Board of Trustees of the Town of Southampton

Town of Southampton

Marine Resources Protection and Management Plan

Moriches Bay, Shinnecock Bay and Mecox Bay

March 30, 2001

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Executive Summary

Marine resource protection and management plans were developed for marine underwater lands within the Shinnecock and Mecox Bays in Southampton Town, inclusive of the Incorporated Villages of Quoque and Southampton, to improve water quality, enhance fin and shellfish stocks, and bolster marine economic returns. The plan establishes goals and policies concerning living marine resources and use of underwater lands, and identifies general strategies for mitigating environmental impacts and enhancing sustainability. It includes a characterization of living resources within the South Shore Estuary, as well as an assessment of current resource management practices in effect in Southampton Town. Coastal Resource inventories and general management recommendations have also been developed for Moriches and Quantuck Bays, however mapping of resource-related databases and specific definitions of capital projects still need to be addressed as a component of the overall LWRP. Consistent with New York State's Coastal Management Program, the plan recognizes the goals and objectives of the South Shore Estuary Reserve Draft Comprehensive Management Plan (SSER CMP), and implements the policies and recommendations of this regional plan.

The Marine Resource Protection and Management Plan will be implemented through more detailed management and enhancement initiatives. A number of possible capital projects for 2001-2005 have been identified. These would be undertaken jointly by the Town of Southampton and Southampton Trustees, with oversight and assistance provided by the New York State Department of State. With regard to the future of Southampton's bays, the plan holds real promise for guiding a variety of initiatives and capital projects which protect and enhance marine underwater lands, including shellfish management, habitat restoration, aquaculture, and development of a Geographic Information System (GIS) based resource management program. Research gaps and needs are likewise defined, including characterization of bay bottom substrate and submerged aquatic vegetation (SAV), rangewide mapping of shellfish habitat, predation studies, evaluation of finfish population dynamics, and continued water quality monitoring. Shinnecock and Mecox Bays are the focus of this report; however, the management policies and initiatives set forth here lay the foundation for improved protection and management of all marine waters within the SSER and Peconic Bays.

This report was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

<u>Management Boundaries</u>: The geographic scope of the management plan includes the estuarine waters, wetlands and underwater lands of the Shinnecock, Moriches and Mecox Bay complexes within Southampton Town and the Eastern Bays Subregion of the SSER, inclusive of the incorporated villages of Quoque and Southampton. There are approximately 11,000 acres within the Shinnecock and Mecox Bays, predominantly shallow waters, mudflats, intertidal flats, high salt marsh and low salt marsh. The salt marshes are extensively ditched in places with subsequent ecological impacts.

Submerged aquatic vegetation communities are scattered throughout the region. Within Shinnecock Bay, there are significant dredge spoil sites at Phillips Creek, Middle Pond, Gull and Warner's Islands, and along the Ponquogue and western portions of the barrier island. Freshwater wetlands are found in the upper reaches of the tributaries to both Shinnecock and Mecox Bays, and in small interior pockets of the barrier. Diverse aquatic and terrestrial habitats and species occur throughout the bay complexes, especially estuarine and anadromous fisheries, shellfisheries, shorebirds, colonial waterbirds, and migrating and wintering waterfowl.

Moriches and Quantuck Bays contain approximately 3,100 acres of wetlands and underwater lands, consisting mostly of estuarine intertidal marshes, mudflats, intertidal flats, manmade canals and shallow bays. Similar to other areas of the South Shore Estuary Reserve, many tidal marshes have been grid-ditched as a mosquito control method, with the associated impacts on marine ecology and diversity. The Moriches system is directly influenced by the Moriches Inlet, which provides an interface with ocean water. Moriches Bay is connected to the east by the Quantuck Canal and Quantuck Bay, a smaller embayment system which eventually flows into Shinnecock. Quantuck Bay lies within the incorporated villages of Westhampton Beach and Quogue. Known for its significant waterfowl and sport finfish populations, Moriches Bay still supports productive eelgrass stands. Quantuck Bay contains extensive State protected marshes, but receives appreciably less flushing than Moriches and Shinnecock Bays.

<u>Ownership/Protection Efforts</u>: The underwater lands and wetlands are predominantly owned by the Trustees of the Freeholders and Commonalty of the Town of Southampton, who were granted title to these lands and waters by the Dongan Patent of 1686. Large stretches of the Shinnecock and Mecox Bay barriers are also publicly owned. Significant wetland protection efforts continue, with most of the remaining unprotected wetlands currently slated for preservation through town, county and state acquisition. The Shinnecock Bay barrier wetlands have been designated as a state conservation priority site by the 1998 State Open Space Plan, along with Quantuck and Moriches Bay parcels, and are slated for inclusion in the revised 2000 plan. The barrier wetland complex, as well many other bay wetland sites, are also listed in the Town of Southampton's 1998 Community Preservation Project Plan as priority protection sites.

<u>Resource Threats</u>: The shellfisheries within the Shinnecock, Moriches and Mecox Bays have been in sharp decline for the last four decades. Possible causes range from pollution and habitat destruction to increased predation, changes in temperature and salinity, overharvesting and brown tide. Information needed to manage commercial shellfisheries is also incomplete. Oyster populations in Mecox Bay have recently shown some encouraging signs of a comeback, however, harvests of hard clams, soft clams and scallops throughout the Shinnecock, Moriches and Mecox Bay complexes remain low.

Submerged aquatic vegetation (SAV), especially eelgrass beds, has similarly declined in abundance, due to declining water quality, pollution, nutrient loading, disease and other factors. These losses have undoubtedly affected local finfish populations, however population trends in both SAV's and finfish need to be better documented. Further research is needed to develop methodology for restoring SAVs, as transplanting techniques have had limited success.

Historically, significant losses in both estuarine intertidal emergent wetlands and coastal freshwater wetlands have also occurred; yet recent trends, at least in the Shinnecock Bay complex, show a modest net gain in tidal wetlands in the last twenty years. Current government sponsored wetland restoration and enhancement initiatives such as those completed at the Ponquoque Bridge, as well as those proposed for other Shinnecock Bay wetlands, offer hope for additional wetland gains. Projects like marsh water management (OMWM) must be a priority, as mosquito control ditching has contributed greatly to loss and erosion of marshes.

Non-point source pollution has been significantly reduced, as both the Town of Southampton and Southampton Trustees have been making a vigorous effort to correct road runoff discharge points and revamp area road drainage systems since the local passage of the Town of Southampton Clean Water Bond Act in 1993. The Southampton Trustees have also independently financed drainage improvements in both Shinnecock and Mecox Bays. Additional stormwater abatement projects are currently underway in the Shinnecock Bay region, with most work slated for completion in 2001. State Clean Water/Clean Air Bond monies are being used to implement these extensive road drainage improvements, matched by county and town funds.

Despite these successes, leaching of residential sewage, fertilizers and pesticides remains a problem, especially in the older densely developed areas of Tiana, East Quoque and Hampton Bays. The town's wetland law (Chapter 325)(adopted by the Town Board and the Town of Southampton in 1993) has clearly translated into some indirect surface water quality improvements, as restrictive building setbacks, combined with requirements for upgrading of outdated sanitary systems and re-establishment of non-disturbance buffers and non-fertilization zones, have enhanced protection of local bays. Still, innovative sanitary system alternatives need to be better explored.

Discharges of sanitary waste and associated nutrient loading from pleasure boats have historically posed a significant problem, yet this issue is being addressed through a model Trustee/Town sponsored mobile vessel pump-out program. Efforts are now underway to seek a no discharge zone designation for Shinnecock Bay, an action which will clearly benefit marine resources over a longer term.

Due to competing development and recreational interests, as well as natural causes, endangered piping plover, roseate, common and least tern populations remain highly vulnerable. The Southampton Trustees and Town of Southampton have pledged to continue their endangered species protection and management efforts; however,

additional more pro-active measures, such as habitat creation and restoration, are likely needed to stem species declines. Monitoring of other vulnerable species, such as endangered sea turtles, harbor seals, and diamond-backed terrapin is likewise needed, so that prudent protection and management measures can be applied. Historic wetland losses have likely contributed to waterfowl reductions; consequently, wetland acquisitions should continue to be a priority for the Town.

<u>Marine Resource Protection and Management Recommendations</u>

Marine research and monitoring efforts need to be funded to increase management efficiency and better assess shellfish, finfish, and submerged aquatic vegetation population status and trends. GIS mapping of SAVs and bottom substrates, together with shellfish population sampling, should receive immediate attention, to better enable the Trustees to implement a scientifically-based shellfish management plan. The restoration of shellfish populations and the sustainability of commercial fisheries as a viable economy should be the highest priority. To address declining natural abundance, the feasibility of allowing small-scale private commercial mariculture projects in Trustees waters should be assessed. Crop rotation and sanctuary creation techniques should also be further explored and refined. Current water quality protection efforts should continue, including wetland acquisition, stormwater abatement, no discharge zone designation and expansion of the mobile vessel pump-out program. Inventories of shoreline hardening structures need to be completed, with greater effort given to natural shoreline restoration. Endangered species protection programs should also be expanded to include habitat creation and restoration. Lastly, implementation of many of these recommendations will require cooperation and interaction between the Trustees, local Baymen, the scientific community, and Southampton Town. In this regard, the creation of a local coordination structure, such as a Marine Resource Advisory Committee could play a crucial role in the follow-up and implementation of the Marine Resource Protection and Management Plan.

<u>Acknowledgments</u>

We are grateful to the Southampton Board of Trustees for their valuable input into this document. Their localized insight into the ecology and ever-changing state of the bays, as well as their foresight and leadership with regard to protecting and managing marine resources have inspired us to develop a much needed coastal master plan for guiding the Town into the future. Sustainability of our living marine resources, as well as the economies and livelihoods dependent on them, must rank as one of the highest priorities for Southampton Town. Realizing this goal will indeed be a monumental challenge. However, with the support of the Board of Trustees, local Baymen and the Town of Southampton, the possibilities for success are encouraging.

Finally, we are eternally grateful to the State of New York's Department of State's Division of Coastal Resources for their funding, support and encouragement that provided the impetus for the Town of Southampton and Board of Trustees to develop

this document. We look forward to a continued productive relationship, as we move forward with the implementation of this plan.

Introduction

The Marine Resources Protection and Management Plan (MRMP) provides a comprehensive overview of aquatic resources, together with recommendations designed to better enhance and maintain the local waters and underwater lands of the Town of Southampton. Historically, the economic mainstay of the Town was based upon fishing and agriculture, but developed over time to incorporate tourism. Nevertheless, marine living resources continue to provide an important source of food, livelihood, and recreation to thousands of residents and visitors, and therefore are of major economic importance to the Town. Accordingly, implementation of the MRMP must be seen as an investment in the future, one which is essential to securing the quality of life in Southampton and the larger South Shore Estuary Reserve for generations to come.

The MRMP is designed to provide a management plan to protect and preserve the sustainability of the local marine resources. Its role in galvanizing both local and regional cooperation for effective conservation measures will be crucial, as it sets in place both a blueprint and master guide for fostering future capital projects and identifying ways and means of providing additional financial resources for the management of the coast. To this end, the MRMP is geared towards identifying specific actions that can be taken to promote sustainable use of marine living resources, particularly those that can be undertaken successfully by both the Town and Town Trustees.

Developed in conjunction with the mission of the South Shore Estuary Reserve (SSER), the MRMP is a plan designed to bring resource management into the next century. The ultimate goal is to provide the people of Southampton with a well-managed and natural environment. The MRMP is the first step in increasing effective local management and returning our natural resources to a state of dependable, sustainable use and biologic diversity.

Background and Framework for the Plan

The Town of Southampton has long recognized the important economic and ecological roles that its underwater lands play and, as such, has for many years advanced a host of programs, policies, and regulations geared toward preservation of the coast. The Town's 1970 Master Plan clearly acknowledged the importance of its estuaries and imparted a planning framework which called for creation of a network of marine sanctuaries and shoreland preserve systems, the aim of which was to guarantee long term protection for the natural and public benefits of the bays. Such a plan was also the impetus for enacting sweeping zoning changes, particularly in those watershed reaches where conservation of natural vegetation is crucial to maintaining the quality of surface and drinking waters in the Town.

Of even more importance was the l970 Master Plan's overall vision, as this document formed the basis for the major shift needed to put Southampton on the path toward sustainable use of the coast. Over the years following, numerous initiatives were taken by the Town to better protect its bays, including wetlands regulations, acquisitions and restorations; overlay zoning; and stormwater abatement; as well as broader conservation planning for the shore. The Town's Comprehensive Plan Update of 1997 likewise includes various provisions for protecting water resources, including endorsement of the South Shore Estuary Reserve Comprehensive Management Plan (SSER CMP) and the Peconic Estuary Program Comprehensive Conservation and Management Plan (PEP CCMP).

With regards to wetland habitat protection, Southampton completed a comprehensive wetlands restoration study for town-owned lands in the SSER in 1997. A similar plan was prepared by the Town for the Peconic Estuary system in l994. As a result, wetland restoration and enhancement projects are being undertaken at many locations, including Davis Creek and Old Fort Pond, including recently completed work at Paynes Creek, Conscience Point and Ponquogue Bridge. All of these projects are being sponsored by the Town with assistance from federal, state and non-profit sources, including several

significant grants obtained through the New York State Department of State (NYSDOS) and New York State Department of Environmental Conservation (NYSDEC) using Environmental Protection Fund (EPF) and 1996 New York State Clean Water/Clean Air Bond Act funds.

A Local Waterfront Revitalization Plan (LWRP) is now being developed by the Town, as well as Harbor Management and Inter-Municipal Waterbody Management Plans. The NY Department of State awarded a $30,000 EPF grant to Southampton in 1996 to prepare a Marine Resources Management Plan for the protection and management of marine resources within the Shinnecock and Mecox Bays. The goal of the plan is to provide the necessary management strategies to revitalize the Town's commercial and recreational fisheries, and thereby address marine living resources issues for the Town's LWRP.

All of these town initiatives have in many respects been upstaged by the Trustees of the Freeholders and Commonalty of the Town of Southampton, who have acted as the protectors and stewards of underwater lands, wetlands, and marine living resources in the Town since the Dongan Patent of 1686. Pursuant to the Patent, the Trustees hold title to the public property and domain associated with most tidelands, bottomland and beach access ways, and are charged with protection of the public's interest in same. The Trustees are entrusted with specific marine management responsibilities, including stewardship of the waterways and their resources, as well as regulation of uses incidental to or in the aid of the traditional categories of navigation, commerce and fishing, such as docks and piers. An elected Board of Trustees acts on behalf on the Freeholders and Commonalty of the Town of Southampton, and has been the mainstay for protecting and managing underwater lands, wetlands and marine living resources across the Town.

The focus of the MRMP is to strengthen the capability of the Trustees to maintain the sustainable use of finfish, shellfish and other fisheries related resources, by carving out a set of specific recommendations and strategies that can be implemented to conserve those coastal resources held in public trust. To that end, the plan identifies financial resources

and institutional mechanisms for addressing priorities and capital project needs across the Town.

This report is intended to provide guidance to the Southampton Trustees, Town of Southampton and other decision-makers involved in protecting and managing the marine living resources of the coast. The Town's Geographic Information System (GIS) was employed to create digitized maps of wetlands, shellfish grounds, public access sites and other resources, as well as to portray capital projects completed or underway in the Town. Strategic future project areas are also highlighted, showing how these initiatives relate to other investments being made by the Town. Accompanying the maps is a description of the biological resources occurring in key areas in the South Shore Estuary Reserve. The status of current protection and management practices is also discussed. Marine resource management strategies and recommendations, as well as priority protection and management initiatives/capital projects have been presented in the front of the report to facilitate implementation. These sections are preceded by the overview sections, which provide general habitat descriptions as well as an assessment of existing conservation measures and specific threats and problems posed by the managers of the coast.

Local Embayments in the Town of Southampton

The Shinnecock and Mecox Bays form an integral part of an extraordinary complex of estuarine wetlands, bay waters, barrier islands, upland habitats and coastal communities within the entire Town of Southampton. Totaling 19,310 acres overall, Southampton's estuarine habitat presents a monumental and complex protection and management challenge, taking in 11 major and minor embayments, 4 coves, 11 ponds and 28 creeks town-wide. Across this vast waterscape lie the magnificent Shinnecock and Mecox Bays, extensive coastal complexes that rank as some of the richest centers of marine biodiversity in Southampton.

Shinnecock Bay Area

Shinnecock Bay, within the Eastern Sub-Bay Region of the State legislatively designated South Shore Estuary Reserve (SSER), is approximately 4,635 acres in area. The Bay is connected to the Moriches Bay complex to the west by the Quogue Canal, Quantuck and Moneybogue Bays and to the Great Peconic Bay to the north via the Shinnecock Canal. There is an extensive coastal barrier island along the Shinnecock's southern edge, separating the estuary from the Atlantic Ocean. The Shinnecock Inlet, an artificially fortified inlet, connects the Bay to the Atlantic Ocean, allowing for heavy tidal flushing. The Shinnecock Bay system lies partly within two incorporated villages: The Village of Quogue and the Village of Southampton. It also borders Reservation land held by the Shinnecock Nation, which lie outside the jurisdiction of the Town.

Shinnecock Bay is both biologically and commercially significant as common shellfish, such as hard clams (Mercenaria mercenaria), soft clams (Mya arenaria), bay scallops (Argopecten irradians), mussels (Mytilus edulis) and crustacean blue crabs (Callinectes sapidus), populate the Bay. The area is certified for commercial and recreational shellfishing. The Shinnecock Indian Reservation historically supported an American oyster (Crassostrea virginica) and hard clam aquaculture farm in Heady Creek, a main

tributary within the Bay system. The commercial harvest of common razor clams (Ensis directus) has begun recently in Shinnecock Bay waters.

The Bay area is also highly productive for marine finfish, serving as a feeding area and nursery (April through November) for bluefish (Pomatomus saltatrix), winter (Pleuronectes americanus) and summer flounder (Parlichthys lethostigma) [fluke], American eel (Anguilla rostrata), tautog [Blackfish] (Tautoga onitis) and scup (Stenotomus chrysops). The species of forage fish commonly found in the bay area include Atlantic silverside (Menidia menidia), striped killifish (Fundulus majalis), mummichog (Fundulus heteroclitus) and northern pipefish (Syngnathus fuscus) (NYSDOS, 1987). Shadfish runs still exist at Taylor Creek.

Similar to Moriches Bay, Shinnecock Bay is utilized as nesting and feeding grounds for the many migratory birds including waders and shorebirds. The New York State Department of State has designated Shinnecock Bay as having winter waterfowl populations of statewide significance. Waterfowl that commonly use the Bay include brant (Branta bernicla), scaup (Aythya marila), black ducks (Anas rubripes), Canada geese (Branta canadensis), mallards (Anas platyrhynchos), buffleheads (Bucephala albeola) and canvasbacks (Aythya valisineria).

The Shinnecock Bay system has been recognized as one of 123 conservation priority sites in the New York State Open Space Plan (National Audubon Society, 1998) and is being recommended for inclusion within the latest 2000 draft of the State plan by the Region 2 Long Island Open Space Advisory Committee. It has also been designated as one of the New York State Important Bird Areas (IBA) by the National Audubon Society and New York State due to the tremendous numbers of common, threatened and endangered birds that utilize the system during the year. The Shinnecock Bay system contains four New York State Designated Significant Fish and Wildlife Habitats. These include Southampton Beach, Tiana Beach, Shinnecock Bay, Dune Road Marsh, and Far Pond and Middle Pond Inlets. The New York State Department of State has reported the

significance of Shinnecock Bay to be "irreplaceable" (Coastal Fish and Wildlife Habitat Rating Form, 1993).

The bay consists of large open water areas and lesser amounts of mudflats and salt marshes. Extensive tidal wetlands are located in the back-bay area behind the Quogue/Tiana and Southampton barrier beaches. To the north and west sides on the mainland side, the bay is bordered by dense residential areas and a number of small craft harbor facilities.

While the entire bay system is considered significant, specific tributaries have been targeted for increased protection due to high productivity levels of finfish, shellfish and birds, or crucial environmental parameters such as healthy submerged aquatic vegetation (SAV). These areas include Tiana Bay, Far Pond, Middle Pond, Old Fort Pond, Heady Creek, Taylor Creek, the Dune Road Marsh, Gull Island and the Shallows.

Tiana Bay is one of the largest coves within the western Shinnecock Bay and ranks as a productive area for shellfishing, containing hard and soft clams, mussels and crabs. It has a few small pockets of emergent marsh, and its coastal perimeter is identified as a finfish nursery area containing SAV communities.

Far Pond and Middle Ponds are both along the mainland in eastern Shinnecock Bay, are known nesting sites for the endangered piping plovers, and are recognized by the New York State Department of State as significant fish and wildlife habitats. The area "…represents a regionally uncommon, undeveloped barrier peninsula and inlets associated with the two ponds" (SSER Wetlands Restoration Study, 1997). The ponds have each been identified as nursery grounds for winter flounder, and support populations of snowy egrets (Egretta thula), brants and mallards.

Old Fort Pond ties in closely with Far and Middle Ponds, and maintains shellfish populations and is widely used during good scallop seasons. Cormorants (Phalacrocorax

sp.) and herring gulls (Larus argentatus) are often found on or near the site. The area also contains emergent wetlands, and serves as a nursery ground for marine finfish.

Heady Creek is a crucial tributary to the eastern-most reaches of the Bay complex. It contains commercial and recreational shellfishing sites, emergent marshes and prime finfish nursery. Significant SAV populations occur within the tributary. The Shinnecock Nation has historically used Heady Creek as a hard clam and American oyster hatchery.

Taylor Creek, just east of Heady Creek, is a productive shellfish area, and possesses extensive intertidal wetlands and submerged aquatic vegetation. Taylor Creek is a highly productive finfish nursery ground, and borders on the Ruth Wales Dupont Sanctuary, which attracts significant numbers of winter waterfowl and shorebirds.

The Dune Road Marsh takes in approximately 1,500 acres along the southern shore of Shinnecock Bay and northern fringes of the Westhampton Island and Ponquogue barrier island complexes. The area extends for more than 6 ½ miles along the Tiana Barrier Island to the west of the Shinnecock Inlet. Undeveloped salt marshes, tidal mud flats, dredge spoil islands and shallow open water areas make up the Dune Road Marsh.

Large expanses of undeveloped coastal ecosystems, such as the Dune Road Marsh, are rare in New York State, and provide an important environment for diverse populations of fish and other wildlife. The endangered roseate terns (Sterna dougallii) and threatened common terns (Sterna hirundo) regularly nest along the Dune Road Marsh during their season, specifically including Sedge Island, Lanes Island, Greater and Lesser Greenbacks Islands, and Warners Islands. In 1985, almost 5,000 breeding pairs of common terns and 50 roseate terns nested along this stretch of barrier. State endangered piping plovers (Charadrius melodus) commonly nest along the upland areas bordering the marsh. Lanes Island has historically supported one of the three largest common tern nest sites in the State, and is also highly important as a black skimmer (Rynchops niger) nesting colony. In 1985, approximately 54 pairs of black skimmers were identified in the area. A number of heron species utilize the Dune Road Marsh area including the snowy egret, great egret

(Casmerodius albus), black-crowned night heron (Nycticorax nycticorax), and little blue heron (Florida caerulea). Commonly occurring species include Canada geese, herring gulls (Larus argentatus), great black-back gulls (Larus marinus), American oystercatcher (Haematopus palliatus), mallards, sharp tailed sparrows (Ammospiza caudacuta), and seaside sparrows (Ammospiza maritima). Northern harriers (Circus cyaneus) and short-eared owls (Asio flammeus) use the Marsh during the winter.

The Dune Road Marsh is a highly productive area for marine finfish, shellfish and other wildlife. It serves as a nursery and feeding area for marine finfish such as bluefish, winter and summer flounders, weakfish (Cynoscion regalis), as well as forage fish such as Atlantic silversides, pipefish and sticklebacks. Both commercial and recreational shellfishing for mussels and hard clams occurs along the Dune Road Marsh. The diamondback terrapin (Malaclemys terrapin) nests frequently on the marshes inland.

Warners Islands, east of the Ponquogue Bridge, are owned by Southampton Trustees, and are important breeding locations for the state endangered Roseate terns as well as Common terns. They also provide forage habitat and protection for numerous species of other shorebirds.

Gull Island, just west of the Ponquogue Bridge, is a historic nesting site for many species of shorebirds, including the endangered roseate terns, threatened Common terns and gulls. In 1995, it supported the largest great egret breeding colony in the Long Island and New York City regions.

The shallows of Shinnecock Bay provide a healthy nursery area and feeding site for many species of marine finfish, including weakfish, killifish and Atlantic silversides. Local fishermen construct seine nets to catch weakfish especially along the mainland shore of Tiana, Hampton Bays and Shinnecock Hills.

Mecox Bay

Mecox Bay is one of the largest coastal pond ecosystems on Long Island consisting of 1,100 acres, located roughly two miles east of Southampton Village. The area includes Mecox Bay, Mecox Beach, Mill Creek, Hayground Cove, Channel Pond and the adjacent wetlands. The bay itself is predominantly fresh to brackish water, and is a shallow coastal bay (being less than three feet deep at the mean low water) (NYDOS, 1987) with an approximate average depth of between four and five feet. The bay is connected to the Atlantic Ocean by Mecox Inlet, which is opened intermittently by either human engineering or natural breaches. The Mecox Bay system provides valuable nesting areas and feeding sites for various shorebirds and migratory waterfowl. The Bay is important to "…a variety of fish and wildlife species throughout the year" (NYDOS, 1987).

This coastal pond system is an important habitat for marine finfish and shellfish. White perch (Morone americana), soft clams, blue claw crabs and sticklebacks are common. Mecox Bay is one of two places on Long Island that provide commercial fishing for white perch during the winter months between November and March (NYDOS, 1987).

Mecox Bay is a highly significant waterfowl wintering area, and the concentrations of certain species are of statewide significance. Canada geese, black ducks, scaup, mallards, common goldeneye (Bucephala clangula), American wigeon (Anas americana), canvasbacks and mute swans (Cygnus olor) all utilize the Bay system during the winter months from November to March. Record numbers of waterfowl wintering in the Bay have been reported. Least terns and Piping plovers nest in the inlet area and on the ocean beaches, and utilize the mud flats as forage sites.

Moriches Bay Area

The Southampton sector of Moriches Bay forms a significant part of the SSER as it contains approximately 2,500 acres of underwater land. Situated from just east of the

Cupsogue Beach County Park, the Southampton portion of Moriches Bay is connected to the Shinnecock Bay system through Moneybogue Bay, Quantuck Canal, Quantuck Bay and Quogue Canal. The Bay system runs through three incorporated villages: the Village of Westhampton Dunes, the Village of Westhampton Beach and the Village of Quogue.

Moriches Bay provides a highly productive environment for marine finfish and shellfish, as well as other wildlife. The Bay serves as a feeding area and as a nursery (April through November) for bluefish, winter and summer flounder [fluke], tautog, American eel, scup and blue crab. Forage species, such as Atlantic silversides, mummichog, northern pipefish, sticklebacks (Apeltes quadracus, Gasterosteus aculeatus) and striped killifish, utilize the bay system as well. Hard clams, soft clams, scallops and mussels also inhabit the Moriches Bay, which is open for commercial and recreational shellfishing in most areas.

The salt marshes, intertidal flats and shallows provide invaluable nesting and feeding grounds for migratory birds and shorebirds throughout the year. Moriches Bay is considered one of the most important waterfowl wintering areas on Long Island. Waterfowl that commonly use the Bay include Atlantic brant, scaup, black ducks, Canada geese, mallards, buffleheads and canvasbacks. The extent of ice cover is limited each year (NYDOS, 1987), leading to significant wildfowl use. Through midwinter, waterfowl species feed in open water areas.

Before migration in early spring, the birds also feed widely in the adjacent salt marshes.
The Moriches Bay contains five New York State Designated Significant Fish and Wildlife Habitats. These include Moriches Bay, Smith Point County Park, Cupsogue County Park, and a portion of Quantuck Creek and Quogue Refuge. Moriches Bay has also been identified as a significant fish and wildlife habitat by the USFWS (1995).
The barrier beach/dune system is the most dominant feature fronting Moriches Bay (USACE, 1994). The Dune Road area in Westhampton and the Village of Westhampton Dunes is highly developed. Some tidal wetland islands are located within Moriches Bay.

Quantuck and Moneybogue Bays

The area of Quantuck and Moneybogue Bays, including Aspatuck Creek and Moneybogue Bay, collectively comprise approximately 630 acres of underwater land. This estuarine system of open water and emergent tidal marshes is an important habitat for shellfish and finfish, as well as a large assemblage of shorebirds, waders and waterfowl. There are extensive protected tidal wetland holdings owned by the Village of Westhampton Beach and the State of New York in the southeastern reaches of Moneybogue Bay. The headwaters of Aspatuck Creek and Quantuck Creek within the Quantuck Bay are also largely intact, along with tidal creeks and marshes in the southeast part of this estuary.

The fringing coast-lands are largely developed with residential homes, however, density ranges from high in the upper portion of Moneybogue Bay to relatively light along significant stretches of Quantuck. Brown tide has recently impacted Moneybogue and Quantuck Bays, as well as fouling from nutrient enrichment, contaminants and sedimentation. Road drainage systems have been recently revamped in many areas, both in the township and in the Incorporated Villages of Westhampton Beach and Quogue. Still, continued surface water quality improvement through stormwater abatement will be necessary to safeguard living marine resources, both within these smaller estuaries, as well as in the much larger interconnected Shinnecock Bay. Shoreline areas that have been previously bulkheaded need to be considered for restoration, and new dockage needs to be limited to avoid impacts to bay bottoms and SAVs.

Submerged Aquatic Vegetation

Overview

Submerged Aquatic Vegetation (SAV) communities are an essential component to a healthy embayment and therefore are one of the major focuses of current marine protection and management efforts. Beyond providing substrate stabilization, finfish habitats and nutrient cycling benefits, SAV species also afford important habitats for shellfish, and are vital as a nursery habitat for many species of marine finfish. The presence and abundance of SAV beds is used as a quantitative measure of the ecosystem's health.

SAV is defined by the New York Department of Environmental Conservation as "an aquatic plant, either rooted or non-rooted, which grows entirely beneath the surface of the water, except for the flowering parts in some species…" (Ecological Communities of New York State)

Submerged Aquatic Vegetation is commonly composed of members of four phyla: Anthophyta (Sea Grasses), Rhodophyta (Red Algae), Chlorophyta (Green Algae), and Phaeophyta (Brown Algae). SAV can be either macroalgae (seaweed), which are non-vascular, non-rooted cells or cellular colonies, or sea grasses that are vascular, rooted plants.

Local Concentrations

Concentrations of Submerged Aquatic Vegetation occur in the Southampton waters include Tiana Bay, Far Pond, Middle Pond, Old Fort Pond, Heady Creek, Taylor Creek, the Dune Road Marsh, Mecox Bay, Quantuck and Moneybogue Bays, and parts of Peconic Bay. The SAV populations in these areas provide ample suitable habitats for finfish and shellfish nursery habitats.

Due to a number of limiting factors, the precise location and health of these known SAV beds is inconsistent. Research directed at the mapping and monitoring of SAV beds in Shinnecock and Moriches Bays is identified as a priority of the Town of Southampton.

Submerged Vascular Vegetation

***Eelgrass** (Zostera marina)*

The most ecologically valued SAV in Southampton waters is eelgrass (Zostera marina). This rhizome rooted, vascular plant is member of the Phylum Anthophyta (Sea Grasses), and the family Potamogetonaceae, or Pondweed. It's flowers, which are inconspicuous (hidden) are found during the summer on one side of the leaf, enclosed within a sheath. The seed produced is cylinder-shaped. Eelgrass is considered the most important species of SAV due primarily to its high habitat value. The value placed on eelgrass comes from it's function as a highly productive marine finfish nursery, providing hiding spots from predators, a source of food, and a fixed spawning area for many finfish and shellfish species. Blades of eelgrass dampen tidal currents resulting in a low velocity zone within the bed itself. The rooted nature of the plant also stabilize underlying substrates which prevents scouring and erosion of the bottom Eelgrass is also an important food source for many waterfowl and other seashore birds.

In the 1930's, a "wasting disease" severely reduced the amount of eelgrass beds along the East Coast. The disease is believed to have been caused by Labyrinthula zosterae, a slime mold. The eelgrass beds have been extremely slow to recover. Many areas have still not been re-colonized, and small resurgences of the disease have been documented in Long Island tributaries. While it is not the most abundant SAV, eelgrass is the plant most associated with SAV habitats locally.

***Widgeon grass** (Ruppia maritima)*

Widgeon grass is vascular, rooted SAV has limited distribution in local embayments. Being not a true sea grass but actually a freshwater grass that tolerates high levels of salinity, Ruppia maritima grows usually exclusive from eelgrass, although mutual beds have been inconsistently observed. The flowers grow in clusters of between four and six during the middle to late summer months.

Submerged Macroalgal Vegetation

Macroalgae are submerged algal colonies that are neither rooted nor vascular, but are visible to the human eye. Algae are members of the Kingdom Protista (formerly the subkingdom Thallophyta) and are photosynthetic plants. Some varieties attach to the bottom substrates using holdfasts, which are not true roots as in vascular plants, while others are planktonic and unattached. Macroalgae have a lower habitat value and support less finfish and shellfish species than vascular SAV beds. Algal SAV populations may also hinder or destroy beds of eelgrass by depriving the Zostera of sunlight, oxygen or nutrients due to excessive algal blooms.

***Green Fleece** (Codium fragile)*

Codium fragile, or Green Fleece as it is commonly known, is a macroalgae of the Phylum Chlorophyta (Green Algae). First observed in Montauk in 1957, this invasive non-native species of algae has a dominant position in the sublittoral ecosystem. The theory of its arrival is that a shipment of oysters from Europe carried the algae into America. The only limiting factor to its growth is light penetration, allowing it to exist as deep as 40 feet underwater. The body of Codium is a series of interwoven, filaments that are extensions of a very large single cell. Known also as the “oyster thief”, Codium attaches itself to substrates, commonly oyster shells, and as the algae photosynthesizes, it’s body may trap enough gases to become buoyant, carrying the oyster away with it.

***Sea Lettuce** (Ulva lactuca)*

Sea Lettuce (Ulva lactuca) is another green algae. Two cells thick, Ulva may be up to two feet in length. It has a varied shape, but is generally long and broad. Ulva is found densely in quiet bays and salt marshes, and grows attached to a substrate by a small filamentous disc, but is commonly found floating. Ulva presents a problem in some systems as its population expanses reduce the amount of light penetration reaching benthic organisms and fauna.

Fucus species

Fucus species found in Long Island waters include sea wrack (Fucus distichus), rock-weed (F. spirilis) and bladder wrack (F. vesiculosus). Each species commonly have receptacles that are sack-like and are used for reproduction. Normally, Fucus species are found attached to rocky substrates in the intertidal zone, and are connected by disc-like holdfasts. However, it is not uncommon to find floating sea wrack, commonly in salt marshes.

Red Algae (**Phylum Rhodophyta)***

Red algae, which require less light penetration than other macroalgae, may be found at varying depths and strata of the water column. Generally smaller than green or brown algae, members of the phylum Rhodophyta are sometimes very difficult to identify, but make up a large part of overall macroalgal vegetation. Common local species include Irish Moss (Chondrus crispus) and Agardhiella species.

***Irish Moss** (Chondrus crispus)*

A fan shaped seaweed commonly found in the lower intertidal zone, Irish moss is a perennial, which fruits throughout summer and fall. It is bladed, finely filamentous seaweed that holds commercial value as a source of carrageenin, used in toothpaste,

chocolate milk and lotions. Irish Moss often is found attached to shells and rocks along the embayments.

Agardhiella species

Generally coarse, bushy and cylindrical, Agardhiella are commonly found in floating mats in the bays. Also perennial, this seaweed grows well in the shallows of embayments from the low tide line to as deep as 12 feet. Agardhiella commonly attaches to stones or shells but may also be found floating.

Gracilaria tikvahiae

Gracilaria, which is commercially important for producing agar compounds, is found in shallow waters within local bays, generally near rocky substrates. It may also attach to pilings, stones, ropes and shells. Gracilaria may break off, however, and be found in a planktonic state. It is medium sized seaweed that grows quickly during the summer months when water temperatures are in excess of 15°C.

Environmental Importance

American oysters use the SAV beds to attach to during their juvenile state. The bay scallop uses the grass blades to attach during a post-larval period. Many forage fish, including mummichog, Atlantic silversides, and striped killifish, utilize the SAV beds. Finfish use the slowed current of the Zostera as a hiding place, depend on food from the plant in the form of epiphytes and suspended particles trapped by the eelgrass blades, and also spawn in beds where the eggs attach to the blades. The brant is known to feed on eelgrass, and numerous other waterfowl also rely on SAV beds for food.

Limiting Factors

Environmental factors which limit the growth and abundance of SAV populations include water temperature, water clarity, or the amount of suspended particles in the water column, turbidity, and nutrient concentrations. There is a correlation between high nutrient abundance and macroalgal blooms, which reduce the amount of ambient sunlight reaching the vascular plants, such as eelgrass, thus deteriorating their potential. Also, concentrations of dissolved inorganic nitrogen can have adverse effects on SAV metabolism. Other limiting factors include dissolved oxygen levels, excessive grazing and salinity.

Restoration

SAV populations could benefit significantly from stormwater abatement, as land runoff, particularly loading of nutrients and sediments, can cause eelgrass beds to die back. Eelgrass transplanting is currently being undertaken in some East End towns; however, such initiatives have only met with limited success. This may be due in part to poor water quality, nutrient enrichment, siltation, turbidity, and low light penetration; however research into improving and refining SAV restoration methodology needs to continue.

Regulations

Eelgrass beds are protected by the New York State Environmental Conservation Law, Article 25, the Tidal Wetlands Program. This regulates human activity up to six feet below mean low tide in subtidal zones. Locally, eelgrass protection is addressed by the Southampton Trustees Rules and Regulations, with Trustee permits required for any activity, such as docks and moorings, which may impact, directly or indirectly, SAVs.

Information Gaps

The dramatic disappearance of SAVs throughout the South Shore and Peconics is indicative of water quality problems and the declining state of the bays. Priority must be given to restoring these habitats, as these underwater grasses and macroalgal vegetation provide the basis for primary production in the estuary. SAVs filter large quantities of sediments suspended in flowing waters and absorb nutrients like nitrogen and phosphorous, thereby maintaining and enhancing surface water quality. SAVs also absorb wave energy, lessening erosion of shorelines. Young finfish, shrimp, crabs, pipefish and seahorses find shelter in SAVs, and geese and ducks feed heavily at these sites. Larger fish such as striped bass will hunt for food within underwater grassbeds, along with egrets and herons.

Loss of underwater grasses, especially eelgrass and widgeon grass, have historically run as high as 90 percent. While there has perhaps been a slight comeback in some areas, information as to the current extent of SAVs is lacking. The location, abundance and impact of many SAV beds in Shinnecock and Mecox Bays is still undocumented, as is the potential for restoration. Current research into rehabilitation of sea grass beds and vegetation studies in Peconic Bay is providing new insight into the importance and fragility of SAV populations. However, further research is required to fill present information gaps.

Tidal Wetlands in the Town of Southampton

Tidal wetlands represent some of the most highly productive and diverse habitats in the coastal ecosystem. "As a transition zone between terrestrial and open water ecosystems, they are comprised of both low and high salt marsh, mudflats, as well as brackish and freshwater tidal marsh habitats" (NYSDOS, 3/15/99). Approximately 16% of Suffolk County's coastal wetlands are found in the Town of Southampton, consisting of nearly 2,000 acres. Roughly 1,100 acres are in Shinnecock and Moriches Bay (O'Connor and Terry, 1972).

Tidal Wetland Functions

Coastal tidal wetlands are essential components of healthy estuarine ecosystems. The functions of salt marshes include sediment trapping and substrate stabilization, organic material production and discharge, nutrient export, storm wave-energy dampening, and floodwater storage. The marsh area also creates critical finfish and shellfish spawning and nursery habitats, and waterfowl nesting and feeding locations.

Tidal wetlands are also a primary source of large amounts of the organic materials that are found within the embayments. This material is a base for the coastal food chain in the form of decaying organic particles and detritus, which are providers for the secondary production of the surrounding, higher organisms.

Tidal wetland zones include the high salt marsh, low salt or intertidal marsh, salt pannes, salt scrub, coastal salt pond, and mudflats. Specific variation in tidal zone location, tidal activity, plant species, salinity and inundation gradations and other heterogeneous features characterize each marsh zone. Tidal salt marshes are found typically in shallow, sheltered areas, and are located, generally, in strictly estuarine systems.

Low Salt Marsh

Low (or intertidal) Salt Marshes are zones that are flooded by salt water at high tide and are exposed at low tide. The zone is located from the mean high tide to the mean sea level or to about six feet below mean high tide. This low marsh is characterized by the dominant smooth cordgrass (Spartina alterniflora). Achieving heights of up to ten feet, most marshes are homogenous stands of cordgrass. Marine algal species, including knotted wrack (Ascophyllum nodosum), sea lettuce (Ulva lactuca), and rockweed (Fucus vesiculosus), are often found as mats on the sediment between the cordgrass stems. Other plants in the low marsh may include glasswort (Salicornia europaea), salt marsh sand spurry (Spergularia marina) and lesser sea blite (Suaeda maritima).

Clapper rails (Rallus longirostris), willets (Catoptrophorus semipalmatus), seaside sparrows and marsh wrens (Cistothorus palustris) are common birds associated with the low marsh zone. Fiddler crabs (Uca spp.), ribbed mussels (Geukensia demissa) and salt marsh snails (Melampus bidentatus) are commonly found in low marshes, as are mummichogs, at high tide.

The low salt marsh is one zone within the overall coastal marsh ecosystem. As the elevation increases slightly, a gradation into high salt marsh ecosystem is observed. As the elevation decreases, the low marsh grades into intertidal mudflats. Low marsh zones also may occur narrowly along the banks of tidal creeks, which carry salt marsh flow into the estuaries.

High Salt Marsh

High salt marshes are zones that are flooded periodically by spring and flood tides, but are exposed for the remainder of the time. High marshes may extend from the mean high tide up to the limit of the spring tides. The zone is characterized by either salt meadow grass (Spartina patens), or by dwarf cordgrass that is between six inches and one foot tall. Other areas within the zone may also contain sea lavender (Limonium carolinianum), salt

marsh plantain (Plantago maritima), seaside gerardia (Agalinis maritima), spikegrass (Distichlis spicata) and black grass (Juncus gerardii).

Mosquitoes (Aedes spp.), saltmarsh snails (Melampus bidentatus), sharp-tailed sparrows (Ammodramus caudacutus), marsh wren (Cistothorus palustris), eastern meadowlarks (Sturnella magna) clapper rails, and black ducks are common high marsh animals.

Other salt marsh communities occur within the tidal marsh system. Salt pannes are shallow depressions that occur in both low and high salt marsh communities that provide habitat for mummichogs and sheepshead minnows. Salt shrub communities occur along the upper edge of the salt marsh and are predominated by groundsel tree (Baccharis halimifolia), salt marsh elder (Iva frutescens) and switchgrass (Panicum virgatum). These densely vegetated areas usually form a narrow buffering zone between salt marsh and uplands and are critical nesting sites for marsh wren. Tidal mudflats are sparsely vegetated mud or muck beds, which are exposed at low tide. They are frquented by wading birds, oyster catchers, gulls and shorebirds.

Salt Marsh Wildlife

Fish that are dependent upon the marsh for much of their life history include Atlantic silversides, mummichogs, striped killifish, and sheepshead minnows (Cyprinodon variegatus). Fish that utilize the wetlands as nurseries include winter flounder, tautog, sea bass (Centropristes striata), alewife (Alosa pseudoharengus), menhaden (Brevoortia tyrannus), bluefish, mullet (Mugil cephalus), sand lance (Ammodytes americanus) and striped bass (Morone saxatilis).

A number of avian species are commonly found in the tidal marsh system. These include the willet, red-winged blackbird (Agelaius phoeniceus), blue-winged teal (Anas discors), Canada geese, rails (Rallus spp.), herons (Ardea spp.), great egret (Casmerodius albus), snowy egret, glossy ibis (Plegadis falcinellus), terns (Sterna spp.), swallows (Family Hirundinidae), northern harrier (Circus cyaneus) and other hawks and owls.

The mudflats adjacent to tidal wetlands provide habitat niches for ribbed mussel, fiddler crabs, blue mussels and soft-shell and hard clams. The diamondback terrapins, a state listed special concern species, also utilize estuarine channels that wind through mudflats and marshes.

Human Threats in Tidal Marshes

The estuarine wetlands found in the Shinnecock and Mecox Bays are among some of the most important ecosystems found in the Town. Because they serve as commercial shellfish grounds, finfish nurseries, waterfowl wintering areas and water cleansing areas, these tidal marshes are of incomparable economic and ecological value. Yet only a fraction of the wetlands that historically occurred remain. Recreational and commercial development have affected miles of shoreline, mostly through marsh draining, ditching, diking and impoundment, filling, pollution, shoreline hardening and fortification.

Marshes in the Shinnecock and Mecox Bays have historically been altered to achieve a variety of desired results, including controlling mosquitoes, preventing flooding and to increase the productivity of salt hay, which was used as animal feed. Along sections of the Shinnecock Bay Barrier, construction of Dune Road has blocked or reduced the amount of water that enters during incoming flood tides. According to Hruby (1990), roadbeds and railways may fully or partially block marsh areas from tidal currents, while culverts beneath some roadways, which are meant to maintain the tidal activity, often either redirect or block off the flow due to obstruction. These have somewhat different characteristics than other wetlands due to altered morphology. Some of the inherent impacts of tidal flow restriction include alteration of the original marsh size and structure, changes in vegetation, a decrease in water quality and salinity, and in some instances, a encumbrance to certain wildlife species that originally inhabited the system.

Ditching of salt marshes in Shinnecock Bay and throughout the northeastern United States has historically been undertaken as a means to control mosquito populations. Considered to be a nuisance and disease-carrying insect, land managers began to utilize a

method of digging ditches at intervals of between 100 and 150 feet, and cross ditches used to drain standing water. This, in theory, was believed to reduce the breeding habitat for the mosquito. Researchers within the last decade have concluded that the process of ditching may harm the natural ecology of the marsh ecosystem. The impacts of tidal ditching have led to changes in marsh vegetation, and habitat value. As noted by Clark (1985), and supported by other researchers, waterfowl and shorebirds found commonly in unaltered marshes, are typically less frequent in marshes that have been ditched. It has also been observed that salt marsh draining can reduce the submerged aquatic vegetative communities found in high marsh pools. Shoreline erosion rates can also be increased particularly where mosquito ditches intersect with open water.

Diking, or filling in of wetlands, creates impoundments, often increasing flooding in other areas. In the past, diking and impoundment practices were used to increase open water locations that are favored by recreationally important waterfowl species. Although the alteration caused by diking did increase open water habitats, it also allowed for invasion of other vegetation, such as the Common Reed (Phragmites australis), a highly invasive plant. Impoundments have been observed to actually reduce the likelihood of many species of recreationally significant waterfowl, while increasing the mosquito population.

Filling is a process in which a salt marsh is covered by fill, which is generally associated either with dredge spoils from navigable channel dredging, or in an effort to “reclaim” marshland for residential, commercial or agricultural use. Filling often encourages colonization by invasive vegetation, and may completely alter or destroy the natural regime of the original salt marsh.

Pollution may cause damage to salt marshes, thereby changing their structure and function in the embayment system. Pollutants that may have a direct impact on the tidal marshes include oil spills, petroleum hydrocarbon exposure, due to boat traffic and marinas, as well as stormwater runoff. Research has concluded that storm water runoff contains not only hydrocarbons and salts from the road surfaces, but also fresh water

which, when delivered into a marsh system in pulses, may increase sedimentation and may decrease the productivity of the marsh environment. Runoff may disrupt salinity, change the elevation of the marsh, and negatively affect vegetation types found in the marsh.

Shoreline hardening structures may also be traced to wetland degradation. Docks, revetments and bulkheads are devices built commonly in wetland habitats to limit erosion and provide for on-site dockage. Because structures such as revetments and bulkheads deflect the wave energy away from the shoreline, they can cause scouring along adjacent shore faces and at the toe of the bulkhead. Such structures also diminish the landward migration of salt marshes, thus reducing the acreage of wetlands and the potential of the habitat. Over the long-term, hardening structures have been shown to negatively impact upon the function as well as value of salt marsh habitats.

Docks, pedestrian catwalks and walkway platforms are examples of structures that may also be found in marsh systems. Recent examinations of the effects of such building on the productivity of marsh vegetation have shown correlation between dock type and height and vegetative success. The shade caused by dock structures limit the height of vegetation found beneath the docks, dramatically in some cases. In general, man-made structures such as docks, revetments and shoreline hardening devices have been shown to alter the natural vegetation, change natural tidal regimes and disturb the natural morphology of the system through sedimentation and erosion.

Common Reed (Phragmites australis)

Phragmites is an indigenous plant on the northeastern US coast, however an invasive species from Europe is believed to have hybridized with our native Phragmites resulting in an aggressive colonizer which has spread rapidly though marsh ecosystems in America. This invasive species is thought to be morphologically different than the native species, and research is currently underway to enable distinctions to be quantifiably recorded. Due to its ability to thrive in varied saltiness, as well as its height and

reproductive capabilities, Phragmites can easily out-compete other naturally occurring vegetation.

Established Phragmites often grows to 12 feet tall, and may shade out smaller species, such as Spartina alterniflora, S. patens and Distichlis spicata. The slow degradation rate of Phragmites stalks also have been shown to contribute to marsh elevation increases which directly alters the natural vegetation and composition of the marsh zone and system. Due to the woody nature of the Phragmites stalks, an increased chance of fire is present. Additionally, native species of shorebirds that are better adapted to nesting in shorter grasses often decrease in number once Phragmites invades a site. Reeds may also block shoreline vistas for the public due to its height.

Phragmites population control initiatives have been undertaken in some areas with varying success. These include burning, excavation and removal, burying, cutting, and application of herbicides. Many of the techniques used to control Phragmites are expensive, ineffective, costly and/or labor intensive.

National Wetlands Inventory

The National Wetlands Inventory is a project of the United States Fish and Wildlife Service which "produces information on the characteristics, extent and status of the Nation's wetlands and deepwater habitats". This information, in the form of maps, is utilized by many sectors of the public, local, state and federal governments for wetland protection, prioritization and preservation. The Emergency Wetlands Resource Act of 1986 requires the USFWS to map the wetlands of the United States and create a digital database of the information. Based at the NWI National Center in St. Petersburg, Florida, the Wetlands Inventory produced the first statistically accurate estimate of the national wetland areas and losses. The first update was made in 1990, and the next is expected in 2000.

Within the Town of Southampton, the NWI has completed the mapping of areas including Eastport, Quogue, Riverhead, Sag Harbor and south of Sag Harbor, Southampton and Shinnecock Inlet East. The digitizing for most of these areas is currently underway.

The most important feature of the NWI is the ability to utilize the collected information and, using GIS programs, identify and prioritize wetland systems for protection, enhanced management or restoration. The NWI enables resource managers to produce better policy decisions and allows for updated trend analysis regarding habitat loss that may be traced back to factors of environmental concern.

New York State Tidal Wetlands Inventory

The New York State Tidal Wetlands Inventory, maintained by the NYSDEC, uses GIS programs to determine the effectiveness of the New York State tidal wetland program. The program is charged with ensuring no net loss of wetlands, and creating a tidal wetlands trend analysis (TWTA) utilizing the GIS technology. The TWTA is divided into the area south of the Tappan Zee Bridge, and north of the bridge to the Troy Dam. Under the program, the total acres of wetland categories, such as high marsh, low marsh and fresh marsh, are being inventoried. The TWTA is based on aerial photographs from 1989, and site visits were compared to a tidal wetland inventory based on previous aerial infrared photographs.

The ***Shinnecock Bay Wetlands Trends Analysis*** has been completed. Shinnecock Bay showed a net gain of 161 acres of tidal wetlands, which was believed to be a result of a landward movement of the wetland boundaries from 1974 to 1995. According to the NYSDEC study, approximately 21 acres were lost due to natural causes, 15 acres of which were located on islands. Six islands that were originally wetland covered were also destroyed. Based on the analysis, the New York State Tidal Wetlands program was deemed successful in the Shinnecock Bay area. The analysis showed that the main cause

of wetland destruction, which had been formerly man-induced activity, has shifted to naturally occurring storm activity.

The ***Moriches Bay Wetlands Trends Analysis*** is currently underway. According to NYSDEC reports, the Moriches area has shown a net gain of approximately 100 acres of tidal wetlands, resulting from the same reason as Shinnecock. An estimated 2 ½ acres of wetlands were lost due to naturally occurring events, and the causes for most wetland loss has shifted to natural occurrences as opposed to human induced causes.

Restoration

Wetland restoration and enhancement initiatives are currently underway in the Town of Southampton to help maintain and protect the bay systems. Habitat restoration in regards to tidal wetlands can be defined as "the process of returning a significantly disturbed or totally altered site to its previously existing functional wetland condition by some action of man" (EPA, 1993). Restoration may occur through various means depending on site-specific conditions. Some of the methods currently employed include the manipulation of tidal regimes, morphological manipulation, vegetation manipulation, and invasive vegetation control.

Manipulation of tidal regimes includes the alteration of previously dug ditches, removal of tidal gates, and other devices or debris that restrict the natural tidal flow. Dikes and impoundments may be removed, and culverts may be either removed or widened to return the area to a natural state.

Manipulation of the morphology, which includes the alteration of elevation, slope, grade, or contours, may also be employed to restore a wetland habitat. This method is often used in conjunction with tidal regime modifications. Since elevation above the high tide is an important factor regarding a healthy salt marsh, modifying or decreasing the slope and elevation can often be used to accomplish wetland restoration and enhancement goals.

Manipulation of vegetation is another method used to restore marshland. Since it is not uncommon to find a marsh completely overtaken by an invasive species, such as Phragmites, the reintroduction of native plants is important. The methods of re-vegetating an area may include seeding on sites with low wave intensity, or using stems, potted seedlings and plugs.

Invasive vegetation control includes the removal and destruction of invasive species of marsh vegetation, such as Phragmites. Utilizing mowing and cutting methods or chemical control applications, Phragmites populations may be reduced or eliminated all together.

Restoration Projects in the Town of Southampton

In 1995, Cornell Cooperative Extension prepared a comprehensive wetland restoration study for all town-owned degraded wetland sites within the Peconic Estuary for the Town of Southampton. ("Ecological Restoration and Enhancement Potential of Southampton Town-owned Degraded Tidal Wetlands"). This was followed by a similar state funded study effort in 1997, which focused on the South Shore Estuary Reserve. ("South Shore Estuary Wetlands Study"). Invasion by the Phragmites proved to be the most common form of tidal wetland degradation. Shoreline erosion and filling were also found to be common forms of degradation.

These reports identified suitable areas for wetland restoration and enhancement projects. Based on these studies, a total of eleven sites have been targeted by the Town for restoration in the Peconic Estuary and the South Shore Estuary Reserve. These include the Ponquogue Bridge in Shinnecock Bay, Stokes Poges Marsh on Moriches Bay, and Cold Spring Pond off Peconic Bay, Sag Harbor Cove/Paynes Creek and Davis Creek in Little Peconic Bay, among others. Recently, restoration was completed at the south side of the Ponquoque Bridge, including creation of a tidal pool, coastal fresh ephemeral pond and bayside dunes. A coastal trail system and interpretive signage have also been added.

Other restoration efforts have been completed at Sag Harbor Cove/Paynes Creek and at Conscience Point. Restoration activities are also currently underway at Davis Creek.

Regulations

Tidal Wetlands are protected under the Federal Water Pollution Control Act, also known as the Clean Water Act of 1972, as well as pursuant to NYS Environmental Conservation Law, Article 25. Locally, all tidal, brackish and freshwater wetlands are protected under Chapter 324 (Wetlands) of the Code of the Town of Southampton. The Southampton Trustees hold title to most underwater lands and wetlands, and therefore regulate activities occurring in those areas. The federal and state laws protect tidal marshes, littoral zones and shorelines to the depth of 6 feet below the mean low water from destruction or degradation.

A History and Overview of Shellfishing in Southampton Town

History

Historically, the underwater lands of Southampton have supported a major commercial and recreational fishery, which remains a critical part of the economy of the Town today. Prior to the 1950's, shellfishing was undertaken by commercial fishermen during finfish migration, and typically not as a full-time profession. Scallops and oysters were harvested in the fall, and hard clams and scallops were taken during the winter. Over the past 75 years, Baymen from western Long Island moved to the East End to continue their traditional livelihoods. Few, if any, restrictions were placed on shellfish harvesting due to the small amount of full-time shellfish harvesters. The number of Baymen increased during the 1940's and 1950s, and local Towns and the NYSDEC enacted limits on size, amount of catch and harvesting methods. Shellfish regulations began in the Town of Southampton in 1949.

Commercial shellfishing in Southampton currently supports over one hundred people in the Town. In 1998, there were 113 commercial shellfishing permits issued by the Town Trustees. In addition, 1,741 recreational shellfishing permits were issued. In 1999, 114 commercial permits were issued, with 1,380 recreational. Of the full-time Baymen working the waters today, many are finding it difficult to support a family on the income made from shellfishing.

The shellfish stocks have been declining steadily since the 1960s. The causes of the decline are still not proven, but poor natural recruitment, over-harvesting, increased predation, long-term climatic changes in temperature and salinity, and toxic algal blooms, such as Brown Tide, have been identified as possible factors.

Current Status: Shinnecock Bay Shellfish

Typically, the shellfish commonly harvested in Southampton waters include the Hard Clam, Soft Clam, American Oysters, Blue Mussels, and Bay Scallops.

Today, some of the Town's embayments still support a relatively healthy population of shellfish. These areas support small, but nonetheless significant, fisheries. Productive areas still exist in Shinnecock Bay such as Old Fort Pond, Middle Pond, Heady Creek and Taylor Creek. However, hard clam and scallop populations have drastically declined in recent years.

Harvest levels have fluctuated tremendously over the years. In 1964, Southampton shellfish landings hit a low with 18,883 bushels harvested in Moriches and Shinnecock Bays combined. In 1968, 39,643 bushels were landed from Shinnecock Bay alone, valued at almost half a million dollars. The fluctuations are partly because a good set historically occurred every five years. However, prior to 1987, there had not been a substantial set in over ten years, according to hard clam researchers.

Mecox Bay Shellfish: Yesterday and Today

Mecox Bay once supported a strong oyster population, which was actively harvested. While there is limited historical or landing data, the fluctuation of salinity since the early 1980's may pose severe threats to the sustainability of the resource. According to Trustee Jon Semlear, the last "good" sets of oysters occurred in Mecox Bay prior to 1987. However, due to recent re-seeding efforts by the Town Trustees, the current oyster set is substantial. While monitoring continues, considerable information gaps regarding the current oyster population, including density and limiting factors, exist and require additional study. The Trustees currently are undertaking trials of oyster seed introduction within Mecox Bay in an effort to increase the current population.

Currently, as well as historically, the predominant shellfish taken from Mecox Bay include oysters and soft-shell clams. While current population estimates regarding soft-shell clams are unavailable, Mecox Bay is believed to support a relatively healthy quantity.

Southampton Board of Trustees

The Southampton Trustees of the Freeholders and Commonalty of the Town of Southampton hold title to most of the underwater land in the Town of Southampton, and are charged with maintaining and protecting local marine resources. According to the Rules and Regulations for the Management and Products of the Waters of the Town of Southampton (1997), take of shellfish from Southampton waters is regulated "…to protect the propagation of such shellfish, to preserve public peace and good order and to protect the public health and welfare". Any person who is a Freeholder, resident, temporary resident or a taxpayer, and has obtained a permit, may harvest shellfish from the Trustee waters.

Commercial shellfishing permits may be granted to any resident or freeholder over the age of 16 years at the cost of $100, valid until December 31st of the year of issue. To obtain a commercial permit, the applicant must first have "…displayed a current Shellfish Digger's Permit from the New York State Department of Environmental Conservation which indicates an address in the Town of Southampton" (Rules and Regulation, 1997). The harvesting of shellfish by means of SCUBA equipment is prohibited.

No shellfish may be taken between the hours of sunset and sunrise in Southampton waters, and none may be taken from uncertified waters. Specific regulations are in place regarding the harvesting of the different shellfish species.

Hard Clams must measure more than one inch thick and must be taken from the bottom by hand-powered rakes or tongs, not by mechanical means. There is no take limit on hard

clams under a commercial permit, and residential permit holders may take ½ of a bushel of shellfish, of which no more than 100 may be hard clams per day.

Soft Clams must measure more than 1½ inches in length. A shellfish permit holder may take soft clams utilizing any of the hand digging techniques commonly employed (Trustees Rules and Regulations). A commercial permit holder may hand dig and "… employ the harvesting technique commonly known as "churning"(Trustees Rules and Regulations)." Churning is a technique in which a 20 horsepower or less outboard engine is used to stir up the bottom substrate to allow access to burrowed soft clams. Churning through submergent vegetation or within 10 lineal feet of a navigable channel is prohibited.

Oysters may only be harvested by hand with no mechanical assistance. In Mecox Bay, oysters may be only taken by means of oyster tongs, scratch rake, or by an eagle claw 24 inches wide or smaller.

Scallops may be taken in Shinnecock Bay, upper and lower Sag Harbor coves and from "…all waters from Tiana Bay westerly to the westerly boundary of the Town of Southampton at Seatuck" (Trustees Rules and Regulations). Scallops may be taken with a dredge or scrape 36 inches in width or under, and may be mechanically operated, but must be brought aboard by hand power. A commercial permittee may harvest ten bushels of scallops per day. Residential permittees may take one bushel per day.

Crab harvests, such as Blue Crabs or Lady Crabs (Ovalipes ocellatus), are regulated by the Southampton Trustees. Crabs may be taken with a dredge whose mouth is not larger than 36 inches, and may be mechanical, but must be brought aboard by hand. The size of blue crabs is not to be less than 5 inches from point to point, and no females with visible eggs may be taken. There is no limit for commercial permit takes per day, but residential permittees may take no more than 50 blue crabs per day.

Trustees Management and Enhancement Initiatives

The Southampton Trustees, in conjunction with the Cornell Cooperative Extension, undertake a seeding program yearly. Cornell Cooperative was contracted by the Trustees to hatch 2,500,000 seed clams between March 16, 1998 and March 15, 1999. The seed are reared at Cedar Beach in Southold (Marine Environmental Learning Center). Two million clams, approximately 12 millimeters in size, are planted on the bay bottoms, and 500,000 at 5 millimeters in size are placed in the Trustees owned rafts. The cost of the seeds for 1998-1999 is $25,000 and is paid from the Trustees' budget. Cornell Cooperative also rears oysters and scallops as space permits. In addition, in 1998-1999, 200,000 scallop seeds were purchased from Clam Farm fisheries for $7,000.

The Southampton Trustees also transplant shellfish from uncertified areas into seasonal areas in an effort to not only increase the current stock, but also to aid in optimal spawning. Transplants take adult, fecund shellfish and place them in certified waters, thus allowing purification. Transplants take place, on average, twice yearly. After the seasonal areas close, generally in March, local Baymen take clams from the Peconic River and transplant them into the closed seasonal areas. Under the supervision of the Bay Constables and Town Trustees, an average of 10 Baymen can transplant approximately 200 bushels of clams during each event. The Town Trustees compensate the Baymen for their time and expenses.

As mentioned previously, the Trustees program has also used oyster spat to re-seed the Mecox Bay area during 1999. A noticeable increase in oysters was observed in these waters during the season of 2000, and it is widely believed that this increase is due directly to the re-seeding effort. However, no quantifiable assessment has been undertaken to correlate the increase and the re-seeding effort.

NYSDEC Regulations

The NYSDEC is charged with monitoring water quality in all bivalve shellfish growing areas (SGA), and determining whether the conditions are suitable to allow for public consumption of mollusks taken. The NYSDEC, utilizing National Shellfish Sanitation standards (NSSP) allow for the certification and designation of water bodies. The classifications are: Certified (open to harvesting year round); Seasonally Certified (usually open to harvesting during the winter months, independent of rainfall); Conditionally Certified (generally open for winter harvest dependent upon a "trigger amount" of rainfall within 24 hours); or Uncertified (closed year-round). Each of these classifications is based on water quality testing using the total coliform bacteriological standard, which is used as an indicator for the possible presence of pathogens in filter feeding bivalves. Since bivalve shellfish ingest suspended particles, high concentrations of coliform bacteria consolidate within the gut, making human consumption potentially hazardous.

Seasonal shellfish growing areas are generally open during the winter months, usually December through April, and closed during the remainder of the year. Conditional areas are also open during the winter months but may be temporarily closed to harvesting following a period of a "trigger amount" of rainfall specific for the area. Historic NYSDEC water quality monitoring proves that conditional harvest areas are more affected by surface runoff than other sites. The SGA is closed for seven consecutive days given the rainfall does not exceed the "trigger amount". If the rainfall does exceed the "trigger amount", the area remains closed, and returns to the first day of the closure cycle. The cycle continues until seven consecutive days of no, or below "trigger amount" rainfall has been recorded. The current "trigger amount" threshold for conditional areas of Flanders Bays is not more than 0.20 inches, and 0.25 inches for Fish Cove/North Sea Harbor.

Information Gaps

Information needed to manage shellfisheries within the Shinnecock and Mecox Bays is incomplete. Detailed research regarding location and local abundance of shellfish within Trustees waters is needed to ensure that management decisions are based increasingly on sound scientific information. The relationship of adult clam density to larval setting, natural population densities, the relationship between bottom type and shellfish productivity and predation impact on shellfish are all areas which require increased study to fill current information gaps. A quantifiable assessment of re-seeding and other enhancement efforts designed to measure efficiency would also provide invaluable information to the Board of Trustees.

Marine Finfish in the Town of Southampton

Marine Finfish species depend on local embayments as feeding, spawning and breeding habitats, and as general living space. These species play a critical role in the natural diversity, and also represent some commercially important fishes. Two categories of marine finfish occur naturally in the waters of Southampton: Diadromous and Estuarine fishes.

Diadromous Fishes

Diadromy refers to the movement horizontally of fish between freshwater and saltwater habitats for breeding, feeding or other reasons. This life strategy allows fish to obtain reproductive success and enhanced feeding situations. While some species are directly dependent upon local tributaries, other species may only remain here shortly as they spawn or feed.

Within the group of Diadromous fishes, three categories of migration can be observed. First, catadromy refers to the group of finfish that live the majority of their adult life in freshwater habitats but return to saltwater to spawn. The second category is anadromy, which pertains to fish that live mostly in saltwater habitats but return to freshwater to spawn. Finally, amphidromous fish move irregularly between fresh and saltwater, but not for spawning.

Catadromous fishes include the American eel which move from freshwater during late autumn and early winter to migrate to the Sargasso Sea where they spawn. The larvae remain at sea until they mature into a form known as an elver, at which time they enter freshwater tributaries via the estuary.

Anadromous fishes, such as rainbow smelt (Osmerus mordax), river herring (Alosa aestivalis and A. pseudoharengus), brook trout (Salvelinus fontinalis) brown trout (Salmo

trutta), and the sea lamprey (Petromyzon marinus) move from coastal marine waters to freshwater spawning sites. Spawning seasons vary species-specifically.

Estuarine Fishes

Estuarine finfish, including resident species and marine species that spawn in the estuaries, are essential components in the ecosystem's diversity and health. Numerous species of fishes use local estuaries as spawning, young of the year (YOY) and nursery areas, feeding grounds, both primary and seasonal, and as "general living space". These characteristics allow for the designation of local bays, wetlands and tributaries as Significant Coastal Fish and Wildlife Habitats by the New York Department of State (NYDOS, 1987).

Characteristic resident estuarine fish species include mummichogs, Atlantic silversides, striped killifish, northern pipefish, sheepshead minnow, three and four spine sticklebacks and bay anchovy (Anchoa mitchilli). As an essential nursery habitat, the local estuaries are used by commercially and recreationally significant species including summer flounder (Paralichthys denatus), blackfish, black sea bass (Centropristis striata), striped bass (Morone saxatilis), bluefish (Pomatomus saltatrix), Atlantic menhaden (Brevoortia tyrannus), butterfish (Peprilus triacanthus), Atlantic herring (Clupea harengus) and scup (Stenotomus chrysops).

Other fish species use local estuaries as spawn and nursery habitats. Including, among others, the naked goby (Gobiosoma bosci), grubby sculpin (Myoxocephalus aenaeus), winter flounder, white perch, tomcod (Microgadus tomcod), weakfish, cunner (Tautogolabrus adsperus), northern puffer (Sphoeroides maculatus), hogchoker (Trinectes maculatus) and oyster toadfish (Opsanus tau). Certain species, including Atlantic menhaden, black sea bass, bluefish, cunner and northern puffer, spend important developmental stages in local estuaries.

While many species have only limited or no commercial or recreational value, due to sheer biomass, abundance and use as prey for larger fish and birds, forage finfish are vital links in the estuary ecosystem.

Fish Habitat Characterization

As part of the South Shore Estuary Reserve's efforts to delineate estuarine fish habitats along the South Shore, critical finfish habitat types were mapped. In total, nine commonly occurring variations on physical habitat types were recorded, and are used to classify habitats of broad groups of fish communities. These habitat types include Tributaries and Creek mouths, Intertidal Vegetated Marsh-Intertidal Marsh Fishes, Intertidal Non-Vegetated Flats (Sand and Mud), Shallows/Subtidal/Non-Vegetated-Sand (Mud), Shallow/Subtidal/Vegetated-Eelgrass Meadow, Mid-Depth Zones- Sand, Mud, Gravel, and Inlet/Deep/Dredged Subtidal Zones.

Tributaries and Creeks include fresh streams, tidal brackish creeks, tidal flats, wetlands, and coves. Within the Town of Southampton areas such as Heady Creek, Middle Pond, Smith Creek and Aspatuck Creek, would be representative of Tributary and Creek Mouth habitats. These tributaries and creeks are suitable habitats for submerged aquatic vegetation beds including eelgrass (Zostera marina) and Sea Lettuce (Ulva lactuca). The heterogeneous nature of the Tributaries and Creek Mouth habitat type allows for a significant habitat value for a variety of species (SSER, Estuarine Fishes).

The tidal creeks provide nursery areas and protection for a variety of anadromous fish, such as alewives (Alosa pseudoharengus), blue-back herring (Alosa aestivalis), brook trout (Salvelinus fontinalis), brown trout (Salmo trutta), and for the catadromous American eel. The white perch, a semi-anadromous fish, spawns in the creeks and marshes during the spring season. Other fish commonly associated with this habitat type include mummichog, striped killifish, sheepshead minnows and Atlantic silversides.

Potential limiting factors associated with this habitat type are directly related to human impact. Dredge and filling initiatives have been shown impact the salinity and temperature in tidal creeks and tributaries, and thereby impact upon the finfish population directly. As always, pollution impacts upon the habitat, and human disturbance through shoreline bulkheading, dock placement and recreational use may also deteriorate the habitat's sustainability.

Intertidal Vegetated Marsh-Intertidal Marsh Fishes and habitats are composed of the marshlands which occur along bay sides of barrier islands, tributaries and the mouths of coves and flooded shoreline areas. Within the Town of Southampton, this habitat type can be found at the Dune Road Marsh, Tiana Bay and areas of Mecox Bay. Commonly characteristic fish species include sheepshead minnow, bay anchovy, Atlantic silverside and mummichog. These species move in and out of the intertidal habitat with the tide.

Eurythermal species, such as silversides, striped killifish, bay anchovy and mummichogs, are common year round residents in the intertidal zone. Species adapted for survival in the stressful habitat have been shown to have pronounced benefits. However, the effects of human impact are widespread in the habitat, yet many impacts are still not fully understood. According to the SSER technical reports, certain intertidal fish species consume large quantities of mosquito larvae and are subject to unintentional poisoning by pesticides. Dredging and filling initiatives have been shown to impact and limit the productivity of the habitat, as have bulkheading, sediment displacement and deposits and shoreline fortification.

Shallow/Subtidal/Non-Vegetated Sand and Mud habitats are characterized as bay waters, near the shore, from the mean low water line to water one meter deep. Vegetation is common in some of this habitat type, which provides protection for smaller fish species, though almost most of the habitat is unvegetated. Intertidal species enter the shallows when the tide ebbs, and leave when the tide rises and larger predators enter the shallows. Silversides, fourspine sticklebacks, sheepshead minnows, white mullet (Mugil

curema), striped mullet, striped killifish and northern kingfish (Menticirrhus saxatilis) are commonly characteristic species.

In Southampton, Shinnecock Bay's coves are an excellent example of the shallow subtidal zones, and have been noted as being a preferred habitat for Young of the Year (YOY) winter flounders.

Shallow/Subtidal/Vegetated-Eelgrass Meadow habitats are characterized by the eelgrass beds, known as meadows. The most common limiting factor concerning eelgrass distribution relates to light penetration and depth. Therefore, the most common habitat for eelgrass meadows is found in the shallow subtidal zone. Common fish species found within the eelgrass meadows during some part of their life cycle include Summer flounder, American eel, hogchoker, naked goby, menhaden, blackfish, pipefish, hakes and sticklebacks. The Atlantic silverside can be generally found in the eelgrass meadows feeding on plankton during the diurnal cycle, and utilizing the natural predator protection of the meadows nocturnally.

The limiting factors of eelgrass meadows are discussed in the chapter entitled Submerged Aquatic Vegetation, though the importance of eelgrass meadows is noteworthy enough to mention additionally. Based on recent research, the eelgrass meadows have been shown to be some of the most productive areas in the local estuary system. Bulkheading, dock construction, dredging operations and non-point pollution, as well as erosion and shoreline fortification, have been shown to have detrimental effects on the sustainability of the eelgrass meadows. The SSER believes that "the importance of SAV beds as fish habitat combined with the large extent of this habitat type in the estuary warrants particular attention from a fish resource perspective" (SSER).

Mid-Depth Zones - Sand, Mud and Gravel habitat types range from one to seven meters in depth, and are generally the open bay waters. In Shinnecock Bay, the mid-bay depth is greater than three meters. The bottom sediment of open bay areas may include mud, muddy sand, sandy mud, gravel, and rock. In places, many of these sediment types

overlap creating unique habitats for fish species. Composition of the bottom substrate has been linked to species preference. For example, the common species, winter flounder, has been shown to prefer the sand or sandy mud bottom due to the relative ease with which the animal may hide itself under the sand. Therefore, habitat preference is clearly established in this species, and the SSER realizes that "…habitat impacts [for this species] warrant particular attention." (SSER)

Rock and gravel bottom habitats encourage selection by oyster toadfish, scup, black sea bass, wrasses, cunner and blackfish. Other species, such as the little skate, silver hake (Merluccius bilinearis), northern and common sea robins and longhorn sculpin, show little substrate preference and move between sand, mud and rock. Inevitably, the prey fishes, silversides, mummichogs, striped killifish, and anchovy are also found in the open bay waters.

Inlet/Deep/Dredged Subtidal Zones are the final habitat categorization of the SSER estuarine waters. There are three categories of deepwater areas: tidally influenced fast moving inlets, such as beneath the Ponquogue Bridge, the deepwater basin of Shinnecock Bay, and the dredged navigation channels, such as Shinnecock Inlet.

Tidally influenced fast water areas may have habitats suitable for striped bass, bluefish, summer flounder, winter flounder, scup, black sea bass, blackfish, Atlantic menhaden, weakfish and Atlantic mackerel. Also, a number of tropicals can been found in summer months.

The deepwater basins of the Shinnecock Bay are actually a series of interconnecting deep channels that presents a unique situation which is not fully understood. These channels may create a bay very different from the surrounding areas and research regarding the finfish habitats is critical in this area, as according the SSER, "…what habitat differences this area holds for finfish have not yet been determined."

Inlet areas produce a unique condition of bottom substrate, a vital channel for estuarine and marine fish interaction and a suitable habitat for a number of species of finfish. The bottom substrate is ideal for sand eels and bay anchovies, which becomes prey for larger fish. Bluefish and striped bass are common predators, while the black sea bass, scup, wrasses, cunner and blackfish are commonly found in the breakwaters, jetties and groins of the inlets.

Habitat Restoration

Efforts to increase the productivity and successful sustainability of current finfish populations have been attempted through habitat restoration initiatives. This method of management is described in detail in the chapter entitled "Tidal Wetlands in the Town of Southampton". The primary importance, in regards to marine finfish, is in the restoration and rehabilitation of historically productive finfish nursery and spawning sites. Research is currently underway to increase the success of SAV and tidal wetland restoration and rehabilitation.

Regulations

The New York Department of Environmental Conservation (NYSDEC) is the agency responsible for the regulation and conservation of marine finfish and subsequent harvest within the State of New York. The State of New York, according to Article 11, Title 1 (§11-0105) of the Environmental Conservation Law (ECL), possesses ownership of all "…fish… in the state, except those legally acquired or held in private ownership." Regulations regarding finfish harvest within the Town of Southampton are divided up into three sections: regulations concerning recreational take, regulations concerning commercial take and special regulations.

Marine finfish harvested recreationally, which include Striped Bass, Red Drum, Tautog, American eel, Pollock, fluke, Yellowtail flounder, Spanish Mackerel, Cobia, Monkfish, Weakfish, Bluefish, Winter Flounder, Black Sea Bass and American Shad, are regulated

by seasonal openings, minimum lengths, and/or possession limits. For example, striped bass are allowed to be taken between May 8th and December 15th, and must measure a minimum of 28 inches in total length, and a recreational fisherman is limited to keeping one specimen. When the recreational striped bass season is closed, catch and release fishing, by use of angling, is permitted if the animal is returned unharmed and immediately to the water.

Commercial regulations are in effect for Striped bass, Red Drum, Tautog, American eel, Pollock, Yellowtail Flounder, Spanish Mackerel, King Mackerel, Cobia, Monkfish, Weakfish, Bluefish, Winter flounder and Black Sea bass. Regulations for these commercially harvested animals include an open season, minimum length and/or trip limit. For example, the regulations regarding the commercial harvest of Tautog include an open season from April 8 to the last day of February, and a minimum of 14 inches in total length. A trip limit is set at not more than 25 per vessel or not more than 10 per vessel when more than six lobsters are in possession.

Special conditions apply to commercial fishing for Striped Bass, Atlantic sturgeon, Fluke, Bluefish, Winter, Tautog, American eel, Weakfish, Scup and Black Sea Bass. A special condition also applies to summer flounder recreational fishing. These fishing special regulations are specific to the individual harvested species, and are found in the State of New York Codes, Rules and Regulations (Marine Finfish and Crustaceans).

Information Gaps

A considerable amount of information and data has been collected with regards to marine finfish behavior and ecology; however informational gaps do still exist. Areas of research which require increased attention in the future includes identifying the relationship between marine and estuarine habitats and the finfish assemblages that utilize the areas. Population dynamics, as well as the local population distribution of finfish are also areas requiring further investigation locally.

Geographic Information System (GIS)

Town of Southampton GIS

Managing and restoring marine living resources requires detailed knowledge of both ecosystem and manmade components, including shellfish beds, wetlands, submerged aquatic vegetation, biotic communities, waterfowl concentrations, fish runs, bathymetry, navigational channels, public access, moorings, docks, bulkheads, and other shoreline structures. Information on land use is likewise critical, especially details regarding ownership, protected lands, property histories, and existing and proposed development approvals. Gathering and assessing this data, however, can be a huge undertaking, particularly for coastal managers who are faced with making multiple significant resource decisions each day.

Compiling this information into a comprehensive regional data base, in a format which can be periodically updated and made accessible to land managers, is all within the realm of the Town of Southampton's GIS. At present, the Town has developed a Land Manager GIS program that integrates both the Town's land management and GIS databases. This integrated system has enhanced the Town's capability for regulating and managing land use within the Town. It has also facilitated database management. The Town allows full public access to this land use and property-related database through a recently created Geographic Information Systems Professional Services Web Site.

C-RMP GIS

If all of the Trustees records and coastal resource information were integrated with the Town's central database, resource management decisions could be made more efficiently and responsibly. Consequently, one of the goals of the Marine Resources Protection and Management Plan (MRMP) is to expand the Town's existing Land Manager GIS to encompass a management program for its coastal resources as well. This program, the

Coastal Resource Management Program GIS, or C-RMP GIS, will mimic the upgrade and integration of the Land Management database with the GIS, except that it will be specialized for the purposes of the Board of Trustees.

C-RMP GIS Objectives

Working together, the Board of Trustees manage numerous activities for the Town of Southampton and its residents, while the Bay Constables are responsible for enforcing the rules and regulations set by the Trustees. Incorporating the C-RMP GIS will enhance the capabilities of the Trustees to manage coastal resources by accomplishing the following objectives:

1. Assessing property information on a daily basis will be less burdensome, as the GIS will provide for a much more simplified data entry interface which can be easily searched by permit, owner, address or tax parcel
2. Automated reporting systems for generating permits, receipts, account summaries, as well as specialized lists generated by specific queries, will be created.
3. Electronic communication between the Trustees office and the Bay Constables will be provided for, thereby increasing efficiency with respect to inspections of moorings and construction permits, and issuance of impoundments and summons.
4. Automated warning systems that flag properties in violation of a permit will be installed.
5. Archiving of all historical records will be possible, so that all information pertinent to building new docks and piers, etc. can be accessed via the same search methods.

6. Public information maps will be produced to display in the Trustees office, such as the location of the Shellfish openings and closures, public access sites and the beach areas closed due to the Piping Plover and Least Tern Protection and Management program

6. Public information pertaining to marine resources can be provided to commercial and recreational users through internet access.

C-RMP GIS Implementation

The following must be accomplished to implement the C-RMP GIS program:

1. Incorporate the Trustees into the Town's central database using Govern Software to set up a customized Windows data entry interface for all Trustee permitting and reporting activities
    a. Permit types and activities
    b. Fees and G/L accounts
    c. Reports/Receipts
    d. Inspection schedules
    e. Public Hearing Schedules
    f. Links to images and important documents
    g. Links to other departments and GIS
    h. Incorporate the *Rules and Regulations for the Management and Products of the Waters of the Town of Southampton* into the program
2. Introduce program to Board of Trustees to begin entering new permit information into the Town's central database
3. Create and/or acquire GIS datasets relevant to Coastal/Marine Resources
4. Provide access to the Bay Constables to input inspections and violations
5. Enter historical records into central database and set up data archive
6. Add C-RMP GIS to the Town's GIS Professional Services Web Site
7. Set up Public Workstation within Trustees office to provide access to the GIS site

Ultimately the Trustees, clerks and Bay Constables will enjoy a proficient system that will provide a wealth of information very quickly and very easily. C-RMP will aid the efforts of the Trustees to manage coastal resources and to secure the marine environment for its natural inhabitants and the people who reside in the Town.

GIS Marine Resources Data Inventory

Currently the Town utilizes a significant amount of data, collected either in house or acquired by other agencies, which is essential for C-RMP:

- NYS DEC Tidal & Freshwater Wetlands
- NYS DEC Shellfish Harvest Areas
- Local Waterfront Revitalization Plan Boundaries
- NYS Significant Coastal Fish & Wildlife Habitats
- Endangered Shorebird Habitats
- Town of Southampton Public Access Sites
- FEMA Flood Zones
- Town of Southampton Stormwater Abatement Project Sites
- Wetlands Restoration & Enhancement Sites
- Wetland & Shoreland Acquisition Sites
- NYS Natural Heritage Data
- USFWS National Wetlands Inventory
- Town of Southampton Natural Communities
- Land Use & Zoning
- Parcel History (Permits & Approvals)

GIS Marine Resources Data Gaps

The only drawback of a GIS system is that it is only as good as the data that it utilizes. If there are gaps in data, then a management program is not being used to its full potential. Unfortunately there are many pieces of data that are vital to the Trustees that currently have not been acquired or do not exist in GIS format:

- Submerged Aquatic Vegetation
- Underwater Land Substrates
- Bathymetry
- Navigational Channels
- Monitoring Impacts of Hydrodynamic Processes
- Shore Hardening Structures
- Docks, Moorings, Marinas
- Managing Water Quality Trends
- Shellfish Population Dynamics
- Wetlands Restoration Monitoring

C-RMP Needs

The following items are critical in order for the Trustees to implement C-RMP and to fill in the above data gaps.

1. GPS System
   - necessary to inventory all of the Trustee managed databases into the GIS
2. Technical Staff for Field Inventory
   - field inventory requires time and training
   - specialized staff will collect more data in less time
3. GIS Software/Hardware
   - PC for Board of Trustees
   - Database access for Trustees and Bay Constables
   - Color printer for images and maps produced from C-RMP
   - Public workstation for Trustees office
4. Funding

GIS Shellfish Management Website

The Board of Trustees also manages the Conditional Shellfish Program in coordination with the NYS Department of Environmental Conservation (DEC) Shellfisheries Unit of the Bureau of Fish, Wildlife and Marine Resources. Certain bodies of water in Southampton are classified as 'Conditional Areas' which means if the rainfall for the day exceeds the maximum limit, then the conditional areas are temporarily closed to shellfish harvesting until the sanitary condition of the waters are once again suitable for harvesting.

To increase efficiency, the Trustees plan to implement an internet based GIS Shellfish Management program. The program will be set up to automatically update the GIS Shellfish Harvest Areas Map as to which harvest areas are open or closed for that day.

Both the Trustees and the NYS DEC will have access to the web site to make these daily updates concerning conditional, seasonal and emergency closures and/or openings. This GIS web site will also be available for public viewing at a workstation located in the Trustees office, as well as at home to the local fisherman, Baymen, and recreational shellfishers who would be interested in this information.

SAV Mapping

Another critical component of the GIS objective for the MRMP is to locate, identify and map the existing Submerged Aquatic Vegetation beds (SAVs) within Town waters. The NYS Department of State's Division of Coastal Resources provides tremendous GIS support to other state and local agencies throughout New York. As part of their continuing efforts, there are tentative plans to undergo a comprehensive SAV mapping project for the South Shore Estuary Reserve (SSER) of Long Island, New York. This project will be a cooperative effort of several agencies, lead by the National Oceanic and Atmospheric Administration's (NOAA) Coastal Change Analysis Program (C-CAP), and including but not limited to both the State and local governments within the SSER, and Long Island University's Southampton College.

C-CAP is designed to monitor significant changes in submersed habitats using coastal aerial photography and field data, which can then be interpreted and integrated with other GIS data. The ultimate objective of this effort is to a national database to record habitat change.

The methodology for mapping SAVs will mirror the C-CAP protocol, aside from a few exceptions, as described in chapter 4 of the *NOAA Coastal Change Analysis Program (C-CAP): Guidance For Regional Implementation, NOAA Technical Report NMFS 123, Department of Commerce* (http://www.csc.noaa.gov/ccap/protocol/protocol.html).

A multitude of parameters must be taken into consideration when planning an aerial survey of submersed habitats. Environmental conditions, weather, water quality and tidal flux are just a few factors which can greatly influence the quality, or lack thereof, of

aerial photographs which in turn will optimize the quality of the data. Aerial surveys should not only follow NOAA's Implementation Guide, but also the protocol employed by their Photogrammetry Branch (1980) to ensure the highest quality photographs, and minimize the underestimation or misinterpretation of SAVs.

Interpreting SAVs from aerial photos is a task requiring extensive training, experience and patience. Most likely, stereoscopic equipment will be used to interpret and digitize definite SAV habitats directly from the aerial photos. Digitized habitat polygons will be georeferenced to the Suffolk County Real Property Tax Service GIS Tax Parcel base map, State Plane 1927, New York, Long Island Projection. Areas in which the deepwater edge of the SAV beds cannot be established directly from the photos will require some method of field verification. The sophisticated depth sonar, called Roxanne, is a relatively new method of classifying the bottom texture of underwater lands. Prior to Sonar based technology, underwater videography or SCUBA were the preferred methods for collecting field data. In cooperation with the Massachusetts Department of Environmental Protection, C-CAP just recently completed the mapping of SAVs along the Massachusetts coastline, using underwater videography for field verification. Because this is a new method of delineating submersed vegetation, Roxanne will be tested and calibrated in areas of known SAV beds in Massachusetts's waters.

Additional resources must be used in the interpretation process because it is unlikely that all photos will be captured under perfect conditions. Historical data and photographs, charts, and local knowledgeable individuals will all be useful in the interpretation process. The Town of Southampton, Southampton Town Trustees, Long Island University at Southampton and Cornell Cooperative Extension have all expressed interest in providing support for this project.

Once gathered, this data will be integrated with the Town's GIS which will allow for a better understanding of the man-made changes occurring in Southampton's coastal habitats and to identify causal linkages between these changes and the impacts they are having on our marine resources.

MRMP Maps

As part of the Town of Southampton's Marine Resources Management and Protection Plan (MRMP) and the Local Waterfront Revitalization Plan (LWRP), the Town has utilized the existing Land Manager GIS to produce maps related to both plans.

Maps of Shinnecock and Mecox Bay included in the MRMP are:

- Significant Coastal Fish and Wildlife Habitats, NYS Dept. of State, and the Piping Plover and Least Tern Habitat Protection Sites, NYS DEC Fish & Wildlife Service and the Town of Southampton
- Aquatic Habitat Restoration and Non Point Source Abatement and Control Projects, Town of Southampton
- Public Access Sites, Town of Southampton
- Shellfish Lands, NYS DEC
- Local Waterfront Revitalization Plan Waterfront Area Boundaries, NYS DOS
- Tidal and Freshwater Wetlands, NYS DEC
- National Wetlands Inventory, US Fish & Wildlife Service
- Natural Communities, Town of Southampton

Southampton Board of Trustees

Town of Southampton

Marine Resources Protection and Management Plan

Recommendations

The Southampton Trustees

The Board of Trustees of the Freeholders and Commonalty of the Town of Southampton, hold title to the underwater lands in Shinnecock and Mecox Bays, and parts of Peconic and Moriches Bays, and thus are charged with overseeing the protection and management of marine resources. The Marine Resources Protection and Management Plan (MRMP) proposes an array of actions which are intended to be implemented by the Trustees in cooperation with Southampton Town. These recommendations are specific and concrete proposals, which are designed to enhance the ability of the Southampton Trustees to protect the marine resources, and will provide, increased management control on the part of the Trustees.

GIS

Geographic Information Systems (GIS) are becoming particularly useful to coastal managers because of the need to consider a wide range of bio-geographical information when management decisions are made. The Southampton Trustees were to have had GIS capabilities by 2000, however funding and staffing is limited. Nonetheless, a few steps have been taken toward establishing a GIS-based Coastal Resource Management Program (C-RMP) for the Trustees.

A GIS based web site has been developed to provide interested parties with information regarding the status of openings and closings of shellfish harvest areas. This website would lay the foundation for increased efficiency in management of the natural resource and provides an outlet for useful public information located on the Southampton Trustees' web page. By utilizing GIS spatial mapping it is possible to create a database of information on numerous aspects of the marine natural resources in the Town of Southampton. These data sets allow for more effective management initiatives and may be integrated into many aspects of the Trustee's coastal program.

Recommendations

- ***The Southampton Trustees should implement the GIS-based shellfish harvest status website, as it would increase efficiency with regard to Trustee-NYSDEC coordination***

of shellfish area opening and closures, as well as enhance communication with commercial and recreational harvesters.

A shellfish harvest website model was developed by the Southampton Trustees, the Town's Department of Information Systems and Department of Land Management, and was presented at the 1999 Northeast Coastal Managers Conference held in Southampton. The website, which is designed to inform local Baymen and interested parties about emergency closures of shellfish lands in an effort to increase public dissemination of information, was received favorably by all attended. This website update has not been implemented due to time constraints, and should be considered a priority.

- ***The Southampton Trustees and Town of Southampton should cooperate to create a GIS-based map of critical underwater shellfish and finfish habitats, as well as tidal wetlands and submerged aquatic vegetation.***

This information can be utilized to increase management efficiency of the marine natural resources, allow for designation of sanctuary areas, prioritization of protection and management of critical areas, and identification of potential habitat restoration sites. Underwater mapping of estuaries is becoming a critical resource management tool.

- ***The Town of Southampton should seek to obtain a Global Positioning System (GPS) device in order to increase the ease and efficiency by which information may be mapped for later GIS analysis.***

There is a clear necessity for the procurement of a Global Positioning System device in order for the Town and Trustees to carry out the recommendations and pilot projects incorporated in this document. With the need for accurate positioning and GIS mapping required inherently in the vast majority of the C-RMP data collection plan, securing a GPS device is of the highest immediate priority.

- ***GIS mapping should be used to integrate other water resource data, including water quality information, wetland locations, bottom substrate composition, hydrology and sediment transfer, to create a marine resource database and identify information gaps.***

The Town's C-RMP (Coastal Resources Management and Protection) Project should continue to incorporate Trustees data, Land Management applied research data, water quality monitoring information, and GIS overlay information to form a comprehensive database upon which future management decisions can be based.

- ***A GIS based database to monitor the trends in shellfish and finfish populations should be created.***

This database would allow for sound management practices as well as highlight specific areas that require either attention or rehabilitation, focusing potential restoration efforts into pre-defined and quantified areas. A quantifiable approach to shellfish and finfish restoration is essential in order to ensure the effectiveness of enhancement efforts.

Comprehensive Shellfish Management Plan

The Southampton Trustees should implement a comprehensive shellfish management plan to enhance the shellfish productivity and abundance, increase the sustainability of the resources and to better enable the Trustees to protect and manage critical shellfish habitats.

Recommendations

- ***The Town and Trustees should develop a comprehensive shellfish management plan for Shinnecock Bay to promote the sustainability of the resource, and identify areas for specific enhancement.***

The Trustees should formulate appropriate policies and legal framework for shellfish management. These policies should guide all phases of management, enhancement and use of shellfish grounds and promote scientifically sound management practices and sustainable harvest. Management decisions and practices should consider population surveys, examinations of protective sanctuaries and the establishment and management of protected shellfish sanctuaries. Scientific research in all of these vital areas should be supported and used in decision-making. The Trustees should establish institutional mechanisms, which allow for consistent implementation, funding and analysis for shellfish management efforts.

- ***The Town and Trustees should perform an initial population sampling study of shellfish within Shinnecock Bay.***

Many local towns perform shellfish population sampling surveys, for instance Islip, and Brookhaven, which provide information on the abundance, health and dispersal of the resource. By gaining such information, management can be fine-tuned to produce a more equitable long-term harvest. This initiative should be of the highest priority.

- ***The Southampton Trustees should explore the use of crop rotation, alternate openings and closings of shellfish areas and the creation of sanctuaries in Trustee waters based on the information provided by a shellfish population study.***

The management approach of alternate openings and closings of shellfish harvest areas has been successfully utilized by other Long Island towns. The alternation of harvestable areas is similar to the fallow field approach of agriculture, in which areas are left dormant to allow for undisturbed setting of the shellfish larvae, and their growth to a market size. Sanctuaries provide a higher number of spawning chances due to a large number of clams in specific area of one another. Other towns have also utilized sanctuaries across New York to increase shellfish populations. This initiative should be based on scientific evidence provided by the shellfish population study.

- ***The Southampton Trustees should investigate bottomland manipulation, such as shelling and churning, in order to quantify their impacts and make determinations regarding regulations.***

Positive manipulation of underwater lands has been shown to improve larval setting and protection from predation for native shellfish species. Projects have been undertaken in local towns in an attempt to demonstrate the beneficial affects of shelling and other bottom manipulation, and the results should be examined before development of pilot projects begins in Southampton.

- ***The Southampton Trustees and Town of Southampton should explore the feasibility of the establishment of a shellfish landing facility.***

A landing facility, where the amount of shellfish taken from Trustee waters can be measured and inspected for contamination, should be developed. The information derived from such an operation would be extremely beneficial in monitoring the efficiency and productivity of any management initiatives undertaken. The facility may also be utilized as a shellfish market for wholesale, in which Baymen may bring their wares for wholesale with economic incentives.

- ***The Southampton Trustees and Town of Southampton should explore the feasibility of the establishment of a water quality monitoring facility within the Town.***

A facility to test and monitor the health of local waters should be developed. This operation may, if undertaken with the cooperation of other local towns and agencies,

provide the ability to assist the NYSDEC in monitoring for such programs as the Conditional Shellfish harvest, thus allowing for more areas to be managed conditionally by the Town Trustees.

• ***The Southampton Trustees should explore the promotion of the harvest of alternative shellfish species, with specific emphasis on crab populations, for commercial use.***

Crabs are believed to be a significant predator on hard clam populations. In recent years, the abundance of crabs in Southampton waters has increased dramatically. It may be possible to draw correlations between the increase in crab populations and the decline in hard clams. Therefore, it is recommended that the possible harvest for commerce of crabs be explored in depth. If the decision is made to proceed, however, a management plan should be drafted to manage the population of crabs to prevent over-utilization.

•***The Southampton Trustees should explore the option of licensing sites for the establishment of private aquaculture.***

The introduction of commercial, private utilization of underwater lands for use as aquaculture rack locations should be explored as possible management strategy. This option would create revenue for the Trustees as well as provide local Baymen with the ability to enter into commercial aquaculture, a field that provides significant commercial gain to many other local areas. Aquaculture also alleviates the stress on the natural stocks of commercially valuable shellfish and has been shown to improve surface water quality.

• ***The Southampton Trustees should enhance their seeding program with emphasis on rehabilitating low productivity areas based on scientific investigations.***

Recent science has concluded that seeding projects are considerably more effective if they focus on specific areas which require revitalization as opposed to a bay-wide program. To achieve optimal survivability, the recommended seed size is between 15-20 mm. Enhancement locations and activity should be contingent upon Brown Tide and stormwater abatement research and control efforts.

<u>Develop Strategies for Maintaining and Managing Critical Finfish Habitat</u>

Finfish utilize the tidal wetlands, embayments and creeks as spawning and nursery grounds, as protection from predators and as a source of food. Due to direct and indirect human impacts on the littoral zone and the watershed, a decline of finfish may be partly

traced back to local waters. It is, therefore, important that the Town and Trustees agree to protect and recognize the importance of critical finfish habitats.

Recommendations

- ***Prioritizing the protection of critical nursery and fish runs that are identified by GIS mapping and USFWS should be a component of the C-RMP.***

Areas deemed critical by the SSER, PEP, Trustees, Town and other agencies, should be mapped and site-specific management plans developed to enhance their protection.

- ***The Southampton Trustees and Town of Southampton should develop strategies for protecting and managing critical finfish areas.***

The potential for restoration of prime finfish habitats should be assessed and funding sought to begin capital projects. Shoreline fortification in areas identified as high priority finfish habitats should be restricted or prohibited, especially in historically and currently productive spawning areas.

- ***The Town of Southampton should seek a no-net increase in shoreline hardening structure, especially bulkheads, within critical areas of the local embayments.***

Recent research has shown that eelgrass beds, which provide critical finfish and shellfish habitats, may be impacted by the increased wave energy and alteration of hydrology that can be directly linked to shoreline hardening structures, may create a serious detriment to the system as a whole.

Establish a Marine Resource Advisory Committee

Recommendation

- ***The Southampton Trustees should create a Marine Resource Advisory Committee.***

The committee would be made up of Southampton Trustees, Town, Local Baymen and representatives of the local research community. The committee would be responsible for the development of a water-quality monitoring program for the local waters, the production of a means to chart the progress of natural resource abundance with regards to restoration projects, and promotion of the enhancement of and education about commercial shellfishing. Such a committee could also aid in identifying information gaps and the prioritization any future applied research.

Designations

Recommendation

- ***The Mecox Inlet mudflats, Middle Pond Inlet should be designated as Town and Trustees maintained bird sanctuaries pursuant to Article IV (Sanctuaries) of the Trustees' Regulations.***

Due to high number of wild birds, waterfowl, migratory and nesting shorebirds which utilize these areas, and the significant natural communities within the Mecox Inlet mudflats and Middle Pond Inlet should be designated as protected bird sanctuaries. Hunting, 4x4 vehicles and any other significant disturbances should be prohibited in these areas.

- ***The Town of Southampton and Southampton Trustees should explore the preservation of marine biodiversity and sensitive coastal ecosystems by designating specific local sites as protected marine sanctuaries, and promoting local eco-tourism within such sites.***

The designation of selected underwater areas along Southampton's coast as marine sanctuaries is recommended to maintain the native and natural ecological potential as nursery sites, spawning sanctuaries and scientific reserves. The encouragement of local ecological-based tourism, including underwater tours, SCUBA diving, wildlife viewing and photography and boat tours, would provide economic diversification to local businesses, such as had occurred in Key Largo, Florida following the designation of a local marine sanctuary there. Negatively impacting activities, such as excessive boat and personal watercraft traffic, dredging and vessel waste discharge would be strictly prohibited in the protected areas, thereby providing a natural and scenic underwater environment.

Habitat Restoration

Habitat restoration is a widely accepted management strategy in which an ecosystem that has been altered by human causes over time is restored to its pre-existing ecological conditions. Habitat restoration is currently being undertaken at a number of sites across the Town of Southampton.

Recommendations

- ***The Southampton Trustees and the Town of Southampton should identify underwater sites for possible non-destructive eelgrass restoration.***

Restoring submerged eelgrass beds may aid in the productivity of the natural resources in the bays. It provides protection for nursery finfish and shellfish, and is an essential component in the maintenance of various components of embayment dynamics. Using GIS it is possible to map specific areas to determine the feasibility of such projects. Any activities regarding eelgrass restoration or enhancement should be undertaken with cultivated, not transplanted, specimens. Future placement of underwater aquaculture racks should be considered, as such practice has been linked to an increase in eelgrass beds in other areas of the Atlantic Coast, due to the reduction of wave energies.

- ***The Town of Southampton and Southampton Trustees should continue to implement the Town Wetland Restoration Program with enhanced pre and post construction monitoring.***

Continuing the successful Town program of tidal wetland restoration has a positive impact on the finfish nursery community, and the program should continue. Monitoring efforts should be developed using NYSDOS protocols to determine, quantifiably, the effectiveness of such undertakings.

- ***The Town of Southampton and Southampton Trustees should work in cooperation with the NYSDEC, USFWS, Audubon Society, Army Corps of Engineers, US Geological Survey, Suffolk County and other interested agencies in undertaking Open Marsh Water Management (OMWM) and other wetland restoration initiatives which manage mosquitoes and create finfish habitat.***

Open Marsh Water Management is a technique that restores natural drainage to grid-ditched tidal wetlands allowing for an increase in the habitat and territories of marsh finfish, while managing for mosquitoes without the use of pesticides. OMWM techniques are being refined locally and across Long Island and are presenting a significant advance in mosquito control, and should be explored and supported by the Town and Southampton Trustees.

• ***Areas of historic nesting of endangered birds, including Piping plovers, Least terns and Roseate terns, as well as Ospreys, should be restored and enhanced to attract increased nesting.***

In cooperation with the USFWS, NYSDEC, Suffolk County Parks, US Army Corps of Engineers, Suffolk County DPW and other interested agencies, sites which historically supported nesting shorebird populations should be restored. Specific locations, such as Clam Island and Warner's Islands, should take first priority and should be restored as soon as possible to their historic conditions.

Aquaculture

Public and Private aquaculture is an important component to management in many other Long Island towns. Some research has suggested that local populations of hard clams may not be able to rejuvenate themselves without human intervention.

Recommendations

•***The Southampton Trustees should promote aquaculture pilot projects designed to alleviate stress on natural stocks, as well as private aquaculture projects, within the Town.***

Aquaculture programs have proven to be successful undertakings for other East Coast townships, providing a diversification of industry, relief of fishing stress on natural stocks, improved water quality and increased profitability for residents. Pilot projects designed to introduce and determine the feasibility of aquaculture initiatives should be explored as a component of the MRMP implementation.

•***The Southampton Trustees should promote the creation of a cooperative wholesale shellfish market to facilitate the local sale of commercial shellfish.***

Providing a centralized location for the sale of commercial shellfish taken in Southampton waters may provide a high-profile and economically sound method of promoting local shellfish. A wholesale market to which local Baymen could bring their wares would also allow for increased marketability of, and education about, local coastal resources.

Research

Research is a fundamental key to any management plan. Population surveys allow managers to know what resource areas require specific care, as well as present an overall picture of the difficulties in managing the resources.

Recommendation

- ***The Southampton Trustees and Town of Southampton should actively support and promote research and assist in the collection of scientific data from Town waters***.

The Trustees and Town should promote and aid in scientific research regarding natural resources in its waters, as such studies would enhance management capabilities.

Community Outreach

Greater community awareness and education regarding marine resources is needed. Community outreach programs aid in increasing public awareness, and protecting and managing natural resources.

Recommendations

- ***The Southampton Trustees and Town of Southampton should enhance community outreach regarding marine natural resources.***

Enhancement of marine education about resources found locally would include outreach regarding recreational shellfishing regulations, specifically regarding uncertified areas, developing a permanent display at Town Hall showing marine resource use, and increases direct cooperative education in local schools.

- ***The Southampton Trustees should use their updated web site to increase public information.***

The web site for the Southampton Trustees should be updated and enhanced to increase the amount of educational information that may be accessed by the public. Recommended upgrades include a link to the Trustee codes, a link to the shellfish harvest advisory page, links regarding piping plover information and tide information.

- ***The Southampton Trustees and Town of Southampton should develop a marine education facility within the Town to provide increased community outreach.***

As a cooperative effort, the Trustees, Town, State, County and other interested agencies, should develop and create a marine education facility within the Town. This facility

would improve the means of transmitting important coastal information and education. Such a facility exists in the Town of Brookhaven, which also operates a public aquaculture operation and marine park on-site. An educational facility also provides an optimal location for local water quality research and monitoring. Such a project should be viewed as a high priority and could be accomplished in conjunction with establishment of an aquaculture facility to all parties involved.

• ***The Town of Southampton and Southampton Trustees should create a Southampton Coastal Heritage Trail system to foster public appreciation, education, understanding and enjoyment of significant natural and cultural sites associated with Southampton's coastal area.***

The creation of a coastal trail system would serve to increase public awareness and appreciation for marine ecology and wetlands restoration initiatives town-wide. Southampton's waterfront could benefit from the establishment of a network of trails, educational centers and interpretive stations, as the town has many miles of shoreline and public lands which offer unique attractions for residents and visitors. Creation of a coastal trails system would also help to promote the area's recreational pleasure and business opportunities and thus expand upon the existing tourism base. Similar trails exist at Ponquogue Bridge in Shinnecock Bay, and are identified as critical components of the South Shore Estuary Reserve Comprehensive Management Plan (SSER CMP).

Southampton Board of Trustees

Town of Southampton

Marine Resources Protection and Management Plan

Priority Protection Initiatives and Capital Projects

Priority Protection and Management Initiatives

The immediate objective of the MRMP should be to prioritize the recommendations set forth in the plan with clearly identified objectives, goals, targets, strategies and measures and identify potential funding sources for implementation.

Following are those capital projects and management initiatives that need to be undertaken in the fiscal years 2001-2005. These initiatives are designed means to fill current information gaps, develop Best Management Practices (BMPs), or address issues that presently hamper management and environmental protection locally.

Project Name: *Town of Southampton* ***GPS Acquisition***
Project Name: *Town of Southampton* ***Shinnecock Bay Shellfish Population Survey***
Project Name: *Town of Southampton* ***Shinnecock Bay Aquaculture Feasibility Study***
Project Name: *Town of Southampton* ***Aquaculture Outreach Program***
Project Name: *Town of Southampton* ***No-Discharge Zone Pump-Out Boats Acquisition***
Project Name: *Town of Southampton* ***SAV Mapping Initiative – Shinnecock Bay***
Project Name: *Town of Southampton* ***Endangered Coastal Species Outreach Program***
Project Name: *Town of Southampton* ***Roseate Tern Habitat Restoration – Shinnecock***

Project Name: **Town of Southampton GPS Acquisition**

Project Description: The purpose of this project is to acquire a Global Positioning System (GPS) and to train necessary staff members in its application for the Town's coastal program. The GPS device will be used to inventory shoreline hardening structures, docks, moorings and public access sites, as well as for mapping reference sites for wetland restoration monitoring. Long-term uses include mapping the locations of potential eelgrass restoration sites, delineating wetland boundaries and locating shellfish population survey stations.

Unit: Trimble Pro-XR-Beacon, training and "Pathfinder Office" software

Estimated Total Project Cost:	$19,500
Estimate Local Match:	$9,750

Potential Funding Sources:

State Environmental Protection Fund (EPF) Local Waterfront Revitalization Program Grants (LWRP) FY 00-01

Project Benefits:

The acquisition of GPS device would allow for the precise mapping for analysis and management guidance of critical areas, structures and locations to be combined with current GIS applications. A GPS unit is also crucial to the completion of the C-RMP program, which is slated to begin in late 2000.

Role in Implementing MRMP and SSER CMP:

- Accelerate Public and Private Efforts to Manage and Restore Habitats
- Complete the Inventory and Analysis of Existing Public Access and Recreation Sites and Identify Other Shoreline Sites with Potential for Expanding Public Access and recreational Opportunities
- Complete the Inventory and Analysis of Historic and Cultural Resources and Formulate Recommendations for Their Protection and Enhancement
- Design and Undertake an Estuary-Wide Surface Water Quality Monitoring Program…that Provides Data for Water Quality Modeling

Project Name: **Town of Southampton Shinnecock Bay Shellfish Population Survey**

Project Description: This project is designed to refine methodology which will provide a quantitative, reproducible assessment of the open water shellfish population of selected areas of Shinnecock Bay. The goal is to fill information gaps in health of the local population of shellfish and to provide the Southampton Trustees and Town of Southampton with the current status of the commercially important local shellfish. All information collected from such surveys will be strictly utilized by the Southampton Trustees, Town of Southampton and New York State Department of State for management considerations. The project will utilize methodology designed by Dr. Stuart Buckner and Barry Andres to survey an area of approximately16,000 square feet, representative of the larger Shinnecock Bay. Contractual services will be sought for use and operation of the barge. Trustees technical personnel will be utilized to coordinate the data collection and analysis. All work will be conducted under the joint supervision of the Southampton Board of Trustees and Town Department of Land Management.

Method: Using GIS maps, the research area will be divided into a grid equal to 1,000 feet. Each grid will then be numbered, and a station determined at random within the grid. A GPS reading will be taken and recorded for each station to ensure reproducible results. A total of 32 stations will be sampled. The sampling period will last for five days, after which the information will be analyzed in-house. Duplicate samples will be taken from each station, and sediment type will be recorded. Opening the clamshell bucket's mouth fully, it is then lowered into the sediment. By regulating the distance of bucket free-fall, the operator is capable of consistently sampling to an approximately uniform depth. In trials, sediment penetration averages 38 cm. (14 inches) using this technique (Buckner & Andres, 1978). The sample will be deposited into the "cull box" and washed through a series of screens using the high-pressure hose. Two screens, the first designed to break up the sediment sample, and the second to retain any shellfish in the sample, will be 2.5 cm x 3.8 cm (1" x 1.5") and 0.64 cm (0.25") respectively. Any shellfish collected will be measured and counted with their location and abundance reported on a GIS based map using the GPS station coordinates.

Estimated Total Project Cost: $19,000
Estimated Local Match: $9,750

Potential Funding Sources: State Environmental Protection Fund (EPF) Local Waterfront Revitalization Program Grants (LWRP) FY 00-01

Project Benefits: This procedure has been shown to be highly effective in quantifying the estimated population size and dynamics for use in shellfish management and enhancement. Shellfish population surveys are undertaken by many local municipalities, including Brookhaven and Islip, and are widely recognized as crucial endeavors for effective shellfish stock management.

Role in Implementing MRMP and SSER CMP:

- Accelerate Public and Private Efforts to Manage and Restore Habitats
- Conduct Research on the Condition of the Estuarine Ecosystem and Means to Restore Lost or Impaired Ecological Functions.
- Restore the Estuary's Molluscan Shellfish Resources
- Conduct Applied Research to Address Critical Information Needs Regarding Shellfish Populations

Project Name: **Town of Southampton Shinnecock Bay Aquaculture Feasibility Study**

Project Description: This project is designed to examine the impacts, benefits and issues surrounding a pilot project to allow cottage style commercial aquaculture in Southampton Town waters. Specifically targeting the Shinnecock Bay area, the Feasibility Study would be used to examine the viability of endorsing aquaculture by addressing biological, economic and management concerns.

Reason for Project: The noticeable decline in harvestable stock of commercially important shellfish has been observed within Trustee-owned waters in the Town of Southampton. During this period, a number of developments in the field of aquaculture, including an increase in support and education for aquaculture, has allowed for more local commercial fishermen to undertake small-scale aquaculture operations. The implication of the decline in native stock and the increase in aquaculture viability in other local areas has promoted the expansion of such operations into Trustee-owned waters. The Board of Trustees have concluded that investigation is required to examine and report on the feasibility of authorizing the use of Freeholder waters and bottomland for private aquaculture, and to identify practical actions that the Board of Trustees can take in order to address the issue of such authorization.

Method: The Southampton Board of Trustees and the Town's Department of Land Management will jointly undertake this project. The first phase will be the completion and national distribution of a Request for Proposals (RFP). The RFP response will be used to determine a qualified consultant, who will be awarded the contract. The results of the completed study will be used to determine the future of private use of Town waters for commercial aquaculture. If deemed feasible, the document authors will also be required to provide in depth management and regulation recommendations, and address liability and health and safety issues associated with local aquaculture.

Estimated Total Project Cost:	$96,000
Estimated Local Match:	$48,000

Potential Funding Sources: State Environmental Protection Fund (EPF) Local Waterfront Revitalization Program Grants (LWRP) FY 00-01

Project Benefits: This project will benefit the local Baymen, the estuary and the local economy by determining the most efficient and well-managed use of Town waters for controlled, commercial use. This study will provide a blueprint for sound aquaculture management in the long-term.

Role in Implementing MRMP and SSER CMP:

- Conduct Research on the Condition of the Estuarine Ecosystem and Means to Restore Lost or Impaired Ecological Functions.
- Restore the Estuary's Molluscan Shellfish Resources
- Conduct Applied Research to Address Critical Information Needs Regarding Shellfish Populations
- Manage Shellfish to Achieve Optimal Harvests Consistent with Resource Productivity

Project Name: **Town of Southampton Aquaculture Outreach Program**

Project Description: This project is designed to introduce school children to shellfish aquaculture and to provide a hands-on experience of spawning, raising and growing-out local shellfish in Shinnecock Bay. In cooperation with Cornell Cooperative Extension, this program would educate local children about the importance of the local bay systems, monitoring and maintaining the health of the ecosystem and provides a hands-on science lesson. This program also provides a positive, high profile method for the Board of Trustees, Town and State to promote marine education locally, as well as address issues of water quality monitoring and promoting aquaculture. This project would be a cooperative effort between the Board of Trustees, Town and Cornell Cooperative Extension utilizing staff from Cornell Cooperative Extension with technical oversight provided by the Board of Trustees.

Method: Beginning in the early Spring, an extension representative would visit local science classes and provide the background to aquaculture, including the species, techniques and biology of the animals involved. The children would then visit the hatchery to assist in the shellfish spawning and to receive a tour of facilities. The students will assist in the hands-on construction of a tidal upweller system to be placed by the Shinnecock Coast Guard Station. Over the course of the next year, the students will assist in the monitoring and maintenance of the rafts. The seed, which will be purchased specifically for the program, will be raised to size and then seeded onto Trustee bottomland.

Estimated Total Project Cost: $12,000

Estimated Local Match: $6,000

Potential Funding Sources:

State Environmental Protection Fund (EPF) Local Waterfront Revitalization Program Grants (LWRP) FY 00-01

Project Benefits:

This project will promote the development of local aquaculture, and provide an introduction and better understanding for students about the marine environment. Protection of natural resources, water quality issues and basic biology will all be taught, coupled with an inherent increase in the population of local shellfish.

Role in Implementing MRMP and SSER CMP:

- Encourage Environmental Education Groups to Cooperate in Focusing Education Activities on the Estuary
- Restore the Estuary's Molluscan Shellfish Resources
- Develop Estuary Education Programs for Long Island's Primary and Secondary Schools
- Work with Local Government… to Create Community Projects in Which Students can Participate and Learn about Improving the Estuary

Project Name: **Town of Southampton No-Discharge Zone Pump-Out Boats**

Project Description: The procurement of additional mobile Pump-Out boats is critical to obtaining a No Discharge Designation for the Shinnecock and Moriches Bays, as well as for the Peconics. Securing these additional mobile platforms is a high priority of both the Board of Trustees and Town Board. This project would secure the funding for the purchase of three (3) additional Pump-Out Boats, including motors, and training of crew.

Reason for Project: Due to normal wear and tear, as well as an increase in the number of local transient and permanent boats with a type III Marine Sanitation Device onboard, the current number of Pump-Out Boats assigned to the Shinnecock and Moriches Bays are not sufficient to handle the demand for their services. With the limited introduction of new Pump-Out facilities locally, due mainly to the success of the Pump-Out boats, the main source of marine waste disposal is based upon the current fleet.

Estimated Total Project Cost: $165,000

Estimated Local Match: $41,250

Potential Funding Sources:

State Environmental Protection Fund (EPF) Local Waterfront Revitalization Program Grants (LWRP) FY 00-01; Federal Clean Water Act

Project Benefits:

This project will assist the Board of Trustees in providing the proper disposal of marine wastes from class III Marine Sanitation Devices within Shinnecock and Moriches Bays. As the State and Trustees are preparing to recommend the federal designation of Shinnecock Bay as a No Discharge Zone, the necessity for additional Pump-Out boats is clear in order to ensure the overall designation.

Role in Implementing MRMP and SSER CMP:

- Identify Needed Local Government… Programs to Address Gaps in Current Non-Point Source Pollution Control Practices, Especially in Priority Areas
- Identify and Finance Municipal Non-Point Source Pollution Control Projects and Programs
- Use Available Assistance from Clean Water/Clean Air Bond Act to Implement BMPs… for Non-Point Source Pollution Control
- Manage Estuary Water Quality for Fish and Shellfish Resources

Project Name: **Town of Southampton SAV Mapping Initiative Shinnecock**

Project Description: With the assistance of Cornell Cooperative Extension and the NYSDOS, a comprehensive mapping effort will undertaken in Shinnecock Bay to quantify the local extent and health of Submerged Aquatic Vegetation beds. This research will be used to determine the location, extent, health and overall impact of Shinnecock Bay's SAV communities with the emphasis on long-term (more than 5 years) monitoring to determine the impacts affecting local meadows and to prioritize sites of potential non-invasive restoration.

Method: Using aerial photography and GPS-based groundtruthing, the SAV meadows will be identified, mapped and documented for blade growth, seed capacity and total extent. Multiple visits will be required over the course of the investigation to determine local cycles of SAV activity and the growth rate of the meadows.

Estimated Total Project Cost: $70,000

Estimated Local Match: $35,000

Potential Funding Sources:

State Environmental Protection Fund (EPF) Local Waterfront Revitalization Program Grants (LWRP) FY 00-01

Project Benefits:

This project is designed to complete a survey of the extent, location and apparent health of all SAV beds within Shinnecock Bay in an attempt to compile quantifiable data to assist in future protective management, designation of critical areas and identification of restoration sites.

Role in Implementing MRMP and SSER CMP:

- Conduct Research on the Condition of the Estuarine Ecosystem and Means to Restore Lost or Impaired Ecological Functions
- Complete the Inventory and Analysis of Historic and Cultural Resources and Formulate Recommendations for Their Protection and Enhancement
- Accelerate Public and Private Efforts to Manage and Restore Habitats
- Identify Needed Local Government… Programs to Address Gaps in Current Non-Point Source Pollution Control Practices, Especially in Priority Areas

Project Name: **Town of Southampton Piping Plover Outreach Program**

Project Description: This project is designed to create and develop a Town-Wide Outreach Program with locally specific literature regarding the endangered species of Southampton. An in-school education program, presented in cooperation with the USFWS, NYSDEC, TNC and/or Suffolk County Parks, would be used to address the issues facing endangered species locally, as well as to familiarize children with the methods of protection. By targeting the youth of Southampton and following up the program with hand-outs and activity sets, the children are more likely to remember what was taught, and share the information with their parents.

Method: After consultation with the US Fish and Wildlife Service and the NYSDEC, literature, activity pages and handouts will be created focusing on the local beaches and local endangered species. This literature will provide information on the cause of the species' decline, introduce (with pictures) the current methods of protection, and provide contact information that is beach-specific. The take-home activity set will also include a kitchen magnet or button which identifies the recipient as a "Piping Plover Pal", which also has contact information.

Estimated Total Project Cost: $5,000

Estimated Local Match: $2,500

Potential Funding Sources:

State Environmental Protection Fund (EPF) Local Waterfront Revitalization Program Grants (LWRP) FY 00-01

Project Benefits:

This project will educate students regarding the local situation of endangered species along the Southampton coastline and the dangers affecting them. Most importantly, the outreach would provide answers to many of the common questions about Piping plovers and Least terns, and why they are important locally and how to help their status. By targeting the appropriate age group, the program can better enable the overall Piping Plover and Least Tern Protection Program to work efficiently in Southampton. With the literature created, overall education would be improved prior to and during the critical season.

Role in Implementing MRMP and SSER CMP:

- Develop Estuary Education Programs for Long Island's Primary and Secondary Schools
- Develop a Comprehensive Strategy for Conveying Information about the Estuary to Targeted Audiences as Well as the General Public
- Develop and Distribute Information to People About Practical Actions they can Take to Improve the Estuary
- Provide Opportunities for Teachers to Obtain Training in Estuary-Related Subjects

Project Name: Town of Southampton Roseate Tern Habitat Restoration – Shinnecock

Project Description: This project is designed to enhance little Warner's Island for the purpose of re-establishing the historic nesting colonies of federally endangered Roseate tern and state threatened Common tern via careful sand placement. The Audubon Society, NYSDEC, USFWS and Town of Southampton have identified this island as a critical tern habitat. Erosion has reduced the safe, usable area of tern nesting to a small area of potential viability. Historically, this island had supported colonies of Common terns greater than 200 nesting pairs (M. England, pers. corr.) and 38 pairs of Roseate terns. During the 2000 season, no more than 100 pairs of Common terns were observed at the island and only 9 Roseate tern nested were discovered by the USGS and Audubon Society, with no successful fledges reported. Erosion has been linked to be the cause of a high amount of washover incidents within the historic nesting area due to decline in natural elevation. With the limited area of this island available for nesting in a condensed, historically and currently un-vegetated center portion, this tern colony is threatened with extinction if restoration actions are not undertaken prior to the 2001 season. This project is of the highest priority.

Method: In cooperation with the USFWS, NYSDEC, USACE and Suffolk County DPW, clean sand dredged from local projects would be placed on-site to elevate the central nesting area. A re-vegetation plan (Seaside Goldenrod) would be prepared and initiated after the desired elevation has been created. Careful placement of dredged materials would be required as to not disturb the area of fringing marsh along the borders of the island. No machinery would be necessary on the island itself.

Estimated Total Project Cost: $50,000

Estimated Local Match: $25,000

Potential Funding Sources:

State Environmental Protection Fund (EPF) Local Waterfront Revitalization Program Grants (LWRP) FY 00-01; Bond Act Habitat Restoration

Project Benefits:

By re-establishing the Roseate and Common tern rookery at little Warner's Island, locally endangered species will be better protected. This project will be a cooperative effort of a number of agencies, presenting a situation in which all would benefit.

Role in Implementing MRMP and SSER CMP:

- Undertake Habitat Restoration Projects Employing Proven Techniques and Using Currently Available State and Federal Technical Assistance
- Streamline Regulations to Facilitate Habitat Restoration Projects
- Investigate the Relationship Between Loss or Impairment of Habitat Function and Diminution of Wildlife Abundance and Diversity in the Estuary
- Identify Opportunities for Local Population Restoration Initiatives to Expand Range and Abundance

References

Buckner and Andres, 1978. *Survey Procedure and Sampling Equipment for the Hard Clam, Mercenaria mercenari*a. Department of Environmental Control Technical Report Series, No.3. Town of Islip.

Clark, J.S. 1985. *The development of a tidal marsh: upland and oceanic influences*. Ecol. Monogr. 55(2): 97-126.

Cornell Cooperative Extension and Wilke Architects/Engineers. 1997. *South Shore Estuary Wetlands Restoration Study.*

Diamantides, J. and T. Grigalunas. 1997. *The South Shore Estuary Reserve: Value of Economic Impacts and Sectors with a Perspective on Uses.* Prepared for SSER and NYDOS, Division of Coastal Resources.

Environmental Protection Agency. 1993. Draft Mitigation Banking Guidance, Region IV, Atlanta, Ga.

Hruby, T. 1990. *Long Island Region Tidal Wetland Manual. Part III: Management Plan Development.* Camp, Dresser, and McKee, Inc. in cooperation with New York State Department of Environmental Conservation, Division of Marine Resources. Seatuck Research Program.

O'Connor, J.S. and O.W. Terry. 1972. *The Marine Wetlands of Nassau and Suffolk Counties, New York*. Marine Science Research Center, State University of New York, and Nassau-Suffolk Regional Planning Board, Stony Brook, New York.

National Audubon Society. 1998. *Important Bird Areas in New York State.*

New York State Department of Environmental Conservation. 1990. *Ecological Communities of New York State.*

New York State Department of State (NYDOS). March 15, 1999. *Salt Marsh Restoration and Monitoring Guidelines: Review Draft.* Division of Coastal Resource.

Southampton Tomorrow. 1997. Comprehensive Plan Update. Town of Southampton

South Shore Estuary Reserve Draft Reports

Estuarine Finfish, Diadromous Finfish, Crustacean Shellfish, Shellfish, Blue Crab

U.S. Army Corps of Engineers. Revised 1996. *Breach Contingency Plan: Fire Island to Montauk Point Reformulation Study, Long Island New York. New York* District, North Atlantic Division.

U.S. Army Corps of Engineers. December 1999. *An Evaluation of an Interim Plan for Storm Damage Protection; Fire Island to Montauk Point (West of Shinnecock Inlet).*

ACKNOWLEDGEMENTS

The authors of the Marine Resource Management and Protection Plan wish to thank the following people for their assistance and guidance in the development and culmination of this work:

Larry B. Liddle, Chris Smith, Chris Pickerall, Jeff Kassner, Walt Dawydiak, Marci Bortman, Julie Kranz, Ted Sadlier and the Southampton Bay Constables, Chris LaPorta, Gregg Rivara, DeWitt Davies, Vito Minei, Cornelia Schlenk, Stuart Buckner, Sandy DuMais, Scott Strough, Ed Warner, Jon Semlear, Eric Schultz, E. Peter Corwith, Christina Grahn, Jon Aldred, Steve Tettlebach, Captain Bruce Ringers, Dick McIntyre, Melanie Meade, Greg Metzger, Sandy Shumway, Jenelle Close, Marilyn England, Steve Ridler, Gef Flimlin, Lisa Tettlebach, Maureen Davidson, Steve Mars, Steve Sinkevich and Steve Papa, Debbie Barnes, Kristen Kiernan, Tim Bishop and the Southampton College of Long Island University.