FINAL REPORT

NORTHEAST COASTAL AREAS STUDY:

SIGNIFICANT COASTAL HABITATS OF SOUTHERN NEW ENGLAND AND PORTIONS OF LONG ISLAND, NEW YORK

Submitted to

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON APPROPRIATIONS

AND

U.S. SENATE
COMMITTEE ON APPROPRIATIONS

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TABLE OF CONTENTS

I. INTRODUCTION

The coastal and estuarine area of southern New England and northern and eastern Long Island is characterized as an extensive and diverse interconnected system of sounds, bays, lagoons, coves, harbors, coastal streams, tidal rivers and shorelands extending from the western Narrows of Long Island Sound to the islands of Monomoy and Nantucket south of Cape Cod, Massachusetts and south to Montauk Point, New York. (See Map, Appendix A). This broad mixing zone of seawater and freshwater lying between the Atlantic Ocean and the coastal shorelands of Connecticut, Rhode Island, Massachusetts and New York, has been historically renowned for its rich fisheries, abundance of waterfowl, diverse wildlife, productive marshes, scenic beaches, and outstanding recreational opportunities. It has also been an area of unprecedented human population growth and massive urban coastline development that in recent decades has resulted in dramatic declines in its living resources and the large-scale loss and degradation of essential estuarine and coastal habitats. The extinction and extirpation of several species of plants and animals in this area and population declines of others, and consequent biological diminution of the region, can be attributed to many factors, but most prominent are the destruction of natural habitats through dredging, filling, ditching, and draining of wetlands, highway and building construction, and pollution of sediments and waters by environmental contaminants such as chlorinated hydrocarbons, heavy metals, nutrients associated with various human activities and oil. Other factors include overharvesting, intensive recreational use of shoreline beaches and expanding populations of certain nuisance species and their competitive displacement of other species.

Congress, in recognizing the biological and economic importance of the living resources and natural values of the Northeast coastal area both to the region and the Nation as a whole, appropriated $150,000 in FY 1990 for the Fish and Wildlife Service (Service) to conduct a study that would identify those areas in southern New England and Long Island in need of protection for fish and wildlife habitat and the preservation of natural diversity. Specifically, the House Appropriations Committee directed that:

> *The $150,000 provided for a study of the coastal areas of Southern New England and Long Island, New York, includes, but is not limited to, Long Island Sound, Great Peconic Bay, Rhode Island Sound, Narragansett Bay, Buzzards Bay, Nantucket Sound, and the Lower Connecticut River. The study shall include an inventory of the natural values of these areas and subsequent identification of areas in most need of protection for fish and wildlife habitat, endangered species habitat, migratory waterfowl values, and the preservation of biological diversity. The Committee expects the Service to report its findings by March 1, 1990.*

This final report, prepared in response to the above Congressional directive, outlines the geographic scope of the project as well as the methodologies used to delineate the study area boundary and to identify coastal species and habitat types included in the inventory. The major focus of this document is a compendium and individual description of regionally significant habitats and habitat complexes in need of protection. The list of habitat areas was developed after extensive consultation with regional biologists in the Federal and State governments and numerous conservation organizations and universities. Nevertheless, differences in interpretation may exist among regional biologists and land managers as to what constitutes "significance" or

"importance" and to what extent an area may be viewed as needing protection. As used in this report, "significance" of a site or resource refers to its relative regional importance to one or more life history stages or seasonal use periods of Federal trust species, defined in Section III-B and listed in Appendix B, and is not meant to infer any statistical level of significance or quantitative ranking system. For example, the presence of a population, regardless of size, of a U.S. Endangered or Threatened species, the occurrence of an exemplary and undisturbed stand of a regionally scarce community type, a large wintering concentration of waterfowl in numbers or densities considerably greater that what is generally encountered in the region, areas with a high diversity of trust species, a highly vulnerable breeding or spawning area of a fish or bird species that has been substantially reduced or qualitatively degraded from historical times, may all be considered "regionally significant" sites or resources in this report. Periodic re-evaluation of the data and criteria presented will be valuable in maintaining the usefulness of this document.

It is important to note that recommendations for protection that are provided in this report are for planning purposes and do not represent a budgetary commitment, particularly for acquisition, by the Department of the Interior to this project. Any increase above the President's Budget request will need to be offset by corresponding reductions in other projects or programs so that deficit reduction targets can be met. In addition, these areas have not yet been nationally evaluated by the Service in accordance with its Land Acquisition Priority System. Many of the areas identified in this report are already being managed to one degree or another for conservation purposes and are acknowledged here not only for their individual value to fish and wildlife resources but as being part of more extensive habitat complexes requiring a consistent management approach at the ecosystem level.

II. SCOPE OF PROJECT

The study area includes three priority estuaries under the EPA's National Estuary Program: Narragansett Bay, Buzzards Bay and Long Island Sound. Each of these Estuaries of National Significance is currently being assessed by a cooperative effort involving Federal, State, interstate and local agencies, as well as research institutions, educational organizations and citizens' groups. Peconic Bay, at the eastern end of Long Island (NY) in the study area, is in the process of being added to this list of priority estuaries by the EPA. This area is also of considerable interest to the State of New York and The Nature Conservancy as a potential bioreserve. (Briefly, The Nature Conservancy defines a bioreserve as an area having an integrated landscape with naturally functioning ecological processes, and containing outstanding examples of ecosystems, natural communities, and species which are endangered or inadequately protected.)

The Fish and Wildlife Service temporarily established the Northeast Estuary Office in Charlestown, Rhode Island, in January 1990, to conduct and direct the study. Collocated with the Ninigret National Wildlife Refuge, this office is part of the Service's Northeast Coastal and Estuary Program in Region 5. The Service is proposing to establish the office as a permanent station in FY 1992 to implement the study and to participate in the ongoing EPA National Estuary Programs.

The project has worked closely with The Nature Conservancy's Northeast Regional Office and State chapters, and Natural Heritage Programs for the States of Massachusetts, Rhode Island,

Connecticut and New York. Other essential cooperators have included the various State natural resource agencies and universities in the four-state area and the following Federal agencies: Environmental Protection Agency (EPA), National Marine Fisheries Service, National Ocean Service, National Park Service and various divisions, research centers and programs within the Fish and Wildlife Service. The National Audubon Society provided substantial technical assistance regarding certain geographical areas.

The FY 90 House Appropriations Committee language originally directed the Service to complete the present study and submit a final report by March 1990. At the request of the Service the Committee agreed to extend the due date for the final report to March 1991. An interim report was prepared and submitted to the Congress on July 25, 1990, that provided summary information on the status of the project to date as well as a preliminary identification and description of regionally significant fish, wildlife and plant habitats in need of protection. Subsequent to that, the Service requested and received from Congress an additional three-month extension of the report's due date.

III. METHODOLOGY

A. Delineation of Study Area Boundary:

The House Appropriations Committee described the study area as "...to include, but not be limited to: Long Island Sound, Great Peconic Bay, Rhode Island Sound, Narragansett Bay, Buzzards Bay, Nantucket Sound and the lower Connecticut River." Following this general guidance, the Service determined the study area as encompassing the sounds, bays, estuaries, tidal rivers and adjacent shorelands from Nantucket Sound, including the islands of Monomoy, Nantucket and Martha's Vineyard, to the western terminus of Long Island Sound. (See map, Appendix A.) This area also includes Gardiners and Peconic Bays between the two forks of eastern Long Island, but the Service concluded that it did not include the inner lagoons and bays along the south shore of Long Island that were part of the New York Bight system, even though considerable interest was expressed by several Congressmen from Long Island for this area to be included as part of the study. Because of both lack of funding and time to include these areas, the Service felt it would be more appropriate to conduct a separate study at some later date of significant habitats in the New York Bight area (Montauk Point, NY, to Cape May, NJ). It should be noted here that four significant fish and wildlife complexes along the south shore of Long Island have been included in this report, primarily because of the interest and assistance by the National Audubon Society, who largely prepared these specific write-ups. In addition, because of the connection of the New York-New Jersey Harbor to Long Island Sound as well as the excellent report recently prepared by the Trust for Public Land and New York City Audubon Society identifying the value of and threats to this area, a significant heron rookery complex on Staten Island was also included. Other than these sites, no other areas on the south shore have been included and no analysis has been done in this area to determine other areas of significance, of which doubtlessly there are many.

In addition to the immediate coastline, the study area included coastal rivers and streams from their confluence with the estuary up to the limit of tidal influence or fall line. In the specific case of the Connecticut River, the project boundary was determined to extend

to the dam at Holyoke, Massachusetts. Due to the resource limitations of this study, however, and the current interest and consideration by Congress of legislation establishing a Connecticut River National Fish and Wildlife Refuge that calls for further study of the river, this study did not focus as much attention on the upper portion of the Connecticut River as it did on the lower tidal reaches. Should the proposed legislation be enacted, the northern, upstream reaches of the river should be carefully explored and evaluated for significant fish, wildlife and plant habitats in a manner similar to the present study.

For the most part, the landward or inland extent of the project's coastal boundary approximates that delineated by the State Coastal Zone Management Programs for New York, Connecticut, Rhode Island and Massachusetts, although in some cases the width of this zone has been broadened to include the estimated inland limit of influence of maritime climate and coastal processes. On the average, the width of this landward coastal zone is about five miles. The seaward extent of the study area is presently delineated by a line drawn from just offshore the southeastern tip of Cape Cod to southeastern Nantucket Island, and from the nearshore waters of Nantucket Island to Montauk Point, Long Island, NY.

B. Coastal Species of Special Emphasis:

The Service's principal approach in identifying significant habitats to be included in the project study area inventory was to focus on those sites of particular regional or national importance to critical life history stages of select coastal species. As an additional part of this process, the Service identified and evaluated areas of significant regional biological diversity and outstanding representatives of regional coastal community types in this same region.

In conjunction with the various project cooperators, the Service developed a list of southern New England and Long Island Coastal Species of Special Emphasis which it used in directing its efforts to identify habitat areas in need of protection. (See Appendix B.) These are primarily species of national or regional significance for which there is a clear Federal trust responsibility under one or more legislative authorities or mandates (e.g., Endangered Species Act, Marine Mammal Protection Act, Anadromous Fish Conservation Act, Migratory Bird Treaty Act, Fish and Wildlife Coordination Act) or which are considered in various regional planning documents (e.g., Regional Resource Plans, Fishery Management Plans, North American Waterfowl Management Plan) or are ecologically, commercially or recreationally important within the project study area. Many are species whose populations have seriously declined or are presently declining from historical levels of abundance in the region and/or are especially vulnerable to habitat loss and degradation, human disturbance, competition with exotic or nuisance species, overexploitation or environmental contaminants.

The list of Coastal Species of Special Emphasis contains 153 plant and animal species on which the Service concentrated its data collection efforts in this project. It includes 19 species of finfish, 9 shellfish, 5 reptiles, 2 amphibians, 61 bird species, 6 marine mammals, 7 terrestrial mammals, 12 invertebrates, and 32 plant species. This list is not

an exhaustive accounting of all coastal species occurring in the study area, but, rather, represents those species of particular management concern on which the Service focused its inventory efforts.

C. Identification of Significant Habitats of Special Emphasis Species:

In this report, each of the significant, high-priority habitat sites and complexes of habitats is described individually and its approximate boundary delineated on a topographic map. These brief descriptions include the general physical and biological characteristics of each area, the significance, uniqueness or value of each area to Coastal Species of Special Emphasis and/or the biological diversity of the region, general ownership patterns, and threats to the ecological integrity of the site and/or species occurring there during critical life history stages. Also included for each site are conservation considerations developed by the Service on how to best protect these areas and the species which depend upon them. More detailed information on each of these sites is available through the Northeast Estuary Office in Charlestown, Rhode Island.

In identifying specific significant coastal habitats in need of protection, the Service focused on: 1) individual populations or occurrences of coastal species of special emphasis; 2) regionally or nationally significant habitat sites of special emphasis species and/or areas of exceptional biological diversity or community uniqueness; and 3) habitat complexes consisting of two or more and often several important and ecologically-linked habitats within a given geographic area. A knowledge of the distinctions between each of these approaches is necessary to understanding the rationale behind the identification and delineation of the sites presented in this report. They are as follows:

1) **Individual Species Occurrences:** Individual occurrences of coastal species of special emphasis were analyzed to identify areas important to one or more critical life history stages of these species, such as spawning, wintering and juvenile growth areas. Data were sought and collected on individual site occurrences, both current and historical, of 153 selected species ranging from small and local resident breeding populations and seasonal clusterings to larger metapopulations, overwintering concentrations, migrating groups and anadromous fish runs. These data were analyzed for the entire four-state coastal and estuary study region. Distribution and locality information was collected and compiled at the most detailed scale and format available, generally on 1:24000 standard USGS topographic quadrangle maps. The bulk of this information was obtained from state Natural Heritage Programs and natural resource agencies, Federal agencies (Fish & Wildlife Service, National Marine Fisheries Service) and private conservation organizations, in particular The Nature Conservancy and the National Audubon Society. Individual occurrences and locations were pinpointed on base maps as precisely as the data would allow, either as point occurrences or larger areal delineations, often to the nearest second of latitude and longitude. This information is currently being entered into a computer-mapping program (MapInfo) to facilitate storage, retrieval and graphic presentation of data. Whenever possible or practical, all occurrences of a species in the study area were recorded, including historical locations, regardless of number of individuals

at a site, population size, resident or breeding status or regional or national significance. In some instances, however, particularly in the case of widespread species showing considerable movement over the general area, such as certain waterfowl and fish, only the more stable and regularly-occurring concentrations were mapped.

2) **Significant Habitats:** Using these species occurrence data, important or potentially important, habitat sites were identified. Subsequent discussions with knowledgeable field biologists and field verification were undertaken to confirm the importance of these sites. In addition to obviously significant and exceptional sites, i.e., those supporting disproportionately large numbers or densities of a species or where breeding success and productivity are particularly high or above average, the data also served to identify important intermediate sites between major areas that function as migration or recruitment "stepping stones".

Prior to this project, many important habitat areas were already recognized for their value to fish and wildlife by various resource agencies and conservation organizations, at least from a statewide perspective, and were recommended to the study project for inclusion in the final report to Congress as significant habitats in need of protection. Because the Northeast Coastal Areas Study focused its data compilation and analysis efforts primarily on habitats of ecoregional, regional or national significance, differences were obviously to be expected between the two perspectives, although these were surprisingly few. In some instances, habitats viewed as significant or important to biologists or natural resource managers in a particular state may not have been felt to have the same significance when viewed in a broader regional context. Conversely, some areas thought to be of lesser value by a state because of their small size were, in fact, determined to be of regional importance as stepping stone areas between major population sites. In other words, candidate sites recommended by the states still needed to be evaluated and analyzed as part of the present study to determine their overall regional or national significance to fish, wildlife and plants in the southern New England - Long Island, NY, study area.

3) **Habitat Complexes:** The Service also identified significant habitat complexes through analysis of species occurrence data and consultation with others. These larger units generally consist of from two to several individual habitat or landform units that are each of importance to a single species or multiple species and which are either contiguous or in relatively close proximity to each other so as to allow their being recognized as a single, interrelated ecological unit, particularly from a natural resource management perspective. Each of the habitat units will, in many instances, have been individually recognized as being important to either a single species or a group of species, often by an agency or group that is focused on a particular group of species. What the current study attempted to do is identify obvious linkages between significant sites that allow them to be viewed in a much larger and ecologically relevant context. It will be noted that the majority of significant coastal habitat sites identified in this report are primarily habitat complexes comprised of individual, smaller habitat units.

Habitat complexes generally belong to one of three categories:

A. Contiguous, similar habitats, e.g., linear stretches of beaches or dune systems running parallel to the coast, ridgetops or riparian corridors.

B. Contiguous dissimilar habitats, though geomorphologically, and often ecologically, related, e.g., barrier beach/lagoon/salt marsh/upland complexes or local watersheds.

C. Discontinuous, though not necessarily remote, similar habitats that form an essential part, if not the entirety, of a species' population or metapopulation.

To a large extent, habitat complexes as viewed here are very close to the bioreserve concept, as defined earlier, currently being explored by The Nature Conservancy and efforts are being made to consider linking the two concepts closer in the future.

IV. PROTECTION STRATEGIES

A variety of approaches and strategies exists for the protection of valuable wildlife habitats; each provides different degrees of protection and requires different levels of commitment by regulatory agencies, conservation organizations and landowners. These techniques range from the establishment of conservation easements, cooperative management agreements, zoning and land-use regulations, comprehensive planning, enforcement of existing local, state and Federal regulations, tax incentives, mutual covenants and land exchanges to fee simple acquisition. All four states in the study region have enacted special laws to protect coastal wetlands; these laws vary considerably in their degree of protection. Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act of 1977 mandate a strong Federal role for protecting the Nation's coastal wetlands and have proved to be very effective regulatory mechanisms for protecting wetland habitats in general. Federal permits are required for most types of construction in estuarine wetlands. While the regulatory tools to protect coastal wetlands are in place, continued enforcement of existing laws is required to maintain the integrity of the remaining wetlands. The Endangered Species Act and Migratory Bird Treaty Act are also used extensively by the Fish and Wildlife Service and National Marine Fisheries Service to provide protection to species listed under them. In addition to regulation, the Coastal Barrier Resources Act of 1982 removes Federal subsidies and discourages development of designated coastal barriers and adjacent wetlands. Executive Order 11990 - "Protection of Wetlands" - requires Federal agencies to develop guidelines to minimize destruction and degradation of wetlands and to preserve and enhance wetland values.

Successful application of these protection mechanisms can be enhanced through their use in concert with each other and in partnership with all parties involved. Selection of the most appropriate and effective combination of protection techniques and strategies should be determined only through careful consideration of the unique conditions and circumstances that apply to each individual site or complex.

ACKNOWLEDGEMENTS

This report was prepared primarily by Joseph J. Dowhan, Project Leader of the Northeast Estuary Office, in Charlestown, Rhode Island, with the assistance of Hope D. Malcom, Geographic Information Specialist with the same office. The Northeast Coastal Areas Study was originally conceived and initiated by William C. Ashe, former Deputy Regional Director of the Fish and Wildlife Service's Northeast Region, and now with the National Fish and Wildlife Foundation. It is to Bill Ashe that this report is dedicated.

There have been numerous contributors to this study and report, of which the majority have come from a solid core of knowledgeable, experienced and devoted professional biologists in the various Federal and State natural resource agencies and private conservation organizations in this region. Particular gratitude is expressed to the State Natural Heritage Programs and Fish and Game/Wildlife agencies in Connecticut, Massachusetts, New York and Rhode Island, the State Chapters and Field Offices of the Nature Conservancy in each of these same states, the Eastern Regional Office of The Nature Conservancy, especially Dennis Wolkoff, the National Audubon Society, and the many outstanding Fish and Wildlife Service biologists in the field offices, cooperative units, research stations and regional office in the Northeast Region (Region 5).

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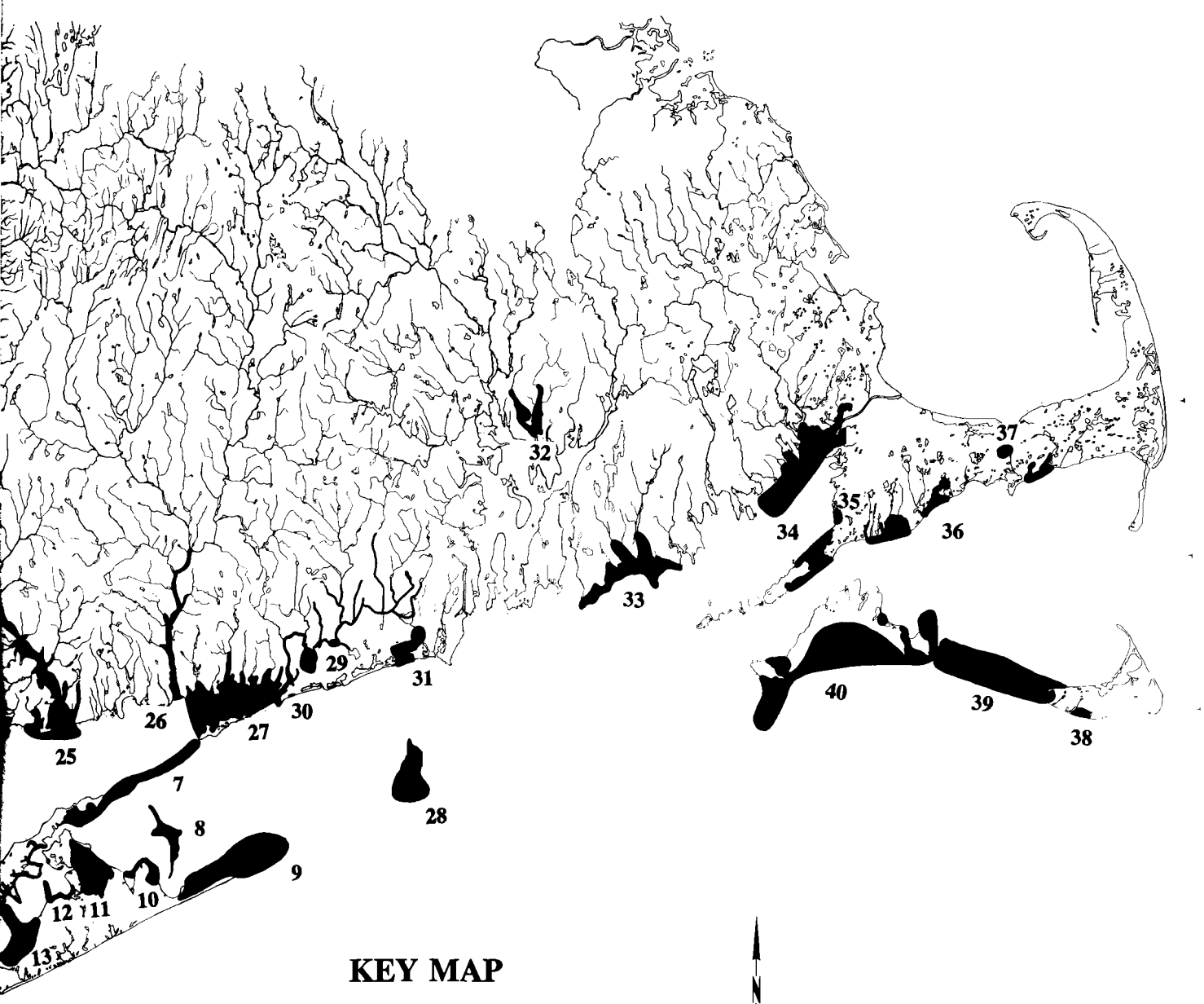
NORTHEAST COASTAL AREAS STUDY
SIGNIFICANT COASTAL HABITATS

Key to Habitat Sites and Complexes:

1. The Narrows Complex
2. Three Harbors Area
3. Nissequogue River
4. Port Jefferson - Stony Brook Harbor Complex
5. Peconic River - Pinelands Complex
6. North Fork Beach Complex
7. Orient Point - Islands Complex
8. Gardiners Island and Point
9. Montauk Peninsula Complex
10. Acabonack Harbor Area
11. Shelter Island - Harbor Bays Complex
12. Noyack Bay Beaches
13. Cow Neck Complex
14. Flanders Bay Wetlands Complex
15. Moriches Bay
16. Great South Bay
17. South Oyster Bay
18. Hempstead Bay (East, Middle, West Bays)
19. Harbor Herons Rookery Complex
20. Norwalk Islands and Tidal Wetlands Complex
21. Lower Housatonic River - Great Meadows Marsh Complex
22. New Haven Harbor Complex
23. Falkner and Goose Islands
24. Greater Hammonasset Complex
25. Connecticut River and Tidal Wetlands Complex
26. Lower Thames River System
27. Fishers Island Sound Complex
28. Block Island
29. Chapman Swamp/Pawcatuck River
30. Maschaug Pond
31. Areas North and East of Trustom Pond and Green Hill Swamp
32. Hundred Acre Cove/Palmer River Complex
33. Rhode Island Sound - Buzzards Bay Beach Complex
34. Buzzards Bay Colonial Bird Nesting and Feeding Areas
35. Sippewisset Marshes
36. Nantucket Sound Barrier Beach\Bay Complex
37. Hyannis Coastal Ponds Complex
38. Miacomet Moorlands, Nantucket Island
39. Muskeget and Tuckernuck Islands and Muskeget Channel
40. Martha's Vineyard Coastal Sandplain and Beach Complex



KEY MAP

NORTHEAST COASTAL AREAS STUDY

ORIGINAL SCALE 1:250,000

NORTHEAST COASTAL AREAS STUDY
SIGNIFICANT COASTAL HABITATS

Key to Habitat Sites and Complexes:

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40. Martha's Vineyard Coastal Sandplain and Beach Complex

Northeast Coastal Areas Study
Significant Coastal Habitats
Site 33 (RI, MA)

I. SITE NAME: Rhode Island Sound - Buzzards Bay Beach Complex

II. LOCATION: This coastal ponds/barrier beach complex is located along the shore of Rhode Island Sound in southeastern Rhode Island and the contiguous areas to the east along the western shores of lower Buzzards Bay in Massachusetts.

TOWNS: Little Compton, Dartmouth
COUNTIES: Newport, Bristol
STATES: Rhode Island, Massachusetts

USGS 7.5 MIN QUADS:	New Bedford South, Mass	41070-58
	Sakonnet Point, RI	41071-42
	Westport, Mass-RI	41071-51
	Tiverton, RI-Mass	41071-52
USGS 30x60 MIN QUADS:	Block Island	41071-A1
	Providence	41071-E1
	New Bedford	41070-E1

III. GENERAL BOUNDARY: The general boundary area is delineated on the accompanying map and incorporates the entire Rhode Island Sound and lower Buzzards Bay shoreline from Sakonnet Point at the western edge of the complex in Rhode Island eastward to Slocums Neck and Barneys Joy Point at the eastern boundary in Massachusetts. Included are Long Pond, Briggs Marsh, Tunipers Pond and Quicksand Pond in Rhode Island, as well as associated barrier beaches (Briggs Beach, Goosewing Beach and South Shore Beach), and Richmond Pond, Westport Harbor/River, The Let and Allens Pond, including associated beaches of Horseneck and Little Beach. The primary areas needing protection are Quicksand, Tunipers, and Allens Ponds.

IV. OWNERSHIP/PROTECTED STATUS: In the Rhode Island section of this complex, almost all of the land is privately-owned residential property, with the exception of the Town-owned South Shore Beach. Three large ownerships account for close to half the shoreline of Quicksand Pond and one of these (the Truesdale Farm) also accounts for the entire eastern shore of Tunipers Pond. The Nature Conservancy, Audubon Society, and the local Land Trust own lands in this area and are in the process of securing conservation easements on additional lands around both ponds. In the Massachusetts section, there are large areas of State-owned parks and reservations, but other areas, particularly in the Allens Pond area, are privately-owned by multiple private individuals. The Massachusetts Audubon Society owns 70 acres (28 ha) at the west end of Allens Pond and holds conservation restrictions on several hundred acres at Barneys Joy. There are presently a number of summer cottages on the barrier beaches.

V. GENERAL HABITAT DESCRIPTION: Most of the ponds (technically lagoons) in this complex, such as Quicksand Pond, are coastal salt ponds separated from the open waters of Rhode Island Sound or Buzzards Bay by a narrow, wave-washed sand or gravel beach with a series of vegetated dunes dominated by beachgrass (*Ammophila breviligulata*) and seaside goldenrod

(*Solidago sempervirens*). A breachway (inlet) opens periodically and provides some tidal flushing. The habitat areas are very diverse ranging from freshwater red maple (*Acer rubrum*) swamps in the inland uplands and agricultural fields to mud flats and salt marshes along the shores. The salt pond at Allens Pond is surrounded by one of the largest unprotected salt marshes in Massachusetts. Uplands on Slocums Neck have shrubby grasslands, the habitat of several species of grassland birds.

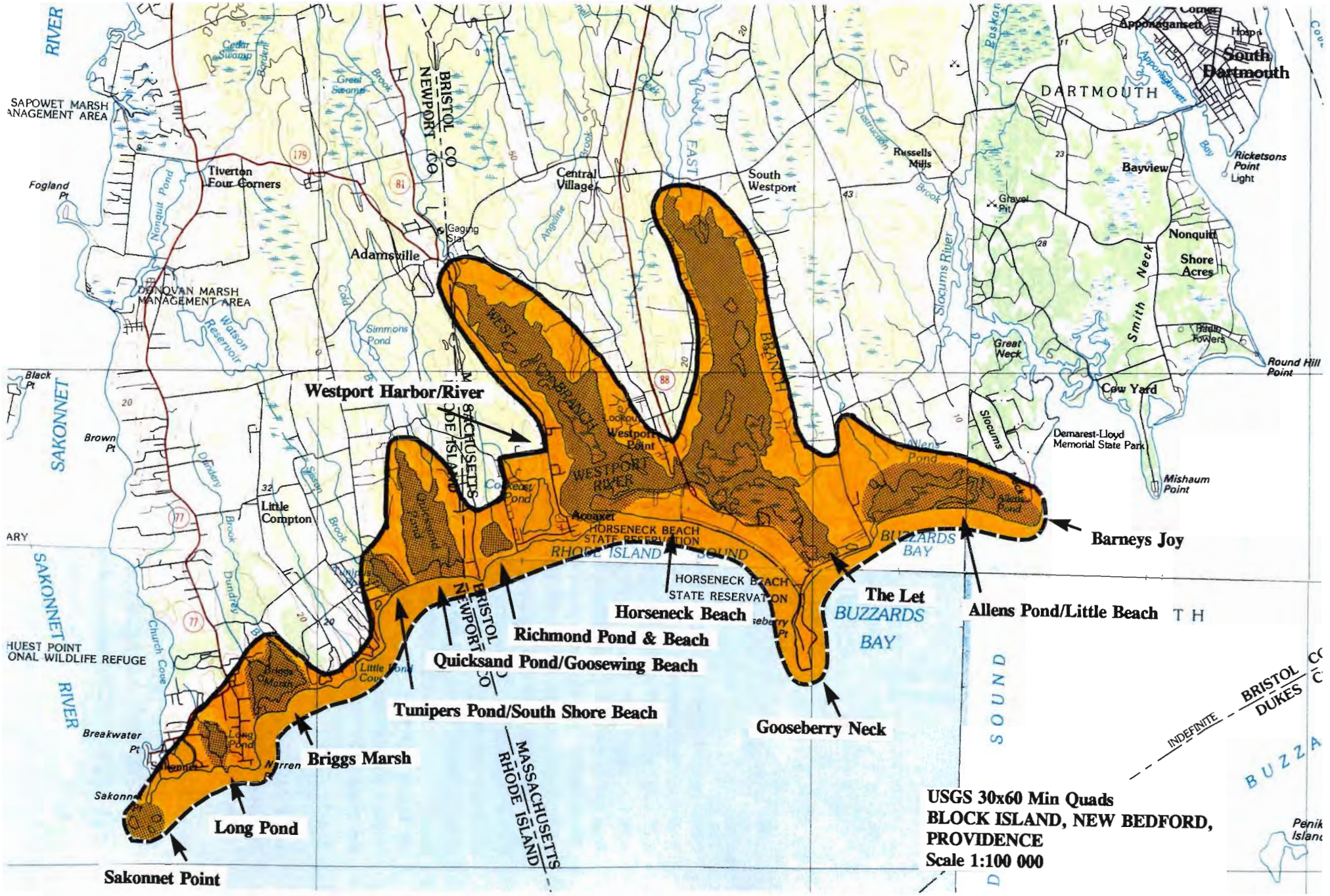
VI. SIGNIFICANCE/UNIQUENESS OF AREA: Quicksand and Tunipers Ponds form one of the most scenic and undisturbed coastal areas in Rhode Island. They provide valuable habitat for finfish, shellfish, waterfowl, and shorebirds. Fish species include winter flounder (*Pseudopleuronectes americanus*), perch (*Perca* spp.), American eel (*Anguilla rostrata*), soft-shelled clam (*Mya arenaria*), hard-shelled clam or quahog (*Mercenaria mercenaria*), and American oyster (*Crassostrea virginica*). Waterfowl residents and migrants include Canada geese (*Branta canadensis*), canvasback (*Aythya valisineria*), American black duck (*Anas rubripes*) and scaup (*Aythya affinis*, *A. marila*) in what has been called one of the most significant migratory waterfowl concentration sites of New England. Of considerable interest, the beaches along most of this shoreline complex are regionally important nesting areas for the U.S. Threatened piping plover (*Charadrius melodus*) and these areas are likely to be proposed as critical habitats for this species. The nesting population of piping plover at Goosewing Beach is the largest concentration in Rhode Island. Least and common terns (*Sterna antillarum* and *S. hirundo*, respectively) nest at several locations. At least 30 species of shorebirds, including the American oystercatcher (*Haematopus palliatus*), willet (*Catoptrophorus semipalmatus*), and spotted sandpiper (*Actitis macularia*) are reported to nest in the eastern portion of this complex, particularly around Allens Pond and the Westport River. About 25 species of migratory sandpipers use the mud flats at low tide. There are regionally significant breeding populations of seaside sparrows (*Ammodramus maritimus*) and sharp-tailed sparrows (*Ammodramus caudacutus*) in the Allens Pond salt marsh. Dozens of land bird species use the thickets around the edges for migratory stops. Other species of note in the area include large concentrations of nesting osprey (*Pandion haliaetus*), New England blazing-star (*Liatris borealis*), northern harrier (*Circus cyaneus*), Northern diamondback terrapin (*Malaclemys t. terrapin*) and sea-beach knotweed (*Polygonum glaucum*). In fact, this is the only mainland nesting site of northern harrier in southern New England. There are historical records of both sea-beach pigweed (*Amaranthus pumilis*) and sandplain gerardia (*Agalinis acuta*), a U.S. Endangered species, in this area. The rocks off Sakonnet Point are used by harbor seals (*Phoca vitulina*) for hauling out.

VII. THREATS: Approximately half of the shorelines on Quicksand Pond and almost all on Tunipers Pond are undeveloped. A large holding, the 75 acre (30 ha) Truesdale Farm, which spans both ponds, will soon go on the market. Adjoining this farm to the north are two other large ownerships whose development would have a serious impact on the pond's resources. In addition, recreational pressures on Goosewing Beach create a threat to the nesting shorebirds. Barrier beaches and sandplain grasslands are both vulnerable to development pressures and over-use by recreational vehicles: rare species habitats and nesting birds can be severely disrupted by intense human use. This area is particularly vulnerable due to its multiple private ownership and heavy recreational use.

VIII. CONSERVATION CONSIDERATIONS: Protection of this area, particularly Allens Pond, Quicksand Pond and Tunipers Pond, is of high priority. The pond and beach nesting areas should

be completely protected from disturbance, and conservation restrictions placed on as much of the already lightly developed portions of the pondshores as possible. The few large undeveloped properties on Quicksand and Tunipers Ponds should be considered for purchase in fee or through the purchase of development rights by private conservation organizations already active in this area to ensure a continued variety of habitats and to reduce human pressures on the ponds and adjacent beaches. Protection and management of the entire shoreline length of this complex should be sought as a means of ensuring the long-term survival of beach-nesting bird populations in this general area. The management of small populations of species such as terns and piping plovers, which are extremely prone to local extinction as a result of internal and external factors, requires the protection of many sites in relatively close proximity to each other (at least within the local movement abilities of the species) as part of an overall metapopulation species conservation strategy. With the addition and protection of the specific areas indicated in this complex, protected habitat of coastal species would be much more continuous and extensive, which would serve to contribute to greater population viability and recovery potential, particularly for colonial beach-nesting birds. Special emphasis should be placed on implementing objectives and tasks outlined in the recovery plan for piping plover. Identification, delineation and protection of main feeding areas should be given high priority for beach-nesting birds including the development of management plans. Several sites may require restoration to enhance their suitability as nesting sites, such as dredge spoil deposition and vegetation control. Gull removal may need to be considered at certain sites where this is determined to be a significant problem. Protection of specific beach sites can be accomplished by a variety of mechanisms including cooperative management and conservation agreements, conservation easements, zoning, planning, land-use regulations and, in some instances, acquisition.

Northeast Coastal Areas Study
Significant Coastal Habitats
Rhode Island Sound - Buzzards Bay Beach Complex



Northeast Coastal Areas Study
Significant Coastal Habitats
Site 34 (MA)

I. SITE NAME: Buzzards Bay Colonial Bird Nesting and Feeding Areas

II. SITE LOCATION: Bird Island and Ram Island are located just offshore the western shoreline of Buzzards Bay, northeast of the city of New Bedford, in the vicinity of the Towns of Marion and Antassawamock, respectively.

TOWNS: Mattapoisett, Marion
COUNTY: Plymouth
STATE: Massachusetts

USGS 7.5 MIN QUADS:	Naushon Island, Mass	41070-47
	Woods Hole, Mass	41070-56
	Sconticut Neck, Mass	41070-57
	Onset, Mass	41070-66
	Marion, Mass	41070-67
USGS 30x60 MIN QUADS:	Martha's Vineyard	41070-A1
	New Bedford	41070-E1

III. GENERAL BOUNDARY: There are two distinct, separate and yet closely related areas comprising this complex: 1) an area on the western and upper portions of Buzzards Bay enclosing two small offshore islands (Ram Island and Bird Island) and a large group feeding area; and 2) a nearshore area of open waters along the lower, eastern shoreline of Buzzards Bay important as a general feeding area for individual birds. Ram Island forms the southwestern boundary of the first area and is situated about 0.5 miles (1 km) south of Antassawamock in the Town of Mattapoisett. Moving northeastward from Ram Island the boundary encloses Bird Island, located about 0.5 miles (1 km) south of Sippican Neck in the Town of Marion, to Great Neck and up into Buttermilk Bay at the head of Buzzards Bay. The dimensions for this area are approximately 10 miles (16 km) long in a southwest-northeast direction and about 3 miles (5 km) wide in a northwest-southeast direction along the western shoreline of Buzzards Bay. The second area is located approximately 10 miles (16 km) south of Bird Island and consists entirely of the nearshore waters around Woods Hole and the northern half of Naushon Island out to about 0.5 miles (1 km) from the shoreline. This second area is approximately 6 miles (10 km) long in a southwest-northeast direction and 2 miles (3 km) wide in a northwest-southeast direction. The general boundaries for both areas are delineated on the accompanying maps.

IV. OWNERSHIP/PROTECTED STATUS: These areas consist entirely of public lands and waters. Ram Island is owned by the State of Massachusetts, Division of Fisheries and Wildlife; Bird Island is owned by the Town of Marion and managed by the Massachusetts Audubon Society.

V. GENERAL HABITAT DESCRIPTION: Both islands are approximately an acre (0.5 ha) in size and are located about a half mile (1 km) from the western mainland shoreline of Buzzards Bay. Bird Island is rocky and densely covered with herbaceous plants including beach grass (*Ammophila breviligulata*), bindweed (*Convolvulus sepium*), seaside goldenrod (*Solidago sempervirens*), black

mustard (*Brassica nigra*), seaside angelica (*Coelopleurum lucidum*) and lamb's quarters (*Chenopodium album*). Ram Island is a low island composed of sand, gravel and larger stones with elevations in the center high enough to support vegetation such as beachgrass and seaside goldenrod. Feeding areas used by individual birds are generally over shoals and submerged sandbars and tidal rips, while waters favored by large feeding flocks are cool, deep and clear where schools of small fish are driven to the surface by predatory fish such as bluefish (*Pomatomus saltatrix*) and striped bass (*Morone saxatilis*).

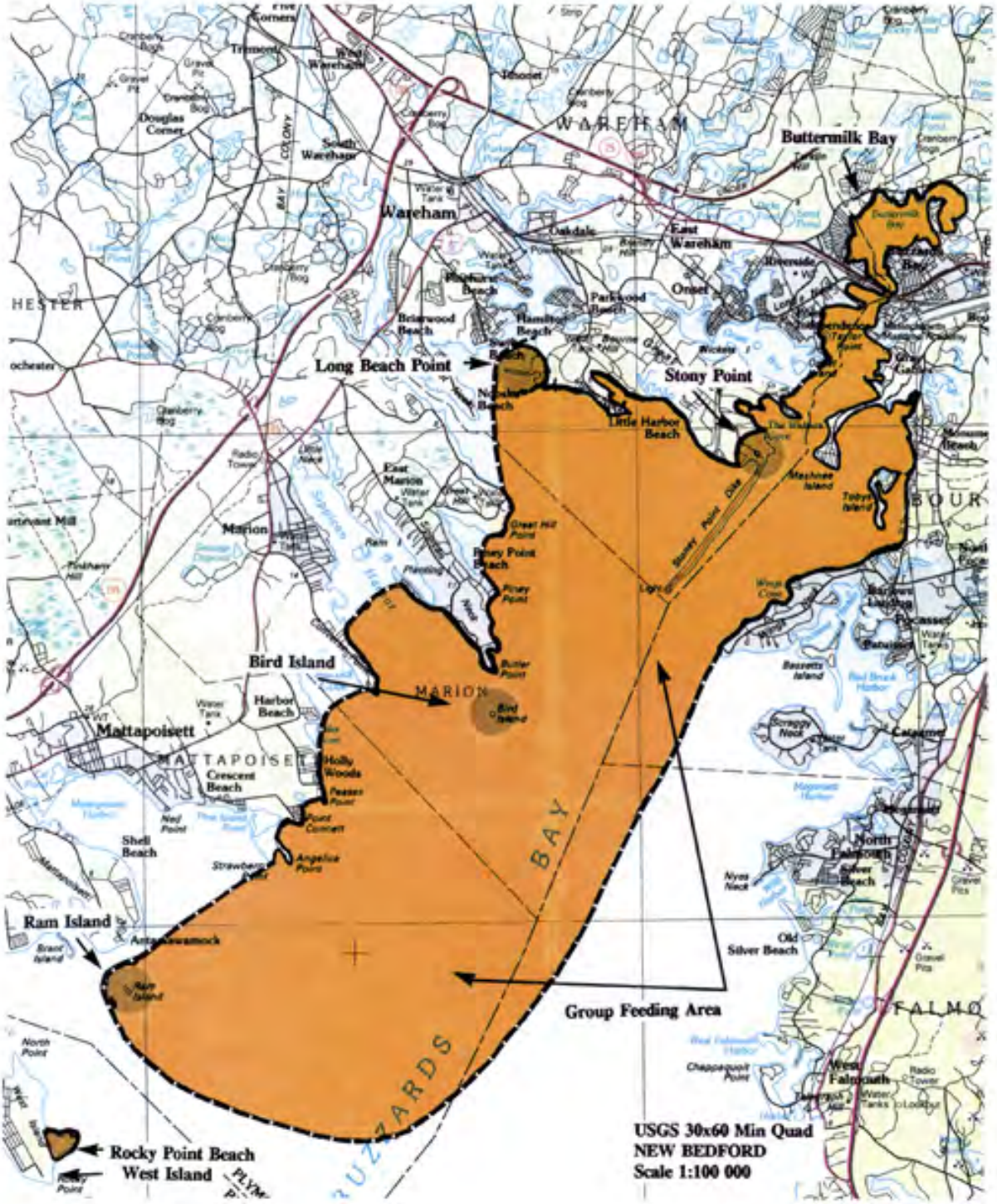
VI. SIGNIFICANCE/UNIQUENESS OF AREA: The Bird Island population of roseate terns (*Sterna dougallii*), a U.S. Endangered species, is the single largest breeding colony of this species in North America, roughly 1500 nesting pairs, comprising approximately half the known breeding population. Since the 1920's, there has been a severe reduction in most major roseate tern nesting sites, largely due to abandonment subsequent to occupation of the colonies by herring gulls (*Larus argentatus*) and great black-backed gulls (*Larus marinus*). An estimated 2500 pairs of roseates nested on Ram Island in 1947, but by the early 1960's this colony was largely overrun by gulls. Currently, no roseate terns nest on Ram Island, although this island is targeted for restoration. Common terns (*Sterna hirundo*) also nest in significant numbers on Bird Island, approximately 800 pairs. The tern feeding areas are rich in American sandlance (*Ammodytes americanus*), sea herring (*Clupea harengus*), blue-backed herring (*Alosa aestivalis*) and round herring (*Etremeus teres*), preferred forage fish for terns in this area. Towards the northeastern end of this complex, near the head of Buzzards Bay, piping plovers (*Charadrius melodus*), a U.S. Threatened species, currently nest on sand beaches near Stony Point on Great Neck, and in the recent past nested on Long Beach Point to the west, at the mouth of the Wareham River. Piping plovers also nest a few miles southwest of Ram Island, on the east end of West Island. The western and upper Bay waters of this complex are important wintering areas for Atlantic brant (*Branta bernicla*), American black duck (*Anas rubripes*), greater scaup (*Aythya marila*) and common goldeneye (*Bucephala clangula*), while the waters around Woods Hole hold significant wintering concentrations of common eider (*Somateria mollissima*) and oldsquaw (*Clangula hyemalis*).

VII. THREATS: Within the study region of southern New England and New York, and generally throughout the Northeast, the reduction of breeding colonies of roseate terns (and other species of terns) has been attributed to displacement by herring gulls and great black-backed gulls, a problem which continues today. Although most site abandonment has been closely associated with gull predation on tern eggs and chicks, in some instances it may have been due to displacement of terns to less favorable sites closer to the shore rendering them more susceptible to predation from mainland-based predators. In addition to gulls, other significant predators on roseate terns include brown rat (*Rattus norvegicus*), great horned owl (*Bubo virginianus*) and black-crowned night-heron (*Nycticorax nycticorax*). Chemical contaminants, including PCBs and organochlorines, are of major concern in certain parts of Buzzards Bay, particularly around New Bedford Harbor.

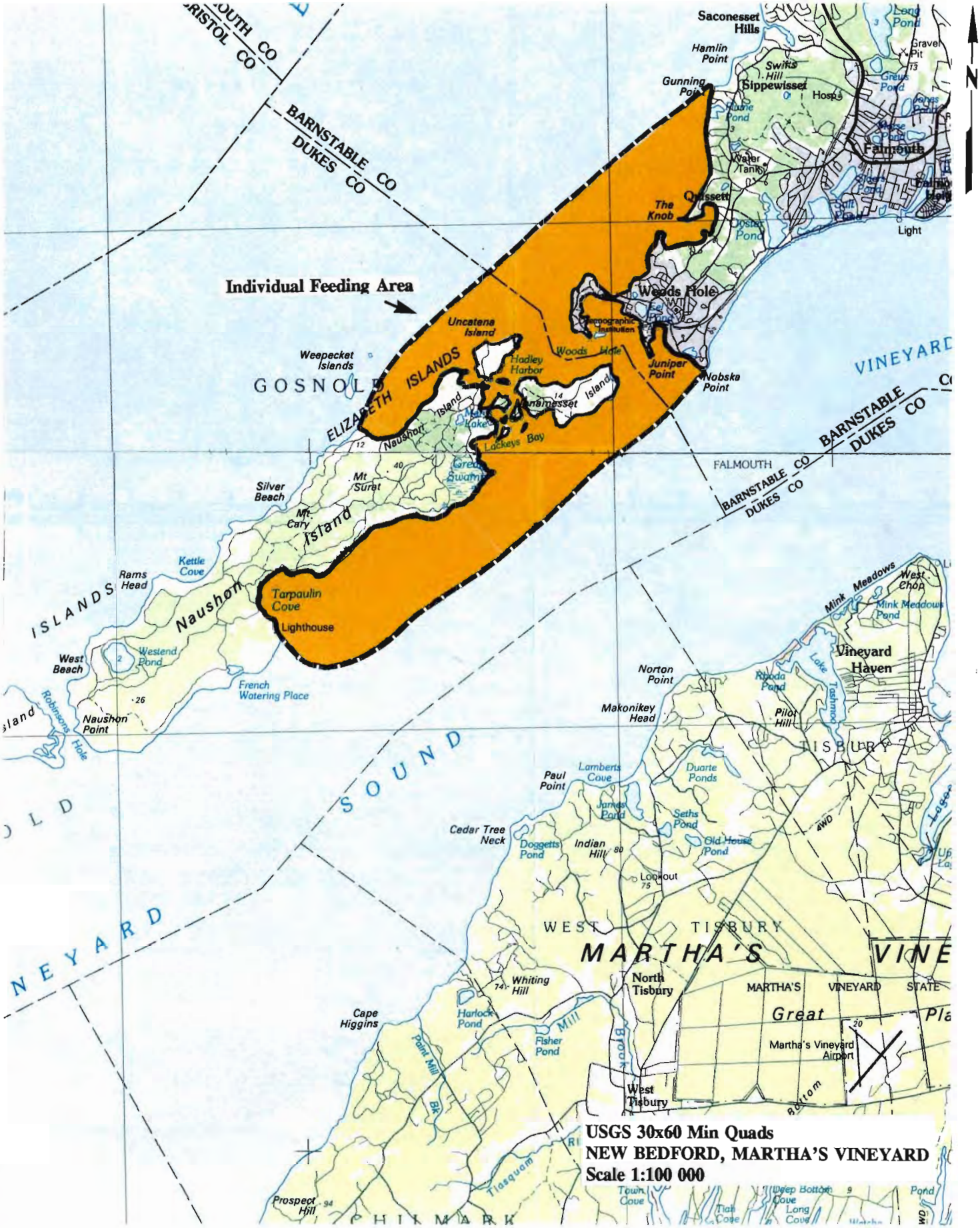
VIII. CONSERVATION CONSIDERATIONS: Recovery efforts for roseate terns in the Northeast region require aggressive gull removal programs at sites formerly occupied by nesting roseates and subsequently displaced by herring gulls and great black-backed gulls. Ram Island has already been targeted for gull removal operations using Gull Toxicant 1339 in a joint State-Federal program and, if successful, could result in the recolonization of this island by roseate terns from Bird Island and other colonies. Beach habitats of nesting terns and piping plovers are highly vulnerable to a variety of human-related disturbances and stringent protective measures are

necessary throughout the critical nesting and young-rearing seasons, including protective fencing, beach closures, predator removal and warden patrols. Efforts should be made to identify and implement pertinent tasks and objectives of the roseate tern and piping plover recovery plans that might apply to the Buzzards Bay area, particularly opportunities to restore and enhance habitat. Consideration should be given to adding dredging spoil deposits on and around Bird Island during the non-nesting season to expand its size and increase the availability of nesting sites for roseate terns. Contact should be made with the Army Corps of Engineers to discuss the feasibility of doing this. Monitoring of both Bay waters and living organisms, particularly roseate terns, for chemical contaminants needs to be given high priority, including measures to clean-up and restore these areas. Attention should be given during any clean-up activities in the New Bedford Harbor area to ensure that contaminants resuspended or released into the water column will not be a problem for terns on either Ram or Bird Islands.

Northeast Coastal Areas Study
Significant Coastal Habitats
Buzzards Bay Colonial Bird Nesting and Feeding Areas, Part 1



Northeast Coastal Areas Study
Significant Coastal Habitats
Buzzards Bay Colonial Bird Nesting and Feeding Areas, Part 2



Northeast Coastal Areas Study
Significant Coastal Habitats
Site 35 (MA)

I. **SITE NAME:** Sippewisset Marshes

II. **LOCATION:** Located along the lower eastern Buzzards Bay shoreline of Cape Cod, approximately 5 miles (8 km) north of Woods Hole and 1 mile (2 km) southwest of West Falmouth.

TOWN: Falmouth
COUNTY: Barnstable
STATE: Massachusetts
USGS 7.5 MIN QUAD: Woods Hole, Mass 41070-56
USGS 30x60 MIN QUAD: New Bedford 41070-E1

III. **GENERAL BOUNDARY:** This saltmarsh area consists of Great Sippewisset Marsh to the north and Little Sippewisset Marsh to the south, separated from each other by a narrow tongue of land (Saconesset Hills). The entire area is about 1.5 miles (2 km) long in a north-south direction and ranges in width (east-west) from 0.25 to just under 1 mile (0.5-2 km). The boundary is delineated on the accompanying map and includes a narrow stretch of sand beaches and nearshore waters of Buzzards Bay.

IV. **OWNERSHIP/PROTECTED STATUS:** Ownership in this area consists of private and Town-owned lands.

V. **GENERAL HABITAT DESCRIPTION:** This classic New England salt marsh has two distinct grass communities: **low marsh**, in which the sediments are covered by water on most high tides, characterized primarily by saltmarsh cordgrass (*Spartina alterniflora*); and **high marsh**, lying above mean high tide level and dominated by salt meadow cordgrass (*Spartina patens*) and spikegrass (*Distichlis spicata*). Black grass (*Juncus gerardii*) is distributed mainly in a narrow fringe along the landward edge of the high marsh. These two types are often referred to as **regularly flooded** and **infrequently flooded** marshes, respectively. Saltmarsh cordgrass growing on regularly flooded low marshes of this area occurs in two growth forms, tall and short. The tall form, between 4-7 ft (1.25 to 2 meters) in height, grows along the banks of the tidal creeks and on areas where marsh sediments are actively accumulating and the marsh is building outward. The short form is found over the remaining low marsh areas and may be as short as 4 inches (10 cm) in height. The low marsh is almost a monoculture of saltmarsh cordgrass, although a few other species of higher plants also commonly occur here, including glassworts (*Salicornia* spp.) and sea lavender (*Limonium nashii*), and several species of macro- and microscopic algae, especially knotted wrack (*Ascophyllum nodosum*), sea lettuce (*Ulva lactuca*) and green fleece (*Codium fragile*). The invertebrate fauna includes two species of fiddler crabs (*Uca pugilator* and *U. pugnax*), common periwinkle (*Littorina littorea*), salt marsh snail (*Melampus bidentatus*) and ribbed mussels (*Modiolus demissa*). Spiders and grasshoppers are generally very abundant. Many migrant and resident birds frequent these marshes, including several species of waterfowl, shorebirds, sparrows, warblers and others. Fishes of these salt marshes can be divided into two groups: 1) relatively permanent residents such as mummichog (*Fundulus heteroclitus*), Atlantic silverside (*Menidia*

menidia) and sheepshead minnow (*Cyprinodon variegatus*); and 2) those that use the marshes mostly as a nursery area, such as winter flounder (*Pseudopleuronectes americanus*), menhaden (*Brevoortia tyrannus*), tautog (*Tautoga onitis*), American sandlance (*Ammodytes americanus*), striped bass (*Morone saxatilis*) and bluefish (*Pomatomus saltatrix*).

VI. SIGNIFICANCE/UNIQUENESS OF AREA: One of the most significant characteristics of the Sippewisset Marshes is their relatively pristine, unditched condition, a rarity among New England and New York coastal marshes, particularly of this size. It is primarily for this reason that these marshes have been the subject of a great many field research studies on all aspects of salt marsh structure and function conducted by scientists at Woods Hole Oceanographic Institution and the Boston University Marine Program, Marine Biological Laboratory in Woods Hole, Massachusetts, and other universities. Their value as a baseline and standard for salt marsh studies and characterizations for over 20 years is unsurpassed in the region. A community profile on the ecology of regularly flooded salt marshes of New England, published by the U.S. Fish and Wildlife Service in 1986, is based primarily on Great Sippewisset Marsh.

These marshes are used extensively by American black duck (*Anas rubripes*) in winter, which feed primarily on salt marsh snails that climb on the stalks of cordgrass, while wintering flocks of snow geese (*Chen caerulescens*) and Canada geese (*Branta canadensis*) graze on the stems of saltmarsh cordgrass. Ospreys (*Pandion haliaetus*), terns, herons, egrets and bitterns feed on various fish along the edge of the marsh and in the tidal creeks. Piping plovers (*Charadrius melodus*), a U.S. Threatened species, nested not too long ago on Black Beach in this complex, but not in recent years. Nearby waters of Buzzards Bay are important feeding areas for roseate tern (*Sterna dougallii*), a U.S. Endangered species, that nest on Bird Island across the Bay to the northwest. Northern diamondback terrapin (*Malaclemys t. terrapin*) feed and nest in these marshes and sandy borders. These marshes and adjacent shallow waters and creeks are critical nursery areas for a number of commercially important fish species, including winter flounder, bluefish, striped bass and tautog. Saltpond grass (*Diplachne maritima*), a regionally rare grass species, has been recorded from the general area in recent times, as has bushy rockrose (*Helianthemum dumosum*) on nearby uplands.

VII. THREATS: Because much of this area is privately owned and the population of Cape Cod continues to grow at a tremendous rate, far above that of the general region as a whole, there is considerable development pressure adjacent to these marshes. In addition to potential loss of habitat, residential and marina development along the shoreline and adjacent uplands could threaten the water quality of both groundwater and surface waters in this area. Degradation of waters, including excessive nutrient loading, can potentially lead to vegetation and faunal changes in the marshes and adjacent waters and impact the suitability of this area for those fish and wildlife species now using the area. Disturbance of piping plover nesting areas by human and pet incursions are a serious problem throughout the region and have led to the abandonment of many former piping plover and tern colonies. The lack of any recent breeding activity on beaches in this area may possibly be the result of human-related disturbances.

VIII. CONSERVATION CONSIDERATIONS: Strategies and opportunities should be sought and developed for the long-term protection of the regionally important fish, wildlife, ecological, educational and scientific values of this marsh complex, using whatever cooperative or regulatory land and water protection and management means that might be available. Such measures might

include the development and implementation of cooperative conservation and management agreements among the various multiple private landowners and Federal, State and local governmental agencies, private conservation organizations and the research/educational community at Woods Hole to ensure the protection of these marshes and the water quality of this area. Other measures to consider include promulgation and enforcement of stringent environmental and land-use zoning policies and regulations, and seeking conservation easements, land exchanges, and, in some cases, acquisition of particularly important or vulnerable tracts. Water quality needs to be closely monitored, enhanced and protected. Human intrusions into beach nesting areas of terns or piping plovers should be prevented throughout the critical nesting season (mid-April to August), and efforts made to enhance the suitability and recolonization potential of the former piping plover nesting area on Black Beach. Disturbances to nesting Northern diamondback terrapins also needs to be assessed and measures implemented to protect nesting areas and individuals.

Northeast Coastal Areas Study
Significant Coastal Habitats
Sippewisset Marshes

USGS 30x60 Min Quad
NEW BEDFORD
Scale 1:100 000

Northeast Coastal Areas Study
Significant Coastal Habitats
Site 36 (MA)

I. SITE NAME: Nantucket Sound Barrier Beach\Bay Complex

II. LOCATION: Three separate areas located along the Nantucket Sound shoreline of Cape Cod, Massachusetts, from East Falmouth to South Yarmouth.

TOWNS: Barnstable, Dennis, Falmouth, Mashpee, Yarmouth
COUNTY: Barnstable
STATE: Massachusetts

USGS 7.5 MIN QUADS:	Cotuit, Mass	41070-54
	Falmouth, Mass	41070-55
	Dennis, Mass	41070-62
USGS 30x60 MIN QUAD:	New Bedford	41070-E1

III. GENERAL BOUNDARY: This complex includes the three major barrier beach-bay systems and nearshore waters of 1) **Waquoit Bay**, just east of East Falmouth; 2) **Cotuit Bay**, between the communities of Cotuit and Osterville; and 3) **Bass River** in South Yarmouth. The boundaries of each of these sites is delineated on the accompanying maps. Although these individual areas are not joined by a common boundary as with other complexes in this study, there are significant ecological and physiographical similarities among these systems to warrant their management consideration as a single complex.

Within each beach-bay system several individual sites of fish and wildlife significance are recognized, and are delineated on the map for each system. The Bass River system includes Bass River, Davis Beach, Stage Island Harbor and Lewis Pond. The Waquoit Bay system includes South Cape Beach and Dead Neck, Washburn Island, Great Pond, Eel Pond, Waquoit Bay, Sage Lot Pond, Hamblin Pond and Jehu Pond. The Cotuit Bay system includes Cotuit Bay, Seapuit River, North Bay, Oyster Harbors Beach, Sampsons Island and Popponesset Beach.

IV. OWNERSHIP/PROTECTED STATUS: Public Trust waters, Waquoit Bay National Estuarine Research Reserve (State DEM/NOAA), several State and Town parks and beaches, and extensive private lands and beaches.

V. GENERAL HABITAT DESCRIPTION: The barrier beach-bay systems of this complex are generally made up of the following physiographic units: **nearshore waters** and sediments; **barrier beach**, including beach, dunes and sand flats; **estuaries and bays**; **tidal wetlands**, including salt and brackish marshes; **brackish or salt ponds**; **embayed islands**; **rivers and streams**; **freshwater wetlands**; and **upland areas**. Beaches in this area are generally sandy, gravelly or cobbly shores. Associated dunes are made up of highly quartzose sands dominated by American beachgrass (*Ammophila breviligulata*) and seaside goldenrod (*Solidago sempervirens*) and by beach plum (*Prunus maritima*) and bayberry (*Myrica pensylvanica*) on the backside of the dunes. Salt and brackish marshes are generally dominated by cordgrasses (*Spartina alterniflora* and *S. patens*), often in mixed associations with spike grass (*Distichlis spicata*) and black grass (*Juncus gerardii*),

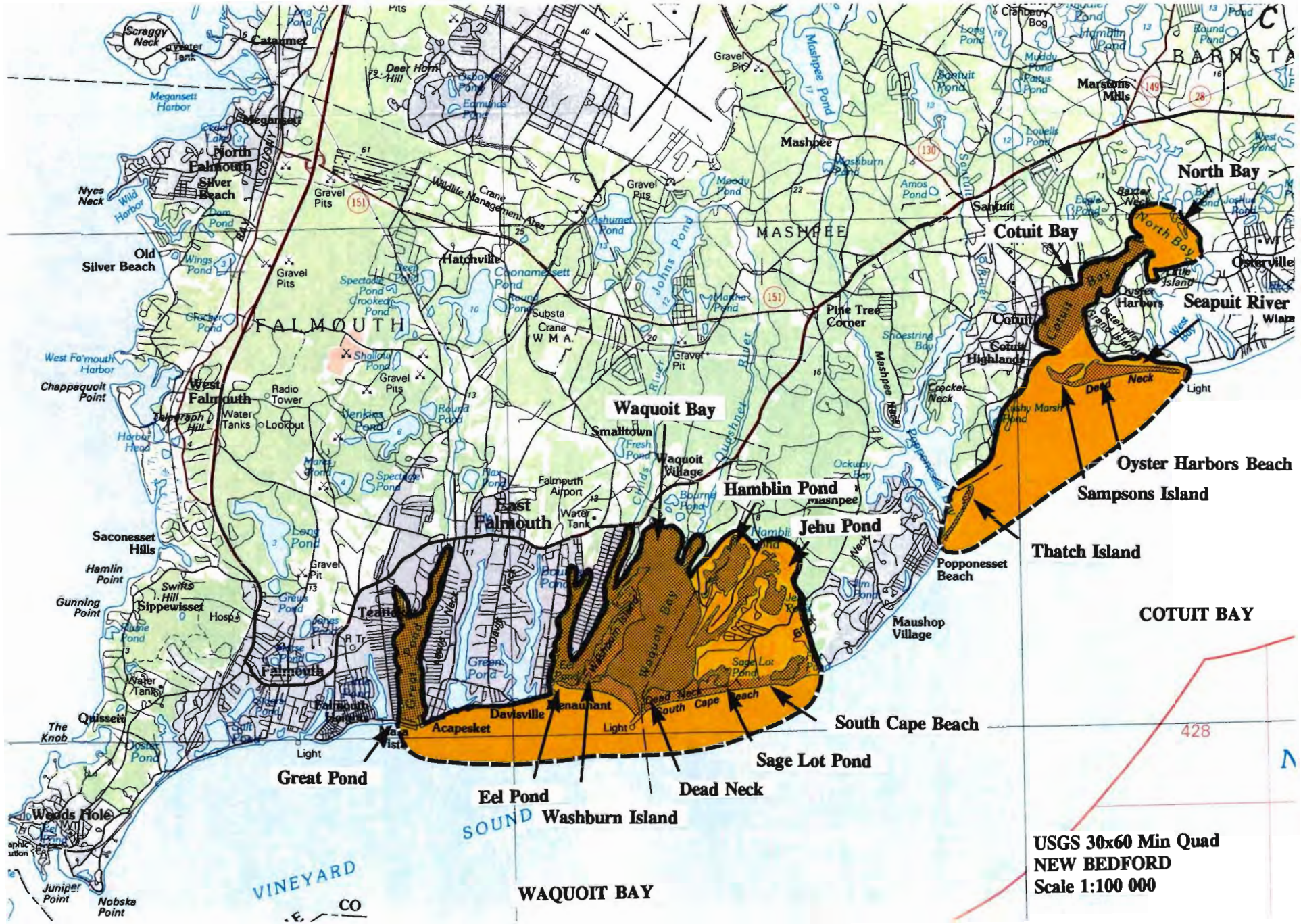
and with an upland shrub border of marsh elder (*Iva frutescens*) and groundsel-bush (*Baccharis halimifolia*). Upland forests are typically mixed hardwoods of several species of oaks (*Quercus* spp.) and pitch pine (*Pinus rigida*) with sassafras (*Sassafras albidum*), black cherry (*Prunus serotina*) and other species. Freshwater wetlands are diverse and include cattails (*Typha angustifolia* and *T. latifolia*), swamp azalea (*Rhododendron viscosum*), and several species of sedges (*Carex* spp.) and rushes (*Juncus* spp.). The estuaries and bays often have extensive beds of eelgrass (*Zostera marina*) and macroalgae, especially sea lettuce (*Ulva lactuca*). Residential development surrounds much of these areas.

VI. SIGNIFICANCE/UNIQUENESS OF AREA: The sand beaches along the barrier islands in each of the systems identified here are regionally important nesting areas for colonial beach-nesting birds, especially for piping plover (*Charadrius melodus*), a U.S. Threatened species, roseate tern (*Sterna dougallii*), a U.S. Endangered species, least tern (*S. antillarum*) and common tern (*S. hirundo*). The enclosed bay waters are important wintering waterfowl concentration areas, and species of special emphasis which commonly overwinter here include American black duck (*Anas rubripes*), Atlantic brant (*Branta bernicla*), greater and lesser scaup (*Aythya marila, A. affinis*), Canada goose (*Branta canadensis*), common goldeneye (*Bucephala clangula*), bufflehead (*Bucephala albeola*) and common loon (*Gavia immer*). Scoters (*Melanitta* spp.), oldsquaw (*Clangula hyemalis*) and common eider (*Somateria mollissima*) often winter in nearby offshore waters in large concentrations. Breeding birds of the tidal and freshwater marshes in these systems include: green-backed heron (*Butorides striatus*), snowy egret (*Egretta thula*), American black duck, mallard (*Anas platyrhynchos*) and osprey (*Pandion haliaetus*). The bay waters are especially important as spawning and nursery areas for winter flounder (*Pseudopleuronectes americanus*), menhaden (*Brevoortia tyrannus*) and tautog (*Tautoga onitis*), and have significant resident populations of silverside (*Menidia menidia*) and killifish (*Fundulus* spp.). Anadromous fish also migrate through these bays to spawn upstream in the rivers and streams that feed into the bays, and include alewife (*Alosa pseudoharengus*), rainbow smelt (*Osmerus mordax*), blueback herring (*Alosa aestivalis*) and striped bass (*Morone saxatilis*). There are important shellfish beds in these areas, especially of hard-shelled and soft-shelled clams (*Mercenaria mercenaria* and *Mya arenaria*, respectively). Northern diamondback terrapins (*Malaclemys t. terrapin*) nest and feed in these areas. Rare plants occurring in this vicinity include sandplain gerardia (*Agalinis acuta*), as U.S. Endangered species, bushy rockrose (*Helianthemum dumosum*) and several species of State concern.

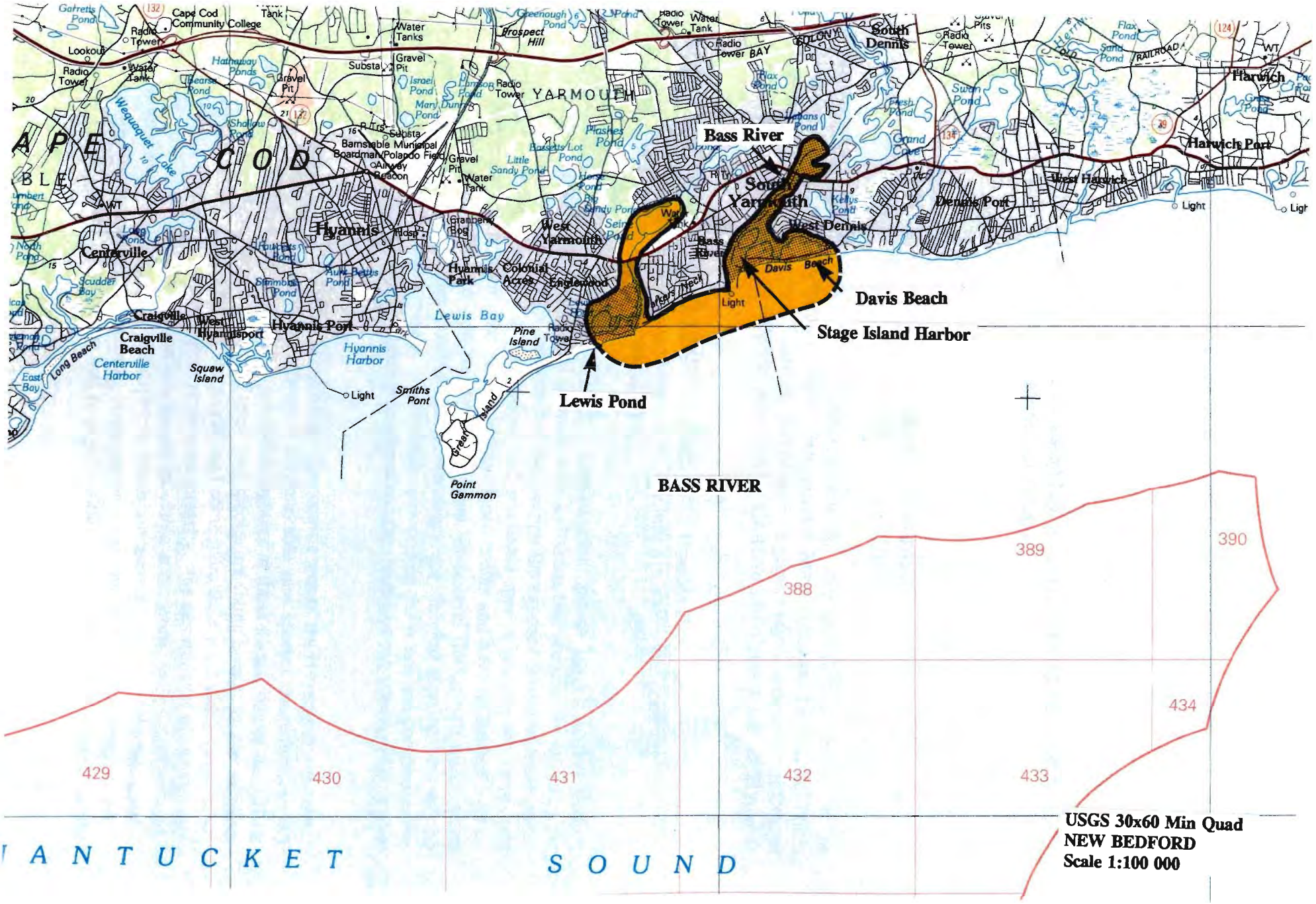
VII. THREATS: The primary threat to this area and its valuable estuarine waters and coastal lands is increasing development of the shoreline and heavy residential densities in the watersheds of these bay systems, with consequent threats to water quality and the continued suitability of these areas for regionally significant fish and wildlife populations. Several of the communities in the area contain no public sewers. The sandy soils and low water table of the Cape provide little buffer to effectively treat the types of pollution normally associated with dense residential development. Other pollution threats include rubbish, oil, non-consumed fuel and sewage release associated with boat use; stormwater runoff and discharges; and pesticides and nutrients associated with cranberry bog farming. Beach habitats of nesting piping plovers and terns are highly vulnerable to a variety of human-related disturbances, from both pedestrians and beach vehicles, and also from loose pets as well as other human-associated species. Disturbances during the critical nesting season (mid-April to August) can lead to seasonal or even permanent abandonment of the site.

VIII. CONSERVATION CONSIDERATIONS: One of the most important resource issues facing these bay systems on Cape Cod is the protection, and in many cases improvement, of water quality in the bays, rivers and nearshore waters of these areas. Appropriate measures need to be taken, including regulation and enforcement, zoning, planning and cooperative management agreements, to ensure the achievement and maintenance of a high level of water quality and the continued long-term value of these areas for fish and wildlife resident populations and seasonal concentrations of regional importance. Human related disturbances to beach-nesting terns and piping plovers is also of major concern and should be prevented during the nesting season by utilizing all available means, including protective fencing and exclosures, posting, beach warden patrols, predator/pet removal and public education. Efforts should be sought to identify and implement pertinent tasks and objectives of the piping plover and roseate tern recovery plans that might be applicable to beaches within this complex, including those involving habitat restoration or enhancement.

Northeast Coastal Areas Study
Significant Coastal Habitats
Nantucket Sound Barrier Beach/Bay Complex, Part 1



Northeast Coastal Areas Study
Significant Coastal Habitats
Nantucket Sound Barrier Beach/Bay Complex, Part 2



Northeast Coastal Areas Study
Significant Coastal Habitats
Site 37 (MA)

I. SITE NAME: Hyannis Coastal Ponds Complex

II. LOCATION: The Hyannis Ponds are an assemblage of several Coastal Plain ponds located on Cape Cod, just north of the Barnstable Municipal Airport.

TOWN: Barnstable
COUNTY: Barnstable
STATE: Massachusetts
USGS 7.5 MIN QUAD: Hyannis, Mass 41070-63
USGS 30x60 MIN QUAD: New Bedford 41070-E1

III. GENERAL BOUNDARY: The general outline for this complex is shown on the accompanying map. It includes Lamson, Israel, Campground, Mary Dunn and Little Israel Ponds and adjacent uplands. This complex is actually part of an even greater regional complex of Coastal Plain ponds extending from Falmouth and Sandwich to Chatham and Orleans and in Plymouth Township.

IV. OWNERSHIP/PROTECTED STATUS: Much of the Hyannis Ponds complex is owned by an industrial park development company. Other owners include a private water company, the Town of Barnstable, and a church-operated cottage area.

V. GENERAL HABITAT DESCRIPTION: Coastal Plain ponds in this region occupy depressions, or kettleholes, on deep glacial outwash soils and sands that are directly linked to the groundwater aquifer. The pondshore communities that occupy the exposed shores of these ponds are typically composed of a mixture of herbaceous and graminoid species and are best developed along those ponds that are small in size, lie in shallow-sloped basins and have no surface inlet or outlet. These ponds are subject to both seasonal and annual water level fluctuations which serve to expose shores and provide the suitable habitat necessary for the full development of the characteristic pondshore plant community. The uplands surrounding the ponds and pondshores are primarily scrub oak (*Quercus ilicifolia*)/pitch pine (*Pinus rigida*) shrub and oak (*Quercus* spp.)/pine (*Pinus* spp.) woods.

VI. SIGNIFICANCE/UNIQUENESS OF AREA: The significance of the Hyannis Ponds cannot be characterized by any single measure. There is a remarkable rare species concentration: 15 nationally restricted, State-listed rare species are found together at these ponds, one of the richest rare plant communities in the region. Some of these rare species are found here in greater numbers than found anywhere else in the State or the world, and some have their most viable populations here. The Hyannis Ponds complex has great ecosystem integrity: the assemblages of rare species found at these ponds are indicative of the occurrence of viable ecosystems, rather than isolated, remnant rare species sites. Several of the Hyannis Ponds are among the least disturbed coastal plain pond natural community types remaining in the region. The Hyannis Ponds complex is quite literally one of the few areas in the region that is of great biological significance on a global scale.

After over 10 years of biological inventory and research by the Massachusetts Natural Heritage & Endangered Species Program, this site has remained one of the three most important unprotected concentrations of biological diversity in Massachusetts. Some of the species of special emphasis and significance occurring in these ponds are: Plymouth gentian (*Sabatia kennedyana*), long-beaked bald-sedge (*Psilocarya scirpoides*), Barrens bluet damselfly (*Enallagma recurvatum*) and decodon borer moth (*Papaipema sulphurata*). Other pondshore species that are generally rare in the region but locally abundant in these ponds include thread-leaved sundew (*Drosera filiformis*), pondshore knotweed (*Polygonum puritanorum*) and inundated beak-rush (*Rhynchospora inundata*), among others.

VII. THREATS: Threats include destruction of plants and habitat by off-road recreational vehicles driving around the pondshores, permanently lowered water table, surface runoff from roads and parking lots, and nutrient enrichment of the water from septic tanks, cranberry bog production and waterfowl waste.

VIII. CONSERVATION CONSIDERATIONS: This unique and globally significant area is in immediate need of protection and management and should be given the highest priority for the development of cooperative agreements and conservation easements among the various private landowners and State and local governments and private conservation organizations. Other options for protection to be considered include zoning restrictions, adoption of strict regulatory guidelines and enforcement and acquisition of immediately threatened lands and ponds. There has already been considerable conservation activity in this area by the State, Town (Barnstable) and The Nature Conservancy, particularly in seeking acquisition opportunities and these should continue to be pursued.

Northeast Coastal Areas Study
Significant Coastal Habitats
Hyannis Coastal Ponds Complex

388

USGS 30x60 Min Quad
NEW BEDFORD
Scale 1:100 000

Northeast Coastal Areas Study
Significant Coastal Habitats
Site 38 (MA)

I. SITE NAME: Miacomet Moorlands

II. LOCATION: The Miacomet Moorlands lie on the southern margin of Nantucket Island, between Miacomet Pond and Hummock Pond, facing the Atlantic Ocean.

TOWN: Nantucket
COUNTY: Nantucket
STATE: Massachusetts
USGS 7.5 MIN QUAD: Nantucket, Mass 41070-32
USGS 30x60 MIN QUAD: Martha's Vineyard 41070-A1

III. GENERAL BOUNDARY: The boundary outline for this area is shown on the accompanying map. It consists of a rectangular-shaped area bounded by Hummock Pond on the west, Miacomet Pond on the east and the Atlantic Ocean on the south. It is approximately 2 miles (3 km) long from east to west and 1 mile (2 km) wide north to south.

IV. OWNERSHIP/PROTECTED STATUS: Ownership is a mix of private, local Land Trust, municipal and Federal (Federal Aviation Administration and U.S. Coast Guard). The Nature Conservancy has also been extensively involved here.

V. GENERAL HABITAT DESCRIPTION: Miacomet Moorlands is a superb example of coastal heathland, a globally endangered plant community which ranges from Long Island, NY, to Cape Cod, MA. With human settlement of Nantucket, trees that were present were cut and a combination of grazing, burning and saltspray has kept this area treeless and given it a prairie-like aspect. This community is dominated by little bluestem (*Schizachyrium scoparium*), bearberry (*Arctostaphylos uva-ursi*), black huckleberry (*Gaylussacia baccata*), lowbush blueberry (*Vaccinium vacillans*), and many species of asters (*Aster* spp.), goldenrods (*Solidago* spp.), bush-clovers (*Lespedeza* spp.), and other herbs.

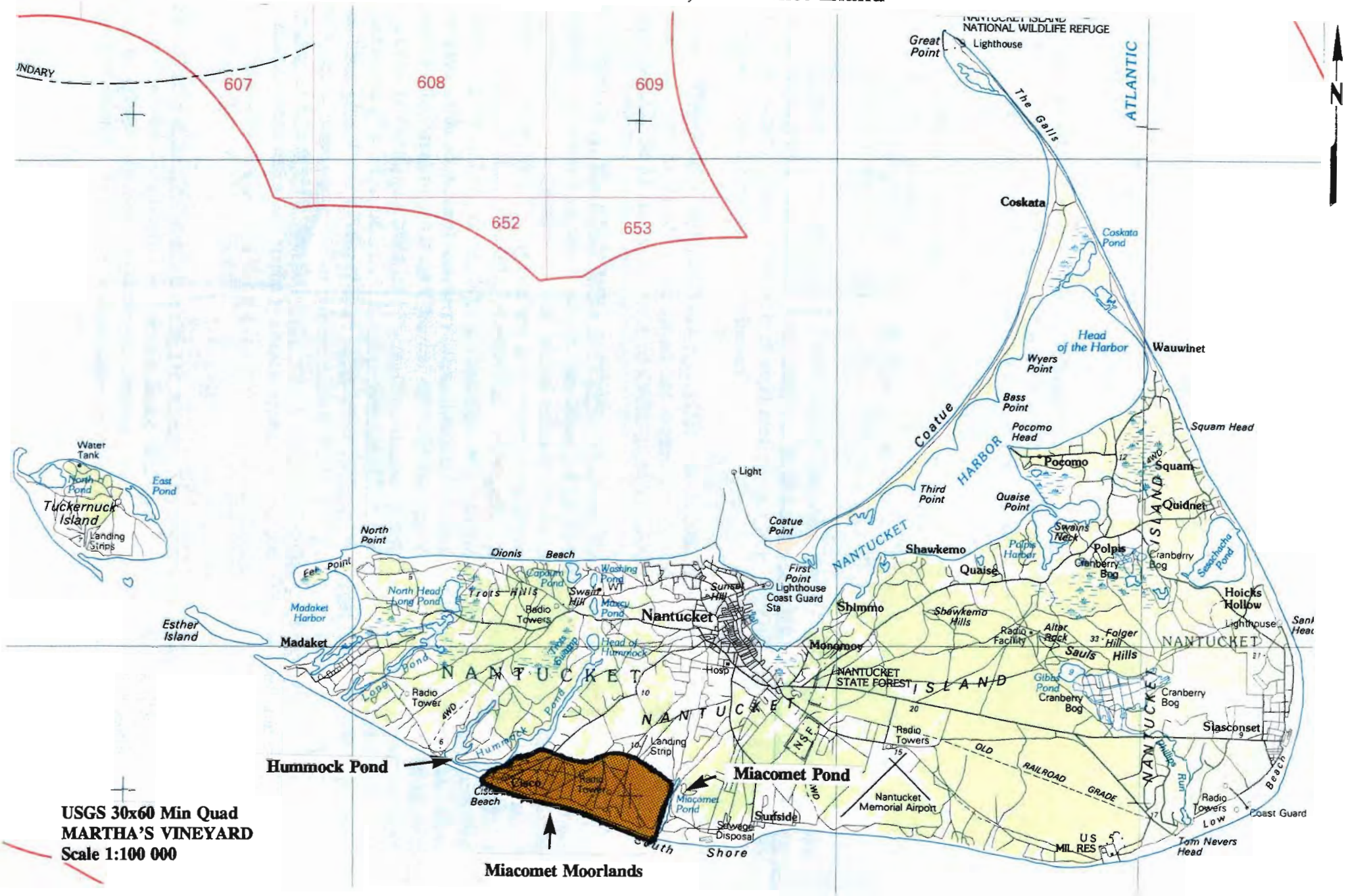
VI. SIGNIFICANCE/UNIQUENESS OF AREA: Miacomet Moorlands supports one of the region's greatest concentrations of rare or unusual species. It also represents the largest and probably finest remaining example of coastal heathland anywhere. Regionally rare or endangered species include: sandplain gerardia (*Agalinis acuta*), a U.S. Endangered species, regal fritillary butterfly (*Speyeria idalia*), Nantucket shadbush (*Amelanchier nantucketensis*), Eastern silvery aster (*Aster concolor*), northern harrier (*Circus cyaneus*) and bushy rockrose (*Helianthemum dumosum*). The Moorlands is considered to be the State's most vital area for nesting short-eared owls (*Asio flammeus*). Other species of regional emphasis include osprey (*Pandion haliaetus*), New England blazing-star (*Liatris borealis*), and grasshopper sparrow (*Ammodramus savannarum*).

VII. THREATS: Most of the acreage once occupied by coastal heathlands, including the once vast Hempstead Plains on Long Island, has been lost to development, farming, or to vegetation succession following cessation of grazing and burning. Dense "forests" of scrub oak are rapidly

advancing across the landscape and homes are eliminating rare plant habitat or impacting bird nesting and feeding areas.

VIII. CONSERVATION CONSIDERATIONS: Given the complex ownership pattern of the area and rapid development of private lands, efforts should be made to secure and protect remaining private lands by private or municipal Land Trusts and to develop cooperative management and conservation agreements among all parties. The Fish and Wildlife Service should pursue a cooperative agreement with the Federal Aviation Administration regarding the signal tower lands, and with the U.S. Coast Guard.

Northeast Coastal Areas Study
Significant Coastal Habitats
Miacomet Moorlands, Nantucket Island



USGS 30x60 Min Quad
MARTHA'S VINEYARD
Scale 1:100 000

Northeast Coastal Areas Study
Significant Coastal Habitats
Site 39 (MA)

I. SITE NAME: Muskeget and Tuckernuck Islands and Muskeget Channel

II. LOCATION: Muskeget and Tuckernuck Islands are located just west of Nantucket Island and south of Cape Cod. Muskeget Channel is a shallow water channel running between the open Atlantic Ocean and Nantucket Sound and lying between Nantucket Island and Martha's Vineyard.

TOWN: Nantucket
COUNTY: Nantucket
STATE: Massachusetts
USGS 7.5 MIN QUAD: Tuckernuck Island, Mass 41070-33
USGS 30x60 MIN QUAD: Martha's Vineyard 41070-A1

III. GENERAL BOUNDARY: The general boundary for this area is outlined on the accompanying map, and includes both islands in their entirety and the nearshore shallow water shoals surrounding them. The main channel area extends from west of Muskeget Island east to Chappaquiddick Island, Martha's Vineyard.

IV. OWNERSHIP/PROTECTED STATUS: Both islands are predominately in private ownership. Parts of Muskeget Island are owned by the Town of Nantucket. There are approximately 30-35 seasonally occupied dwellings on Tuckernuck Island.

V. GENERAL HABITAT DESCRIPTION: Muskeget Channel is a shallow water area of temporary shoals and permanent islands. Muskeget and Tuckernuck Islands were originally formed by the terminal moraine of the last glacial episode. Tuckernuck still retains remnants of the moraine as low hills, but the southern half of the island consists of outwash plains characterized by coastal heathland, a globally restricted and endangered plant community. This community occurs only from Long Island, NY, to Cape Cod, MA. Dominant species include little bluestem (*Schizachyrium scoparium*), bearberry (*Arctostaphylos uva-ursi*), and low ericaceous shrubs. There are extensive areas of scrub oak (*Quercus ilicifolia*) vegetation up to 15 feet (5 m) in height with pitch pine (*Pinus rigida*), black huckleberry (*Gaylussacia baccata*), bayberry (*Myrica pensylvanica*), beach plum (*Prunus maritima*) and sweet pepperbush (*Clethra alnifolia*). Red maple (*Acer rubrum*) and black gum (*Nyssa sylvatica*) occur in kettlehole swamps. Muskeget Island has lost its morainal hills and is now composed of marine-worked sands and gravels. The dominant plants are beachgrass (*Ammophila breviligulata*), seaside goldenrod (*Solidago sempervirens*), poison ivy (*Toxicodendron radicans*), bayberry, beach plum, saltspray rose (*Rosa rugosa*) and other shrubs on the stabilized dunes. There are a few small freshwater marshes and a saltmarsh dominated by cordgrass (*Spartina alterniflora*).

VI. SIGNIFICANCE/UNIQUENESS OF AREA: The shallow waters and shoals of Muskeget Channel and the areas surrounding the islands are highly productive for marine fish, shellfish, and eelgrass (*Zostera marina*), providing rich feeding grounds for terns and gulls in summer and sea ducks in winter. The largest concentration of oldsquaws (*Clangula hyemalis*) in the western

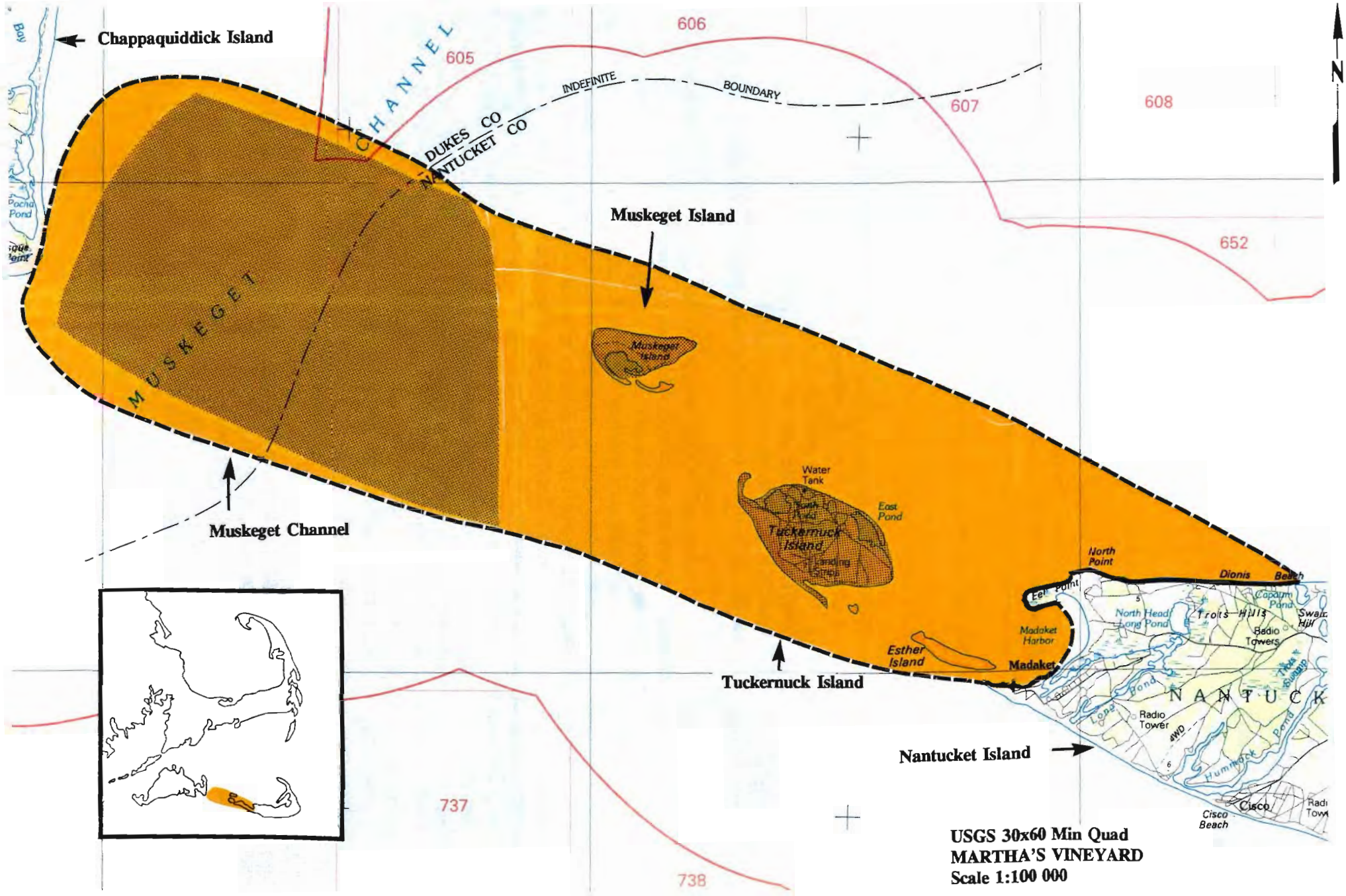
Atlantic occurs here (counts of over 150,000 have been recorded), along with thousands of common eiders (*Somateria mollissima*) and three species of scoter (*Melanitta* spp.). In late summer a thousand or more roseate terns (*Sterna dougallii*), a U.S. Endangered species, feed here in preparation for their southward migration. Muskeget Island is the only known locality for the Muskeget beach vole, a taxon considered either a full species (*Microtus breweri*) or a subspecies of the meadow vole (*M. pennsylvanicus*). It is currently a candidate for listing under the U.S. Endangered Species Act. Extensive sandspits on Muskeget, Tuckernuck, and Skiff Islands (west side of Muskeget Channel off Martha's Vineyard) support rare plants and are favored haulout points for large numbers of harbor and gray seals (*Phoca vitulina* and *Halichoerus grypus*, respectively). One of only two U.S. breeding locations for gray seal is on Muskeget and the island also supports major herring gull (*Larus argentatus*) and great black-backed gull (*Larus atricilla*) colonies. These islands support many State and Federally rare species including: Nantucket shadbush (*Amelanchier nantucketensis*), a candidate species for listing under the Act, several pairs of short-eared owl (*Asio flammeus*), piping plover (*Charadrius melodus*), a U.S. Threatened species, least tern (*Sterna antillarum*), northern harrier (*Circus cyaneus*) and common tern (*Sterna hirundo*). Muskeget Island is a designated National Natural Landmark, due primarily to the presence of breeding gray seals and beach voles.

Of historical note, because of its remoteness and isolation from the mainland as well as the larger islands of Nantucket and Martha's Vineyard, Muskeget Island was a major site occupied by nesting common and roseate terns which allowed them to escape and survive the ravages of the feather trade that decimated bird colonies elsewhere throughout the region around the turn of the century. Having survived the feather trade, the tern colony was later displaced by a major laughing gull (*Larus atricilla*) colony. Not long afterwards, the first breeding colony of herring gulls in the region was established on this island and soon displaced the laughing gulls until they, in turn, were displaced by great black-backed gulls.

VII. THREATS: Threats include commercial fisheries, natural resource extraction, potential land development, oil spills and recreational boating.

VIII. CONSERVATION CONSIDERATIONS: Appropriate levels of Federal protection and management are necessary to protect the important waterfowl, colonial nesting birds and pinniped values of this area. Beach habitats of nesting piping plovers and terns are highly vulnerable to human-related disturbances and measures should be taken to ensure that these habitats are protected from human and predator intrusions during the critical nesting season (mid-April to August). Efforts should be made to identify and implement objectives and tasks outlined in the piping plover recovery plan that could be applied to nesting beaches on these islands. Gull removal should be considered if the growing gull populations are determined to be a threat to the recovery or maintenance of piping plover and tern colonies in this area. Opportunities should be sought to develop cooperative management and conservation agreements between State and Federal resource agencies and private landowners on the islands, particularly Tuckernuck Island, and also to inform other agencies such as the Corps of Engineers and the Coast Guard of the high ecological value of this area and the need to consider these values in any dredging operations, regulation or approval of shipping lanes or oil spill contingency plans.

Northeast Coastal Areas Study
Significant Coastal Habitats
Muskeget and Tuckernuck Islands and Muskeget Channel



USGS 30x60 Min Quad
MARTHA'S VINEYARD
Scale 1:100 000

Northeast Coastal Areas Study
Significant Coastal Habitats
Site 40 (MA)

I. SITE NAME: Martha's Vineyard Coastal Sandplain and Beach Complex

II. LOCATION: This extensive complex of glacial outwash sandplains and coastal beaches encompasses a large interior section of southcentral Martha's Vineyard, an area known as the Great Plains, and beaches along the southern and eastern shorelines of the island. Martha's Vineyard is southern New England's largest island and is located south of Falmouth, Cape Cod.

TOWNS: Gay Head, Chilmark, Edgartown, West Tisbury, Oak Bluffs, Chappaquiddick Island
COUNTY: Dukes
STATE: Massachusetts

USGS 7.5 MIN QUADS:	Tisbury Great Pond, Mass	41070-36
	Squibnocket, Mass	41070-37
	Edgartown, Mass	41070-45
	Vineyard Haven, Mass	41070-46
	Naushon Island, Mass	41070-47
USGS 30x60 MIN QUAD:	Martha's Vineyard	41070-A1

III. GENERAL BOUNDARY: The island of Martha's Vineyard is bounded on the northwest by Vineyard Sound, on the northeast by Nantucket Sound, on the east by Muskeget Channel and on the south and southeast by the Atlantic Ocean. The sandplains area comprising this complex is a triangular-shaped glacial outwash plain whose southern base extends from Chilmark Pond on the west to the eastern shores of Edgartown Great Pond, an east-west distance of approximately 9 miles (14 km). The northern apex of the plains extends inland from the coast about 6 miles (10 km) to a point about 2 miles (3 km) northeast of the village of North Tisbury. The coastal beaches extend southeastward from Long Beach, between Gay Head and Squibnocket Point on the southwestern end of the island eastward along the entire southern shoreline of the island to Wasque Point, and from there north to Cape Poge and curving westward around the Cape Poge Elbow. Included within this complex are the several large ponds along the southern and southwestern shores, such as Squibnocket Pond, Chilmark Pond, Black Point Pond, Tisbury Great Pond, Oyster Pond, Paqua Pond, and Edgartown Great Pond. The complex also includes Nomans Land Island, a small island (approximately 1 square mile) 3 miles (5 km) off the southwest corner (Squibnocket Point) of Martha's Vineyard. The general boundary of the complex as well as the individual sites needing protection are delineated on the accompanying maps.

IV. OWNERSHIP/PROTECTED STATUS: The ownership of the area is exceedingly mixed, and includes many privately-owned parcels, local Land Trusts, Massachusetts Audubon Society and The Nature Conservancy preserves, and various municipal, State and Federal government-owned lands. About 20% of the island of Martha's Vineyard is preserved in some way, of which nearly half of these preserved lands is in public ownership. The sandplains area includes all of Martha's Vineyard State Forest, about 4,000 acres (1620 ha). Most of this sandplains area, however, is privately-owned. Nomans Land Island is owned by the U.S. Military (Navy) and jointly managed by the U.S. Fish and Wildlife Service.

V. GENERAL HABITAT DESCRIPTION: The two major components of this complex are the sandplains and the coastal beaches. The **sandplains** are comprised of fire-adapted grassland, heathland and woodland communities. Sandplain grasslands are regionally and globally restricted maritime grassland communities characteristically dominated by little bluestem (*Schizachyrium scoparium*), switchgrass (*Panicum virgatum*), Indian grass (*Sorghastrum nutans*) and Pennsylvania sedge (*Carex pennsylvanica*), often with wild indigo (*Baptisia tinctoria*), toothed white-topped aster (*Sericocarpus asteroides*) and goat's rue (*Tephrosia virginiana*). Heathlands are low, shrubby plant communities dominated by ericaceous shrubs, particularly low-bush blueberry (*Vaccinium angustifolium*), sheep laurel (*Kalmia angustifolia*), black huckleberry (*Gaylussacia baccata*), staggerbush (*Lyonia mariana*), wild rose (*Rosa virginiana*) and bayberry (*Myrica pensylvanica*). Pitch pine (*Pinus rigida*) and scrub oak (*Quercus ilicifolia*) barrens occur over the nutrient-poor soils of the sandplains. These woodlands have a very open canopy and a dense ericaceous shrub understory. Oak savannas are another common community type of the sandplains and are dominated by white (*Quercus alba*), black (*Q. velutina*), post (*Q. stellata*) and scarlet oaks (*Q. coccinea*), often mixed with pitch pine on drier sites and with black cherry (*Prunus serotina*), red maple (*Acer rubrum*) and sassafras (*Sassafras albidum*) on moister sites. Well-developed shrub and herbaceous layers are often present and include black huckleberry, highbush blueberry (*Vaccinium corymbosum*), bayberry, bearberry (*Arctostaphylos uva-ursi*) and bracken fern (*Pteridium aquilinum*). **Coastal beaches** in this area consist of unvegetated beach face and berm, sparsely vegetated foredunes dominated by American beach grass (*Ammophila breviligulata*) and seaside goldenrod (*Solidago sempervirens*) and more stabilized and densely vegetated inner dunes with bayberry, saltspray rose (*Rosa rugosa*), poison ivy (*Toxicodendron radicans*) and winged sumac (*Rhus copallina*). Nomans Land Island is characterized by wavecut bluffs reaching 50 feet (15 m) in height and narrow beaches of coarse gravel, cobbles and boulders. The island surface is mostly glacial moraine similar to that on Squibnocket Point. Vegetation types are diverse and dense. Dominant upland vegetation is poison ivy, rose (*Rosa* spp.), bayberry, greenbrier (*Smilax* spp.) and arrowwood (*Viburnum dentatum*). Sand dunes are similar to those on Martha's Vineyard and are dominated by beach grass, seaside goldenrod and beach pea (*Lathyrus japonicus*).

VI. SIGNIFICANCE/UNIQUENESS OF AREA: The sandplains of Martha's Vineyard have the dubious distinction of being the final home and last known occurrence of the now-extinct Heath-hen (*Tympanuchus cupido cupido*), of which the last individual, a male, was seen on March 11, 1932. This species and its extinction from overhunting, changing habitat, predation by feral house cats and fire dramatizes the uniqueness and regional importance of this area, its present value to a number of regionally rare species and communities and the threats which it faces. The sandplain grasslands and coastal heathlands are regionally restricted habitats that have developed on the outwash plains at the edge of the glacial moraine that extends along the northeastern U.S. coast from Long Island to Cape Cod. These areas are remarkable not only for their unique, fire-adapted plant communities and their well-developed condition and relative extensiveness on Martha's Vineyard, but also for providing essential habitat for such rare species of special emphasis in the region as bushy rockrose (*Helianthemum dumosum*), Nantucket shadbush (*Amelanchier canadensis*), New England blazing-star (*Liatris borealis*) and regal fritillary butterfly (*Speyeria idalia*), all candidate species for listing under the U.S. Endangered Species Act. Savannah and grasshopper sparrows (*Ammodramus maritimus* and *A. savannarum*) are characteristic nesting sparrows of the grassland sandplains, while nesting osprey (*Pandion haliaetus*) are becoming increasingly common on the island (greater than 75 pairs), and northern harrier (*Circus cyaneus*) nest in several areas. Short-eared owl (*Asio flammeus*) was once a common breeding bird in the sandplain grasslands and

low heaths, but none has been reported nesting in recent years, even though potential habitat appears abundant. The pine barrens have a rich lepidopteran community, including such rare species as the barrens buckmoth (*Hemileuca maia*), a candidate species. Barn owls (*Tyto alba*) nest locally on the island.

The long stretch of nearly continuous sand beaches around the periphery of Martha's Vineyard, particularly from the vicinity of Cape Poge at the northeastern end of Chappaquiddick Island south and westward along the Atlantic Ocean shoreline to Squibnocket Point and Long Beach at the southwestern end of the island, is potentially perhaps the most important beach-nesting area for piping plovers (*Charadrius melodus*), a U.S. Threatened species,and least tern (*Sterna antillarum*) in the study region. A few small isolated beaches and islands in this area also provide essential nesting habitat for common tern (*S. hirundo*) and roseate tern (*S. dougallii*), a U.S. Endangered species, which also nested on Nomans Land Island, and American oystercatcher (*Haematopus palliatus*). In recent years, many of the tern and piping plover nesting areas have been abandoned, likely the result of predation and/or human disturbances during the nesting season. The only New England population of northeastern beach tiger beetle (*Cincindela d. dorsalis*), a U.S. Threatened species, occurs on one small section of beach in this complex. Sea-beach knotweed (*Polygonum glaucum*) and sea-beach pigweed (*Amaranthus pumilis*), both regionally rare plant species, grow on several of the beaches in this area. Gray seals (*Halichoerus grypus*) frequently haulout on these beaches in winter and spring. At one time, the beaches of Nomans Land Island supported a major common and roseate tern nesting colony that contained more birds than nested on all of Martha's Vineyard, primarily because of the absence of any mammalian predators on Nomans Land. Now, however, nesting terns have been displaced by gulls. There is still a colony of black-crowned night-heron (*Nycticorax nycticorax*) and snowy egret (*Egretta thula*) on Nomans Land island, which fly over to Martha's Vineyard to feed.

The large ponds and embayments behind (landward of) the south-facing barrier beaches fronting the Atlantic Ocean, including Great Tisbury Pond, Edgartown Great Pond and Katama Bay, are important wintering waterfowl concentration areas, particularly for American black duck (*Anas rubripes*), lesser scaup (*Aythya affinis*), Atlantic brant (*Branta bernicla*), Canada goose (*Branta canadensis*) and red-breasted merganser (*Mergus serrator*). Bald eagles (*Haliaeetus leucocephalus*), a U.S. Endangered species, occasionally overwinter in these areas. Commercially and recreationally important shellfish beds of American oyster (*Crassostrea virginica*), hard-shelled clam (*Mercenaria mercenaria*) and bay scallop (*Aequipecten irradians*) occur in these ponds and bays. The mudflats along their shores are often visited by large numbers of migrating shorebirds, including dunlin (*Calidris alpina*), black-bellied plover (*Pluvialis squatarola*), ruddy turnstone (*Arenaria interpres*) and semi-palmated plovers (*Charadrius semipalmatus*). Peregrine falcons (*Falco peregrinus*), a U.S. Endangered species, are common during fall and spring migrations. The nearshore Atlantic Ocean waters are important sea duck wintering areas, especially for common eider (*Somateria mollissima*) and scoters (*Melanitta* spp.). These same waters are rich in bluefish (*Pomatomus saltatrix*), winter flounder (*Pseudopleuronectes americanus*), striped bass (*Morone saxatilis*), Atlantic cod (*Gadus morhua*) and Atlantic bonito (*Sarda sarda*).

VII. THREATS: The islands of Nantucket and Martha's Vineyard, as on Cape Cod, are becoming increasingly crowded with both new residents and tourists, creating a corresponding need for more housing and facilities. With this population increase comes an evergrowing demand for greater public access to existing natural areas, open spaces and beaches in pursuit of both traditional and emerging new forms of recreational activities, many of which are incompatible with the long-

term survival of certain native species of wildlife, fish and plants. Clearly, the direct loss or degradation of essential beach and sandplain habitat to housing or facility development has the greatest and most immediate impact on those species and communities dependent on such areas for one or more of their life history stages, seasonal use requirements or survival. Indeed, several species have declined, ceased to breed or have been extirpated from the island as a likely result of direct habitat loss, and several others are similarly threatened. Conversion of habitat types poses a similar threat to several species and communities on the sandplains, including the direct replacement of native vegetation with planted pines and the loss of unique grassland and heath sandplain communities and their dependent species through fire suppression practices which have in turn resulted in vegetational succession to shrubland and woodland communities. In addition to habitat losses, direct impacts have occurred on rare sandplain insect species from aerial pesticide application, particularly for gypsy moth.

The beaches of Martha's Vineyard, most of which are privately-owned but also some stretches of State and County lands, are subject to enormous recreational pressures both from pedestrians and off-road vehicles. While heaviest use is during the summer months, there is considerable "off-season" vehicular use of the beaches by fishermen and other recreationalists. This off-season beach traffic, particularly during times of the year when the beaches are at their narrowest from winter storms, frequently results in people driving on the toes of the dunes, which almost certainly contributes to an increased dune and foredune erosion rate and a corresponding loss of essential beach nesting habitat for certain species such as piping plover. Far more serious, however, is the direct impact of human-related disturbances on colonial beach-nesting birds during the critical nesting season. Such disturbances include beach-walking, sun-bathing, picnicking, boat landings, vehicular traffic, raking and grooming of the upper beach wrackline (an important food source for piping plovers) and unleashed pets within nesting areas. Nesting colonies of piping plovers and terns are extremely sensitive and vulnerable to disturbances and intrusions of these sorts and will frequently abandon a site either seasonally or permanently as a result. There has also been a growing problem and concern with predation on nesting birds by skunk (*Mephitis mephitis*), which were reintroduced to the island in recent times, raccoon (*Procyon lotor*) and feral cats. Predation is potentially the greatest threat to ground-nesting birds of all kinds on the island, including short-eared owl and harrier. The gull population on Nomans Land Island essentially precludes the likelihood of any recolonization by common or roseate terns.

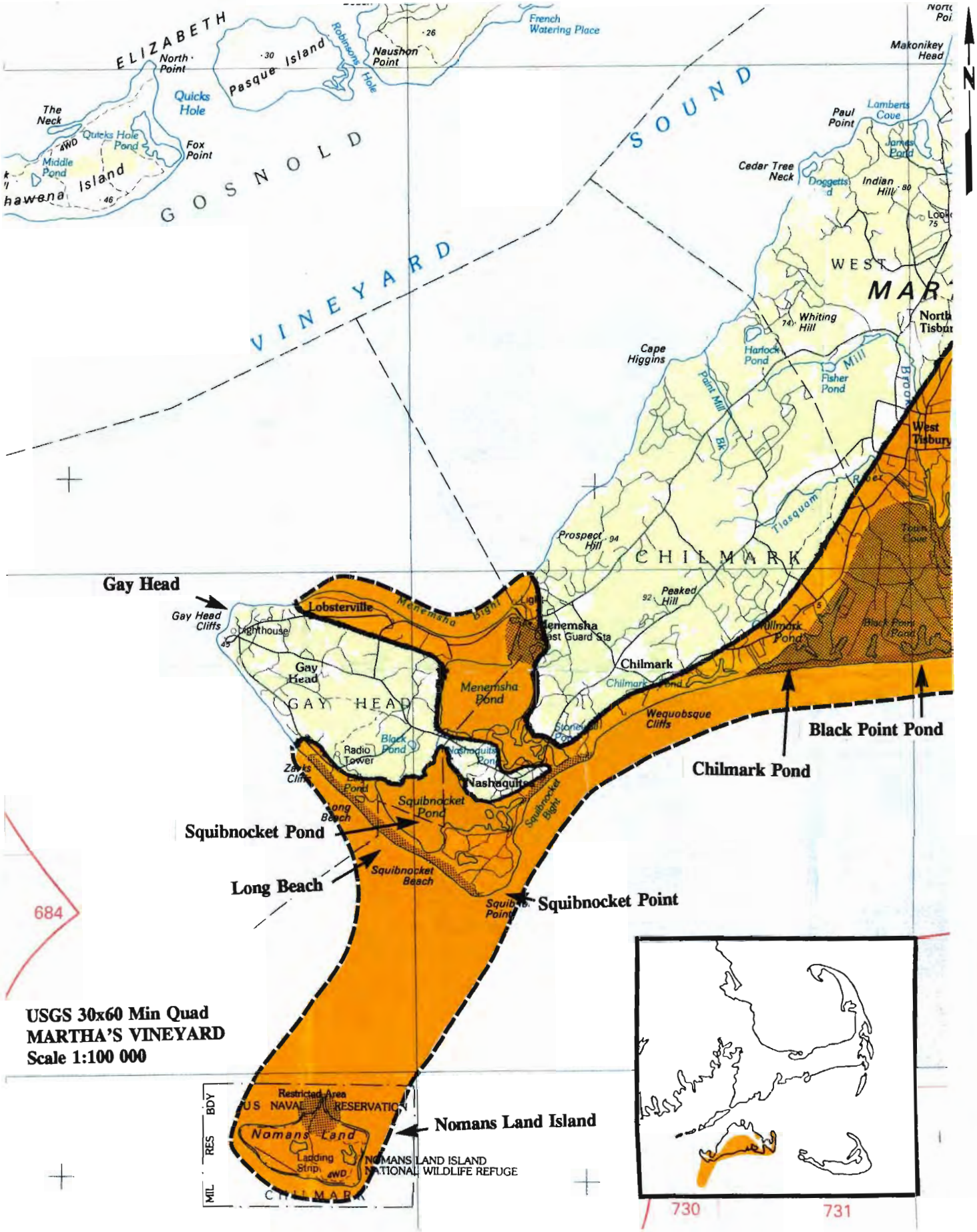
VIII. <u>CONSERVATION CONSIDERATIONS</u>: Special efforts need to be focused on the restoration, maintenance and protection of the full mosaic of fire-adapted plant communities of the sandplains, particularly the early successional grassland and heathland types and the number of regionally rare and restricted species dependent upon them. Studies should be continued on identifying the quality, quantity and proportion in the landscape of the different habitat types required to maintain at least minimum viable populations of rare species of birds, plants and invertebrates and the fire cycles and techniques necessary to maintain these habitats on both Martha's Vineyard and Nomans Land Island.

It is vitally important that nesting beaches of piping plovers and terns on Martha's Vineyard be protected from human-related disturbances during the critical nesting season (mid-April to August) using all available means to exclude people, vehicles and stray animals from these areas. Fenced exclosures, beach closures, posting, animal traps, beach warden patrols and public education should all be considered and implemented as part of an overall protection strategy for the island's valuable

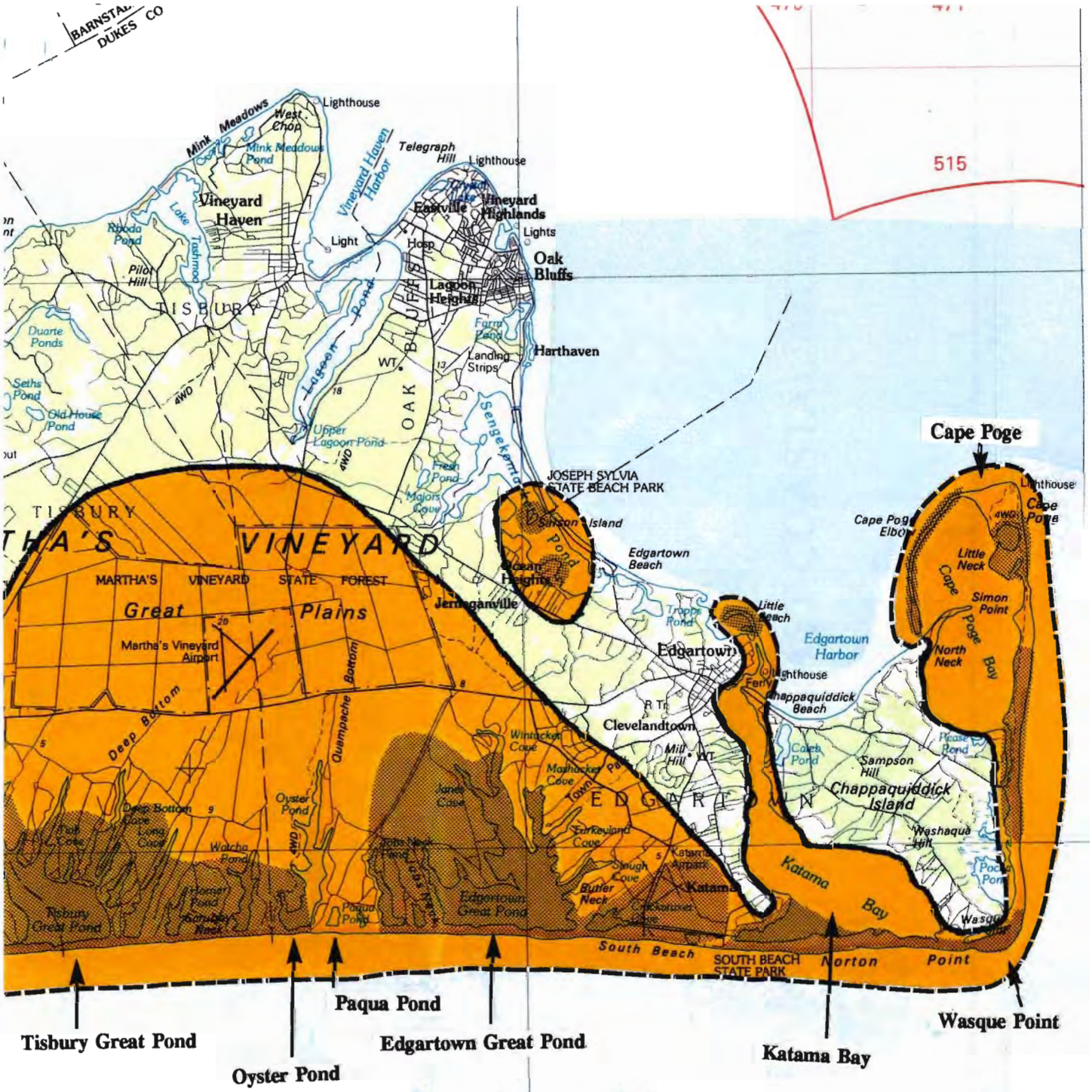
nesting beaches. Given the extent of private ownership of beaches, the implementation of restrictive protection strategies and practices, particularly on such heavily used recreational beaches as these, is simply not possible or likely without extensive cooperative outreach efforts involving private landowners, local, State, County and Federal government agencies, and private conservation groups active in the area. There is an excellent opportunity here to develop cooperative management and conservation agreements and programs among these various entities to best manage and protect for the long term the wealth of living resources occupying these areas while at the same time seeking to provide for continuing and compatible human use and enjoyment of the same landscape. Efforts should be made to identify and implement tasks and objectives of the piping plover and roseate tern recovery plans that may be applicable to the beaches of Martha's Vineyard and Nomans Land Island, including opportunities to restore and enhance degraded beach habitat.

The mammalian predator situation on Martha's Vineyard is of such magnitude and seriousness, particularly impacts on colonial nesting U.S. and State-listed Endangered and Threatened bird species, that investigations should be conducted as soon as possible to assess the population status and distribution of skunks, raccoons and feral cats on the island and to formulate and implement a predator removal program. The Animal Damage Control Program of the U.S. Department of Agriculture should be consulted to carry out such an assessment. The gull situation, particularly on Nomans Land Island, should also be investigated and control measures considered. Cooperation between the Fish and Wildlife Service and the U.S. Navy regarding Nomans Land Island should be continued and preferably enhanced, with greater opportunity provided for biologists to survey and assess the living resources of the island and to undertake intensive vegetation management programs to both improve wildlife habitat and restore coastal sandplain grassland communities. Should this island ever be declared excess or surplus by the Navy, the Fish and Wildlife Service should give strong consideration to taking over its total management.

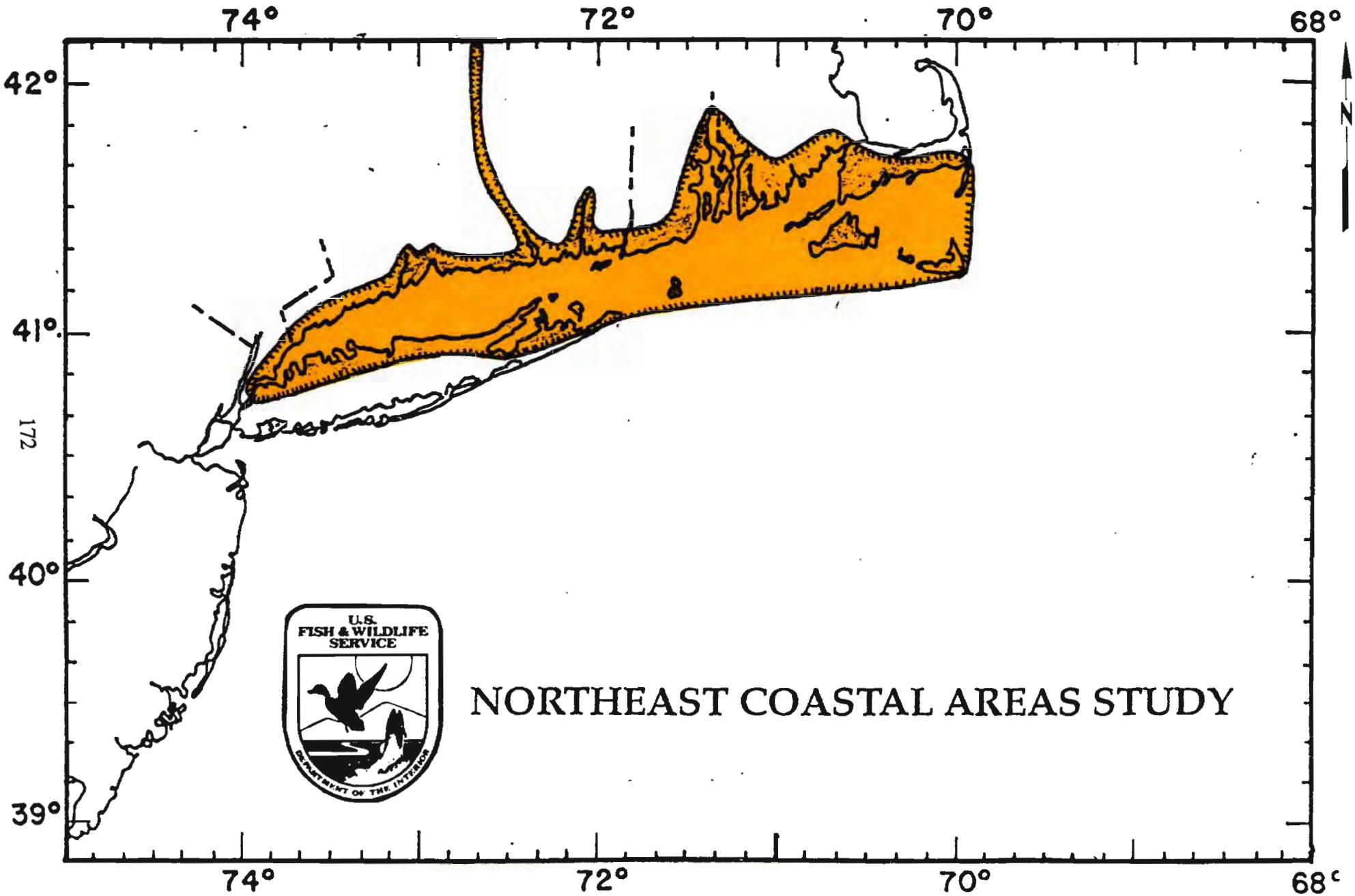
Northeast Coastal Areas Study
Significant Coastal Habitats
Martha's Vineyard Coastal Sandplain and Beach Complex, Part 1



Northeast Coastal Areas Study
Significant Coastal Habitats
Martha's Vineyard Coastal Sandplain and Beach Complex, Part 2



USGS 30x60 Min Quad
MARTHA'S VINEYARD
Scale 1:100 000


74°
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U.S.
FISH & WILDLIFE
SERVICE
DEPARTMENT OF THE INTERIOR
NORTHEAST COASTAL AREAS STUDY

APPENDIX B

List of Southern New England-Long Island
Coastal Species and Habitats of Special Emphasis

NORTHEAST COASTAL AREAS STUDY
U.S. FISH AND WILDLIFE SERVICE

SOUTHERN NEW ENGLAND-NEW YORK
COASTAL SPECIES OF SPECIAL EMPHASIS

The following species have been identified by the U.S. Fish and Wildlife Service's Northeast Estuary Program as being of national or regional significance and of special management concern in the coastal region of southern New England (MA, RI and CT) and New York. Many are species whose populations have declined or are presently declining from historical levels of abundance in the region and/or are especially vulnerable to habitat loss and degradation, disturbance, competition with exotic or nuisance species, overexploitation or environmental contaminants. Some groups, e.g. shellfish and certain finfish, while not especially rare or declining, are of considerable ecological, commercial or recreational importance in the region. The primary purposes of these species lists are to establish a base for identifying habitats in need of protection in the project area and to develop ecoregional strategies for the long-term protection, conservation, and monitoring of both species and habitats.

I. FINFISH: (Spawning areas, nursery and feeding grounds, migration pathways)

Shortnose sturgeon (*Acipenser brevirostrum*) E
Atlantic sturgeon (*Acipenser oxyrhynchus*)
American shad (*Alosa sapidissima*)
Striped bass (*Morone saxatilis*)
Atlantic salmon (*Salmo salar*)
Bluefish (*Pomatomus saltatrix*)
Winter flounder (*Pseudopleuronectes americanus*)
Summer flounder, fluke (*Paralichthys dentatus*)
Weakfish (*Cynoscion regalis*)
Blackfish, Tautog (*Tautoga onitis*)
Scup or Porgy (*Stenotomus chrysops*)
Alewife (*Alosa pseudoharengus*)
Blueback herring (*Alosa aestivalis*)
Rainbow smelt (*Osmerus mordax*)
Menhaden (*Brevoortia tyrannus*)
American sandlance (*Ammodytes americanus*)
American eel (*Anguilla rostrata*)
Bay anchovy (*Anchoa mitchilli*)
Atlantic silverside (*Menidia menidia*)

E = U.S. Endangered Species
T = U.S. Threatened Species
1, 2 = Category 1 or 2 Candidate Species

II. MARINE/ESTUARINE SHELLFISH: (Major shellfish beds; horseshoe crab spawning areas)

American lobster (*Homarus americanus*)
Blue crab (*Callinectes sapidus*)
Horseshoe crab (*Limulus polyphemus*)
American oyster (*Crassostrea virginica*)
Hard-shelled clam or Quahog (*Mercenaria mercenaria*)
Soft-shelled clam (*Mya arenaria*)
Ocean quahog (*Arctica islandica*)
Surf clam (*Spisula solidissima*)
Bay scallop (*Aequipecten irradians*)

III. REPTILES AND AMPHIBIANS: (Nesting, breeding, nursery and feeding areas)

Northern diamondback terrapin (*Malaclemys t. terrapin*) 2
Sea Turtles: (Juvenile concentration areas)
- Loggerhead (*Caretta caretta*) T
- Green (*Chelonia mydas*) T
- Atlantic or Kemp's Ridley (*Lepidochelys kempii*) E
- Leatherback (*Dermochelys coriacea*) E

Tiger salamander (*Ambystoma tigrinum*)
Blue-spotted salamander (*Ambystoma laterale*)

IV. BIRDS:

A. Federally Listed/proposed/candidate species and Fish and Wildlife Service species of special management concern:

Roseate tern (*Sterna dougallii*) E
Gull-billed tern (*Sterna nilotica*)
Piping plover (*Charadrius melodus*) T
Northern harrier (*Circus cyaneus*)
Bald eagle (*Haliaeetus leucocephalus*) E
Osprey (*Pandion haliaetus*)
Peregrine falcon (*Falco peregrinus*) E,T
Short-eared owl (*Asio flammeus*)
American bittern (*Botaurus lentiginosus*)
Least bittern (*Ixobrychus exilis*)
Black rail (*Laterallus jamaicensis*)
Seaside sparrow (*Ammodramus maritimus*)
Common barn owl (*Tyto alba*)

B. Migrants: (Wintering concentrations and staging areas; resident breeding populations)

Common loon (*Gavia immer*)
Red-throated loon (*Gavia stellata*)
Horned grebe (*Podiceps auritus*)
Red-necked grebe (*Podiceps grisegena*)
Pied-billed grebe (*Podilymbus podiceps*)
Canada goose (*Branta canadensis*)
Atlantic brant (*Branta bernicla*)
Northern pintail (*Anas acuta*)
American wigeon (*Anas americana*)
Mallard (*Anas platyrhynchos*)
American black duck (*Anas rubripes*)
Gadwall (*Anas strepera*)
Canvasback (*Aythya valisineria*)
Greater scaup (*Aythya marila*)
Lesser scaup (*Aythya affinis*)
Harlequin duck (*Histrionicus histrionicus*)
Common eider (*Somateria mollissima*)
Oldsquaw (*Clangula hyemalis*)
Bufflehead (*Bucephala albeola*)
Common goldeneye (*Bucephala clangula*)
Scoters (*Melanitta fusca, M. nigra* and *M. perspicillata*)
Hooded merganser (*Lophodytes cucullatus*)
Red-breasted merganser (*Mergus serrator*)
Clapper rail (*Rallus longirostris*)
Sanderling (*Calidris alba*)
Short-billed dowitcher (*Limnodromus griseus*)
Whimbrel (*Numenius phaeopus*)
Grasshopper sparrow (*Ammodramus savannarum*)

C. Nesting Colonial Waterbirds:

Double-crested cormorant (*Phalacrocorax auritus*)
Little blue heron (*Egretta caerulea*)
Tricolored heron (*Egretta tricolor*)
Great egret (*Casmerodius albus*)
Snowy egret (*Egretta thula*)
Cattle egret (*Bubulcus ibis*)
Black-crowned night-heron (*Nycticorax nycticorax*)
Yellow-crowned night-heron (*Nyctanassa violacea*)
Green-backed heron (*Butorides striatus*)

Continued on following page.

C. Nesting Colonial Waterbirds: continued.

Glossy ibis (*Plegadis falcinellus*)
American oystercatcher (*Haematopus palliatus*)
Laughing gull (*Larus atricilla*)
Least tern (*Sterna antillarum*)
Common tern (*Sterna hirundo*)
Black skimmer (*Rynchops niger*)

D. Nuisance" Species: (Species of particular management concern because of impacts on other species)

Mute Swan (*Cygnus olor*)
Herring gull (*Larus argentatus*)
Great black-backed gull (*Larus marinus*)

V. MAMMALS

A. Marine Mammals: (Whale concentration and migration areas; seal pupping and hauling out sites)

Whales: Minke (*Balaenoptera acutorostrata*)
Fin (*Balaenoptera physalus*) **E**
Humpback (*Megaptera novaeangliae*) **E**
Northern right whale (*Eubalaena glacialis*) **E**

Gray seal (*Halichoerus grypus*)
Harbor seal (*Phoca vitulina*)

B. Terrestrial Mammals: (Island endemics-Some of dubious taxonomic status)

Martha's Vineyard short-tailed shrew (*Blarina brevicauda alonga*) **2**
Nantucket short-tailed shrew (*Blarina brevicauda compacta*) **2**
Small-footed myotis (*Myotis leibii*) **2**
Monomoy white-footed mouse (*Peromyscus leucopus ammodytes*) **2**
Martha's Vineyard white-footed mouse (*Peromyscus leucopus fuscus*) **2**
Block Island meadow vole (*Microtus pennsylvanicus provectus*) **2**
Beach or Muskeget Island vole (*Microtus breweri*) **2**

VI. INVERTEBRATES:

American burying beetle (*Nicrophorus americanus*) E
Northeastern beach tiger beetle (*Cincindela d. dorsalis*) T
Puritan tiger beetle (*Cincindela puritana*) T
Decodon borer moth (*Papaipema sulphurata*) 2
Banded bog skimmer dragonfly (*Williamsonia lintneri*) 2
Lemmer's noctuid moth (*Lithophane lemmeri*) 2
Regal fritillary butterfly (*Speyeria idalia*) 2
Barrens bluet damselfly (*Enallagma recurvatum*)
Lateral bluet damselfly (*Enallagma laterale*)
Hessel's hairstreak (*Mitouri hesseli*)
Barrens buckmoth (*Hemileuca maia*)

Dwarf wedge mussel (*Alasmidonta heterodon*) E

VII. PLANTS:

A. Federally Listed:

Sandplain gerardia (*Agalinis acuta*) E

B. Federal Candidates:

Sea-beach pigweed (*Amaranthus pumilis*) 2
Nantucket serviceberry (*Amelanchier nantucketensis*) 2
Variable sedge (*Carex polymorpha*) 2
Spreading Tick-trefoil (*Desmodium humifusum*) 2
New England boneset (*Eupatorium leucolepis* var *novae-angliae*) 2
Pine Barrens boneset (*Eupatorium resinosum*) 2
New England blazing-star (*Liatris borealis*) 2
Graves' beach plum (*Prunus maritima* var *gravesii*) 2
Chaffseed (*Schwalbea americana*) 1
Long's bulrush (*Scirpus longii*) 2

C. Regional Species of Special Concern:

Annual peanut-grass (*Amphicarpum purshii*)
Eastern silvery aster (*Aster concolor*)
Bicknell's hawthorn (*Crataegus bicknellii*)
Sessile-leaved tick-trefoil (*Desmodium sessilifolium*)

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C. Regional Species of Special Concern: continued.

Saltpond grass (*Diplachne maritima*)
Three-angled spike-sedge (*Eleocharis tricostata*)
Parker's pipewort (*Eriocaulon parkeri*)
Bushy rockrose (*Helianthemum dumosum*)
Creeping St. John's-wort (*Hypericum adpressum*)
Round-fruited false-loosestrife (*Ludwigia sphaerocarpa*)
Climbing fern (*Lygodium palmatum*)
Sea-beach knotweed (*Polygonum glaucum*)
Pondshore knotweed (*Polygonum puritanorum*)
Bald rush (*Psilocarya scirpoides*)
Torrey's mountain-mint (*Pycnanthemum torrei*)
Inundated horned-rush (*Rhynchospora inundata*)
Torrey's beak-rush (*Rhynchospora torreyana*)
Plymouth gentian (*Sabatia kennedyana*)
Quill-leaved arrowhead (*Sagittaria teres*)
Untubercled bulrush (*Scirpus etuberculatus*)
Coast violet (*Viola brittoniana*)

APPENDIX B

SHORELAND AND AQUATIC COASTAL HABITATS OF SPECIAL EMPHASIS SPECIES IN SOUTHERN NEW ENGLAND AND NEW YORK

A. Primary focus of the Northeast Coastal Areas Study is on those breeding/spawning areas, nursery areas, feeding/staging areas, wintering areas and migration pathways of importance to Federal trust species of regional or national significance, particularly those in the following groups:

- migratory birds
- anadromous fish
- endangered species of fish, wildlife and plants (Federally listed, proposed and candidates)
- marine mammals
- native species populations on Federal lands
- recreationally and commercially important species
- ecologically significant species
- depredating, nuisance, exotic and potentially invasive species

In addition, other habitats and areas of special emphasis are:

- Areas of significant biological diversity
- Outstanding representatives of Regional Coastal Community types

B. Significant Coastal Habitat Types* in Southern New England and Long Island

- Maritime grasslands
- Vegetated tidal wetlands (freshwater and brackish) with contiguous upland buffers
- Sandplain grasslands and heathlands
- Coastal Plain freshwater and brackish ponds
- Pitch Pine/Scrub Oak barrens
- Atlantic White Cedar swamps
- Colonial bird rookeries
- Relatively undisturbed sand beaches and contiguous dunelands
- Intertidal mud and sand flats
- Submerged aquatic vegetation beds
- Relatively undisturbed and free-flowing freshwater coastal streams
- Shellfish beds
- Floodplain forests
- Productive subtidal shoal areas
- Open peatlands
- Marine mammal pupping and hauling out islands (seal islands and rocks)

* Preferred or Important Habitats of Federal Trust Species/Species of Special Emphasis.