seek funding sources for supporting implementation of the program (*e.g.*, National Estuarine Research Reserve Systems)
- Priority**



- HLR-16.2 Priority** Develop a long-term program for monitoring and assessment of living resources in the Peconic Estuary that is coordinated with the development of a research plan and ongoing research and monitoring efforts.
- HLR-16.3 Support research on the interactions between eelgrass and the dominant macroalgae species in the Peconic Estuary to determine impacts of macroalgae on eelgrass distribution and abundance.
- HLR-16.4 Perform research and monitoring of forage fish species, horseshoe crabs, and conch in the Peconic Estuary to understand their distribution (temporal and spatial), abundance, habitat preferences, and different life stage requirements to develop management strategies.
- HLR-16.5 Perform research on the ecology of food sources of sea turtles to evaluate the importance of the Peconic Estuary to them and potential threats to these endangered and threatened species.
- HLR-16.6 Research the lethal, sublethal, and synergistic effects of elevated nutrients, toxic chemicals, and Brown Tide on the reproduction and behavior of finfish and invertebrate species.
- HLR-16.7 Determine the effects of navigational dredging on shallow water communities and the recovery time of benthic communities exposed to dredging.
- HLR-16.8 Ensure implementation of adequate mapping and monitoring programs to track trends in the extent and quality of eelgrass, and to evaluate progress towards reaching restoration goals.
- HLR-16.9 Establish a scientific panel to review research, monitoring, and assessment data, and to offer guidance in management of the habitats and living resources in the Peconics.
- HLR-16.10 Organize an annual or biennial conference to report research, monitoring, and assessment results to the public and guide management decisions.
- HLR-16.11 Establish and maintain an accessible database of natural resources in the Peconic Estuary.
- HLR-16.12 Promote research and monitoring opportunities in the Peconic Estuary to local schools, colleges, universities, and institutes by establishing funding and scientific platforms and other incentives to facilitate basic and applied marine research.
- HLR-16.13 Seek opportunities to link research and monitoring in the Peconic Estuary System to related estuaries and regional studies.
- HLR-16.14 Support priorities listed in the Living Resources Research, Monitoring, and Assessment Plan including research on ecosystem productivity and ecosystem structure, bioindicators, and effects of global climate change on wetlands.



### ***Responsible Entities***

- HLR-16.1 Plan development and coordination: PEP Natural Resources Subcommittee and the Marine Conservation Planner (co-leads) in consultation with other members of the PEP Management Conference and technical experts; Plan implementation: PEP Management Conference, NYSDEC, NYSDOS, New York Sea Grant Institute, and SCDHS (co-leads)
- HLR-16.2 Monitoring plan: PEP Natural Resources Subcommittee and Marine Conservation Planner (co-leads) in conjunction with NYSDEC; SCDHS; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; Plan implementation: PEP in conjunction with NYSDEC (co-leads); SCDHS; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; Cornell Cooperative Extension; local universities and colleges; and NY Sea Grant
- HLR-16.3 Plan development: PEP Natural Resources Subcommittee and the Marine Conservation Planner (co-leads) in consultation with other members of the PEP Management Conference and technical experts; Plan implementation: PEP Management Conference, NYSDEC, NYSDOS, New York Sea Grant Institute, and SCDHS (co-leads)
- HLR-16.4 PEP Natural Resources Subcommittee, NYSDEC, Marine Conservation Planner (co-leads), and technical experts through the PEP long-term research plan
- HLR-16.5 PEP Natural Resources Subcommittee (lead) and technical experts through the PEP long-term research plan
- HLR-16.6 PEP Natural Resources Subcommittee (lead) and technical experts through the PEP long-term research plan, NY Sea Grant
- HLR-16.7 PEP Natural Resources Subcommittee (lead) and technical experts to define specific research questions, USACE, SCDPW, and NYSDEC
- HLR-16.8 PEP Natural Resources Subcommittee (lead) and PEP Management Council (co-leads)
- HLR-16.9 PEP Natural Resources Subcommittee (lead)
- HLR-16.10 PEP Natural Resources Subcommittee in conjunction with EPA, NYSDEC (co-leads), SCDHS, and local universities and colleges
- HLR-16.11 PEP Natural Resources Subcommittee (lead)
- HLR-16.12 PEP, NY Sea Grant, EPA (co-leads), NOAA, NYS Marine Educators Association (MEA), and Cornell Cooperative Extension - Marine Program
- HLR-16.13 Association of NEPs, EPA, PEP (co-leads), NY Sea Grant, and NOAA
- HLR-16.14 PEP Natural Resources Subcommittee



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

**Addresses Habitat and Living Resources Management Objectives 1, 2, 3, 4, and 8.**

Grazer and filter-feeding organisms, such as zooplankton, clams, scallops, menhaden, and sponges, are vital to the estuary ecosystem. Filter feeders, particularly shellfish, filter large volumes of bay water over relatively short time periods. They can affect water quality and exert significant influence on the size, type, and abundance of phytoplankton. Conversely, changes in phytoplankton species composition can affect the diversity and abundance of grazers and filter-feeders. For example, preliminary Brown Tide research findings by Caron and Lonsdale have resulted in a working hypothesis that reduced shellfish populations prior to the first Brown Tide in the Peconics may have led to significant reduction in grazing pressure on phytoplankton, thereby allowing the onset of Brown Tide. Brown Tide, changes in the nutrient regime, and harvesting of shellfish and finfish can shift the abundance, diversity, and temporal and spatial distribution of grazers and filter-feeders. Understanding the food web dynamics and “top-down” control of productivity can therefore, be equally important to the management of the Peconic Estuary as that of nutrient cycling (“bottom-up”). A working group is needed to examine these issues more closely and evaluate the relationship between filter-feeders and water quality, as well as to link other PEP efforts and to identify potential management applications.

The work group should include Brown Tide researchers, shellfish and fishery scientists, marine ecologists, baymen, aquaculturists, water quality modelers, resource managers and regulators.

**Issues:**

- 1) Understanding the relationship of grazer and filter-feeder diversity and abundance with phytoplankton diversity and abundance;
- 2) How to enhance shellfish and finfish stocks to accommodate harvesting while also maintaining sufficient populations that are adequate to fulfill ecological functions; and
- 3) Need for collaboration between related Peconic Estuary efforts, such as the Brown Tide Research Initiative (BTRI), water quality modeling, estuary-wide aquaculture plan work group, and finfish monitoring.

***Steps***

HLR-17.1 Review appropriate scientific literature, identify information gaps, and develop research recommendations regarding how shellfish, finfish and other “top-down” predators influence water quality and the planktonic community.

HLR-17.2 Develop research, monitoring, and assessment needs for quantifying food web dynamics.

HLR-17.3 Develop food web sub-models to be included in the nutrient model to evaluate the sensitivity of productivity to anthropogenic changes in nutrient supply.





- HLR-17.4 Consult with the BTRI and the estuary-wide aquaculture plan work group to develop management recommendations for “top-down” regulation of water quality and Brown Tide in the Peconic Estuary.
- HLR-17.5 Facilitate communication among BTRI, water quality managers and the estuary-wide aquaculture plan work group.

### ***Responsible Entities***

- HLR-17.1 PEP Natural Resources Subcommittee (lead) through contractor
- HLR-17.2 PEP Natural Resources Subcommittee (lead) and marine conservation planner
- HLR-17.3 PEP Natural Resources Subcommittee through contractor (lead) in consultation with other members of the PEP Management Conference and technical experts
- HLR-17.4 PEP Natural Resources Subcommittee (lead) in consultation with other members of the PEP Management Conference and technical experts; NYSDEC, NYSDOS, New York Sea Grant Institute, SCDHS, BTRI researchers, SUNY Stony Brook, Cornell, and commercial aquaculture facilities in the Peconics
- HLR-17.5 PEP Natural Resources Subcommittee (lead) in consultation with other members of the PEP Management Conference and technical experts; NYSDEC, NYSDOS, New York Sea Grant Institute, SCDHS, BTRI researchers, SUNY Stony Brook, Cornell, and commercial aquaculture facilities in the Peconics

## **BENEFITS OF THE MANAGEMENT ACTIONS**

Implementation of these management actions will greatly benefit the Peconic Estuary by protecting rare and endangered species, enhancing ecological communities throughout the system, restoring degraded habitats to increase biodiversity, protecting high quality areas where there are concentrations of exemplary examples of natural communities, improving our understanding and assessment of impacts on natural resources, and providing sustainable commercial and recreational fisheries. These management recommendations also include important actions that can be taken to mitigate stress by minimizing impacts to living resources and habitats crucial to their survival.

The estuary is on the brink of being seriously impacted by overuse. By setting management actions that foster commercial and recreational use that is sustainable and compatible with protection of biodiversity, stakeholders can ensure an important balance between preservation and the wise use of the bays' natural resources. EAI's Economic Value Assessment and Finance Plan may contain quantifiable benefits to highlight these claims.



## COSTS OF THE MANAGEMENT ACTIONS

The individual cost for each management action is provided in **Table 4-1**.

The total cost of all new actions proposed for the Habitat and Living Resources management in this chapter is \$9,088,750 in one-time costs and \$1,881,250 annually. (See “Action Costs” in **Chapter 1** for an explanation of how these costs were determined.)

## HABITAT AND LIVING RESOURCES ACTIONS SUMMARY TABLE

**Table 4-1** provides the following summary information about each of the actions presented in this chapter. Priority Habitat and Living Resources steps are also identified in the table. These priorities were decided by the PEP Natural Resources Subcommittee.

### *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.

**Table 4-1. Habitat and Living Resources Management Plan Actions.**

Action		Responsible Entity	Timeframe	Cost	Status
<b>HLR-1</b>	<b>Use Critical Natural Resource Areas (CNRAS) to Develop and Implement Management Strategies to Protect High Quality Habitats and Concentrations of Species of Special Emphasis. (<i>Objectives 1, 2, 3, 6, 7, and 8</i>)</b>				
<b>HLR-1.1 Priority</b>	Collect and interpret natural resource, water quality, and land use data sets. Use GIS technology to finalize a comprehensive inventory of species, natural communities and water quality, refine maps (including development of maps of each CNRA), and evaluate individual and cumulative threats within each CNRA.	NYSDEC, The Nature Conservancy (co-leads) with towns and USFWS assistance	Post-CCMP	\$150,000 for contractor assistance NYSDEC – 1.0 FTE TNC – 1.0 FTE Towns – 0.1 FTE USFWS – 0.2 FTE	R
<b>HLR-1.2 Priority</b>	Finalize CNRA boundaries and adopt CNRAs by appropriate levels of government.	NYSDEC; The Nature Conservancy (co-leads); PEP Natural Resources Subcommittee; Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead, and Brookhaven; NYSDEC; OPRHP; Suffolk County Parks Department; USFWS; NYSDOS	Post-CCMP	NYSDEC – 0.3 FTE SCDHS – 0.3 FTE PEP – 0.3 FTE TNC – 0.3 FTE USFWS – 0.3 FTE Towns – 0.2 FTE each SC Parks – 0.3 FTE	R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

<b>Action</b>		<b>Responsible Entity</b>	<b>Timeframe</b>	<b>Cost</b>	<b>Status</b>
<b>HLR-1.3 Priority</b>	Develop management recommendations and plans to protect CNRAs in each town in coordination with existing Federal, State, county, and municipal programs that address individual and potential cumulative impacts including but not limited to docks, shoreline stabilization structures, dredging, marinas, artificial reefs, fish farms, shellfish culture, fishing, pesticides, golf courses, motorized personal watercraft, swimming pools, sewage treatment and disposal, building and adjacent upland development, and clearing of vegetation.	NYSDEC, The Nature Conservancy (co-leads) to assist local governments in coordination with PEP Management Conference, EPA, SCDHS	Post-Completion of HLR-1.1 and HLR-1.2	EPA – 0.05 FTE NYSDEC – 0.9 FTE SCDHS – 0.5 FTE TNC – 0.5 FTE Towns – 1.0 FTE each	R
<b>HLR-1.4 Priority</b>	Protect the CNRAs through land acquisition and other protection tools ( <i>e.g.</i> , clearing restrictions, setback requirements, zoning, Transfer of Development Rights) principally within the areas themselves and including essential watershed buffers (see <b>Chapter 7</b> ).	NYSDEC; NYS Office of Parks, Recreation and Historic Preservation; Suffolk County Planning Department; Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead, and Brookhaven	Ongoing	(Significant funding has been allocated for acquisition estuary-wide. See <b>Chapters 7 and 9</b> .)	C/O

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

Action		Responsible Entity	Timeframe	Cost	Status
HLR-1.5	Prohibit the installation of new shoreline hardening structures within CNRAs. Investigate ecologically enhancing, innovative designs to replace or use as an alternative to hard structures.	Prohibit installation: Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead, villages, NYSDEC; Investigate new designs: NYSDEC, TNC, EPA, SCDHS, Peconic BayKeeper	Subsequent to completion of HLR-1.2	Prohibit installation: Base Program; Investigate new designs: \$50,000 EPA – 0.1 FTE NYSDEC – 0.8 FTE SCDHS – 0.5 FTE TNC – 0.5 FTE Towns – 0.5 FTE each Peconic BayKeeper – 0.2 FTE	R
HLR-1.6	Coordinate PEP recommendations for CNRAs with the NYSDOS Significant Coastal Fish and Wildlife Habitat Program and Local Waterfront Revitalization Plan Programs.	NYSDOS (lead), NYSDEC, PEP Natural Resources Subcommittee	Fall 1999	NYSDEC – 0.1 FTE PEP – 0.1 FTE NYSDOS – 0.2 FTE	C/O
HLR-1.7	Encourage increased use of the NYSDOS Significant Coastal Fish and Wildlife Habitat Program guidelines by appropriate Federal, State, county, and municipal agencies.	NYSDOS (lead), NYSDEC, Towns, USACE, USFWS, NMFS	Ongoing	NYSDOS – 0.2 FTE NYSDEC – 0.1 FTE	C/O
HLR-1.8	Examine the possibility of establishing marine reserves ( <i>e.g.</i> , protect eelgrass beds) within the CNRAs.	PEP Natural Resources Subcommittee, EPA, NYSDEC, SCDHS	Post-CCMP	EPA – 0.05 FTE NYSDEC – 0.05 FTE SCDHS – 0.05 FTE PEP – 0.05 FTE	R
HLR-1.9	Discourage expansion of existing marinas and the creation of new ones within the PEP CNRAs. The marina expansion and creation issue will be further evaluated as part of a comprehensive strategy dealing with shoreline hardening, marinas, docks, and public access (see HLR-1.3).	Contingent upon adoption of CNRAs (see HLR-1.2)	Post- completion of HLR-1.2	Base Program	R

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Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)

Action		Responsible Entity	Timeframe	Cost	Status
<b>HLR-2</b>	<b>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. (Objectives 1, 3, 4, 6, 7, and 8)</b>				
<b>HLR-2.1 Priority</b>	Quantify and map all hardened shoreline, docks and piers, and flow-restriction structures in the Peconic Estuary and assess the overall impacts of stabilization structures on natural resources. Develop recommendations to promote alternative shoreline management and incentives for maintaining and restoring natural shorelines.	Contract with Cornell and USFWS  Develop recommendations: NYSDEC, EPA, SCDHS, NYSDOS, Towns	Due: Spring 2001 Post-CCMP	(\$65,000 NEP funds allocated)  Develop recommendations: NYSDEC – 0.2 FTE EPA – 0.1 FTE SCDHS – 0.1 FTE NYSDOS – 0.2 FTE Towns – 0.1 FTE each	C/O  R
<b>HLR-2.2</b>	Review existing regulations for shoreline hardening structures at all levels of government, encourage consistent policies and strengthen regulations where appropriate.	PEP-Natural Resources subcommittee through contractor	Post-CCMP	\$50,000	R
<b>HLR-2.3 Priority</b>	Establish and enforce a policy of “no net increase” of hardened shoreline in the Peconic Estuary and, if possible, a net decrease in hardened shoreline. Use HLR-1 and HLR-2 as a mechanism to establish this strategy.	PEP Management Conference (lead); NYSDEC; Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead; villages; NYSDOS; USACE; PEP, SCDHS, EPA	Post-CCMP	Establishing the policy could be done with Base program funds but implementation of such a policy could be substantial EPA – 0.3 FTE NYSDEC – 0.3 FTE SCDHS – 0.3 FTE PEP – 0.3 FTE Towns – 0.3 FTE NYSDOS – 0.3 FTE	R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

<b>Action</b>		<b>Responsible Entity</b>	<b>Timeframe</b>	<b>Cost</b>	<b>Status</b>
<b>HLR-2.4 Priority</b>	Develop a variety of financial incentives and programs to encourage property owners to remove or modify hardened shoreline structures and replace them with natural vegetation and other vegetated (bioengineered) alternatives to restore the natural shoreline of the estuary.	Peconic BayKeeper (lead); Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead; villages; HRWG; NYSDEC; SCDHS; PEP	Post-CCMP	NYSDEC – 0.1 FTE SCDHS – 0.1 FTE PEP – 0.1 FTE Towns – 0.2 FTE each Peconic BayKeeper – 0.3 FTE	R
<b>HLR-3</b>	<b>Assess the Impacts of Dredging Activities on Habitat and Natural Resources and Develop Recommendations and Guidelines for Reducing those Impacts. (<i>Objectives 1, 2, 3, 6, and 7</i>)</b>				
<b>HLR-3.1 Priority</b>	Hold a “Dredging Summit” for the Peconic Estuary System to address specific concerns ( <i>i.e.</i> , impacts on shorebird nesting, demersal fish eggs, benthic communities, and the potential release of contaminants) and develop dredging guidance on an embayment-specific basis and for identified CNRAs. Integrate dredging guidance into existing regulatory programs.	NYSDEC (lead) through contractor; USACE; NYSDOS; SCDPW; EPA; SCDHS; Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead; other interested stakeholders	Post- CCMP	Dredging Summit: \$15,000 Develop Guidance: NYSDEC – 0.4 FTE NYSDOS – 0.2 FTE SCDHS – 0.2 FTE EPA – 0.1 FTE	R R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

<b>Action</b>		<b>Responsible Entity</b>	<b>Timeframe</b>	<b>Cost</b>	<b>Status</b>
<b>HLR-3.2 Priority</b>	Assess navigational dredging in tidal creeks and embayments (utilizing Suffolk County's Generic Environmental Impact Statement) for damages or impacts to eelgrass beds and other habitats and develop permit conditions to minimize impacts that potentially could result in habitat loss and degradation. Determine if navigational dredging locally impairs water quality to the point of precluding restoration of eelgrass.	PEP through contractor, NYSDEC, DOS, SCDHS	Post-CCMP	Assessment: \$50,000 Determination: NYSDEC – 0.2 FTE NYSDOS – 0.2 FTE SCDHS – 0.2 FTE	R R
<b>HLR-3.3</b>	Determine the need for frequency of maintenance dredging and develop recommendations to reduce runoff and erosion in creeks to reduce the need for maintenance dredging.	Frequency of dredging: SCDPW (lead); Runoff recommendations: NYSDEC, NYSDOS (co-leads); PEP, SCDHS	Post-CCMP	Frequency of dredging: Base Program Runoff recommendation: NYSDEC – 0.1 FTE SCDHS – 0.1 FTE PEP – 0.2 FTE	R R

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Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)

Action		Responsible Entity	Timeframe	Cost	Status
<b>HLR-4</b>	<b>Examine and Promote Methods of Shellfish Harvesting that are Most Compatible with Establishment and Growth of Eelgrass Beds and Vegetated Salt Marshes. (<i>Objectives 1, 3, 5, 6, and 8</i>)</b>				
HLR-4.1	Examine methods of harvesting clams, scallops, and other shellfish and determine which are most compatible with eelgrass establishment and growth. Develop recommendations for harvesting methods, frequency, and timing which will allow recovery of eelgrass throughout the estuary and enhance shellfish productivity.	NYSDEC (lead) through contract	Post-CCMP	\$50,000 for contractor support  NYSDEC – 0.3 FTE	R
HLR-4.2	Discourage harvesting of shellfish at the edge of vegetated salt marshes and encourage the use of methods that minimize impacts to vegetated habitats.	NYSDEC (lead); Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead; PEP Public Education and Outreach program; shellfishermen	Post-CCMP	Base program and \$10,000 for education and outreach  NYSDEC – 0.2 FTE PEP – 0.2 FTE	R
<b>HLR-5</b>	<b>Implement, Enforce, and Encourage the Continuation of Current Policies and Regulations Protective of Wetlands. (<i>Objectives 1, 2, 3, 4, 6, and 7</i>)</b>				
HLR-5.1	Ensure continued protection of freshwater and tidal wetlands through the implementation and enforcement of current regulations under the Federal Clean Water Act and the State Wetlands Protection Programs, local government regulations and local land use practices.	NYSDEC (lead), ACOE, East End Towns	Ongoing	Base program  Enhance existing programs  NYSDEC – 2.0 FTE/yr	C/O  R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

Action		Responsible Entity	Timeframe	Cost	Status
HLR-5.2	Review existing tidal wetlands protection policies to determine if they provide for maintenance of tidal wetlands with respect to future sea-level rise.	PEP — Natural Resources Subcommittee through contractor	Post-CCMP	\$25,000	R
HLR-5.3	Maintain and enforce the policy of creating no new mosquito ditches in tidal wetlands and establish a policy for not re-opening ditches that have filled-in by natural processes.	SCVC (lead), NYSDEC, EPA, SCDHS, NYSDOS, East End Towns	Ongoing	EPA – 0.1 FTE NYSDEC – 0.2 FTE SCDHS – 0.2 FTE PEP – 0.2 FTE SCVC – 0.3 FTE Towns – 0.1 FTE each	C/O
HLR-5.4	Ensure that SCVC works cooperatively with all government agencies, East End towns and local conservation organizations in the planning of wetland mosquito ditch maintenance and pesticide spraying.	SCVC (lead), SCDHS, NYSDOS, EPA, NYSDEC, East End Towns	Post-CCMP	EPA – 0.1 FTE NYSDEC – 0.1 FTE SCDHS – 0.1 FTE PEP – 0.1 FTE SCVC – 0.1 FTE	R
<b>HLR-6</b>	<b>Evaluate the Effectiveness of Current Policies in Preserving Eelgrass Habitat and Develop Ways to Provide Increased Protection for all Extant Eelgrass. (<i>Objectives 1, 2, 3, 5, 6, and 8</i>)</b>				
HLR-6.1 <b>Priority</b>	Evaluate the effectiveness of current policies in preserving eelgrass habitat and develop ways to provide increased protection for all extant eelgrass.	NYSDEC (lead) through contract	Ongoing	\$25,000	R
HLR-6.2	Monitor and protect extant eelgrass ( <i>Zostera marina</i> ) beds, and restore degraded eelgrass beds.	NYSDEC, (lead), Cornell Cooperative Extension, PEP-Natural Resources Subcommittee PEP-HRWG	Ongoing	(Monitor: \$75,000 biennially, included in Environmental Monitoring Plan.) Protect and Restore: to be determined	C/O  R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

<b>Action</b>		<b>Responsible Entity</b>	<b>Timeframe</b>	<b>Cost</b>	<b>Status</b>
HLR-6.3	Evaluate anchor dragging, propeller scarring, dredging and other known impacts to extant eelgrass beds in the Peconic Estuary and develop recommendations to reduce them.	NYSDEC, Habitat Restoration Workgroup (co-leads) through contract	Post-CCMP	Evaluation through contractor: \$50,000  Develop recommendations: NYSDEC – 0.2 FTE	R
HLR-6.4	Hold a workshop to evaluate the factors that regulate the health and extent of eelgrass beds in the Peconic Estuary and develop management recommendations based on these findings.	NYSDEC, PEP-NRSC, PEP HRWG (co-leads)	Post-CCMP	Workshop costs: \$10,000  Develop recommendations: NYSDEC – 0.4 FTE	R  R
<b>HLR-7</b>	<b>Develop and Implement an Estuary-Wide Habitat Restoration Plan (HRP). (Objectives 1, 2, 4, and 7)</b>				
<b>HLR-7.1 Priority</b>	Develop and implement an estuary-wide Habitat Restoration Plan (HRP).	PEP HRWG (lead)	Initiate in Fall 1998, complete in 2001	Costs for implementation in PEP Habitat Restoration Plan NYSDEC – 0.1 FTE/yr SCDHS – 0.1 FTE/yr PEP – 0.1 FTE/yr Towns – 0.1 FTE each/yr Cornell – 0.2 FTE/yr NYSDOS – 0.2 FTE/yr	C/O
HLR-7.2	Identify and list priority habitat types for the HRP.	PEP HRWG (lead)	Completed	Included in HLR-7.1	C/O
<b>HLR-7.3 Priority</b>	Inventory and prioritize a list of restoration projects for which planning is underway and recommend these for "fast-tracking" towards Bond Act funding.	NYSDOS (lead), NYSDEC, PEP HRWG	Annually, prior to Spring announcement of available funds	Included in HLR-7.1	C/O
HLR-7.4	Inventory and list restoration opportunities in the PEP area and estimate costs.	PEP HRWG (lead), East End Towns	Completed	Included in HLR-7.1	C/O

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

Action		Responsible Entity	Timeframe	Cost	Status
HLR-7.5	Develop and include in the HRP criteria for selection of restoration sites.	PEP HRWG (lead)	Completed	Included in HLR-7.1	C/O
HLR-7.6	Inventory and list completed, ongoing, and proposed restoration projects for inclusion in the HRP. Include all restoration sites on GIS maps.	PEP HRWG (lead)	Completed	Included in HLR-7.1	C/O
HLR-7.7	Develop and include in the HRP a list of funding sources available for habitat restoration in the PEP area.	PEP HRWG (lead)	Completed	Included in HLR-7.1	C/O
HLR-7.8	Develop model guidelines for habitat restoration planning for use by municipalities in applying for EPF monies.	NYSDOS, NYSDEC (co-leads), PEP HRWG, EPA, Towns, CCE	2001	EPA – 0.1 FTE PEP – 0.1 FTE Towns – 0.1 FTE each Cornell – 0.2 FTE NYSDOS – 0.2 FTE	C/N
<b>HLR-8</b>	<b>Develop and Implement Specific Restoration Projects. (<i>Objectives 1, 3, 4, 6, 7, and 8</i>)</b>				
HLR-8.1	Encourage cooperation among governmental agencies to plan and Implement Open Marsh Water Management (OMWM) to manage tidal wetlands with grid ditches for mosquito control with the goal of also restoring more natural conditions.	Cornell Cooperative Extension, SCVC, USFWS, East Hampton Department of Natural Resources, NYSDEC (co-leads), PEP	Post-CCMP	NYSDEC – 0.1 FTE PEP – 0.1 FTE Cornell – 0.3 FTE SCVC – 0.3 FTE USFWS – 0.3 FTE Towns – 0.2 FTE each	R

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Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)

Action		Responsible Entity	Timeframe	Cost	Status
HLR-8.2	Develop recommendations in the PEP Habitat Restoration Plan for control of <i>Phragmites australis</i> by restoration of natural processes such as removal or modification of flow-restriction devices, removal of hardened shorelines, and revegetation of bay and creek shorelines or by other means.	PEP HRWG (lead) through contractor	2001	Base Program and \$10,000 for contractor	C
HLR-8.3 Priority	Develop a quantitative goal for eelgrass restoration based on ongoing monitoring and mapping efforts.	PEP HRWG (lead), NYSDEC, SCDHS, CCE, DOS, Towns	2001	NYSDEC – 0.05 FTE SCDHS – 0.05 FTE PEP – 0.1 FTE Towns – 0.05 FTE each Cornell – 0.2 FTE NYSDOS – 0.2 FTE	C/N
HLR-8.4	Identify and prioritize locations where restoration of eelgrass is most feasible based on water quality and environmental criteria which are being developed for eelgrass in the Peconic Estuary System and elsewhere in its range.	PEP HRWG (lead), PEP, NYSDEC, NYSDOS	2001	Included in HLR-8.3	C/N
HLR-8.5	Develop and/or utilize cooperative programs with the public for simple, local habitat improvements and enhancements.	PEP HRWG (lead), NY Sea Grant, Cornell Cooperative Extension	Post-CCMP	\$25,000 per year	R
<b>HLR-9</b>	<b>Monitor and Evaluate the Success of Restoration Efforts. (Objective 8)</b>				
HLR-9.1	Develop and implement procedures to track and evaluate restoration efforts using success criteria and monitoring protocols in the PEP area.	PEP HRWG (lead)	Post-CCMP	HRWG – 0.2 FTE	R

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Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)

Action		Responsible Entity	Timeframe	Cost	Status
HLR-9.2	Develop procedures for the management and storage of habitat restoration project and monitoring information for the Peconic Estuary.	PEP HRWG (lead), PEP		HRWG – 0.2 FTE	R
HLR-9.3	Identify a regional set of reference sites to assist in habitat restoration evaluation and monitoring and provide a framework for long-term habitat and living resources research and monitoring.	PEP HRWG, PEP Natural Resources Subcommittee	2001	Included in HLR-8.3	C/N
<b>HLR-10</b>	<b>Develop an Aquaculture Plan for the Peconic Estuary. (Objectives 1,2, 5, 6, 7, and 8)</b>				
HLR-10.1 <b>Priority</b>	Assist in the development and implementation of an estuary-wide aquaculture plan. Include criteria regarding scale, location, assessment, monitoring, and methodologies of shellfish and finfish aquaculture which would be ecologically beneficial and would help sustain aquaculture as a beneficial estuarine use when performed in a manner that is sensitive to the natural conditions, productivity and ecology of the Peconic Estuary.	Organize workshop: Suffolk County Planning Department; SCDHS (co-leads); NYSDEC; PEP– Natural Resources Subcommittee; NYSDOS; NY Sea Grant; NY SOGS; USACE; EPA; NOAA/NMFS; Suffolk County; Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead; villages; Cornell Cooperative Extension; fish farmers; other groups and individuals interested in aquaculture; Aquaculture Plan: Suffolk County with input from PEP and other stakeholders (NYSDEC, Long Island Sound Study, New York-New Jersey Harbor Estuary Program)	Post-CCMP Plan: within one year of workshop	Workshop: \$5,000 Plan: EPA – 0.2 FTE NYSDEC – 1.0 FTE S.C. – 1.0 FTE	R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

<b>Action</b>		<b>Responsible Entity</b>	<b>Timeframe</b>	<b>Cost</b>	<b>Status</b>
HLR-10.2	Identify suitable areas for shellfish and finfish aquaculture activities that are compatible with the water quality and habitat protection objectives in the CCMP to ensure that a balance is maintained between cultivated and wild stocks and include in the estuary-wide aquaculture plan.	Suffolk County Planning Department, SCDHS, NYSDEC (co-leads), NYSDOS, USACE, USFWS, PEP-Natural Resources Subcommittee	Post-CCMP	\$500,000 for a survey  Enhance existing programs: NYSDEC – 0.5 FTE/yr SCDHS – 0.5 FTE/yr	R  R
HLR-10.3	Investigate the need to require monitoring of imported cultured organisms and intrastate transplant of shellfish for disease and parasites and determine if a requirement should be established to certify that they are disease free.	Monitoring assessment: NYSDEC (lead); Disease and parasite screening: PEP; NYSDEC; NYSDOS; NYSOGS; USACE; EPA; NOAA/NMFS; Suffolk County, Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead; villages, Cornell Cooperative Extension; other groups and individuals interested in aquaculture (co-leads)	Post-CCMP	\$50,000 per year  Enhance existing programs: NYSDEC – 1.0 FTE/yr	R  R
HLR-10.4	Continue to support the prohibition of commercial culture or introduction of non-indigenous species in New York's waters and require that all aquaculture operations in the estuary use indigenous genotypes.	NYSDEC (lead) to implement legislation, NYS legislature	Ongoing	Base Program  Enhance existing programs: NYSDEC – 1.0 FTE/yr	C/O  R

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Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)

Action		Responsible Entity	Timeframe	Cost	Status
HLR-10.5	Develop water quality and natural resource monitoring protocols for existing and future shellfish and finfish aquaculture projects.	SCDHS, NYSDEC (co-leads), USACE, NYSDOS, NYSOGS, USFWS, PEP, NOAA, fish farmers (permittees)	Post-CCMP	Enhance existing programs: NYSDEC – 1.0 FTE SCDHS – 1.0 FTE	R
<b>HLR-11</b>	<b>Determine the suitability of Artificial Reefs in the Peconic Estuary. (Objectives 1, 3, 4, 6, and 8)</b>				
HLR-11.1	Evaluate the use of natural reefs, wrecks, artificial reefs, and aquaculture facilities by finfish, sea turtles, diving birds, marine mammals, and other estuarine organisms. Develop recommendations to minimize the impact on resources by these structures.	PEP Natural Resources Subcommittee (lead) (long-term research plan) through contractor	Post-CCMP	\$100,000 through contractor	R
HLR-11.2	Determine environmental and habitat criteria (e.g., productivity, etc.) for site selection of different reef structures, and evaluate the potential for the extent of habitat and species displacement and the number of reefs that could be supported in the estuary without causing adverse effects.	PEP Natural Resources Subcommittee & NYSDEC (co-leads)	Post-CCMP	\$100,000 through contractor	R
HLR-11.3	Evaluate the potential placement of artificial reefs in known sea turtle and marine mammal feeding areas as part of the siting process outlined in the NYSDEC Artificial Reef Plan.	NYSDEC (lead); Towns of East Hampton, Southampton, Southold	Post-CCMP	\$50,000 through contractor	R

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Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)

Action		Responsible Entity	Timeframe	Cost	Status
<b>HLR-12</b>	<b>Foster Sustainable Recreational and Commercial Finfish and Shellfish Uses of the Peconic Estuary that are Compatible with Biodiversity Protection. (<i>Objectives 1, 2, 3, 5, 6, 7, and 8</i>)</b>				
<b>HLR-12.1 Priority</b>	Collect better statistical data on commercial and recreational fishing landings and by-catch specific to the Peconic Estuary System.	NOAA/NMFS, NYSDEC (co-leads)	Post-CCMP	Enhance existing programs: NYSDEC – 2.0 FTE/yr	R
<b>HLR-12.2 Priority</b>	Identify, protect, and restore key shellfish and finfish spawning, nursery, and feeding habitats in the Peconic Estuary to enhance shellfish and fish stocks and incorporate this data into the on-going Essential Fish Habitat work being conducted under the Atlantic States Marine Fisheries Commission (ASMFC).	PEP, NOAA/NMFS, ASMFC, New York Sea Grant Institute, NYSDEC, local universities and colleges	Post-CCMP	\$100,000	R
HLR-12.3	Support the Atlantic Coastal Cooperative Statistics Program.	NMFS, NYSDEC, PEP (co-leads)	Ongoing	Base Programs	C/N
HLR-12.4	Support the fishery management plans which have been and are being developed by the Mid-Atlantic Fishery Management Council (MAFMC) and the ASMFC.	NYSDEC, PEP (co-leads), ASMFC, NMFS, MAFMC	Ongoing	Base Programs	C/O
HLR-12.5	Ensure the enforcement of existing regulations on both commercial and recreational fisheries.	NYSDEC Division of Law Enforcement (lead), Suffolk County Marine Police, town bay constables	Ongoing	Base Program  Enhance existing programs: NYSDEC – 2.0 FTE /yr	C/O R
HLR-12.6	Support NMFS Essential Fish Habitat Designations within the Peconic Estuary.	PEP — MC, NYSDEC, NMFS	Ongoing	Base Program NYSDEC – 0.1 FTE /yr	C/O

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

Action		Responsible Entity	Timeframe	Cost	Status
HLR-12.7	Develop a public education program about the value of fish and fishing and the importance of commercial and recreational fishing regulations and compliance with the regulations.	PEP Public Education and Outreach program (lead), NYSDEC, Sea Grant, Cornell Cooperative Extension - Marine Program, AMI, marina and fishing business-owners	Post-CCMP	\$15,000	R
HLR-12.8	Support the prevention, or at least minimization, of effects on finfish and non-target species by lost or incorrectly designed fishing gear. Measures to be supported include: (1) developing a program to encourage commercial and recreational fishermen to retrieve and properly dispose of fishing line, nets, traps, pots, and other gear; (2) work with the AMI to develop a campaign for dockside recovery and recycling programs; (3) support implementation of fishery regulations requiring escape vents and degradable panels in fish and lobster pots; (4) implementing fishery regulations requiring minimum mesh size for gill, fyke, and otter trawl nets; and (5) promoting the use of fishing gears that minimize by-catch and discard ( <i>e.g.</i> , pound nets).	NMFS, NYSDEC, NYS Sea Grant (co-leads), CCE, AMI, commercial and recreational fishing community	Post-CCMP	Base Program and additional funding (to be determined) for outreach and education Enhance existing programs: NYSDEC – 2.0 FTE/yr Cornell – 0.1 FTE/yr	C/N  R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

<b>Action</b>		<b>Responsible Entity</b>	<b>Timeframe</b>	<b>Cost</b>	<b>Status</b>
HLR-12.9	Implement CZARA Section 6217 BMPs regarding fish waste at marinas and on docks. Develop public education materials for distribution at marinas, bait and tackle shops, and other related businesses detailing these BMPs.	PEP Public Education and Outreach program (lead), AMI, marina owners, other business owners, NYSDEC, Sea Grant, Cornell Cooperative Extension – Marine Program	Post-CCMP	\$15,000 for education and outreach materials	R
HLR-12.10	Expand the monitoring and analysis of the NYSDEC finfish trawl survey to the east of Shelter Island and coordinate with the PEP Living Resources Research, Monitoring, and Assessment Plan.	NYSDEC (lead), PEP Natural Resources Subcommittee	Post-CCMP	(Included in Environmental Monitoring Plan: Start-up: \$500,000 Annually: \$300,000	R
HLR-12.11	Examine the role of areas uncertified for shellfishing as "spawner sanctuaries" for shellfish species.	PEP Natural Resources Subcommittee (lead), NYSDEC, Cornell Cooperative Extension	Post-CCMP	\$50,000	R
HLR-12.12	On a biennial cycle, perform deep- and shallow-water shellfish abundance surveys.	PEP through contractor	Post-CCMP	\$150,000	R

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Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)

Action		Responsible Entity	Timeframe	Cost	Status
HLR-13	Protect Nesting and Feeding Habitat of Shorebirds. (Objectives 1, 2, 3, 6, 7, and 8)				
HLR-13.1 Priority	Strengthen existing municipal shorebird (terns and plovers) management programs to ensure timely fencing and erection of enclosures, adequate monitoring and reporting, and management of recreation and other activities within nesting and feeding habitat. Implement the 1997 Suffolk County Department of Parks, Recreation and Conservation Piping Plover Protection Program and the NYSDEC Bureau of Wildlife 1998 Action Plan for Piping Plover Conservation in New York.	NYSDEC; Suffolk County Parks Department; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; villages; Trustees; The Nature Conservancy; USFWS (co-leads)	Ongoing and Post-CCMP	Base Program  Enhance existing programs: NYSDEC – 1.0 FTE/yr TNC – 1.0 FTE/yr Towns – 0.3 FTE each/yr	C/O  R
HLR-13.2	Restrict the use of off-road vehicles and small watercraft in shorebird nesting areas during breeding season (April – August).	OPRHP; Suffolk County Parks Department; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; villages; NYSDEC for DEC-owned properties (co-leads)	Ongoing and Post-CCMP	Enhance existing programs:  Towns – 0.3 each/yr	R
HLR-13.3	Consult with the USFWS to comply with Federal guidelines for managing recreational activities in piping plover breeding habitat.	Beach managers including Federal (USFWS), state, Suffolk County, the towns, property owners (co-leads)	Ongoing and Post-CCMP	Base Program USFWS – 0.2 FTE/yr	C/O

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Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)

Action		Responsible Entity	Timeframe	Cost	Status
HLR-13.4	Document threats to nesting shorebirds (plovers and terns) such as off-road vehicles, predation, and recreation, and develop and implement measures that lead to higher productivity and larger nesting populations.	East End towns and NYSDEC (co-leads)	Post-CCMP	\$10,000	R
<b>HLR-14</b>	<b>Protect Sea Turtles and Marine Mammals. (Objectives 1, 3, 4, 6, 7, and 8)</b>				
HLR-14.1	Review uses of areas which have been identified as sea turtle feeding and marine mammal areas and consider what restrictions may be necessary to be more protective of these species and their food resources.	NYS agencies (e.g., NYSDEC, NYSDOS, NYS Office of Parks, Recreation and Historic Preservation, NYS Office of General Services) (co-leads), Suffolk County, towns	Post-CCMP	Enhance existing programs: NYSDEC – 1.0 FTE NYSDOS – 0.2 FTE Parks – 0.2 FTE SCDHS – 0.2 FTE Towns – 0.1 FTE each	R
HLR-14.2	Evaluate the expansion of existing laws to ensure that all species of seals as well as other marine mammals are protected from intentional injury or death.	NYS agencies (e.g., NYSDEC, NYSDOS, NYS Office of Parks, Recreation and Historic Preservation, NYS Office of General Services) (co-leads), SCDHS, towns	Post-CCMP	Included in HLR-14.1	R
HLR-14.3	Expand New York State law protecting harbor seals (ECL Article 11, section 0107 to include all species of seals in NYS marine waters.	New York State Legislature, NYSDEC (co-leads)	Post-CCMP	Included in HLR-14.1	R

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Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)

Action		Responsible Entity	Timeframe	Cost	Status
<b>HLR-15</b>	<b>Utilize Land Use Planning, BMPs, and Other Management Measures to Reduce the Negative Impacts of Human Uses and Development on the Estuary System. (Objectives 1, 2, 3, 4, 6, 7, and 8)</b>				
<b>HLR-15.1 Priority</b>	Each town should develop a master or comprehensive management plan, coordinated with plans of other towns that increases the level of protection of natural resources and habitats and accounts for cumulative impacts.	Towns of East Hampton, Southampton, Southold, Shelter Island, Riverhead; NYSDOS (co-leads), EPA, NYSDEC, SCDHS	Post-CCMP	Enhance existing programs: NYSDEC – 0.1 FTE EPA – 0.1 FTE SCDHS – 0.1 FTE Towns – 1.0 FTE each	R
<b>HLR-15.2 Priority</b>	Increase public access to the estuary consistent with other ecosystem objectives.	All Federal, state, and local governmental agencies in the PEP watershed (co-leads); NYSDEC	Post-CCMP	Base Program and site-specific costs for each access opportunity to be determined  Enhance existing programs: NYSDEC – 1.0 FTE/yr	C/N  R
<b>HLR-15.3</b>	Develop and implement a Harbor Protection Overlay District such as that developed by the Town of East Hampton and include it in the master plan for each town.	NYSDOS (lead); Towns of Southampton, Southold, Shelter Island, and Riverhead	Post-CCMP	\$50,000 per town  Towns – 1.0 FTE each	R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

<b>Action</b>		<b>Responsible Entity</b>	<b>Timeframe</b>	<b>Cost</b>	<b>Status</b>
HLR-15.4	Develop implementation mechanisms for all measures required by Section 6217(g) of CZARA that are applicable to the Peconic Estuary. These measures would include BMPs for the use of natural vegetation, minimization of impervious surfaces, safe and reasonable use of lawn, garden, and household chemicals, and minimization of stormwater runoff. Incorporate these BMPs into the site plan requirements for all newly-developed and redeveloped property, particularly along the shoreline.	NYSDEC, NYSDOS, PEP Education and Outreach Program (co-leads), Suffolk County Soil and Water Conservation District, SCDHS, USDA NRCS, Cornell Cooperative Extension, NY Sea Grant, Peconic BayKeeper, SCDHS	Post-CCMP	Base Program  Enhance existing programs: NYSDEC – 0.1 FTE SCDHS – 0.1 FTE PEP – 0.1 FTE	C/N  R
HLR-15.5	Use the Protected Lands Council of the Central Pine Barrens Comprehensive Land Use Plan as a model for developing a similar coalition of public agencies and conservation organizations to address common issues of concern throughout the estuary.	PEP; Pine Barrens Commission and Protected Lands Council (co-leads); Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; NYSDEC; SCDHS	Post-CCMP	NYSDEC – 0.05 FTE/yr SCDHS – 0.05 FTE/yr  Enhance existing programs: Towns – 0.5 FTE each/yr	C  R
HLR-15.6	Encourage towns with existing Conservation Advisory Councils or planning staff, to be given the responsibility as Conservation Advisory or Planning Boards to review proposed Town Board actions as they affect public lands and open space concerns.	Towns of East Hampton, Southold, Shelter Island, and Riverhead (co-leads)	Post-CCMP	Enhance existing programs: Towns – 0.5 FTE each/yr	R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

Action		Responsible Entity	Timeframe	Cost	Status
HLR-15.7	Review and provide comments to NYSDEC on any revisions to the Statewide Oil Spill Areawide Contingency Plan for the Peconic Estuary relating to waterfowl, marine mammals, and sea turtles and their rehabilitation if oiled. Develop and distribute information on reporting and responding to small-scale spills.	PEP Natural Resources Subcommittee in conjunction with the USCG, NYSDEC, USFWS (co-leads); Rehabilitation: local wildlife rehabilitators (licensed); Education: PEP Public Education and Outreach program in conjunction with the USCF, NYSDEC, USFWS; BMPs: NYSDO; AMI; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; villages	Post-CCMP	Base Program NYSDEC – 0.05 FTE/yr SCDHS – 0.05 FTE/yr PEP – 0.05 FTE/yr	R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

Action		Responsible Entity	Timeframe	Cost	Status
HLR-15.8	Develop regulations for new marinas or expansion of existing marinas which include the following (from CZARA section 6217): (1) assessment of water quality conditions during and after construction; (2) site and design such that tides and/or currents will aid in the flushing of the site or renew its water regularly; (3) site and design to protect against adverse effects on shellfish resources, wetlands, submerged aquatic vegetation, or other important riparian and aquatic habitat areas as designated by local, State, or Federal governments; (4) designate and enforce no-wake zones and ensure that shoreline areas are stabilized effectively by vegetative means; and, (5) require effective stormwater runoff control measures to reduce sediment and toxic inputs.	NYSDEC (lead); Suffolk County; DHS; EPA; PEP; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; AMI; private marina owners.	Post-CCMP	EPA – 0.3 FTE NYSDEC – 0.5 FTE SCDHS – 0.3 FTE PEP – 0.3 FTE	R
				Enhanced Programs: NYSDEC – 1.0 FTE/yr	R

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Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)

Action		Responsible Entity	Timeframe	Cost	Status
<b>HLR-16</b>	<b>Develop and Implement a Living Resources Research, Monitoring, and Assessment Program. (<i>Objectives 1, 2, 3, 5, 6, 7, and 8</i>)</b>				
HLR-16.1 <b>Priority</b>	Develop and implement a research program for the Peconic Estuary and its watershed to investigate natural processes, impairments, and links to water quality, maintenance of systems and species, and effects of recreation and pollution on biodiversity, among other research needs. Investigate and seek funding sources for supporting implementation of the program (e.g., National Estuarine Research Reserve Systems).	Plan development and coordination: PEP Natural Resources Subcommittee and the Marine Conservation Planner (co-leads) in consultation with other members of the PEP Management Conference and technical experts; Plan implementation: PEP Management Conference, NYSDEC, NYSDOS, New York Sea Grant Institute, SCDHS (co-leads)	Plan development and peer-review: 2001  Plan implementation: After the plan is developed, adopted, and funding is allocated.	Plan development: Base Program  Plan implementation: \$3 million over 3 to 5 years NYSDEC – 0.2 FTE/yr SCDHS – 0.05 FTE/yr TNC – 0.7 FTE/yr	Plan Dev.: C/N;  Implement.: R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

<b>Action</b>		<b>Responsible Entity</b>	<b>Timeframe</b>	<b>Cost</b>	<b>Status</b>
<b>HLR-16.2 Priority</b>	Develop a long-term program for monitoring and assessment of living resources in the Peconic Estuary that is coordinated with the development of a research plan and ongoing research and monitoring efforts.	Monitoring and assessment plan: PEP Natural Resources Subcommittee and Marine Conservation Planner (co-leads) in conjunction with NYSDEC; SCDHS; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; Plan implementation: PEP in conjunction with NYSDEC (co-leads); SCDHS; Towns of East Hampton, Southampton, Southold, Shelter Island, and Riverhead; Cornell Cooperative Extension; local universities and colleges; NY Sea Grant	Plan development and peer-reviewed: By 2001	Plan development: Base Program	C/N
			Plan implementation: After the plan is developed, adopted, and funding is allocated	Plan implementation: To be determined. Included in HLR-16.1	R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

<b>Action</b>		<b>Responsible Entity</b>	<b>Timeframe</b>	<b>Cost</b>	<b>Status</b>
HLR-16.3	Support research on the interactions between eelgrass and the dominant macroalgae species in the Peconic Estuary to determine impacts of macroalgae on eelgrass distribution and abundance.	Plan development: PEP Natural Resources Subcommittee and the Marine Conservation Planner (co-leads) in consultation with other members of the PEP Management Conference and technical experts; Plan implementation: PEP Management Conference, NYSDEC, NYSDOS, New York Sea Grant Institute, SCDHS (co-leads)	Post-CCMP	\$150,000 (estimate)	R
HLR-16.4	Perform research and monitoring of forage fish species, horseshoe crabs, and conch in the Peconic Estuary to understand their distribution (temporal and spatial), abundance, habitat preferences, and different life stage requirements to develop management strategies.	PEP Natural Resources Subcommittee, NYSDEC, Marine Conservation Planner (co-leads), technical experts through the PEP long-term research plan	Post-CCMP and adoption of HLR-16.1	\$500,000 (estimate)	R
HLR-16.5	Perform research on the ecology of food sources of sea turtles to evaluate the importance of the Peconic Estuary to them and potential threats to these endangered and threatened species.	PEP Natural Resources Subcommittee (lead) and technical experts through the PEP long-term research plan	Post-CCMP and adoption of HLR-16.1	\$75,000 through contractor	R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

<b>Action</b>		<b>Responsible Entity</b>	<b>Timeframe</b>	<b>Cost</b>	<b>Status</b>
HLR-16.6	Research the lethal, sublethal, and synergistic effects of elevated nutrients, toxic chemicals, and Brown Tide on the reproduction and behavior of finfish and invertebrate species.	PEP Natural Resources Subcommittee (lead) and technical experts through the PEP long-term research plan, NY Sea Grant	Post-CCMP and adoption of HLR-16.1	To be determined	R
HLR-16.7	Determine the effects of navigational dredging on shallow water communities and the recovery time of benthic communities exposed to dredging.	PEP Natural Resources Subcommittee (lead) and technical experts to define specific research questions, USACE, Suffolk County SCDPW, NYSDEC	Post-CCMP and adoption of HLR-16.1	To be determined	R
HLR-16.8	Ensure implementation of adequate mapping and monitoring programs to track trends in the extent and quality of eelgrass, and to evaluate progress toward reaching restoration goals.	PEP Natural Resources Subcommittee, PEP Management Council (co-leads)	Post-CCMP	\$45,000 per year	R
HLR-16.9	Establish a scientific panel to review research, monitoring and assessment data, and to offer guidance in management of the habitats and living resources in the Peconics.	PEP Natural Resources Subcommittee (lead)	Post-CCMP and adoption of HLR-16.1	To be determined	R
HLR-16.10	Organize an annual or biennial conference to report research, monitoring, and assessment results to the public and guide management decisions.	PEP Natural Resources Subcommittee in conjunction with EPA, NYSDEC (co-leads), SCDHS, local universities and colleges	Post-CCMP; Biennial	\$10,000 per conference	R
HLR-16.11	Establish and maintain an accessible database of natural resources in the Peconic Estuary.	PEP Natural Resources Subcommittee (lead)	Ongoing	NYSDEC – 0.1 FTE/yr SCDHS – 0.05 FTE/yr PEP – 0.1 FTE/yr Enhance existing programs: NYSDEC – 0.5 FTE/yr	C/O

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

Action		Responsible Entity	Timeframe	Cost	Status
HLR-16.12	Promote research and monitoring opportunities in the Peconic Estuary to local schools, colleges, universities, and institutes by establishing funding and scientific platforms and other incentives to facilitate basic and applied marine research.	PEP, NY Sea Grant, EPA (co-leads), NOAA, NYS Marine Educators Association (MEA), Cornell Cooperative Extension – Marine Program	Post-CCMP	Funding needs for research center/scientific platform to be determined	R
HLR-16.13	Seek opportunities to link research and monitoring in the Peconic Estuary Program to related estuaries and regional studies.	Association of NEPs, EPA, PEP (co-leads), NY Sea Grant, NOAA	Post-CCMP	NYSDEC – 0.2 FTE/yr EPA – 0.1 FTE/yr PEP – 0.1 FTE/yr	R
HLR-16.14	Support priorities listed in the Living Resources Research, Monitoring, and Assessment Plan including research on ecosystem productivity and ecosystem structure, bioindicators, and effects of global climate change on wetlands.	PEP Natural Resources Subcommittee	Ongoing	Base Programs	C/O
<b>HLR-17</b>	<b>Establish a Working Group to Examine the Role of Grazers and Filter Feeding Organisms in Influencing Water Quality and Productivity, and to Better Understand the Food Web Dynamics and to Develop Management Applications. (Objectives 1, 2, 3, 4, and 8)</b>				
HLR-17.1	Review appropriate scientific literature, identify information gaps, and develop research recommendations regarding how shellfish, finfish and other “top-down” predators influence water quality and the planktonic community.	PEP Natural Resources Subcommittee (lead) through contractor	Post-CCMP	\$50,000 for review	R

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**Table 4-1. Habitat and Living Resources Management Plan Actions. (continued)**

<b>Action</b>		<b>Responsible Entity</b>	<b>Timeframe</b>	<b>Cost</b>	<b>Status</b>
HLR-17.2	Develop research, monitoring and assessment needs for quantifying food web dynamics.	PEP Natural Resources Subcommittee (lead) and marine conservation planner	Post-CCMP	NYSDEC – 0.1 FTE TNC – 0.5 FTE PEP – 0.2 FTE	R
HLR-17.3	Develop food web sub-models to be included in the nutrient model to evaluate the sensitivity of productivity to anthropogenic changes in nutrient supply.	PEP Natural Resources Subcommittee through contractor (lead) in consultation with other members of the PEP Management Conference and technical experts	Post-CCMP	\$100,000 for model development	R
HLR-17.4	Consult with the BTRI and the estuary-wide aquaculture plan work group to develop management recommendations for “top-down” regulation of water quality and Brown Tide in the Peconic Estuary.	PEP Natural Resources Subcommittee (lead) in consultation with other members of the PEP Management Conference and technical experts; NYSDEC, NYSDOS, New York Sea Grant Institute, SCDHS, BTRI researchers, SUNY Stony Brook, Cornell, commercial aquaculture facilities in the Peconics	Post-CCMP	Enhance existing programs:  NYSDEC – 0.2 FTE EPA – 0.2 FTE SCDHS – 0.2 FTE	R
HLR-17.5	Facilitate communication among BTRI, water quality managers and the estuary-wide aquaculture plan work group.	PEP Natural Resources Subcommittee (lead) in consultation with other members of the PEP Management Conference and technical experts; NYSDEC, NYSDOS, New York Sea Grant Institute, SCDHS, BTRI researchers, SUNY Stony Brook, Cornell, and commercial aquaculture facilities in the Peconics	Post-CCMP	Included in HLR-17.4	R



