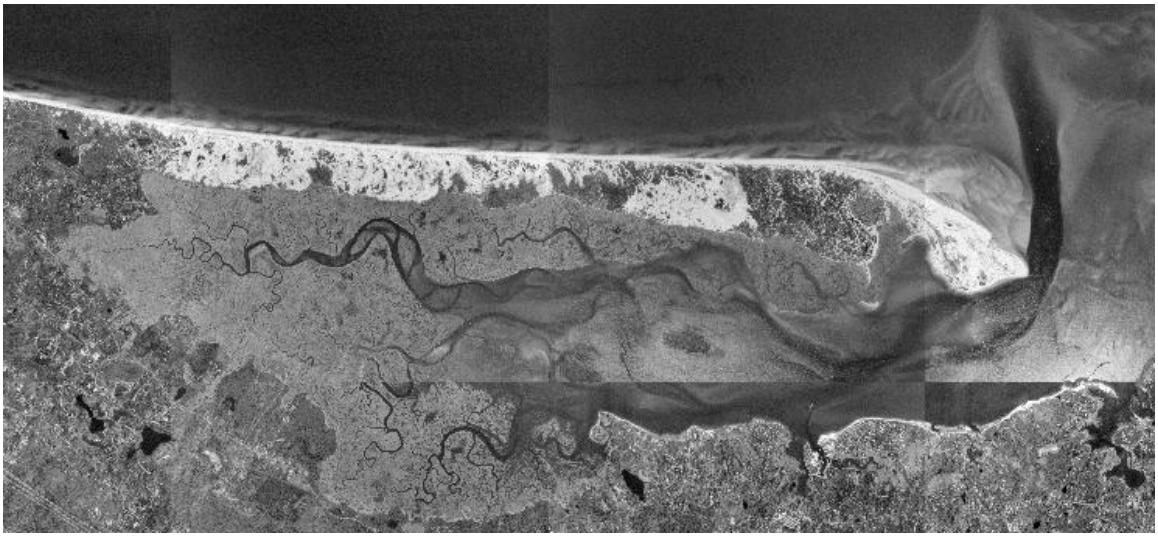
LONG RANGE
NATURAL RESOURCE MANAGEMENT PLAN
FOR
SANDY NECK BARRIER BEACH



Woods Hole Group

Town of Barnstable

The Watershed Institute at Boston College · Education, Protection & Restoration

February 2003

Long Range
Natural Resource Management Plan
for
Sandy Neck Barrier Beach

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1.0 INTRODUCTION

Sandy Neck is a valuable and beautiful barrier beach that has been recognized as a significant natural resource at the private, municipal, state, regional, and federal levels. It is included in the state's designation as an Area of Critical Environmental Concern (ACEC) (the ACEC designation has been incorporated into the Town's Sandy Neck research library), and has been identified by the Nature Conservancy as one of the best barrier beach systems remaining in the North Atlantic Coast Ecoregion. For this reason, the Conservancy, the Town of Barnstable, and other leading organizations invest resources into conservation and research efforts at Sandy Neck. For all of the attributes of Sandy Neck, there are a variety of stakeholders and interests that, at times, conflict, but share the undisputed importance of Sandy Neck as a valuable environmental resource. Sandy Neck includes one of the largest stretches of publicly accessible coastline in the Commonwealth, and has a pristine character. With its diverse and unique wildlife habitat, including migrating dunes, coastal beaches, tidal flats, wetlands, and maritime forests, Sandy Neck offers a coastal wilderness experience for the public only 15 minutes from the center of Hyannis or Sandwich.

Due to the complexity of Sandy Neck and the history of management challenges, the requirement for a management plan was set forth in the Settlement Agreement for Sandy Neck (June 2000) (Attachment 1). The Settlement Agreement defined the primary objective of the Management Plan as, "*to maximize the enjoyment of Sandy Neck for all users consistent with the conservation of all Sandy Neck resources.*" The Settlement Agreement also identified specific management recommendations related to access of private and leased property, some of which have been implemented and some of which have not pending future approval by the Conservation Commission as well as State and Federal environmental authorities. All components of the Settlement Agreement are reflected in this management plan. The management plan addresses this fundamental objective, including more specific objectives such as to:

- Maintain the unique biodiversity of Sandy Neck;
- Ensure the proliferation of rare and endangered species;
- Encourage and maximize recreational use of and access to Sandy Neck within environmental constraints;
- Protect access to private property in a manner that is harmonious with the environment;
- Maximize educational opportunities at Sandy Neck; and
- Encourage active involvement from various stakeholders to reduce conflicts that can be constraints to effective management.

This management plan was prepared by the Woods Hole Group, Inc. and the Watershed Institute at Boston College at the request of and under contract to the Town of Barnstable. The plan is intended to be used by the Town as a guidance document for making short- and long-term management decisions at Sandy Neck that are consistent with the Town's objectives for the resource, as well as those of the various stakeholders. In addition to providing management alternatives and recommendations, the plan contains background

information and data related to the natural resources at Sandy Neck, which can provide the basis for future permit applications and/or impact reports. Unlike some management plans prepared for other barrier beaches (e.g., Duxbury), this management plan is not intended to become a permit or an Order of Conditions. Instead, the plan is intended to be a flexible work in progress guidance document that the Town can modify as required to meet the dynamic future needs of Sandy Neck and its stakeholders. As such, recommendations are presented, but all information required to demonstrate impacts is not contained in the management plan. Such information should be presented and updated as part of the permitting and monitoring process on a project-by-project basis. For instance, the Town aims to enhance the public use and benefit of Sandy Neck, and to establish Sandy Neck as a sustainable (environmentally and economically) enterprise. Achieving this vision will require flexible and adaptable future management strategies.

The plan represents a culmination of efforts completed as part of a three-phase project. Phases 1 and 2 were initiated in early 2001 and were completed in summer 2001, including the application, negotiation, and implementation of a short-term management strategy for ORV use and access at Sandy Neck for 2001 and 2002. Phases 1 and 2 also incorporated extensive public input, including a series of public workshops and meetings that provided valuable background information for the development of the long-range management plan (Phase 3). A draft plan was completed in February 2002, comments (Attachment 5) were received on the draft, and this revised version of the plan was prepared in response to the comments. Based on this public involvement, elements of the plan were designed to clarify and amplify ideas emerging from previous plans (e.g., Town of Barnstable Management Plan 1995), temporary agreements among stakeholders, as well as public hearings. A major goal is to provide a viable and long-ranging management plan for Sandy Neck that successfully balances the needs of the Town with natural resource protection and recreational activities among a broad population of stakeholders.

Because the dynamic and fragile nature of Sandy Neck requires the plan to be adaptable to unforeseen management challenges, the plan is proposed as a working document for the Town that can be modified as time progresses. It is not intended to be a static on-the-shelf document. Accordingly, the plan incorporates the necessary flexibility to accommodate both natural changes to the beach and shifts in the needs of users. Additionally, the plan is sensitive to the overarching concerns at Sandy Neck related to the protection of its natural resources for future generations.

To address this wide range of subject matter, the plan is organized into twelve sections. Sections two through four provide a review of the conditions at Sandy Neck under which management decisions will be made, including natural resources, the environmental regulations and stakeholders. Sections five through eleven address specific management topics, including ORV use and access, other access corridors (e.g., boat), Town-owned cottage sites, recreation, natural resources, public education and outreach, as well as the Town's operational management structure. For each of these management topics, discussions are presented identifying existing conditions, alternatives for future improvement, and management implications from an environmental, regulatory, Town

resource, and economic perspectives. Finally, section twelve summarizes options, presents recommendations, and establishes a preliminary timeline for the implementation of the various management options.

2.0 NATURAL RESOURCES AND HISTORY OF SANDY NECK

2.1 Geology

Sandy Neck is a barrier beach system located on the north shore of Cape Cod, MA that extends approximately 6 miles east from its sole mainland connection. The barrier shelters on its leeward side extensive estuarine salt marsh and Barnstable Harbor. This narrow neck of sand varies in width from approximately 200 feet to a maximum of 1/2 mile. Shaped by glacial activity and longshore drift, Sandy Neck is geologically quite young, although relatively stable for this type of landform. MCZM shoreline change data (Figure 2-1) show a typical section of the front beach, which is relatively stable with erosion rates on the order of one-quarter to one-half foot per year. Figure 2-1 also shows the eastern tip of Sandy Neck at Beach Point, which has a substantial historical accretion rate of more than 1.5 feet per year. Pioneering work by Alfred Redfield (1972) characterized the system, and dates the oldest sections of Sandy Neck at about 3500 years (Figure 2-2). Despite its historical evolution, the recent relative stability of the barrier spit has facilitated the establishment of a variety of soil types and natural communities, including migrating sand dunes, fresh and saltwater marshes, bogs and both deciduous and coniferous forests.

2.2 Hydrology

Consideration of the hydrologic characteristics of Sandy Neck is a critical component of any successful management plan for this site. The topography of the surrounding embayment at Sandy Neck results in large fluctuations in local sea level due to tidal action. The mean tidal range at Sandy Neck exceeds 9 vertical feet and can reach 13 feet during full and new moon periods, with storm tides exceeding peak lunar values. During high tide periods, Sandy Neck is often inundated with water along its coastal and salt marsh boundaries, making human access along these ecotones nearly impossible. During winter storms and hurricanes, the storm surge often penetrates the primary dunes. These storms leave standing pools of salt water deep in the interdune area. Although rare, these storms provide crucial nutrients to the plant communities within the dunes and help shape the topographic features of the beach. They do, however, present challenges to the management of permanent transportation corridors along the barrier beach. Current vehicle travel corridors are situated in the most dynamic areas of the beach that are at highest risk to tidal and storm action.

Freshwater communities at Sandy Neck are made possible by the presence of a freshwater supply that sits atop and slightly displaces the salty ground water. This lens of freshwater is nourished solely by rainwater. The freshwater table varies considerably throughout the annual cycle with the peak being in early spring. During spring, temporary ponds and flooded natural bogs dominate the landscape at Sandy Neck. These ephemeral freshwater ponds, called vernal pools, are crucial resources for many organisms that complete their life cycles on Sandy Neck. Many species of amphibians, insects, and plants exploit these seasonal resources. Protecting these vernal ponds, even when they are dry, is an important element of the management plan.

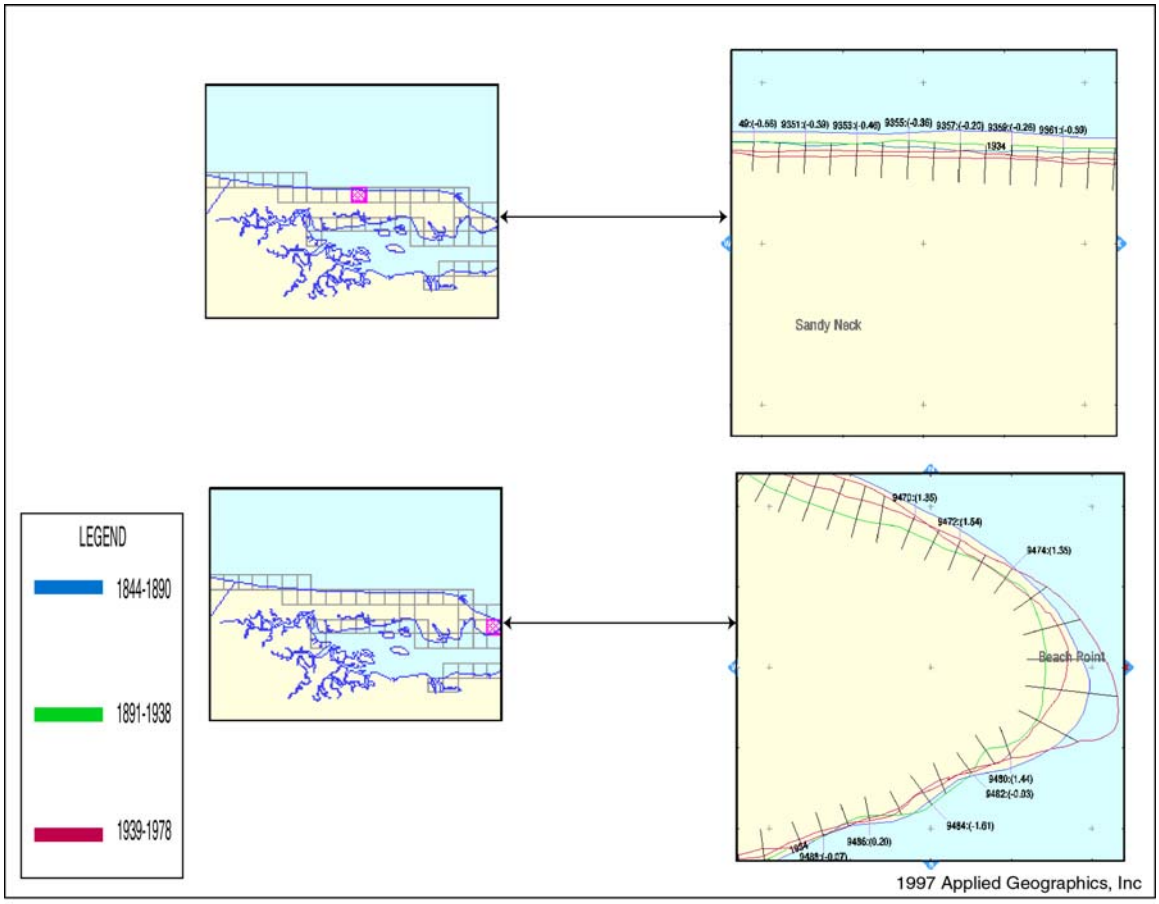

Figure 2-1. MCZM Shoreline Change Data.

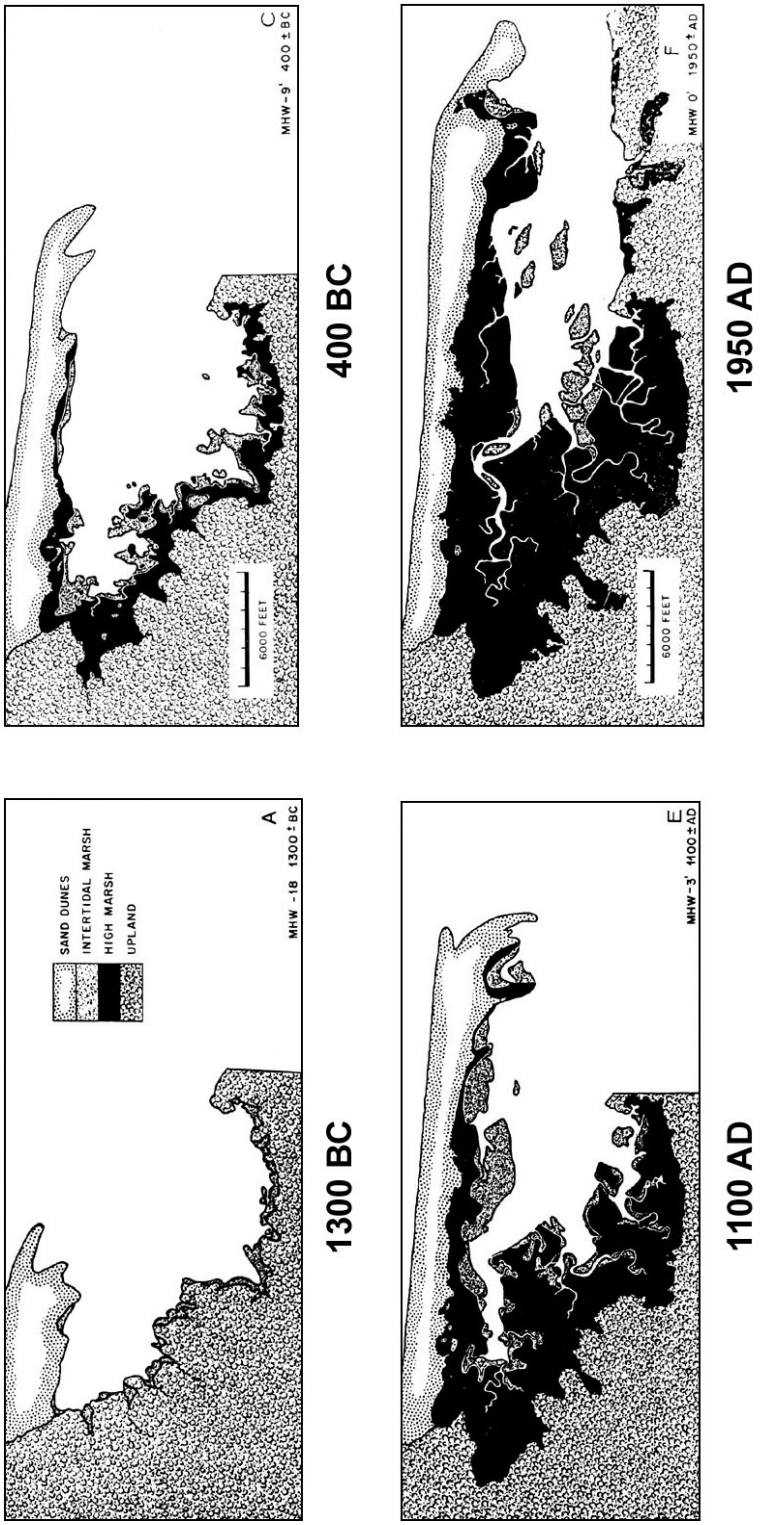

Figure 2-2. Historic development of Sandy Neck (Redfield, 1972).

2.3 Wetland Resource Areas

Nearly all of Sandy Neck is considered a resource area with respect to the Massachusetts Wetlands Protect Act. Figures 2-3a, 2-3b and 2-3c show the extent of the wetland and vegetation resources on Sandy Neck based on the Town of Barnstable GIS. These wetland resources include barrier beach, coastal beach, coastal dunes, salt marsh, land under the ocean, land containing shellfish, bordering vegetated wetlands, coastal banks, and estimated habitats of rare wildlife for coastal and inland wetlands. Additionally, all of Sandy Neck has been designated by the Secretary of Environmental Affairs as an Area of Critical Environmental Concern (ACEC) by the Massachusetts Coastal Zone Management. The importance of Sandy Neck as an environmental resource is undisputed. As such, all proposals for management changes at Sandy Neck receive a higher level of scrutiny and review by various authorities.

2.3.1 Land Under the Ocean

As defined in 310 CMR 10.25(2), "land under the ocean means land extending from the mean low water line seaward to the boundary of the municipality's jurisdiction and includes land under estuaries." As such, the peninsula of Sandy Neck is surrounded by land under the ocean, which is protected by the Act.

Land under the ocean surrounding Sandy Neck extends north into Cape Cod Bay, across a relatively flat sandy plateau to the offshore municipal limits. To the east, Sandy Neck land under the ocean extends to the Barnstable/Yarmouth Town line east of the entrance channel to Barnstable Harbor. Sandy Neck land under the ocean also extends south into Barnstable Harbor. The vast land under the ocean resource of Sandy Neck is significant to the interests of storm damage protection as well as wildlife habitat (e.g., shellfish and shorebird habitat).

2.3.2 Coastal Beaches

As defined in 310 CMR 10.27(2), "coastal beach means unconsolidated sediment subject to wave, tidal and coastal storm action which forms the gently sloping shore of a body of salt water and includes tidal flats. Coastal beaches extend from the mean low water line landward to the dune line, coastal bankline or the seaward edge of existing man-made structures, when these structures replace one of the above lines, whichever is closest to the ocean." According to this definition, all of Sandy Neck is surrounded by coastal beaches, which are protected by the Act. Sandy Neck coastal beaches are significant to the interests of storm damage protection and wildlife habitat, including nesting for threatened species of shorebirds.

2.3.3 Coastal Dunes

As defined in 310 CMR 10.28(2), coastal dune means any hill, mound or ridge of sediment landward of a coastal beach deposited by wind action or storm overwash. Coastal dune also means sediment deposited by artificial means and serving the purpose of storm damage prevention or flood control." Sandy Neck encompasses extensive

Figure 2-3a. Vegetation and wetland resources on Sandy Neck in Zones A and B (Town of Barnstable GIS, 2001).

Figure 2-3b. Vegetation and wetland resources on Sandy Neck in Zone C (Town of Barnstable GIS, 2001).

Figure 2-3c. Vegetation and wetland resources on Sandy Neck in Zone D (Town of Barnstable GIS, 2001).

coastal dune resources that are protected by the Act. Primary and secondary dunes back the length of the coastal beaches on the Cape Cod Bay shore of Sandy Neck. Some dunes in the interior of Sandy Neck (e.g., Sugar Foot) extend more than forty feet high. Coastal dunes on Sandy Neck are significant to the interests of storm damage protection as well as extensive and diverse wildlife habitat for vegetation, mammals, and birds.

2.3.4 Barrier Beaches

Barrier beaches are defined in 310 CMR 10.29(2) as "a narrow, low-lying strip of land generally consisting of coastal beaches and coastal dunes extending roughly parallel to the trend of the coast. It is separated from the mainland by a narrow body of fresh, brackish or saline water or a marsh system. A barrier beach may be joined to the mainland to the mainland at one or both ends." On a large scale, the entire Sandy Neck peninsula is a barrier beach that is protected by the Act, and is significant to the interests of storm damage protection and wildlife habitat.

2.3.5 Coastal Banks

Coastal banks include "the seaward face of side of any elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action, or other wetland." Although much of the area backing the Sandy Neck coastal beaches and salt marshes is coastal dune, there also are coastal banks on the backside, which are protected appropriately by the Act.

2.3.6 Salt Marshes

As defined in 310 CMR 10.32(2), "salt marsh means a coastal wetland that extends landward up to the highest high tide line, that is, the highest spring tide of the year, and is characterized by plants that are well adapted to or prefer living in, saline soils. Dominant plants within salt marshes are salt meadow cord grass (*Spartina patens*) and/or salt marsh cord grass (*Spartina alterniflora*). A salt marsh may contain tidal creeks, ditches and pools." According to this definition, there are extensive salt marsh resource on Sandy Neck that span much of the backside, as well as that penetrate the main body of the peninsula via tidal creeks. These salt marsh resources are protected stringently by the Act, and are significant to the interests of storm damage protection and wildlife habitat, including refuge for finfish, shellfish, and shorebirds.

2.3.7 Land Containing Shellfish

"Land containing shellfish means land under the ocean, tidal flats, rocky intertidal shores, salt marshes, and land under salt ponds when any such land contains shellfish" [310 CMR 10.34(2)]. There are known shellfish resources on Sandy Neck, within the surrounding land under the ocean, tidal flats, and salt marshes, which are protected by the Act. Land containing shellfish at Sandy Neck is harvested for recreational and commercial purposes.

2.3.8 Estimated Habitats of Rare Wildlife (for coastal wetlands)

Projects proposed in habitats that are identified on the most recent Estimated Habitat Map of State-Listed Rare Wetlands Wildlife are subject to review by the Natural Heritage and

Endangered Species Program (310 CMR 10.37). Sandy Neck provides a significant resource for various species of rare coastal wildlife, and as such is protected strictly by state and federal endangered species regulations. Section 2.4 provides more detail on the rare coastal species, habitat locations, and observations on Sandy Neck.

2.3.9 Bordering Vegetated Wetlands

The Act's definition of bordering vegetated wetlands (BVW) is comprehensive, but generally indicates that BVW "are freshwater wetlands which border on creeks, river, streams, ponds and lakes." Often BVW are considered wet meadows, marshes, swamps, and bogs. BVW provide, perhaps, the most important inland wildlife habitat, and as such are regulated strictly by the Act. Sandy Neck includes areas in its interior that can be characterized as BVW.

2.3.10 Estimated Habitats of Rare Wildlife (for inland wetlands)

As with rare wildlife in the coastal environment, projects proposed in habitats that are identified on the most recent Estimated Habitat Map of State-Listed Rare Wetlands Wildlife are subject to review by the Natural Heritage and Endangered Species Program (310 CMR 10.59). Sandy Neck provides a significant resource for various species of rare inland wildlife, and as such is protected strictly by state and federal endangered species regulations. Section 2.4 provides more detail on the rare inland species, habitat locations, and observations on Sandy Neck.

2.4 Rare and Endangered Species

Sandy Neck supports a wide range of biological diversity that includes significant numbers of endangered species. Its large size, isolation and relatively pristine ecology provide some of the most important habitats for rare and endangered species anywhere in Massachusetts. In order for long-term management of Sandy Neck to be successful, careful consideration of strategies for protecting endangered species is critical. Although piping plovers (Figure 2-4) (*Charadrius melodus*), least terns (*Sterna antillarum*) and diamondback terrapins (*Malaclemys terrapin*) represent the current high profile challenges to successful management, other species will no doubt require implementation of specific plans in the future. The Massachusetts Division of Fisheries and Wildlife has recorded and certified the presence of at least nine endangered or threatened species on Sandy Neck (Table 2-1). They include three species of plants, one invertebrate species, one amphibian species, one reptile species, and three species of shore birds. Fact sheets about each of these species prepared by MassWildlife are contained in Attachment 6. Most likely, other endangered species exist on the site, which a thorough inventory would reveal. A complete biodiversity inventory represents one of the critical elements of a long-term management plan, which dictates the need for encouraging research and education at Sandy Neck.

Figure 2-4. An adult male piping plover in full breeding plumage. Photo by Dr. Eric Strauss.

Table 2-1. Rare and Endangered Species Found on Sandy Neck.

Species	Common Name	Mass. Status	Federal Status
Abagrotis crumbi benjamani	**Coastal Heathland Cutworm**	**Special Concern**	**NA**
Charadrius melodus	**Piping Plover**	**Threatened**	**Threatened**
Drosera filiformis	**Thread-leaved Sundew**	**Special Concern**	**NA**
Malaclemys terrapin	**Diamondback Terrapin**	**Threatened**	**NA**
Scaphiopus holbrooki	**Eastern Spadefoot Toad**	**Threatened**	**NA**
Sebatia kennedyana	**Plymouth Gentian**	**Special Concern**	**NA**
Setaria geniculata	**Bristly Foxtail**	**Special Concern**	**NA**
Sterna antillarum	**Least Tern**	**Special Concern**	**Threatened**
Sterna hirundo	**Common Tern**	**Special Concern**	**NA**

Other species observed and documented at Sandy Neck (but not resident) include Roseate terns (*Sterna dougallii*), Yellow-crowned night herons (*Nycticorax violaceus*), and a variety of marine mammals. Successful management of these ephemeral visitors to Sandy Neck is contingent upon a well-trained and observant staff that can respond quickly to wildlife protection issues. Figures 2-5a through c illustrate the location of piping plover nests discovered on the front beach at Sandy Neck in 2001. Figure 2-6 illustrates a typical plover nest.

Continued vigilance through the use of biomonitoring will provide accurate and timely information to beach managers with respect to endangered species. The Massachusetts Natural Heritage Program maintains a thorough database and publishes a biomap of natural diversity that helps guide human activities within fragile ecosystems such as Sandy Neck. The Program provides funding for communities to conduct rare species inventories through the use of local experts, schools and non-government organizations.

Figure 2-5a. Piping plover nests discovered on Sandy Neck in 2001 in Zones A and B (Town of Barnstable GIS, 2001).

Figure 2-5b. Piping plover nests discovered on Sandy Neck in 2001 in Zone C (Town of Barnstable GIS, 2001).

Figure 2-5c. Piping plover nests discovered on Sandy Neck in 2001 in Zone D (Town of Barnstable GIS, 2001).

Figure 2-6. Typical piping plover nest from Sandy Neck with four eggs. The surrounding pebbles and white shell fragments help to conceal the nest from predators. Photo by Dr. Eric Strauss.

2.5 Other Biological Resources

In addition to protected species, Sandy Neck provides habitat for a variety of species, including birds, mammals, reptiles, and amphibians. For example, there are migratory shorebirds that depend upon Sandy Neck other than the piping plovers and least terns. As such, appropriate management of Sandy Neck's beaches also is required to protect shorebird feeding and nesting habitat. Recommendations presented in later sections of the management plan articulate strategies to protect wildlife habitat (e.g., movement of vehicle travel from beaches and marshes to less sensitive inland trails, and reduction of vehicle and other recreational activities on certain portions of the beach, such as east of Trail 5).

Ultimately, the maintenance of Sandy Neck as a healthy sustainable environment for recreation will require a shift in management strategy from a "species based" to a "systems based" approach. Sandy Neck is comprised of a variety of natural communities, each of which supports important endangered species. However, limiting management perspective to rare and endangered species misses the opportunity and responsibility of the Town to protect the common natural resources at Sandy Neck.

Considering the barrier beach as a natural system, five resource areas, or natural communities, emerge as appropriate subsystems for management. Beginning from the oceanside, there is the intertidal zone with its associated foredunes and beachfront, the primary dune line that includes the primary and secondary dunes, the interdune communities that include vernal pools and bogs, the maritime forests and the salt marsh.

Each of these resource areas have both shared and unique characteristics relevant to management planning. Some species, such as diamondback terrapin turtles, utilize different resource areas (salt marsh, interdunes) according to the time of year. Other species, such as sundews, require only one natural community (interdune bogs). Although these natural resource areas can be considered individually, they cannot be managed independently. Nor can one community be "sacrificed" to recreational demands without significant impacts to others. Human impacts need to be managed so that one system does not shoulder an overwhelming burden of human impact. The continued integrity of Sandy Neck's natural communities represents one of the most important goals of the management plan.

Particularly fragile natural communities are found within the dune swales. Highly dependent upon the seasonal freshwater pools, these plant and animal communities are a current focus of investigation and future protection by the State Natural Heritage Program. Some of these communities maintain standing water long enough in the spring to be considered vernal pools. Typically, vernal pool systems will support complex plant assemblages as well as amphibians such as the eastern spadefoot toad shown in Figure 2-7. The protection of these communities will need to be enhanced if recreational activity within the interdune system is intensified.

Figure 2-7. Eastern spadefoot toad; a resident of Sandy Neck's vernal pool and interdune community.

In addition to the endangered species and species in fragile environments, such as vernal pools, there are a variety of mammals that represent an important component of Sandy Neck's biodiversity. Figures 2-8 and 2-9 show a white tail deer and a red fox in their natural surroundings respectively, on Sandy Neck.

Figure 2-8. A male white tail deer bounds across the dunes at Sandy Neck. This particular deer has been fitted with a radio transmitting collar that allows researchers to follow his movement patterns. Photo by Dr. Peter Auger.

Figure 2-9. Red fox on Sandy Neck basking in the early morning sun. The recent expansion of coyotes onto Sandy Neck has displaced most of the resident foxes. Photo by Dr. Peter Auger.

2.6 Archaeology and Recent Human History

All of Sandy Neck has been designated as a significant historical site by the Massachusetts Historical Commission. Sandy Neck also is listed on the National Register of Historic Places as a Cultural Resource District based on the significance of its historic cottages and archaeological resources. Findings suggest that Prehistoric occupation of Sandy Neck began approximately 2000 years ago. Continuous exploitation of natural resources by humans has been a continuous pattern of activity, both by Native Americans and from the mid 17th century onward, by Euroamericans. Although agriculture, whaling and market gunning are no longer viable sources of revenue at Sandy Neck, shellfishing and fin fishing remain important recreational and commercial activities. Current conditions reflect a site that is mostly in public holding with parcels of private property throughout the barrier spit. Most of the human activity at Sandy Neck falls into three categories: recreation, scientific investigation, or environmental education.

Significant cultural artifacts and historic sites reflecting the changing history of human occupation at Sandy Neck remain and are vulnerable to destruction. Their protection remains one of the Town's major management challenges as recreational activities are deflected away from the front beach to more geologically stable areas behind the dunes. Appendix B of the 1995 Sandy Neck Management Plan (Attachment 4) provides a thorough review of archaeological resources and significance of Sandy Neck, and is provided as a valuable reference. Due to the significance of Sandy Neck's cultural and archaeological resources, management decisions should be made so as to minimize adverse impacts or loss of such resources. Another resource that should be consulted is, "a Management Plan for the Cultural Resources of the Sandy Neck Conservation Area" (Dunford, 1982), which outlines management recommendations and has been made part of the Sandy Neck research library. At a minimum, new planned trails should carefully be routed based on the location of known resources based on consultations with the Barnstable and Massachusetts Historical Commissions. Any new or exposed sites should be reported immediately to appropriate authorities, and measures should be taken to minimize impacts, including vandalism.

2.7 Organizing Sandy Neck Into Management Zones

The Sandy Neck barrier beach should be considered as four specific zones for the purpose of resource and activity management (Figure 2-10). The particular zones represent natural boundaries of both human and ecological activities on the beach. A system of zones allows the Town to customize the management practices for each zone in order to target specific management goals.

Zone A is at the western boundary of the park and receives intensive pedestrian and bathing activity on the beach front from people whose cars are parked in adjacent lots. Zone B runs from the Access Trail east to Trail #2. This area receives intensive recreational use along the beach front, both from pedestrians and off-road vehicles (ORV's). Zone B has relatively low piping plover nesting activity along the front beach, but relatively high (85%) diamondback terrapin nesting activity along the marsh-dune boundary or ecotone. Zone C begins at Trail #2 and runs east until Trail #5. This area

Figure 2-10. Recommended management zones for Sandy Neck.

receives heavy ORV use along the front beach as well as moderate piping plover nesting activity. Approximately 15% of all diamondback nesting activity occurs at the western end of this zone along the marsh-dune ecotone. Zone D begins at Trail #5 and runs east along the rest of the beach to the Barnstable Harbor entrance. This area receives light ORV use, heavy boating use and is the most important piping plover nesting habitat at Sandy Neck. Only rarely (< 2%) do diamondback terrapins nest this far east at Sandy Neck.

The division of Sandy Neck into management zones is particularly useful for piping plover protection. Between 1982 and 1998, 365 plover nests were located at Sandy Neck (Figure 2-11). This data set was compiled carefully, and includes interdune information, which is critically important to the management plan since hatchlings from interdune nests still require access to the beach for feeding. Considering the need for a balanced use of Sandy Neck between human activities and environmental protection, it is rational to examine total productivity by zone as the basis for making management decisions (i.e., where to focus on stringent environmental management and where to focus on human use/access). From a total productivity perspective, Figure 2-11 shows the vast majority of nests (90%) occurred at the eastern end of Sandy Neck in Zones C and D. This part of Sandy Neck has the most diverse and extensive nesting habitat for piping plovers (see Strauss 1990 for a more thorough description of nesting habitat). Figure 2-12 lends more insight, and shows the total number of chicks fledged by management zone. Figure 2-12 shows that Zones C and D accounted for 208 of the 234 plover chicks fledged (89%) on Sandy Neck between 1992 and 1998. Finally, Figure 2-13 provides an extremely powerful basis for making management decisions, which is the probability that hatched chicks will survive until fledging for each zone. Due to a combination of natural and anthropogenic conditions, Zones C and D offer the best conditions for plover productivity. Figure 2-13 shows that the probability of chick survivorship also is higher in Zones C and D. Analysis of more recent data is underway and will be provided as an addendum to the plan.

Due to the relatively high productivity of Zones C and D, the recommended management strategy includes more stringent management in Zones C and D, where it is expected that piping plovers will flourish. This is not to say that Zones A and B offer unsuitable habitat, only that the most effective management of the balanced anthropogenic and wildlife requirements can be achieved by focusing more strict environmental protection strategies within Zones C and D, which are historically more productive and require less human activity. Least and common tern nesting activity also is concentrated at the eastern end of Sandy Neck. By contrast, Zone B (Access Trail to Trail 2), which is heavily impacted by pedestrian and ORV traffic, has supported approximately only 7% of nesting activity. This nesting trend is reflective of both anthropogenic factors (disturbance) and the relative lack of suitable nesting and foraging areas in Zones A and B as compared to Zones C and D. Extensive intertidal flats, large expanses of relatively unvegetated beachfront, and gentle sloping foredunes make Zone D of Sandy Neck the most promising area for advancement of rare and endangered shorebirds.

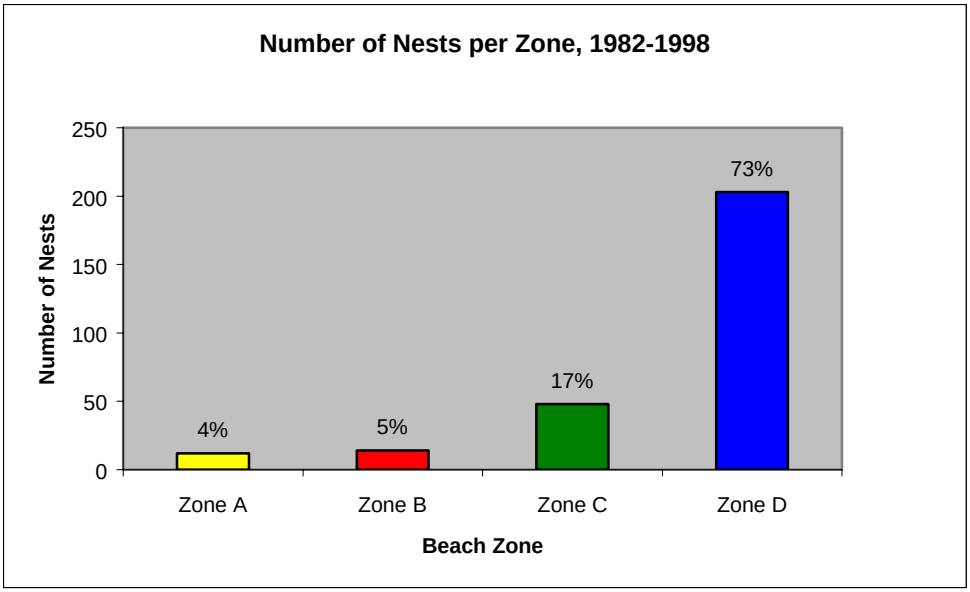

Figure 2-11. Piping Plover nesting behavior has displayed consistent patterns over the past seventeen years. Nests are concentrated in Zone D at the eastern end of Sandy Neck (Littleneck/Beach Point).

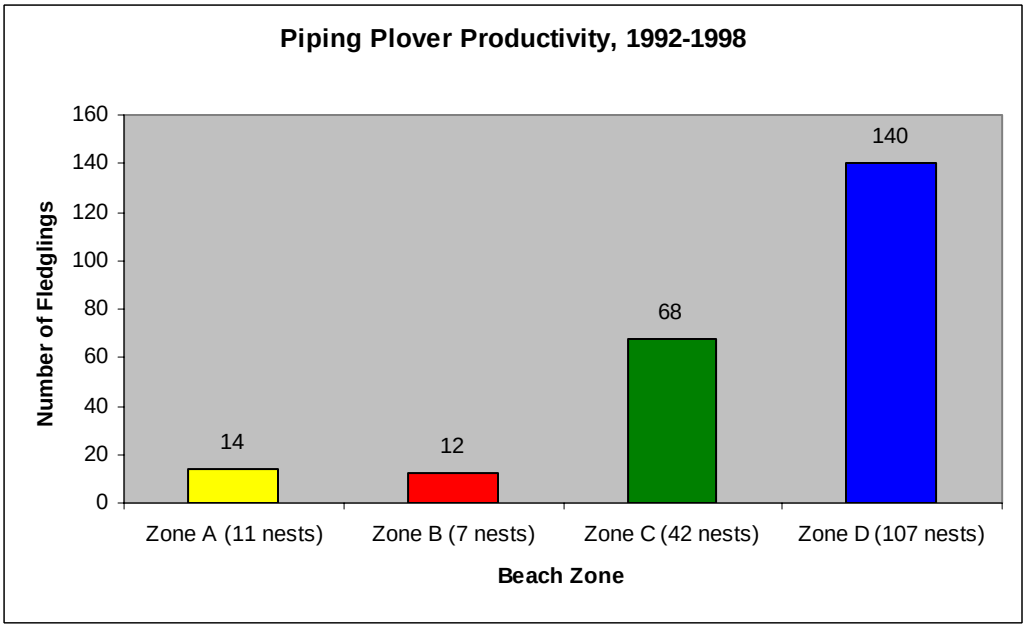

Figure 2-12. Since the implementation of temporary closures in 1992, productivity, measured as the total number of fledglings produced, has been highest at the eastern end of Sandy Neck.

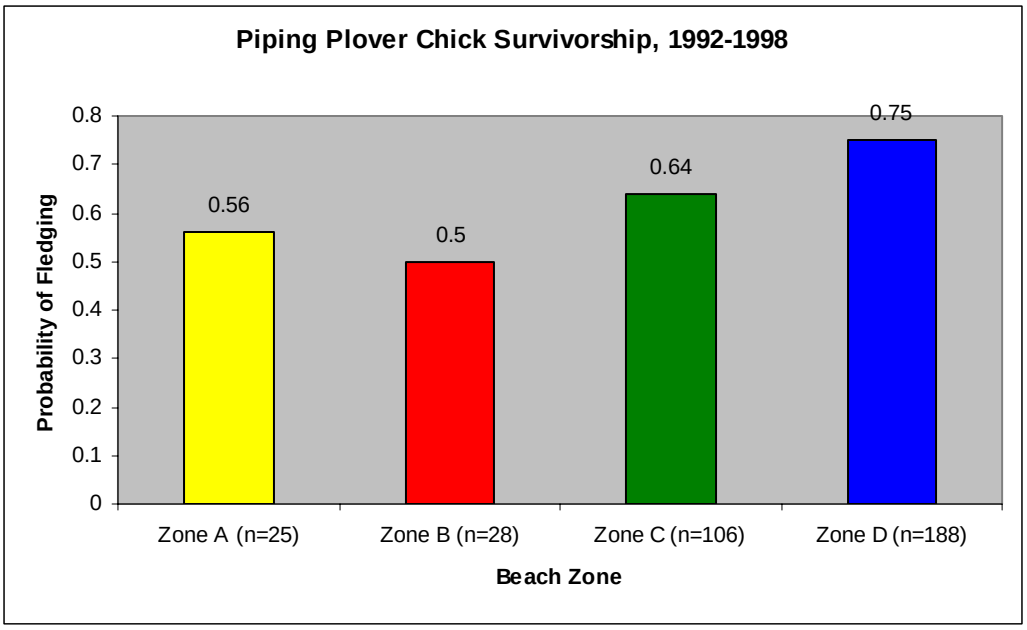

Figure 2-13. Piping Plover chick survivorship, measured as the probability that a hatchling will survive until fledging is highest at the eastern end of Sandy Neck.

3.0 APPLICABLE ENVIRONMENTAL REGULATIONS

Because Sandy Neck is a uniquely sensitive environment, there are numerous environmental regulations and guidelines that shape the management of activities on Sandy Neck. Agencies at the municipal, county, state, and federal government levels exercise jurisdiction. Appendix E of the 1995 Town of Barnstable Sandy Neck Barrier Beach Management Plan provides a comprehensive summary of the applicable federal, state, regional and local regulations and statutes that pertain to use and protection of barrier beaches. The 1995 plan serves as a reference, providing a summary of each piece of legislation, a reference to the actual code, the agency that implements the regulation, and contact information.

As a supplement to what was provided in the 1995 Management Plan, below is an elaboration of the permitting process for proposed activities on Sandy Neck. A schematic of the permitting process is provided by Figure 3-1. This explanation is not intended to substitute a thorough reading of the regulations for procedure; however, it is provided as a general guideline because the regulatory process on Sandy Neck is particularly complex. Applicants should review the regulatory procedures carefully, work cooperatively with regulatory staff, and utilize experienced professionals when proposing activities on Sandy Neck or any other sensitive resource area.

3.1 Local Permitting Process

At the local level, there are two (2) primary permitting processes:

- An Order of Conditions must be obtained from the Barnstable Conservation Commission for activities proposed on Sandy Neck. To obtain an Order of Conditions, a Notice of Intent (NOI) must be filed, and a public hearing must be held to review the project. Because Sandy Neck provides habitat for rare and endangered species, each NOI must be copied to the Natural Heritage and Endangered Species Program (NHESP) as well. NHESP reviews proposed activities for consistency with regulations that govern the management of endangered species. After reviewing a proposed project and consulting with NHESP, the Conservation Commission issues an Order of Conditions consistent with both the Wetlands Protection Act, an authority which is delegated from the Massachusetts Department of Environmental Protection, and the Town Bylaw. Before work proceeds the Order must be recorded at the Barnstable County Registry of Deeds. Orders of Conditions can be appealed within a period of ten business days, which places authority in the hands of the DEP for issuance of a Superceding Order, unless the appeal is withdrawn. If the proposed activity exceeds certain thresholds established in the MEPA regulations, a Certificate from the Secretary of Environmental Affairs must be obtained before the Order of Conditions can be issued. Presently there is an Order of Conditions (Attachment 2) governing ORV use and access on Sandy Neck for a period of up to two years.

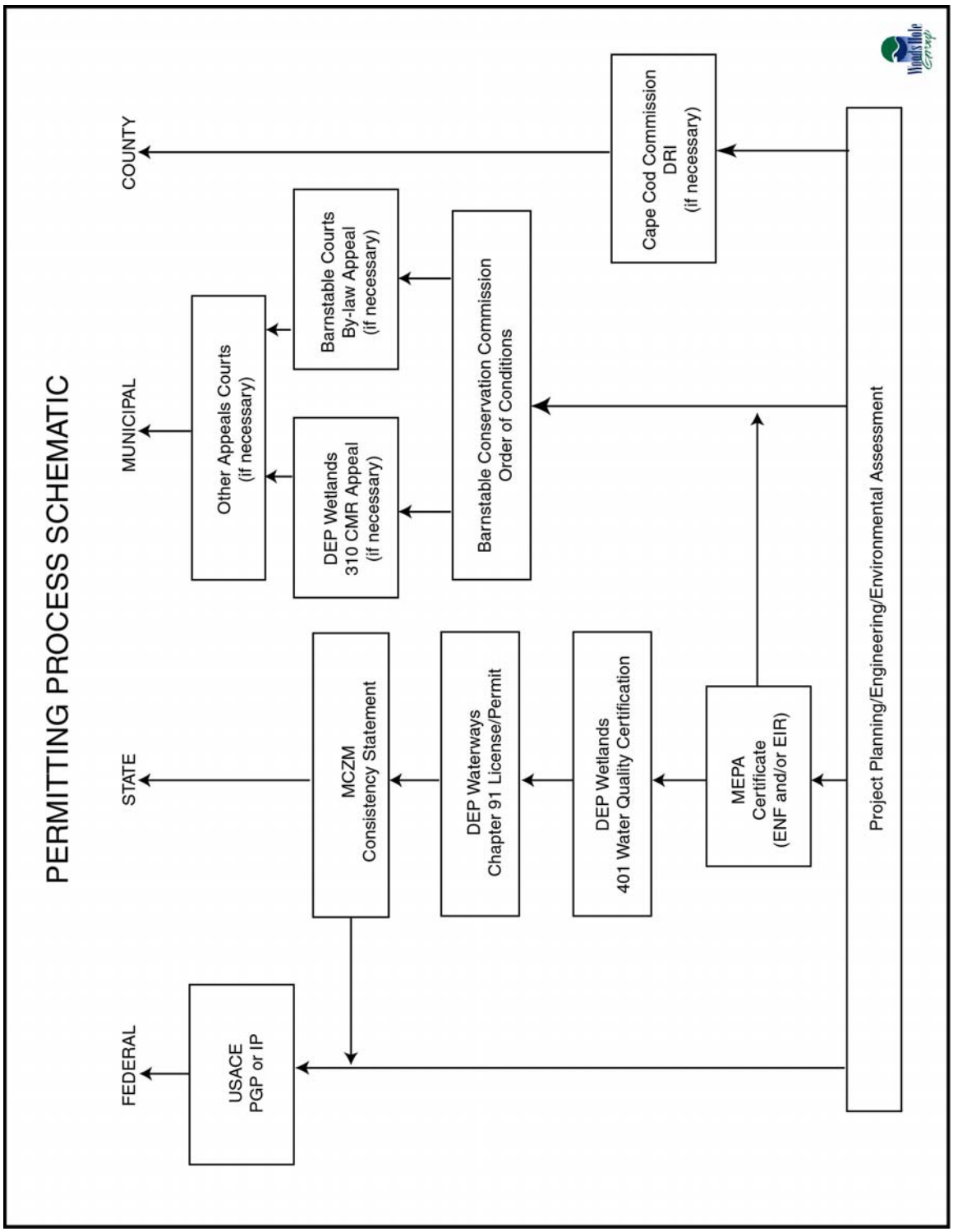

Figure 3-1. Permitting schematic

- Projects determined to be a Development of Regional Impact (DRI) require local review by the Cape Cod Commission, a county agency. Generally, projects that require MEPA review require Cape Cod Commission review, particularly when an EIR is required by MEPA (see state permitting process below). The DRI process can be lengthy, requiring an assessment of environmental impacts with regard to the Cape Cod Commission regulations as well as significant public participation. To streamline the process, there are measures that allow a joint review by the Cape Cod Commission and MEPA. The joint review process can expedite the permitting schedule, and must be initiated early at the time the ENF is filed with MEPA.

3.2 State Permitting Process

At the state level, there are four (4) primary regulatory processes that may be applicable to proposed activities on Sandy Neck:

- The Massachusetts Environmental Policy Act (MEPA) Unit reviews proposed activities with potential environmental impacts that exceed certain thresholds set forth in the MEPA regulations. For projects that exceed MEPA thresholds, an Environmental Notification Form (ENF) and/or an Environmental Impact Report (EIR) must be submitted for MEPA review. Because Sandy Neck is in an Area of Critical Environmental Concern (ACEC), MEPA thresholds are more stringent. The stricter ACEC standards are summarized in the ACEC Programs Regulatory Summary and "Guide to State Regulations and Programs Regarding ACEC," at www.state.ma.us/dem/program/acec. The MEPA review process follows strict review periods and is comprehensive, particularly when an EIR is required. The process includes specific requirements for environmental impact assessment, as well as significant public input and review by various regulatory agencies at the state level (e.g., Bureau of Underwater Archaeological Resources (BUAR), Massachusetts Historical Society, etc.). The MEPA review is best tracked through the Environmental Monitor, a twice-monthly MEPA publication. The intent of the MEPA process is to ensure that proposed activities have been designed to eliminate and/or minimize impacts during the planning and design stage in advance of entering the subsequent state permitting process. The MEPA process is completed upon issuance of a Certificate from the Secretary of Environmental Affairs.

- Natural Heritage and Endangered Species Program (NHESP) implements the Massachusetts Endangered Species Act (MESA), which governs protection of rare species and their habitats and provides guidelines for the management of recreational activities, including ORV use, at Sandy Neck. NHESP's primary goal is to protect the state's wide range of native biological diversity, with a focus on the approximately 190 species of animals and 258 species of plants officially listed as endangered, threatened, or of special concern in Massachusetts. NHESP maintains maps of critical habitat, such as Sandy Neck, where listed species may reside. For projects proposed within listed habitats, NHESP exercises regulatory review during the NOI and MEPA processes. NHESP regulations specifically

prohibit "taking" of any listed plant or animal. Taking is defined as to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity of an animal, or to collect, pick, kill, transplant, cut or process a plant. NHESP also protects significant habitats. NHESP will provide guidelines on a project-by-project basis to ensure consistency with the MESA.

- Once the MEPA process (if required) is completed, projects that exceed certain thresholds with regard to potential impacts to water quality require a Water Quality Certification from the DEP. This requires the completion of an application, a public notice, and a mandatory review period that can extend up to 120 days.

- Once a Water Quality Certificate (if required) is issued, a Chapter 91 License or Permit can be issued. The Chapter 91 process is administered by the DEP, and is required for most projects that extend below the mean high water (MHW) line into state tidelands. This requires the completion of an application, a set of engineering plans that meet specific requirements, a mandatory public notice and review period, and a regulatory review period that can extend up to 90 additional days. Projects that involve a long-term occupation of state tidelands (e.g., a jetty) require a Chapter 91 License, which can be valid for up to 99 years. Other more temporary projects (e.g., dredging) require a Chapter 91 Permit.

- Once a Chapter 91 License/Permit (if required) is issued, certain projects require a Consistency Statement from the Massachusetts Coastal Zone Management (MCZM) Office. MCZM has a set of guidelines with which proposed activities in the coastal zone (generally below MHW) must comply. A MCZM Consistency Statement requires the submittal of a letter that demonstrates the proposal's consistency with MCZM policies. The request for a Consistency Statement requires a public notice and a mandatory review period of (30) thirty days.

3.3 Federal Permitting Process

Proposed activities below the high tide line (HTL) may require review by the US Army Corps of Engineers (USACE). Based on USACE thresholds, certain smaller activities can be approved via a Programmatic General Permit (PGP), which requires a brief application and typically a short review period by the USACE regulatory staff in conjunction with other state and federal staff. Other, more significant activities require an Individual Permit (IP), which includes a more comprehensive review of environmental issues and potential impacts. Just as MEPA provides a formal avenue for various state agencies to review proposed activities, the USACE permitting process provides the formal process for other federal agencies (e.g., USEPA, NMFS, and USFWS among others) to provide input. Projects sponsored by a Federal agency may require the completion of an Environmental Impact Statement (EIS) under Federal Guidelines.

Also under Federal jurisdiction would be the issuance of a Section 10 permit, potentially allowing more flexible management of rare and endangered species. This Federal

permitting process would be administered by the US Fish and Wildlife Service under the U.S. Endangered Species Act (ESA). Section 10(a)(1)(B) of the ESA has provisions for relief on restrictions for the use of land inhabited by endangered species. A Section 10 permit could potentially allow incidental "taking" of endangered species (e.g., piping plovers) on a state-wide or site-specific basis under strictly controlled conditions. Because a state-wide permit is not currently advocated or supported by MassWildlife, a site-specific Section 10 permit is a more viable option for limited portions of Sandy Neck. Obtaining such a permit requires an application to USFWS, accompanied by a Habitat Conservation Plan (HCP). The HCP must be approved by USFWS, and must specify the impacts likely to result from incidental taking, as well as provisions for conservation of the species. The HCP must be supported by biological survey data and information, including:

- Biological Goals
- Adaptive Management
- Monitoring
- Permit Duration
- Public Participation

It is recommended that the Section 10 process by completed in cooperation with MassWildlife staff to ensure maximum consistency with application requirements, and consistency with the corresponding MA state permitting process. A part of the permitting process also would be delegated to the natural Heritage and Endangered Species Program of the Massachusetts Division of Wildlife.

4.0 STAKEHOLDERS ASSOCIATED WITH SANDY NECK

Due to the unique characteristics of Sandy Neck, its value to public and private uses, the broad regulatory landscape, and the high level of public interest in the management of Sandy Neck, there are various stakeholders associated with Sandy Neck:

- Town of Barnstable
  - Schools,
  - Marine Environmental Affairs,
  - Recreation,
  - Conservation,
  - Town Manager,
  - Town Council,
  - Police,
  - Sandy Neck Board.
- Private Cottage/Property Owners
- Cottage/Property Lessees
- The Nature Conservancy
- Massachusetts Audubon Society
- Massachusetts Beach Buggy Association
- Non-Motorized Recreational Users
- Private environmental education groups
- Town of Sandwich
- Cape Cod Commission
- Massachusetts Coastal Zone Management Office
- Massachusetts Division of Fisheries and Wildlife, NHESP
- Massachusetts Department of Environmental Management, ACEC Program
- Massachusetts Department of Environmental Protection
- Massachusetts Historical Commission
- US Fish and Wildlife Service
- University Research Community

Each of these groups has strong interest in the management of Sandy Neck. In some cases stakeholders share similar views, and in other cases views conflict. Historically, conflicts have served as constraints on effective management. As such, effort must be made to reduce the level of conflict associated with activities at Sandy Neck. Proposed activities or changes in use on Sandy Neck should be pursued thoughtfully, and input from the various stakeholders should be sought prior to implementation. Many of these groups participated in the 2000 mediation process, which resulted in the requirement for this management plan, among other requirements. Many of these groups also participated in the 2001 permitting process, which resulted in successful issuance of an Order of Conditions for a short-term ORV management strategy. Many of these groups also participated in the development of this management plan. This management plan,

therefore, includes a Stakeholder Involvement Program, which is described in Section 11 as related to the Sandy Neck operational management structure.

5.0 MANAGEMENT OF ORV USE AND ACCESS CORRIDORS

The barrier beach system on Sandy Neck contains of a variety of natural resources including beaches, migratory sand dunes, tidal marshes, vernal pools and wetland bogs. Many parts of Sandy Neck provide critical endangered species habitat. Inevitably, vehicle traffic on Sandy Neck will have an impact on at least one of these natural resources. The challenge, therefore, is to develop a management plan that minimizes the vehicle impacts to the natural resources on Sandy Neck while still providing an acceptable level of access for recreational opportunities and travel to private property. It is important to have a clear and separate distinction between the rights of the general public and the rights of private property owners and lessees who have greater access provisions.

The following section presents existing trail conditions on Sandy Neck, and variety of alternatives for future vehicle management. Whenever possible, alternative changes to the proposed trail system were considered to shift vehicle activity away from the most dynamic areas of the beach toward the inland portions of Sandy Neck that are more geologically stable and less environmentally sensitive. As such, trail routes have been plotted so as to avoid sensitive marsh and beach ecotones. These alternatives will reduce vehicle impacts to the wetland resources on Sandy Neck as well as improve vehicle accessibility. Trail improvements also should be designed and planned so as to improve safety for travelers. Due to Sandy Neck's designation as an ACEC, most of these improvements will require approval through the local, state and federal permitting process (as described in Section 3.0), through which project-specific impacts can be identified and examined thoughtfully and completely.

5.1 Existing Conditions

Currently, there is a network of trails on Sandy Neck, which can provide access for ORVs. Due to the physical conditions (e.g., tide and storms) that limit use of these trails, safety hazards, and sensitive environmental resources (e.g., endangered species), use of this trail network presents a variety of challenges. As such ORV access is governed by an Order of Conditions (Attachment 2). ORV users that wish to drive directly onto Sandy Neck must pass through the gatehouse, located on Sandy Neck Road approximately one-quarter mile south of the parking lot. From the gatehouse all vehicles presently proceed east then north along the "Access Trail", a 1500 ft trail that connects Sandy Neck Road to the eastern end of the pedestrian beach. Once on the beach face, vehicles may proceed along the "Beach Trail", a 5 mile controlled vehicle corridor that runs east along the front beach to the eastern tip of Sandy Neck. The exact width and extent of the Beach Trail varies daily and seasonally depending on the extent of beach inundation by tidal heights and storm events, as well as the seasonal breeding patterns of rare and endangered species including piping plovers and least terns. The Beach Trail is routinely closed for tidal and resource management considerations. Closures range from a few hours for tides and storms to over one month for wildlife protection.

When the Beach Trail is closed for wildlife management, usually to protect piping plover chicks, essential vehicles may travel along the south side of Sandy Neck via the "Marsh

Trail", an unimproved trail that follows the ecotone between Great Marsh and the south side of Sandy Neck. Presently, the Marsh Trail is connected to the Beach Trail by four cross trails that run in the north to south direction across Sandy Neck. Traveling from west to east, these trails include Trail 1, Trail 2, Trail 4 and Trail 5. Trail 3 was decommissioned in the early 1980's, but the existing trails retained their original numbering scheme. In addition to these cross trails, Trail 6, located approximately 400 yards east of Trail 5, provides vehicle access to the cottage colony from the front beach. Access to the interior of Sandy Neck is allowed by horse back along the "Horse Trail", a hilly bi-pass that connects Trails 4 and 5. Additional inland trail routes remain, but they are used infrequently, typically by the Mosquito Control Program vehicles. One additional island trail was added as part of the short-term management plan in 2001 (Figure 5-1c), which permits access between Trails 5 and 6 without traveling on the front beach where piping plovers and least terns are resident routinely during the nesting season. The addition of this trail successfully eased travel for essential vehicles, reduced the demand on escorts, and minimized impacts to shorebirds.

5.2 Management Alternatives

5.2.1 No Action

The present guidelines for ORV use on Sandy Neck are presented in Attachment 2 (Order of Conditions for Vehicle Management on Sandy Neck, 2001). Should no action be taken by the Town the current Order of Conditions for vehicle use on Sandy Neck will remain valid until March 30, 2002, with the possibility of a one year extension conditioned upon the consent of the Barnstable Conservation Commission. Following the expiration of the existing Order of Conditions, an update of the previous Notice of Intent originally submitted on February 13, 2001 will have to be resubmitted to the Conservation Commission, should the Town wish to operate under the present vehicle management guidelines.

Orders of Conditions issued by the Barnstable Conservation Commission for status quo would likely be appealed. Once appealed, a MEPA review of the guidelines will be required. Since Sandy Neck is designated by the state as an Area of Critical Environmental Concern, an EIR will most likely need to be prepared by the Town during the MEPA review process to assess vehicle impacts to Sandy Neck's wetland resources.

5.2.2 Reducing or Prohibiting ORV Use on Sandy Neck

Reducing or eliminating ORV use is another option for future long-term vehicle management on Sandy Neck. Considering only natural resources interests this may be an attractive option, as any reduction in vehicle use reduces the potential risk of impacting Sandy Neck's wildlife resources. By reducing or eliminating vehicle travel on Sandy Neck the Town would also reduce the expenses it currently spends on managing ORV traffic on Sandy Neck. Reducing use may also open opportunities for funding from environmental stakeholders.

However, eliminating vehicle use on Sandy Neck would have significant negative consequences as well. For one, preventing all vehicle use on Sandy Neck would

Figure 5-1a. Proposed trail system on Sandy Neck in Zones A and B.

Figure 5-1b. Proposed trail system on Sandy Neck in Zone C.

Figure 5-1c. Proposed trail system on Sandy Neck in Zone C.

significantly decrease the access rights of private property owners located along Sandy Neck. Since property owners are presently operating under the current vehicle use guidelines set forth by the Endangered Species Act, any more restrictions on vehicle use may result in a case for the taking of a legal Right of Way by the Town. Secondly, the Town intends for Sandy Neck to be explored and enjoyed by the public, and prohibiting ORV access would reduce these recreational opportunities. By reducing recreational ORV use the Town would eliminate the annual funds it obtains through its current vehicle permitting program, and eliminate a major mode of public access to this primarily Town owned resource. As such, reducing or prohibiting ORV use on Sandy Neck is not consistent with the interests of the Town, the public, or the private stakeholders, and is not recommended at this time.

5.2.3 Improvements to the Existing Trail Network

The location of the current ORV trail system at Sandy Neck serves its constituents only moderately well, particularly for private property owners and lessees who have restricted access to their property. Its positive attributes include low maintenance, relative ease of traffic enforcement and scenic grandeur. However, the negative aspects of this trail system are numerous. Both the Beach Trail and Marsh Trail are subjected to tidal inundation, which results in their frequent closure. Wildlife protection issues force the closure of most of the Beach Trail and western portions of the Marsh Trail at least on a seasonal basis. Ice buildup along the trails in winter creates treacherous conditions during certain times of the year. As such, there are safety hazards associated with the present system that should be improved as part of any trail improvement plan. Finally, significant portions of the beach are inaccessible by self-contained campers, especially regions of the inter-dune areas. Historically, campers were allowed in trails 2 and 4 during certain times of the year. These sheltered campsites were very popular until their closure in the early 1980's, but remain in demand especially during the fall and spring.

Current and predicted future demand for ORV access strongly advocates for a more dependable trail system that is less susceptible to temporary closures. In many cases the present trail network along Sandy Neck could be improved through the movement of existing trails to more stable and less environmentally sensitive areas along Sandy Neck, such as inland. Experience shows that new trails can be created to enhance travel while minimizing and/or reducing environmental impacts (e.g., the Trail 5/6 connector). The following is a description of specific alternatives that could potentially improve Sandy Neck's present trail network, subject to a number of considerations. These alternative trails are shown on Figure 5-1. Future applications to the Conservation commission for trail modifications should be accompanied by figures similar to Figure 5-1, which can be developed in conjunction with the Town GIS department. Additionally, transparent overlays showing vegetation type, topography, wetland resources, species habitat of special concern, existing and proposed trails, and private property would be of use in permit applications. Also, any proposed trail improvements or new trails should be planned and constructed in such a manner as to minimize impacts to cultural or archaeological resources.

5.2.3.1 Enhanced Beach Trail Access

Two recommendations are proposed to enhance access along the Beach Trail. First, it is recommended that a Section 10 Permit (and Conservation Permit) be sought in the short-term allowing more flexible use of the Beach Trail up to Trail 1. This would allow for more recreational use of the first 600 yards of the front beach, as well as unfettered access for essential vehicles to the interior trail network on Sandy Neck starting at Trail 1. Provided the Section 10 flexibility is granted and managed appropriately, it is recommended that the Section 10 Permit be extended to Trail 2 to further expand recreational opportunities on the front beach and to improve private property access. Essential vehicles would then have unfettered access to the interior trail system starting at Trail 2, which would relieve pressure on the extremely sensitive Marsh Trail between Trails 1 and 2. In the short-term, improvements to the escort system, including staffing, communications, and the use of ATVs, are recommended to improve ORV access to the front beach.

5.2.3.2 Movement of Access Trail

Presently the northern end of the Access Trail is located in an area of the front beach where there is a high density of pedestrian traffic. Moving the Access Trail further east would alleviate this problem by shifting vehicle traffic further away from the pedestrian beach. Inland topography just behind the primary dune between the Access Trail and Trail 2 is relatively flat with elevations typically ranging between 10 and 20 feet above MLLW. The vegetative cover within this area indicates a fairly stable environment with a reduced risk to changes in topography over time due to dune migration.

Figure 5-1 displays an inland trail which potentially could connect the Access Trail with Trail 1. The path of this proposed trail was selected due to its avoidance of wetland resources and its navigability through relatively smooth, flat terrain. This proposed connector inland trail would alleviate vehicle pressure at the pedestrian beach, improve public safety, expand recreational opportunities, and supply an alternative route for vehicles during beach closures between the Access Trail and Trail 1. This trail, as part of the Access Trail, will have high vehicle use levels and could serve as the main beach access route for all ORV traffic entering or leaving Sandy Neck.

5.2.3.3 Inland Trail to Trail 2

Presently the greatest restrictions on vehicle use at Sandy Neck occur in June and July when piping plover fledglings are present along the front beach between the Access Trail and Trail 2. During these periods, ORV access near areas of fledgling activity is prohibited. This management requirement has the effect of closing the Beach Trail from the western-most plover nest eastward to at least Trail 2. Often, the entire Beach Trail is closed to ORV traffic, allowing passage only when accompanied by escorts. In addition, due to restriction on use of the Marsh Trail west of Trail 2, essential vehicles typically require an escort along the front beach past this fledgling activity. The escort system is set forth under the present state and federal guidelines for piping plover habitat management as implemented via the Order of Conditions (Attachment 2). Although this escort system may be necessary for the protection of endangered species habitat,

operating under these specific guidelines significantly reduces the ability of lessees and landowners to access their property (e.g., night travel is prohibited, and early morning/evening travel can require a long wait). In addition, the escort system increases the Town resources required for management of Sandy Neck. Three extra seasonal employees are required to maintain the escort system, in addition to the cost of the vehicles, fuel, and maintenance, even though the number of required escorts is not large even during the peak season. In 2002, the number of escorts provided in June, July, and August was 61, 127, and 13, respectively, averaging to approximately four per day in the peak season.

To minimize conflicts between ORV access and endangered species and preserve access to private and leased property, the creation of an inland trail, running parallel to the Beach Trail within the secondary dune environment on Sandy Neck could also be considered. The construction of such a trail would shift vehicles from the highly sensitive and regulated beach face to more stable inland areas where the risks associated with affecting endangered species habitat are reduced. Safety risks associated with traveling on the marsh and beach trails (e.g., storm, tide, and ice-related) would be reduced as well, provided an appropriate route is selected without excessively sloping terrain. To minimize impacts the island trail could be opened to essential vehicles only, at first. Figure 5-1 displays a recommended route for this inland trail. Topography along the proposed route is relatively flat and should be navigable by ORV users. Particular areas of the route may require some engineering activities in steeper sections. These topographic highs could be flattened with the use of a bulldozer; however, they are no steeper than areas of the current trail network (e.g., entrance to Trail 5); therefore, the proposed route should be passable by a properly trained ORV user.

5.2.3.4 Spur Trails and Corral Parking

Certain areas along the previously described inland trail provide the opportunity to create short trail sections, called spurs, which would expand recreational opportunities by providing beach face access from points along the proposed inland trail. This would be possible if initial management of the inland trail supported opening it to non-essential vehicles as well. This system of spurs could also serve as a method for avoiding specific nesting areas on Sandy Neck, which at present shut off all public beach access east of where fledgling activity exists. In addition, fenced parking areas (i.e., corrals) could be set up at the end of these spurs and serve as a method for concentrating vehicles in a specific area. Figure 5-1a shows a recommended spur trail and corral parking. Challenges associated with this alternative include monitoring and enforcement of environmental protection standards, and management of human rubbish and waste.

5.2.3.5 Bi-pass for Nickerson Property

One of the major bottlenecks for essential vehicle traffic along the Marsh Trail is located between Trails 1 and 2 in front of the Nickerson Property. Local patterns of migratory dune movement have pushed the Marsh Trail directly onto the marsh at this location. Vehicle traffic in this sensitive area is not only restricted to low tides due to marsh flooding, but also has resulted in the erosion of soils within the vicinity of the Nickerson Property. A recommended inland bi-pass route to the north of the Nickerson property is

displayed in Figure 5-1. This alternative bi-pass would improve vehicle access along the Marsh trail, reduce the safety risks associated with travel in tidally-flooded sections, of the trail, and shift vehicle use from the highly sensitive marsh environment to inland areas that are more stable and less biologically sensitive. This alternative trail also would serve to minimize potential impacts to private property.

5.2.3.6 Inland Trail East of Sugar Foot to Trail 5

Routine flooding of the Marsh Trail, similar to what occurs at the Nickerson Property, also occurs between Trails 4 and 5. An alternative inland route for ORV traffic between Trails 4 and 5, such as along the present Horse Trail would aid in alleviating the travel restrictions due to flooding. This trail is difficult to design due to a large dune system that exists just east of Trail 4. Presently portions of the Horse Trail that cross through this dune environment are not navigable by ORV traffic; however, the section of the Horse Trail between the eastern extent of this dune system and Trail 5 consists of relatively flat terrain which is presently navigable by ORV vehicles. This eastern section of the Horse Trail is also quite stable due to the vegetative tree cover surrounding it (Figure 5-1). One possible means for avoiding areas of the Marsh Trail which routinely flood between Trails 4 and 5 would be by creating an inland trail that connects the eastern section of the Horse Trail with the Marsh Trail. A recommended route for this Horse Trail connector is displayed in Figure 5-1. This connector trail travels along relatively flat terrain and avoids areas where wetland resources have been identified. Whenever possible, the trail route also avoids areas of dense forestation in order to minimize the required tree removal for its construction. Once again, this alternative inland route allows vehicles to avoid regions of the Marsh Trail between Trails 4 and 5 which routinely flood and shifts vehicle traffic away from the more environmentally sensitive marsh ecotone; thereby, decreasing the overall impact of vehicles on Sandy Neck's wetland resources.

5.2.3.7 Marsh Trail Fortification

Although the Marsh Trail remains serviceable as an ORV corridor, tidal action has rendered portions of the trail impassable even at moderate tides and presents a safety hazard for traveling vehicles. In areas where alternative inland trail construction is not feasible, maintenance of the existing marsh trail is the only viable management alternative. For example, the presence of extensive interior wetlands and high dunes makes it difficult to identify a navigable inland route for a connector trail between Trails 2 and 4. Therefore, the most plausible option for improving travel along this portion of the Marsh Trail might be achieved by performing minor fortifications to specific areas of Marsh Trail. Most of these improvements would require minimal engineering, such as adding crushed stone to low lying puddles in order to facilitate ORV passage. Some of these actions already are required for the mosquito control program; therefore, there are opportunities for cooperation between public and private interests.

5.3 Management Implications

Most of the trail alternatives mentioned in Section 5.2 are designed to expand recreational opportunities, improve access for essential vehicles, and to protect endangered species habitat by shifting ORV traffic away from the more sensitive beach and marsh ecotones.

In addition, most of these alternative trail sections will move vehicle use to above mean high water which should improve trail accessibility. Although there are certain benefits associated with the enhanced trail network, the management implications are significant, including financial and ecological costs. As stated previously, the creation of any trail on Sandy Neck will require an assessment of impacts, a plan to avoid/minimize impacts, and regulatory approval at the local, state and federal levels through the guidelines described in Section 3.0. Such regulatory processes are certain to be lengthy and perhaps costly. As such, well-informed management professionals from both within and outside of the Town staff will be required to navigate the regulatory process. The intended positive management implications of this investment would include expanded opportunities to generate revenue to promote the economic sustainability of the Sandy Neck resource, and to fund enhanced resources (e.g., larger staff, commercial opportunities) for the communities enjoyment and for the protection of sensitive environmental resources.

6.0 MANAGEMENT OF OTHER ACCESS CORRIDORS

Although ORV access to Sandy Neck imposes significant challenges to sustainable management of the resource, other modes of access are utilized as well. Pedestrians stream onto Sandy Neck from its western terminus and boaters congregate on both the oceanside beaches and marsh islands. Typically, these users require nearby parking in order to access the resources at Sandy Neck. Some of these parking resources are provided on-site, but many of the boaters who use Sandy Neck are ultimately moored or parked at some distance off-site. Future expansion of the passive recreational use of Sandy Neck depends upon the availability of sufficient on-site parking to meet recreational demand. The following is a description of the present parking available for pedestrian users as well as a description of boat use on Sandy Neck. Suggested improvements to the management for both of these methods of access to Sandy Neck are also discussed.

6.1 Existing Conditions

6.1.1 Parking

A hard surface parking lot is located just north of the gatehouse at the northern end of Sandy Neck Road. This parking lot exists within the primary dune system on Sandy Neck. Migration of this dune system has caused portions of the parking lot to erode, resulting in a reduction in vehicle capacity from 175 to 150 cars. Additional parking for approximately 15-20 cars is located near the park entrance.

6.1.2 Boat Access

Presently, public motorboat use on Sandy Neck is primarily focused to the eastern end of Sandy Neck (Zone D), although sailboat and kayak activity is distributed throughout the watershed. As described in Section 2, Zone D is an area of active piping plover and least tern breeding activity. Boat users provide a threat to piping plovers and least terns primarily though increased predation either by the introduction of domesticated animals and/or by the attraction of other predatory animals to the area by discarded food and other fragrant trash.

6.1.3 Emergency Access

Currently, emergency access to Sandy Neck is possible by pedestrian travel, off-road vehicle, motorboat and helicopter rescue coordinated through the Town, Fire departments, and local Coast Guard. Four wheel drive emergency access is possible through the regular vehicle access trail, the marsh trail and from the paved parking lot. All three trails are susceptible to closure from tidal or recreational conditions, which can severely limit ORV emergency access. As such, cooperative agreements with local fire departments (Barnstable, West Barnstable, East Sandwich) and the U.S. Coast Guard provide for boat and helicopter access in the event that ORV and pedestrian travel are not viable options.

6.2 Management Alternatives

6.2.1 Parking Improvements

Presently there is a demand for increased parking at Bodfish Park. Increasing the parking capacity at Bodfish Park is recommended for consideration, but may not be a viable long-term solution due to the erosion presently exhibited at this location, as well as the potential impacts this construction may have on the wetland resources located within the primary dune environment.

As an alternative, space for an additional parking lot does exist at the southern end of Sandy Neck Road near Route 6A. Due to the distance between this potential parking area and the beach on Sandy Neck (approximately half a mile), a shuttle service will most likely be required should this parking lot be created. This shuttle service could be contracted out by the Town during periods when estimates for recreational parking on Sandy Neck are over the number of cars required for the payment of the shuttle service by parking fees. A first estimate for the cost of this shuttle service is approximately $500/day. A shuttle service could also be considered from other remote sites, such as Cape Cod Community College, Sandwich High School, or a commercial in-town site where beach goers with common interests (e.g., kayaking, fishing, etc.) would congregate. Shuttles also could be utilized to transport people to more remote portions of Sandy Neck for recreational activities, which could serve to expand public enjoyment, and not significantly increase ORV traffic.

6.2.2 Regulation Recreational Boating

A logical strategy for improving plover and tern productivity on Sandy Neck would be to increase the level of endangered species protection within Zone D. Potentially harmful actions taken by boat users in Zone D could be minimized through increased patrols of this area by a qualified ranger. This ranger could enforce guidelines that would reduce the risk of predation, as well as educate boat users about the endangered species and wetland resources located on Sandy Neck.

6.2.3 Improved Boat Access (Ferry Service)

An alternative that was considered, but not recommended at this time, involves the establishment of a ferry service between the mainland and Sandy Neck for recreational users as well as private property owners. Due to the extensive infrastructure requirements (e.g., ferry, docking facilities, dredging), tidal restrictions on access, and lack of public support for the concept, this alternative is not recommended for implementation at this time.

6.2.4 Emergency Access

Additional access trails should be installed near the public parking lot. This management action would facilitate emergency access for official ORV's in a variety of weather, tidal and recreational conditions. Each trail should be oriented differently so that they are not equally susceptible to tidal action, snow drifting, pedestrian travel and potential wildlife use. In addition, the cooperative agreements between the managers of Sandy Neck and

the various fire departments and agencies that provide additional emergency access should be thoroughly reviewed and clarified.

6.3 Management Implications

6.3.1 Parking

Increasing parking at the western end of Sandy Neck would certainly increase public accessibility and encourage low impact, pedestrian use of Sandy Neck. Parking fee revenues provide an opportunity for the Town to recapture some of the costs of maintaining the park for passive recreation. Parking facilities provide the opportunity for educational signage and a site for increased vendor activity.

6.3.2 Boat Access

Controlling boating activity through education and enforcement represents a significant challenge to management personnel at Sandy Neck. However, these users of the beach impose potential threats to the resource, and as such, require enforcement activity. In the event that a Section 10 permit is requested by the Town requesting less stringent guidelines at the western end of Sandy Neck (Zone B), action taken to improve endangered species protection on the eastern end of Sandy Neck (Zone D), such as with the above methods may help to improve the overall protection of endangered species on Sandy Neck. Since improving the overall productivity of endangered species is the true intent of the Endangered Species Act, such combined actions may be desirable under a Section 10 provisions.

6.3.3 Emergency Access

The addition of access trails will require staff time to design and shepard through the permitting process. Actual establishment of the trails will simply be a matter of staking them out and driving the new routes until they are established. Staff time will be required to review and reaffirm the existing cooperative agreements with the agencies that can provide boat and helicopter access to the beach in the event of an emergency.

7.0 MANAGEMENT OF COTTAGE SITES

7.1 Existing Conditions

There are currently twenty-three cottages on Town-owned land with twenty-year leases that will expire in 2002. Most of the Town-owned parcels have cottages constructed by private entities. The cottages have an important historic and cultural significance for the Town of Barnstable as described on Appendix B of the 1995 Management Plan (Attachment 4). In fact, Sandy Neck itself is designated as a National Historic District, and an important part of its history is related to the cottages. As such, management of the cottage sites is relevant to the preservation of history and community character, as identified in the Cape Cod Commission's Regional Policy Plan.

Short-term management of the Town-owned cottage sites will be governed by the leases. The old leases stated that the parties will enter into good faith negotiations on an extension, renewal or termination of the leases no later than January 2001. Therefore, the Town had to decide whether to renew/renegotiate these leases. At the time of this writing, the majority of the leases had been negotiated with the existing leaseholders. The Town did an analysis to evaluate the relative costs and benefits of renewing the leases or converting some of the properties for other uses (e.g., ecotourism), and determined that inadequate resources (e.g., staff, funding, access) presently exist to change the use. The new leases are effective for a 5-year period expiring on July 1, 2007, at which time the Town has the option to renew the leases for an additional 5 years. New lease rates are higher, with a two-tiered structure such that waterview cottages demand a higher price.

The Town also needs to adopt a policy towards the privately held cottages in order to modulate their impact on natural communities on Sandy Neck. It is important that a clear distinction be made between the rights of the public and the respective rights of the private property owners and lessees when managing Sandy Neck. For instance, certain rights are extended in the Order of Conditions (Attachment 2) to "essential vehicles," which include property owners and lessees, that permit access above and beyond the general public. This section only addresses approaches to the Town-owned land. An analysis of how to approach the privately held cottages must await a decision by the Town as to how they would like to manage the area, and what their objectives are for the cabins.

If the leases are ever allowed to expire, the cottage subject to the lease is destroyed during the term of the lease, or if the lease is terminated according to the provisions in the lease, there is a requirement to remove the cottage from the lot within 180 days. The terms of the lease itself, therefore, anticipate a time when the Town-owned land will no longer be occupied.

7.2 Management Alternatives

The Town may choose to allow the current leases to expire some time in the future. If the leases are allowed to expire, the Town may decide to remove the cottages from the land, improve the cottages, or rent the land and/or cottages for shorter-term stays. Improvements to or raising the cottages will introduce challenges related to requirements for raising or modifying historic buildings in the flood plain, as well as alternatives to Sandy Neck's cultural landscape. Such issues must be handled appropriately on a case-by-case basis, including interactions with appropriate building, zoning, environmental regulatory, and historic boards/commissions

Future leases may include a provision regarding what type of access is appropriate for the area, and whether or not the cottages may be converted for year-round use. Leases should also stipulate that leaseholders are required to abide by town, state, and federal restrictions on access so as to clarify expectations and minimize conflict. Finally, if the Town wishes to continue to allow access to these properties and/or cottages, new lessees can be found using a lottery system to assign the expiring leases.

In addition to alternatives related to the structure of the leases, there are additional alternatives related to management of the cottage sites related to vehicle access. In particular, improvements to the escort system, provisions for night travel, self escorting, and emergency travel by essential vehicles all should be considered, perhaps as part of a Section 10 Permit as outlined in the Settlement Agreement (Attachment 1).

7.3 Management Implications

7.3.1 Environmental

Environmental implications associated with the Town-owned cottage sites are minimal due to the relatively small number of trips as compared to recreational use, and the continued need to access the eastern portions of Sandy Neck for private property.

7.3.2 Regulatory

Allowing the leases to expire would reduce the regulatory burden on the Town. It would no longer be necessary to provide for access to these cottages, nor would the Town be required to devote any resources to renegotiating the leases.

If the leases are ever to be assigned by lottery, the Town will need to establish guidelines for how to manage the lottery process, as well as possibly addressing access and winterization. Further, the Town may choose to adopt an overlay zone for the cottage colony that would regulate what activities and impacts are appropriate for the area. Any modifications would require environmental regulatory approval.

7.3.3 Town Resources and Staff

Decreasing the number of cottagers on Sandy Neck would require fewer local resources to manage the cottages. It would also, however, eliminate the revenue derived from the

leases. There may also be political pressure from the lessees and others to renew or renegotiate the leases.

7.4 Economic

Revenue from the Town-owned cottages has been increased as part of the new lease agreements. Future negotiations could further increase the lease payments with the current occupants, or revenues could be increased by renting the cottages for shorter durations. To ensure economic flexibility, future leases should have more limited durations than the previous 20-year terms.

8.0 MANAGEMENT OF RECREATIONAL OPPORTUNITIES

8.1 Existing Conditions

Currently, the beach is used by a variety of recreational stakeholders, but the opportunities to expand recreational opportunities are nearly limitless. The Town derives revenue from the sale of ORV permits for use of the beach, as well as charging for use of the parking lot by recreational users, and collecting a rental fee from the operator of the concession stand. The activities and stakeholders that are currently using Sandy Neck include:

- ORV users – in designated use corridors, and subject to an inspection/permitting program
- Recreational users – swimming, jogging and sunbathing
- Shell fishermen; fishermen
- Hunters
- "Conservation camp" – high school and college students
- Boaters
- Other users

8.2 Management Alternatives

There are several things the Town could do to increase recreational opportunities while protecting the fragile natural communities on Sandy Neck and trying to increase the revenue derived from the area. Among the Town's goals for Sandy Neck is to make it an enterprise account; thus, the revenue derived from the beach is an important consideration. Expanding recreational opportunities is a fundamental way to boost revenue. The first, and easiest to implement, is to raise the price of a parking sticker. The Town may also choose to encourage boat access by providing new parking facilities/boat launch in neighboring towns. A permit system could be devised (Audubon Society model) which would raise revenue for beach maintenance activities. A further suggestion would be to put the management of the gatehouse and the beach under one department in the Town (currently, oversight for the beach and gatehouse are split between the recreation and natural resources divisions). The Town could also implement a series of nature-related programming, including kayaking, nature walks, stargazing nights, camping, fishing, etc. Opportunities for commercial partnerships with the Town should be investigated and encouraged, up to and including the establishment of a recreational center as a base camp for recreational activities and for merchandising. In order to expand recreational opportunities, while not significantly expanding ORV traffic, shuttle alternatives could be developed and offered to transport pedestrians to and from the bathing beach, as well as to other sections of the beach and dune system.

Expansion of recreational opportunities must be balanced with public safety and transportation issues, public access, availability of town staff, and environmental impacts.

8.3 Management Implications

8.3.1 Environmental

There are competing environmental interests associated with expanding recreational use on Sandy Neck. On one hand, increased use implies increased impacts. However, carefully managed recreational programs can improve user sensitivity and education, thereby decreasing impacts. Additional revenues also would allow for an expansion of resources and staff required to enhance protection of natural resources. The national park model offers proof of the potential to successfully balance human and environmental needs.

8.3.2 Regulatory

In order to implement some of the management alternatives, environmental regulatory processes would be required. Operational regulations would need to be promulgated regarding management authority for the beach and the gatehouse. Also, some research would need to be done on compacts between towns (Sandwich or Dennis) regarding parking lot fees and boat launch sites.

8.3.3 Town Resources and Staff

Putting the management of the beach and the gatehouse under the same town department would require some resources and staff time. An analysis of current and future staffing needs and regulations would be required. It would also be necessary to hire rangers to enforce the boat access provisions, if the Town decides to implement such a system.

8.4 Economic

Expansion of recreational opportunities and business relationship offers the most encouraging route to increasing revenues on Sandy Neck. Placing the gatehouse and beach management under one Town department would make it more likely that Sandy Neck becomes an enterprise account. A more detailed analysis of the economic implications of these proposed programs would be necessary to determine whether or not they would suffice to achieve this Town objective.

9.0 MANAGEMENT OF NATURAL COMMUNITIES

There are tremendous opportunities for progressive natural resource management initiatives at Sandy Neck pertaining to the beach, dune, marsh, freshwater, wetland and maritime forest ecosystems and species. This section outlines the basis for implementing a biodiversity management approach, but does not expand on specifics. Because the most pressing short- and long-term challenges at Sandy Neck are related to access, and resources are limited for present natural resource management initiatives, this plan focuses instead on detailed management alternatives to minimize conflicts associated with access, as well as alternatives to boost recreational opportunities and associated revenue. As opportunities are created to focus on wildlife management (e.g., via additional revenue and/or staff time not required to manage the access conflicts), the plan should be expanded to include more specific and progressive initiatives for the natural resources.

9.1 Existing Conditions

Current management practices at Sandy Neck have tended to focus on individual species of high profile, whose protection is driven by regulatory demand (see Section 2). This is typical for coastal recreational areas and tends to be reactive to environmental or regulatory mandates for protection. This approach can be successful, but shifts the balance of policy development away from the Town and towards the various regulatory agencies. The extensive in-house and collaborative resources of the Town suggest that a more proactive approach to natural community management is both possible and desirable.

Introduced in Section 2, Sandy Neck's natural communities can be broadly characterized in the following manner. Considering a transect that bisects the beach beginning at the oceanside there are: the intertidal zone with its associated fore dunes and beachfront; the primary dune line that includes the primary and secondary dunes; the interdune communities that include vernal pools and bogs; the maritime forests; and the salt marsh. Each of these resource areas have both shared and unique characteristics relevant to management planning. Current management practices focus on controlling erosion from vehicle and foot traffic through the placement of symbolic fencing and signs. Occasional use of snow fencing and discarded Christmas trees is employed in the vicinity of the bathing beach where pedestrian traffic is most intense. In addition, users are informed about fragile areas through pamphlets handed out during ORV inspection procedures and available from kiosks near the gatehouse. Many of the most fragile communities remain unmapped and without adequate protection, especially at the eastern end of the barrier spit.

With respect to its natural communities, Sandy Neck has a strong history of local research findings serving as models for national policy and management. Salt marsh dynamics (Redfield, 1972), diamondback terrapin ecology (Auger, 1979, 1989) and piping plover conservation biology (Strauss 1990) are a few examples of such studies initiated and conducted by local residents that helped to formulate policy at Sandy Neck. The environmental strategies developed at Sandy Neck both preceded, and contributed to,

the national conservation policies. Data collected at Sandy Neck was pioneering information. However, the lack of a formal program for policy implementation hampered the ability for the Town to retain local control of the management of the resource in question. As a result, management of those resources was dictated more by regulatory oversight than facilitated by the local expertise.

Although piping plovers, least terns, and diamondback terrapins are current management foci, other community-based management challenges are emerging as priorities at the Sate and Federal levels. The fragile plant communities along the foredune and within the dune swales, especially those associated with amphibian populations, are recognized as important barrier beach resources in need of protection. A better understanding of the wetland bogs has revealed their critical role in barrier beach ecology. In addition, increased scrutiny by State biologists of the invertebrate populations found on beaches, such as beetles and moths suggests that a targeted protection program be warranted. These future trends in ecosystem management are compelling reasons for the Town to adopt a biodiversity assessment program of its own.

9.2 Management Alternatives

The regulatory burden associated with maintaining ORV access to Sandy Neck can be lessened under certain provisions of the Federal Endangered Species Act. An important management strategy for the Town to pursue is the acquisition of a Section 10 permit from the U.S. Fish & Wildlife Service. A Section 10 Agreement with the USF&WS allows for increased flexibility in management practices at the site. Such an agreement might facilitate increased ORV travel between the Access Trail and Trail 2 during periods of plover breeding. Either or both of these management solutions would be appropriate goals of a Section 10 negotiation. With respect to the natural communities, each of their management priorities are outlined below, and a mechanism is proposed to achieve the combined goals of sustainable environmental management and thorough recreational use of Sandy Neck.

9.2.1 Beach front and foredune

Currently, this region of the barrier beach receives the most intense impact from human activity. Attempts to control the destruction of both plants along the foredune, and the wrack line should be priorities. This needs to be achieved in balance with the geology of the beachfront, which is very dynamic. Wind and water erosion will continue to sculpt the foredunes and create new blowouts along the dune line. If the plant communities and wrackline are stabilized, these foredunes will remain healthy and dynamic. Protecting the foredune system will have the additional benefit of enhancing piping plover nesting habitat.

Symbolic fencing and signage are useful management tools to protect this part of the beach. In addition, shifting a portion of the recreational impact to other parts of the beach will alleviate some of the pressure along the beachfront. Severe erosive events could be managed through beach replenishment, but such active measures will not likely be required in the near future due to the relatively stable and natural beach environment at Sandy Neck.

9.2.2 Primary and secondary dunes

The primary and secondary dunes provide the barrier beach with its inherent resilience to withstand storm surge and high winds. These dunes are in constant motion, however, and behave like waves of water – just on a different time course. Attempts to stop the natural migration patterns of these dunes damages the ecology of the beach. That being said, human impact can negatively affect this process. Uncontrolled pedestrian or ORV activity within the dunes can scar the dune faces, which increases the rates of erosion. As recreational activity is shifted towards these dunes, clear delineation and maintenance of trails will be a critical factor in reducing negative human impact on this ecosystem. Short-term damage to dunes can be managed through natural recovery and/or dune plantings and restricted access (including foot travel) delineations as appropriate.

9.2.3 Interdune communities (vernal pools & bogs)

The vernal pool, dune swale and bog communities are some of the most fragile systems on the barrier beach. As such, they can support very little human activity and are easily damaged from pedestrian traffic. These areas should be delineated and roped off at the western end of the park where pedestrian activity is highest. Vernal pools and bogs also are threatened by invasive species such as Phragmites, and efforts should be explored to control expansion and establishment of vigorous monospecific and dense stands.

9.2.4 Maritime forests

The maritime forests are characterized by thin soils and a relative lack of fresh water. The plants that live there have adapted to these harsh conditions, but are susceptible to stress. These areas provide wonderful opportunities for passive recreation, but must be managed carefully. All trees, including those that are dead, must be protected from harvesting. These areas serve as refuges for the larger vertebrates (deer, coyotes) that inhabit Sandy Neck. If they are to be used for recreation, certain patches should remain closed on a rotating basis in order to provide the necessary refugia for resident animals.

9.2.5 Salt marsh

The salt marsh has historically been exploited for a variety of resources. It continues to provide multiple ecological services to the community, including storm protection, pollution abatement, food resources and recreational opportunities. Management of the salt marsh is complicated by multiple jurisdictions of regulatory agencies. However, the opportunity for fruitful collaboration exists among agencies and stakeholders.

Invasive vegetation, such as Phragmites, also can threatened the salt marsh environment. As such, Phragmites growth should be monitored and controlled to prevent degradation of the salt marsh as well as the vernal pools and bogs. An invasive species management plan can be developed as the basis for Phragmites control, and the Nature Conservancy is one stakeholder that may have resources to assist with the endeavor.

9.2.6 Establishing biodiversity oversight

Towards the goal of adopting a more proactive approach to barrier beach management, the Town should encourage a biodiversity survey and management program for Sandy

Neck, similar to the program established by the Massachusetts Executive Office of Environmental Affairs (EOEA). Included in the biodiversity assessment should be an assessment of Sandy Neck as habitat for migratory birds other than the piping plover. The EOEA program teams local experts and interested stakeholders in research projects aimed at assessing the local biodiversity of a particular site. One of the primary goals of the committee would be to provide overall guidance on developing an appropriate monitoring program for Sandy Neck that can provide data to assist in decision-making. As such, the committee should have access to and be knowledgeable of past, ongoing, and future research efforts. Monitoring data should be used in a adaptive management approach to improve future projects based on baseline data and the monitored performance of past projects.

In some aspects, the Town has been accomplishing these goals through the efforts of the Barnstable School's Field Research program under the direction of Dr. Peter Auger. Through collaboration with this program, long-term studies are in progress on white tailed deer, coyotes, piping plovers, and diamondback terrapins. Additional taxonomic surveys are crucial if the Town is to have a thorough understanding of the natural communities at Sandy Neck. Some of the tasks associated with these studies, such as mapping could be handled "in-house". However, the most efficient way to foster this program would be to facilitate expanded relationships with the educational and research communities that utilize the barrier beach. Existing collaborations with local research universities such as the University of Massachusetts, Boston College, Wheaton College and Harvard could be strengthened and collaborations with new universities established. In addition, local nonprofit educational and research organizations such as the Cape Cod Museum of Natural History and the Thornton Burgess Society could be cultivated. All of the past, ongoing, and future research should be documented, shared, and archived in the Town's Sandy Neck library. Appropriate information should be incorporated into project-specific permit applications and the management plan should be updated when appropriate scientific data and interpretation exist to affect management policy.

Sandy Neck is an extraordinary site in which to conduct biological research and significant projects have been completed or are currently underway. The size and diversity of habitats along the beach provide a unique opportunity to undertake studies that help find the sustainable balance between recreation and resource protection. This balance is a critical issue within the regulatory community and funding agencies. Sandy Neck is a strong position to compete for revenue sources that would permit these collaborations and local partnerships to flourish.

With the combined goals of enhancing local control and community environmental education, the Town should establish a *Biodiversity Research & Education Sub Committee* of the Sandy Neck Board to encourage, facilitate and oversee ecological research at Sandy Neck (and possibly, the Town as a whole). The information gathered by scientists, students and Town residents would contribute to a local database and to the scientific community at-large. Such a database would supply the Town with useful information that would allow the Town Manager to make informed decisions about management alternatives at Sandy Neck. In addition, the participation in such local

research projects by a wide variety of stakeholders would help to foster the trust necessary to implement sustainable management policies. Participation by stakeholders in the process should be a key goal of the Town as it pursues this endeavor.

The committee composition would reflect the expertise necessary to evaluate the needs at Sandy Neck, to foster educational research and to facilitate collaborations and funding with outside agencies. The committee should include six members: 1) Town Manager, 2) Natural Resources representative, 3) Sandy Neck Advisory Board Member, 4) Public Education/Research representative, 5) Private Educational/Research representative, and 6) Active Research scientist. This committee would report through the Sandy Neck Board to the Director of MEA and the Town Manager and maintain a working relationship with other Town Boards and Committees.

9.3 Management Implications

9.3.1 Environmental

Establishing a biodiversity research and education program would serve to highlight and protect the fragile natural resources at Sandy Neck. Local participation in the gathering and dissemination of information about the natural resources at Sandy Neck can only enhance the Town's management efforts within the park. The demonstration of local initiative for research into sustainable management practices will strengthen the Town's position with respect to negotiations with any State and Federal regulatory agencies. The Town has an opportunity to become a national model for local management practices for natural resources.

9.3.2 Regulatory

All regulatory authority would remain with the existing agencies, as the Committee would be advisory. However, the Committee could exert considerable influence on the regulatory process by requesting and facilitating the critical information (data) necessary to navigate the regulatory process. Typically, experimental management strategies, such as alternative trails, beach zonation, etc., are made more palatable to regulatory agencies if they can be assured that the necessary data will be collected in order to ascertain the impact of their decisions. This is where the actions of the Committee can be crucial in providing the necessary assurances that these novel management plans will be monitored appropriately.

Perhaps even more importantly, the Committee can foresee research topics whose answers would bolster management decisions being made at the beach. In this way, the Committee could serve as a clearinghouse for research information and help research scientists acquire the funding necessary to answer the specific research questions that the Town might impose. The Committee could sponsor a small grants program to fund the initial phases of research at Sandy Neck. Quite often, small grants ($2000-5000) can provide the necessary "jump-start" for research that will later be more heavily funded by outside agencies, such as the National Science Foundation. When these larger grants are garnered, Town support could be compensated for through administrative overhead within the grant. By utilizing the Committee in this fashion, the Town can stay at the

forefront of environmental management at Sandy Neck, thus preserving a controlling interest in the management decisions.

9.3.3 Town Resources and Staff

Currently a full-time Town monitor is employed along with one shorebird monitor to help document and manage natural resources, with a focus on rare and endangered species during the peak recreational season. Additional staff could be employed to implement a broader wildlife management program; however, resources are currently not available and must be planned realistically. Part of the interest in expanding recreational opportunities is to generate the additional revenue required to make Sandy Neck a self-sufficient operation, and to potentially increase resources and planning for wildlife management. To prepare a more aggressive wildlife management plan at this time would be premature given current realistic funding levels.

To expand funding in addition to funding associated with recreational use, staff time would be required to attend Committee meetings and to help evaluate proposals and award funds. The Town GIS unit would be expected to provide mapping services to the participating research scientists and teachers who are collecting data in these projects.

Active participation in this Committee might be one of the primary duties of a Beach Manager at Sandy Neck. Otherwise, the Town might appoint an administrative scientist position for this Committee, especially if this Committee had duties beyond the boundaries of Sandy Neck.

The Small Grants Program for Sandy Neck would impose additional fiscal burden on the Town, although the costs would be low and the potential return on investment very high. The Town might award three such grants each year, so that the total program budget would not exceed $12,000-15,000. The EOEA offers small grants each year to schoolteachers conducting these studies. Teachers applying from the Sandy Neck program would be eligible for matching grants. In addition, some of the annual costs to administer this program would be recovered in subsequent grants awarded to investigators at Sandy Neck.

10.0 PUBLIC EDUCATION AND OUTREACH PROGRAMS

10.1 Other Activities

Sandy Neck serves as a living laboratory for environmental education. Both public and private educational organizations bring students of all ages to the beach, dunes and marshes. In addition, the Town sponsors occasional events at Sandy Neck that are targeted at outdoor education audiences. These activities are not well organized from the Town's perspective and could be important sources of collaboration and revenue.

Currently, ORV's registering to use the beach receive only a cursory information packet about the beach. Former Chief Ranger, Steven Tucker prepared an interpretive guide to natural history of Sandy Neck, and it is handed out to interested parties. Historically, the inspection process for ORV's at Sandy Neck included a multimedia presentation that included elements of beach ecology and vehicle safety.

10.2 Recommendations

The Town should establish an interpretive program of natural history at Sandy Neck. The current ranger staff is eager to facilitate the outreach program, but needs leadership, funding, and a clear agenda. The program should include elements of on-site activities, as well as a school-based program. Staff time should be devoted to overseeing and organizing educational events at Sandy Neck – especially collaborative programs with existing providers. Existing programs are provided by Nature's Web, The Cape Cod Museum of Natural History, The Association for the Preservation of Cape Cod, The Cape Cod Bird Club and others. These points of contact provide opportunities for the Town to reach novel audiences and foster nontraditional use of the resource.

A number of educational opportunities exist that could be focused on Sandy Neck, but based in the schools. One example is the headstarting program for diamondback terrapins. Based in schools and community groups, diamondback terrapin eggs from disrupted nests are hatched and reared by students in various classrooms. This program has been very successful in New Jersey and Maryland and is poised to be implemented here in Barnstable. The EOEA has funds for such classroom initiatives and once implemented, the headstarting program could make real contributions to terrapin conservation at Sandy Neck.

The interpretive program could be part of the tasks of the *Biodiversity Research & Education Committee*. Coordination of the program could be assigned to the Committee administrator. As mentioned before, this program could easily be adopted across the whole town.

In collaboration with the School department, the Town should complete the renovations of the Sandy Neck Field Station. Purchased by the Town in the 1970's, the field station has been under the control of a variety of agencies, but has been under the stewardship of Dr. Peter Auger. It has served as the focal location for thousands of field trips in the past

25 years, as well a center for over a dozen long-term studies. The station has been partly rebuilt three times with volunteer help and supplies, but is badly in need of complete renovation. The Cobb Trust through its Trustee, Mr. David Cole, has pledged funding to rebuild the facility. The project remains in the regulatory process. The Town should make the completion of this project one of the management priorities for Sandy Neck. Once completed, this facility could become one of the central parts of an interpretive program.

The Town should strengthen its education effort with ORV users at Sandy Neck. A new multimedia educational program should be developed and shown to all new users of the beach as part of the inspection process. The program could be developed on PowerPoint and displayed via computer kiosk at the check-in station or taken to specific locations by the ranger staff. During the 1980's, Dr. Eric Strauss developed a similar program that was used for approximately three years, both at Sandy Neck and at schools and ORV club meetings.

In addition to improved communications amongst the existing stakeholders, there is a need for a more broad public relations and marketing program. Unfortunately, Sandy Neck is an under-utilized, under-appreciated, and in some cases an unknown resource to the residents of the community. Opportunities for enhancing recreational use must be expanded to generate the revenue required to maintain Sandy neck and protect its valuable resources. As such, development of a marketing and communications package is recommended, including:

- ORV user education program
- Pamphlets for user groups
- Web site for Sandy Neck
- Questionnaires
- Advertising
- Community-wide events (e.g., recreational, entertainment, cleanup, etc.)

11.0 OPERATIONAL MANAGEMENT STRUCTURE

This section of the management plan addresses the management structure and practices associated with Sandy Neck. The existing structure is illustrated, and areas needing improvement are identified. Recommended improvements, including a modified management structure, are presented as well.

11.1 Existing Structure

Figure 11-1 shows the present management structure for Sandy Neck. Operational management of Sandy Neck is accomplished within the Sandy Neck Program in cooperation with the Natural Resources Program under the Division of Marine and Environmental Affairs (MEA). MEA then reports to the Town Manager's office, which ultimately reports to the Town Counsel. Other entities involved in the management of Sandy Neck include the:

- Sandy Neck Board (SNB), reporting to the Town Manager's office and interacting with the Town Council and other boards as described in Section 28.00 of the Barnstable Administrative Code. The fundamental purpose of the SNB is to provide advice regarding the management of Sandy Neck from a variety of user perspectives.

- Police Department, reporting to the Town Manager, which is responsible for law enforcement, based on reports primarily from MEA staff and the user public.

- Recreation Department, reporting to the Town Manager, which is responsible for the gatehouse and lifeguards.

- The Conservation Department, reporting to the Town Manager, which is responsible for providing guidance to the Conservation Commission for the implementation and enforcement of environmental regulations.

- County, State, and Federal Agencies, which are involved in the management of Sandy Neck through the establishment of the environmental regulations the Conservation Commission implements.

As also identified on Figure 11-1, there are limitations associated with the present management structure. First, there are missing functions that limit the effectiveness of management at Sandy Neck:

- **No Single Management Authority** - There is no single point of contact or general manager for all activities at Sandy Neck. Instead a variety of responsibilities are widespread amongst Town entities, which introduces uncertainty to the Sandy Neck Program and subsequently the MEA Division. This lack of consolidated management also places pressure on the Town Manager's office to make

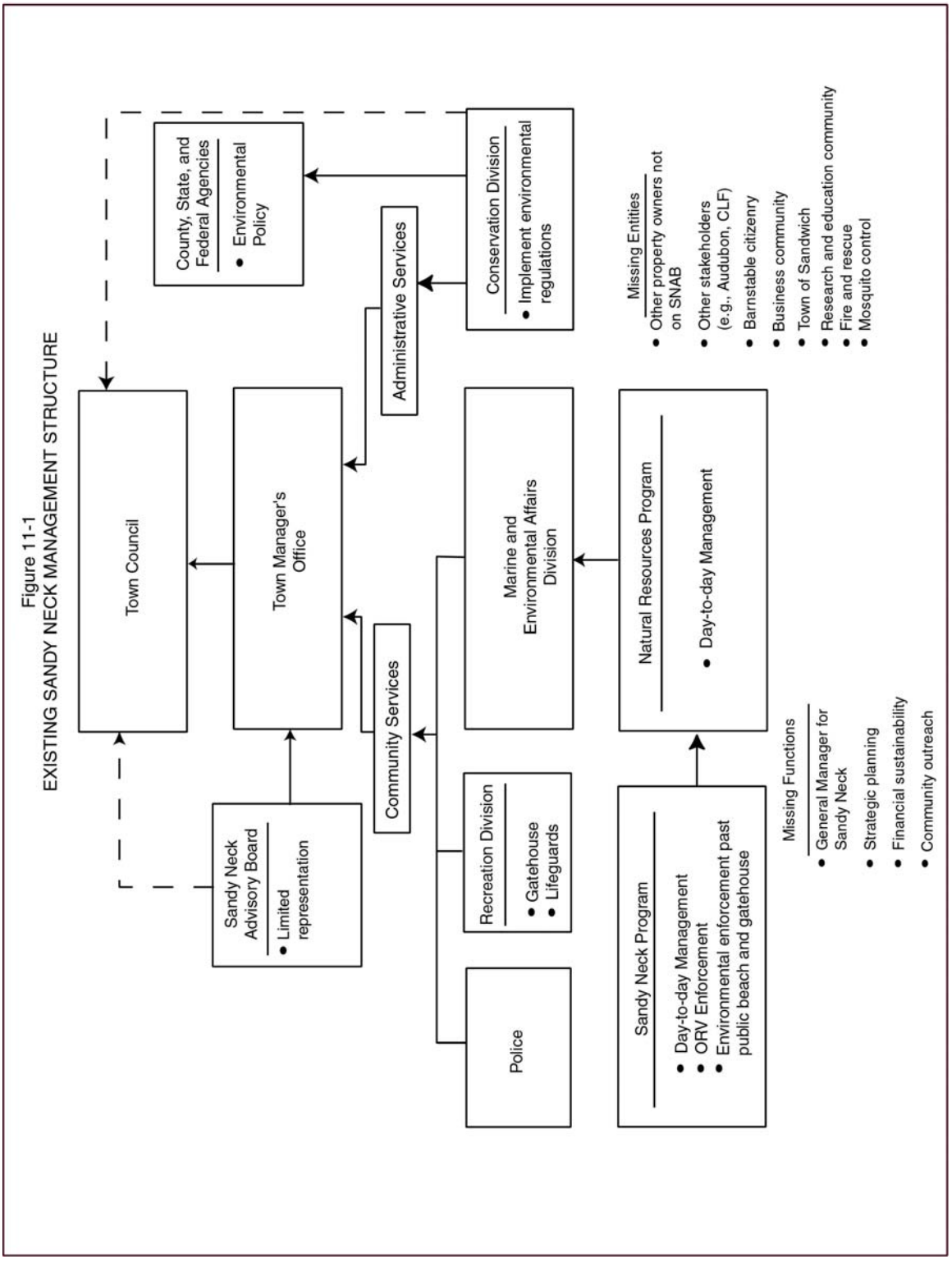

Figure 11-1. Existing Sandy Neck Management Structure.

management decisions that could otherwise be addressed within the Sandy Neck Program.

- **Limited Strategic Planning and Implementation** - With no single entity responsible for the vision and management of Sandy Neck, there is a lack of focus on strategic planning for future use. Attention, instead is focused on the day to day management of the resource, which results in lost opportunities for the Town to improve its beneficial use of Sandy Neck.

- **Uncertain Financial Stability** - Revenues are directed to a variety of entities; therefore, it is not a priority to balance the revenues and expenditures for the resource as a whole.

- **Limited Public Outreach** - The value of Sandy Neck is not communicated to the user groups and to the community at large. This is particularly unfortunate because Sandy Neck is a tremendous resource that can be enjoyed more fully by the public.

In addition to the missing functions, the present management structure of Sandy Neck also is limited because there are a multitude of interest and user groups that do not have a clearly defined voice:

- There are a variety of private property owners not represented by the SNB.
- There are other stakeholders, such as environmental groups (e.g., Audubon Society and Conservation Law Foundation), that do not have a direct voice.
- There is not clear pathway for the citizens of Barnstable and nearby communities (e.g., Sandwich), including the business community, to actively participate in the direction of Sandy Neck.
- The research and education community is actively using Sandy Neck, but has no defined role in the management of the resource.
- The plans for involving the fire and rescue services need to be formalized.
- The role of the mosquito control project also needs to be formalized.

11.2 Recommended Improvements

The management structure and processes for Sandy Neck can be improved to allow for the Town's vision of Sandy Neck to be realized, in terms of becoming a self-sustaining resource that benefits a wide range of user groups in an environmentally sensitive manner. An improved management structure is presented in Figure 11-2. There are four fundamental recommended management improvements.

- Hire a Sandy Neck Park Manager
- Consolidate all operational management responsibilities
- Revitalize the Sandy Neck Board through a Stakeholder Involvement Program
- Administer an Enterprise Account for Sandy Neck

- Improve public outreach, education, and participation (see Section 10)

These recommendations are discussed in more detail below.

11.2.1 Hire a Sandy Neck Park Manager

A new Town position should be established and filled to focus solely and directly on Sandy Neck. This should be a management position for the Sandy Neck Program, reporting to the Director of the MEA Division. The fundamental responsibilities of this position should include operational management responsibilities (i.e., supervisory, administrative, technical and educational, and enforcement), as well as a role in the future strategic planning for the resource. At the time of the Draft Management Plan was written, a job description was developed and advertised, and candidates were being interviewed. The position description appropriately provides a definition of the position, supervisory responsibility, job environment, essential functions, and minimum qualifications. The position has since been filled, and resulted in improved management of Sandy Neck in 2002.

11.2.2 Consolidate all operational management responsibilities

With the hiring of the Sandy Neck Park Manager should come consolidation of operational management responsibility to the Sandy Neck Program. All operational management responsibilities historically delegated to other Town programs (e.g., gatehouse staffing and lifeguards) should be moved under the Sandy Neck Program. As use of the resource expands, consideration of management will allow for informed staffing decisions, including additional staff needs (e.g., environmental monitoring, wildlife guides, enforcement). All staffing, of course, will be contingent upon funding, and management must continue to do the best it can with available resources. Enforcement, for example, does not suffer greatly since there is backing by the Police Department, and the user-public helps significantly with controlling and reporting disallowed activities.

11.2.3 Revitalize the Sandy Neck Board

The Sandy Neck Board is critical for the future success in the management of this valuable Town resource. The Sandy Neck Board must work with the Town to craft the future vision for Sandy Neck in such a manner that it meets the interests of the Town, its

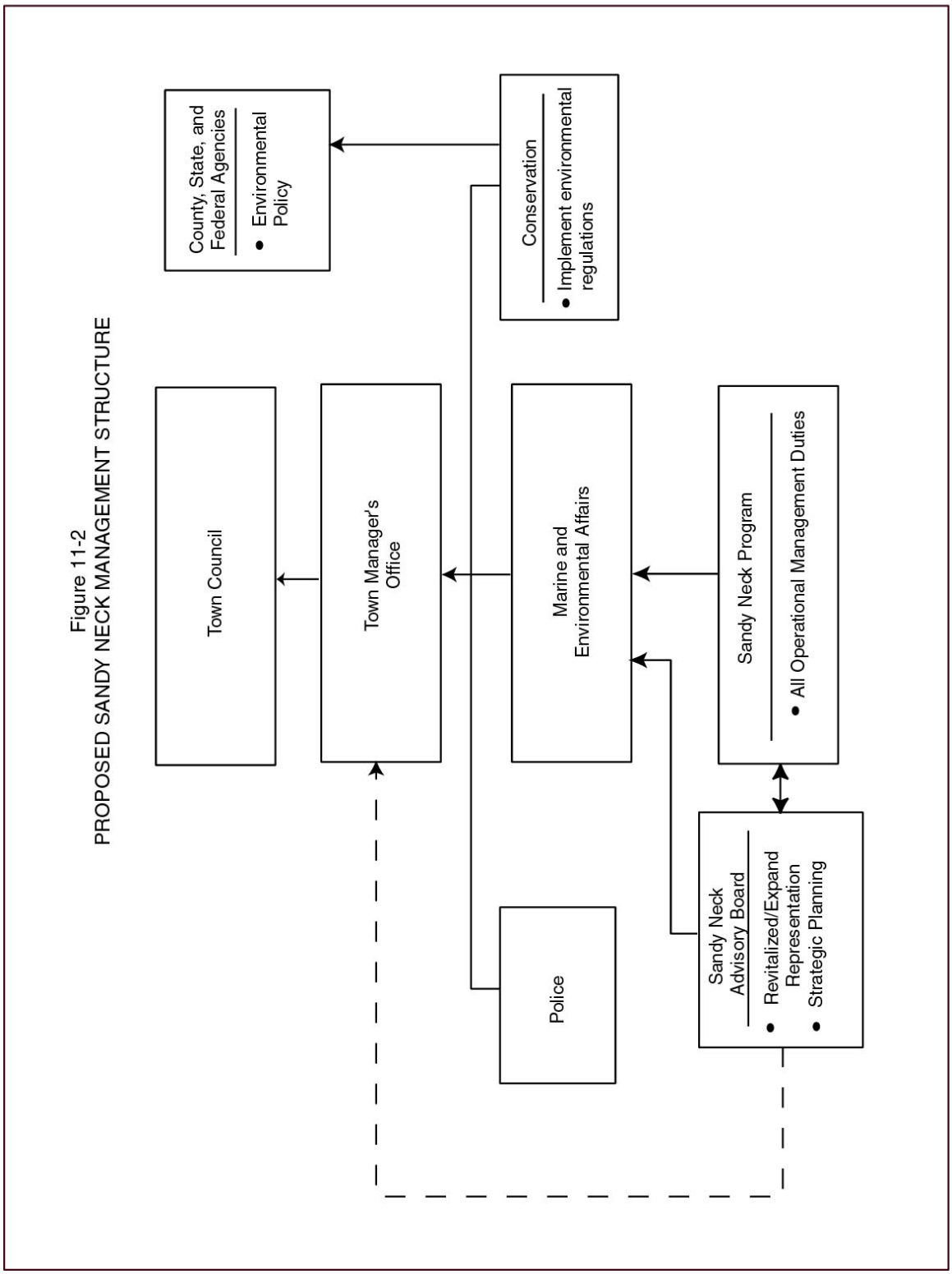

Figure 11-2. Proposed Sandy Neck Management Structure.

citizens, and the various stakeholders. In its present capacity, though, there is a need for revitalization in terms of expanding its representation, as well as broadening and more clearly defining its mission. Presently, the Board is more focused on operational issues and interests than on crafting the future vision. With the establishment of the Park Manager position, the Board should be freed to focus on more strategic items related to Sandy Neck.

11.2.3.1 Stakeholder Involvement Program - Expanded Representation

Presently, the Sandy Neck Board is comprised of seven members appointed by the Town Council, including one member of the Recreation Commission, one member of the Conservation Commission, and five members at large. The membership of the Board should be more clearly defined and perhaps expanded to include representation for the "missing entities" identified in Section 11.1 above. This expanded representation also will likely require the establishment of sub-groups (for the public, business, environmental interest, and research and education communities, for example), who then have one individual empowered to represent their interests on the Sandy Neck Board (i.e., similar to the presently effective scenario with the Massachusetts Beach Buggy Association). In addition to expanded and more diverse representation, it should be formalized that the Sandy Neck Park Manager participate as Town Staff on the Board. This will accomplish two objectives: one, to ensure that the Town interests are adequately represented; and two, to ensure close communication of the interests of the Board to the Town entity responsible for managing the resource.

11.2.3.2 Sandy Neck Mission

Section 28.02 of the Barnstable Administrative Code defines the authorities and responsibilities of the Sandy Neck Board as, "The Sandy Neck Board provides the Town Manager with advice relative to the management, control and jurisdiction of real and personal property and passive recreation such as hiking, horseback riding, swimming, hunting, camping and fishing." A mission statement for Sandy Neck should be established to further clarify the role of the Board so that it's activities can be focused on achieving the Town's missions for Sandy Neck. The mission statement for Sandy Neck should be defined by the Town, and we recommend incorporating the following major components:

- Conservation (not preservation)
- Economic sustainability
- Public use and participation
- Respect of private interests
- Education and research
- Community Outreach

Once the broadened mission for Sandy Neck is established and clarified, the Board should be focused and held accountable for developing and implementing strategies to ensure the mission for the resource is realized. In this regard, the Board will require strong membership and a strong leader, as well as be task and action driven. The Board

can provide recommendations that can be implemented by the combined efforts of the stakeholders and the Town staff.

11.2.4 Establish Biodiversity Research and Education Committee (Section 9.2.6 and 10.2)

11.2.5 Administer an Enterprise Account for Sandy Neck

Along with the consolidation of operational management responsibilities should come a consolidation of revenues and expenditures associated with the resource. In time, an Enterprise Account should be established for Sandy Neck to establish the economic sustainability of the resource. Achieving an increased level of financial independence will require a full investigation of revenue streams, including the full range of recreational, rental, commercial, and environmental opportunities that are discussed in this management plan, as well as research and other grant opportunities. Financial sustainability also will depend greatly upon an effective community outreach and marketing communications program, as discussed in Section 10.

12.0 IMPLEMENTATION PLAN

A number of recommendations are presented throughout this management plan, and are summarized in Table 12-1. Table 12-1 is intended as an implementation plan, in that recommendations are presented in the form of short- and long-term action items. Each action item has associated sub-tasks, such as consensus building, planning, engineering design, permitting, etc., which would be formulated and implemented by the project team (i.e., Town and external staff) on a case-by-case basis. The recommendations are intended to be implemented in a prioritized and phased manner. This way adequate information can be assembled on a project-by-project basis as part of the permitting process. Implemented projects can then be monitored as the basis for planning future projects in an adaptive management approach. Lessons learned and data gathered from previous projects should be applied to help plan, improve the design, and minimize environmental impacts associated with future projects.

Finally, because Sandy Neck proper does not represent the ACEC in entirety, management decisions should consider implications for the ACEC as a whole when feasible.

As such, the implementation plan provides the foundation upon which management objectives can be developed and achieved depending upon the dynamic nature of Sandy Neck. This management plan, therefore, is intended as a work-in-process to be updated by the Town and its team as part of an adaptive management process at Sandy Neck.

Table 12-1. Sandy Neck Management Plan Summary of Recommendations.

SANDY NECK MANAGEMENT PLAN

Summary of Recommendations

Management Component	Short-Term Recommendations	Long-Term Recommendations
ORV Use and Access	* Apply for Section 10 Permit to Trail 1 * Move access trail east * Improve escort system	* Expand Section 10 to Trail 2 * Create inland trail to Trail 2, 1st for essential vehicles, potentially for later public use depending upon monitoring data/impacts * Create corral parking areas * Create Nickerson Bypass * Implement limited Marsh Trail fortifications (Trails 2 and 5) * Implement connector trail from Marsh Trail east of Sugar Foot * Limit front beach use east of Trail 5 * Expand ORV access west of existing parking lot (emergency access benefit as well) * Adapt ORV access based upon needs of user groups
Pedestrian Access	* Investigate use of existing offsite parking facilities with shuttle service * Rehabilitate handicap access ramp * Enhance walking trails with ropes and signage	* Acquire and develop offsite parking * Expand local parking capacity
Boat Access	* No significant changes unless as a fallback to ORV access	* Consider more accessible docking facilities, slips, or temporary boat storage, although implementation not recommended at this time
Emergency Access	* Improve communication lines between departments	* Consider upgrade to Town boat resource, weighed against Coast Guard, Fire Department and commercial resources (e.g., Millway Marina) * Expand ORV access west of existing parking lot
Town-Owned Cottage Sites	* Address leases prior to expiration (renew as is or modify price/duration)	* Implement lease program that is consistent with long-term needs of Town, yet allowing flexibility for changing needs
Recreational Opportunities	* Expand beach use via Section 10, expanded parking, and more flexible ORV use * Investigate and implement shuttle service to expand access opportunities for beachgoers, as well as for access to other portions of Sandy Neck for recreational purposes, while not encouraging additional non-essential ORV traffic * Encourage other opportunities (e.g., fishing, kayaking, canoeing, sailing, sailboarding, natural history and dune tours, camping, etc.)	* Establish recreation and retail center either onsite or in Town * Adapt recreational opportunities based on needs of user groups
Archaeological & Cultural Resources	* Make priority to minimize impacts/loss associated with any management strategy/project * Consult with town and state historical commissions when planning projects, and notify authorities if resources are discovered	* Same as short-term
Natural Communities	* Apply for Section 10 to Trail 1 * Inventory and catalogue biodiversity resources, including monitoring program for baseline resources and new projects. * Actively use monitoring data to plan and improve future projects, based on the performance of previous projects * Establish technical advisory sub-committee of Sandy Neck Board, with main goal of planning/interpreting monitoring programs/data * Implement invasive species (e.g., *Phragmites*) removal strategies, in cooperation with Nature Conservancy * Investigate wildlife response plan, including fire response	* Expand Section 10 to Trail 2 * Establish more stringent natural resource management east of Trail 5 * Limit marsh trail access between Trails 1 and 2 * Adapt and expand wildlife conservation and management practices based upon dynamic characteristics of the natural resources, and as funding and staff resources become available * Ensure long-term overall protection of Sandy Neck natural resources in a manner consistent with governing regulations
Funding	* Implement short-term measures to raise revenues at Sandy Neck * Establish short- and long-term budgetary goals for Sandy Neck revenues and expenses	* Implement long-term measures to raise revenues at Sandy Neck * Attain a self-sufficient enterprise account status for Sandy Neck
Education	* Establish education sub-committee of Sandy Neck Board * Foster research partnerships * Rebuild field station	* Maintain long-term commitment to research * Keep updated Town library of research activities, data, and findings * Adapt natural resource management based upon research findings
Community Outreach	* Reinstitute ORV user education program * Distribute pamphlets for user groups * Establish a Sandy Neck web site * Distribute and respond to questionnaires * Develop an overall marketing communications package * Establish annual event	* Maintain long-term commitment to community outreach and marketing the Sandy Neck resource * Update materials and web site routinely * Adapt community outreach programs and management based upon community needs
Management	* Hire a Sandy Neck Park Manager * Consolidate all operational management responsibilities * Revitalize the Sandy Neck Advisory Board through a Stakeholder Involvement Program	* Administer an Enterprise Account for Sandy Neck * Adapt management structure as activities at Sandy Neck evolve

13.0 REFERENCES

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ATTACHMENT 1: SETTLEMENT AGREEMENT

SANDY NECK SETTLEMENT AGREEMENT
June 2, 2000
(including final technical corrections through July 5, 2000)

I. ESCORTS FOR ESSENTIAL VEHICLES AS RELATED TO COTTAGE OWNERS

A. Essential vehicles shall have access to and from the cottages on Sandy Neck as set forth below.

B. Regularly scheduled escorts will be provided between 8:00 and 5:00. For rides desired between 8:00 a.m. and 5:00 p.m. the person needing the ride calls to arrange for the service. If there are no calls, the escorts will not travel the pickup route.

C. For rides desired between 6:30 a.m. - 8:00 a.m. or between 5:00 p.m.- 8:00 p.m. the reservation must be made at least 24 hours in advance or by 5:00 p.m. the previous day, whichever is earlier.

D. Reservation requests will be confirmed based on the availability of escort providers.

E. The scheduled Escort Service will provide for at least four roundtrips per day under ordinary conditions, with a goal of five trips when staffing levels and tide and beach conditions allow.

F. The schedule and mechanics of the Escort System will be worked out by a committee including representatives of the Barnstable Department of Natural Resources, representatives of the Barnstable Recreation Department and representatives of cottage owners. This committee met on June 1 and is scheduled to meet again on June 15 and will continue to meet during this season, as needed, to make adjustments to this Escort System. It has been determined that flexibility and continued communication is a necessary component to make this system work.

G. To facilitate use of the Marsh Trail as an alternative access route, use of an escort to provide access between Trail 5 and Trail 6 on an as-needed basis will be investigated.

II. BUFFER ZONES AND SYMBOLIC FENCING

A. The location of the symbolic fencing as of May 22, 2000 is expected to remain, as is, until plover and tern fledging. After plover and tern fledging this year, the fencing may be adjusted to facilitate vehicle access and parking as long as significant shorebird roosting habitat is maintained.

B. The current fencing is generally based on the following process and considerations:

- The beach manager makes the final determination on the location of symbolic fencing in a manner that adequately protects habitat for rare species, with the Division of Fisheries and Wildlife making the final decision in instances when questions or disputes arise as to where fencing should be placed in order to meet performance standards under the Wetlands Protection Act.

- There shall be a minimum 15' buffer from the toe of all dunes along the front beach.

III. TRAIL 5 TO 6

A. On an experiment basis during the 2000 season, a section of the eastern-most portion of the upper beach, immediately west of where Trail 6 enters the beachfront will be used for an access trail. Several hundred feet west of Trail 6, the access trail would turn and run diagonally out to the outer (lower) portion of the beach. This access trail is only for essential vehicles. Symbolic fencing will be placed on both sides of the trail. The trail will be a minimum of 15' - 20' from the toe of the dune.

B. When no unfledged plovers are present, cottage owners and lessees may drive unescorted with a passenger walking in front of the vehicle before 8:00 a.m.

IV. MARSH TRAIL

A. Essential vehicle users and special use vehicle permit users which may use the Marsh Trail during terrapin nesting activity (normally June/July) shall first check with the Gatehouse for information about terrapin activity. Those using the Marsh Trail also will report their observations about terrapin activity to staff at the Gatehouse. During terrapin hatching activity (normally October) use of the Marsh Trail will be limited to essential vehicles requiring direct access to marsh camp properties and

special use permit holders. Natural Resource staff shall assign routes. Terrapin crossing signs will be posted.

B. When unfledged plover or tern chicks are present, guests of cottage owners may use the Marsh Trail. Use is limited to one guest vehicle roundtrip per cottage per week.

V. SECTION 10 PROVISIONS [1]

Note: Should the Section 10 provisions proposed by the Massachusetts Division of Fisheries and Wildlife be permitted by the US Fish and Wildlife Service, only the 600 yard provision would apply automatically at Sandy Neck. All others would have to be approved by the Massachusetts Division of Fisheries and Wildlife. Note that many of the provisions have eligibility, monitoring and reporting provisions not described in this agreement. Readers should consult the Division of Fisheries and Wildlife Piping Plover Conservation Plan for these details.

A. "Take" in the First 600 Yards of the Beach Trail
Incidental take of piping plover chicks or adults by unescorted essential or recreational vehicles is permitted in the section of beach between the westernmost vehicle access point and Trail One (approximately 600 yards).

B. Moving Eggs
Piping plover eggs may be moved up to 20 yards farther from pedestrian or vehicle access points or trails if such action will facilitate continued access by pedestrians or vehicles while also reducing disturbance to incubating adults or newly hatched chicks. Eggs in a given nest may be moved only twice in any 24-hour period, no more than 2 yards per move and no more than 20 yards total. Only one nest may be moved at Sandy Neck per year.

C. Reduce the Symbolic Fencing Distance From a Nest
The symbolically fenced buffer area around a plover nest may be reduced below the minimum radius of 50 yards to increase pedestrian and vehicle access but must threaten the eggs or chicks with direct mortality. The fence buffer may be reduced at no more than one nest at Sandy Neck per year.

D. Escorting Recreational Vehicle Caravans Through Nesting Area
Recreational vehicles may be escorted in discreet caravans through one section of Sandy Neck where unfledged plover chicks are present when that section of beach would otherwise be closed to vehicle access due to

[1] These are management provisions, some of which might have been applied at Sandy Neck, that were proposed in an April 2000 application from the Massachusetts Division of Fisheries and Wildlife (MassWildlife) to the U.S. Fish and Wildlife Service for a state-wide Section 10 permit to allow limited "take" of Piping Plovers at sites in Massachusetts that had met a number of conditions. This permit was never granted to MassWildlife, and we do not plan to seek another comprehensive, state-wide permit in the near future. However, we are willing to work with individual landowners, including the Town of Barnstable, that may wish to apply for site-specific Section 10 permits and state Conservation Permits (pursuant to the Massachusetts Endangered Species Act) to allow limited take of Piping Plovers under strictly controlled conditions.

the presence of the plovers. Such caravans will not be allowed before July 15, may only pass through one 200-yard section and are limited to 4 one-way traverses per day.

E. Night Driving For Essential Vehicles

Incidental take of plover chicks or adults may occur as a result of driving after dark where unfledged chicks are present and when caused by law enforcement, public safety or Sandy Neck essential vehicles. Not more than one vehicle may pass to and from any given property after dark during any 24-hour period. A person shall walk in front of the vehicle when the vehicle is within 200 yards of unfledged plover chicks.

- Night driving will be reviewed by the Conservation Commission if two plovers are run over by vehicles driving pursuant to this provision.

VI. DEFINITION OF ESSENTIAL VEHICLES AS IT RELATES TO COTTAGE OWNERS

Essential vehicles are those operated by cottage owners, spouses and immediate family of cottage owners, lessees of cottage owners and contractors providing necessary repairs for cottage owners.

VII. LONG RANGE COMPREHENSIVE NATURAL RESOURCE MANAGEMENT PLAN

A Long-Range Comprehensive Natural Resource Management Plan (hereinafter "Management Plan" or "the Plan") shall be developed for Sandy Neck.

- The parties to this mediated settlement pledge to cooperate with the Town of Barnstable in developing the Management Plan and hope that that this Long-Range Management Planning Process will be completed by April 1, 2001.

- The parties to this mediated settlement accept the direction of the Town's memo of June 2, 2000 as it addresses the Long-Range Management Planning Process. The memo states:

  The Town commits to funding and staffing the Management Planning process. The Management Plan will be created by Town officials and employees with careful attention to the thoughts of all other groups. The Management Plan will cost no more than $75,000 and the Town will seek to appropriate funds accordingly in compliance with the Plan's timetable.

  The Town will develop a Long-Range Comprehensive Town of Barnstable Sandy Neck Management Plan. The primary objective of the Management Plan is to maximize the enjoyment of Sandy Neck for all users consistent with the conservation of all Sandy Neck resources. The Plan will deal with the following subject matter areas:

  I. Natural and historic resources of Sandy Neck;
  II. Sharing the wealth: multiple use of Sandy Neck;
  III. Existing regulations governing uses/protecting natural resources in Sandy Neck;
  IV. Conflicts between uses and resource protection goals on Sandy Neck;
  V. Recommendations for continued use of Sandy Neck consistent with resource protection goals.

  The Town Manger of the Town of Barnstable, subject to the overall control of the Barnstable Town Council, has legal responsibility to make the final determinations about the content of the Town of Barnstable Sandy Neck Management Plan. Town staff will provide a staff function in the development of the Plan. Staff will include those officers and employees and agencies determined to be appropriate to the task by the Town Manager. The following organizations are identified as sources of input for the development of the Plan:

  1. Sandy Neck Property Owner Representatives Including Cottage Owners and The Nature Conservancy

2. Massachusetts Audubon Society
3. Sandy Neck Recreational User Representative - Massachusetts Beach Buggy Association
4. Sandy Neck Non-Motorized Recreational User Representative
5. Town of Sandwich Representatives
6. Cape Cod Commission
7. Massachusetts Coastal Zone Management Office
8. Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program
9. Massachusetts Department of Environmental Management, Area of Critical Concern Program
10. Massachusetts Department of Environmental Protection
11. Massachusetts Historical Commission
12. US Fish and Wildlife Service

VIII. IMPLEMENTATION AND CONSTRUCTION OF THIS AGREEMENT

A. The parties to this agreement will not oppose implementation of its terms. To the extent feasible, the parties will work together and individually to support implementation and to encourage others to support implementation.

B. The request for a Superseding Order of Conditions will be resolved with the following steps:
   1. Withdraw the proposed Notice of Intent.
   2. Amend the current Order of Conditions by incorporating this settlement agreement.
   3. Should there be any conflict between the current Order of Conditions and this agreement, this agreement shall control.

C. The Superior Court ordinance appeal will be resolved with the following steps:
   1. The Town and the appellant/cottage owners will jointly apply for a stay of the appeal.
   2. The appeal will be withdrawn when a long-term agreement has been reached between the Town and the property owners regarding access and rights of way.

D. The essential vehicle and Management Planning provisions are material to this agreement. If there are significant problems in implementing this agreement, the parties will first attempt to resolve the problems by meeting forthwith for direct, face-to-face discussions before exercising their other legal options including seeking relief from the stay.

SETTLEMENT AGREEMENT SIGNATURE PAGE

(Note: A photocopy of the page with the actual signatures is available from mediator Gregory Sobel, or from the Massachusetts Office of Dispute Resolution)

[Name and Organization of Signator]	[Date]
David Curly, Barnstable Recreation Department	6/2/00
Doug Kalweit, Barnstable Natural Resource Department	6/2/00
Don Fillman, Massachusetts Beach Buggy Association	6/2/00
Nason King, Sandy Neck Board	6/2/00
John Alger, plaintiff	6/2/00
(Mr. Alger's note on the signature page says "contingent upon unanimous approval and approval of other petitioners")	
Douglas Moquin, Representative For Sandy Neck Colony Association and Sandy Neck Property Owners	6/2/00
Jack Lyons, Home Owner on Sandy Neck	6/2/00
Robert Smith, Barnstable Town Attorney	6/2/00
Anthony Troiano, Barnstable Senior Natural Resource Officer	6/2/00
Tom Geiler, Barnstable HSES	6/2/00
Robert Gatewood, Barnstable Conservation Division	6/2/00
Robert Lancaster, Barnstable Conservation Commission	6/2/00
Scott M. Melvin, Massachusetts Division of Fisheries and Wildlife	6/2/00
Daniel Gilmore, Massachusetts Department of Environmental Protection	6/2/00
Rebecca Haney, Massachusetts Coastal Zone Management	6/2/00
Stephen McKenna, Massachusetts Coastal Zone Management	6/2/00

ATTACHMENT 2: ORDER OF CONDITIONS

ATTACHMENT 3: BIBLIOGRAPHY

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ATTACHMENT 4: APPENDIX B OF THE 1995 MANAGEMENT PLAN

ATTACHMENT 5: COMMENTS ON DRAFT PLAN

ATTACHMENT 6: LISTED SPECIES FACT SHEETS